

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

**FACTUAL REPORT
VOL. 2 LABORATORY TEST RESULTS - II**

Job No. : SG/1281/2018

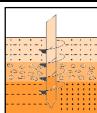
Client : **WESTPORTS MALAYSIA SDN. BHD.**
P.O. Box 266,
Pulau Indah,
42009 Port Klang, Selangor.
Tel : 03 3169 4000

Consultant : **HSS INTEGRATED SDN. BHD.**
Wisma HSS Integrated Sdn Bhd
B1 (1-4), Block B, Plaza Dwitasik,
No. 21, Jalan 5/106, Bandar Sri Permaisuri,
56000 Kuala Lumpur.
Tel : 03 9173 0355

Main Contract : **STRATA GEOTECHNICS SDN.BHD.**
No:22 Jalan P4/8,Seksyen 4,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor Darul Ehsan
Tel : 03 8724 2829, 03 8724 2830 Fax : 03 8724 2824

Date Prepared : 28th February 2019

Serial No.	Inv. No	Master Copy	Distribution	Issued Date	Prepared by:	Checked by:
-	-	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

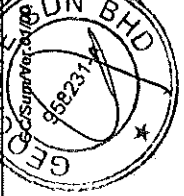
SUMMARY OF TEST RESULTS

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 : 17.12.18																						
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 TEST		CU 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)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)								
BH21	UD1	3.00	58	1.51	0.91	73	30	43	13.5	52	40	8	0	2.58				12.55	0				22	0.422	1.7	0.13	0.60	7.5							
	UD6	18.00	55	1.53	1.03	81	29	52	14.4	62	37	1	0	2.58				36.02	0																
	UD7	21.00	55	1.50	0.97					60	38	2	0																						
	UD11	33.00	44	1.49	0.88	55	23	32	11.5	43	34	23	0	2.64				45.95	0				52	0.551	2.0	0.12	0.64	7.8							
	D13	36.00	73	NA	NA					54	43	3	0																						
	D15	39.00	21	NA	NA						11	89	0																						
	D17	42.00	41	NA	NA					19	13	68	0																						
	D18	43.50	24	1.98	1.63					21	78	1	0	2.70											0.6	<0.01	0.27	7.6							
	D20	46.50	22	NA	NA					13	87	0																							
	D22	49.50	13	1.99	1.70					19	81	0														0.7	<0.01	0.36	7.5						
	D29	60.00	17	NA	NA					13	87	0																							
																								NES = NOT ENOUGH SAMPLE				NP = NON PLASTIC				NA = NOT APPLICABLE			

Note : 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

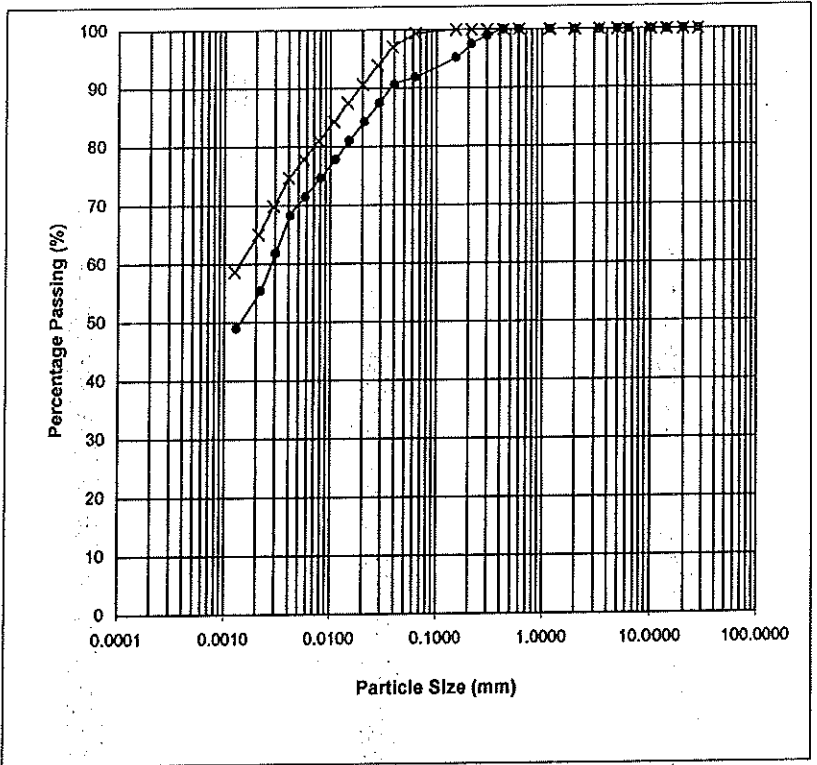
PARTICLE SIZE DISTRIBUTION

(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, FULAU INDAH, SELANGOR

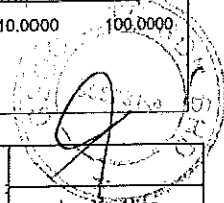
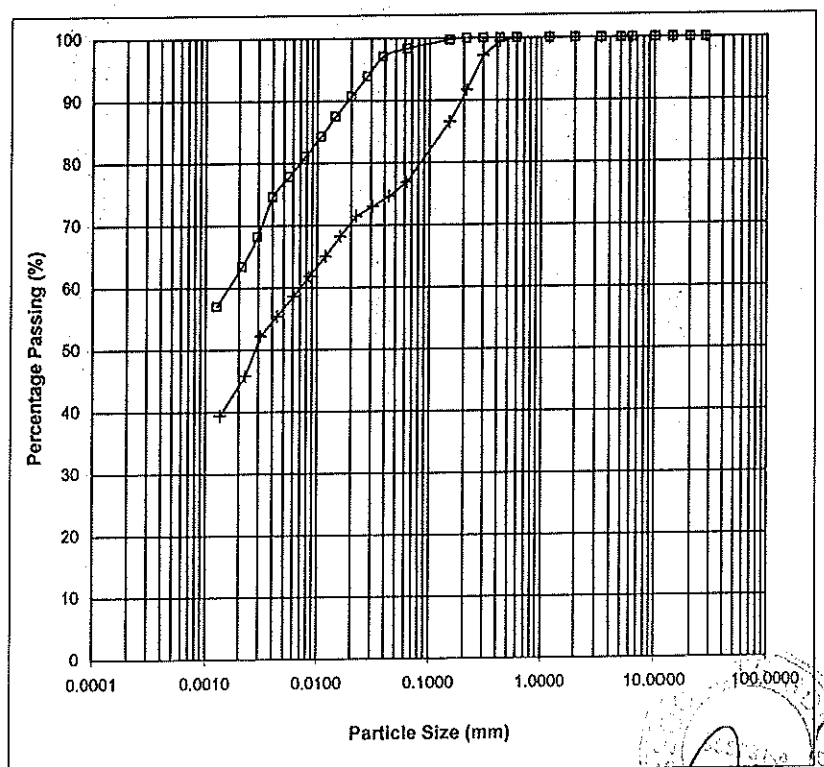
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	99	0.300	100	
0.212	98	0.212	100	
0.150	95	0.150	100	
0.063	92	0.063	99	
0.0401	91	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	62	0.0029	70	
0.0022	55	0.0021	65	
0.0013	49	0.0012	59	
Clay (%)		52	Clay (%)	62
Silt (%)		40	Silt (%)	37
Sand (%)		8	Sand (%)	1
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH21	UD1	3.00	11.12.18
X	BH21	UD6	18.00	11.12.18



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	97	
0.212	100	0.212	92	
0.150	100	0.150	87	
0.063	98	0.063	77	
0.0384	97	0.0438	75	
0.0278	94	0.0312	73	
0.0200	91	0.0223	71	
0.0144	87	0.0160	68	
0.0107	84	0.0119	65	
0.0077	81	0.0085	62	
0.0056	78	0.0061	59	
0.0040	75	0.0044	55	
0.0029	68	0.0031	52	
0.0021	63	0.0023	46	
0.0013	57	0.0013	39	
Clay (%)		60	Clay (%)	43
Silt (%)		38	Silt (%)	34
Sand (%)		2	Sand (%)	23
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH21	UD7	21.00	11.12.18
+	BH21	UD11	33.00	11.12.18



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

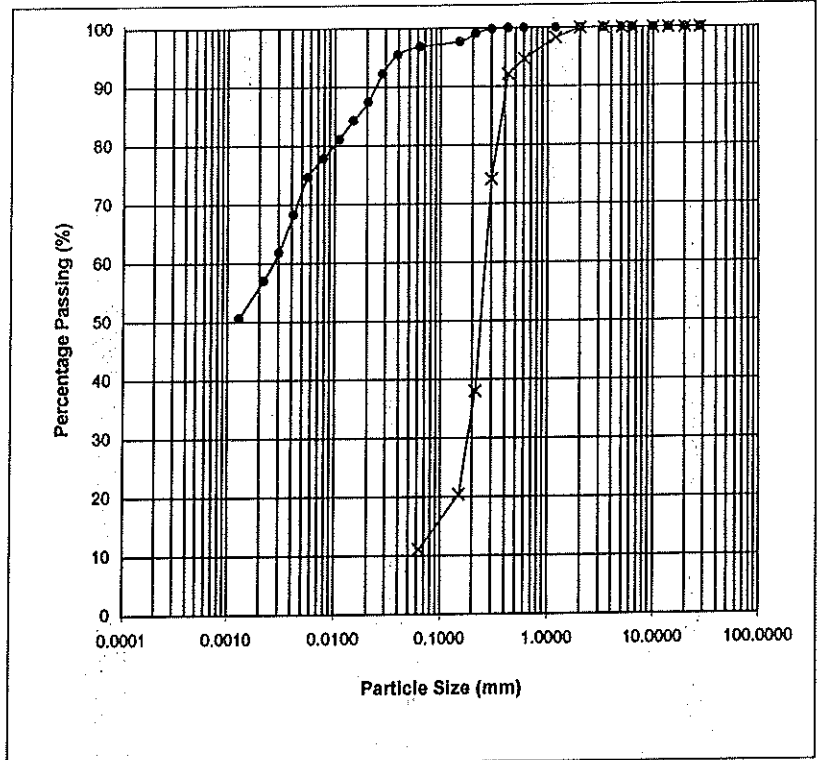
PARTICLE SIZE DISTRIBUTION

(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

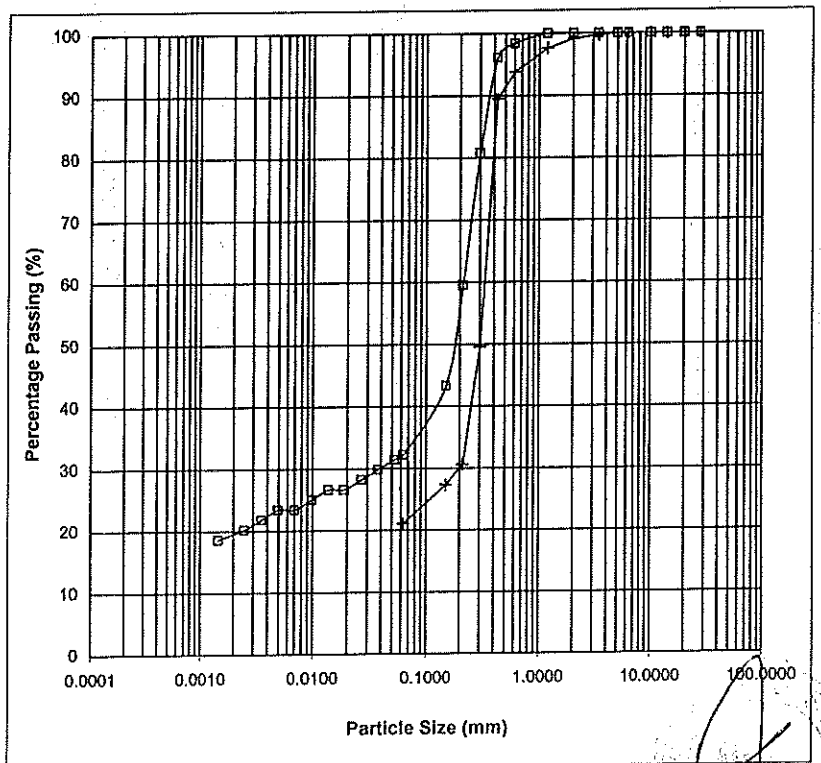
Particle Size Distribution			
●		x	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	98
0.600	100	0.600	95
0.425	100	0.425	92
0.300	100	0.300	74
0.212	99	0.212	38
0.150	98	0.150	20
0.063	97	0.063	11
0.0389	96		
0.0280	92		
0.0204	87		
0.0147	84		
0.0109	81		
0.0079	78		
0.0057	75		
0.0041	68		
0.0030	62		
0.0022	57		
0.0013	51		
Clay (%)	54	Clay (%)	11
Silt (%)	43	Silt (%)	
Sand (%)	3	Sand (%)	89
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH21	D13	36.00	11.12.18
x	BH21	D15	39.00	11.12.18



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	99
1.18	100	1.18	98
0.600	98	0.600	94
0.425	96	0.425	89
0.300	81	0.300	50
0.212	60	0.212	31
0.150	43	0.150	27
0.063	32	0.063	21
0.0527	31		
0.0375	30		
0.0266	28		
0.0189	27		
0.0138	27		
0.0098	25		
0.0070	23		
0.0049	23		
0.0035	22		
0.0025	20		
0.0015	19		
Clay (%)	19	Clay (%)	21
Silt (%)	13	Silt (%)	
Sand (%)	68	Sand (%)	78
Gravel (%)	0	Gravel (%)	1
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH21	D17	42.00	11.12.18
+	BH21	D18	43.50	11.12.18



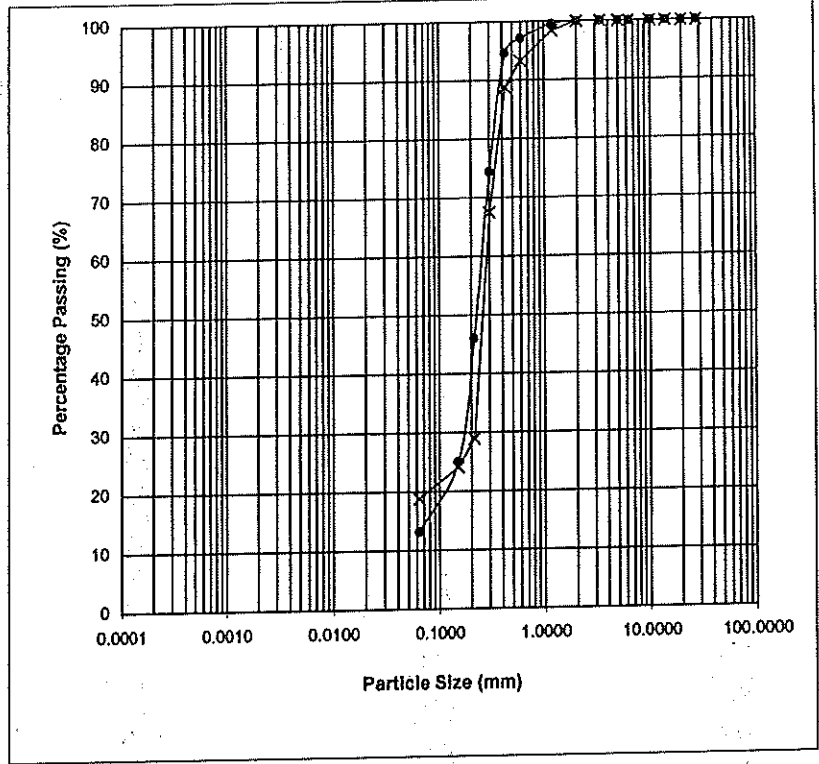
PARTICLE SIZE DISTRIBUTION

(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

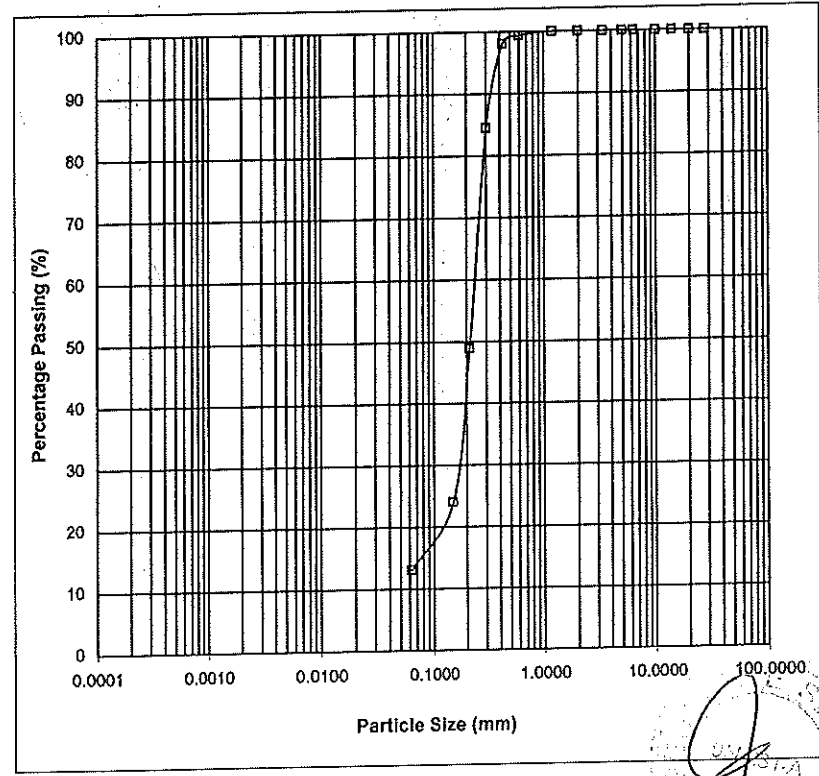
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	98
0.600	97	0.600	93
0.425	95	0.425	89
0.300	74	0.300	67
0.212	46	0.212	29
0.150	26	0.150	24
0.063	13	0.063	19
Clay (%)	13	Clay (%)	19
Silt (%)		Silt (%)	
Sand (%)	87	Sand (%)	81
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH21	D20	46.50	11.12.18
X	BH21	D22	49.50	11.12.18

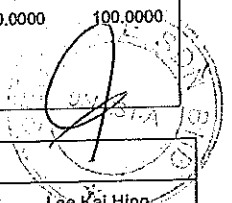


Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100		
20.00	100		
14.00	100		
10.00	100		
6.30	100		
5.00	100		
3.35	100		
2.00	100		
1.18	100		
0.600	99		
0.425	98		
0.300	84		
0.212	49		
0.150	24		
0.063	13		
Clay (%)	13		
Silt (%)			
Sand (%)	87		
Gravel (%)	0		
Total (%)	100		

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH21	D29	60.00	11.12.18
+				



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



Total Stress Triaxial Compression

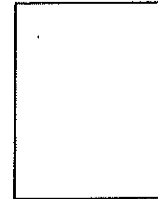
Unconsolidated Undrained

Sample details

Depth : 3.00m
Description : 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)	140.90	141.89	143.71
Bulk Density ρ (Mg/m ³)	1.636	1.647	1.668
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample

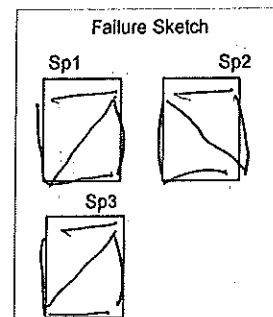


Initial Conditions

	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 %	42	40	37
Dry Density ρ_{d0} (Mg/m ³)	1.16	1.18	1.22
Voids Ratio e_0	1.23	1.19	1.11
Deg of Saturation S_0 %	86.93	86.58	84.92

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	14.26	28.34	32.71
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	14.06	28.14	32.51
Strain at Failure ϵ_f %	5.00	8.03	10.00
Shear Strength c_u (kPa)	7.13	14.17	16.35
Moisture Content w_f %	42	40	37
Dry Density ρ_{df} (Mg/m ³)	1.16	1.18	1.22
Voids Ratio e_f	1.23	1.19	1.11
Deg of Saturation S_f %	86.93	86.58	84.92



Notes : Shear Shear Shear

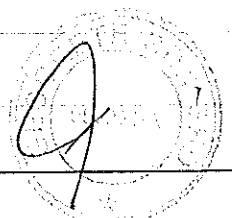
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 07.12.18

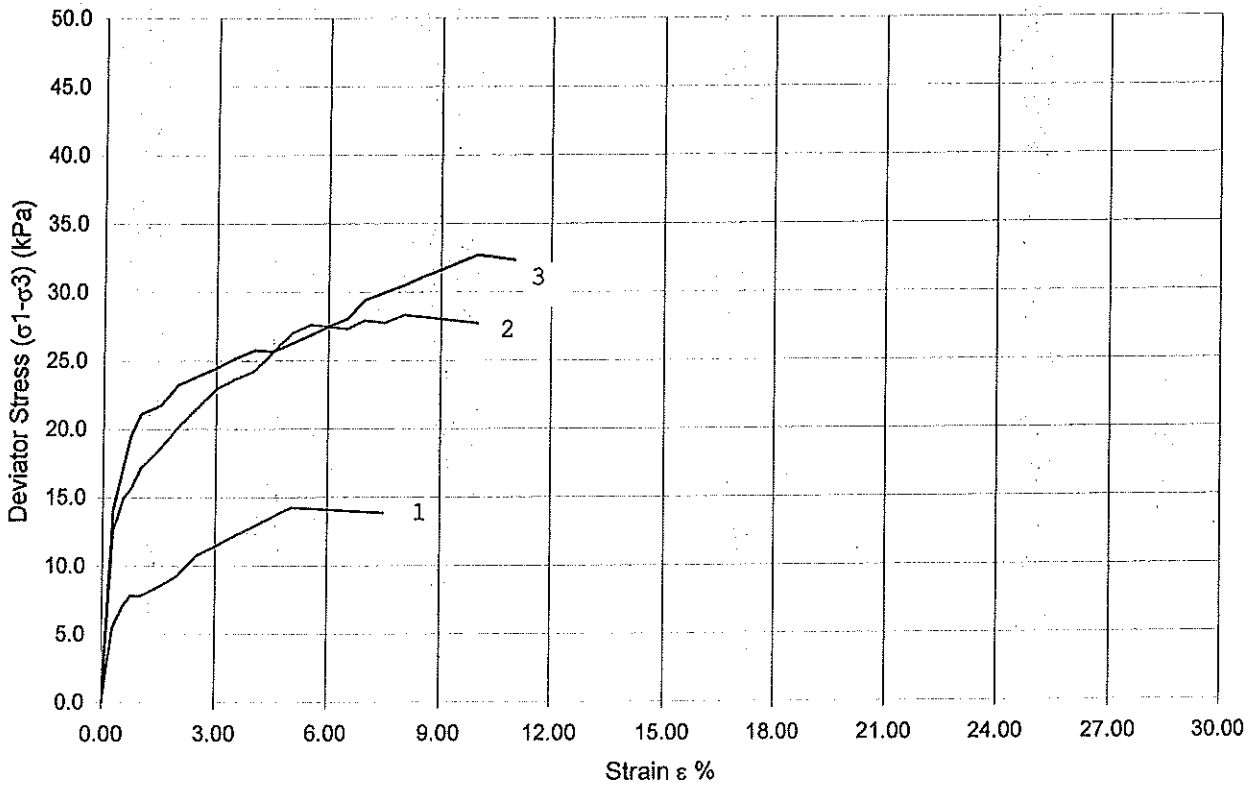
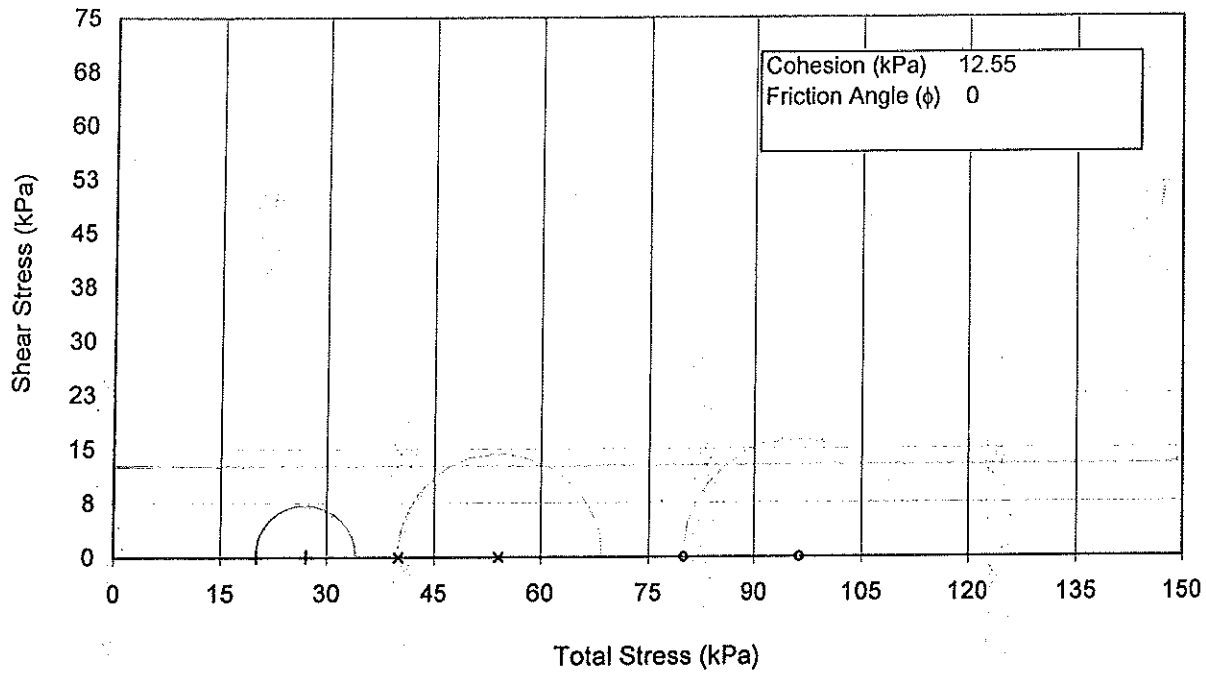
Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Sample : UD1
Borehole : BH21
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

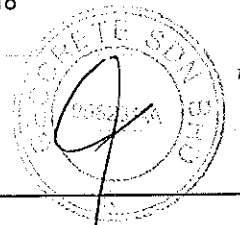
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 07.12.18

Sample : UD1
Borehole : BH21

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

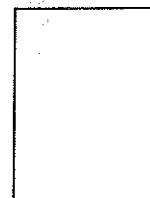
Unconsolidated Undrained

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)	130.92	132.16	134.22
Bulk Density ρ (Mg/m ³)	1.520	1.534	1.558
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample

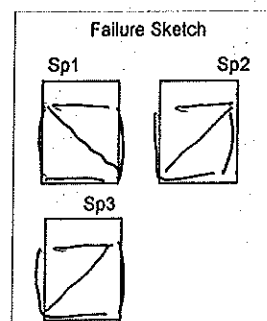


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	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	14391	14391	14391
Moisture Content w_0 %	50	49	46
Dry Density ρ_{d0} (Mg/m ³)	1.02	1.03	1.07
Voids Ratio e_0	1.54	1.50	1.41
Deg of Saturation S_0 %	83.09	83.75	83.33

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	67.42	70.90	77.77
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	67.22	70.70	77.57
Strain at Failure ϵ_f %	3.03	6.51	3.49
Shear Strength c_u (kPa)	33.71	35.45	38.89
Moisture Content w_f %	50	49	46
Dry Density ρ_{df} (Mg/m ³)	1.02	1.03	1.07
Voids Ratio e_f	1.54	1.50	1.41
Deg of Saturation S_f %	83.09	83.75	83.33



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

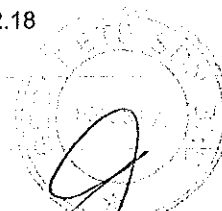
Date of Test :

07.12.18

Sample : UD6

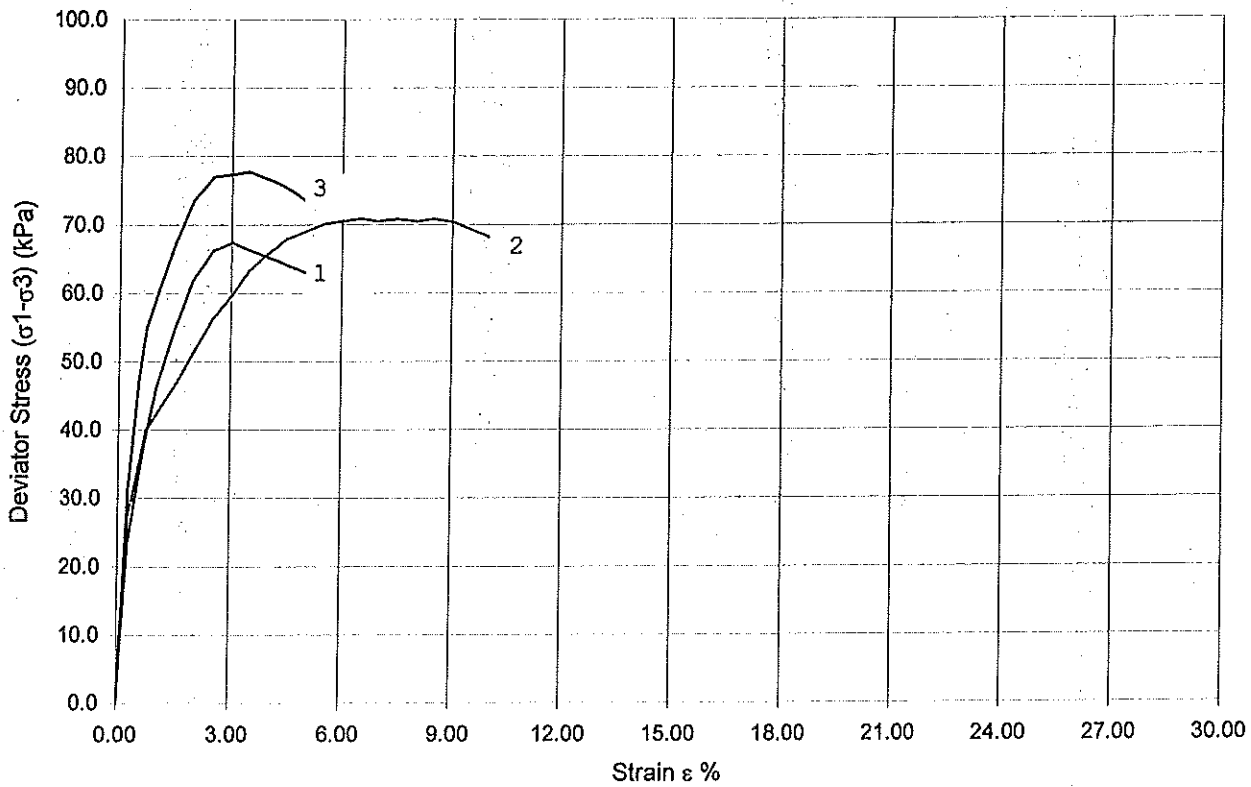
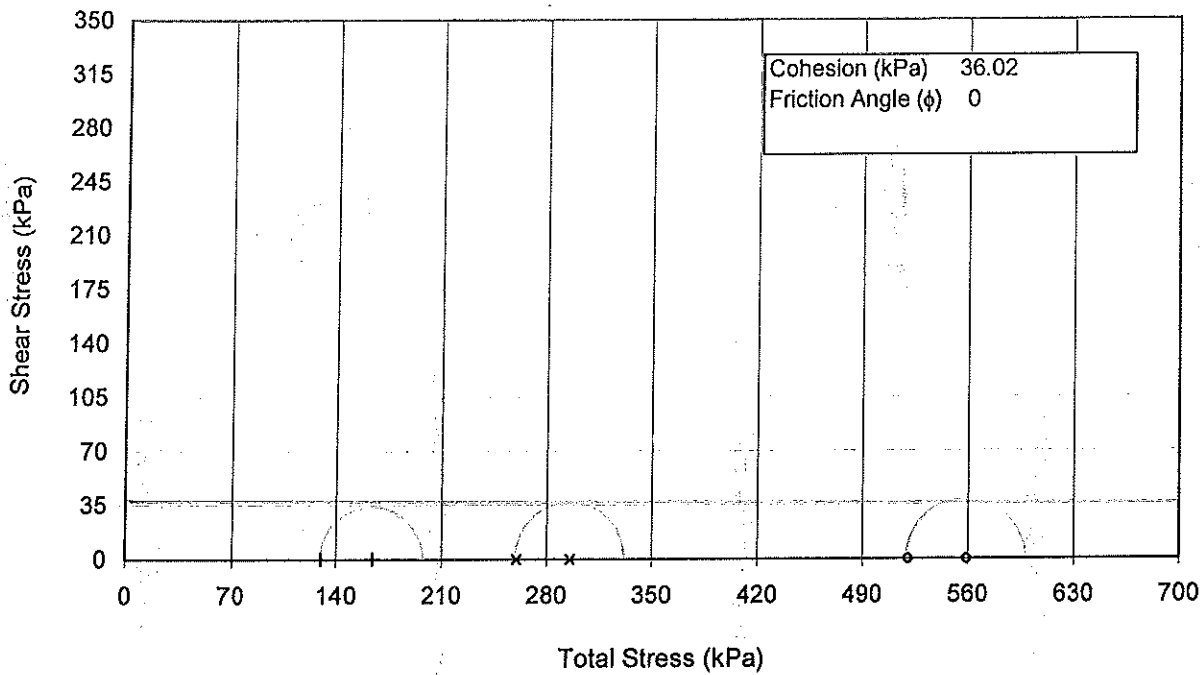
Borehole : BH21

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

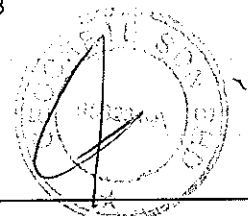
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 07.12.18

Sample : UD6
 Borehole : BH21

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

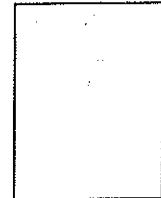
Unconsolidated Undrained

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)	140.88	141.50	143.02
Bulk Density ρ (Mg/m ³)	1.635	1.643	1.660
Particle Density ρ_s	2.64	2.64	2.64

Sketch showing specimen location in original sample



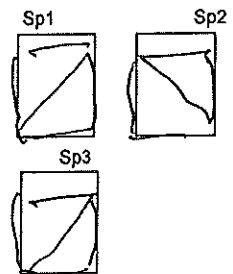
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	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	44	42
Dry Density ρ_{d0} (Mg/m ³)	1.13	1.14	1.17
Voids Ratio e_0	1.35	1.31	1.26
Deg of Saturation S_0 %	88.86	88.36	88.25

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	67.15	96.88	111.69
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	66.95	96.68	111.49
Strain at Failure ϵ_f %	8.49	10.53	10.53
Shear Strength c_u (kPa)	33.58	48.44	55.84
Moisture Content w_f %	45	44	42
Dry Density ρ_{df} (Mg/m ³)	1.13	1.14	1.17
Voids Ratio e_f	1.35	1.31	1.26
Deg of Saturation S_f %	88.86	88.36	88.25

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 : 08.12.18

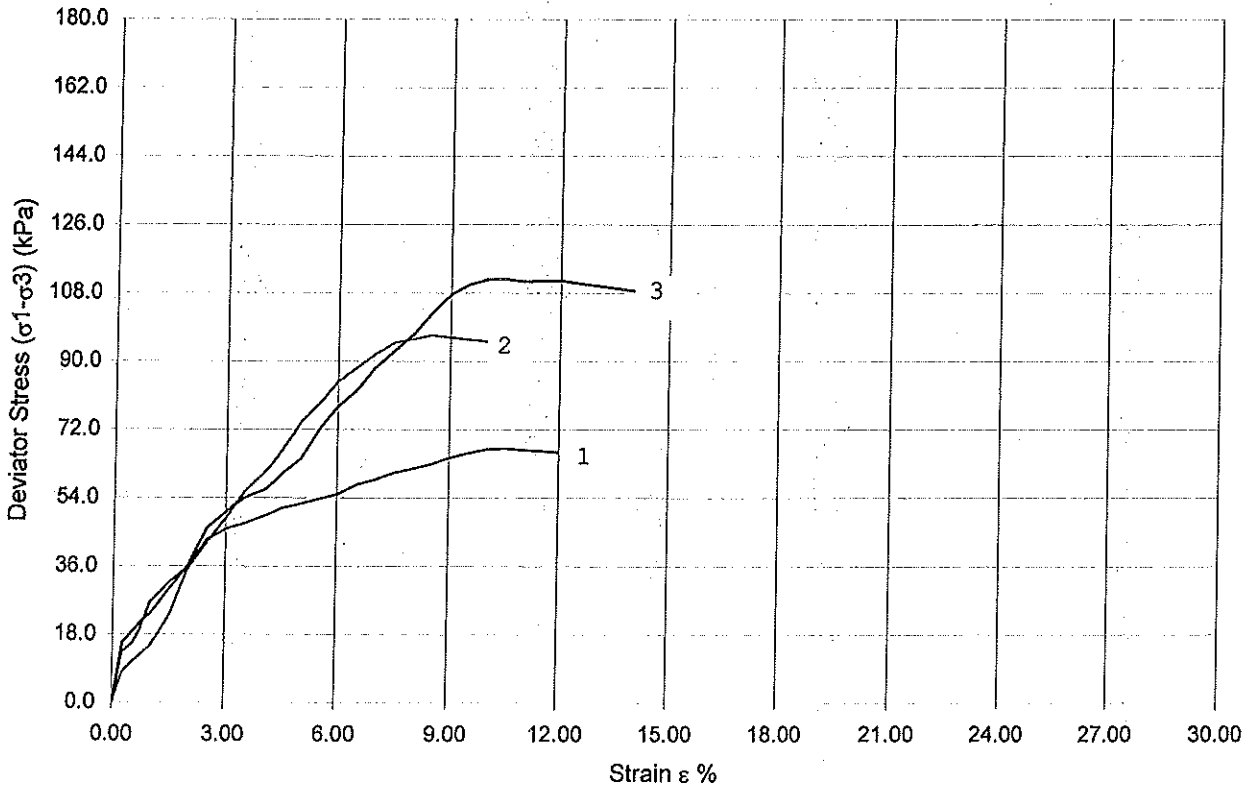
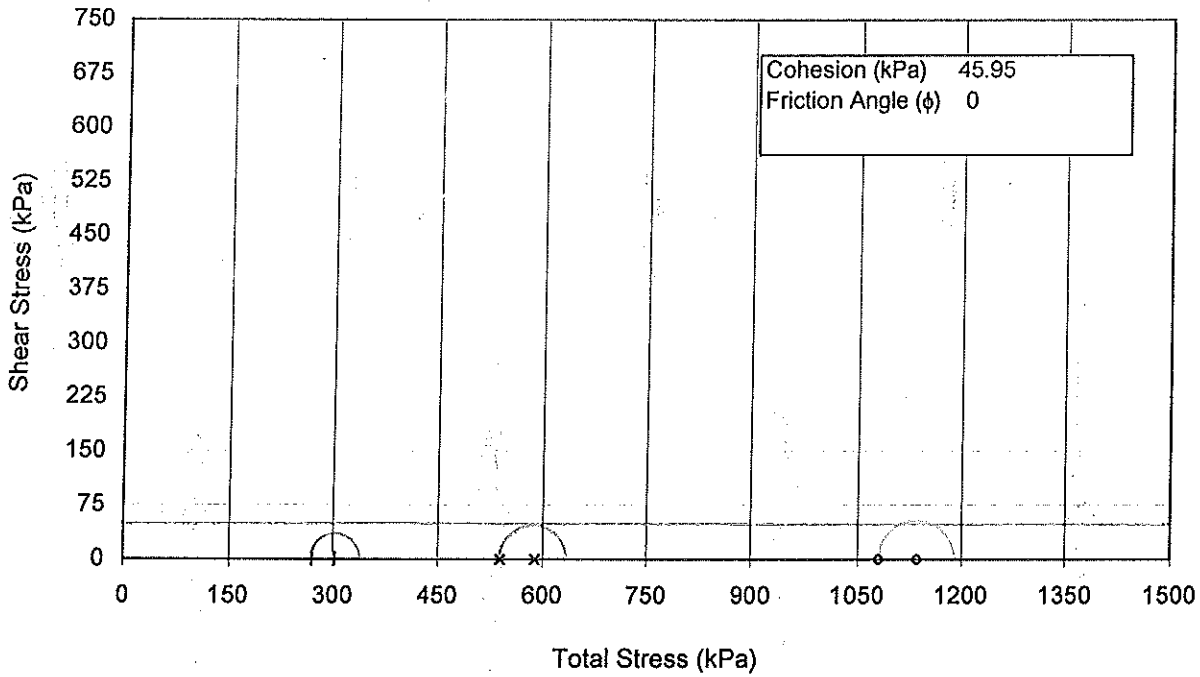
Sample : UD11

Borehole : BH21

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 : 08.12.18

Sample : UD11
 Borehole : BH21

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	16.12.18
Sample No.	BH21 / UD1 / 3.00m	Test Started	06.12.18
Soil Description	Dark grey CALY	Ring No.	A3

BEFORE TEST

Moist. Content from trimmings:	=	67 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	120.32 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.09 gm	Area (A)	=	1964 mm ²
Wt of sample	=	59.23 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	35.92 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	23.31 gm	Bulk Density (P)	=	1.508 Mg/m ³
Initial Moisture Content, M _o	=	65 %	Dry Density (PD)	=	0.914 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.8217			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	92 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1411 mm ⁻¹			
Height of Solid H _s	=	7.088 mm			

AFTER TEST

Wt of sample + Ring	=	116.74 gm	Overall settlement	=	2.480 mm
Wt of Dry sample + Ring	=	97.01 gm	Volume Change	=	4.871 cm ³
Wt of Ring	=	61.09 gm	Final Volume	=	34.41 cm ³
Wt of Wet sample	=	55.65 gm	Final Bulk Density	=	1.617 Mg/m ³
Wt of Dry sample	=	35.92 gm	Final Dry Density	=	1.044 Mg/m ³
Wt of Moisture	=	19.73 gm	Final Void Ratio, e _f	=	1.4719
Final Moisture Content, M _f	=	55 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	96 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



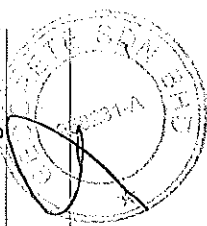
ONE DIMENSIONAL CONSOLIDATION TEST

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	16.12.18
Sample No	BH21 / UD1 / 3.00m	Test started	06.12.18
		Ring No.	A3

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	1.8217	0.0000	0				
6.25	0.524	0.0739	1.7478	0.0739	6.25	4.3081	2.56	16.89	-0.2456
12.5	0.730	0.1030	1.7188	0.0291	6.25	1.7117	4.00	10.41	-0.0966
25.0	1.128	0.1591	1.6626	0.0562	12.5	1.6884	1.69	23.89	-0.1866
50.0	1.876	0.2647	1.5571	0.1055	25.0	1.6521	2.56	14.84	-0.3506
100	2.776	0.3917	1.4301	0.1270	50.0	1.0459	1.44	24.08	-0.4219
50	2.668	0.3764	1.4453	-0.0152	-50.0				
25	2.576	0.3634	1.4583	-0.0130	-25.0				
12.5	2.480	0.3499	1.4719	-0.0135	-12.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



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

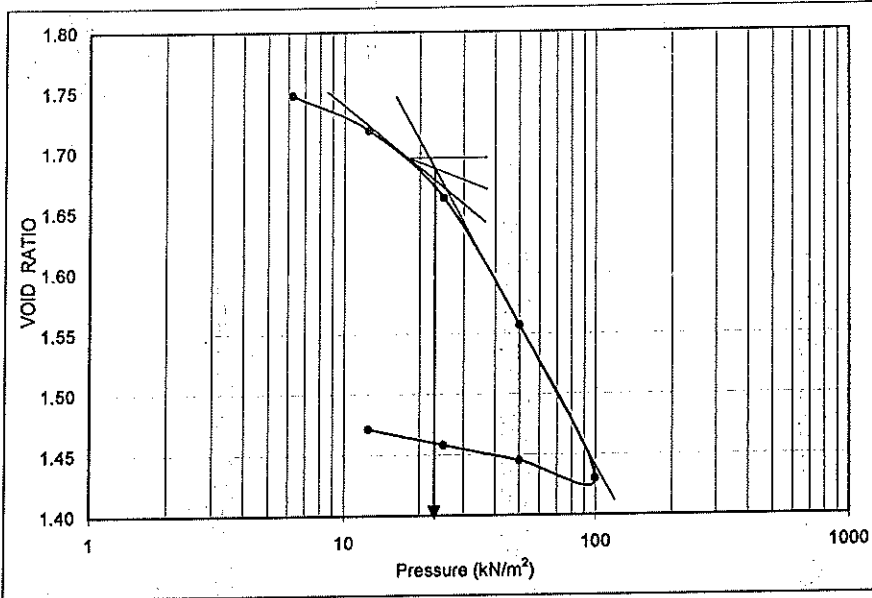
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH21 / UD1 / 3.00m

SOIL SAMPLE Dark grey CALY

Date of Report 16.12.18
Test started 06.12.18
Ring No. A3



INITIAL

Water content 65 %

Dry Density 0.91 Mg/m³

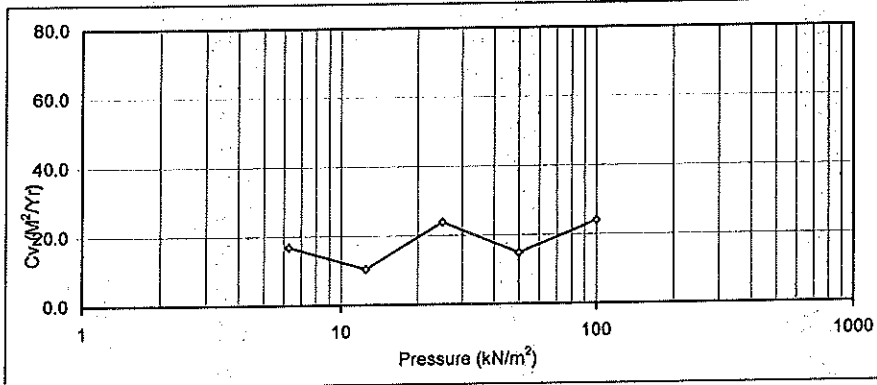
Void Ratio 1.8217

Saturation 92 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.580



FINAL

Water content 55 %

Dry Density 1.04 Mg/m³

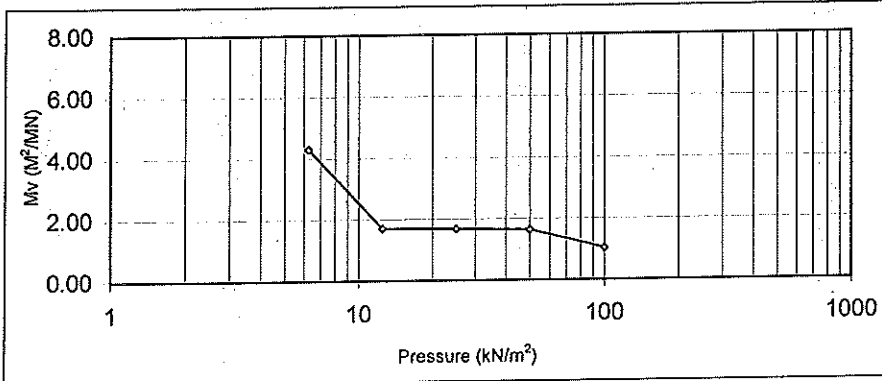
Void Ratio 1.4719

Saturation 96 %

Height 18 mm

Comp. Index, C_c 0.4219

Precons. Load 22 kN/m²



Comp. Ratio, C_R 0.150

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	16.12.18
Sample No.	BH21 / UD11 / 33.00m	Test Started	06.12.18
Soil Description	Dark grey CLAY	Ring No.	A4

BEFORE TEST

Moist. Content from trimmings:	=	72 %	SG (Measured)	=	2.640
Wt of sample + Ring	=	120.05 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.46 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.59 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	34.38 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	24.21 gm	Bulk Density (P)	=	1.491 Mg/m ³
Initial Moisture Content, M_o	=	70 %	Dry Density (PD)	=	0.875 Mg/m ³
Initial Void Ratio, e_o , $\frac{SG}{P_D} - 1$	=	2.0167			
Initial Saturation, S_o ; $\frac{M_o \times SG}{e_o}$	=	92 %			
V. Ratio Change Factor F_v , $\frac{1+e_o}{H}$	=	0.1508 mm ⁻¹			
Height of Solid H_s	=	6.630 mm			

AFTER TEST

Wt of sample + Ring	=	117.18 gm	Overall settlement	=	2.302 mm
Wt of Dry sample + Ring	=	95.84 gm	Volume Change	=	4.522 cm ³
Wt of Ring	=	61.46 gm	Final Volume	=	34.76 cm ³
Wt of Wet sample	=	55.72 gm	Final Bulk Density	=	1.603 Mg/m ³
Wt of Dry sample	=	34.38 gm	Final Dry Density	=	0.989 Mg/m ³
Wt of Moisture	=	21.34 gm	Final Void Ratio, e_f	=	1.6695
Final Moisture Content, M_f	=	62 %			
Final Saturation, S_o , $\frac{M_f \times SG}{e_f}$	=	98 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



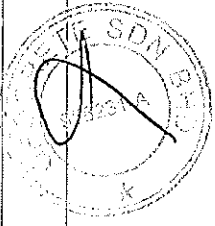
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	16.12.18
Sample No	BH21 / UD11 / 33.00m	Test started	06.12.18
		Ring No.	A4

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)	$\Delta_e = F \times \Delta H$	$e=e_0 - e_1$	de	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	2.0167	0.0000	0				
12.5	19.808	0.192	0.0290	1.9877	0.0290	12.5	0.7760	2.89	15.22	-0.0962
25.0	19.536	0.464	0.0700	1.9467	0.0410	12.5	1.1147	4.00	10.74	-0.1363
50.0	18.982	1.018	0.1536	1.8632	0.0836	25.0	1.1683	4.00	10.29	-0.2776
100	18.180	1.820	0.2745	1.7422	0.1210	50.0	0.8830	7.84	4.89	-0.4019
200	17.080	2.920	0.4404	1.5763	0.1659	99.9	0.6445	6.76	5.10	-0.5512
100	17.214	2.786	0.4202	1.5965	-0.0202	-99.9				
50	17.478	2.522	0.3804	1.6363	-0.0398	-50.0				
12.5	17.698	2.302	0.3472	1.6695	-0.0332	-37.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



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

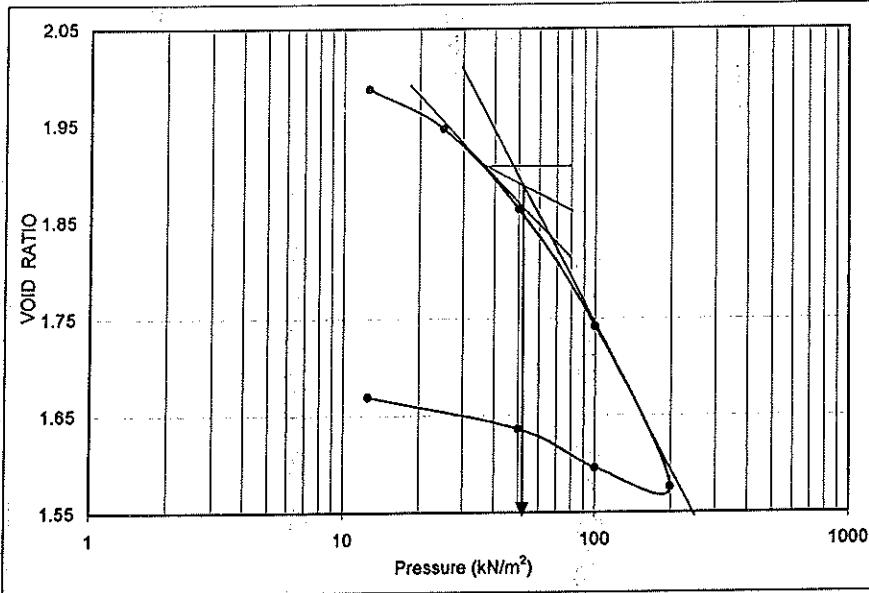
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH21 / UD11 / 33.00m

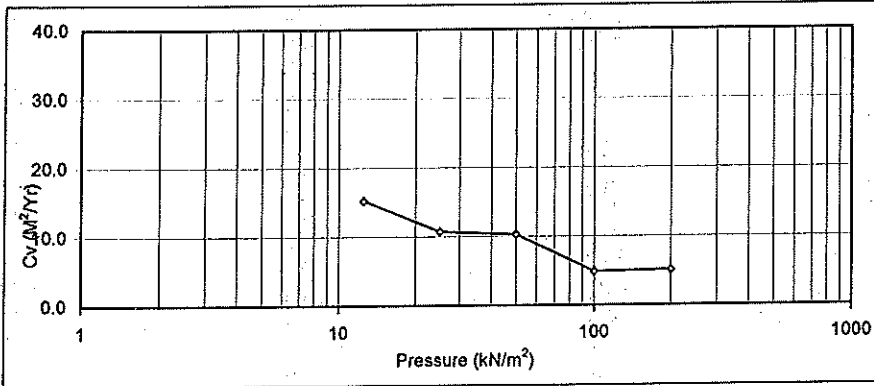
SOIL SAMPLE Dark grey CLAY

Date of Report 16.12.18
 Test started 06.12.18
 Ring No. A4



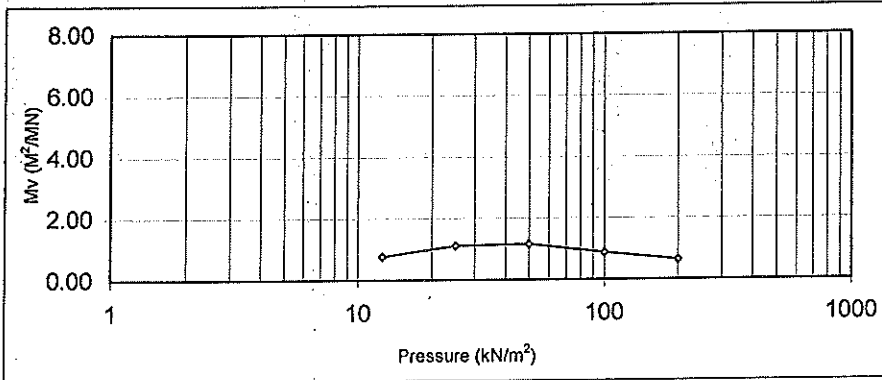
INITIAL

Water content	70	%
Dry Density	0.88	Mg/m ³
Void Ratio	2.0167	
Saturation	92	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.640	



FINAL

Water content	62	%
Dry Density	0.99	Mg/m ³
Void Ratio	1.6695	
Saturation	98	%
Height	18	mm
Comp. Index, Cc	0.5512	
Precons. Load	52	kN/m ²



Comp. Ratio, C_R 0.183

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 21 / D 18 (43.50 m)

Test Size : 60 mm x 60 mm x 20 mm

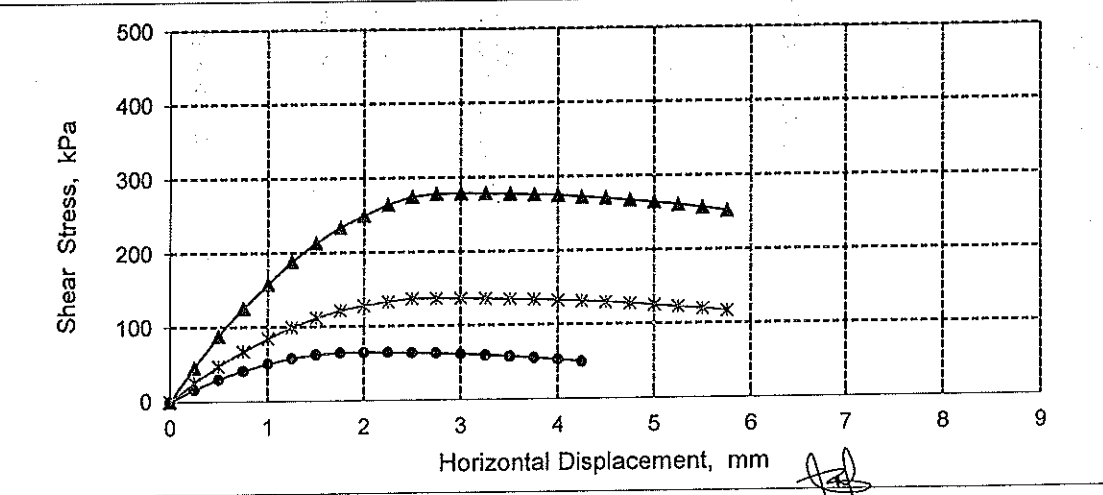
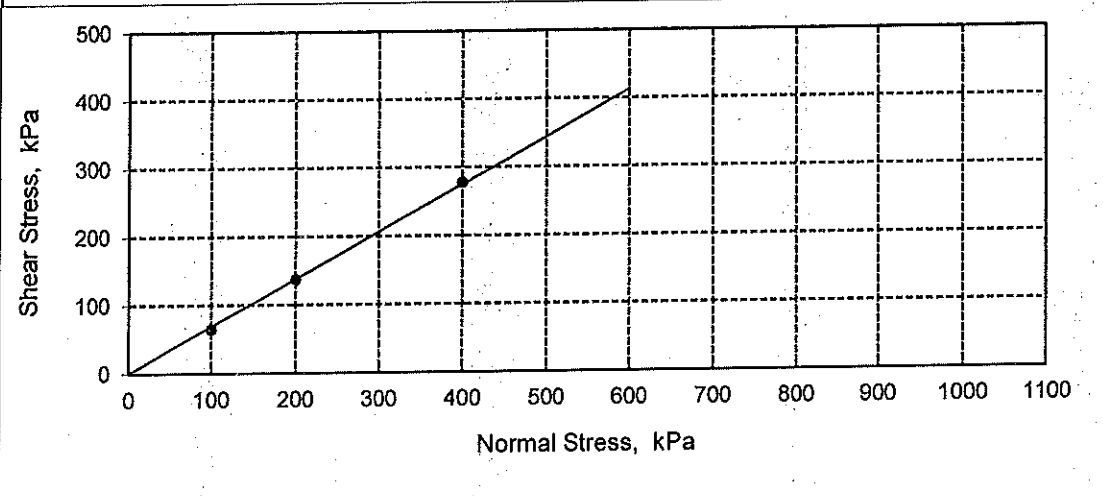
Date Tested : 19 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		142.0	142.7	142.8
Moisture Content (%)		21.8	21.7	22.1
Bulk Density (Mg/m ³)		1.972	1.982	1.983
Dry Density (Mg/m ³)		1.619	1.629	1.624

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		64.8	137.1	278.7
Displ. at Failure (mm)		2.0	2.5	3.0
Settlement (mm)		0.1	0.2	0.3

c' 1 kPa

ϕ' 34.5 deg.



GEOSOIL ENGINEERING

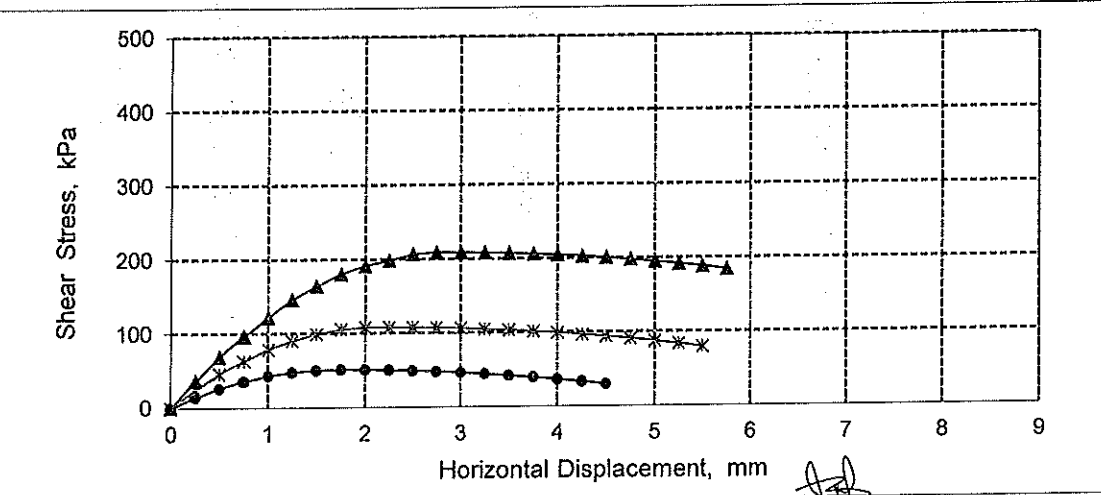
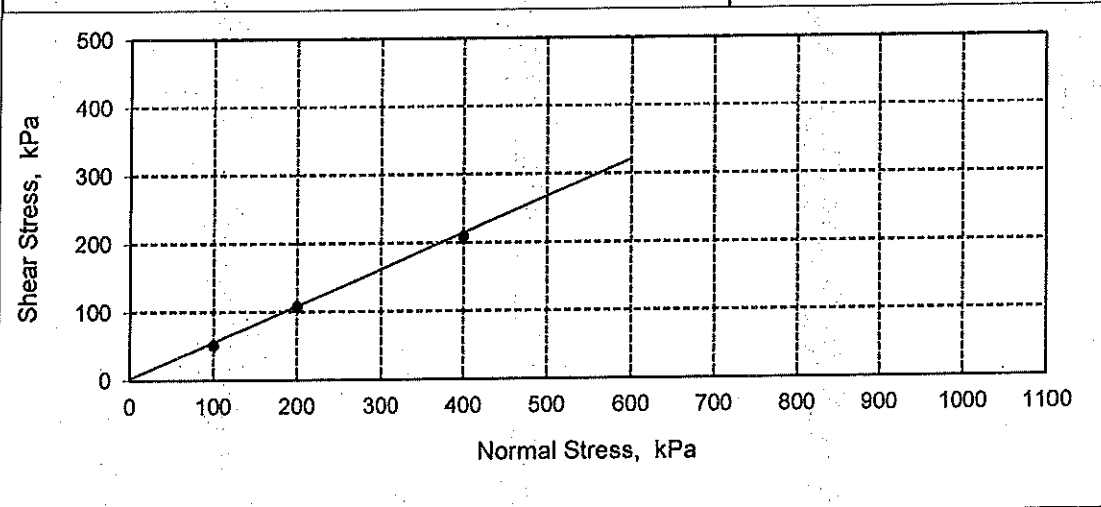
DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

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

Sample No. : BH 21 / D 22 (49.50 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)	143.9	142.9	143.0	
Moisture Content (%)	17.3	16.5	17.0	
Bulk Density (Mg/m ³)	1.999	1.985	1.986	
Dry Density (Mg/m ³)	1.704	1.704	1.697	
SHEARING STAGE				
Normal Stress (kPa)	100	200	400	c' 3 kPa φ' 28 deg.
Max. Shear Stress (kPa)	51.1	108.2	209.2	
Displ. at Failure (mm)	1.8	2.3	2.8	
Settlement (mm)	0.3	0.5	0.8	



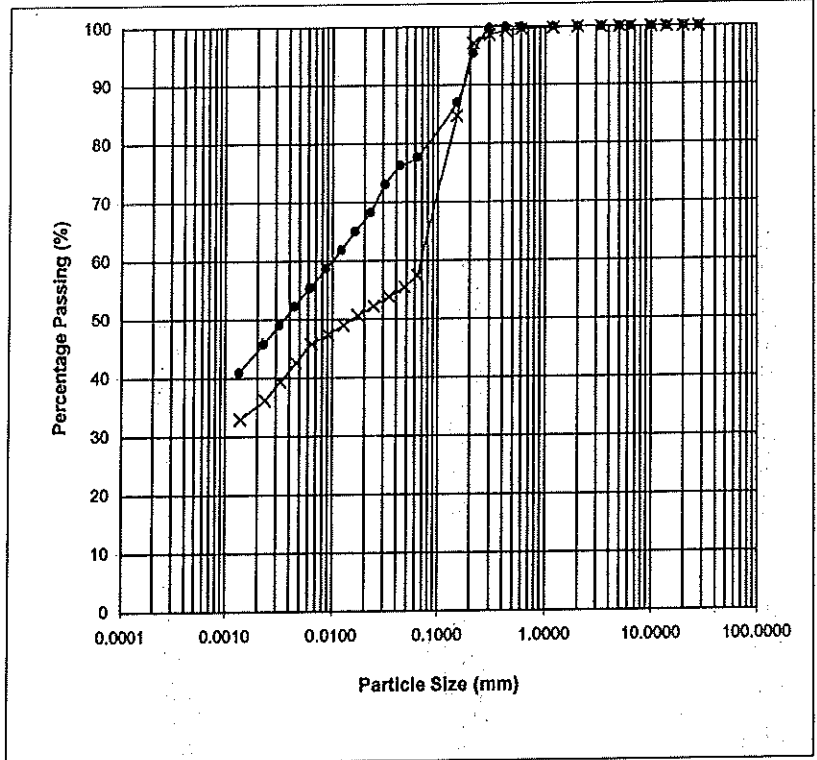
PARTICLE SIZE DISTRIBUTION

(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

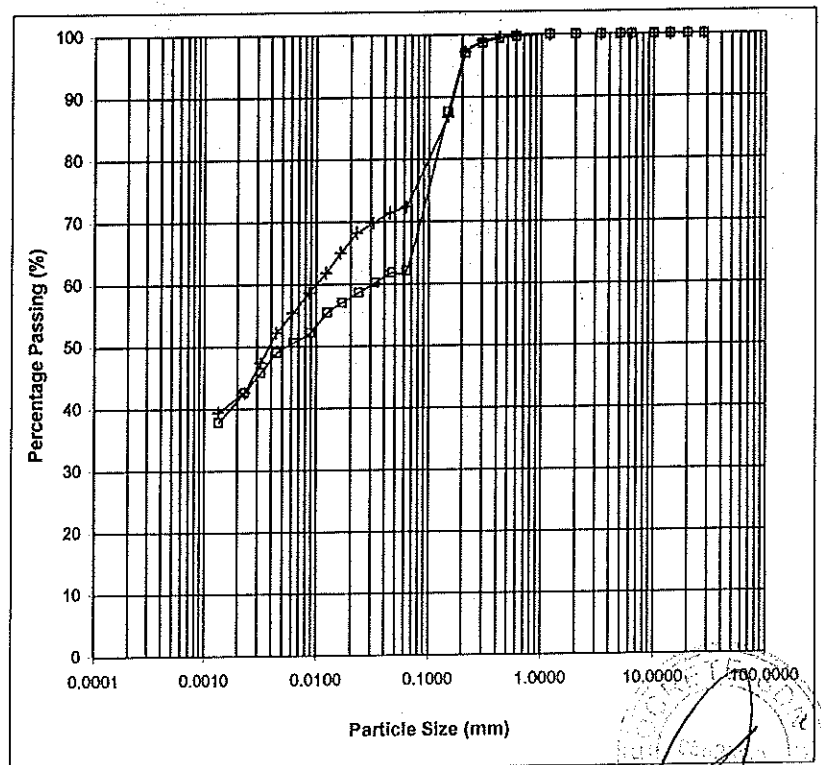
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	99
0.300	100	0.300	99
0.212	98	0.212	97
0.150	87	0.150	85
0.063	78	0.063	67
0.0435	76	0.0480	55
0.0312	73	0.0341	54
0.0228	68	0.0243	52
0.0162	65	0.0173	51
0.0120	62	0.0127	49
0.0086	59	0.0091	47
0.0062	55	0.0064	46
0.0044	52	0.0046	43
0.0032	49	0.0033	39
0.0023	46	0.0024	36
0.0013	41	0.0014	33
Clay (%)		Clay (%)	35
Silt (%)		Silt (%)	23
Sand (%)		Sand (%)	42
Gravel (%)		Gravel (%)	0
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH22	UD1	3.00	22.12.18
x	BH22	UD3	9.00	22.12.18



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	99
0.212	97	0.212	97
0.150	88	0.150	87
0.063	62	0.063	72
0.0466	62	0.0445	71
0.0332	60	0.0317	70
0.0237	59	0.0226	68
0.0168	57	0.0162	65
0.0124	55	0.0120	62
0.0089	52	0.0086	59
0.0063	51	0.0062	55
0.0045	49	0.0044	52
0.0032	46	0.0032	47
0.0023	43	0.0023	43
0.0014	38	0.0013	39
Clay (%)		Clay (%)	41
Silt (%)		Silt (%)	31
Sand (%)		Sand (%)	28
Gravel (%)		Gravel (%)	0
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH22	UD7	21.00	22.12.18
+	BH22	UD8	24.00	22.12.18



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

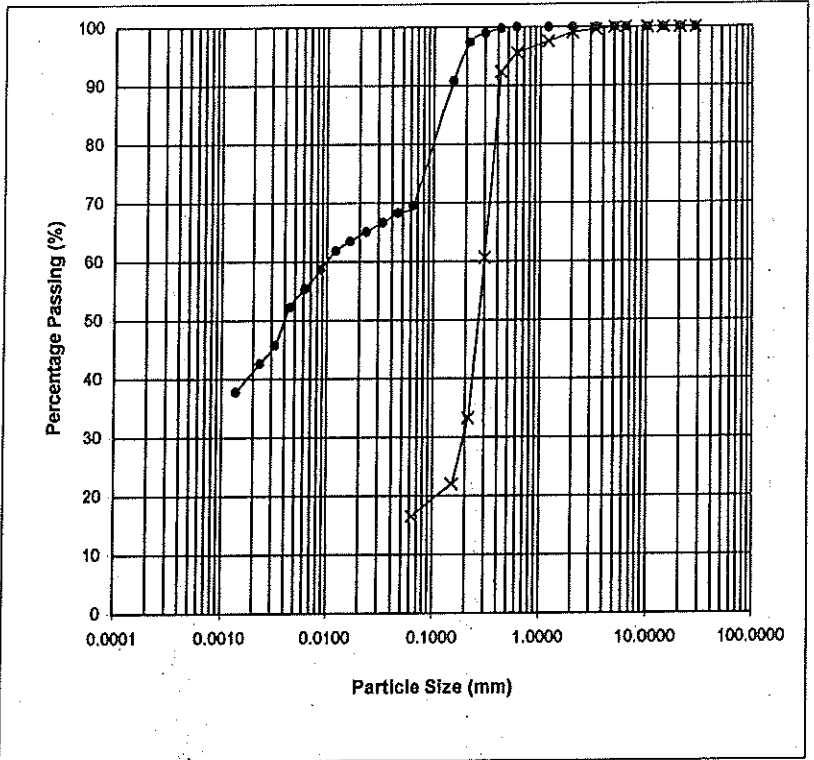
PARTICLE SIZE DISTRIBUTION

(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

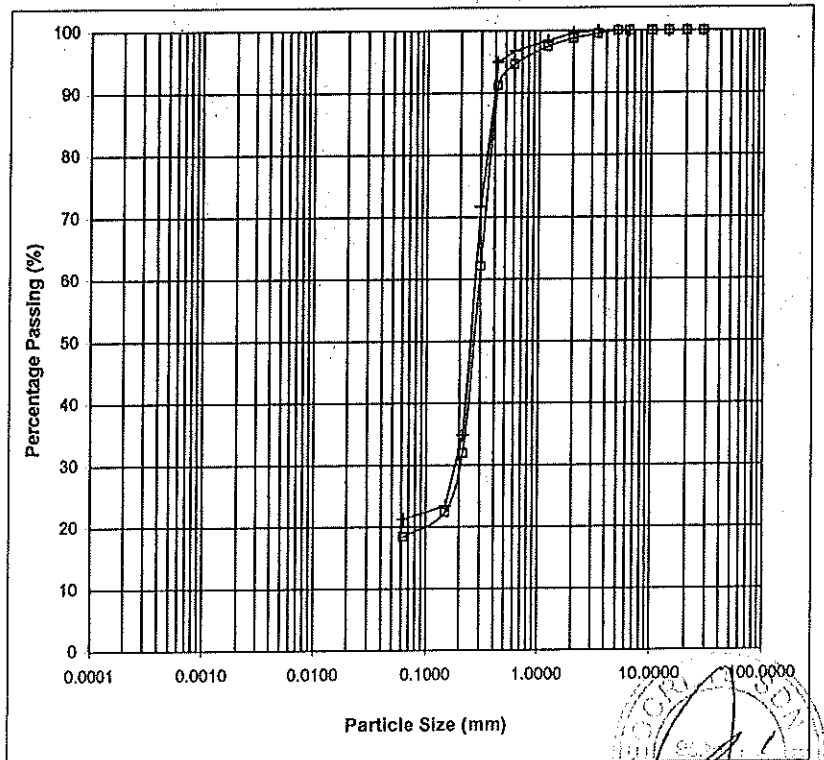
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	99
1.18	100	1.18	98
0.600	100	0.600	96
0.425	100	0.425	92
0.300	99	0.300	61
0.212	97	0.212	33
0.150	91	0.150	22
0.063	70	0.063	17
0.0452	88		
0.0322	67		
0.0230	65		
0.0164	63		
0.0120	62		
0.0086	59		
0.0062	55		
0.0044	52		
0.0032	46		
0.0023	43		
0.0014	38		
Clay (%)	40	Clay (%)	17
Silt (%)	29	Silt (%)	
Sand (%)	31	Sand (%)	82
Gravel (%)	0	Gravel (%)	1
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH22	UD11	33.00	22.12.18
X	BH22	D13	36.00	22.12.18



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	99	2.00	100
1.18	97	1.18	98
0.600	95	0.600	97
0.425	91	0.425	95
0.300	62	0.300	72
0.212	32	0.212	35
0.150	22	0.150	23
0.063	18	0.063	21
Clay (%)	17	Clay (%)	19
Silt (%)		Silt (%)	
Sand (%)	82	Sand (%)	80
Gravel (%)	1	Gravel (%)	1
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH22	D14	37.50	22.12.18
+	BH22	D17	42.00	22.12.18



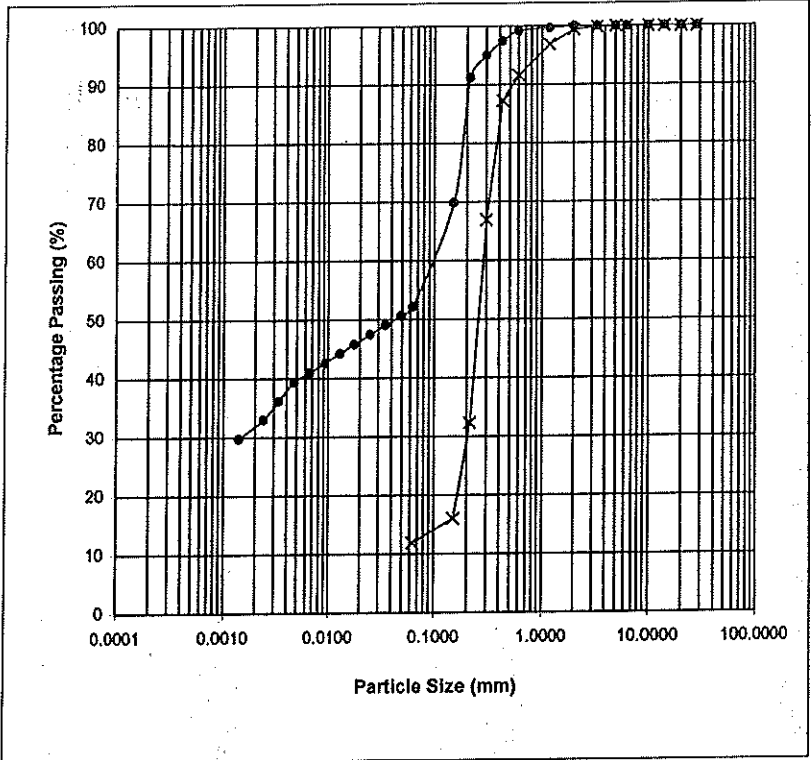
PARTICLE SIZE DISTRIBUTION

(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

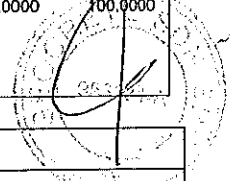
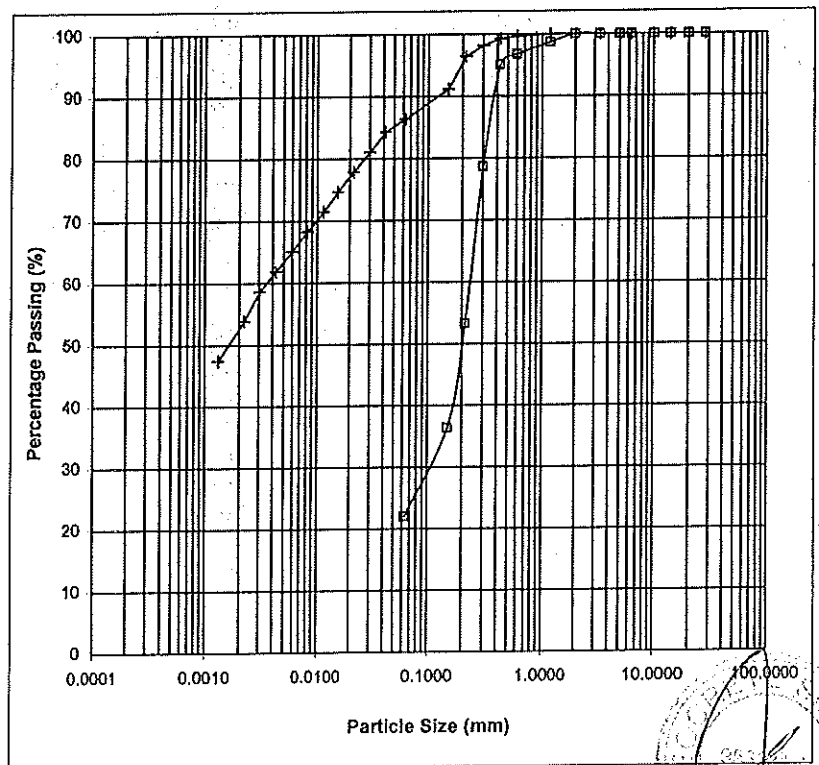
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	99
1.18	100	1.18	97
0.600	99	0.600	92
0.425	98	0.425	87
0.300	95	0.300	67
0.212	91	0.212	32
0.150	70	0.150	16
0.063	52	0.063	12
0.0489	51		
0.0348	49		
0.0248	47		
0.0176	46		
0.0130	44		
0.0092	43		
0.0086	41		
0.0047	39		
0.0033	36		
0.0024	33		
0.0014	30		
Clay (%)	31	Clay (%)	12
Silt (%)	21	Silt (%)	
Sand (%)	48	Sand (%)	87
Gravel (%)	0	Gravel (%)	1
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH22	D18	43.50	22.12.18
X	BH22	D22	49.50	22.12.18



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	95	0.425	99
0.300	79	0.300	98
0.212	53	0.212	96
0.150	36	0.150	91
0.063	22	0.063	86
		0.0416	84
		0.0300	81
		0.0215	78
		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 (%)	22	Clay (%)	50
Silt (%)		Silt (%)	36
Sand (%)	78	Sand (%)	14
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH22	D26	55.50	22.12.18
+	BH22	D29	60.00	22.12.18



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

Total Stress Triaxial Compression

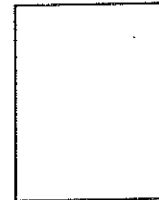
Unconsolidated Undrained

Sample details

Depth : 3.00m
Description : 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)	136.11	138.52	141.04
Bulk Density ρ (Mg/m ³)	1.580	1.608	1.637
Particle Density ρ_s	2.62	2.62	2.62

Sketch showing specimen location in original sample



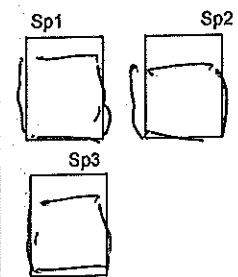
Initial Conditions

	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	14391	14391	14391
Moisture Content w_0 %	51	49	47
Dry Density ρ_{d0} (Mg/m ³)	1.04	1.08	1.12
Voids Ratio e_0	1.51	1.44	1.35
Deg of Saturation S_0 %	89.12	90.27	90.83

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	40.25	47.08	57.73
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	40.05	46.88	57.53
Strain at Failure ϵ_f %	0.00	0.00	0.00
Shear Strength c_u (kPa)	20.13	23.54	28.87
Moisture Content w_f %	51	49	47
Dry Density ρ_{df} (Mg/m ³)	1.04	1.08	1.12
Voids Ratio e_f	1.51	1.44	1.35
Deg of Saturation S_f %	89.12	90.27	90.83

Failure Sketch



Notes : Plastic Plastic Plastic

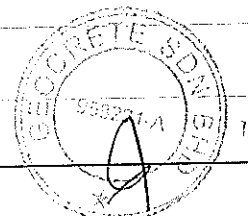
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

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

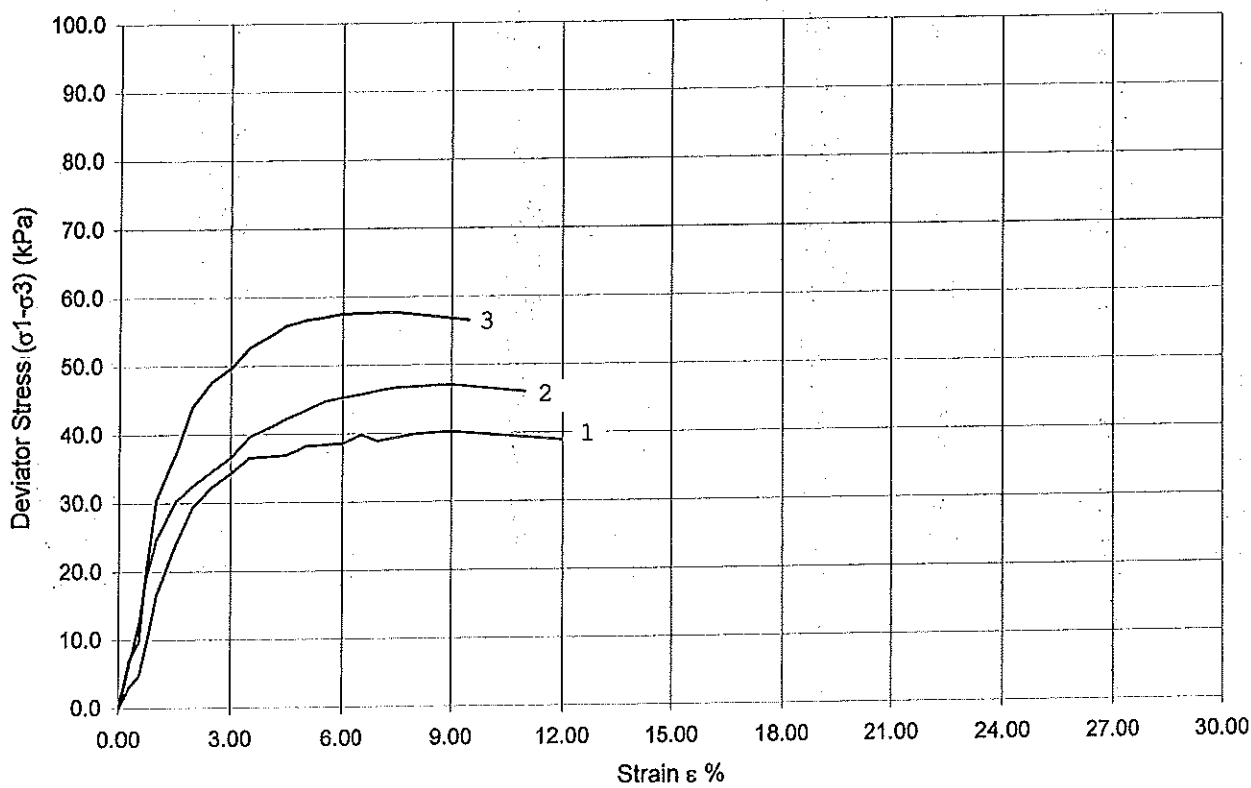
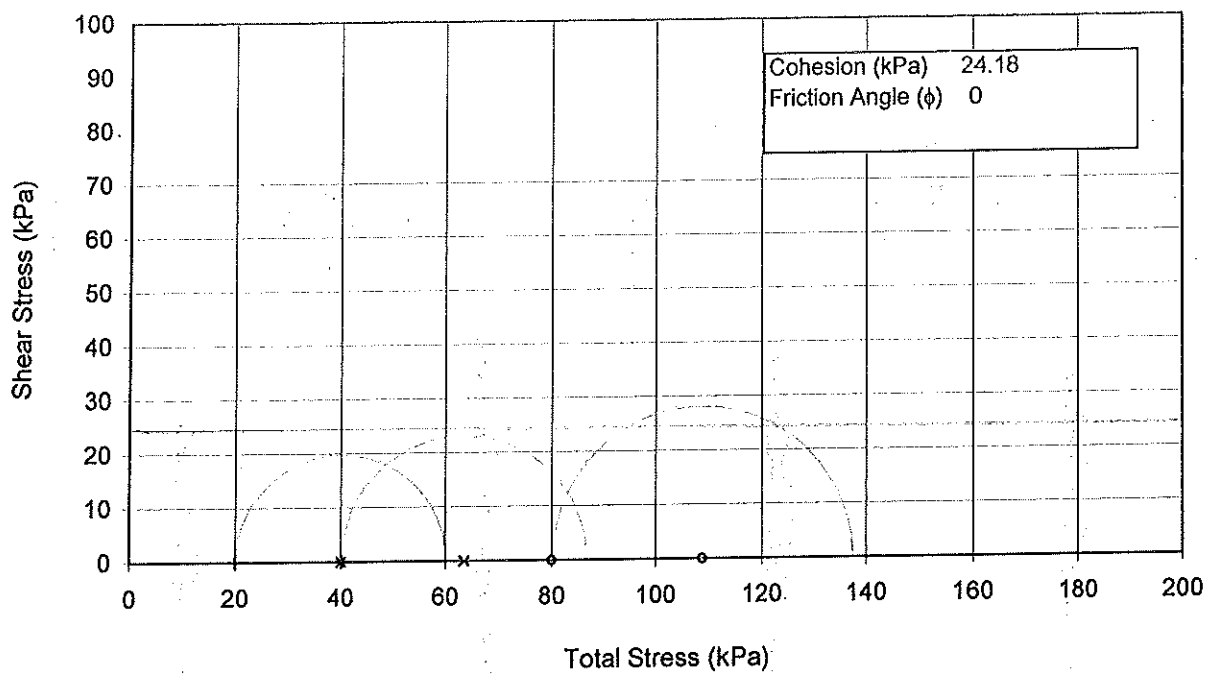
Sample : UD1
Borehole : BH22
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



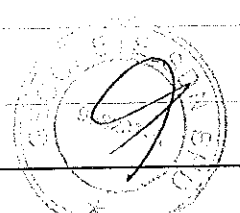
Total Stress Triaxial Compression

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

Test Name : UU
 Date of Test : 20.12.18
 Sample : UD1
 Borehole : BH22
 Checked :
 Chris
 Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

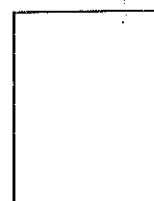
Unconsolidated Undrained

Sample details

Depth : 9.00m
Description : Greenish 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)	139.81	140.35	142.11
Bulk Density ρ (Mg/m ³)	1.623	1.629	1.650
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

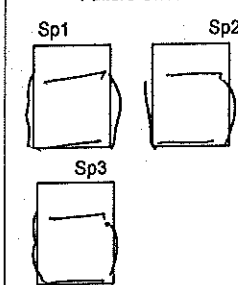
Load Channel : 14391 14391 14391

Moisture Content w_0 %	35	34	32
Dry Density ρ_{d0} (Mg/m ³)	1.20	1.21	1.25
Voids Ratio e_0	1.21	1.18	1.12
Deg of Saturation S_0 %	77.46	76.49	75.79

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	13.29	23.52	63.29
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	13.09	23.32	63.09
Strain at Failure ϵ_f %	6.51	6.97	11.97
Shear Strength c_u (kPa)	6.65	11.76	31.64

Failure Sketch



Moisture Content w_f %	35	34	32
Dry Density ρ_{df} (Mg/m ³)	1.20	1.21	1.25
Voids Ratio e_f	1.21	1.18	1.12
Deg of Saturation S_f %	77.46	76.49	75.79

Notes : Plastic Plastic Plastic

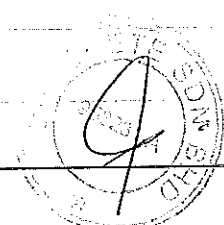
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

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

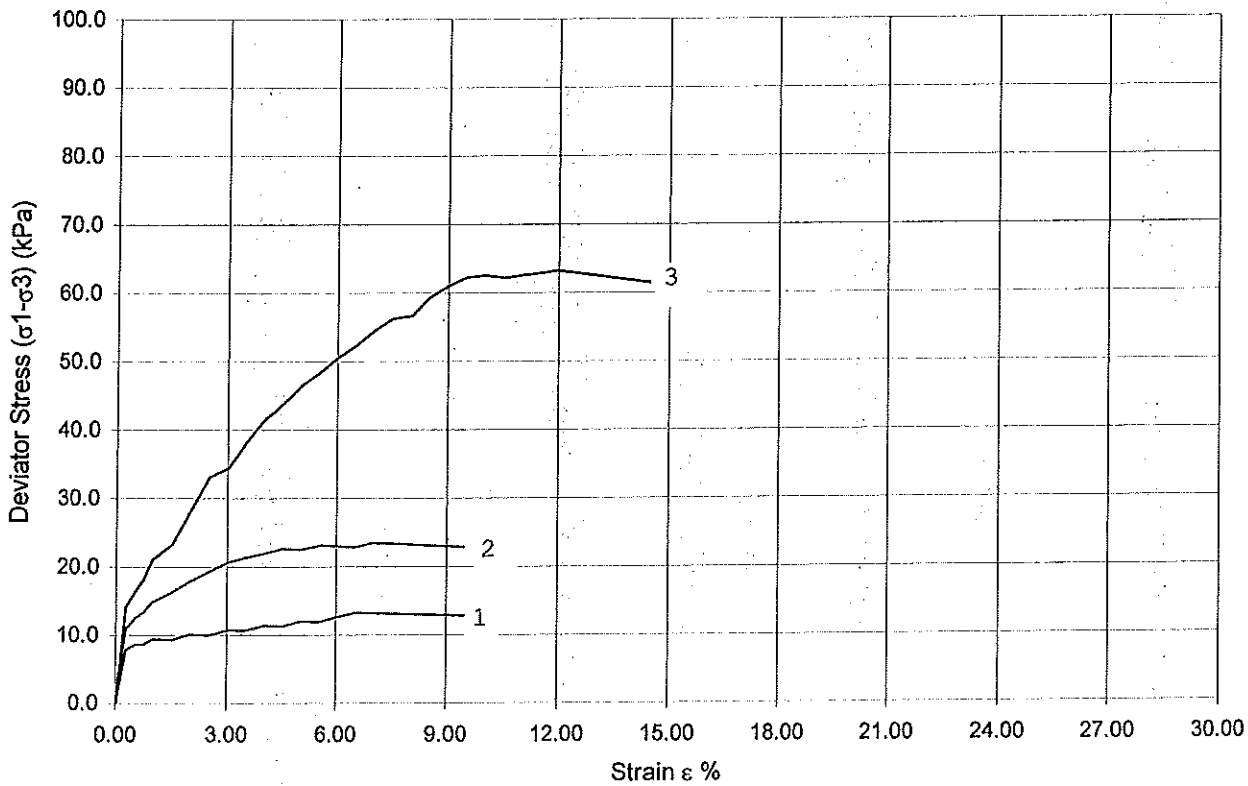
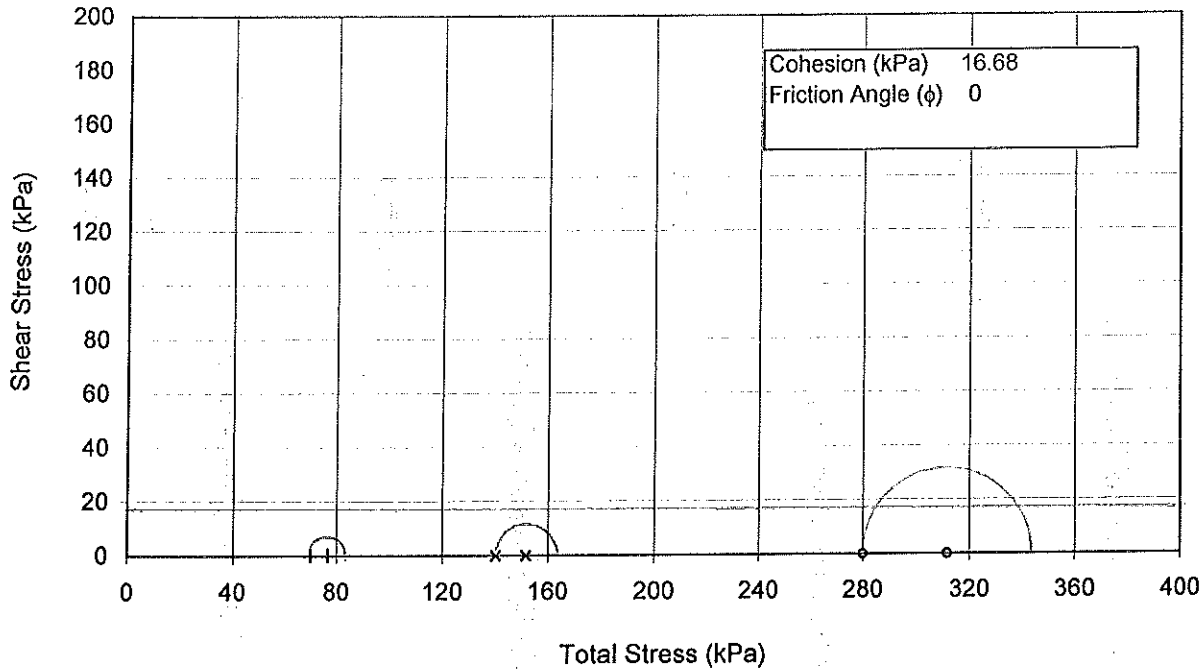
Sample : UD3
Borehole : BH22
Approved
Lee Kai Hing

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

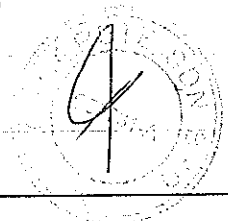
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 20.12.18

Sample : UD3
Borehole : BH22

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

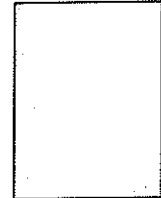
Unconsolidated Undrained

Sample details

Depth : 24.00m
 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)	144.36	147.41	148.51
Bulk Density ρ (Mg/m ³)	1.676	1.711	1.724
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)	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

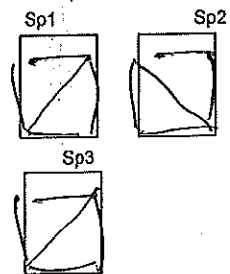
Load Channel : 14391 14391 14391

Moisture Content w_0 %	37	34	32
Dry Density ρ_{d0} (Mg/m ³)	1.23	1.28	1.30
Voids Ratio e_0	1.16	1.07	1.03
Deg of Saturation S_0 %	83.62	83.55	82.66

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	33.05	57.33	60.08
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	32.85	57.13	59.88
Strain at Failure ϵ_f %	10.99	6.97	9.47
Shear Strength c_u (kPa)	16.53	28.66	30.04

Failure Sketch



Moisture Content w_f %	37	34	32
Dry Density ρ_{df} (Mg/m ³)	1.23	1.28	1.30
Voids Ratio e_f	1.16	1.07	1.03
Deg of Saturation S_f %	83.62	83.55	82.66

Notes : Shear Shear Shear

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

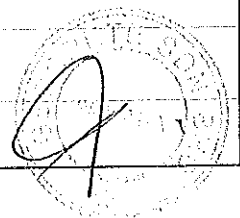
Test Name : UU
 Date of Test : 20.12.18

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

Sample : UD8
 Borehole : BH22

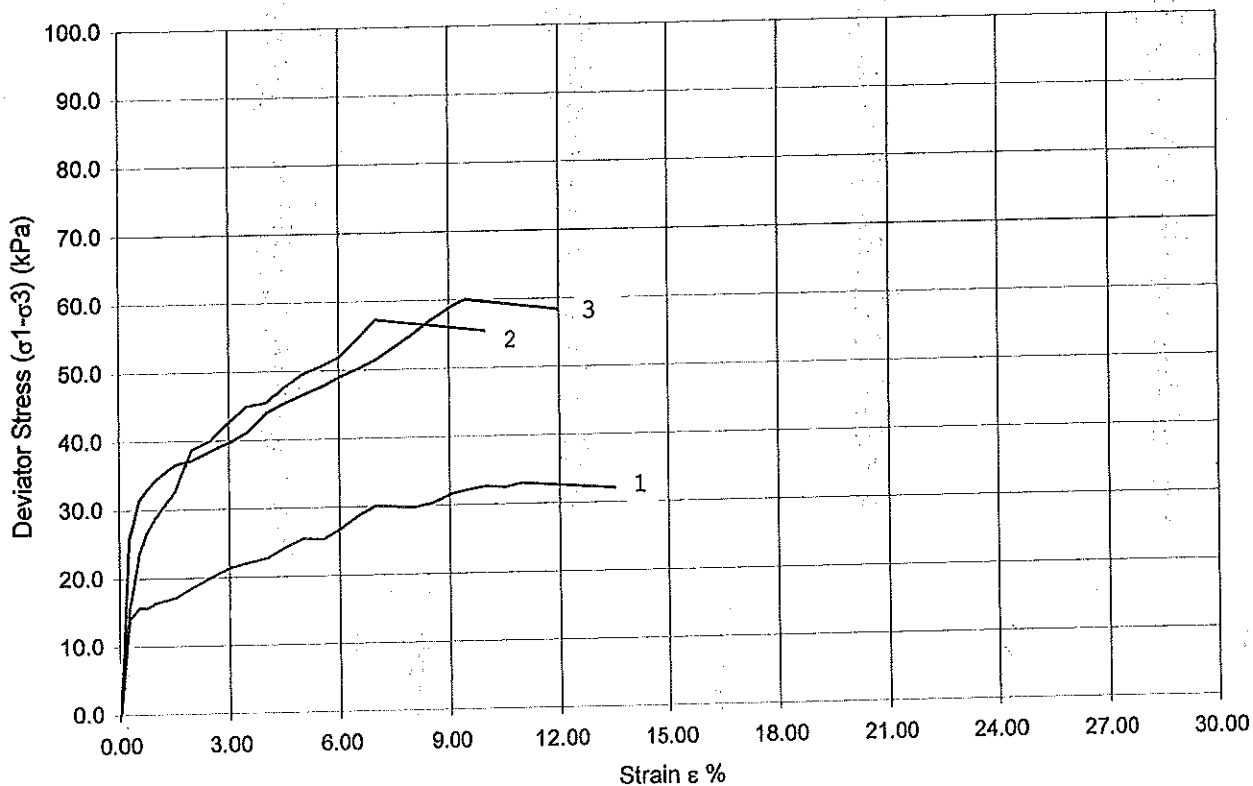
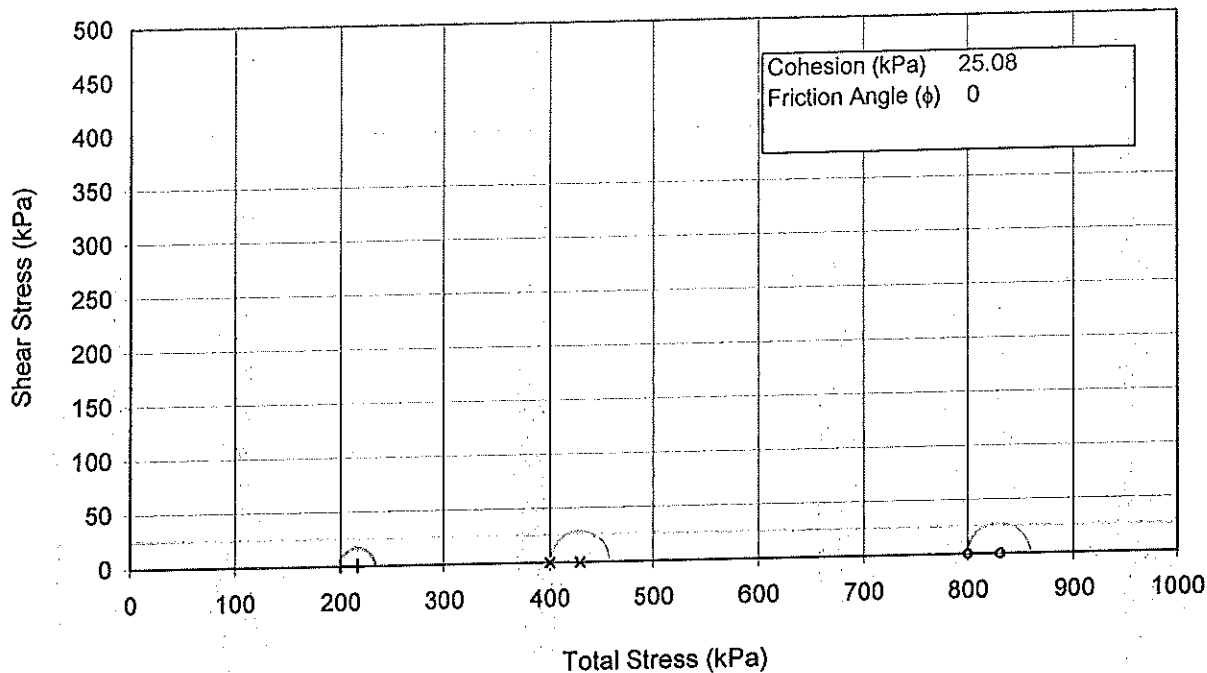
Operator : Shyam Nath
 Checked : Chris

Approved : Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



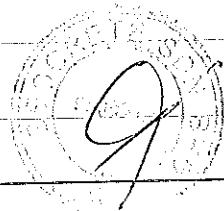
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 20.12.18

Sample : UD8
 Borehole : BH22

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

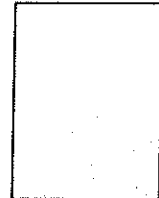
Unconsolidated Undrained

Sample details

Depth : 33.00m
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)	141.20	143.57	145.04
Bulk Density ρ (Mg/m ³)	1.639	1.667	1.684
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample

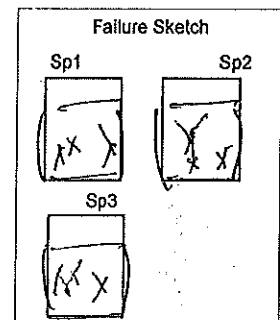


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	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 %	33	32	30
Dry Density ρ_{d0} (Mg/m ³)	1.23	1.26	1.30
Voids Ratio e_0	1.16	1.10	1.04
Deg of Saturation S_0 %	76.53	77.17	75.42

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	42.19	93.75	173.00
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	41.99	93.55	172.80
Strain at Failure ϵ_f %	10.99	14.01	10.99
Shear Strength c_u (kPa)	21.10	46.87	86.50
Moisture Content w_f %	33	32	30
Dry Density ρ_{df} (Mg/m ³)	1.23	1.26	1.30
Voids Ratio e_f	1.16	1.10	1.04
Deg of Saturation S_f %	76.53	77.17	75.42



Notes : Intermediate Intermediate Intermediate

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

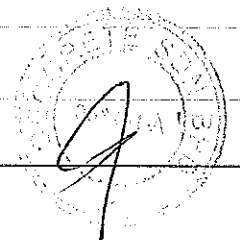
Test Name : UU
Date of Test : 20.12.18

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

Sample : UD11
Borehole : BH22

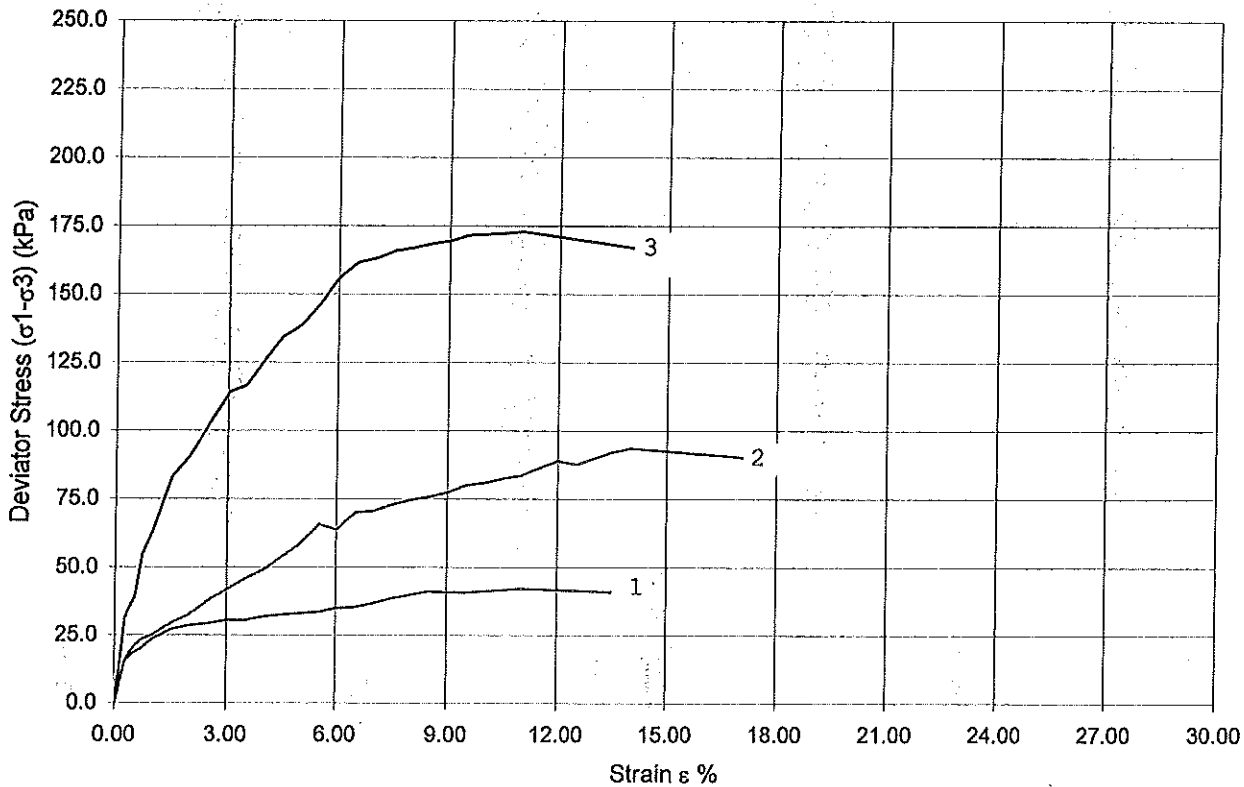
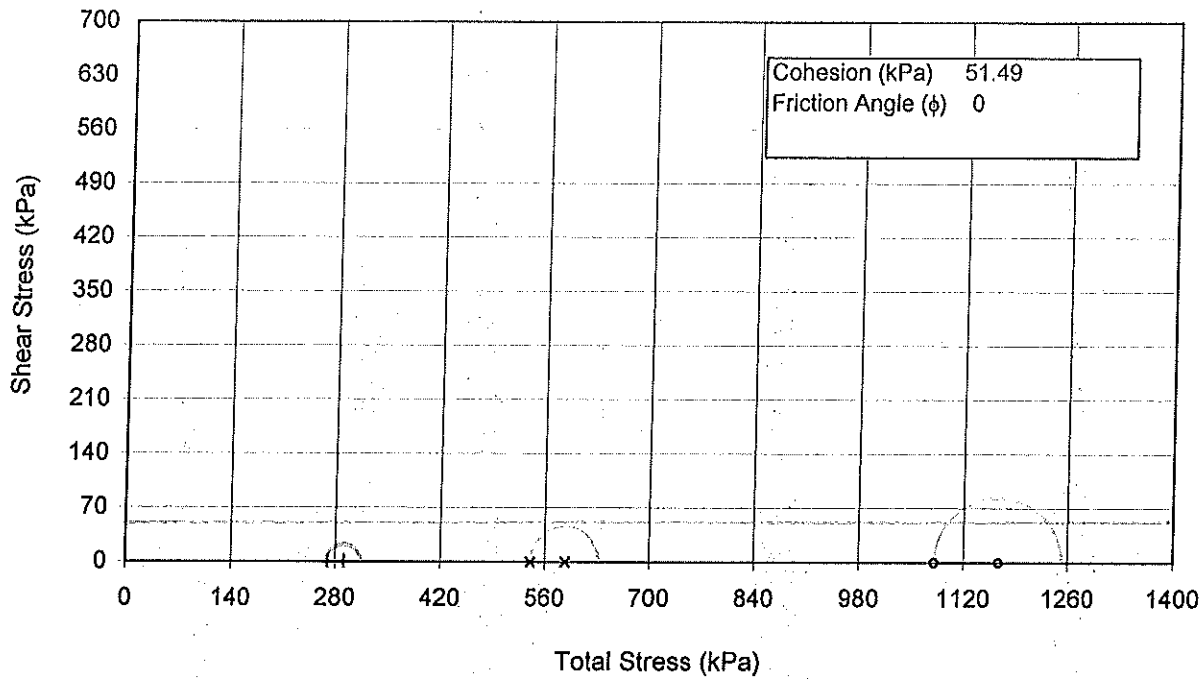
Operator : Shyam Nath
Checked : Chris

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

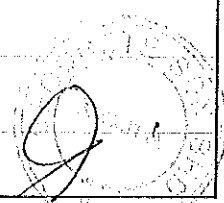
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 20.12.18

Sample : UD11
 Borehole : BH22

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.	BH22 / UD3 / 9.00m	Test Started	19.12.18
Soil Description	Greenish grey CLAY	Ring No.	A12

BEFORE TEST

Moist. Content from trimmings:	=	51 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	122.25 gm	Diameter (D)	=	50 mm
Wt of Ring	=	59.14 gm	Area (A)	=	1964 mm ²
Wt of sample	=	63.11 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	42.70 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	20.41 gm	Bulk Density (P)	=	1.606 Mg/m ³
Initial Moisture Content, M _o	=	48 %	Dry Density (PD)	=	1.087 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.4381			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	88 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1219 mm ⁻¹			
Height of Solid H _s	=	8.203 mm			

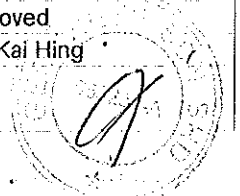
AFTER TEST

Wt of sample + Ring	=	120.58 gm	Overall settlement	=	1.866 mm
Wt of Dry sample + Ring	=	101.84 gm	Volume Change	=	3.665 cm ³
Wt of Ring	=	59.14 gm	Final Volume	=	35.62 cm ³
Wt of Wet sample	=	61.44 gm	Final Bulk Density	=	1.725 Mg/m ³
Wt of Dry sample	=	42.70 gm	Final Dry Density	=	1.199 Mg/m ³
Wt of Moisture	=	18.74 gm	Final Void Ratio, e _f	=	1.2106
Final Moisture Content, M _f	=	44 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	96 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

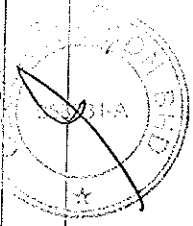
Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH22 / UD3 / 9.00m

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A12

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H-H_c-\Delta H$ (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 ₆₀ (min)	Cv for t ₆₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.4381	0.0000	0				
6.25	0.060	19.940	0.0073	1.4308	0.0073	6.25	0.4818	1.21	36.58	-0.0243
12.5	0.202	19.798	0.0246	1.4135	0.0173	6.25	1.1485	1.96	22.36	-0.0575
25.0	0.368	19.632	0.0449	1.3932	0.0202	12.5	0.6770	1.44	29.96	-0.0672
50.0	0.652	19.348	0.0795	1.3586	0.0346	25.0	0.5876	1.44	29.28	-0.1150
100	1.044	18.956	0.1273	1.3108	0.0478	50.0	0.4139	2.56	15.90	-0.1588
200	1.632	18.368	0.1989	1.2392	0.0717	99.9	0.3204	2.56	15.10	-0.2381
400	2.402	17.598	0.2928	1.1453	0.0939	199.8	0.2189	1.21	29.67	-0.3119
200	2.364	17.636	0.2882	1.1499	-0.0046	-199.8				
50	2.186	17.814	0.2665	1.1716	-0.0217	-149.9				
12.5	1.866	18.134	0.2275	1.2106	-0.0390	-37.5				

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

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

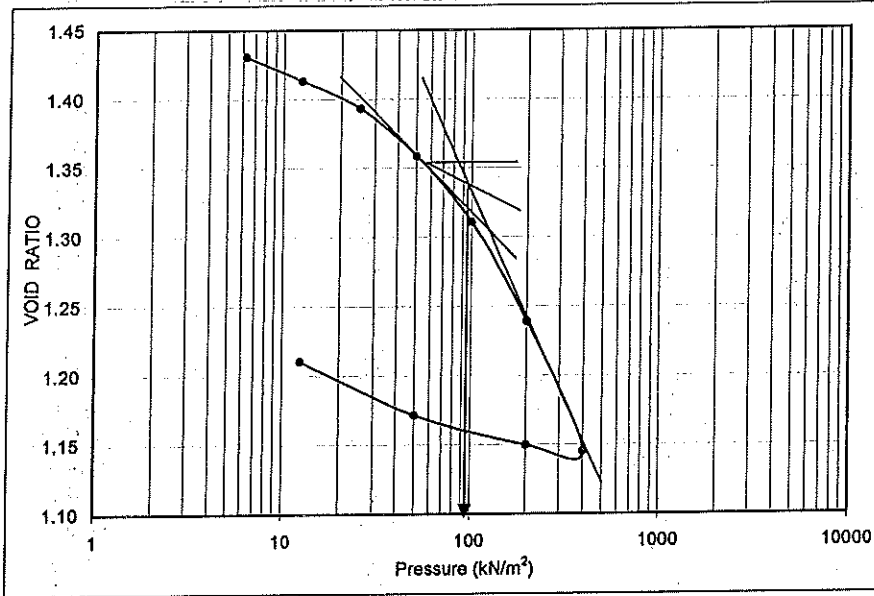


ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

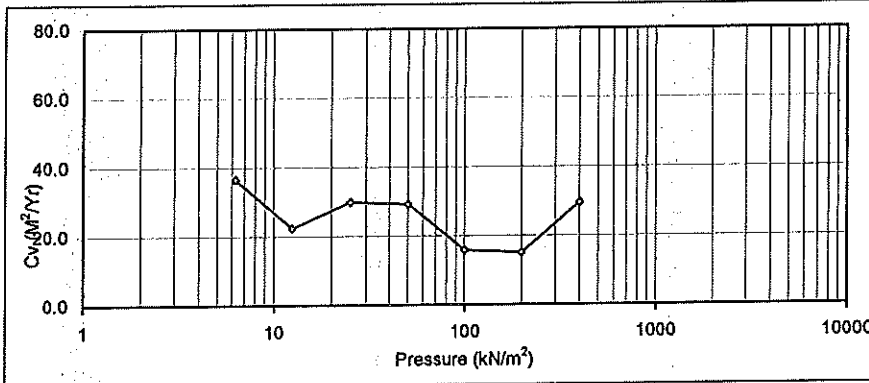
BH REF BH22 / UD3 / 9.00m
 SOIL SAMPLE Greenish grey CLAY

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A12



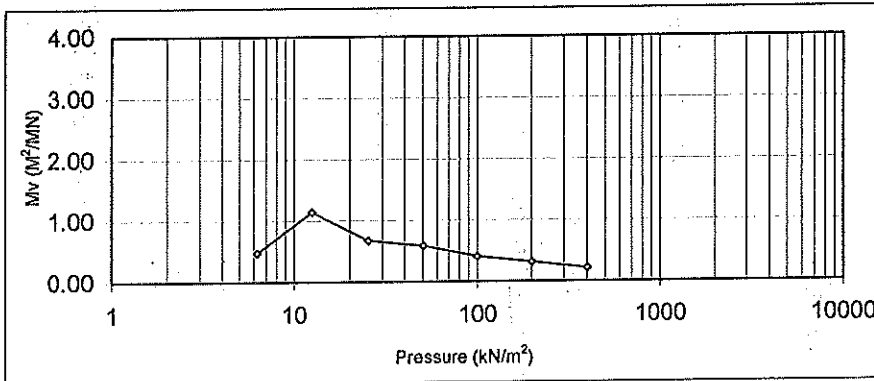
INITIAL

Water content 48 %
 Dry Density 1.09 Mg/m³
 Void Ratio 1.4381
 Saturation 88 %
 Height 20 mm
 Diameter 50 mm
 Sp. Gravity 2.650



FINAL

Water content 44 %
 Dry Density 1.20 Mg/m³
 Void Ratio 1.2106
 Saturation 96 %
 Height 18 mm
 Comp. Index, Cc 0.3119
 Precons. Load 91 kN/m²
 Comp. Ratio, C_R 0.128



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

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	29.12.18
Sample No.	BH22 / UD3 / 9.00m	Test Started	19.12.18
Soil Description	Greenish grey CLAY	Ring No.	A12

BEFORE TEST

Moist. Content from trimmings:	=	51 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	122.25 gm	Diameter (D)	=	50 mm
Wt of Ring	=	59.14 gm	Area (A)	=	1964 mm ²
Wt of sample	=	63.11 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	42.70 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	20.41 gm	Bulk Density (P)	=	1.606 Mg/m ³
Initial Moisture Content, M ₀	=	48 %	Dry Density (PD)	=	1.087 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.4381			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	88 %			
V. Ratio Change Factor F _v , $\frac{H}{1+e_0}$	=	0.1219 mm ⁻¹			
Height of Solid H _s	=	8.203 mm			

AFTER TEST

Wt of sample + Ring	=	120.58 gm	Overall settlement	=	1.866 mm
Wt of Dry sample + Ring	=	101.84 gm	Volume Change	=	3.665 cm ³
Wt of Ring	=	59.14 gm	Final Volume	=	35.62 cm ³
Wt of Wet sample	=	61.44 gm	Final Bulk Density	=	1.725 Mg/m ³
Wt of Dry sample	=	42.70 gm	Final Dry Density	=	1.199 Mg/m ³
Wt of Moisture	=	18.74 gm	Final Void Ratio, e _f	=	1.2106
Final Moisture Content, M _f	=	44 %			
Final Saturation, S ₀ ; $\frac{M_f \times SG}{e_f}$	=	96 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

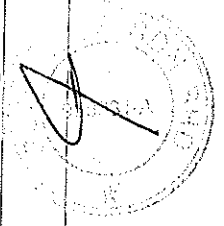
Project PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH22 / UD3 / 9.00m

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A12

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_c-\Delta H$ (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	1.4381	0.0000	0				
6.25	0.060	19.940	0.0073	1.4308	0.0073	6.25	0.4818	1.21	36.58	-0.0243
12.5	0.202	19.798	0.0246	1.4135	0.0173	6.25	1.1485	1.96	22.36	-0.0575
25.0	0.368	19.632	0.0449	1.3932	0.0202	12.5	0.6770	1.44	29.96	-0.0672
50.0	0.652	19.348	0.0795	1.3586	0.0346	25.0	0.5876	1.44	29.28	-0.1150
100	1.044	18.956	0.1273	1.3108	0.0478	50.0	0.4139	2.56	15.90	-0.1588
200	1.632	18.368	0.1989	1.2392	0.0717	99.9	0.3204	2.56	15.10	-0.2381
400	2.402	17.598	0.2928	1.1453	0.0939	199.8	0.2189	1.21	29.67	-0.3119
200	2.364	17.636	0.2882	1.1499	-0.0046	-199.8				
50	2.186	17.814	0.2665	1.1716	-0.0217	-149.9				
12.5	1.866	18.134	0.2275	1.2106	-0.0390	-37.5				

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

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

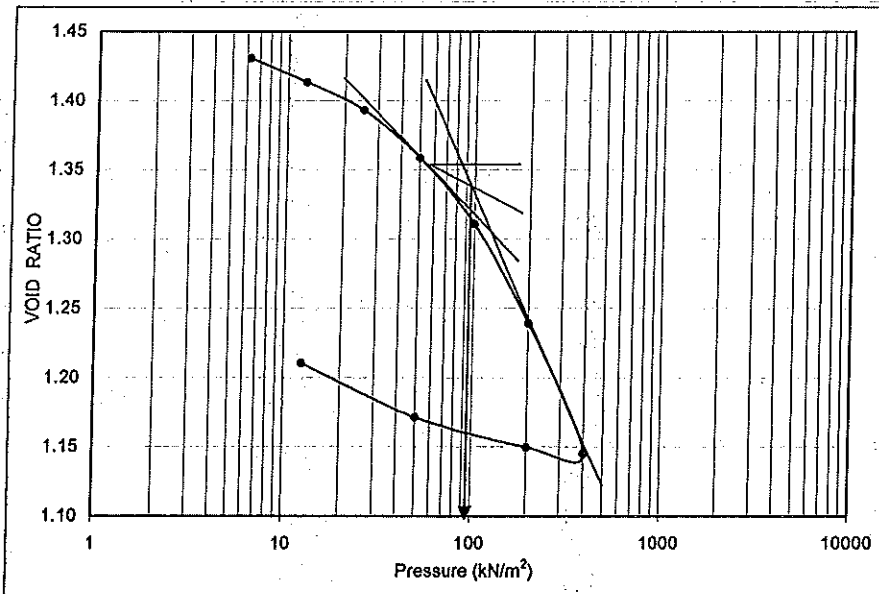


ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

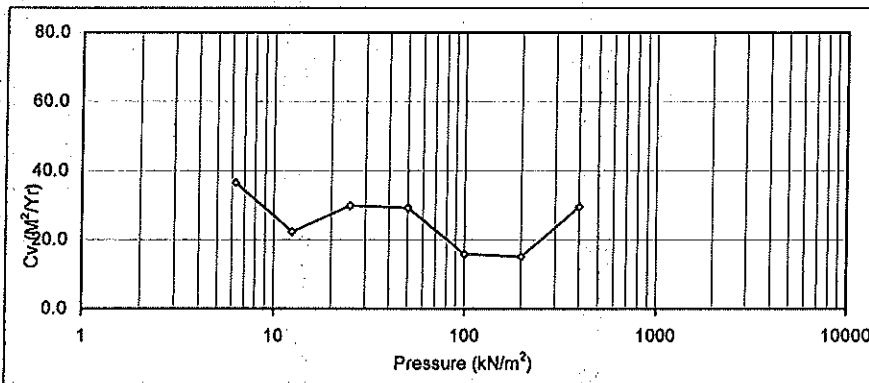
BH REF BH22 / UD3 / 9.00m
 SOIL SAMPLE Greenish grey CLAY

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A12



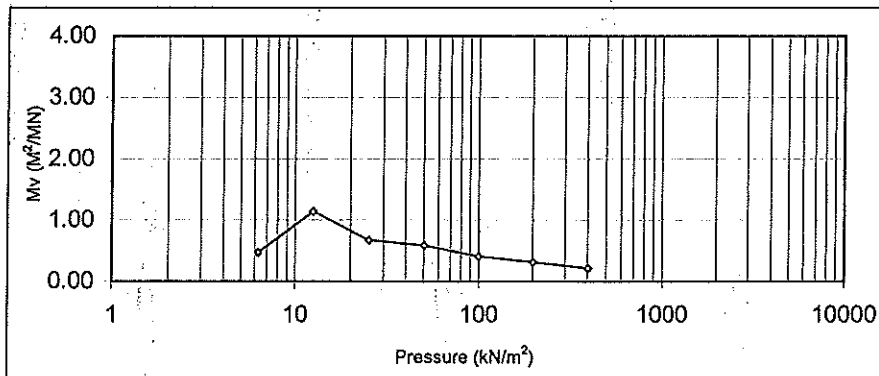
INITIAL

Water content	48	%
Dry Density	1.09	Mg/m ³
Void Ratio	1.4381	
Saturation	88	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.650	



FINAL

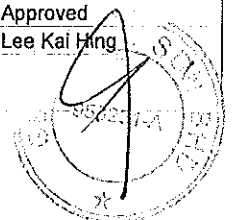
Water content	44	%
Dry Density	1.20	Mg/m ³
Void Ratio	1.2106	
Saturation	96	%
Height	18	mm
Comp. Index, C _c	0.3119	
Precons. Load	91	kN/m ²



Comp. Ratio, C_R 0.128

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

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	29.12.18
Sample No.	BH22 / UD8 / 24.00m	Test Started	19.12.18
Soil Description	Dark grey CLAY with some sand	Ring No.	A13

BEFORE TEST

Moist. Content from trimmings:	=	49	%	SG (Measured)	=	2.650	
Wt of sample + Ring	=	121.28	gm	Diameter (D)	=	50	mm
Wt of Ring	=	60.41	gm	Area (A)	=	1964	mm ²
Wt of sample	=	60.87	gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	41.34	gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	19.53	gm	Bulk Density (P)	=	1.549	Mg/m ³
Initial Moisture Content, M _o	=	47	%	Dry Density (PD)	=	1.052	Mg/m ³
Initial Void Ratio, e _o , SG/P _o - 1	=	1.5183					
Initial Saturation, S _o ;	$\frac{M_o \times SG}{e_o}$	=	82	%			
V. Ratio Change Factor F,	$\frac{H}{1+e_o}$	=	0.1259	mm ⁻¹			
Height of Solid	H _s	=	7.942	mm			

AFTER TEST

Wt of sample + Ring	=	120.28	gm	Overall settlement	=	1.582	mm
Wt of Dry sample + Ring	=	101.75	gm	Volume Change	=	3.108	cm ³
Wt of Ring	=	60.41	gm	Final Volume	=	36.18	cm ₃
Wt of Wet sample	=	59.87	gm	Final Bulk Density	=	1.655	Mg/m ³
Wt of Dry sample	=	41.34	gm	Final Dry Density	=	1.143	Mg/m ³
Wt of Moisture	=	18.53	gm	Final Void Ratio, e _f	=	1.3191	
Final Moisture Content, M _f	=	45	%				
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
Sample No BH22 / UD8 / 24.00m

Date of Report 29.12.18
Test started 19.12.18
Ring No. A13

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	1.5183	0.0000	0				
12.5	0.092	19.908	0.0116	1.5067	0.0116	12.5	0.3700	1.96	22.55	-0.0385
25.0	0.134	19.866	0.0169	1.5014	0.0053	12.5	0.1693	4.00	10.97	-0.0176
50.0	0.182	19.818	0.0229	1.4954	0.0060	25.0	0.0970	9.61	4.55	-0.0201
100	0.374	19.626	0.0471	1.4712	0.0242	50.0	0.1958	7.29	5.92	-0.0803
200	0.734	19.266	0.0924	1.4259	0.0453	99.9	0.1870	9.00	4.66	-0.1506
400	1.324	18.676	0.1667	1.3516	0.0743	199.8	0.1581	9.00	4.44	-0.2468
800	2.076	17.924	0.2614	1.2569	0.0947	400.7	0.1047	9.61	3.87	-0.3146
400	1.966	18.034	0.2476	1.2708	-0.0139	-400.7				
100	1.784	18.216	0.2246	1.2937	-0.0229	-299.8				
25	1.582	18.418	0.1992	1.3191	-0.0254	-74.9				

Operator Shyam Nath
Checked Chris
Approved Lee Kai Hing

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



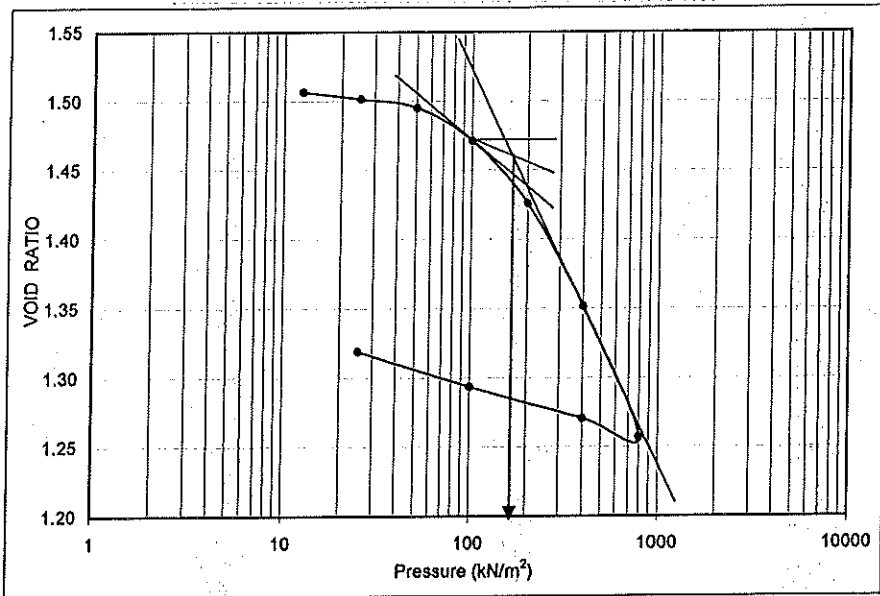
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH22 / UD8 / 24.00m

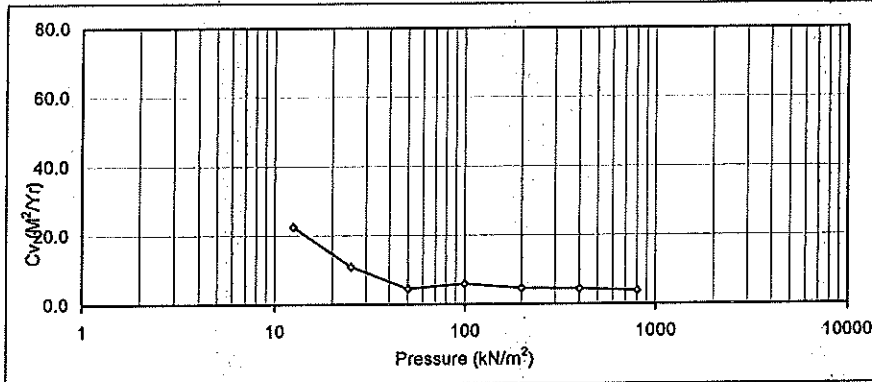
SOIL SAMPLE Dark grey CLAY with some sand

Date of Report 29.12.18
Test started 19.12.18
Ring No. A13



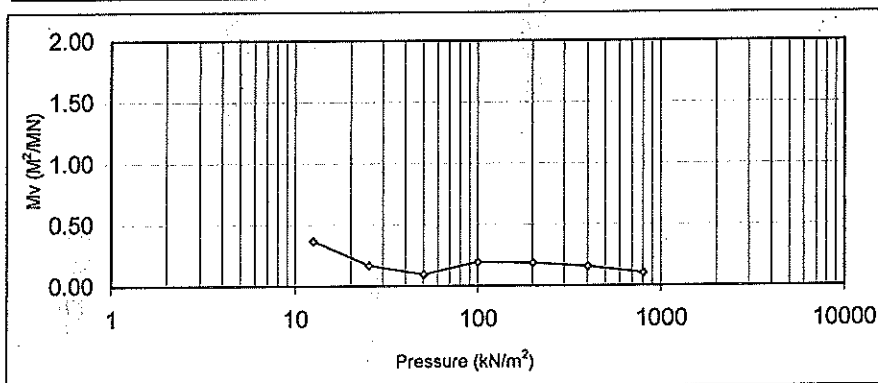
INITIAL

Water content	47	%
Dry Density	1.05	Mg/m ³
Void Ratio	1.5183	
Saturation	82	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.650	



FINAL

Water content	45	%
Dry Density	1.14	Mg/m ³
Void Ratio	1.3191	
Saturation	90	%
Height	18	mm
Comp. Index, Cc	0.3146	
Precons. Load	175	kN/m ²



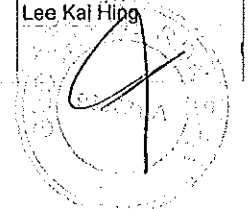
Comp. Ratio, Cr 0.125

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

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	29.12.18
Sample No.	BH24 / UD7 / 21.00m	Test Started	19.12.18
Soil Description	Greenish grey CLAY with some sand	Ring No.	A14

BEFORE TEST

Moist. Content from trimmings:	=	76 %	SG (Measured)	=	2.630
Wt of sample + Ring	=	117.14 gm	Diameter (D)	=	50 mm
Wt of Ring	=	59.11 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.03 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	33.60 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	24.43 gm	Bulk Density (P)	=	1.477 Mg/m ³
Initial Moisture Content, M_o	=	73 %	Dry Density (PD)	=	0.855 Mg/m ³
Initial Void Ratio, e_o , $\frac{SG}{P_o} - 1$	=	2.0750			
Initial Saturation, S_o ; $\frac{M_o \times SG}{e_o}$	=	92 %			
V. Ratio Change Factor F_v , $\frac{1+e_o}{H}$	=	0.1538 mm ⁻¹			
Height of Solid H_s	=	6.504 mm			

AFTER TEST

Wt of sample + Ring	=	116.14 gm	Overall settlement	=	2.282 mm
Wt of Dry sample + Ring	=	92.71 gm	Volume Change	=	4.483 cm ³
Wt of Ring	=	59.11 gm	Final Volume	=	34.80 cm ³
Wt of Wet sample	=	57.03 gm	Final Bulk Density	=	1.639 Mg/m ³
Wt of Dry sample	=	33.60 gm	Final Dry Density	=	0.965 Mg/m ³
Wt of Moisture	=	23.43 gm	Final Void Ratio, e_f	=	1.7242
Final Moisture Content, M_f	=	70 %			
Final Saturation, S_o , $\frac{M_f \times SG}{e_f}$	=	106 %			

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 BH24 / UD7 / 21.00m

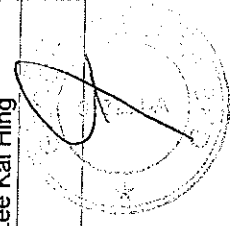
Date of Report
 Test started
 Ring No.

29.12.18
 19.12.18
 A14

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta_0 = F \times \Delta H$	$e = e_0 - \epsilon_1$	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	2.0750	0.0000	0				
12.5	0.038	19.962	0.0058	2.0692	0.0058	12.5	0.1524	2.56	17.31	-0.0194
25.0	0.104	19.896	0.0160	2.0591	0.0101	12.5	0.2656	22.09	2.00	-0.0337
50.0	0.316	19.684	0.0486	2.0265	0.0326	25.0	0.4311	4.84	8.98	-0.1083
100	0.690	19.310	0.1061	1.9690	0.0575	50.0	0.3877	5.29	7.98	-0.1910
200	1.330	18.670	0.2045	1.8706	0.0984	99.9	0.3431	12.96	3.09	-0.3269
400	2.656	17.344	0.4084	1.6667	0.2039	199.8	0.3826	20.25	1.78	-0.6773
200	2.624	17.376	0.4034	1.6716	-0.0049	-199.8				
50	2.468	17.532	0.3795	1.6956	-0.0240	-149.9				
12.5	2.282	17.718	0.3509	1.7242	-0.0286	-37.5				

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

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



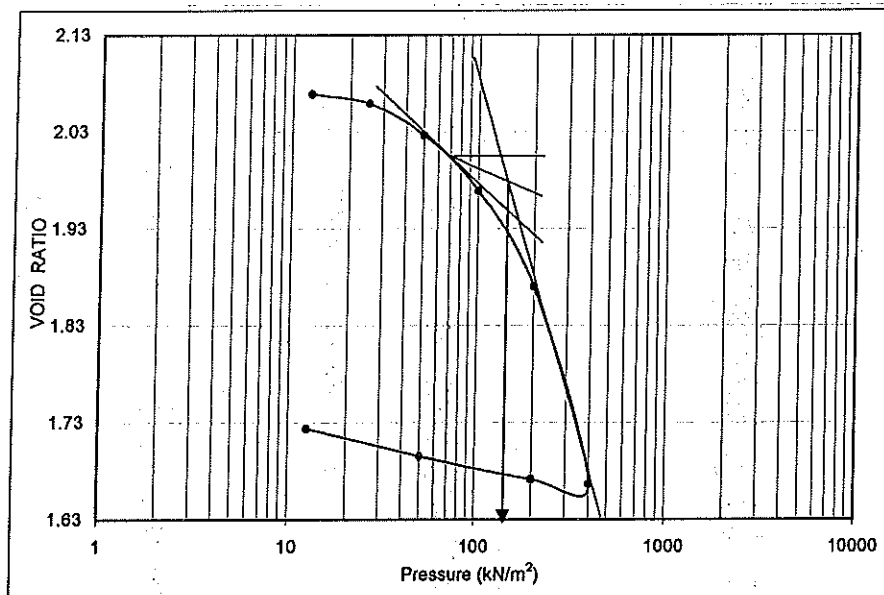
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH24 / UD7 / 21.00m

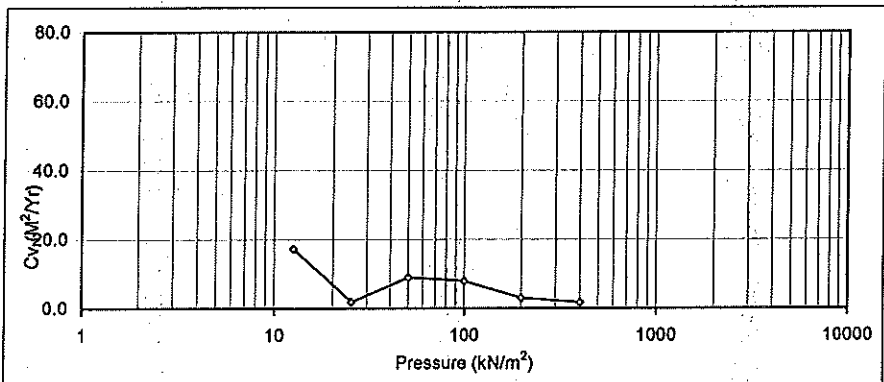
SOIL SAMPLE Greenish grey CLAY with some sand

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A14



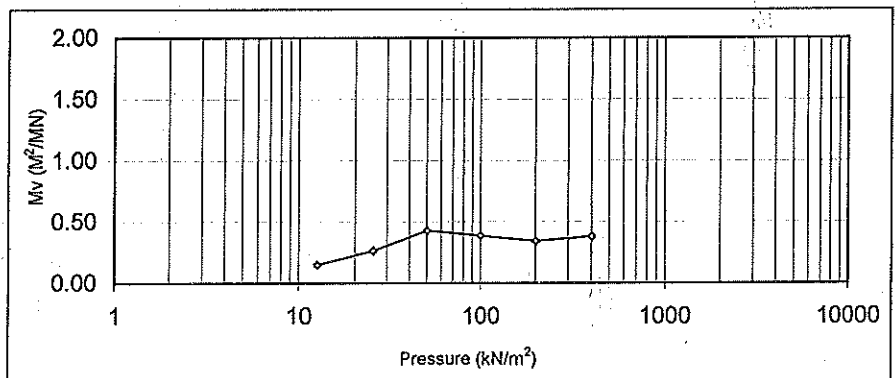
INITIAL

Water content	73	%
Dry Density	0.86	Mg/m ³
Void Ratio	2.0750	
Saturation	92	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.630	



FINAL

Water content	70	%
Dry Density	0.97	Mg/m ³
Void Ratio	1.7242	
Saturation	106	%
Height	18	mm
Comp. Index, Cc	0.6773	
Precons. Load	150	kN/m ²



Comp. Ratio, Cr 0.220

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

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



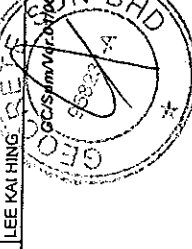
SUMMARY OF TEST RESULTS

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.	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)	Cu (kPa)	ϕ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH
	BH23	UD1	51	1.89	1.12	46	24	22	44	22	34	0											2.7	0.08	0.64	7.8	
		UD4	40	1.88	1.21	35	22	13	43	23	64	0															
		UD5	48	1.79	1.25	38	21	17	6.1	35	45	0															
		UD10	46	1.84	1.28	43	23	20	8.8	40	33	0	2.65														
		D13	29	NA	NA	33	22	11	4.1	25	19	56	0										1.5	0.15	0.23	3.4	
		D18	28	NA	NA					23	19	58	0														
		D19	33	NA	NA					35	29	36	0														
		D21	28	NA	NA	36	24	12		27	16	57	0														
		D22	46	NA	NA	43	25	18	5.1	44	33	23	0	2.65													
		D24	40	NA	NA	33	22	11		22	13	65	0														
		D25	32	NA	NA					25	75	0															
		D29	33	NA	NA	47	24	23		41	36	23	0														

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

Remarks

* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE.



CHECKED BY: CHRIS
APPROVED BY: LEE KAI HING

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.	BH23 / UD5 / 15.00m	Test Started	22.12.18
Soil Description	Grey sandy CLAY	Ring No.	8

BEFORE TEST

Moist. Content from trimmings:	=	53 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	122.79 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.04 gm	Area (A)	=	1964 mm ²
Wt of sample	=	61.75 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	40.98 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	20.77 gm	Bulk Density (P)	=	1.572 Mg/m ³
Initial Moisture Content, M ₀	=	51 %	Dry Density (PD)	=	1.043 Mg/m ³
Initial Void Ratio, e ₀ , SG/P ₀ - 1	=	1.5404			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	87 %			
V. Ratio Change Factor F _v , $\frac{H}{1+e_0}$	=	0.1270 mm ⁻¹			
Height of Solid H _s	=	7.873 mm			

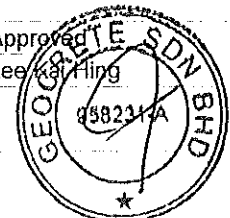
AFTER TEST

Wt of sample + Ring	=	120.84 gm	Overall settlement	=	1.908 mm
Wt of Dry sample + Ring	=	102.02 gm	Volume Change	=	3.748 cm ³
Wt of Ring	=	61.04 gm	Final Volume	=	35.54 cm ³
Wt of Wet sample	=	59.80 gm	Final Bulk Density	=	1.683 Mg/m ³
Wt of Dry sample	=	40.98 gm	Final Dry Density	=	1.153 Mg/m ³
Wt of Moisture	=	18.82 gm	Final Void Ratio, e _r	=	1.2981
Final Moisture Content, M _f	=	46 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_r}$	=	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
 BH23 / UD5 / 15.00m

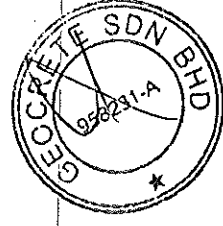
Sample No: _____

Date of Report: 02.01.19
 Test started: 22.12.18
 Ring No.: 8

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta_0 = F \times A H$	$e=e_0 - e_1$	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	1.5404	0.0000	0				
12.5	0.278	19.722	0.0353	1.5051	0.0353	12.5	1.1285	1.21	36.19	-0.1173
25.0	0.504	19.496	0.0640	1.4764	0.0287	12.5	0.9281	1.69	25.25	-0.0954
50.0	0.872	19.128	0.1108	1.4297	0.0467	25.0	0.7701	1.00	41.40	-0.1553
100	1.456	18.544	0.1849	1.3555	0.0742	50.0	0.6303	1.21	32.55	-0.2464
200	2.346	17.654	0.2980	1.2424	0.1130	99.9	0.5045	1.21	30.05	-0.3756
100	2.280	17.720	0.2896	1.2508	-0.0084	-99.9				
50	2.166	17.834	0.2751	1.2653	-0.0145	-50.0				
12.5	1.908	18.092	0.2424	1.2981	-0.0328	-37.5				

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

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



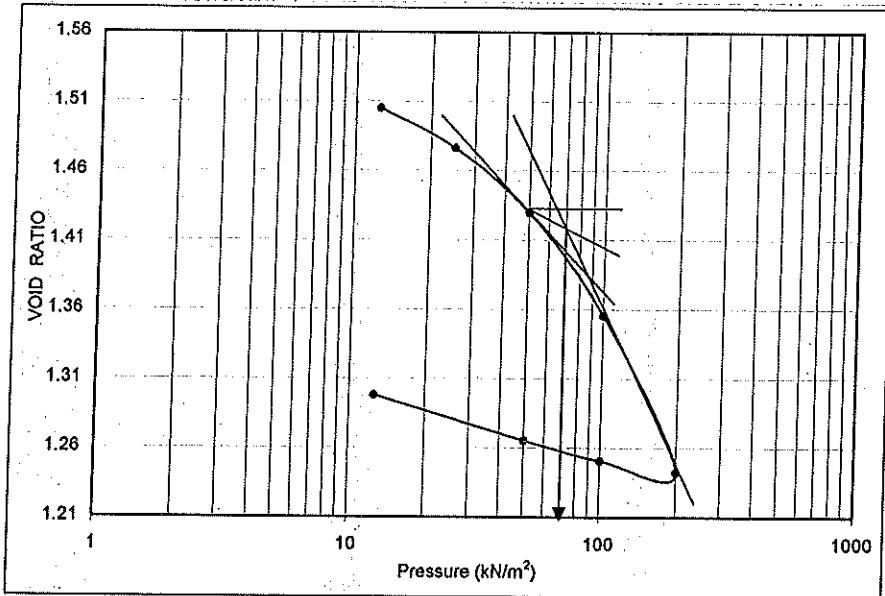
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH23 / UD5 / 15.00m

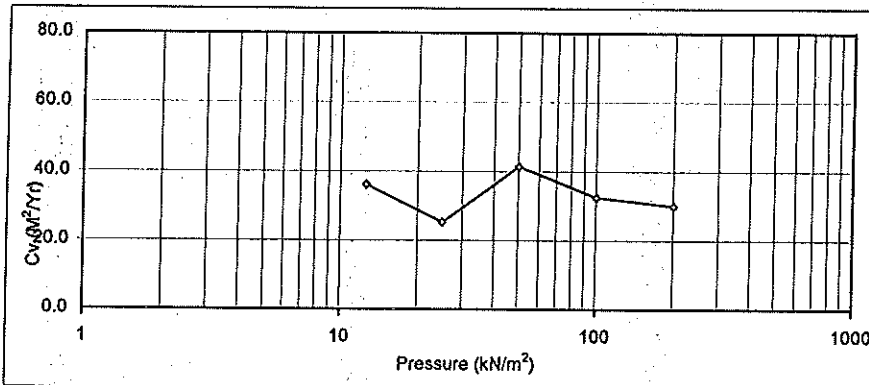
SOIL SAMPLE Grey sandy CLAY

Date of Report 02.01.19
 Test started 22.12.18
 Ring No. 8



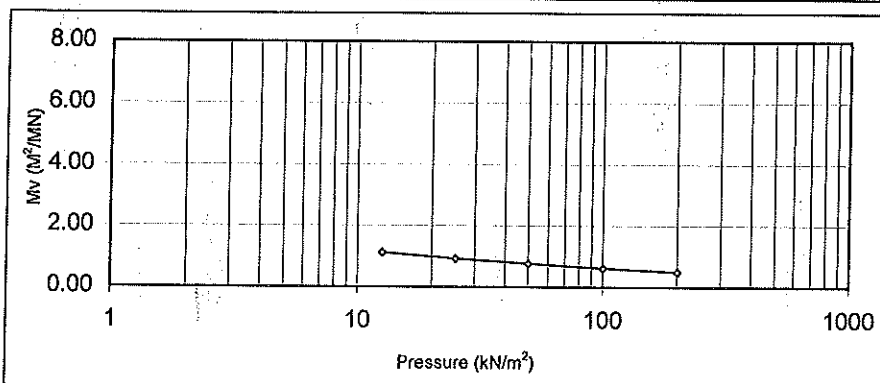
INITIAL

Water content	51	%
Dry Density	1.04	Mg/m ³
Void Ratio	1.5404	
Saturation	87	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.650	



FINAL

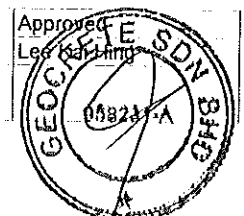
Water content	46	%
Dry Density	1.15	Mg/m ³
Void Ratio	1.2981	
Saturation	94	%
Height	18	mm
Comp. Index, Cc	0.3756	
Precons. Load	69	kN/m ²



Comp. Ratio, C_R 0.148

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

Operator Shyam Nath	Checked Chris
------------------------	------------------



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.	BH23 / UD10 / 30.00m	Test Started	22.12.18
Soil Description	Grey sandy CLAY	Ring No.	9

BEFORE TEST

Moist. Content from trimmings:	=	79 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	116.67 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.89 gm	Area (A)	=	1964 mm ²
Wt of sample	=	57.78 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	32.87 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	24.91 gm	Bulk Density (P)	=	1.471 Mg/m ³
Initial Moisture Content, M _o	=	76 %	Dry Density (PD)	=	0.837 Mg/m ³

Initial Void Ratio, e _o , SG/P _D - 1	=	2.1672
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	93 %
V. Ratio Change Factor F, $\frac{e_o}{1+e_o}$	=	0.1584 mm ⁻¹
Height of Solid $\frac{H}{H_s}$	=	6.315 mm

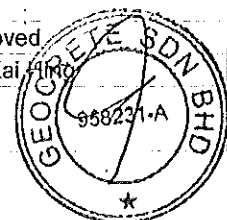
AFTER TEST

Wt of sample + Ring	=	115.04 gm	Overall settlement	=	1.824 mm.
Wt of Dry sample + Ring	=	91.76 gm	Volume Change	=	3.583 cm ³
Wt of Ring	=	58.89 gm	Final Volume	=	35.70 cm ₃
Wt of Wet sample	=	56.15 gm	Final Bulk Density	=	1.573 Mg/m ³
Wt of Dry sample	=	32.87 gm	Final Dry Density	=	0.921 Mg/m ³
Wt of Moisture	=	23.28 gm	Final Void Ratio, e _r	=	1.8784
Final Moisture Content, M _f	=	71 %			
Final Saturation, S _o ; $\frac{M_f \times SG}{e_r}$	=	100 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

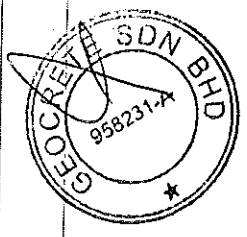
BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL	Date of Report	02.01.19
	CT10 - CT19 AND ITS ASSOCIATED WORKS AT	Test started	22.12.18
	WESTPORT, PULAU INDAH, SELANGOR	Ring No.	9
Sample No	BH23 / UD10 / 30.00m		

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_c-\Delta H$ (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	2.1672	0.0000	0				
12.5	0.164	19.836	0.0260	2.1413	0.0260	12.5	0.6619	10.89	4.04	-0.0863
25.0	0.356	19.644	0.0564	2.1109	0.0304	12.5	0.7825	6.25	6.92	-0.1010
50.0	0.724	19.276	0.1147	2.0526	0.0583	25.0	0.7642	4.00	10.51	-0.1936
100	1.308	18.692	0.2071	1.9601	0.0925	50.0	0.6253	5.76	6.95	-0.3073
200	2.420	17.580	0.3832	1.7840	0.1761	99.9	0.6330	4.41	8.28	-0.5850
100	2.366	17.634	0.3747	1.7926	-0.0086	-99.9				
50	2.204	17.796	0.3490	1.8182	-0.0257	-50.0				
12.5	1.824	18.176	0.2889	1.8784	-0.0602	-37.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing

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



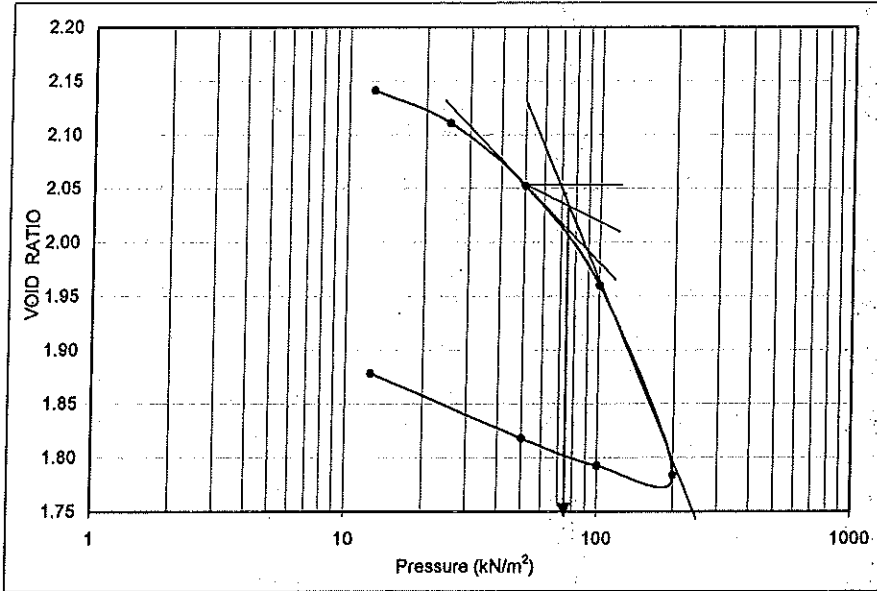
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

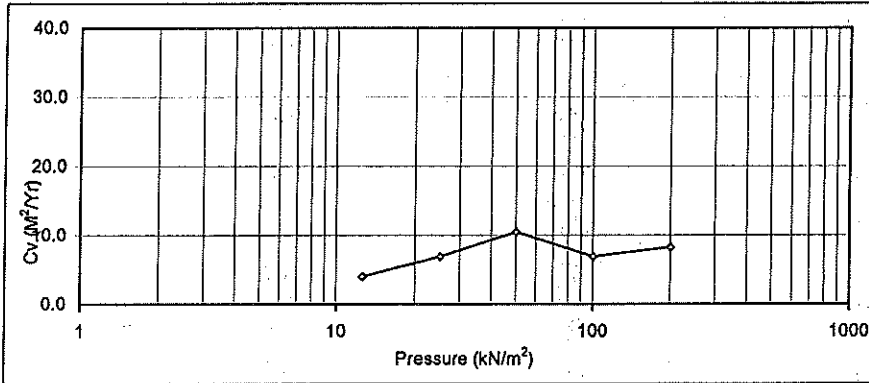
BH REF BH23 / UD10 / 30.00m

SOIL SAMPLE Grey sandy CLAY

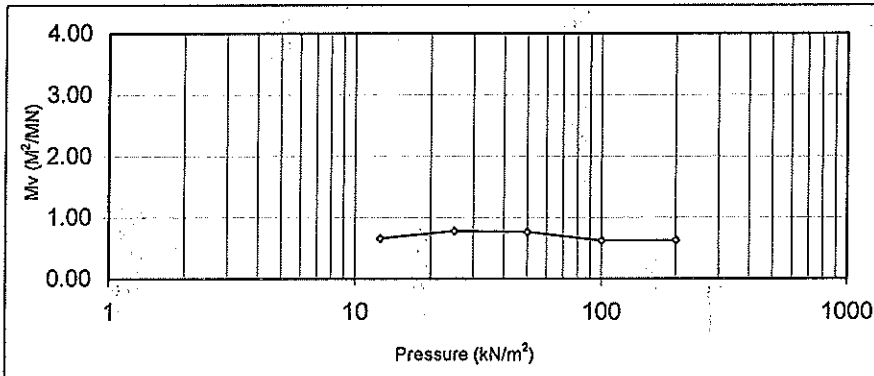
Date of Report 02.01.19
 Test started 22.12.18
 Ring No. 9



INITIAL		
Water content	76	%
Dry Density	0.84	Mg/m ³
Void Ratio	2.1672	
Saturation	93	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.650	



FINAL		
Water content	71	%
Dry Density	0.92	Mg/m ³
Void Ratio	1.8784	
Saturation	100	%
Height	18	mm
Comp. Index, Cc	0.5850	
Precons. Load	72	kN/m ²



Comp. Ratio, C _R	0.185	
-----------------------------	-------	--

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

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



Total Stress Triaxial Compression

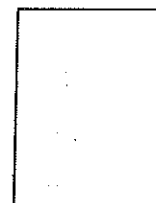
Unconsolidated Undrained

Sample details

Depth : 15.00m
 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)	152.08	154.25	155.38
Bulk Density ρ (Mg/m ³)	1.765	1.791	1.804
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)	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

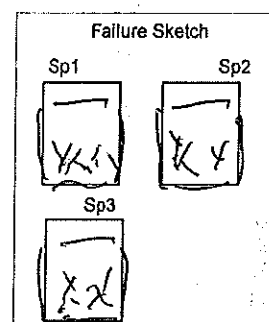
Load Channel 14391 14391 14391

Moisture Content w_0 %	45	43	40
Dry Density ρ_{d0} (Mg/m ³)	1.22	1.25	1.29
Voids Ratio e_0	1.17	1.12	1.06
Deg of Saturation S_0 %	101.20	102.39	100.38

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	86.04	99.22	109.72
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	85.84	99.02	109.52
Strain at Failure ϵ_f %	10.00	6.97	8.03
Shear Strength c_u (kPa)	43.02	49.61	54.86

Moisture Content w_f %	45	43	40
Dry Density ρ_{df} (Mg/m ³)	1.22	1.25	1.29
Voids Ratio e_f	1.17	1.12	1.06
Deg of Saturation S_f %	101.20	102.39	100.38



Notes : Intermediate Intermediate Intermediate

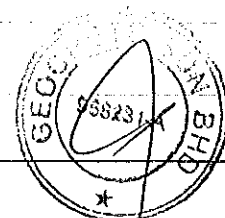
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

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

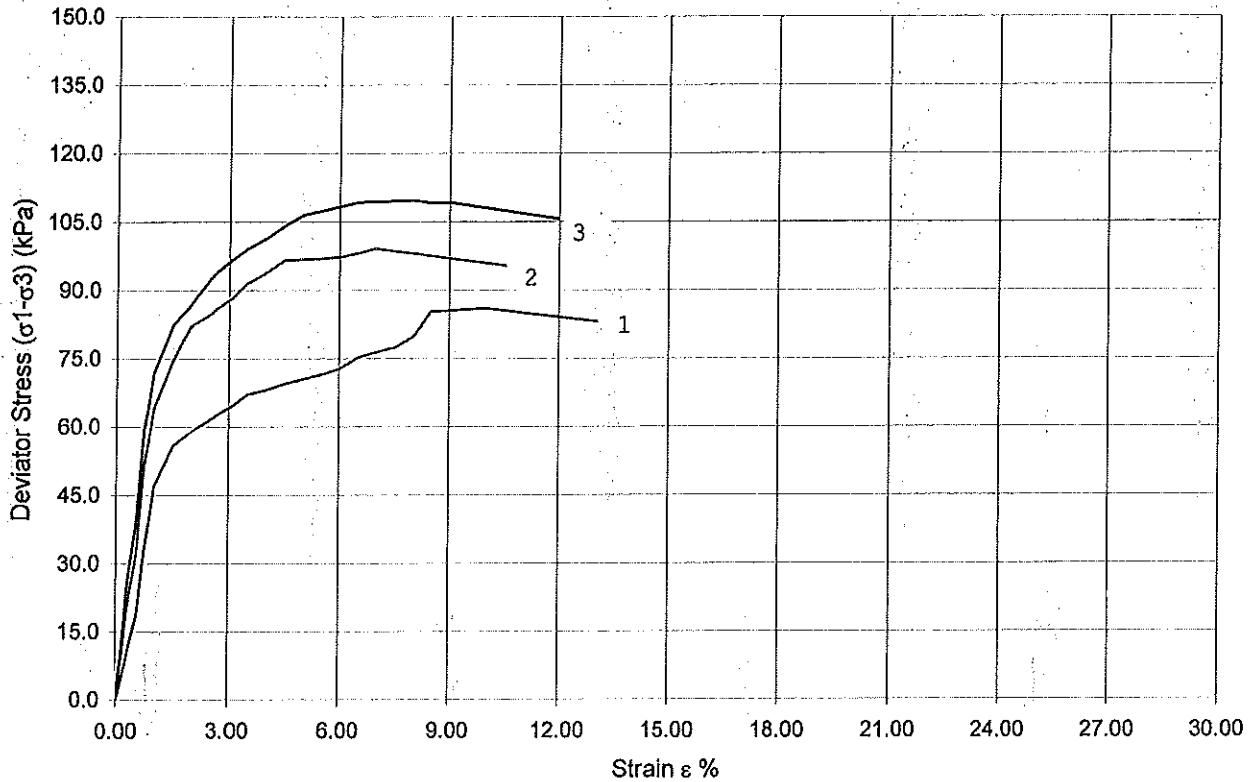
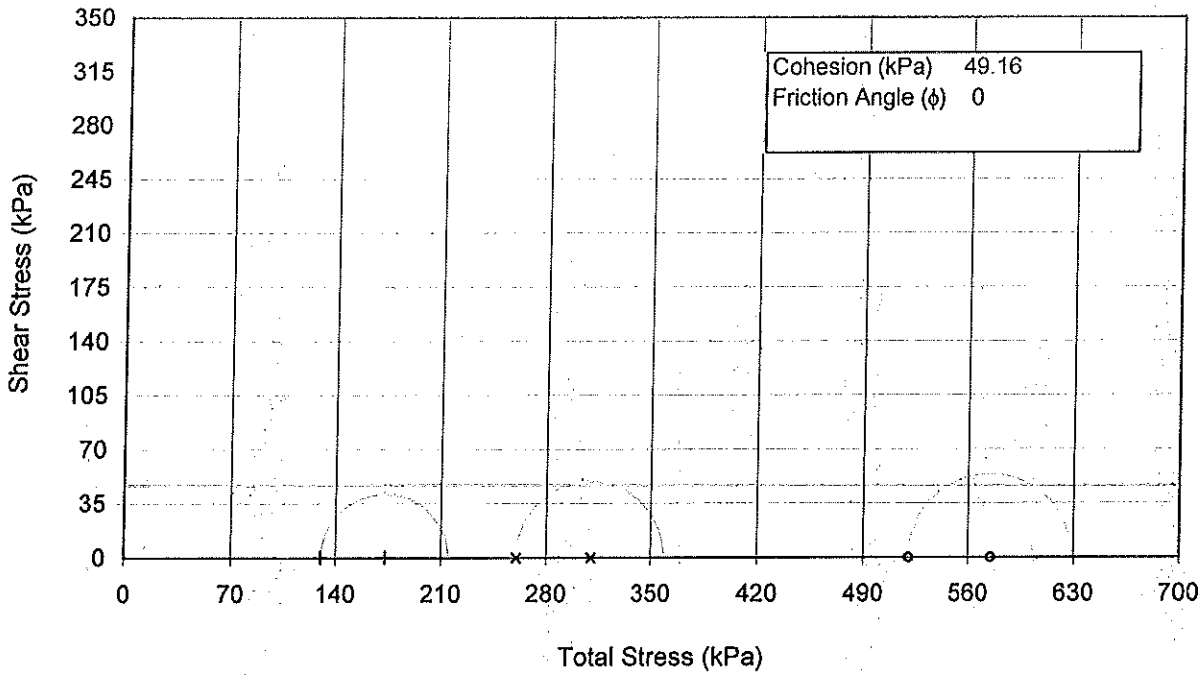
Sample : UD5
 Borehole : BH23
 Approved
 Lee Kai Hing

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

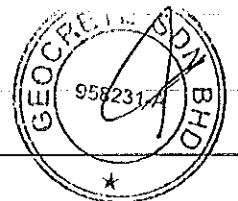
Test Name : UU

Date of Test : 23.12.18

Sample : UD5

Borehole : BH23

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

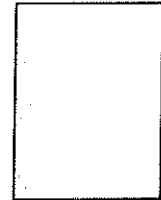
Unconsolidated Undrained

Sample details

Depth : 30.00m
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)	155.50	158.53	159.42
Bulk Density ρ (Mg/m ³)	1.805	1.840	1.851
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)	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

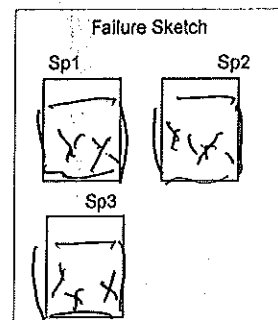
Strain Channel

Load Channel	14391	14391	14391
--------------	-------	-------	-------

Moisture Content w_0 %	45	43	41
Dry Density ρ_{d0} (Mg/m ³)	1.24	1.28	1.31
Voids Ratio e_0	1.13	1.06	1.02
Deg of Saturation S_0 %	105.70	107.96	106.45

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	125.16	168.21	202.71
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	124.96	168.01	202.51
Strain at Failure ϵ_f %	9.47	9.01	9.01
Shear Strength c_u (kPa)	62.58	84.10	101.36



Moisture Content w_f %	45	43	41
Dry Density ρ_{df} (Mg/m ³)	1.24	1.28	1.31
Voids Ratio e_f	1.13	1.06	1.02
Deg of Saturation S_f %	105.70	107.96	106.45

Notes : Intermediate Intermediate Intermediate

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

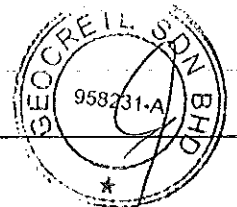
Sample : UD10

Borehole : BH23

Operator
Shyam Nath

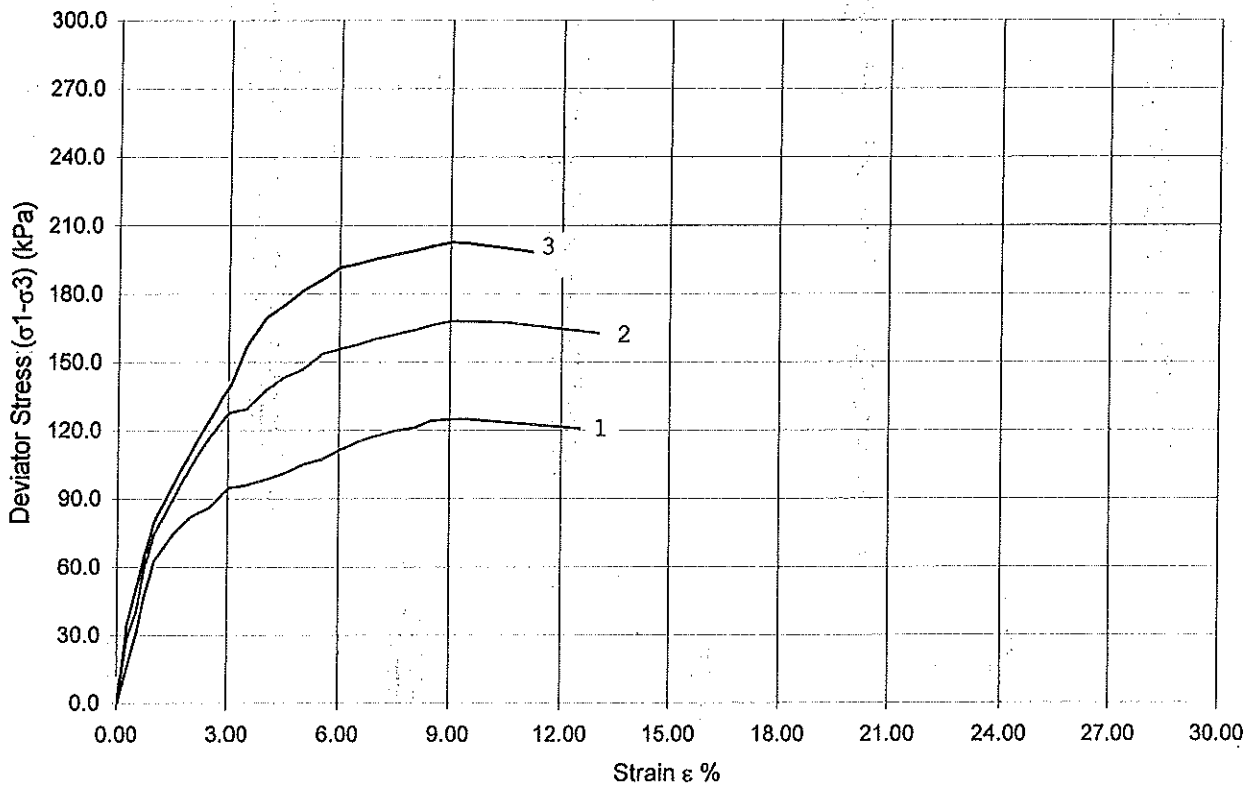
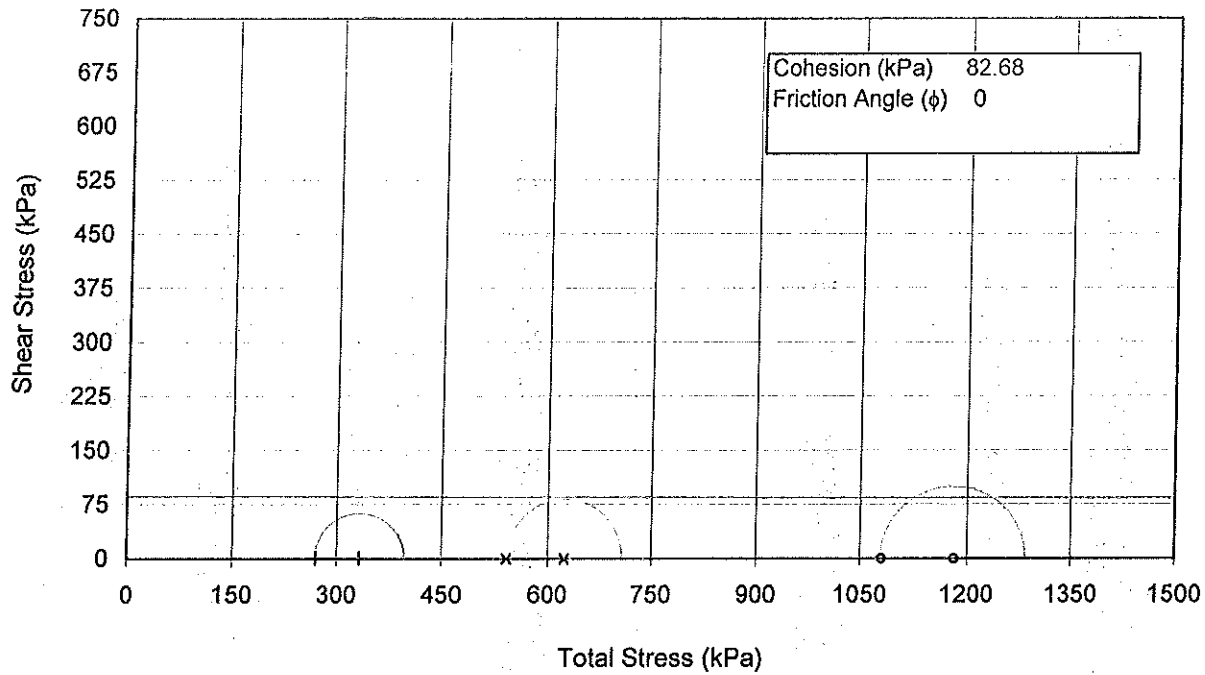
Checked
Chris

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

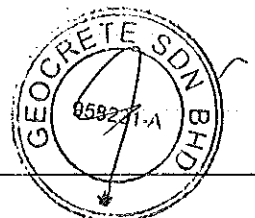
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 23.12.18

Sample : UD10
Borehole : BH23

Approved :
Lee Kai Hing



SUMMARY OF TEST RESULTS

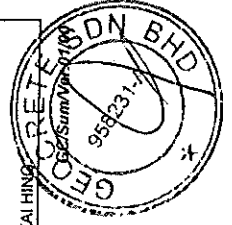
GEOCRETE SENDIRIAN BERHAD (Co. No.958231 - A)		PROJECT :	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR						REF : L081/18/139/18 DATE : 29.12.18																																	
			SIEVE AND HYDROMETER ANALYSIS			CUU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST																																
SAMPLE AND SPECIMEN DETAILS	Borehole Zo.	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	ATTERBERG LIMITS			SHEAR BOX TEST		CUU TEST		φ (Deg)	Cc	pH	Chloride (%)	Total Sulphate (%)	Organic Content (%)	Soluble Sulphate (mg/L)																								
					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)	Pe (kPa)																	
	BH24	42	1.61	1.21	53	25	28	11.8	44	32	24	0	2.63		31.20	0		6.9	0.20	0.47	6.9																					
	UD3	27	1.81	1.43	55	24	31		47	33	20	0	2.63																													
	D6	36	NA	NA					31	22	47	0																														
	UD7	70	1.61	1.10	73	29	44		57	40	3	0	2.58		30.15	0							0.677																			
	UD10	42	1.72	1.18	81	31	50	14.3	62	36	2	0			34.88	0						0.256																				
	D16	33	NA	NA					46	29	25	0																														
	D17	31	NA	NA	51	26	25	9.7	44	32	24	0	2.64																													
	D20	37	NA	NA					30	19	51	0																														
	D23	28	NA	NA				NA	19		81	0																														
	D24	23	1.99	1.63					12	88	0	0	2.70																													
	D30	32	NA	NA					22	78	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



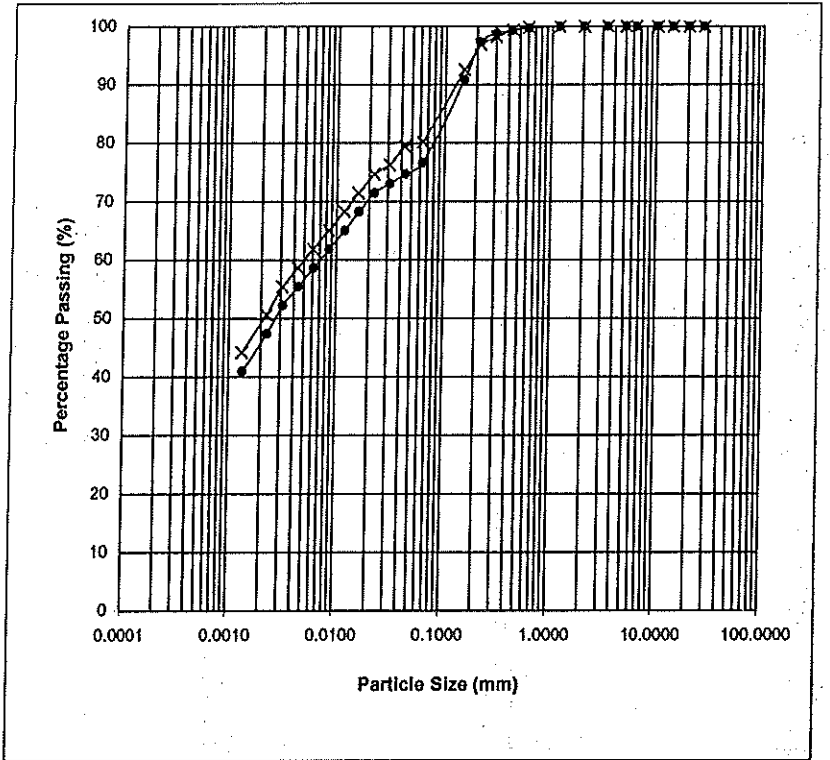
PARTICLE SIZE DISTRIBUTION

(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

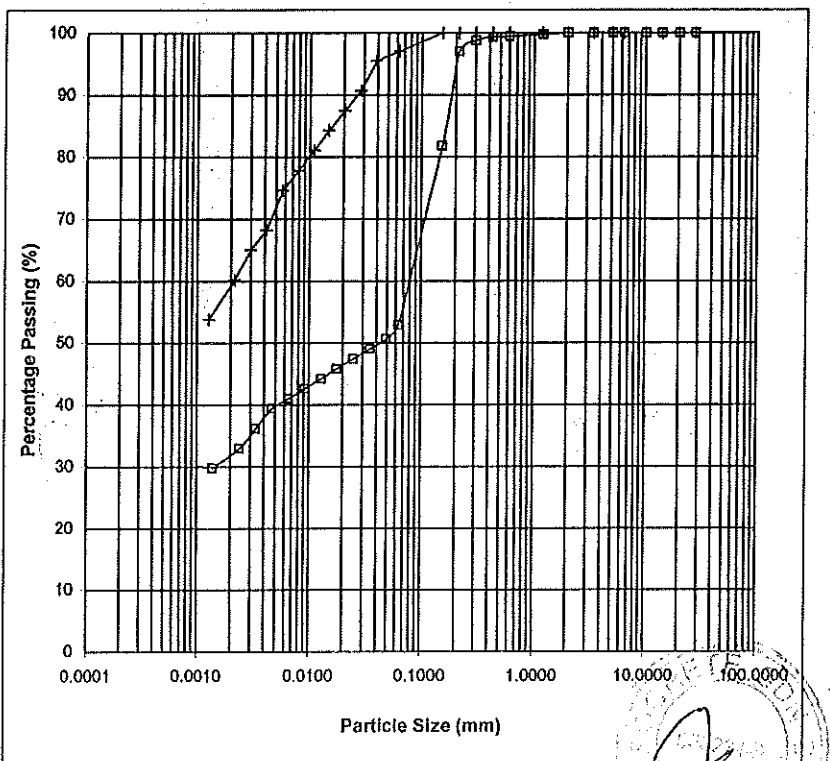
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	99	0.425	99	
0.300	99	0.300	98	
0.212	97	0.212	97	
0.150	91	0.150	93	
0.083	77	0.083	80	
0.0438	75	0.0427	79	
0.0312	73	0.0307	76	
0.0223	71	0.0219	75	
0.0160	68	0.0157	71	
0.0119	65	0.0117	68	
0.0085	62	0.0084	65	
0.0061	59	0.0060	62	
0.0044	55	0.0043	59	
0.0031	52	0.0031	55	
0.0023	47	0.0022	51	
0.0013	41	0.0013	44	
Clay (%)		44	Clay (%)	47
Silt (%)		32	Silt (%)	33
Sand (%)		24	Sand (%)	20
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH24	UD1	3.00	22.12.18
x	BH24	UD3	9.00	22.12.18



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	100	
0.212	97	0.212	100	
0.150	82	0.150	100	
0.083	53	0.083	97	
0.0489	51	0.0389	96	
0.0348	49	0.0283	91	
0.0248	47	0.0204	87	
0.0176	46	0.0147	84	
0.0130	44	0.0109	81	
0.0092	43	0.0079	78	
0.0066	41	0.0057	75	
0.0047	39	0.0041	68	
0.0033	36	0.0030	65	
0.0024	33	0.0021	60	
0.0014	30	0.0013	54	
Clay (%)		31	Clay (%)	57
Silt (%)		22	Silt (%)	40
Sand (%)		47	Sand (%)	3
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH24	D6	16.50	22.12.18
+	BH24	UD7	21.00	22.12.18



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

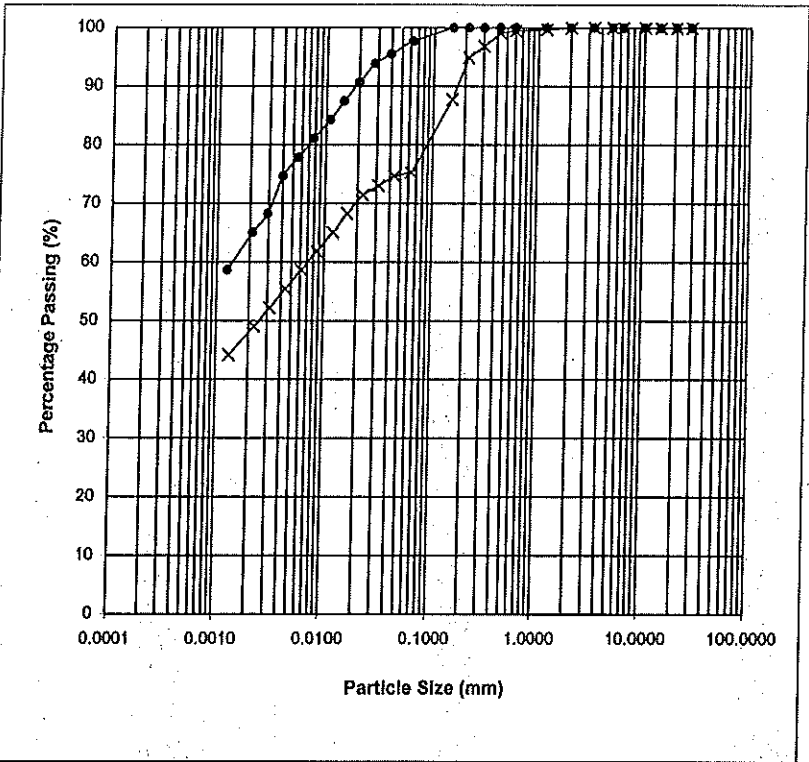
PARTICLE SIZE DISTRIBUTION

(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

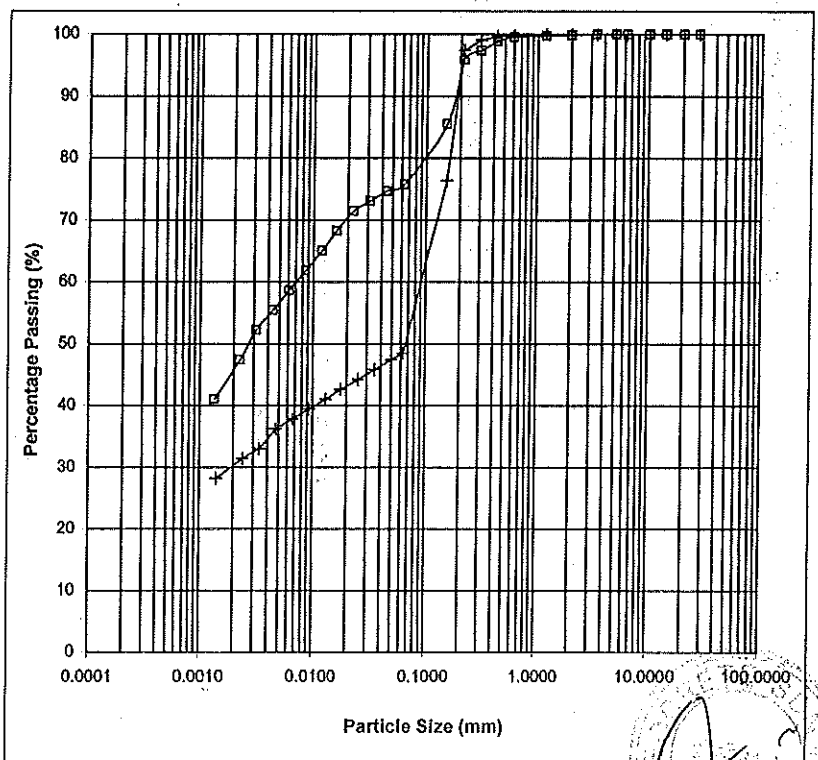
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	100	0.425	99
0.300	100	0.300	97
0.212	100	0.212	95
0.150	100	0.150	88
0.063	98	0.063	75
0.0389	96	0.0438	75
0.0278	94	0.0312	73
0.0200	91	0.0223	71
0.0144	87	0.0160	68
0.0107	84	0.0119	65
0.0077	81	0.0085	62
0.0058	78	0.0061	59
0.0040	75	0.0044	55
0.0029	68	0.0031	52
0.0021	65	0.0022	49
0.0012	59	0.0013	44
Clay (%)	62	Clay (%)	46
Silt (%)	36	Silt (%)	29
Sand (%)	2	Sand (%)	25
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH24	UD10	30.00	22.12.18
x	BH24	D16	39.00	22.12.18



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	97	0.300	99
0.212	96	0.212	97
0.150	86	0.150	76
0.063	76	0.063	48
0.0438	75	0.0496	47
0.0312	73	0.0353	46
0.0223	71	0.0251	44
0.0160	68	0.0179	43
0.0119	65	0.0131	41
0.0085	62	0.0093	39
0.0061	59	0.0066	38
0.0044	55	0.0047	36
0.0031	52	0.0034	33
0.0023	47	0.0024	31
0.0013	41	0.0014	28
Clay (%)	44	Clay (%)	30
Silt (%)	32	Silt (%)	19
Sand (%)	24	Sand (%)	51
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH24	D17	40.50	22.12.18
+	BH24	D20	45.00	22.12.18



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

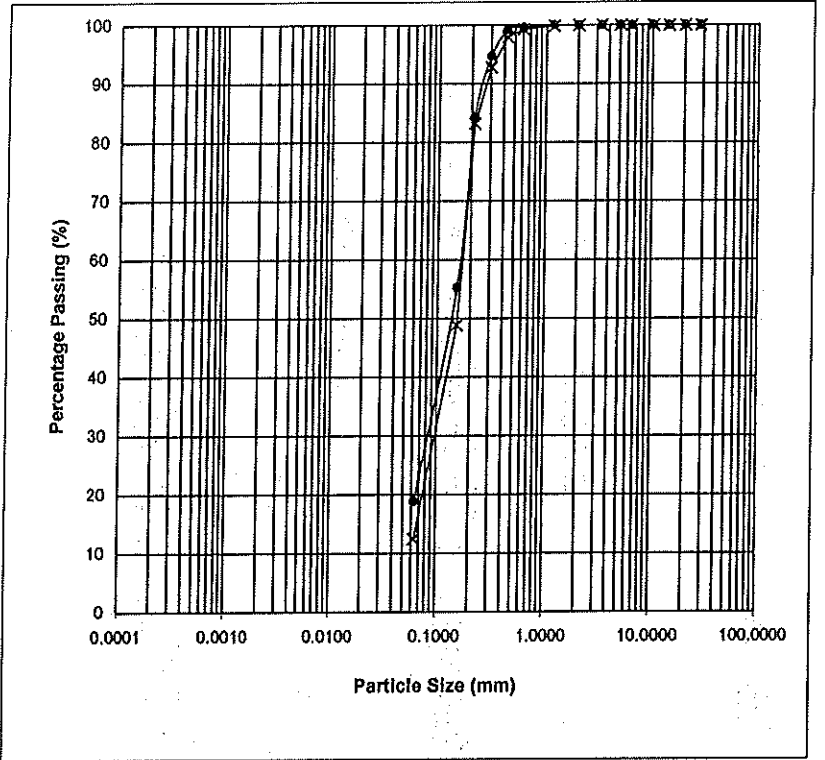
PARTICLE SIZE DISTRIBUTION

(B.S 1977 - 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

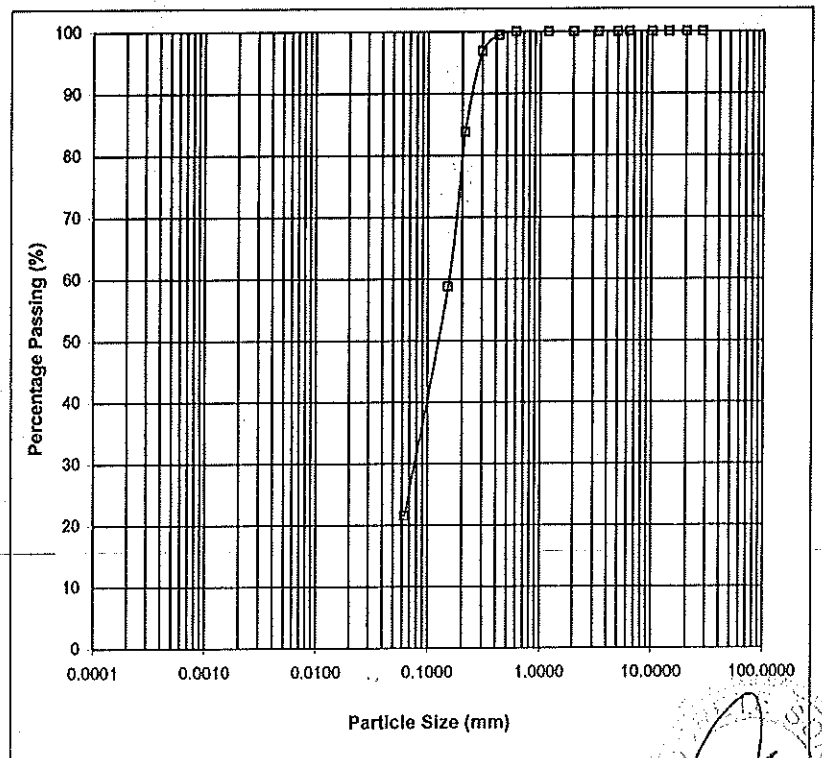
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	99	
0.425	99	0.425	98	
0.300	95	0.300	93	
0.212	84	0.212	83	
0.150	55	0.150	49	
0.083	19	0.083	12	
Clay (%)		19	Clay (%)	12
Silt (%)		81	Silt (%)	88
Sand (%)		0	Sand (%)	0
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH24	D23	49.50	22.12.18
X	BH24	D24	51.00	22.12.18



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	100		
0.425	99		
0.300	97		
0.212	84		
0.150	59		
0.063	22		
Clay (%)		22	
Silt (%)		78	
Sand (%)		0	
Gravel (%)		0	
Total (%)		100	

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH24	D30		22.12.18
+				



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

Total Stress Triaxial Compression

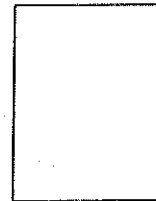
Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : 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)	137.11	138.35	140.02
Bulk Density ρ (Mg/m ³)	1.592	1.606	1.625
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

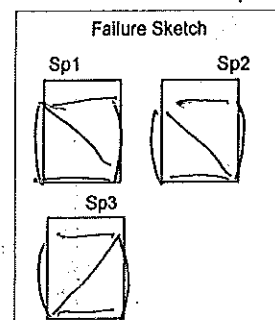
	Specimen 1	Specimen 2	Specimen 3
Strain Channel	14391	14391	14391
Load Channel	14391	14391	14391

Moisture Content w_0 %	34	33	30
Dry Density ρ_{d0} (Mg/m ³)	1.19	1.21	1.25
Voids Ratio e_0	1.17	1.14	1.06
Deg of Saturation S_0 %	74.90	74.91	72.53

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	46.59	66.13	74.45
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	46.39	65.93	74.25
Strain at Failure ϵ_f %	11.97	10.00	11.51
Shear Strength c_u (kPa)	23.30	33.06	37.23

Moisture Content w_f %	34	33	30
Dry Density ρ_{df} (Mg/m ³)	1.19	1.21	1.25
Voids Ratio e_f	1.17	1.14	1.06
Deg of Saturation S_f %	74.90	74.91	72.53



Notes : Shear Shear Shear

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

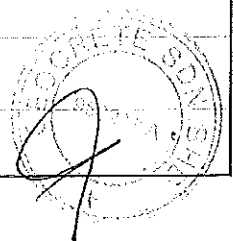
Test Name : UU
 Date of Test : 20.12.18

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

Sample : UD:i
 Borehole : BH24

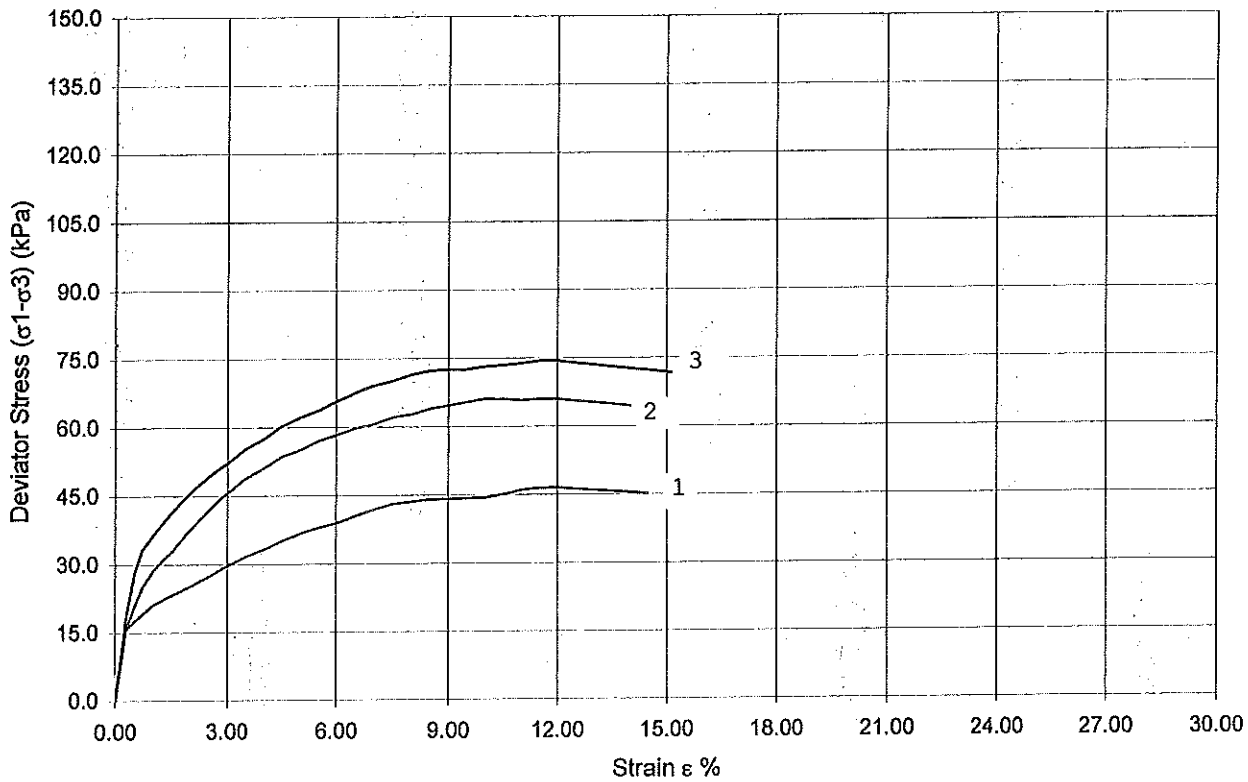
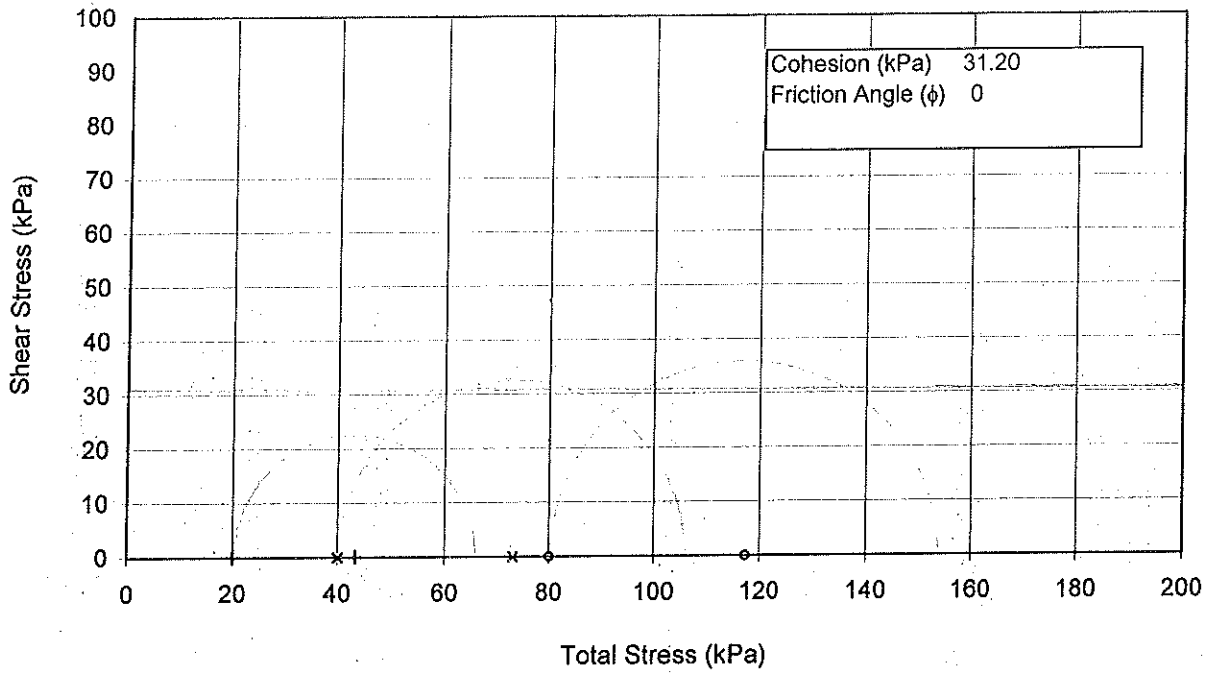
Operator : Shyam Nath
 Checked : Chris

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

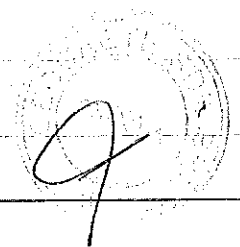
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 20.12.18

Sample : UD1
Borehole : BH24

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

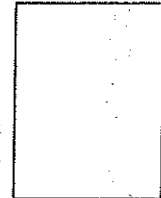
Unconsolidated Undrained

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)	137.55	138.53	140.18
Bulk Density ρ (Mg/m ³)	1.597	1.608	1.627
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



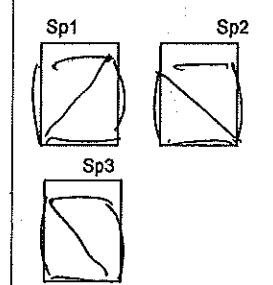
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	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 %	47	46	45
Dry Density ρ_{d0} (Mg/m ³)	1.09	1.10	1.12
Voids Ratio e_0	1.37	1.34	1.29
Deg of Saturation S_0 %	87.80	88.53	89.12

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	46.77	65.07	69.09
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	46.57	64.87	68.89
Strain at Failure ϵ_f %	7.50	8.49	6.97
Shear Strength c_u (kPa)	23.39	32.53	34.54
Moisture Content w_f %	47	46	45
Dry Density ρ_{df} (Mg/m ³)	1.09	1.10	1.12
Voids Ratio e_f	1.37	1.34	1.29
Deg of Saturation S_f %	87.80	88.53	89.12

Failure Sketch



Notes : Shear Shear Shear

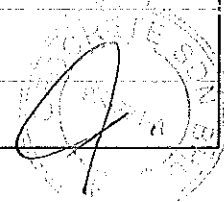
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

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

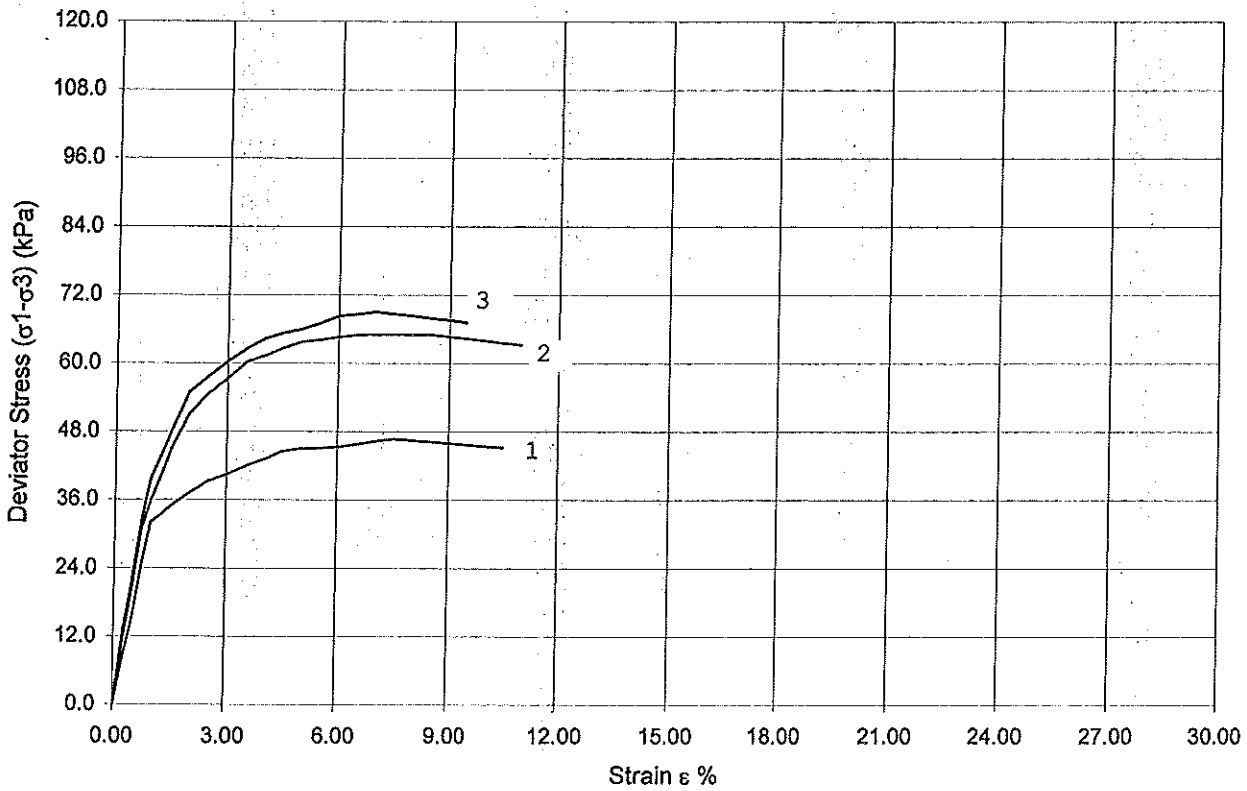
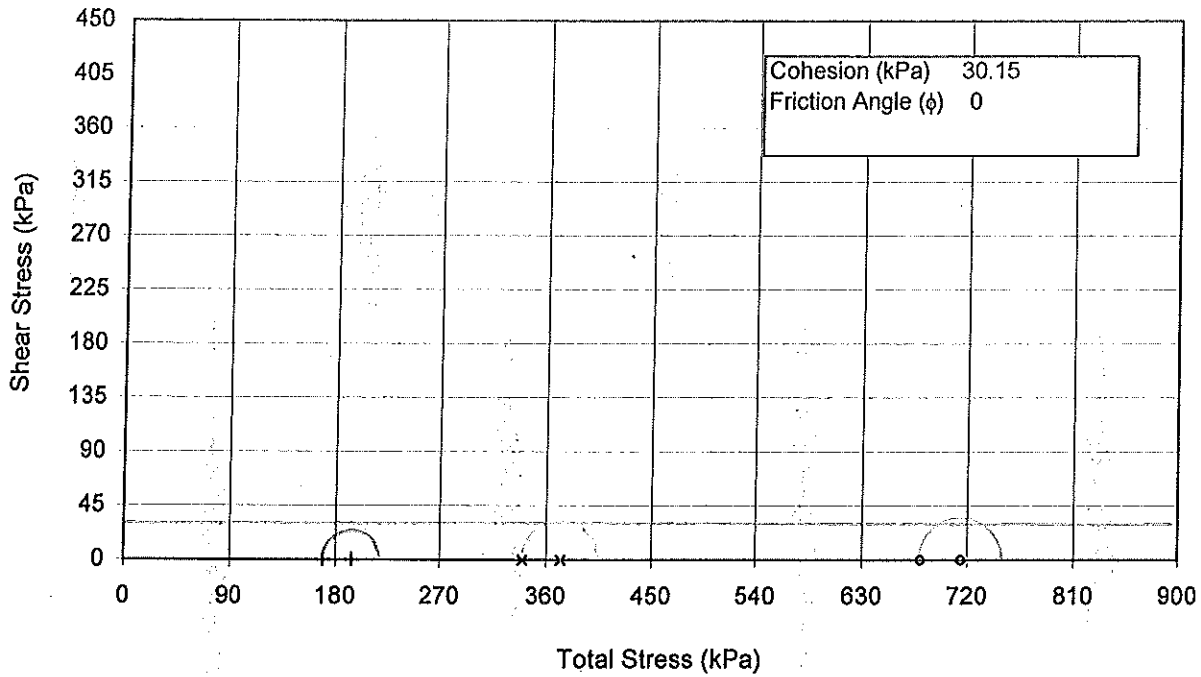
Sample : UD7
Borehole : BH24
Approved
Lee Kai Hing

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

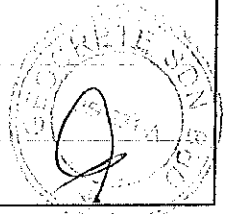
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 20.12.18

Sample : UD7
 Borehole : BH24

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

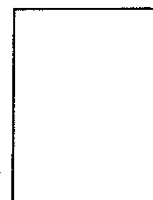
Unconsolidated Undrained

Sample details

Depth : 30.00m
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)	147.05	148.53	151.32
Bulk Density ρ (Mg/m ³)	1.707	1.724	1.756
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



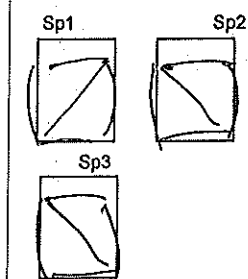
Initial Conditions

	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 %	48	46	44
Dry Density ρ_{d0} (Mg/m ³)	1.15	1.18	1.22
Voids Ratio e_0	1.24	1.19	1.12
Deg of Saturation S_0 %	100.17	100.23	102.22

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	55.95	69.08	84.23
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	55.75	68.88	84.03
Strain at Failure ϵ_f %	8.03	5.99	8.49
Shear Strength c_u (kPa)	27.98	34.54	42.11
Moisture Content w_f %	48	46	44
Dry Density ρ_{df} (Mg/m ³)	1.15	1.18	1.22
Voids Ratio e_f	1.24	1.19	1.12
Deg of Saturation S_f %	100.17	100.23	102.22

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 :

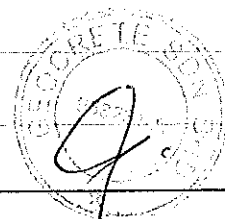
20.12.18

Sample : UD10

Borehole : BH24

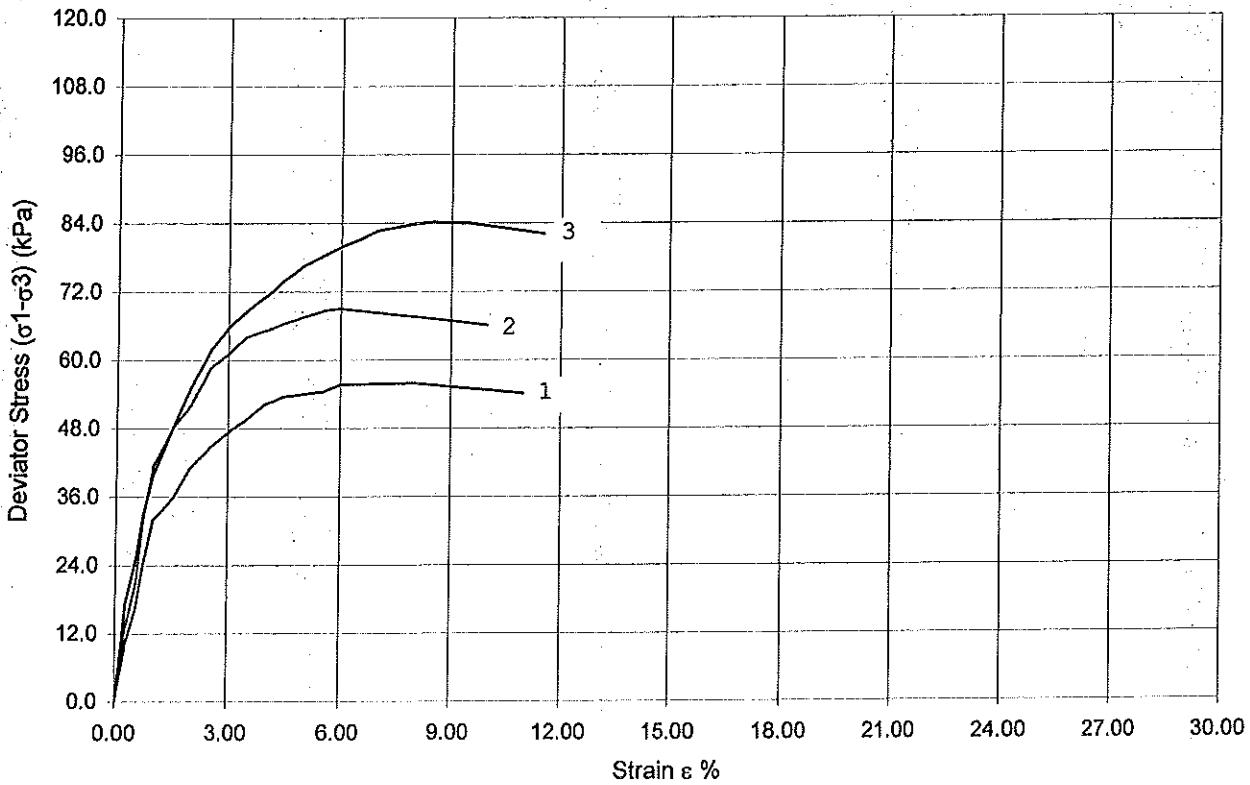
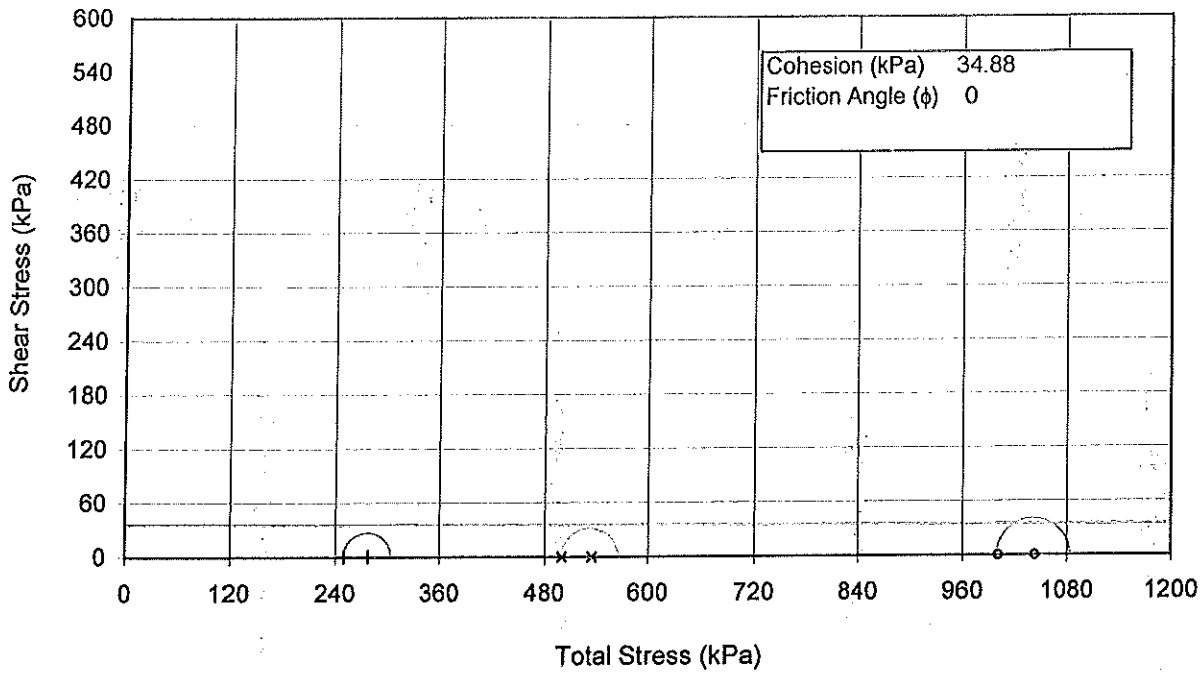
Approved

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 : 20.12.18

Sample : UD10
 Borehole : BH24

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.	BH24 / UD10 / 30.00m	Test Started	19.12.18
Soil Description	Dark grey CLAY	Ring No.	A15

BEFORE TEST

Moist. Content from trimmings:	=	45 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	124.30 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.58 gm	Area (A)	=	1964 mm ²
Wt of sample	=	63.72 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	44.59 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	19.13 gm	Bulk Density (P)	=	1.622 Mg/m ³
Initial Moisture Content, M ₀	=	43 %	Dry Density (PD)	=	1.135 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.2731			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	87 %			
V. Ratio Change Factor F _v , $\frac{1+e_0}{H}$	=	0.1137 mm ⁻¹			
Height of Solid	H _s	=	8.799 mm		

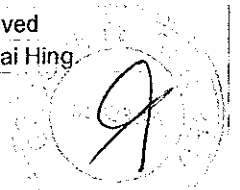
AFTER TEST

Wt of sample + Ring	=	122.42 gm	Overall settlement	=	1.674 mm
Wt of Dry sample + Ring	=	105.17 gm	Volume Change	=	3.288 cm ³
Wt of Ring	=	60.58 gm	Final Volume	=	36.00 cm ³
Wt of Wet sample	=	61.84 gm	Final Bulk Density	=	1.718 Mg/m ³
Wt of Dry sample	=	44.59 gm	Final Dry Density	=	1.239 Mg/m ³
Wt of Moisture	=	17.25 gm	Final Void Ratio, e _f	=	1.0828
Final Moisture Content, M _f	=	39 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	92 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



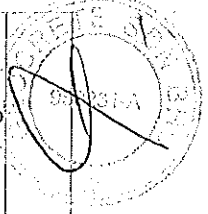
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	29.12.18
Sample No	BH24 / UD10 / 30.00m	Test started	19.12.18
		Ring No.	A15

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	1.2731	0.0000	0				
6.25	0.067	19.933	0.0076	1.2655	0.0076	6.25	0.5382	1.96	22.58	-0.0253
12.5	0.163	19.837	0.0185	1.2546	0.0109	6.25	0.7749	4.41	9.95	-0.0362
25.0	0.244	19.756	0.0277	1.2454	0.0092	12.5	0.3283	2.56	16.99	-0.0306
50.0	0.361	19.639	0.0410	1.2321	0.0133	25.0	0.2385	1.21	35.59	-0.0442
100	0.602	19.398	0.0684	1.2047	0.0274	50.0	0.2487	1.69	25.02	-0.0910
200	0.971	19.029	0.1104	1.1627	0.0419	99.9	0.1941	1.21	33.86	-0.1393
400	1.510	18.490	0.1716	1.1015	0.0613	199.8	0.1459	1.44	27.13	-0.2035
800	2.188	17.812	0.2487	1.0244	0.0771	400.7	0.0950	1.69	21.64	-0.2560
400	2.086	17.914	0.2371	1.0360	-0.0116	-400.7				
100	1.844	18.156	0.2096	1.0635	-0.0275	-299.8				
25	1.674	18.326	0.1903	1.0828	-0.0193	-74.9				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



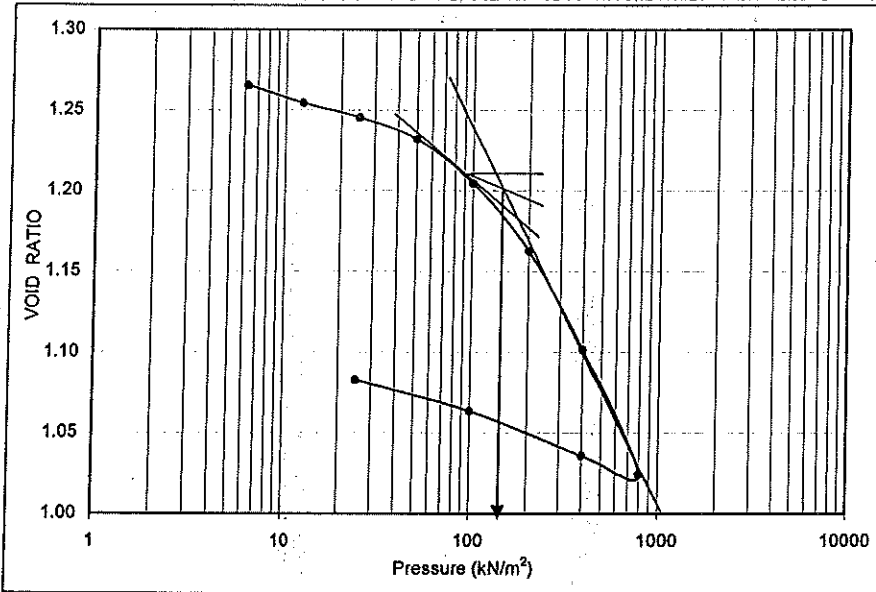
GEOCRETE SDN. BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

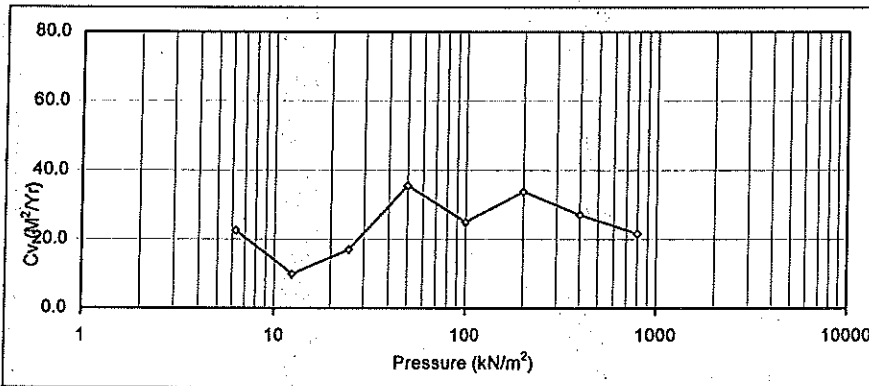
BH REF BH24 / UD10 / 30.00m
 SOIL SAMPLE Dark grey CLAY

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A15



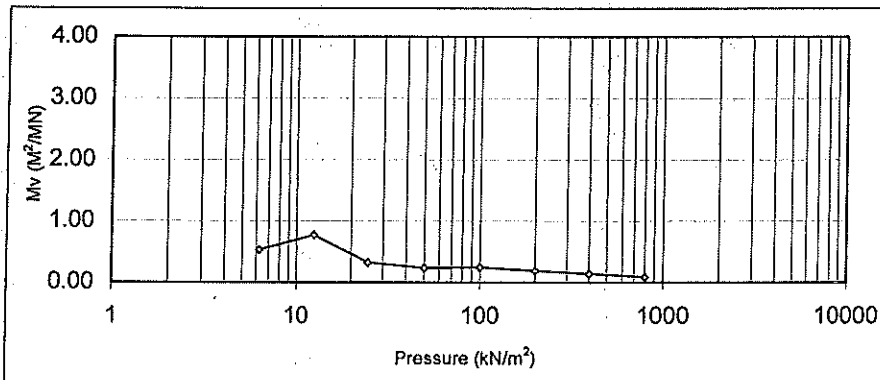
INITIAL

Water content	43	%
Dry Density	1.14	Mg/m ³
Void Ratio	1.2731	
Saturation	87	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.580	

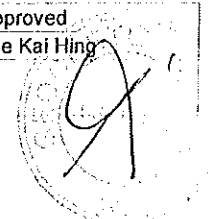


FINAL

Water content	39	%
Dry Density	1.24	Mg/m ³
Void Ratio	1.0828	
Saturation	92	%
Height	18	mm
Comp. Index, C _c	0.2560	
Precons. Load	150	kN/m ²



Comp. Ratio, C_r 0.113



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.

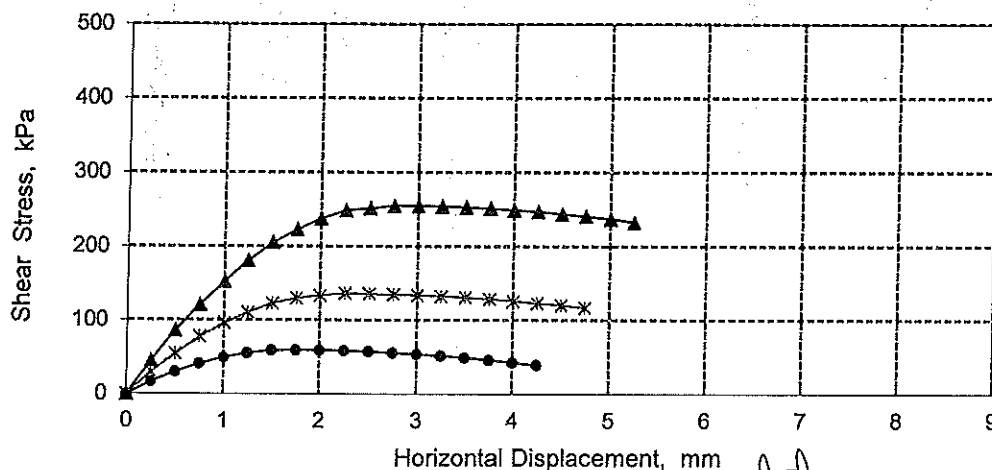
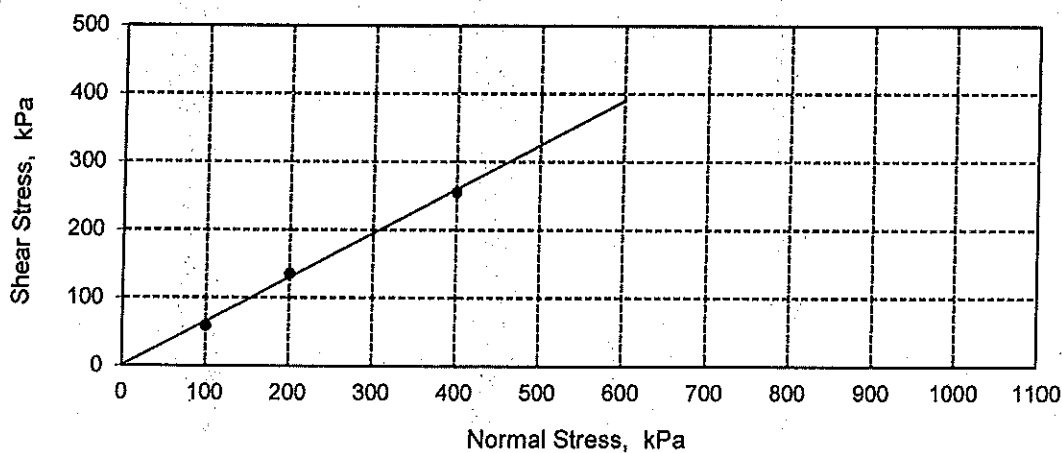
Sample No. : BH 24 / D 24 (51.00 m)

Test Size : 60 mm x 60 mm x 20 mm Date Tested : 27 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		143.6	143.6	143.4
Moisture Content (%)		21.5	22.2	22.0
Bulk Density (Mg/m ³)		1.994	1.994	1.991
Dry Density (Mg/m ³)		1.641	1.632	1.632
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		59.3	136.1	255.5
Displ. at Failure (mm)		1.5	2.3	2.8
Settlement (mm)		0.2	0.4	0.6

c' 1 kPa

ϕ' 33 deg.

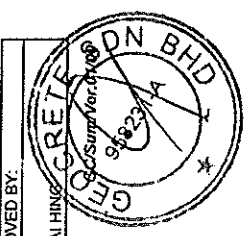


SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No.959231 - A)		PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR												REF : L081/18/139/18 DATE : 29.12.18										
SAMPLE AND SPECIMEN DETAILS.		ATTERBERG			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 (%)	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)	
BH25	UD1	3.00	44	1.16	1.67	2.00	28	26	2.00	1.59	1.59	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	UD5	15.00	28	1.57	2.00	2.00	26	24	2.00	1.59	1.59	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	UD7	21.00	26	1.59	2.00	2.00	24	24	2.00	1.59	1.59	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	UD10	30.00	76	0.91	1.61	2.00	85	32	53	14.7	37	3	0	2.58	29.07	0	43	0.517	1.4	0.12	0.93	7.8	7.8	7.8
	D13	34.50	40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	D14	36.00	24	NA	NA	NA	NA	NA	NA	NA	17	83	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	D17	40.50	23	NA	NA	NA	NA	NA	NA	NA	21	79	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	D23	49.50	20	NA	NA	NA	NA	NA	NA	NA	19	81	0	2.71	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	D25	52.50	36	NA	NA	NA	NA	NA	NA	NA	28	22	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	D26	54.00	17	2.22	2.22	2.01	9	91	0	2.71	4	27.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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. ** BH25 UD5 - TRIAXIAL (UU) & CONSOL TESTS CANNOT BE CARRIED OUT DUE TO NON-PLASTICITY NATURE OF SPECIMEN.



APPROVED BY:
LEE KAI HING

CHECKED BY:
CHRIS

SUM

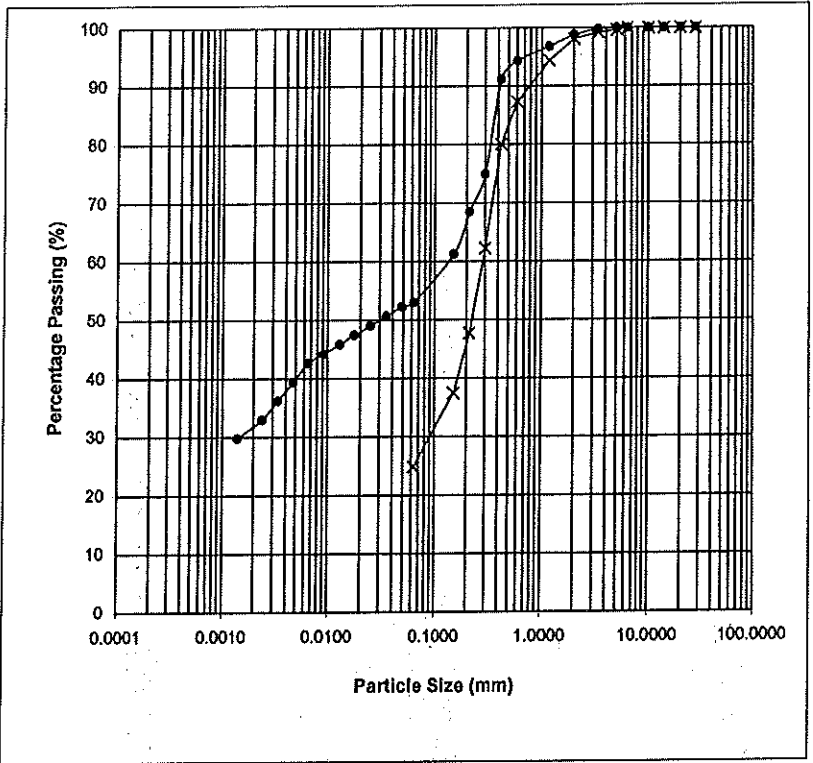
PARTICLE SIZE DISTRIBUTION

(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

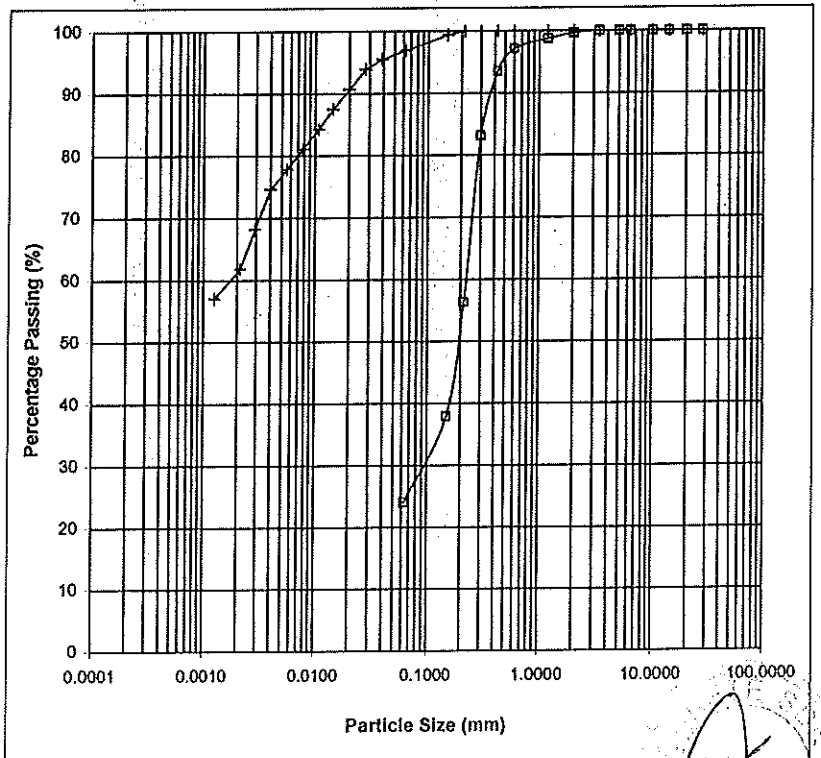
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	99
2.00	99	2.00	98
1.18	97	1.18	94
0.600	94	0.600	87
0.425	91	0.425	80
0.300	75	0.300	62
0.212	68	0.212	48
0.150	61	0.150	38
0.063	53	0.063	25
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 (%)	31	Clay (%)	25
Silt (%)	22	Silt (%)	
Sand (%)	46	Sand (%)	73
Gravel (%)	1	Gravel (%)	2
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH25	UD1	3.00	22.12.18
X	BH25	UD5	15.00	22.12.18



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	94	0.425	100
0.300	83	0.300	100
0.212	56	0.212	100
0.150	38	0.150	99
0.063	24	0.063	97
		0.0389	96
		0.0278	94
		0.0200	91
		0.0144	87
		0.0107	84
		0.0077	81
		0.0056	78
		0.0040	75
		0.0029	68
		0.0021	62
		0.0013	57
Clay (%)	24	Clay (%)	60
Silt (%)		Silt (%)	37
Sand (%)	76	Sand (%)	3
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH25	UD7	21.00	22.12.18
+	BH25	UD10	30.00	22.12.18



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

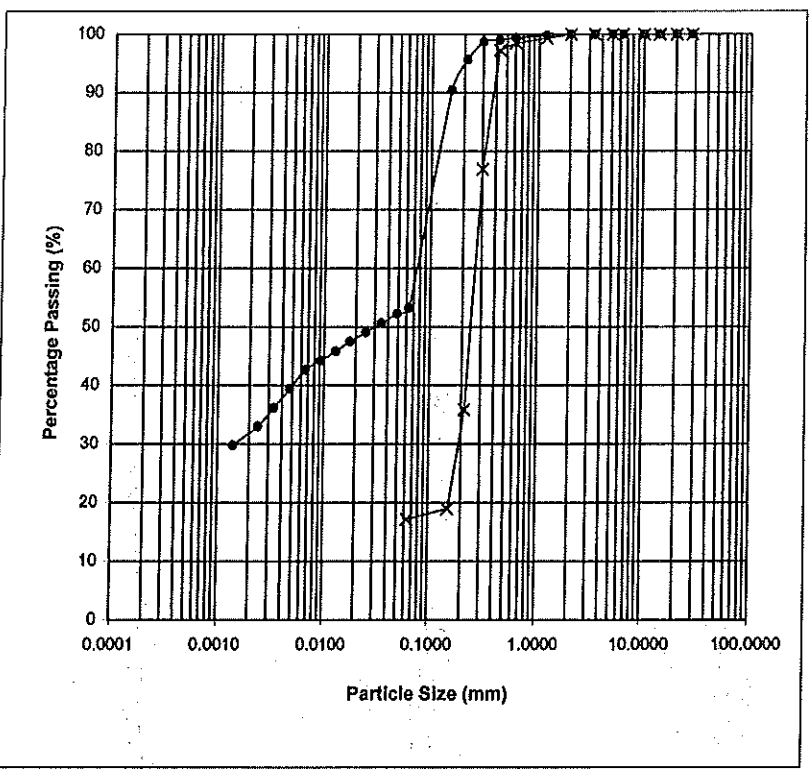
PARTICLE SIZE DISTRIBUTION

(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

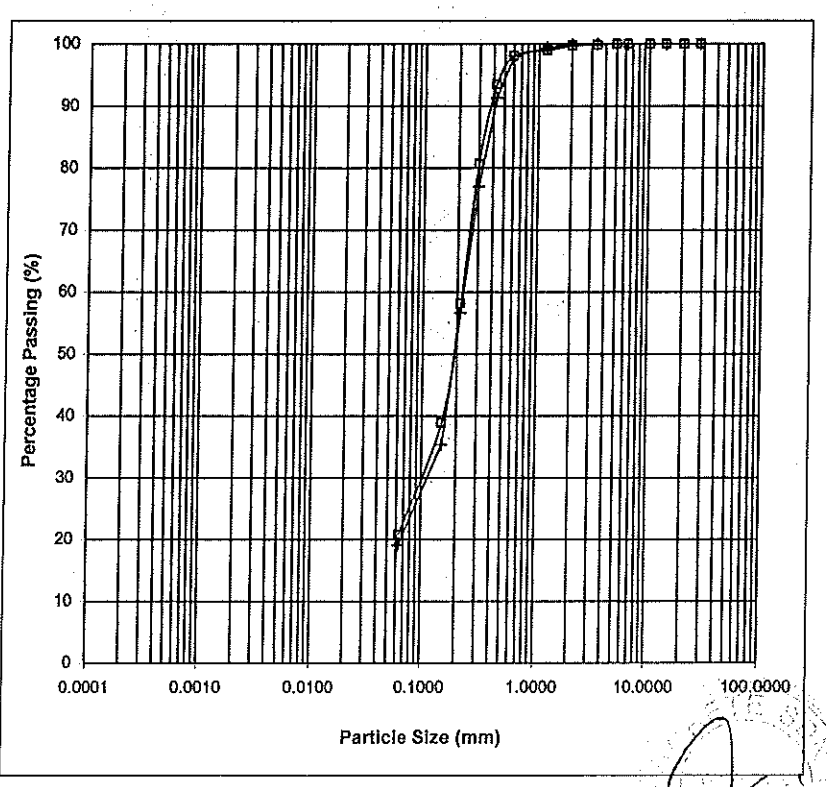
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	99	
0.600	99	0.600	98	
0.425	99	0.425	97	
0.300	99	0.300	77	
0.212	96	0.212	36	
0.150	90	0.150	19	
0.063	53	0.063	17	
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 (%)		31	Clay (%)	17
Silt (%)		22	Silt (%)	
Sand (%)		47	Sand (%)	83
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH25	D13	34.50	22.12.18
X	BH25	D14	36.00	22.12.18



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	99	
0.600	98	0.600	98	
0.425	93	0.425	91	
0.300	81	0.300	77	
0.212	58	0.212	57	
0.150	39	0.150	35	
0.063	21	0.063	19	
Clay (%)		21	Clay (%)	19
Silt (%)			Silt (%)	
Sand (%)		79	Sand (%)	81
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH25	D17	40.50	22.12.18
+	BH25	D23	49.50	22.12.18



Total Stress Triaxial Compression

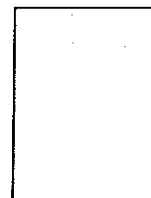
Unconsolidated Undrained

Sample details

Depth : 3.00m
Description : Greenish 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)	141.82	143.51	145.10
Bulk Density ρ (Mg/m ³)	1.646	1.666	1.684
Particle Density ρ_s	2.66	2.66	2.66

Sketch showing specimen location in original sample

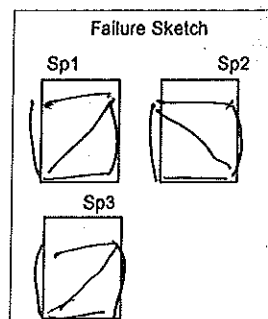


Initial Conditions

	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	14391	14391	14391
Moisture Content w_0 %	44	43	42
Dry Density ρ_{d0} (Mg/m ³)	1.14	1.16	1.19
Voids Ratio e_0	1.33	1.29	1.24
Deg of Saturation S_0 %	88.41	89.31	89.46

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	52.18	70.56	77.90
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	51.98	70.36	77.70
Strain at Failure ϵ_f %	6.97	6.97	6.97
Shear Strength c_u (kPa)	26.09	35.28	38.95
Moisture Content w_f %	44	43	42
Dry Density ρ_{df} (Mg/m ³)	1.14	1.16	1.19
Voids Ratio e_f	1.33	1.29	1.24
Deg of Saturation S_f %	88.41	89.31	89.46



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

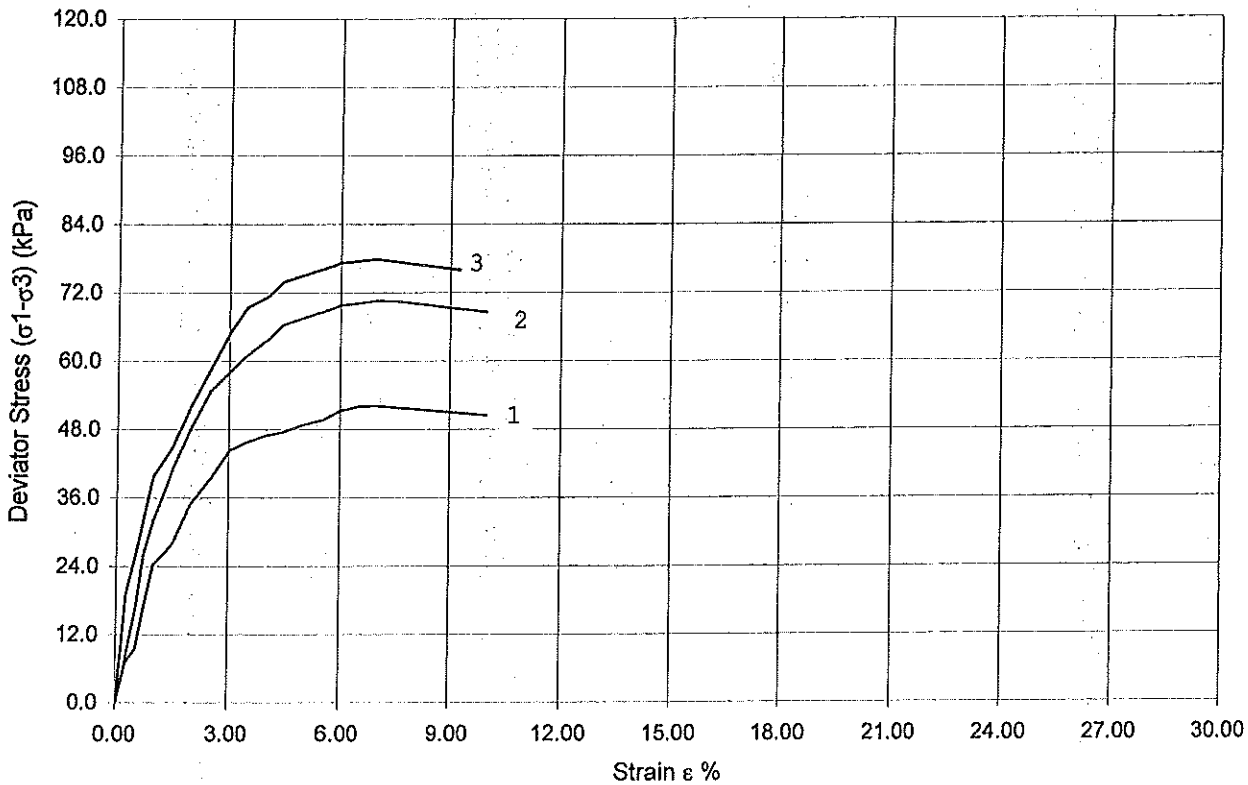
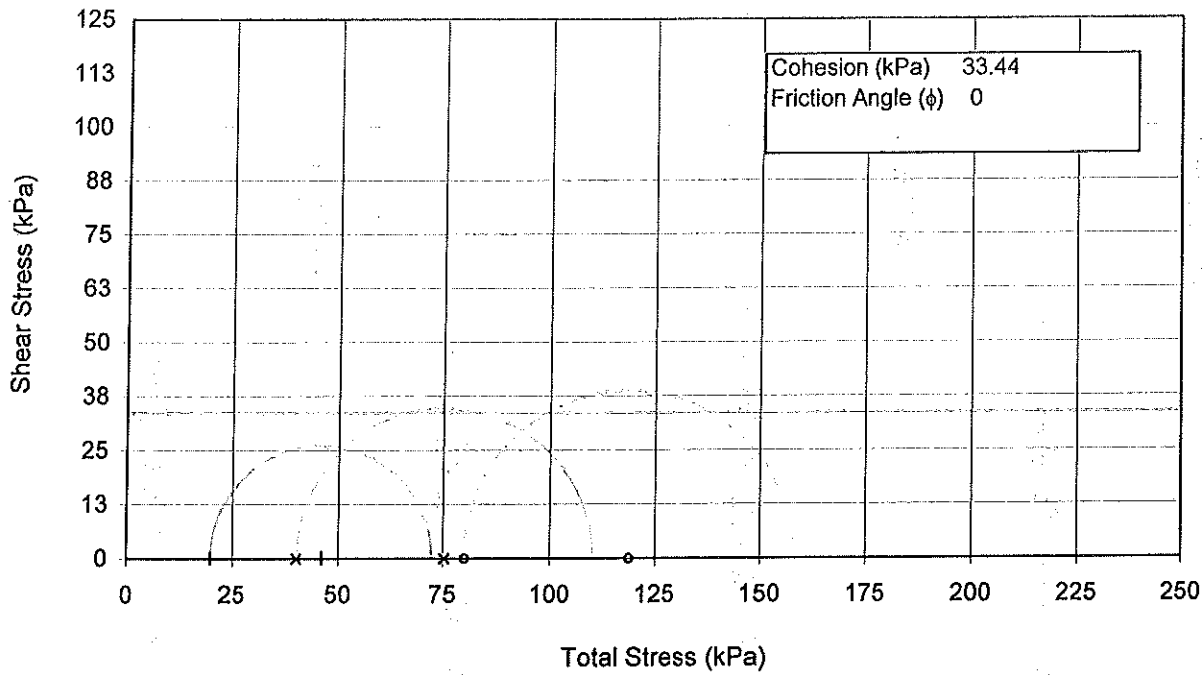
Sample : UD1
Borehole : BH25
Approved
Lee Kai Hing

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 : BH25

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

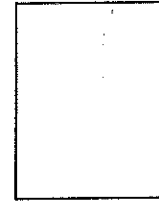
Unconsolidated Undrained

Sample details

Depth : 30.00m
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)	136.22	138.35	140.41
Bulk Density ρ (Mg/m ³)	1.581	1.606	1.630
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)	240	480	960
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

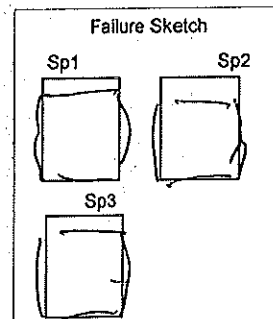
Strain Channel

Load Channel 14391 14391 14391

Moisture Content w_0 %	77	76	76
Dry Density ρ_{d0} (Mg/m ³)	0.89	0.91	0.93
Voids Ratio e_0	1.89	1.83	1.79
Deg of Saturation S_0 %	105.15	107.31	109.78

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	39.24	63.99	71.20
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	39.04	63.79	71.00
Strain at Failure ϵ_f %	8.03	10.00	12.50
Shear Strength c_u (kPa)	19.62	32.00	35.60



Moisture Content w_f %	77	76	76
Dry Density ρ_{df} (Mg/m ³)	0.89	0.91	0.93
Voids Ratio e_f	1.89	1.83	1.79
Deg of Saturation S_f %	105.15	107.31	109.78

Notes : Plastic Plastic Plastic

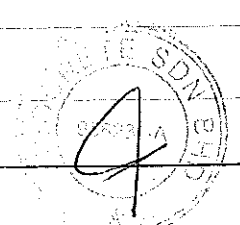
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

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

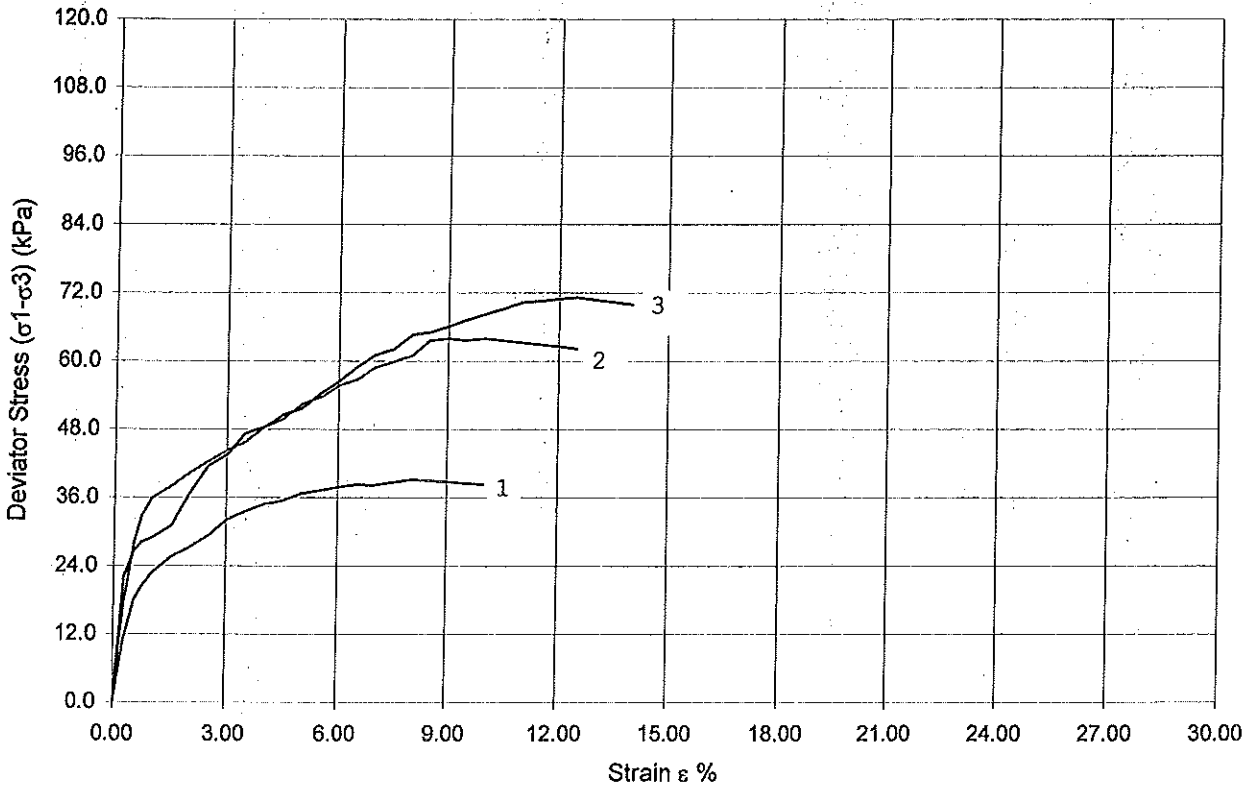
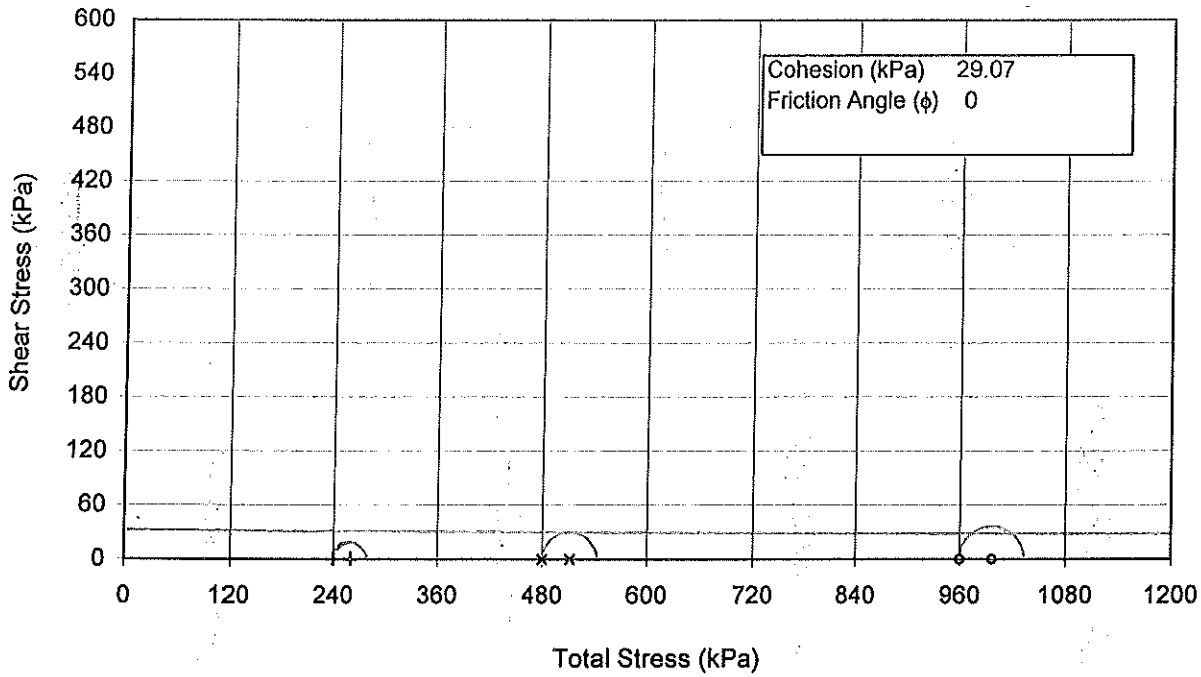
Sample : UD10
Borehole : BH25
Approved
Lee Kai Hing

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 : UD10
Borehole : BH25

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.	BH25 / UD1 / 3.00m	Test Started	19.12.18
Soil Description	Greenish grey sandy CLAY	Ring No.	1

BEFORE TEST

Moist. Content from trimmings:	=	59 %	SG (Measured)	=	2.660
Wt of sample + Ring	=	121.06 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.48 gm	Area (A)	=	1964 mm ²
Wt of sample	=	60.58 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	38.85 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.73 gm	Bulk Density (P)	=	1.542 Mg/m ³
Initial Moisture Content, M _o	=	56 %	Dry Density (PD)	=	0.989 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.6898			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	88 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1345 mm ⁻¹			
Height of Solid H _s	=	7.435 mm			

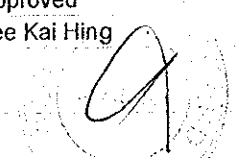
AFTER TEST

Wt of sample + Ring	=	118.23 gm	Overall settlement	=	1.924 mm
Wt of Dry sample + Ring	=	99.33 gm	Volume Change	=	3.779 cm ³
Wt of Ring	=	60.48 gm	Final Volume	=	35.51 cm ³
Wt of Wet sample	=	57.75 gm	Final Bulk Density	=	1.626 Mg/m ³
Wt of Dry sample	=	38.85 gm	Final Dry Density	=	1.094 Mg/m ³
Wt of Moisture	=	18.90 gm	Final Void Ratio, e _f	=	1.4311
Final Moisture Content, M _f	=	49 %			
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

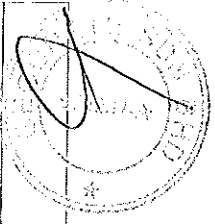
BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL Date of Report 29.12.18
CT10 - CT19 AND ITS ASSOCIATED WORKS AT Test started 19.12.18
WESTPORT, PULAU INDAH, SELANGOR Ring No. 1
 Sample No BH25 / 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	1.6898	0.0000	0				
6.25	0.263	19.737	0.0354	1.6545	0.0354	6.25	2.1337	3.61	12.14	-0.1175
12.5	0.421	19.579	0.0566	1.6332	0.0212	6.25	1.2922	2.89	14.84	-0.0706
25.0	0.592	19.408	0.0796	1.6102	0.0230	12.5	0.7054	1.44	29.29	-0.0764
50.0	0.861	19.139	0.1158	1.5740	0.0362	25.0	0.5626	1.69	24.40	-0.1202
100	1.408	18.592	0.1894	1.5005	0.0736	50.0	0.5889	2.25	17.56	-0.2444
200	2.424	17.576	0.3260	1.3638	0.1366	99.9	0.5785	5.29	6.86	-0.4540
100	2.362	17.638	0.3177	1.3722	-0.0083	-99.9				
50	2.192	17.808	0.2948	1.3950	-0.0229	-50.0				
12.5	1.924	18.076	0.2588	1.4311	-0.0360	-37.5				

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

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



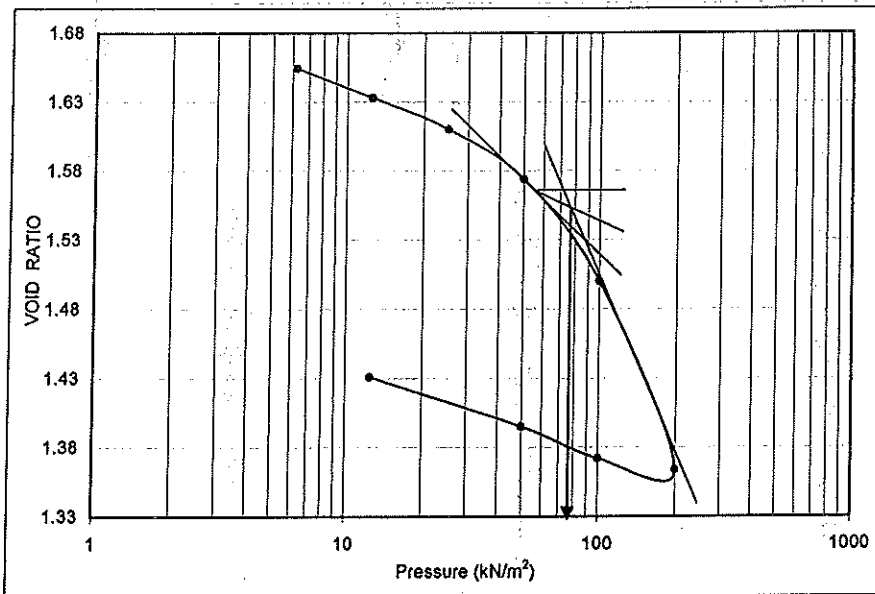
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH25 / UD1 / 3.00m

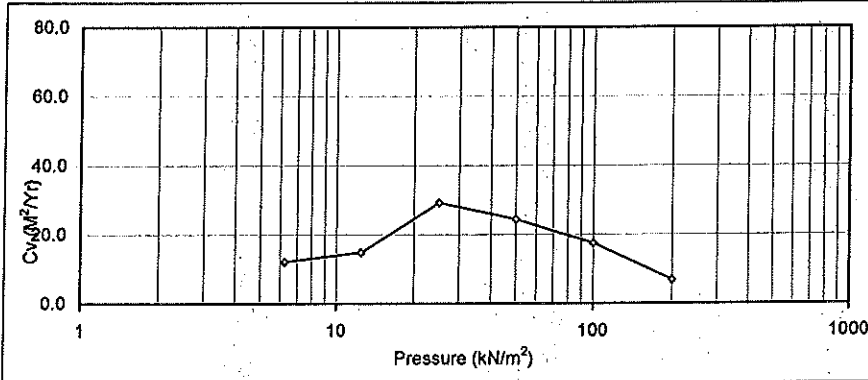
SOIL SAMPLE Greenish grey sandy CLAY

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. 1



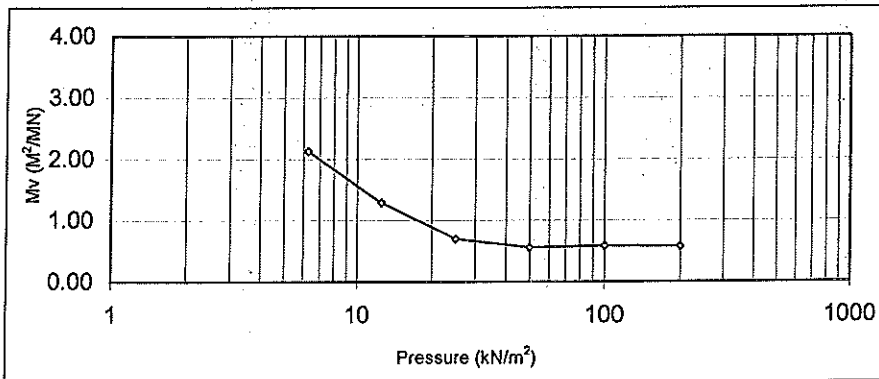
INITIAL

Water content	56	%
Dry Density	0.99	Mg/m ³
Void Ratio	1.6898	
Saturation	88	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.660	



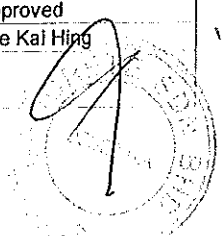
FINAL

Water content	49	%
Dry Density	1.09	Mg/m ³
Void Ratio	1.4311	
Saturation	90	%
Height	18	mm
Comp. Index, C _c	0.4540	
Precons. Load	76	kN/m ²



Comp. Ratio, C_R 0.169

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	29.12.18
Sample No.	BH25 / UD10 / 30.00m	Test Started	19.12.18
Soil Description	Dark grey CLAY	Ring No.	2

BEFORE TEST

Moist. Content from trimmings:	=	75 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	118.14 gm	Diameter (D)	=	50 mm
Wt of Ring	=	59.62 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.52 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	33.80 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	24.72 gm	Bulk Density (P)	=	1.490 Mg/m ³
Initial Moisture Content, M_o	=	73 %	Dry Density (PD)	=	0.860 Mg/m ³
Initial Void Ratio, e_o , $SG/P_D - 1$	=	1.9987			
Initial Saturation, S_o ; $\frac{M_o \times SG}{e_o}$	=	94 %			
V. Ratio Change Factor F_v , $\frac{H}{1+e_o}$	=	0.1499 mm ⁻¹			
Height of Solid	Hs	=	6.669 mm		

AFTER TEST

Wt of sample + Ring	=	115.56 gm	Overall settlement	=	1.966 mm
Wt of Dry sample + Ring	=	93.42 gm	Volume Change	=	3.862 cm ³
Wt of Ring	=	59.62 gm	Final Volume	=	35.42 cm ³
Wt of Wet sample	=	55.94 gm	Final Bulk Density	=	1.579 Mg/m ³
Wt of Dry sample	=	33.80 gm	Final Dry Density	=	0.954 Mg/m ³
Wt of Moisture	=	22.14 gm	Final Void Ratio, e_f	=	1.7040
Final Moisture Content, M_f	=	66 %			
Final Saturation, S_o , $\frac{M_f \times SG}{e_f}$	=	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

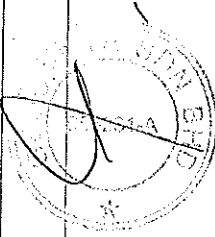
Date of Report: 29.12.18
 Test started: 19.12.18
 Ring No.: 2

Sample No: BH25 / UD10 / 30.00m

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 /MN)	t ₉₀ (min)	
0	0.000	20.000	0.0000	1.9987	0.0000	0			
12.5	0.257	19.743	0.0385	1.9602	0.0385	12.5	1.0422	8.41	5.21
25.0	0.623	19.377	0.0934	1.9053	0.0549	12.5	1.5122	12.96	3.28
50.0	1.292	18.708	0.1937	1.8050	0.1003	25.0	1.4315	20.25	1.99
100	2.330	17.670	0.3494	1.6494	0.1556	50.0	1.1758	15.21	2.41
50	2.286	17.714	0.3428	1.6560	-0.0066	-50.0			
25	2.124	17.876	0.3185	1.6803	-0.0243	-25.0			
12.5	1.966	18.034	0.2948	1.7040	-0.0237	-12.5			

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

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



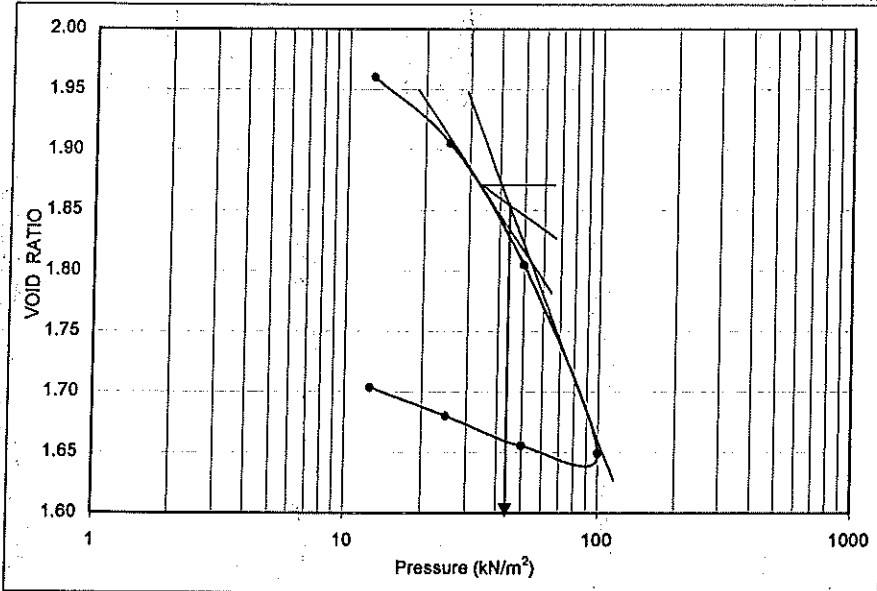
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH25 / UD10 / 30.00m

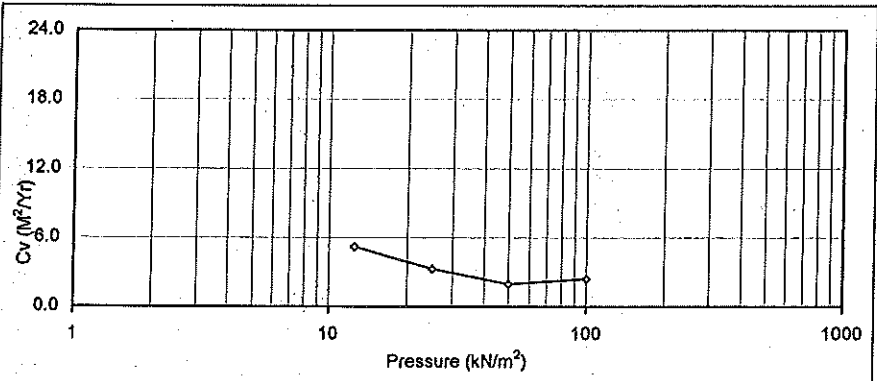
SOIL SAMPLE Dark grey CLAY

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. 2



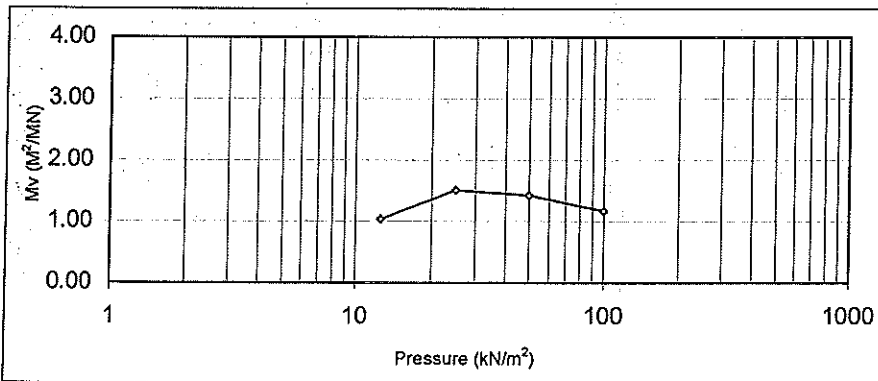
INITIAL

Water content	73	%
Dry Density	0.86	Mg/m ³
Void Ratio	1.9987	
Saturation	94	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.580	



FINAL

Water content	66	%
Dry Density	0.95	Mg/m ³
Void Ratio	1.7040	
Saturation	99	%
Height	18	mm
Comp. Index, C _c	0.5171	
Precons. Load	43	kN/m ²
Comp. Ratio, C _R	0.172	



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 25 / D 26 (54.00 m)

Test Size : 60 mm x 60 mm x 20 mm

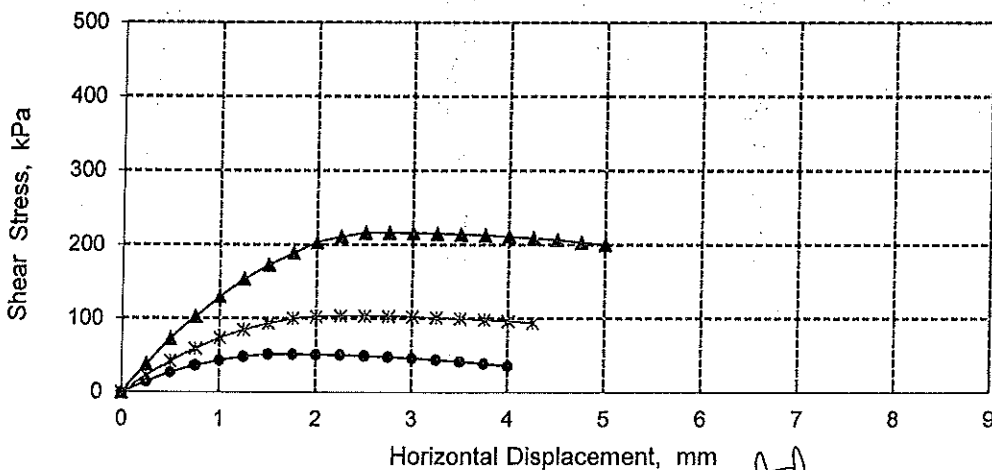
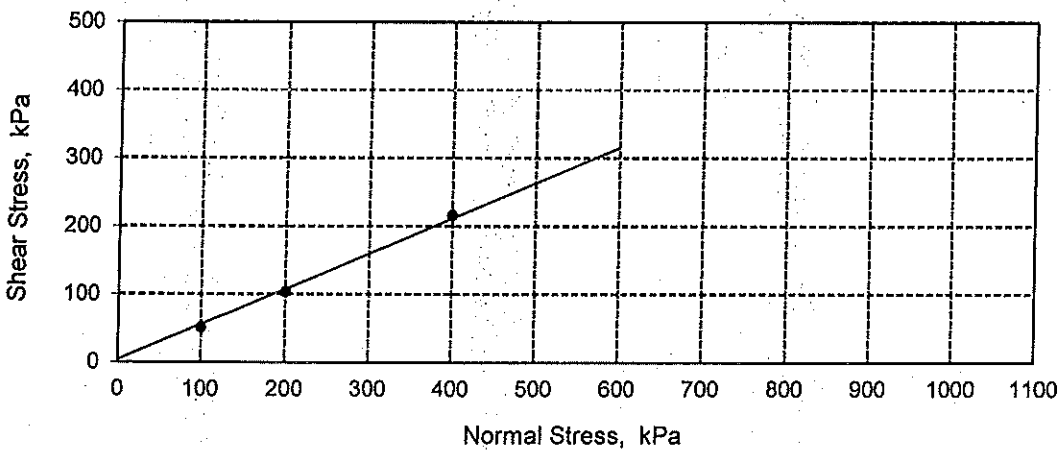
Date Tested : 27 / 12 / 2018

INITIAL CONDITIONS			
Specimen No.	S 1	S 2	S 3
Specimen Weight (g)	159.0	159.6	159.6
Moisture Content (%)	9.9	10.1	9.7
Bulk Density (Mg/m ³)	2.208	2.217	2.217
Dry Density (Mg/m ³)	2.009	2.014	2.021

SHEARING STAGE			
Normal Stress (kPa)	100	200	400
Max. Shear Stress (kPa)	51.6	103.8	216.5
Displ. at Failure (mm)	1.8	2.3	2.5
Settlement (mm)	0.1	0.2	0.3

c' 4 kPa

φ' 27.5 deg.

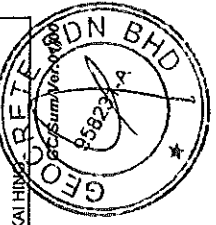


SUMMARY OF TEST RESULTS

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 : 17.12.18							
SAMPLE AND SPECIMEN DETAILS		ATTERBERG			SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CU TEST		UU Triaxial TEST		CONSOLIDATION TEST			CHEMICAL TEST				
		Depth (m)	Moisture Content (%)	Dry Density (Mg/m3)	Bulk Density (Mg/m3)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	Cu (kPa)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)
BH26	UD1	3.00	62	1.61	0.99	13.2	56	39	5	0							30	0.381	3.0	0.18	0.82	7.5		
	UD5	15.00	37	1.48	0.81	12.1	47	33	20	0	2.64				19.53	0	160	1.351						
	UD8	24.00	36	1.83	1.35		23	16	61	0														
	UD9	27.00	57	1.48	0.94	14.1	59	40	1	0					26.08	0								
	D12	34.50	32	NA	NA		21	16	63	0	2.68													
	D13	36.00	38	NA	NA		23	19	58	0														
	D18	43.50	19	NA	NA	NA	8	92	0															
	D19	45.00	29	2.06	1.78		28	20	52	0	2.67													
	D22	49.50	15	NA	NA		25	75	0								4	27.5						
	D29	60.00	18	NA	NA		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.

APPROVED BY: _____
 CHECKED BY: _____
 LEE KAI HING / CHRIS



SUM

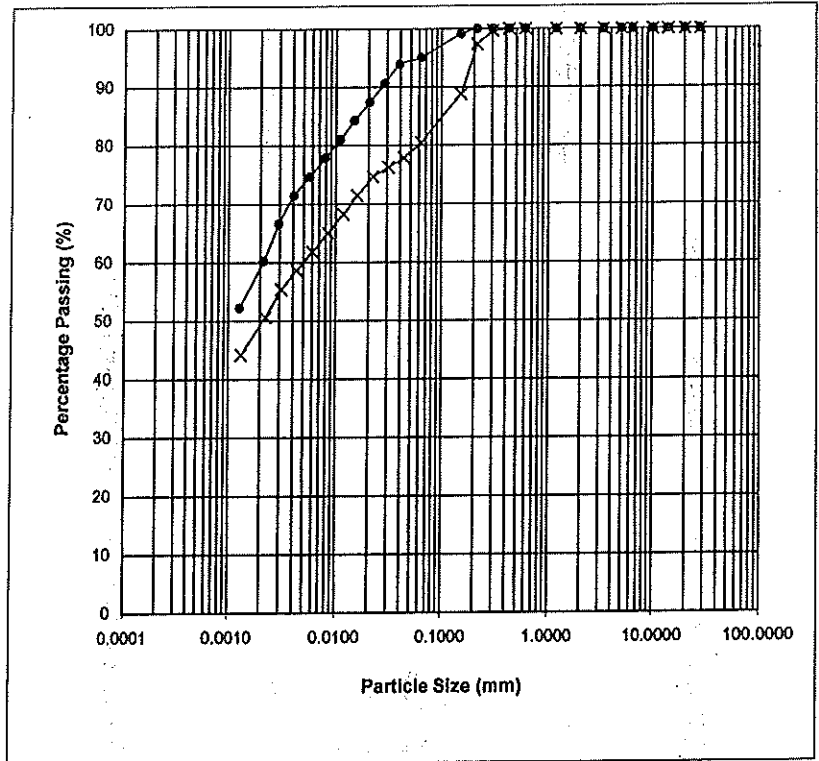
PARTICLE SIZE DISTRIBUTION

(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

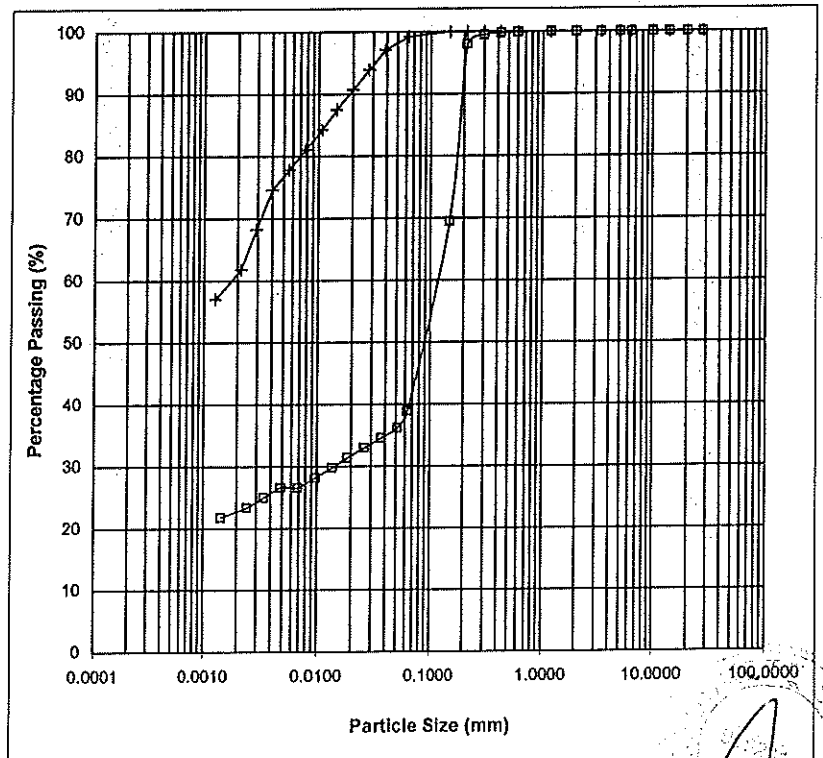
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	100
0.212	100	0.212	97
0.150	99	0.150	89
0.063	95	0.063	80
0.0393	94	0.0431	78
0.0283	91	0.0307	76
0.0204	87	0.0219	75
0.0147	84	0.0157	71
0.0109	81	0.0117	68
0.0079	78	0.0084	65
0.0057	75	0.0060	62
0.0041	71	0.0043	59
0.0029	67	0.0031	55
0.0021	60	0.0022	51
0.0013	52	0.0013	44
Clay (%)	56	Clay (%)	47
Silt (%)	39	Silt (%)	33
Sand (%)	5	Sand (%)	20
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH26	UD1	3.00	11.12.18
X	BH26	UD5	15.00	11.12.18

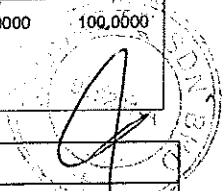


Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	99	0.300	100
0.212	98	0.212	100
0.150	70	0.150	100
0.063	39	0.063	99
0.0518	36	0.0384	97
0.0366	35	0.0278	94
0.0262	33	0.0200	91
0.0186	31	0.0144	87
0.0137	30	0.0107	84
0.0097	28	0.0077	81
0.0069	27	0.0056	78
0.0049	27	0.0040	75
0.0035	25	0.0029	68
0.0025	23	0.0021	62
0.0014	22	0.0013	57
Clay (%)	23	Clay (%)	59
Silt (%)	16	Silt (%)	40
Sand (%)	61	Sand (%)	1
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH26	UD8	24.00	11.12.18
+	BH26	UD9	27.00	11.12.18



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



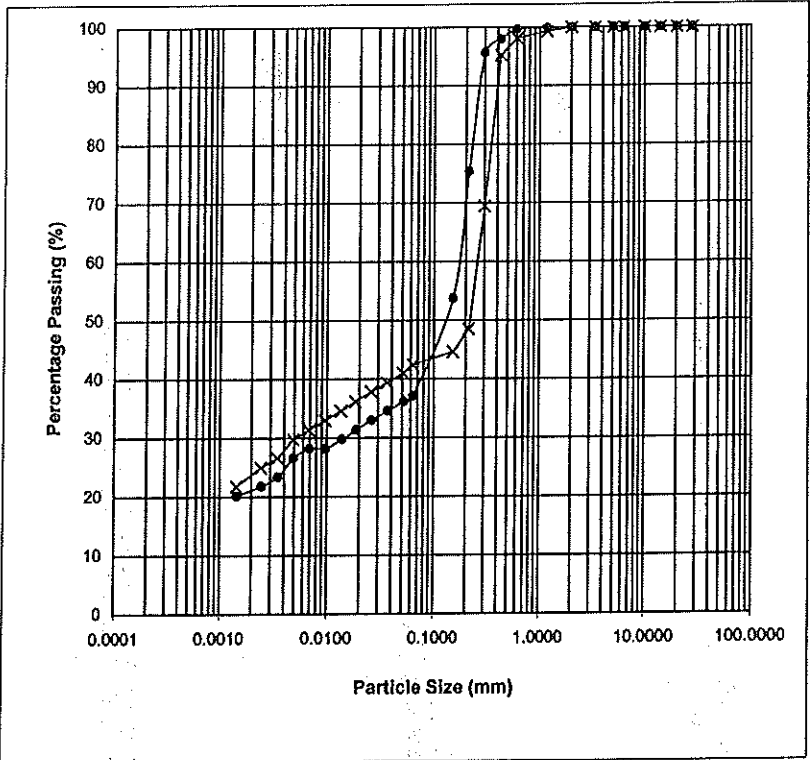
PARTICLE SIZE DISTRIBUTION

(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

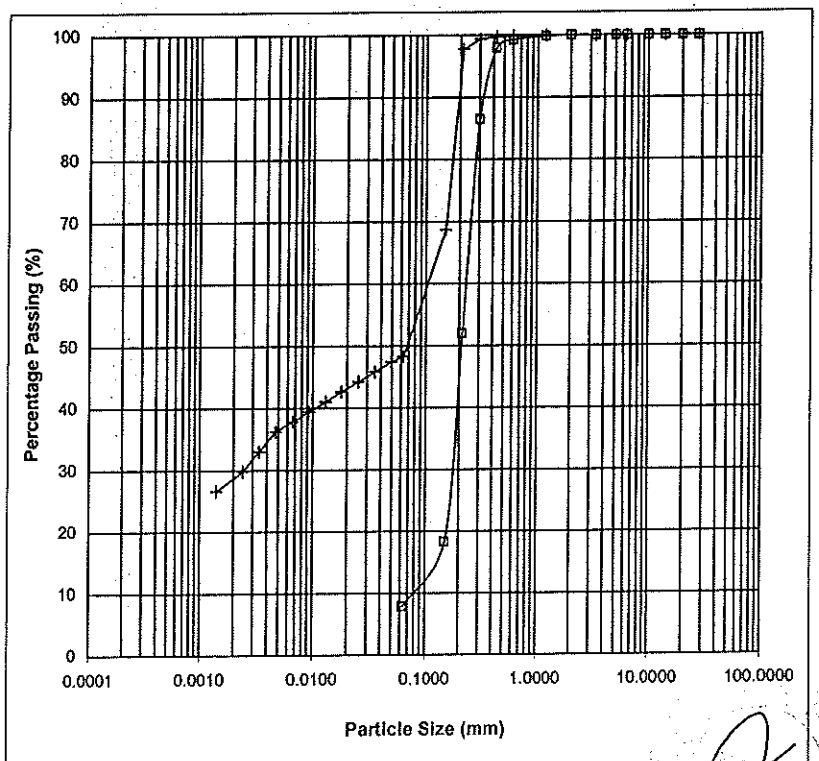
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	99
0.600	100	0.600	98
0.425	98	0.425	95
0.300	96	0.300	69
0.212	75	0.212	48
0.150	54	0.150	45
0.063	37	0.063	42
0.0518	36	0.0508	41
0.0368	35	0.0362	39
0.0262	33	0.0257	38
0.0186	31	0.0183	36
0.0137	30	0.0134	35
0.0097	28	0.0096	33
0.0069	28	0.0068	31
0.0049	27	0.0048	30
0.0035	23	0.0035	27
0.0025	22	0.0025	25
0.0014	20	0.0014	22
Clay (%)	21	Clay (%)	23
Silt (%)	18	Silt (%)	19
Sand (%)	63	Sand (%)	58
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH26	D12	34.50	11.12.18
x	BH26	D13	36.00	11.12.18



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	98	0.425	100
0.300	86	0.300	99
0.212	52	0.212	98
0.150	18	0.150	69
0.063	8	0.063	48
		0.0496	47
		0.0353	46
		0.0251	44
		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 (%)	8	Clay (%)	28
Silt (%)		Silt (%)	20
Sand (%)	92	Sand (%)	52
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH26	D18	43.50	11.12.18
+	BH26	D19	45.00	11.12.18



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 : 15.00m
 Description : 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)	141.93	143.86	145.88
Bulk Density ρ (Mg/m ³)	1.647	1.670	1.693
Particle Density ρ_s	2.64	2.64	2.64

Sketch showing specimen location in original sample

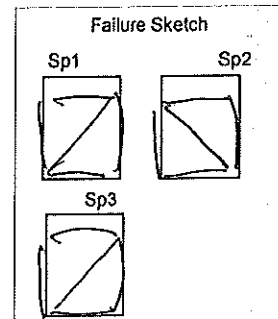


Initial Conditions

	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 %	46	44	42
Dry Density ρ_{d0} (Mg/m ³)	1.13	1.16	1.20
Voids Ratio e_0	1.35	1.28	1.21
Deg of Saturation S_0 %	91.04	90.93	91.00

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	32.71	39.15	45.35
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	32.51	38.95	45.15
Strain at Failure ϵ_f %	10.00	11.51	13.03
Shear Strength c_u (kPa)	16.35	19.57	22.68
Moisture Content w_f %	46	44	42
Dry Density ρ_{df} (Mg/m ³)	1.13	1.16	1.20
Voids Ratio e_f	1.35	1.28	1.21
Deg of Saturation S_f %	91.04	90.93	91.00



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

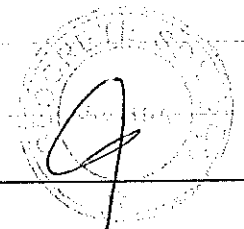
Operator
Shyam Nath

Checked
Chris

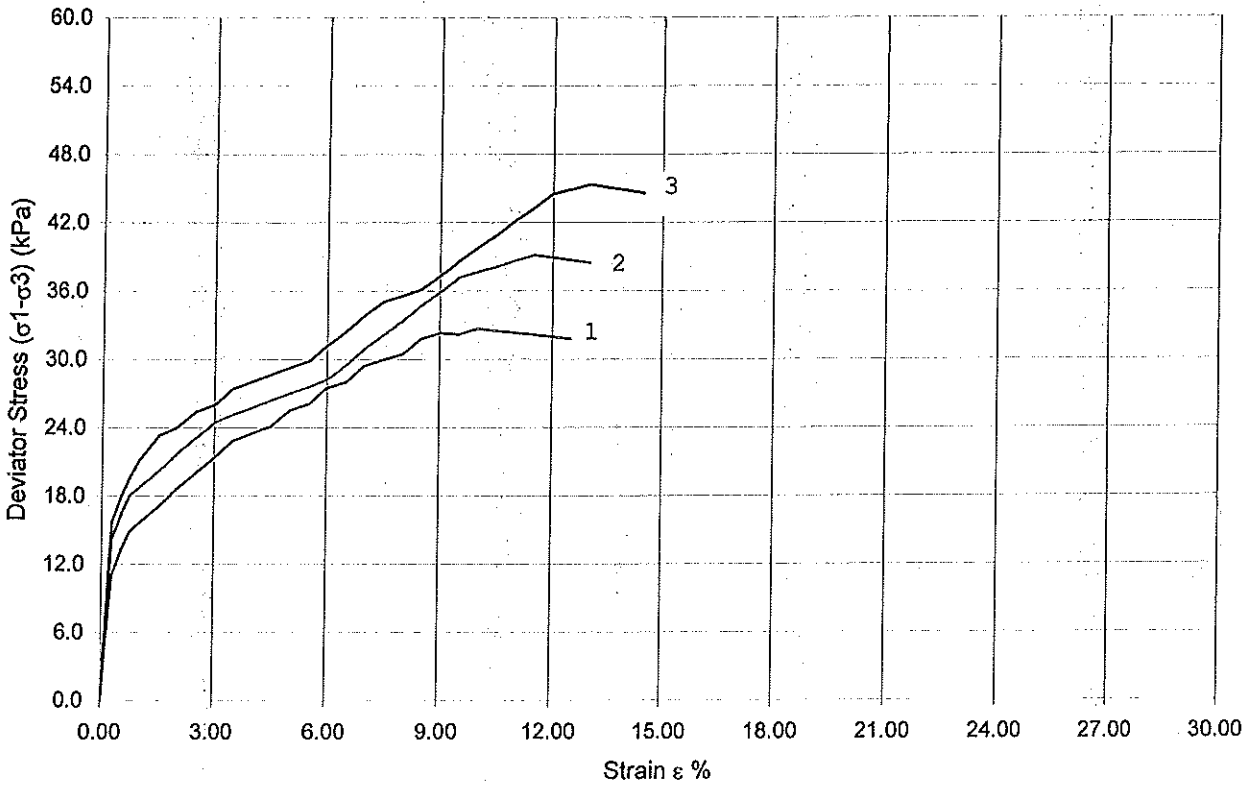
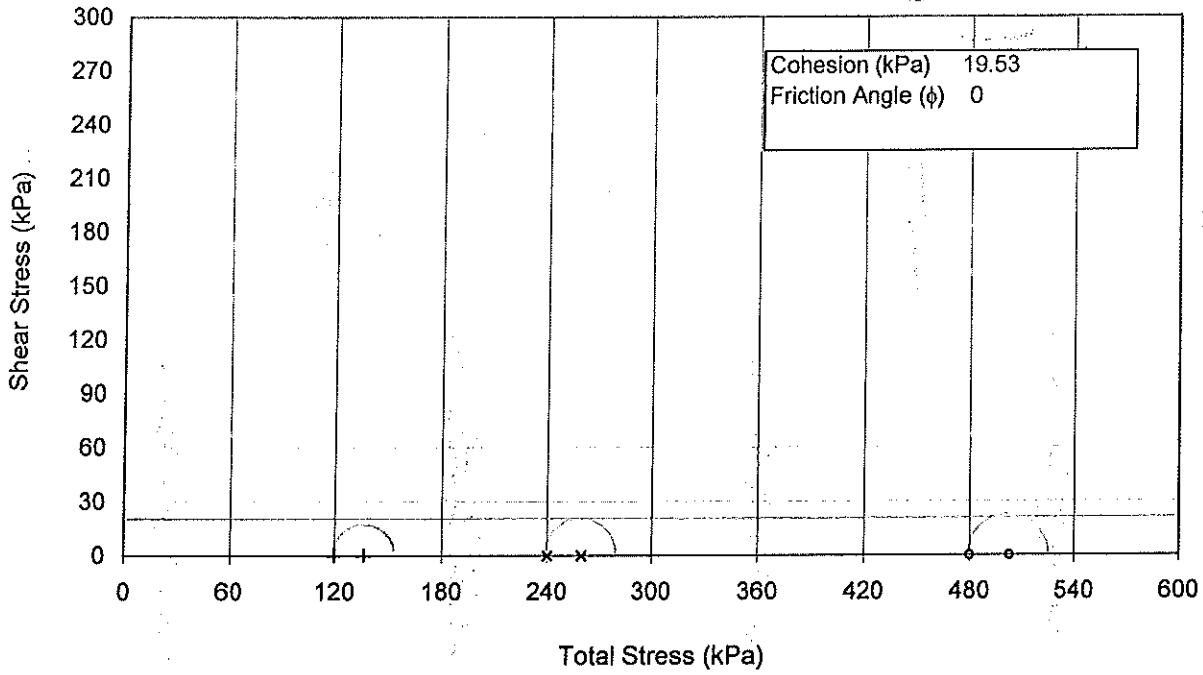
Test Name : UU

Date of Test : 08.12.18

Sample : UD5
 Borehole : BH26
 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 : 08.12.18
 Sample : UD5
 Borehole : BH26
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

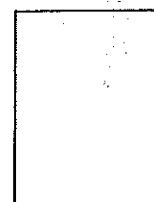
Unconsolidated Undrained

Sample details

Depth : 27.00m
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)	126.98	127.39	128.12
Bulk Density ρ (Mg/m ³)	1.474	1.479	1.487
Particle Density ρ_s	2.60	2.60	2.60

Sketch showing specimen location in original sample

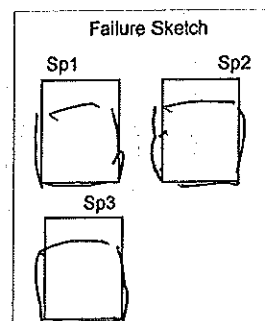


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	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 %	60	58	57
Dry Density ρ_{d0} (Mg/m ³)	0.92	0.94	0.95
Voids Ratio e_0	1.81	1.77	1.75
Deg of Saturation S_0 %	85.35	84.67	84.95

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	29.86	45.78	80.82
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	29.66	45.58	80.62
Strain at Failure ϵ_f %	0.00	0.00	0.00
Shear Strength c_u (kPa)	14.93	22.89	40.41
Moisture Content w_f %	60	58	57
Dry Density ρ_{df} (Mg/m ³)	0.92	0.94	0.95
Voids Ratio e_f	1.81	1.77	1.75
Deg of Saturation S_f %	85.35	84.67	84.95



Notes : Plastic Plastic Plastic

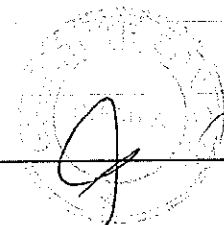
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 08.12.18

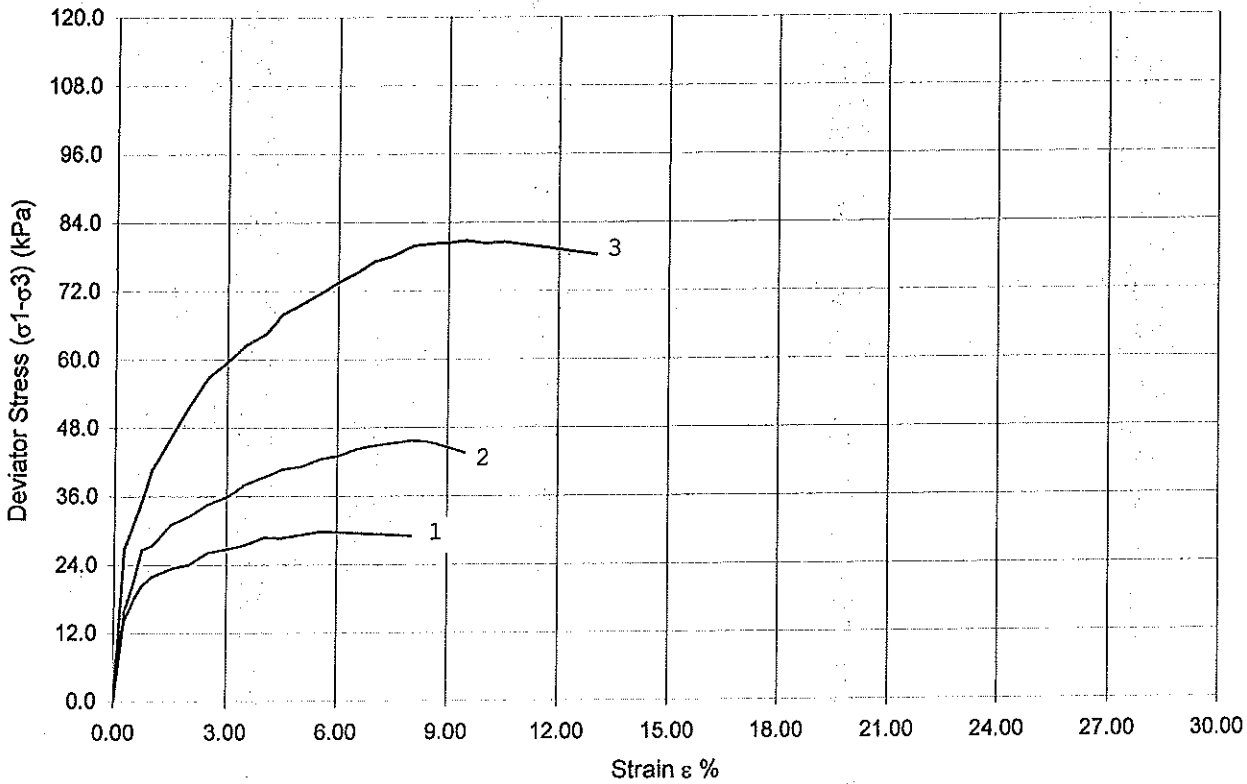
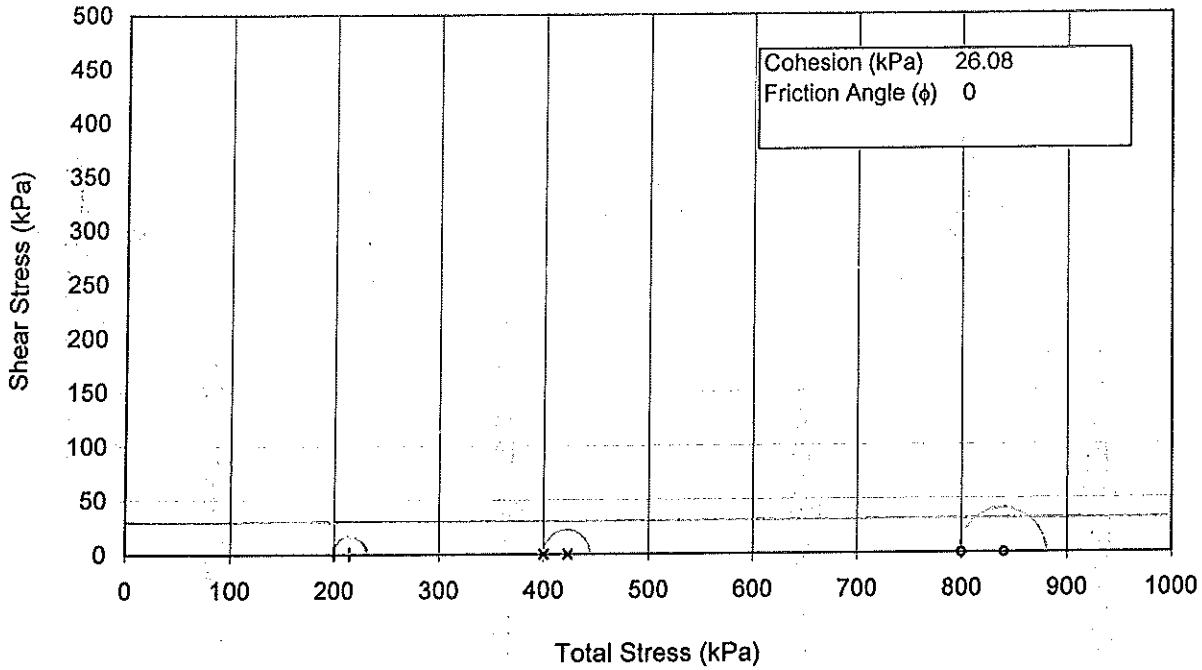
Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Sample : UD9
Borehole : BH26
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



Total Stress Triaxial Compression Unconsolidated Undrained

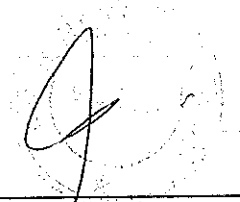


Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 08.12.18

Sample : UD9
 Borehole : BH26

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	16.12.18
Sample No.	BH26 / UD1 / 3.00m	Test Started	06.12.18
Soil Description	Dark grey CLAY	Ring No.	A5

BEFORE TEST

Moist. Content from trimmings:	=	62 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	124.30 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.00 gm	Area (A)	=	1964 mm ²
Wt of sample	=	63.3 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	39.02 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	24.28 gm	Bulk Density (P)	=	1.611 Mg/m ³
Initial Moisture Content, M _o	=	62 %	Dry Density (PD)	=	0.993 Mg/m ³
Initial Void Ratio, e _o , $\frac{SG}{P_D} - 1$	=	1.5976			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	100 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1299 mm ⁻¹			
Height of Solid H _s	=	7.699 mm			

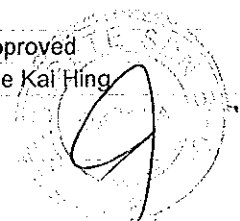
AFTER TEST

Wt of sample + Ring	=	120.86 gm	Overall settlement	=	1.966 mm
Wt of Dry sample + Ring	=	100.02 gm	Volume Change	=	3.862 cm ³
Wt of Ring	=	61.00 gm	Final Volume	=	35.42 cm ³
Wt of Wet sample	=	59.86 gm	Final Bulk Density	=	1.690 Mg/m ³
Wt of Dry sample	=	39.02 gm	Final Dry Density	=	1.102 Mg/m ³
Wt of Moisture	=	20.84 gm	Final Void Ratio, e _f	=	1.3422
Final Moisture Content, M _f	=	53 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	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 BH26 / UD1 / 3.00m

Date of Report

16.12.18

Test started

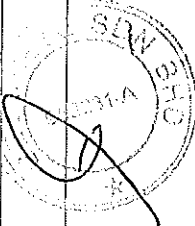
06.12.18

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 /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.5976	0.0000	0				
3.12	0.408	19.592	0.0530	1.5446	0.0530	3.12	6.6690	1.96	22.19	-0.1760
6.2	0.572	19.428	0.0743	1.5233	0.0213	3.12	2.7033	2.56	16.50	-0.0708
12.5	0.784	19.216	0.1018	1.4957	0.0275	6.2	1.7665	1.44	28.78	-0.0915
25.0	1.104	18.896	0.1434	1.4542	0.0416	12.5	1.3558	1.21	33.31	-0.1381
50	1.710	18.290	0.2221	1.3755	0.0787	25.0	1.3263	1.44	26.65	-0.2615
100	2.594	17.406	0.3369	1.2607	0.1148	50.0	1.0165	1.21	29.22	-0.3814
50	2.382	17.618	0.3094	1.2882	-0.0275	-50.0				
25	2.182	17.818	0.2834	1.3142	-0.0260	-25.0				
12.5	1.966	18.034	0.2553	1.3422	-0.0281	-12.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



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

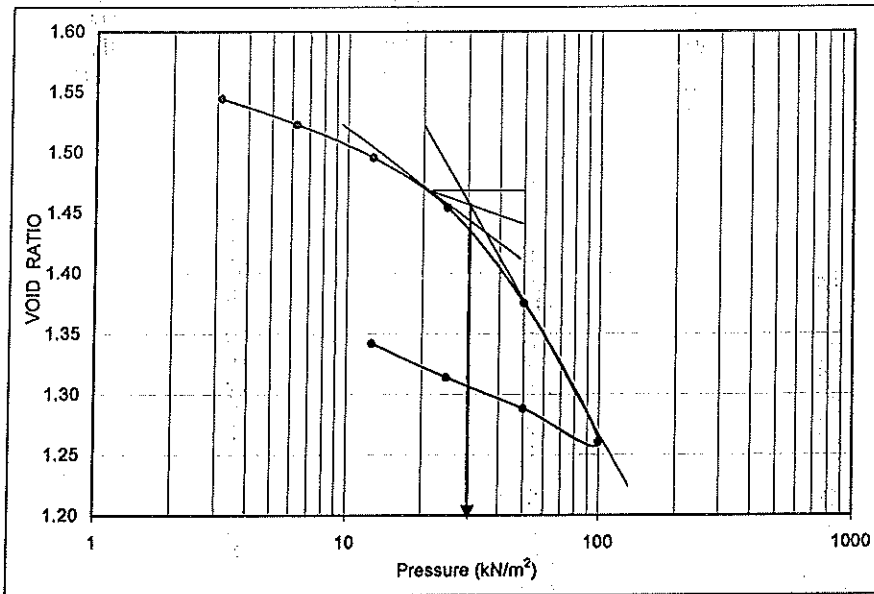
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH26 / UD1 / 3.00m

SOIL SAMPLE Dark grey CLAY

Date of Report 16.12.18
 Test started 06.12.18
 Ring No. A5



INITIAL

Water content 62 %

Dry Density 0.99 Mg/m³

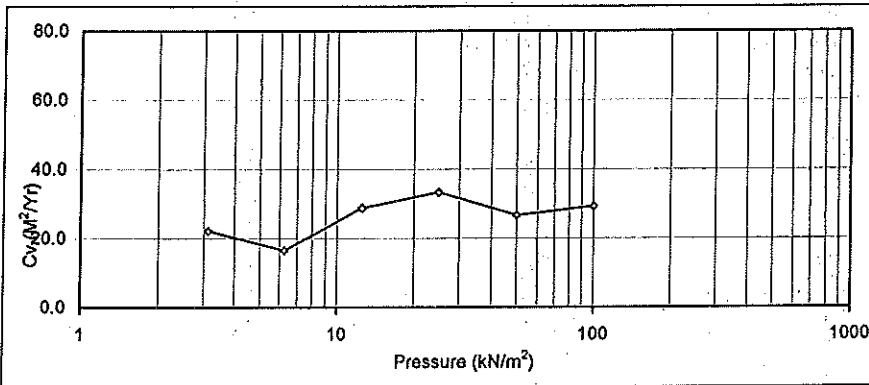
Void Ratio 1.5976

Saturation 100 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.580



FINAL

Water content 53 %

Dry Density 1.10 Mg/m³

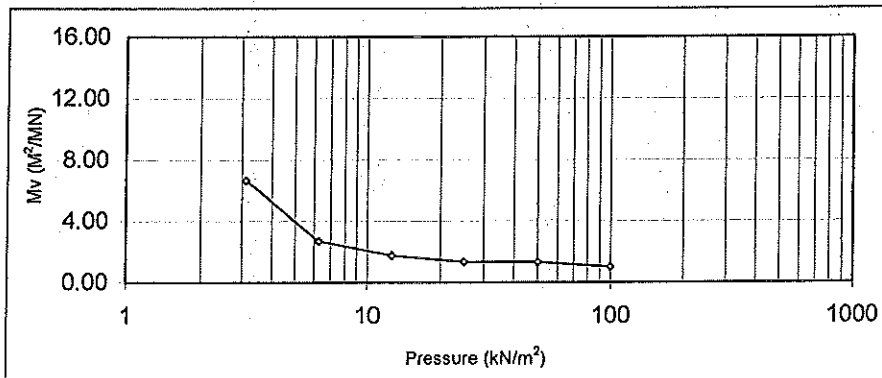
Void Ratio 1.3422

Saturation 103 %

Height 18 mm

Comp. Index, Cc 0.3814

Precons. Load 30 kN/m²



Comp. Ratio, C_R 0.147

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	16.12.18
Sample No.	BH26 / UD5 / 15.00m	Test Started	06.12.18
Soil Description	Grey CLAY with some sand	Ring No.	A6

BEFORE TEST

Moist. Content from trimmings:	=	85 %	SG (Measured)	=	2.640
Wt of sample + Ring	=	119.70 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.55 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.15 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	31.74 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	26.41 gm	Bulk Density (P)	=	1.480 Mg/m ³
Initial Moisture Content, M ₀	=	83 %	Dry Density (PD)	=	0.808 Mg/m ³
Initial Void Ratio, e ₀ , SG/P ₀ - 1	=	2.2676			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	97 %			
V. Ratio Change Factor F, $\frac{e_0}{1+e_0} \times \frac{H}{H_s}$	=	0.1634 mm ⁻¹			
Height of Solid	=	6.121 mm			

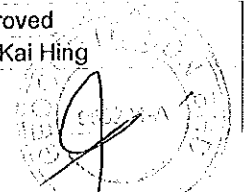
AFTER TEST

Wt of sample + Ring	=	116.94 gm	Overall settlement	=	2.564 mm
Wt of Dry sample + Ring	=	93.29 gm	Volume Change	=	5.036 cm ³
Wt of Ring	=	61.55 gm	Final Volume	=	34.25 cm ₃
Wt of Wet sample	=	55.39 gm	Final Bulk Density	=	1.617 Mg/m ³
Wt of Dry sample	=	31.74 gm	Final Dry Density	=	0.927 Mg/m ³
Wt of Moisture	=	23.65 gm	Final Void Ratio, e _f	=	1.8487
Final Moisture Content, M _f	=	75 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	106 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



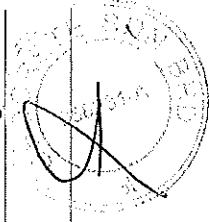
ONE DIMENSIONAL CONSOLIDATION TEST

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	16.12.18
Sample No	BH26 / UD5 / 15.00m	Test started	06.12.18
		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		
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	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	2.2676	0.0000	0					
12.5	0.052	19.948	0.0085	2.2591	0.0085	12.5	0.2087	1.21	36.60		-0.0282
25.0	0.110	19.890	0.0180	2.2497	0.0095	12.5	0.2335	16.81	2.62		-0.0315
50.0	0.332	19.668	0.0542	2.2134	0.0363	25.0	0.4518	5.29	8.21		-0.1205
100	0.744	19.256	0.1216	2.1461	0.0673	50.0	0.4282	8.41	5.00		-0.2236
200	1.838	18.162	0.3003	1.9673	0.1787	99.9	0.6028	10.89	3.57		-0.5938
400	4.326	15.674	0.7068	1.5608	0.4065	199.8	0.7943	33.64	0.94		-1.3505
200	4.240	15.760	0.6927	1.5749	-0.0141	-199.8					
50	3.410	16.590	0.5571	1.7105	-0.1356	-149.9					
12.5	2.564	17.436	0.4189	1.8487	-0.1382	-37.5					

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



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

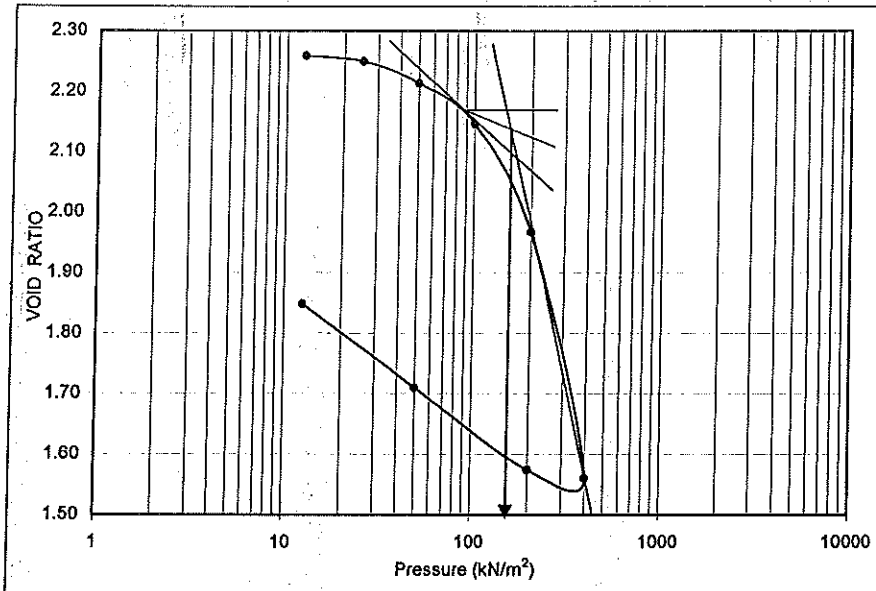
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH26 / UD5 / 15.00m

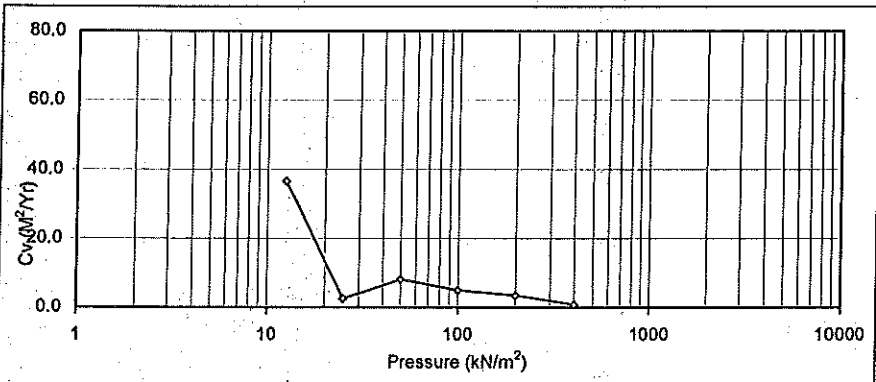
SOIL SAMPLE Grey CLAY with some sand

Date of Report 16.12.18
 Test started 06.12.18
 Ring No. A6



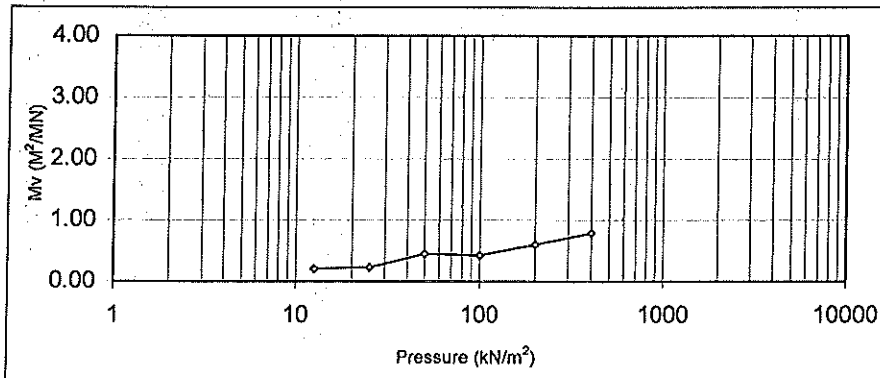
INITIAL

Water content	83	%
Dry Density	0.81	Mg/m ³
Void Ratio	2.2676	
Saturation	97	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.640	



FINAL

Water content	75	%
Dry Density	0.93	Mg/m ³
Void Ratio	1.8487	
Saturation	106	%
Height	17	mm
Comp. Index, C _c	1.3505	
Precons. Load	160	kN/m ²
Comp. Ratio, C _R	0.413	



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 26 / D 19 (45.00 m)

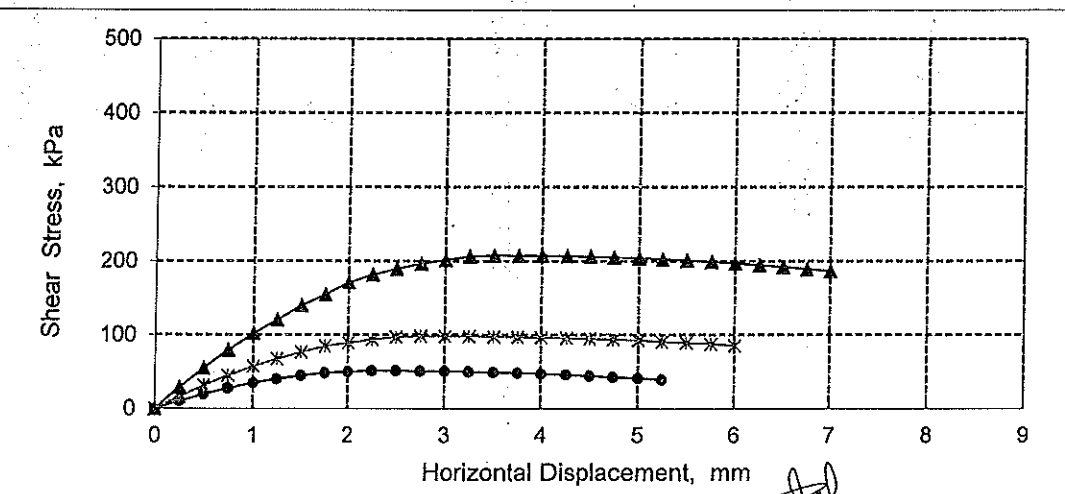
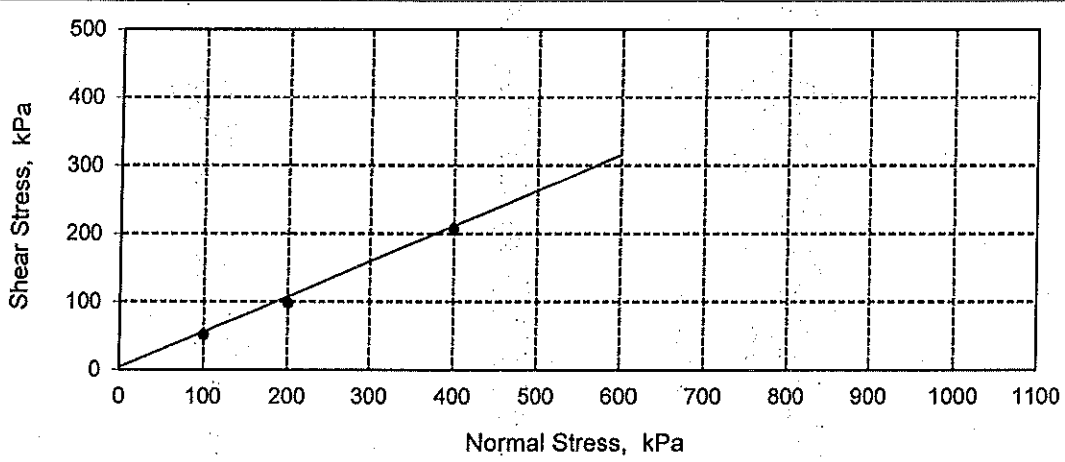
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 20 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		149.2	148.0	148.4
Moisture Content (%)		14.9	15.3	15.1
Bulk Density (Mg/m ³)		2.072	2.056	2.061
Dry Density (Mg/m ³)		1.803	1.783	1.791
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		51.6	98.4	208.0
Displ. at Failure (mm)		2.3	2.8	3.5
Settlement (mm)		0.1	0.2	0.3

c' 4 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 : L081/18/139/18 DATE : 13.12.18																				
SAMPLE AND SPECIMEN DETAILS		Moisture Content (%)		Bulk Density (Mg/m3)		Dry Density (Mg/m3)		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)						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)						
BH27	UD1	3.00	43	1.74	1.22	1.70	53	23	30	8.0	35	25	40	0										1.2	0.09	0.50	8.1							
	UD3	9.00	18	2.00	1.70	1.70					21	79	0																					
	UD5	15.00	29	1.79	1.37	1.37	60	26	34	12.6	40	28	32	0	2.65																			
	UD7	21.00	31	1.68	1.28	1.28	48	24	24	7.6	30	23	47	0																				
	UD9	27.00	57	1.58	0.97	0.97	68	23	45	14.5	54	38	8	0																				
	D10	31.50	32	NA	NA	NA	55	23	32		39	28	33	0																				
	D11	33.00	12	NA	NA	NA					13	87	0																					
	D16	40.50	10	1.91	1.58	1.58					17	83	0																					
	D20	46.50	24	NA	NA	NA					25	18	57	0																				
	D22	49.50	16	NA	NA	NA					17	83	0																					
	D23	51.00	18	1.99	1.66	1.66					22	77	1	2.69																				
	D26	55.50	13	NA	NA	NA					11	89	0																					
	D29	60.00	11	NA	NA	NA					18	82	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

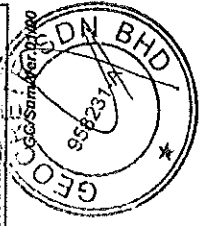
APPROVED BY:

LEE KAI HING

CHECKED BY:

CHRIS

SUM



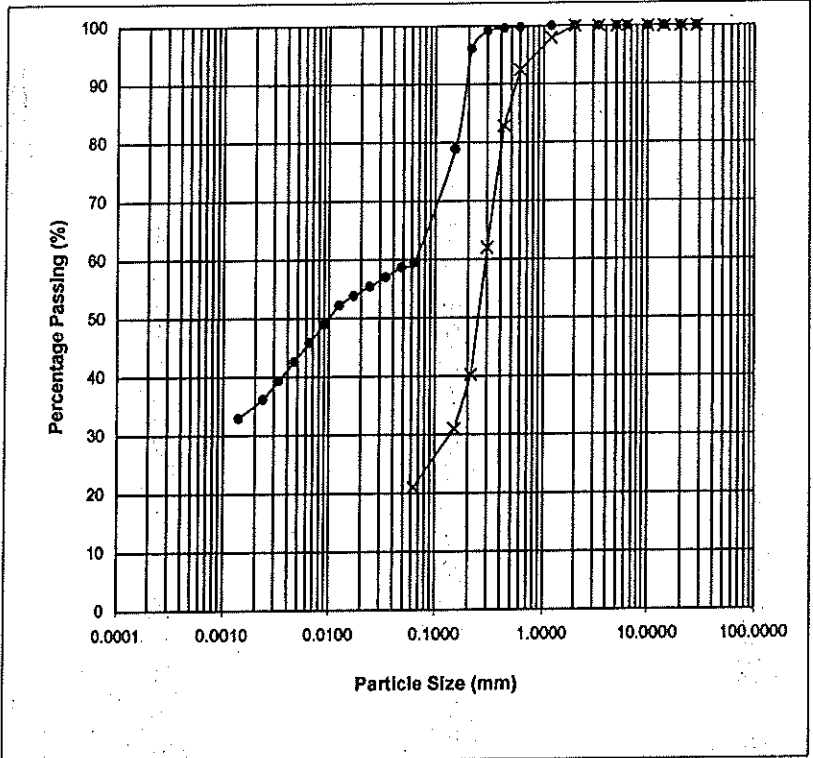
PARTICLE SIZE DISTRIBUTION

(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

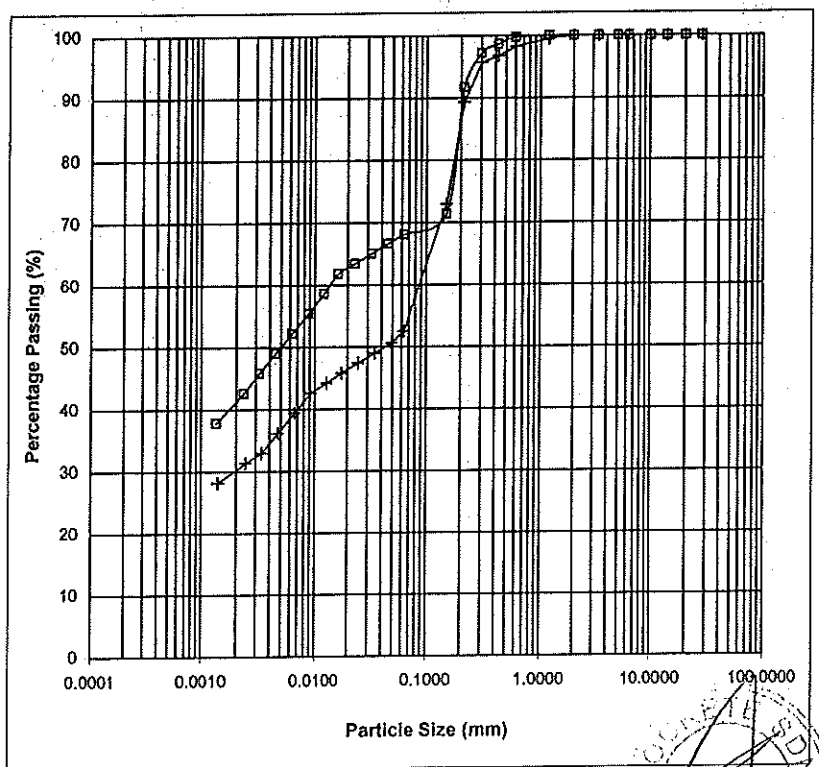
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	98
0.600	100	0.600	93
0.425	100	0.425	83
0.300	99	0.300	62
0.212	96	0.212	40
0.150	79	0.150	31
0.063	60	0.063	21
0.0473	59		
0.0337	57		
0.0240	55		
0.0171	54		
0.0126	52		
0.0090	49		
0.0064	46		
0.0046	43		
0.0033	39		
0.0024	36		
0.0014	33		
Clay (%)	35	Clay (%)	21
Silt (%)	25	Silt (%)	
Sand (%)	40	Sand (%)	79
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH27	UD1	3.00	08.12.18
x	BH27	UD3	9.00	08.12.18



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	98
0.425	99	0.425	97
0.300	97	0.300	96
0.212	92	0.212	89
0.150	71	0.150	73
0.063	68	0.063	53
0.0456	67	0.0489	51
0.0325	65	0.0348	49
0.0231	63	0.0248	47
0.0165	62	0.0176	46
0.0122	59	0.0130	44
0.0088	55	0.0092	43
0.0063	52	0.0066	39
0.0045	49	0.0047	36
0.0032	46	0.0034	33
0.0023	43	0.0024	31
0.0014	38	0.0014	28
Clay (%)	40	Clay (%)	30
Silt (%)	28	Silt (%)	23
Sand (%)	32	Sand (%)	47
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH27	UD5	15.00	08.12.18
+	BH27	UD7	21.00	08.12.18



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

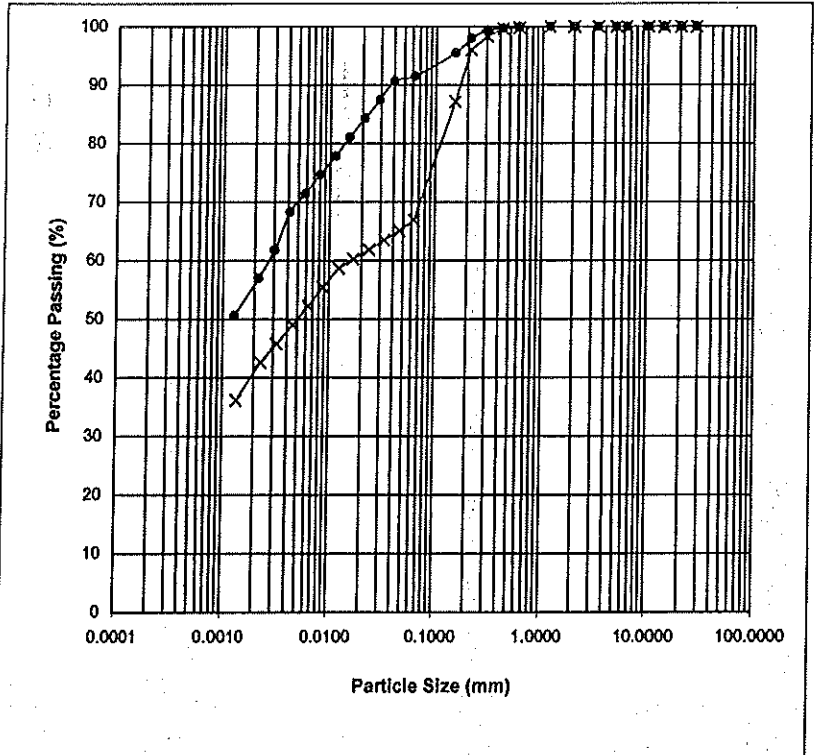
PARTICLE SIZE DISTRIBUTION

(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

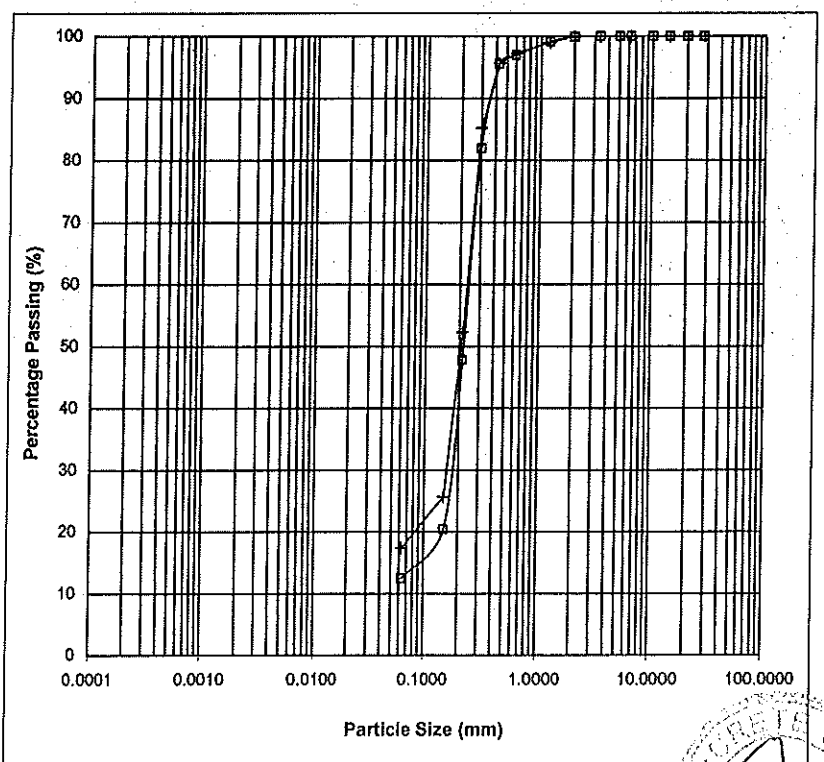
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	99	0.300	98	
0.212	98	0.212	96	
0.150	96	0.150	87	
0.063	92	0.063	67	
0.0401	91	0.0459	65	
0.0289	87	0.0327	63	
0.0208	84	0.0233	62	
0.0150	81	0.0166	60	
0.0111	78	0.0122	59	
0.0080	75	0.0088	55	
0.0058	71	0.0063	52	
0.0041	68	0.0045	49	
0.0030	62	0.0032	46	
0.0022	57	0.0023	43	
0.0013	51	0.0014	36	
Clay (%)		54	Clay (%)	39
Silt (%)		38	Silt (%)	28
Sand (%)		8	Sand (%)	33
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH27	UD9	27.00	08.12.18
X	BH27	D10	31.50	08.12.18



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	99	
0.600	97	0.600	97	
0.425	96	0.425	96	
0.300	82	0.300	85	
0.212	48	0.212	52	
0.150	20	0.150	26	
0.063	12	0.063	17	
Clay (%)		13	Clay (%)	17
Silt (%)		87	Silt (%)	83
Sand (%)		0	Sand (%)	0
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH27	D11	33.00	08.12.18
+	BH27	D16	40.50	08.12.18



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

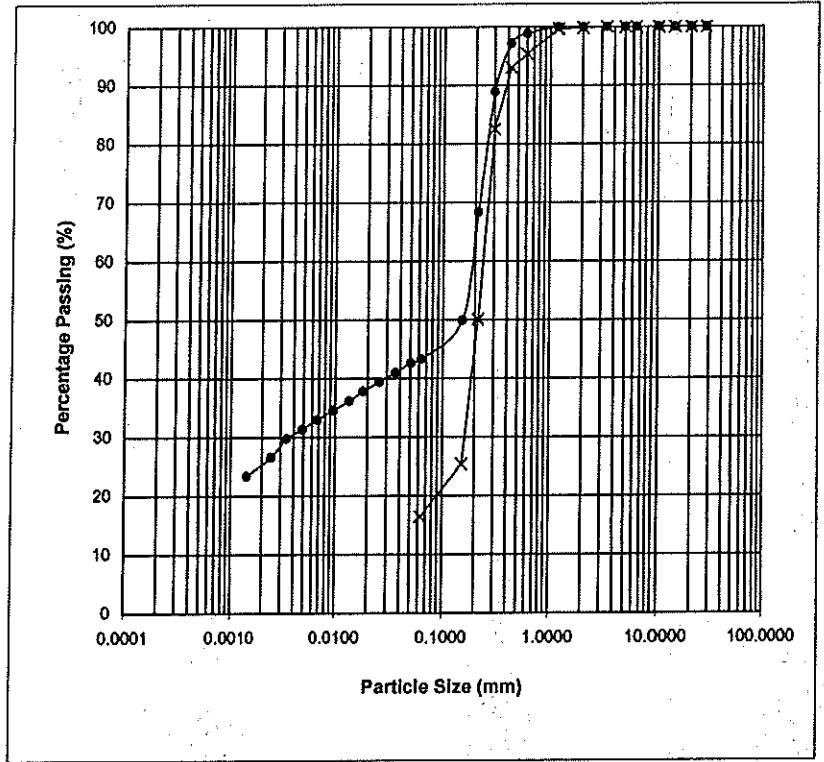
PARTICLE SIZE DISTRIBUTION

(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

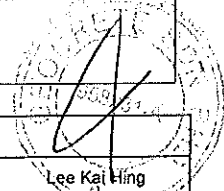
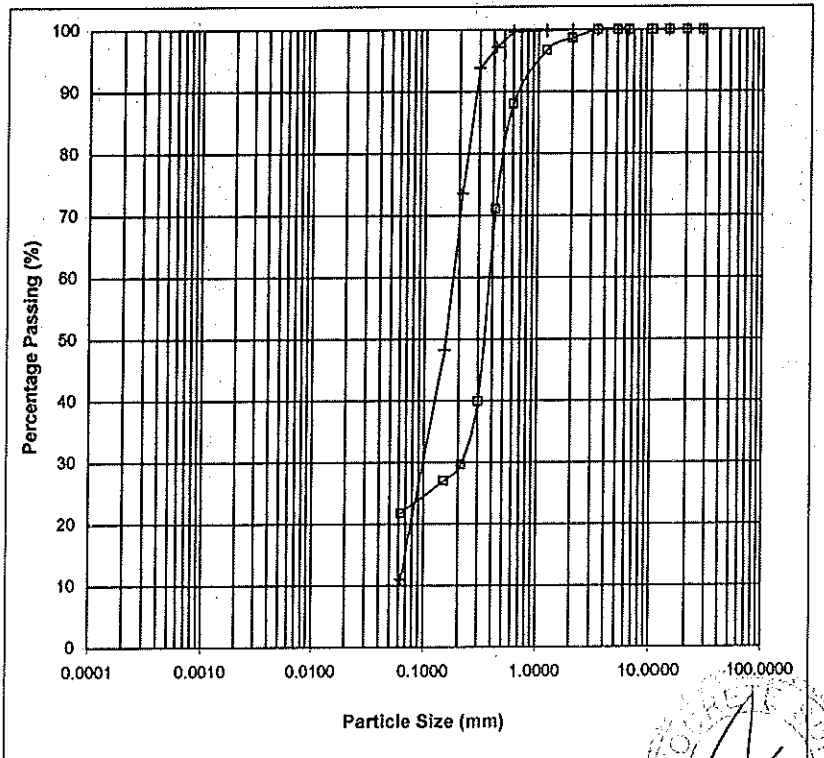
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	95
0.425	97	0.425	93
0.300	89	0.300	83
0.212	68	0.212	50
0.150	50	0.150	25
0.063	43	0.063	16
0.0505	43		
0.0380	41		
0.0256	39		
0.0182	38		
0.0134	36		
0.0095	35		
0.0068	33		
0.0048	31		
0.0034	30		
0.0024	27		
0.0014	23		
Clay (%)	25	Clay (%)	17
Silt (%)	18	Silt (%)	
Sand (%)	57	Sand (%)	83
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH27	D20	46.50	08.12.18
X	BH27	D22	49.50	08.12.18



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	99	2.00	100
1.18	97	1.18	100
0.600	88	0.600	100
0.425	71	0.425	97
0.300	40	0.300	94
0.212	30	0.212	74
0.150	27	0.150	48
0.063	22	0.063	11
Clay (%)	22	Clay (%)	11
Silt (%)		Silt (%)	
Sand (%)	77	Sand (%)	89
Gravel (%)	1	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH27	D23	51.00	08.12.18
+	BH27	D26	55.50	08.12.18



Total Stress Triaxial Compression

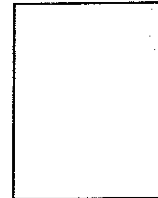
Unconsolidated Undrained

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)	147.72	149.66	153.34
Bulk Density ρ (Mg/m ³)	1.71	1.74	1.78
Particle Density ρ_s	2.66	2.66	2.66



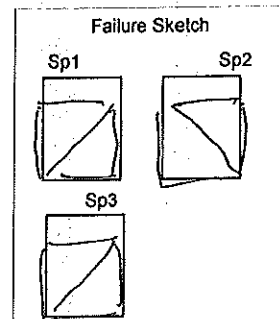
Initial Conditions

	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

	Specimen 1	Specimen 2	Specimen 3
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	44	42	41
Dry Density ρ_{d0} (Mg/m ³)	1.19	1.22	1.27
Voids Ratio e_0	1.24	1.17	1.10
Deg of Saturation S_0 %	95.11	95.13	98.00

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	62.18	66.36	88.65
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	61.98	66.16	88.45
Strain at Failure ϵ_f %	8.49	12.50	8.03
Shear Strength c_u (kPa)	31.09	33.18	44.32
Moisture Content w_f %	44	42	41
Dry Density ρ_{df} (Mg/m ³)	1.19	1.22	1.27
Voids Ratio e_f	1.24	1.17	1.10
Deg of Saturation S_f %	95.11	95.13	98.00



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 :

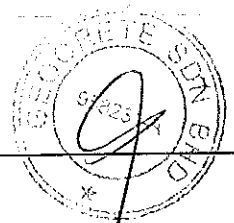
04.12.18

Sample : UD1

Borehole : BH27

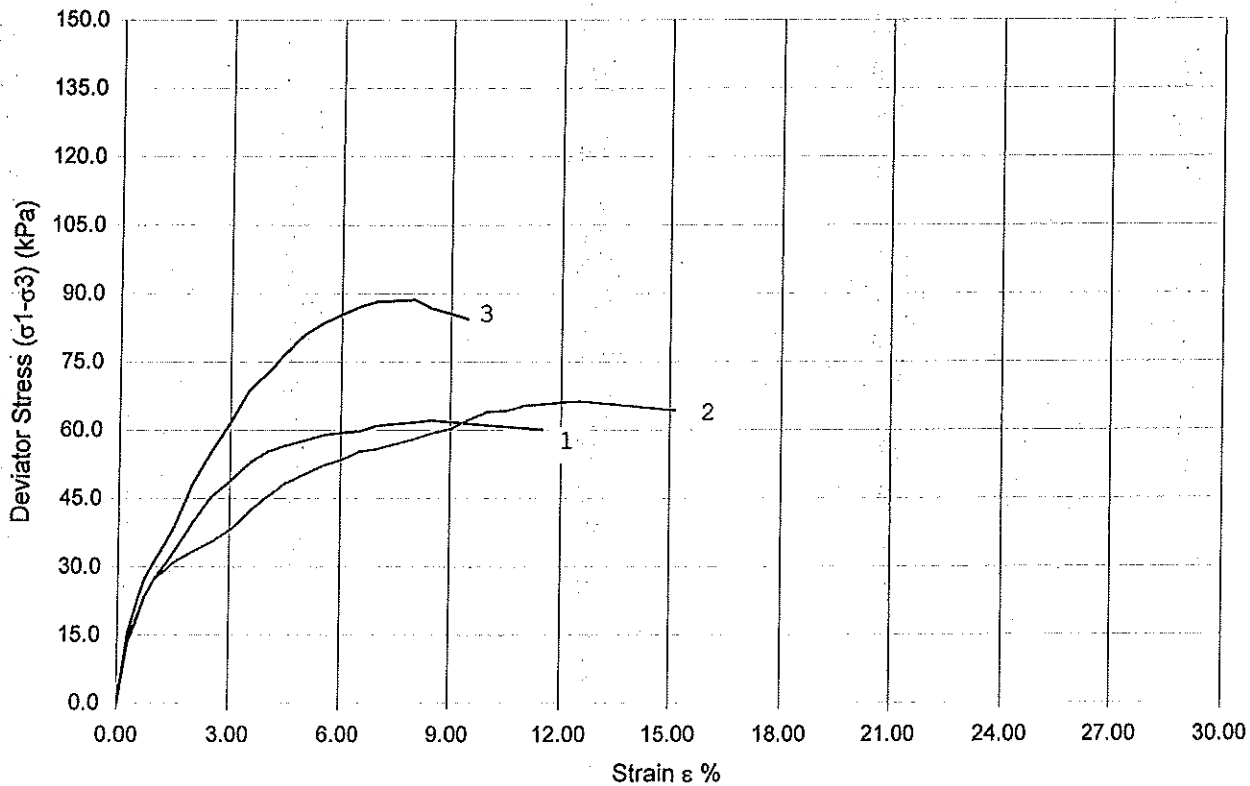
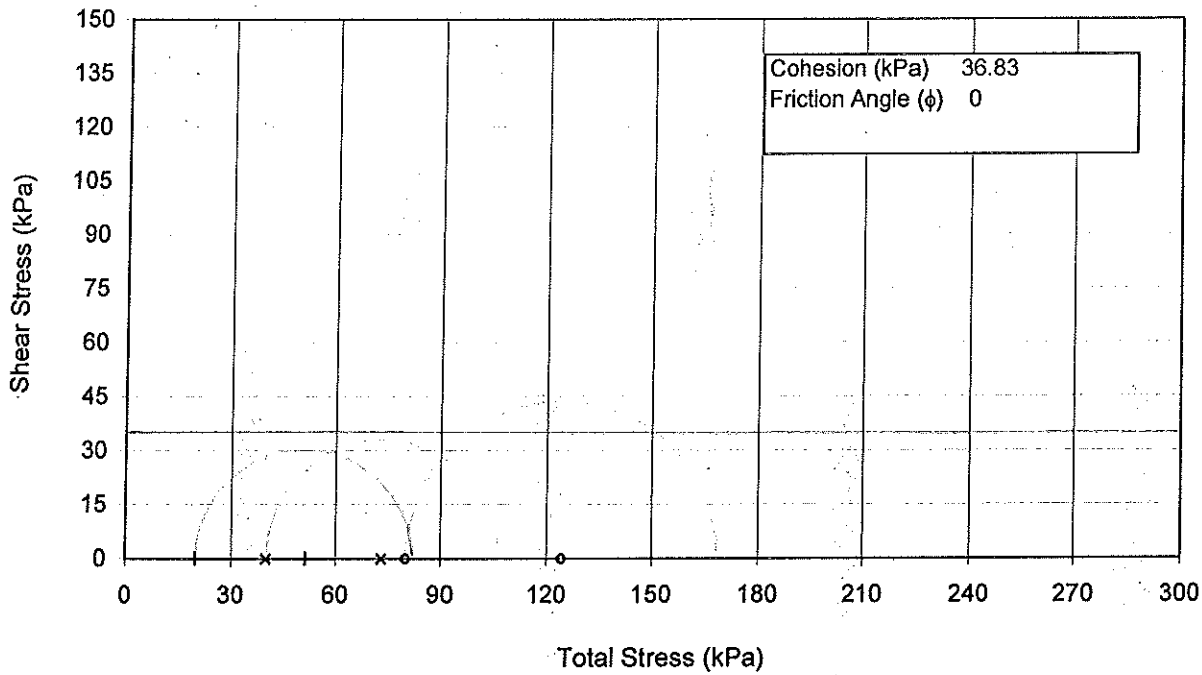
Approved

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 : BH27
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

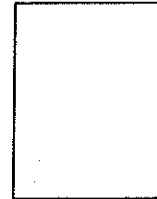
Unconsolidated Undrained

Sample details

Depth : 15.00m
 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)	151.35	154.08	156.35
Bulk Density ρ (Mg/m ³)	1.76	1.79	1.81
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)	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

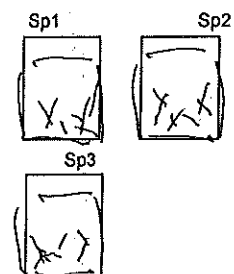
Load Channel	Specimen 1	Specimen 2	Specimen 3
	14391	14391	14391

Moisture Content w_0 %	32	31	30
Dry Density ρ_{d0} (Mg/m ³)	1.33	1.37	1.40
Voids Ratio e_0	1.00	0.94	0.90
Deg of Saturation S_0 %	85.74	86.25	87.63

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	43.83	63.65	76.92
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	43.63	63.45	76.72
Strain at Failure ϵ_f %	10.53	9.47	9.01
Shear Strength c_u (kPa)	21.91	31.83	38.46

Failure Sketch



Moisture Content w_f %	32	31	30
Dry Density ρ_{df} (Mg/m ³)	1.33	1.37	1.40
Voids Ratio e_f	1.00	0.94	0.90
Deg of Saturation S_f %	85.74	86.25	87.63

Notes : Intermediate Intermediate Intermediate

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

Test Name : UU
 Date of Test : 04.12.18

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

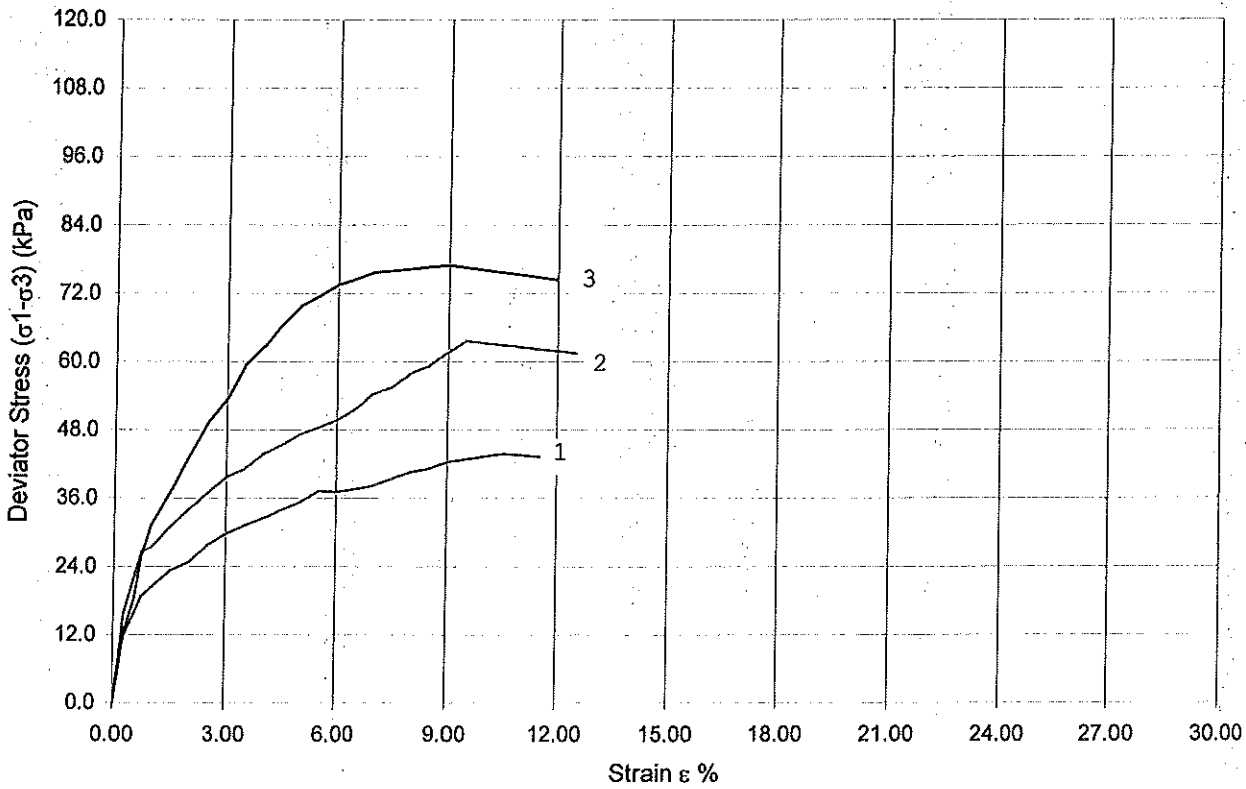
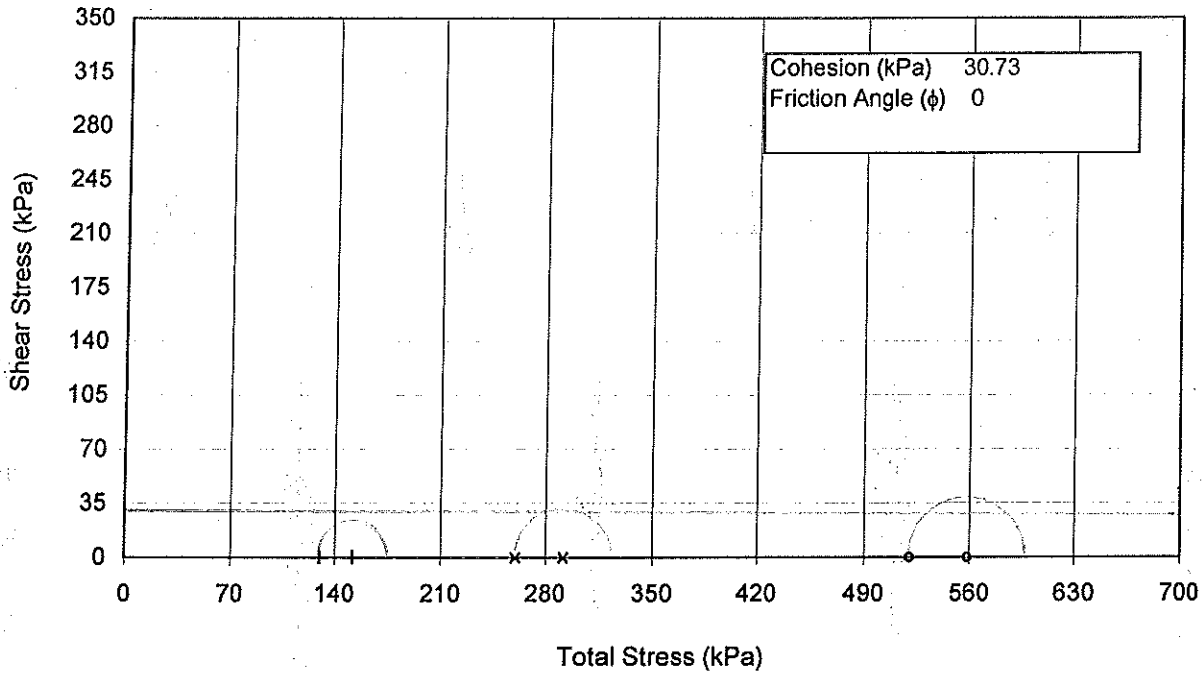
Operator : Shyam Nath
 Checked : Chris

Sample : UD5
 Borehole : BH27
 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

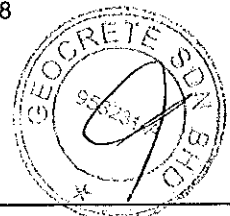
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 04.12.18

Sample : UD5
Borehole : BH27

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

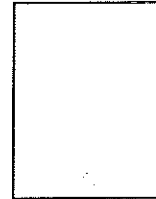
Unconsolidated Undrained

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)	143.08	144.82	147.41
Bulk Density ρ (Mg/m ³)	1.66	1.68	1.71
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)	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

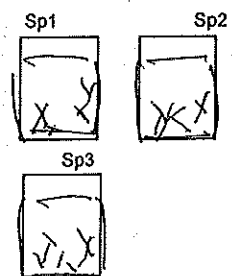
Moisture Content w_0 %	32	31	30
Dry Density ρ_{d0} (Mg/m ³)	1.26	1.28	1.32
Voids Ratio e_0	1.11	1.07	1.02
Deg of Saturation S_0 %	76.24	77.03	78.16

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	72.60	86.04	113.25
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	72.40	85.84	113.05
Strain at Failure ϵ_f %	9.01	8.49	11.51
Shear Strength c_u (kPa)	36.30	43.02	56.63

Moisture Content w_f %	32	31	30
Dry Density ρ_{df} (Mg/m ³)	1.26	1.28	1.32
Voids Ratio e_f	1.11	1.07	1.02
Deg of Saturation S_f %	76.24	77.03	78.16

Failure Sketch



Notes : Intermediate Intermediate Intermediate

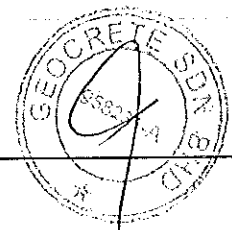
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 04.12.18

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

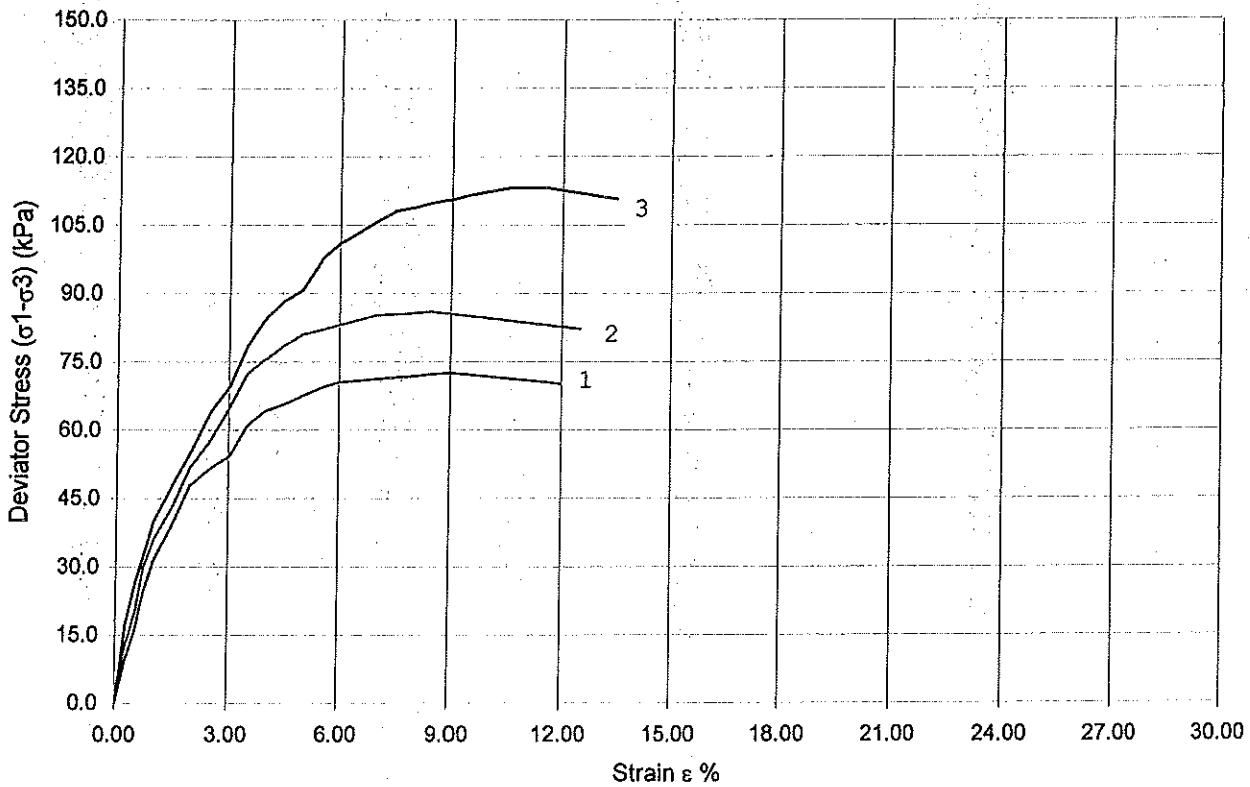
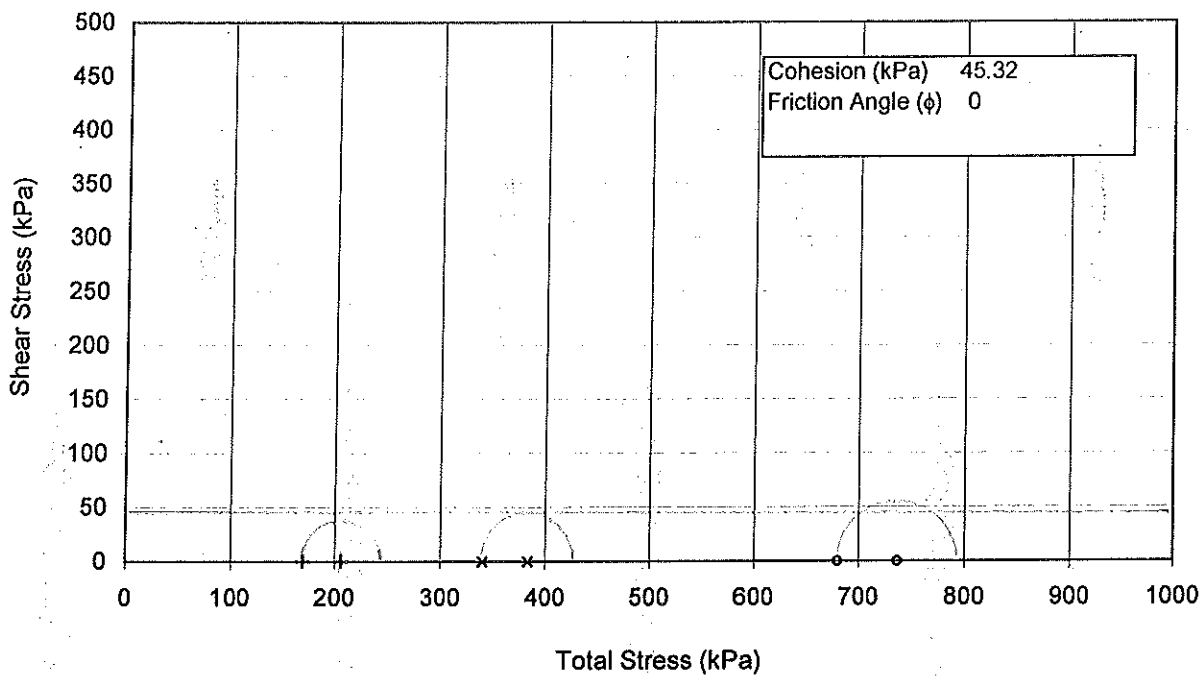
Operator : Shyam Nath
 Checked : Chris

Sample : UD7
 Borehole : BH27
 Approved : Lee Kai Hing



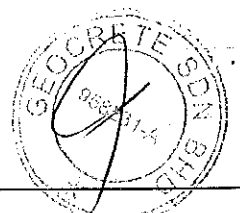
Total Stress Triaxial Compression

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 : BH27
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

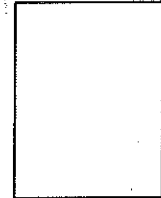
Unconsolidated Undrained

Sample details

Depth : 27.00m
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)	134.98	136.21	137.07
Bulk Density ρ (Mg/m ³)	1.57	1.58	1.59
Particle Density ρ_s	2.59	2.59	2.59

Sketch showing specimen location in original sample



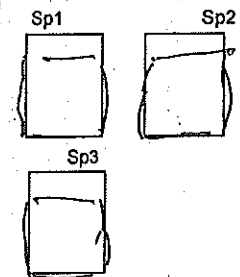
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	210	420	840
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 %	61	63	57
Dry Density ρ_{d0} (Mg/m ³)	0.98	0.97	1.01
Voids Ratio e_0	1.65	1.66	1.56
Deg of Saturation S_0 %	94.80	97.41	95.18

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	14.70	33.07	40.42
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	14.50	32.87	40.22
Strain at Failure ϵ_f %	6.97	9.01	6.97
Shear Strength c_u (kPa)	7.35	16.53	20.21
Moisture Content w_f %	61	63	57
Dry Density ρ_{df} (Mg/m ³)	0.98	0.97	1.01
Voids Ratio e_f	1.65	1.66	1.56
Deg of Saturation S_f %	94.80	97.41	95.18

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 :

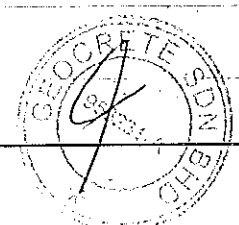
04.12.18

Sample : UD9

Borehole : BH27

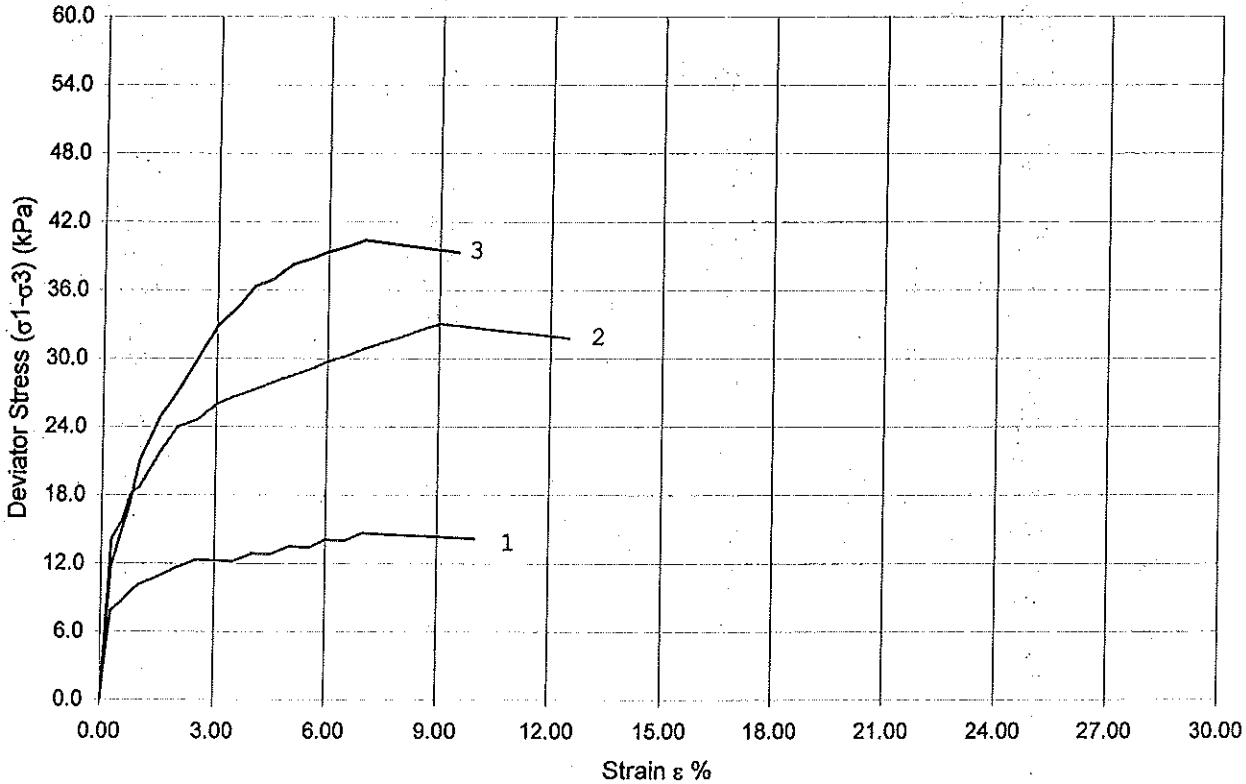
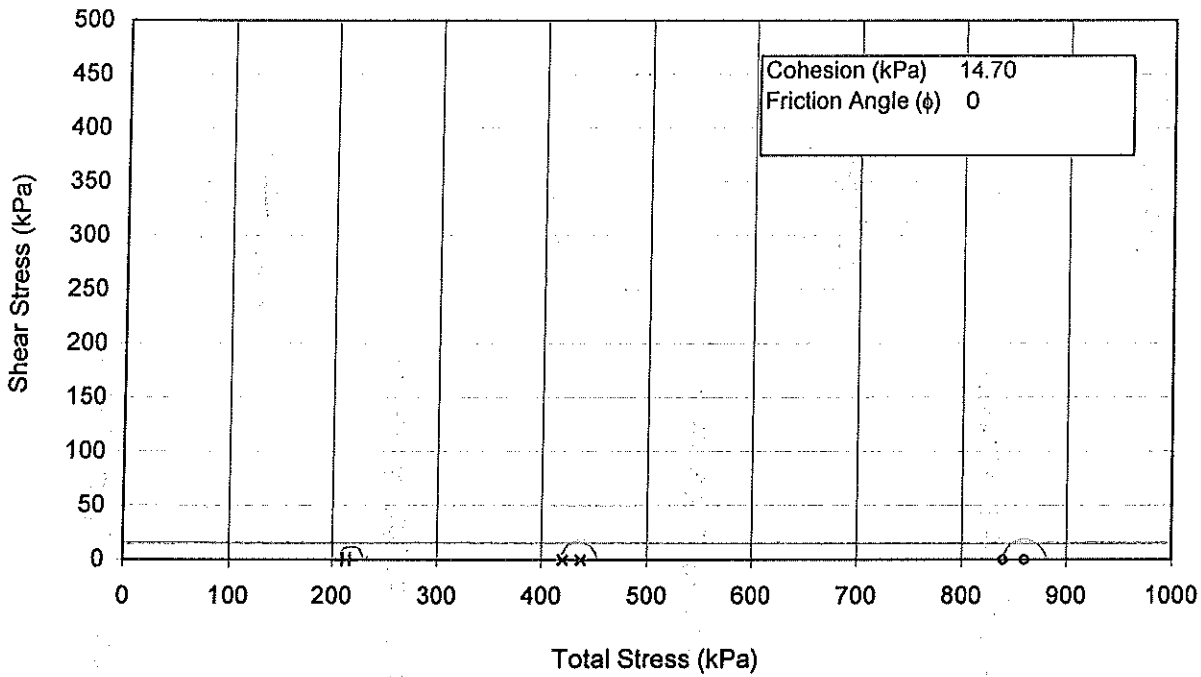
Approved

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

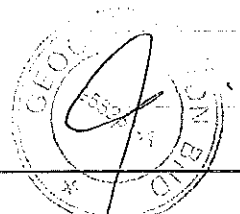
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 04.12.18

Sample : UD9
Borehole : BH27

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 27 / D 16 (40.50 m)

Test Size : 60 mm x 60 mm x 20 mm

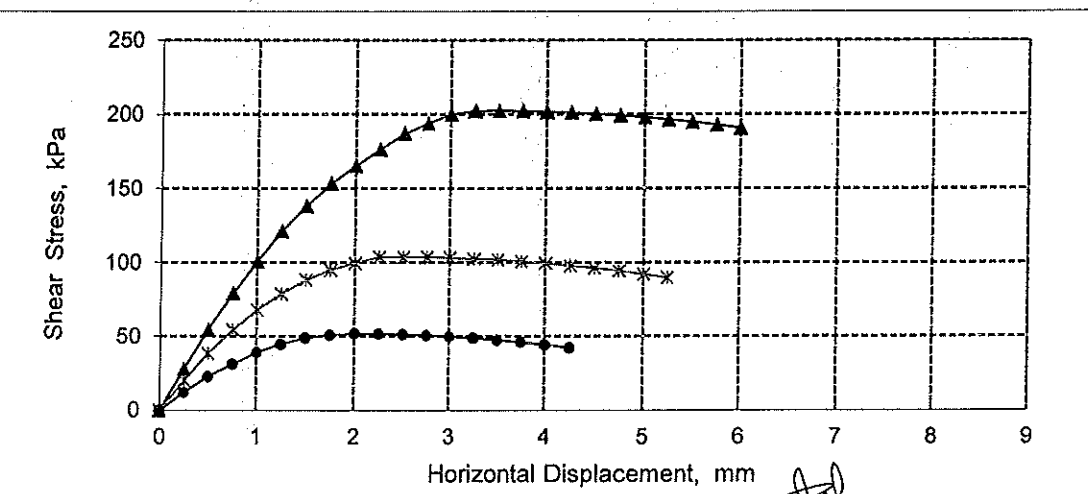
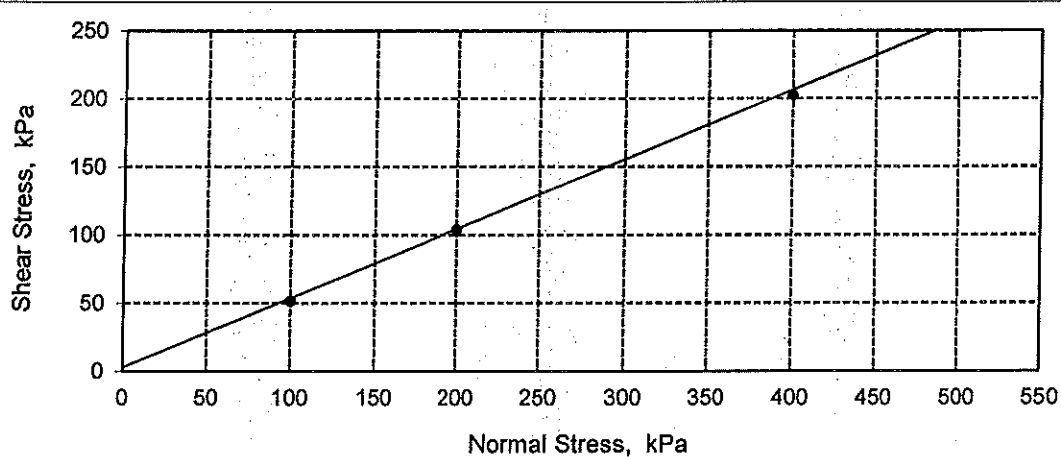
Date Tested : 12 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		136.7	137.2	137.1
Moisture Content (%)		19.9	20.5	20.0
Bulk Density (Mg/m ³)		1.899	1.906	1.904
Dry Density (Mg/m ³)		1.584	1.582	1.587

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		51.8	103.9	202.7
Displ. at Failure (mm)		2.0	2.3	3.5
Settlement (mm)		0.3	0.5	0.8

c' 3 kPa

ϕ' 27 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 27 / D 23 (51.00 m)

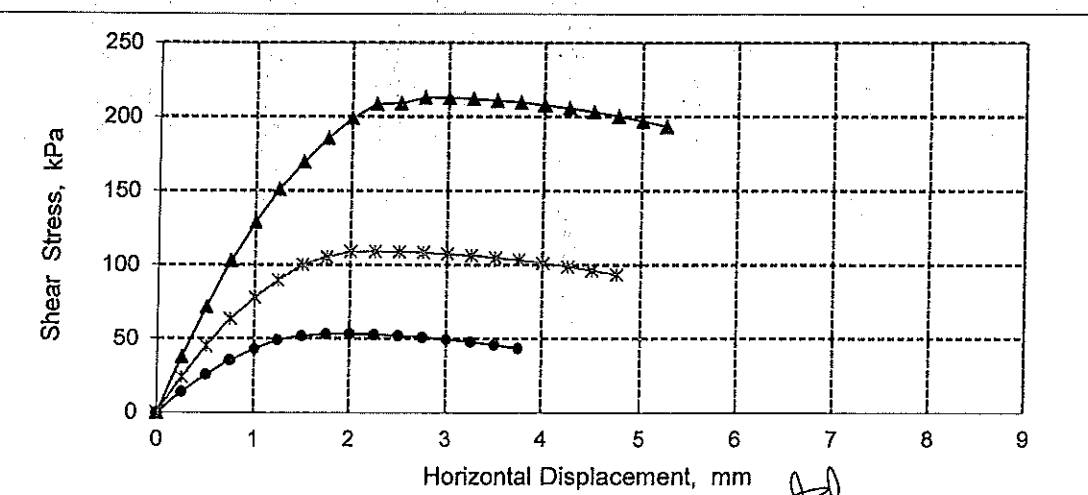
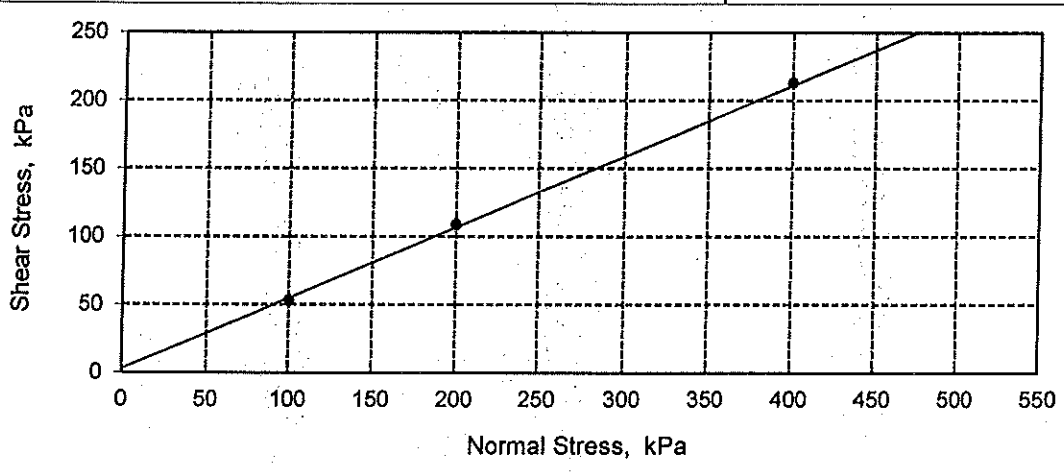
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 12 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		142.8	143.4	142.8
Moisture Content (%)		20.2	20.1	20.0
Bulk Density (Mg/m ³)		1.984	1.991	1.983
Dry Density (Mg/m ³)		1.651	1.658	1.653
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		53.4	109.3	213.3
Displ. at Failure (mm)		2.0	2.3	2.8
Settlement (mm)		0.2	0.3	0.6

c' 3 kPa

φ' 27.5 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	13.12.18
Sample No.	BH27 / UD5 / 15.00m	Test Started	03.12.18
Soil Description	Dark grey sandy CLAY	Ring No.	14

BEFORE TEST

Moist. Content from trimmings:	=	74	%	SG (Measured)	=	2.660	
Wt of sample + Ring	=	117.27	gm	Diameter (D)	=	50	mm
Wt of Ring	=	60.68	gm	Area (A)	=	1964	mm ²
Wt of sample	=	56.59	gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	33.34	gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	23.25	gm	Bulk Density (P)	=	1.440	Mg/m ³
Initial Moisture Content, M ₀	=	70	%	Dry Density (PD)	=	0.849	Mg/m ³

Initial Void Ratio, e ₀ , SG/P _D - 1	=	2.1344	
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	87	%
V. Ratio Change Factor F, $\frac{H}{1+e_0}$	=	0.1567	mm ⁻¹
Height of Solid H _s	=	6.381	mm

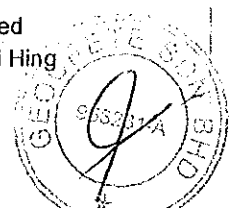
AFTER TEST

Wt of sample + Ring	=	114.86	gm	Overall settlement	=	2.114	mm
Wt of Dry sample + Ring	=	94.02	gm	Volume Change	=	4.153	cm ³
Wt of Ring	=	60.68	gm	Final Volume	=	35.13	cm ₃
Wt of Wet sample	=	54.18	gm	Final Bulk Density	=	1.542	Mg/m ³
Wt of Dry sample	=	33.34	gm	Final Dry Density	=	0.949	Mg/m ³
Wt of Moisture	=	20.84	gm	Final Void Ratio, e _r	=	1.8031	
Final Moisture Content, M _r	=	63	%				
Final Saturation, S ₀ , $\frac{M_r \times SG}{e_r}$	=	92	%				

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

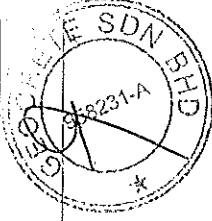
BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No	BH27 / UD5 / 15.00m	Test started	03.12.18
		Ring No.	14

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)	Cc	Cc
0	0.000	20.000	0.0000	2.1344	0.0000	0					
12.5	0.098	19.902	0.0154	2.1190	0.0154	12.5	0.3942	1.69	26.14		-0.0510
25.0	0.244	19.756	0.0382	2.0961	0.0229	12.5	0.5917	4.00	10.91		-0.0760
50.0	0.500	19.500	0.0784	2.0560	0.0401	25.0	0.5255	5.76	7.42		-0.1333
100	1.028	18.972	0.1611	1.9733	0.0827	50.0	0.5570	7.84	5.24		-0.2749
200	2.632	17.368	0.4125	1.7219	0.2514	99.9	0.9242	18.49	1.98		-0.8351
100	2.582	17.418	0.4046	1.7297	-0.0078	-99.9					
50	2.362	17.638	0.3702	1.7642	-0.0345	-50.0					
12.5	2.114	17.886	0.3313	1.8031	-0.0389	-37.5					

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing

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



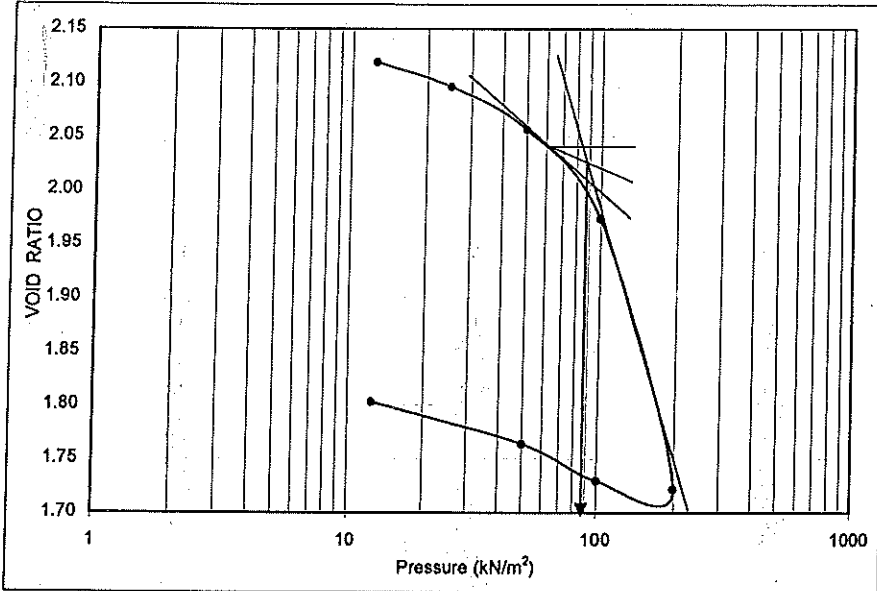
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH27 / UD5 / 15.00m

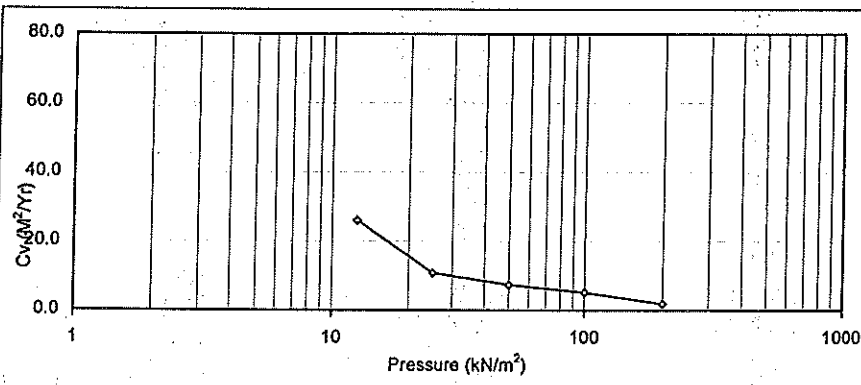
SOIL SAMPLE Dark grey sandy CLAY

Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 14



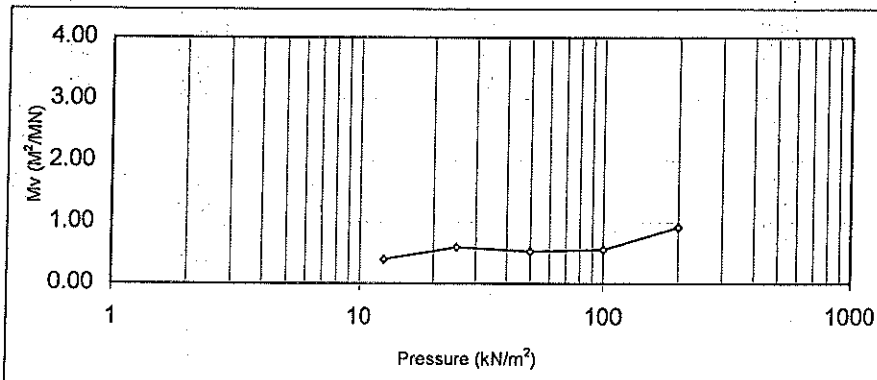
INITIAL

Water content	70	%
Dry Density	0.85	Mg/m ³
Void Ratio	2.1344	
Saturation	87	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.660	



FINAL

Water content	63	%
Dry Density	0.95	Mg/m ³
Void Ratio	1.8031	
Saturation	92	%
Height	18	mm
Comp. Index, C _c	0.8351	
Precons. Load	87	kN/m ²



Comp. Ratio, C_R 0.266



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.	BH27 / UD9 / 21.00m	Test Started	03.12.18
Soil Description	Grey CLAY	Ring No.	15

BEFORE TEST

Moist. Content from trimmings:	=	61 %	SG (Measured)	=	2.660	
Wt of sample + Ring	=	117.73 gm	Diameter (D)	=	50 mm	
Wt of Ring	=	58.91 gm	Area (A)	=	1964 mm ²	
Wt of sample	=	58.82 gm	Thickness (H)	=	20 mm	
Wt of Dry sample	=	37.12 gm	Volume (V)	=	39.29 cm ³	
Wt of Initial Moisture	=	21.7 gm	Bulk Density (P)	=	1.497 Mg/m ³	
Initial Moisture Content, M _o	=	58 %	Dry Density (PD)	=	0.945 Mg/m ³	
Initial Void Ratio, e _o , SG/P _D - 1	=	1.8152				
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	86 %				
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1408 mm ⁻¹				
Height of Solid H _s	=	7.104 mm				

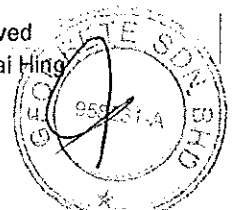
AFTER TEST

Wt of sample + Ring	=	114.65 gm	Overall settlement	=	2.118 mm
Wt of Dry sample + Ring	=	96.03 gm	Volume Change	=	4.160 cm ³
Wt of Ring	=	58.91 gm	Final Volume	=	35.13 cm ³
Wt of Wet sample	=	55.74 gm	Final Bulk Density	=	1.587 Mg/m ³
Wt of Dry sample	=	37.12 gm	Final Dry Density	=	1.057 Mg/m ³
Wt of Moisture	=	18.62 gm	Final Void Ratio, e _f	=	1.5171
Final Moisture Content, M _f	=	50 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	88 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



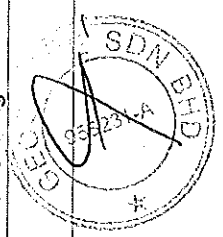
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL	Date of Report	13.12.18
	CT10 - CT19 AND ITS ASSOCIATED WORKS AT	Test started	03.12.18
	WESTPORT, PULAU INDAH, SELANGOR	Ring No.	15
Sample No	BH27 / UD9 / 21.00m		

Pressure (P) kN/m ²	Settlement ΔH (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX	
		$A_0 = F \times \Delta H$	$e = e_0 - e_1$	d_v kN/m ²	Mv (M ² /MIN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	C_c		
0	0.000	0.0000	1.8152	0.0000						
3.12	0.406	0.0571	1.7580	0.0571	3.12	6.6357		3.61	12.05	-0.1899
6.2	0.536	0.0754	1.7397	0.0183	3.12	2.1389		4.41	9.60	-0.0608
12.5	0.794	0.1118	1.7034	0.0363	6.2	2.1510		3.61	11.49	-0.1207
25.0	1.180	0.1661	1.6491	0.0543	12.5	1.6421		3.61	11.12	-0.1805
50	1.884	0.2652	1.5500	0.0991	25.0	1.5556		1.21	31.29	-0.3292
100	2.660	0.3744	1.4408	0.1092	50.0	0.8957		1.69	20.64	-0.3629
50	2.588	0.3643	1.4509	-0.0101	-50.0					
25	2.362	0.3325	1.4827	-0.0318	-25.0					
12.5	2.118	0.2981	1.5171	-0.0343	-12.5					

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



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

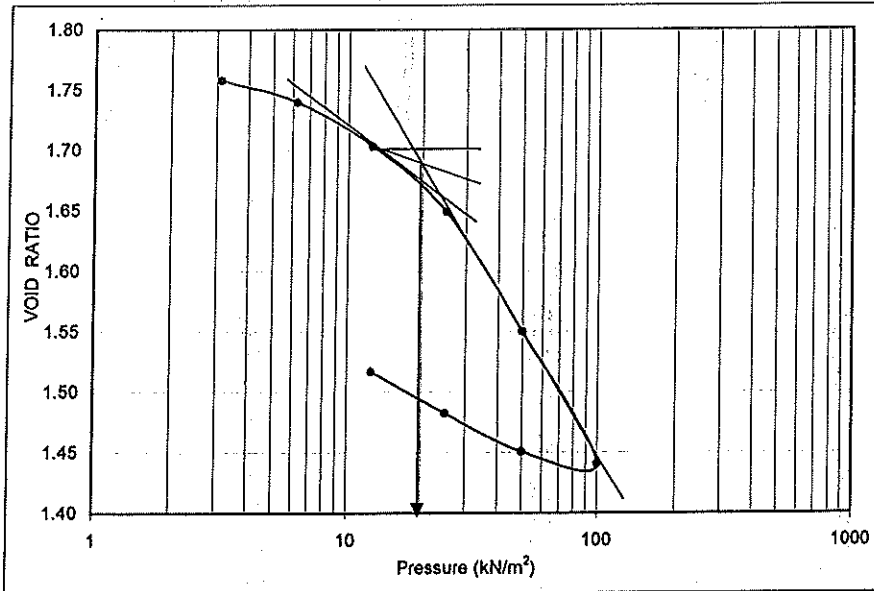
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH27 / UD9 / 21.00m

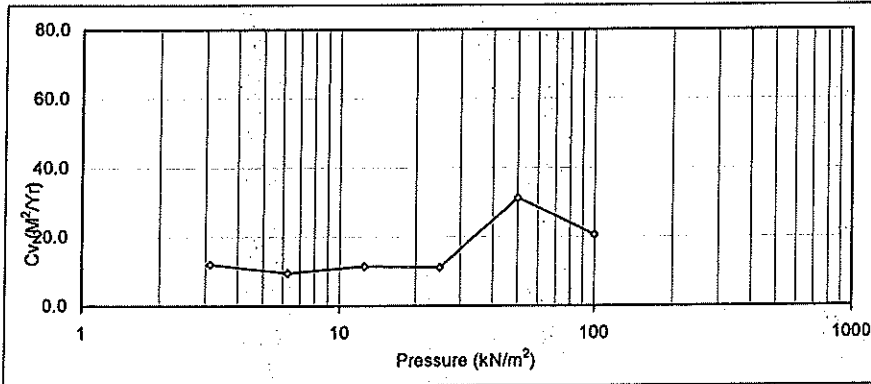
SOIL SAMPLE Grey CLAY

Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 15



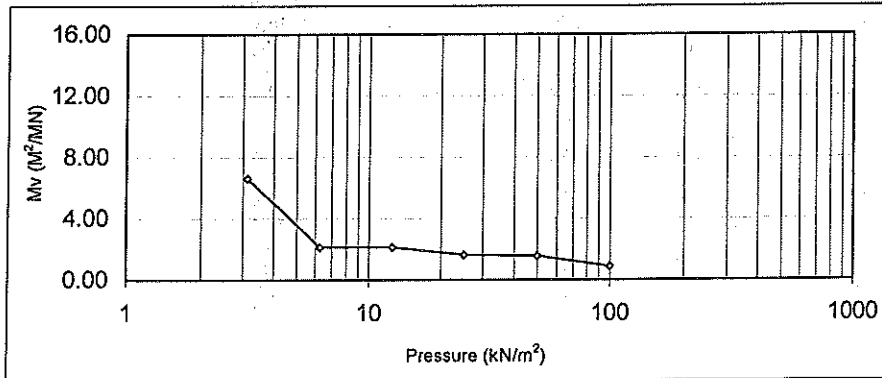
INITIAL

Water content	58	%
Dry Density	0.94	Mg/m ³
Void Ratio	1.8152	
Saturation	86	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.660	

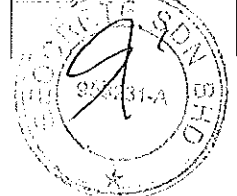


FINAL

Water content	60	%
Dry Density	1.06	Mg/m ³
Void Ratio	1.5171	
Saturation	88	%
Height	18	mm
Comp. Index, C _c	0.3629	
Precons. Load	190	kN/m ²



Comp. Ratio, C_R 0.129



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 : 08.02.19																
SAMPLE AND Borehole No.	SPECIMEN DETAILS, 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)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)				
BH28	UD1	52	1.62	1.06	71	26	45	14.0	51	32	17	0	2.61						24.69	0					2.9	0.17	0.75	7.7		
	UD3	62	1.68	1.03	75	29	46		54	38	8	0																		
	UD5	44	1.68	1.19	68	25	43		40	29	31	0							15.53	0		24	0.266							
	UD7	55	1.73	1.13	81	31	50	14.9	53	37	10	0	2.61											2.8	0.15	0.63	7.6			
	UD9	42	1.69	1.11					42	33	24	1																		
	UD10	43	1.66	1.02	51	22	29	11.1	35	22	43	0																		
	D15	23	2.07	1.78					16		83	1	2.70				2	35							0.8	0.09	0.42	7.6		
	D19	44	NA	NA	43	22	21		31	19	50	0																		
	D23	48	NA	NA	45	22	23	10.8	35	26	39	0																		
	D26	35	NA	NA	40	21	19		31	27	42	0															1.8	0.14	0.64	7.8
	D30	22	NA	NA					20	14	66	0																		

Note : NES = NOT ENOUGH SAMPLE

Remarks

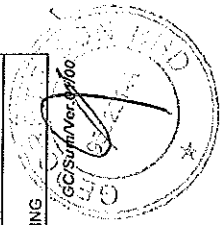
* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE, ONLY AVAILABLE IF REMOULDED SHEAR BOX TEST WAS CARRIED OUT.

NP = NON PLASTIC

NA = NOT APPLICABLE

Checked by: CHRIS

Approved by: LEE KAI HING



SUM

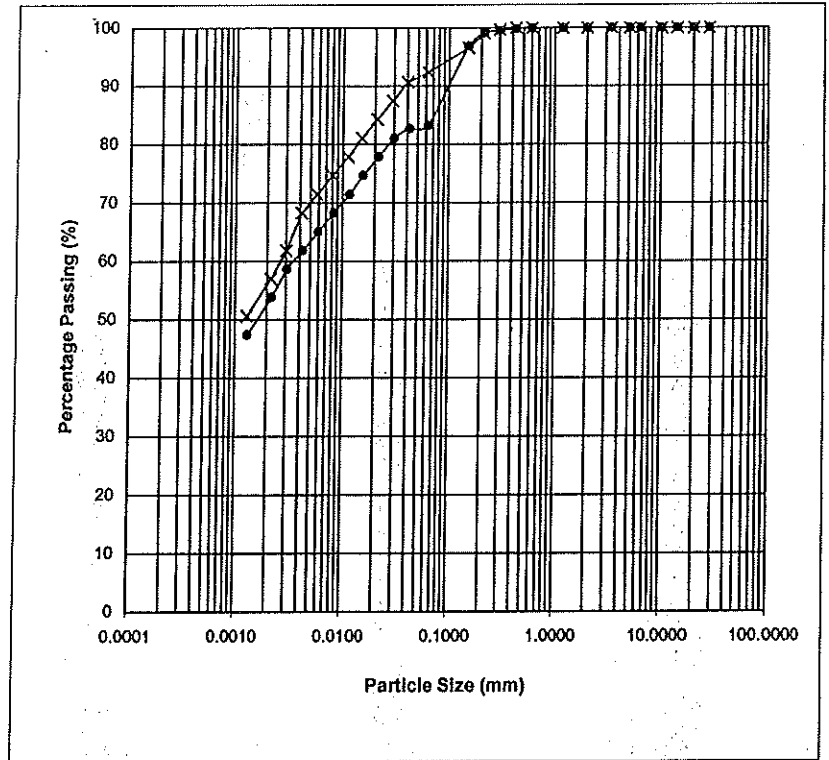
PARTICLE SIZE DISTRIBUTION

(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

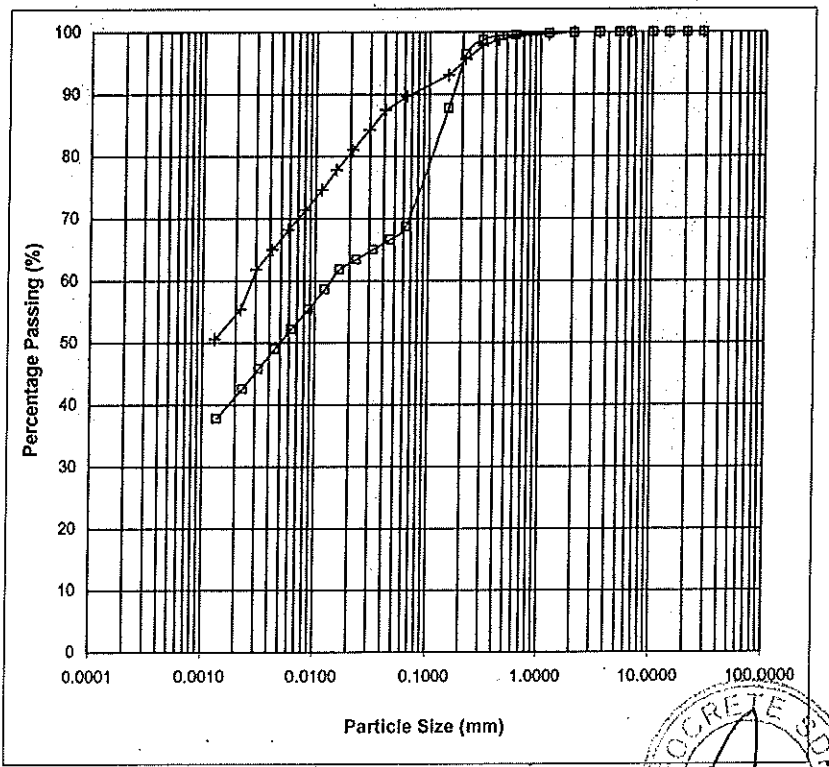
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	100	0.300	100	
0.212	99	0.212	99	
0.150	97	0.150	97	
0.063	83	0.063	92	
0.0420	83	0.0401	91	
0.0300	81	0.0289	87	
0.0215	78	0.0208	84	
0.0155	75	0.0150	81	
0.0115	71	0.0111	78	
0.0083	68	0.0080	75	
0.0059	65	0.0058	71	
0.0043	62	0.0041	68	
0.0031	59	0.0030	62	
0.0022	54	0.0022	57	
0.0013	47	0.0013	51	
Clay (%)		51	Clay (%)	54
Silt (%)		32	Silt (%)	38
Sand (%)		17	Sand (%)	8
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH28	UD1	3.00	30.01.19
X	BH28	UD3	9.00	30.01.19



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	99	0.300	98	
0.212	96	0.212	96	
0.150	88	0.150	93	
0.063	69	0.063	90	
0.0456	67	0.0408	87	
0.0325	65	0.0294	84	
0.0231	63	0.0212	81	
0.0165	62	0.0152	78	
0.0122	59	0.0113	75	
0.0088	55	0.0081	71	
0.0063	52	0.0058	68	
0.0045	49	0.0042	65	
0.0032	46	0.0030	62	
0.0023	43	0.0022	55	
0.0014	38	0.0013	51	
Clay (%)		40	Clay (%)	53
Silt (%)		29	Silt (%)	37
Sand (%)		31	Sand (%)	10
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH28	UD5	15.00	30.01.19
+	BH28	UD7	21.00	30.01.19



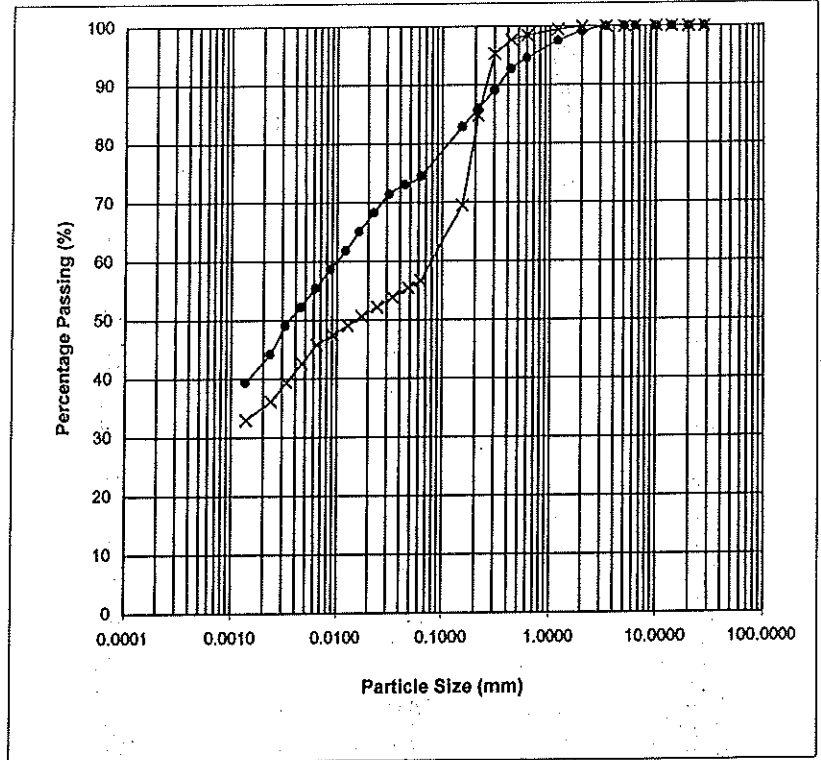
PARTICLE SIZE DISTRIBUTION

(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

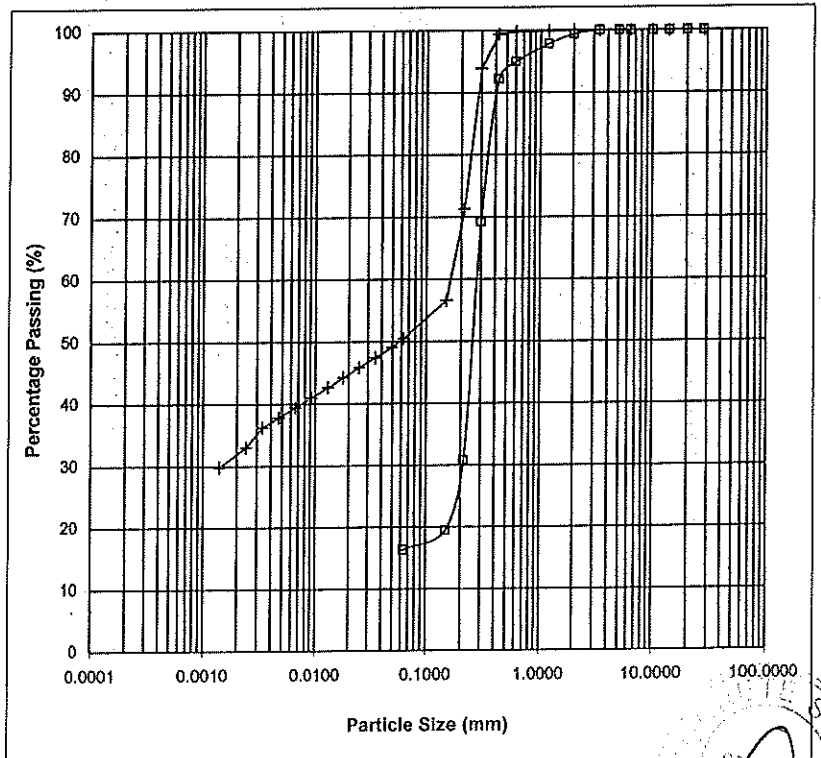
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	99	2.00	100	
1.18	98	1.18	99	
0.600	95	0.600	98	
0.425	93	0.425	98	
0.300	89	0.300	95	
0.212	86	0.212	85	
0.150	83	0.150	70	
0.063	75	0.063	57	
0.0442	73	0.0480	55	
0.0315	71	0.0341	54	
0.0226	68	0.0243	52	
0.0162	65	0.0173	51	
0.0120	62	0.0127	49	
0.0086	59	0.0091	47	
0.0062	55	0.0064	46	
0.0044	52	0.0046	43	
0.0032	49	0.0033	39	
0.0023	44	0.0024	36	
0.0013	39	0.0014	33	
Clay (%)		42	Clay (%)	35
Silt (%)		33	Silt (%)	22
Sand (%)		24	Sand (%)	43
Gravel (%)		1	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH28	UD9	27.00	30.01.19
X	BH28	UD10	30.00	30.01.19



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	99	2.00	100	
1.18	98	1.18	100	
0.600	95	0.600	100	
0.425	92	0.425	99	
0.300	69	0.300	94	
0.212	31	0.212	71	
0.150	19	0.150	57	
0.063	16	0.063	51	
		0.0493	49	
		0.0351	47	
		0.0250	46	
		0.0178	44	
		0.0130	43	
		0.0093	41	
		0.0066	39	
		0.0047	38	
		0.0033	36	
		0.0024	33	
		0.0014	30	
Clay (%)		16	Clay (%)	31
Silt (%)			Silt (%)	19
Sand (%)		83	Sand (%)	50
Gravel (%)		1	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH28	D15	37.50	30.01.19
+	BH28	D19	43.50	30.01.19



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

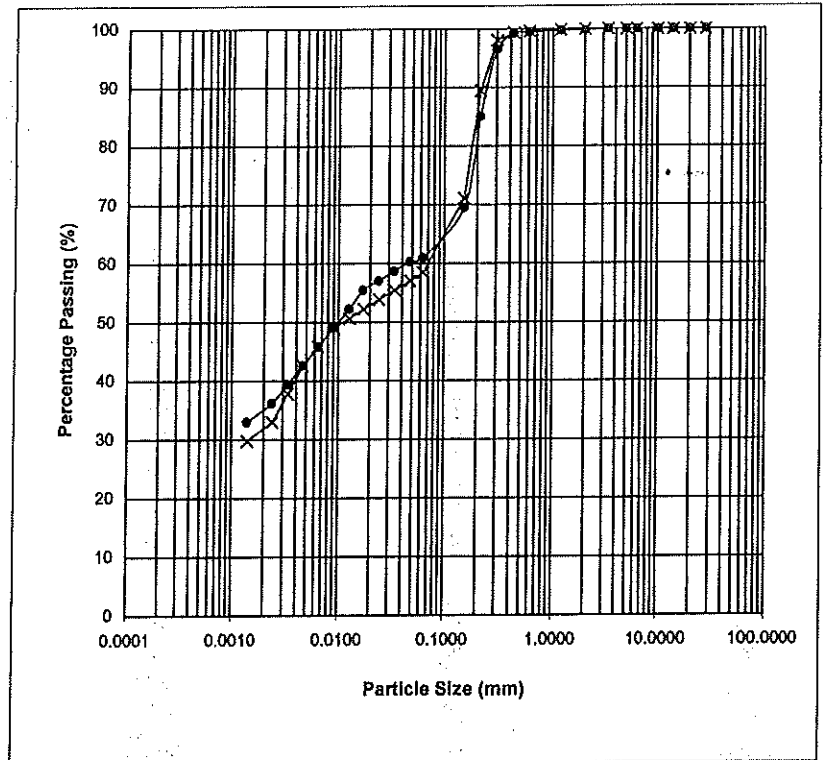
PARTICLE SIZE DISTRIBUTION

(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

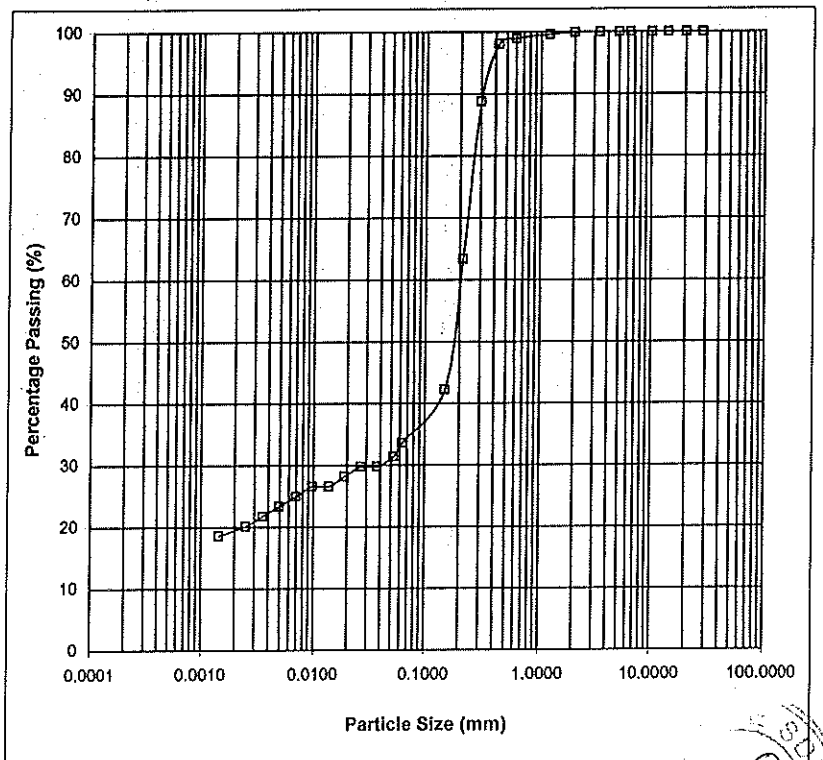
Particle Size Distribution			
●		x	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	100
0.425	99	0.425	99
0.300	97	0.300	98
0.212	85	0.212	89
0.150	70	0.150	71
0.063	61	0.063	58
0.0470	60	0.0476	57
0.0334	59	0.0339	55
0.0238	57	0.0241	54
0.0170	55	0.0172	52
0.0126	52	0.0126	51
0.0090	49	0.0090	49
0.0064	46	0.0064	46
0.0046	43	0.0046	43
0.0033	39	0.0033	38
0.0024	36	0.0024	33
0.0014	33	0.0014	30
Clay (%)	35	Clay (%)	31
Silt (%)	26	Silt (%)	27
Sand (%)	39	Sand (%)	42
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH28	D23	49.50	30.01.19
x	BH28	D26	54.00	30.01.19



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	99		
0.425	98		
0.300	89		
0.212	63		
0.150	42		
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 (%)	20		
Silt (%)	14		
Sand (%)	66		
Gravel (%)	0		
Total (%)	100		

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH28	D30	60.00	30.01.19
+				



Total Stress Triaxial Compression

Unconsolidated Undrained

Sample details

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

Sketch showing specimen location in original sample



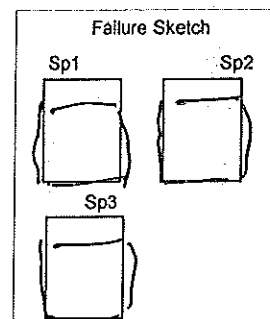
	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	137.23	139.56	141.66
Bulk Density ρ (Mg/m ³)	1.593	1.620	1.644
Particle Density ρ_s	2.61	2.61	2.61

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	52
Dry Density ρ_{d0} (Mg/m ³)	1.04	1.06	1.08
Voids Ratio e_0	1.52	1.47	1.41
Deg of Saturation S_0 %	92.21	94.68	95.76

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	44.34	49.60	54.22
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	44.14	49.40	54.02
Strain at Failure ϵ_f %	9.47	9.01	8.49
Shear Strength c_u (kPa)	22.17	24.80	27.11



Moisture Content w_f %	54	53	52
Dry Density ρ_{df} (Mg/m ³)	1.04	1.06	1.08
Voids Ratio e_f	1.52	1.47	1.41
Deg of Saturation S_f %	92.21	94.68	95.76

Notes : Plastic Plastic Plastic

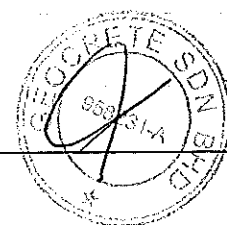
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 30.01.19

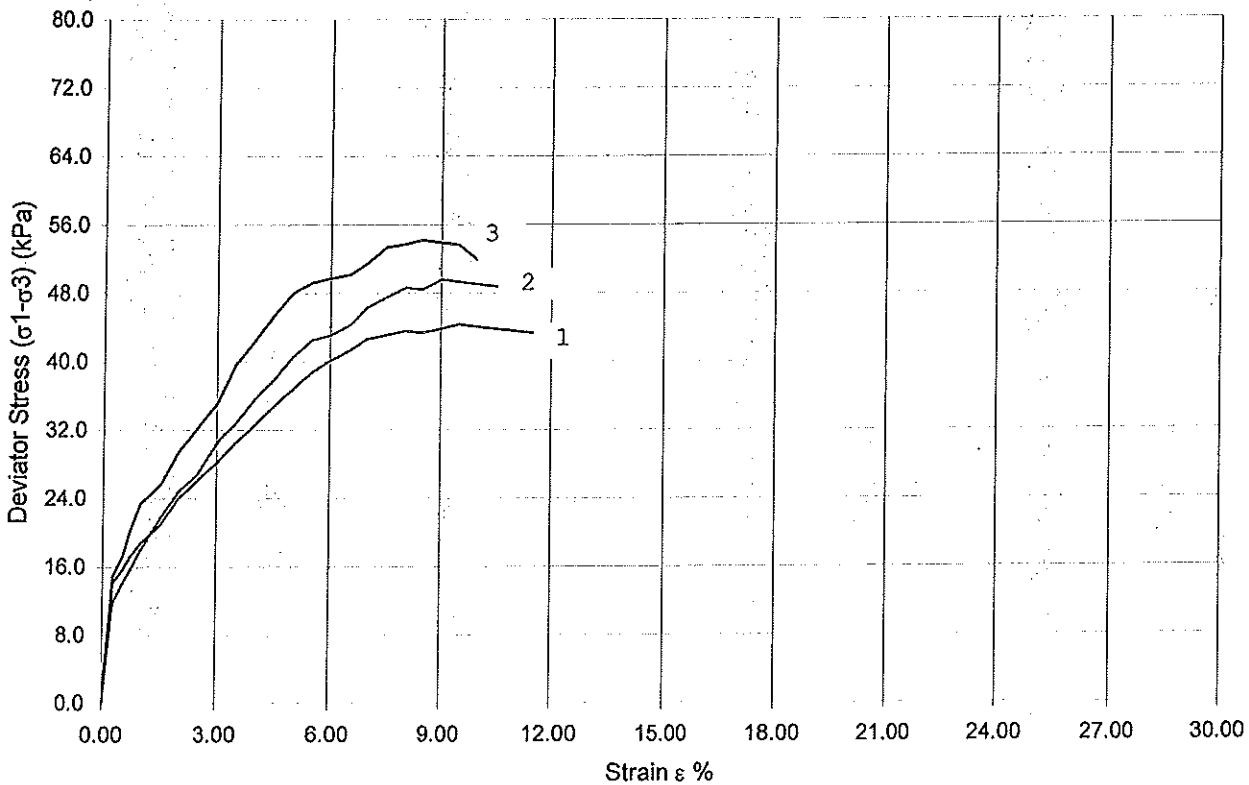
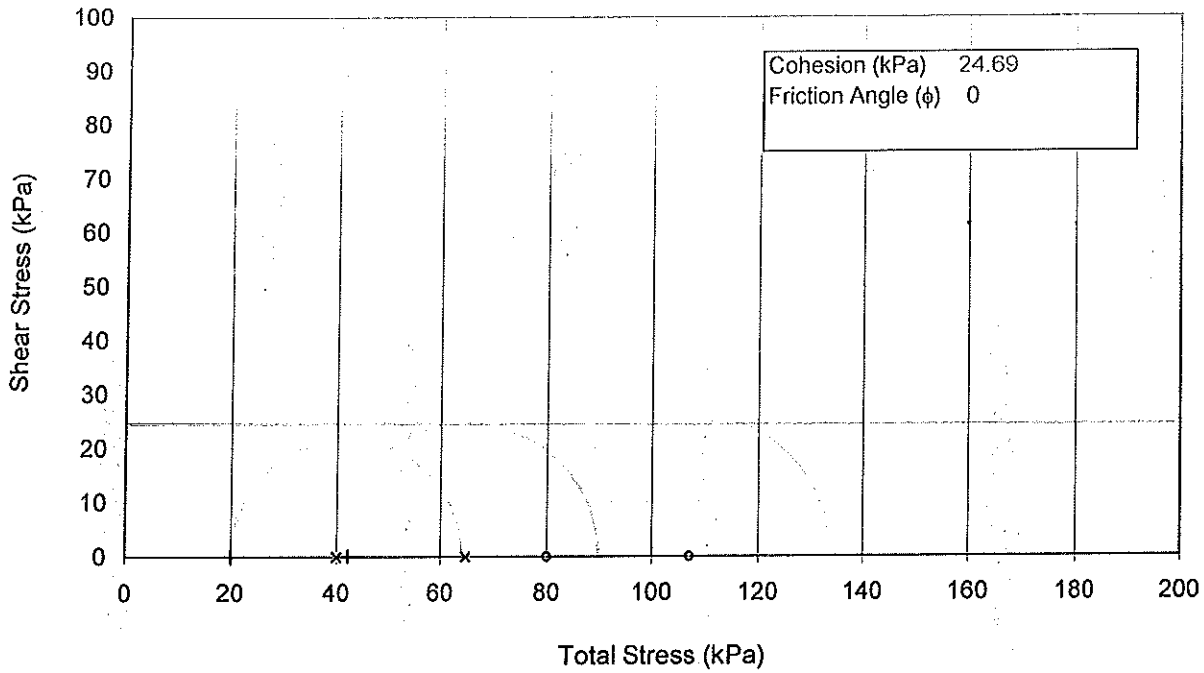
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Sample : UD1
 Borehole : BH28
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris

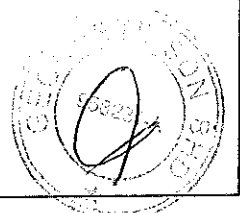


Total Stress Triaxial Compression Unconsolidated Undrained



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 : 30.01.19
 Sample : UD1
 Borehole : BH28
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

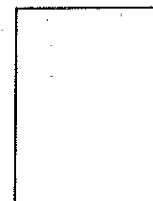
Unconsolidated Undrained

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)	143.50	144.40	145.81
Bulk Density ρ (Mg/m ³)	1.666	1.676	1.693
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)	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

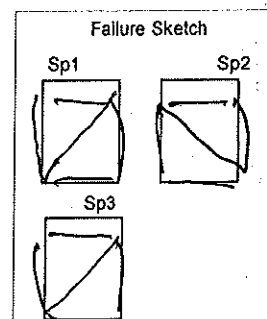
Load Channel 14391 14391 14391

Moisture Content w_0 %	42	41	40
Dry Density ρ_{d0} (Mg/m ³)	1.17	1.19	1.21
Voids Ratio e_0	1.21	1.16	1.14
Deg of Saturation S_0 %	90.72	89.93	91.08

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	25.58	28.92	38.68
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	25.38	28.72	38.48
Strain at Failure ϵ_f %	7.50	8.49	10.99
Shear Strength c_u (kPa)	12.79	14.46	19.34

Moisture Content w_f %	42	41	40
Dry Density ρ_{df} (Mg/m ³)	1.17	1.19	1.21
Voids Ratio e_f	1.21	1.16	1.14
Deg of Saturation S_f %	90.72	89.93	91.08



Notes : Shear Shear Shear

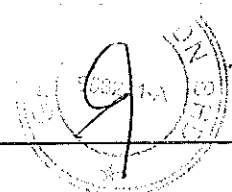
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 30.01.19

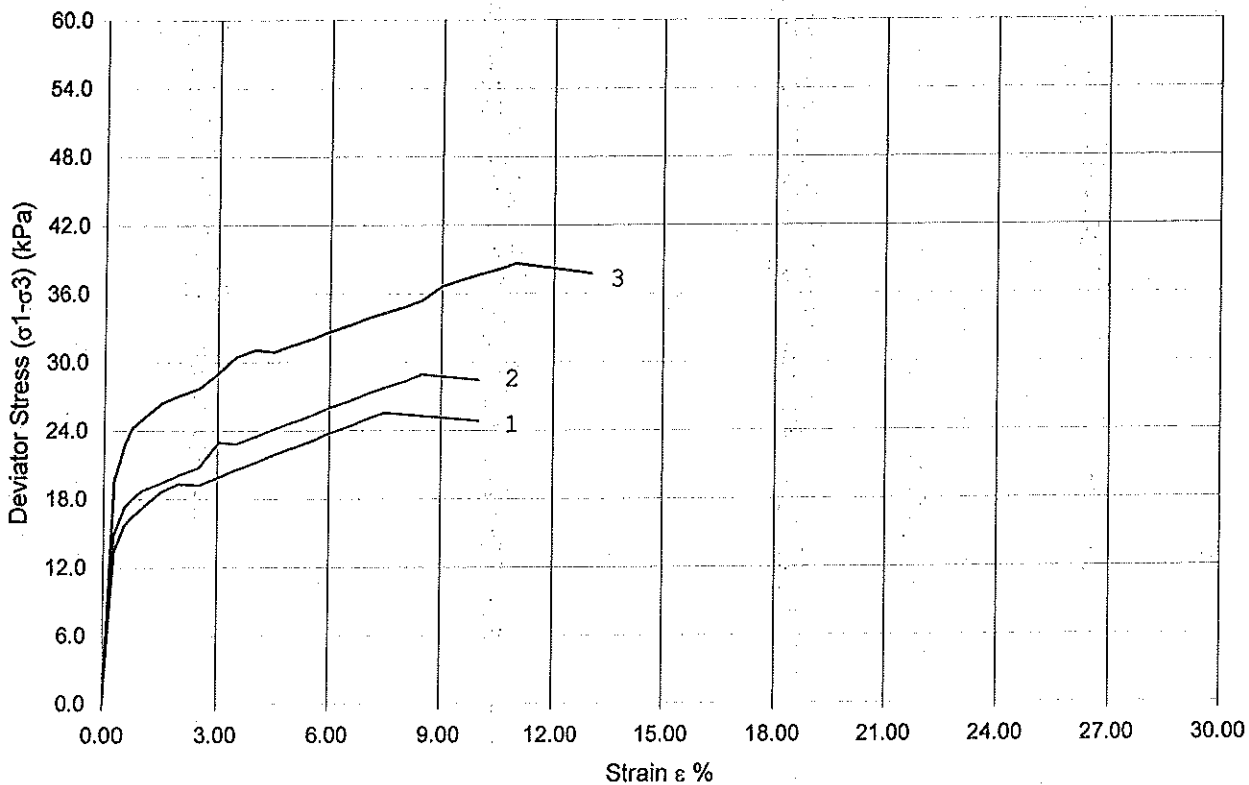
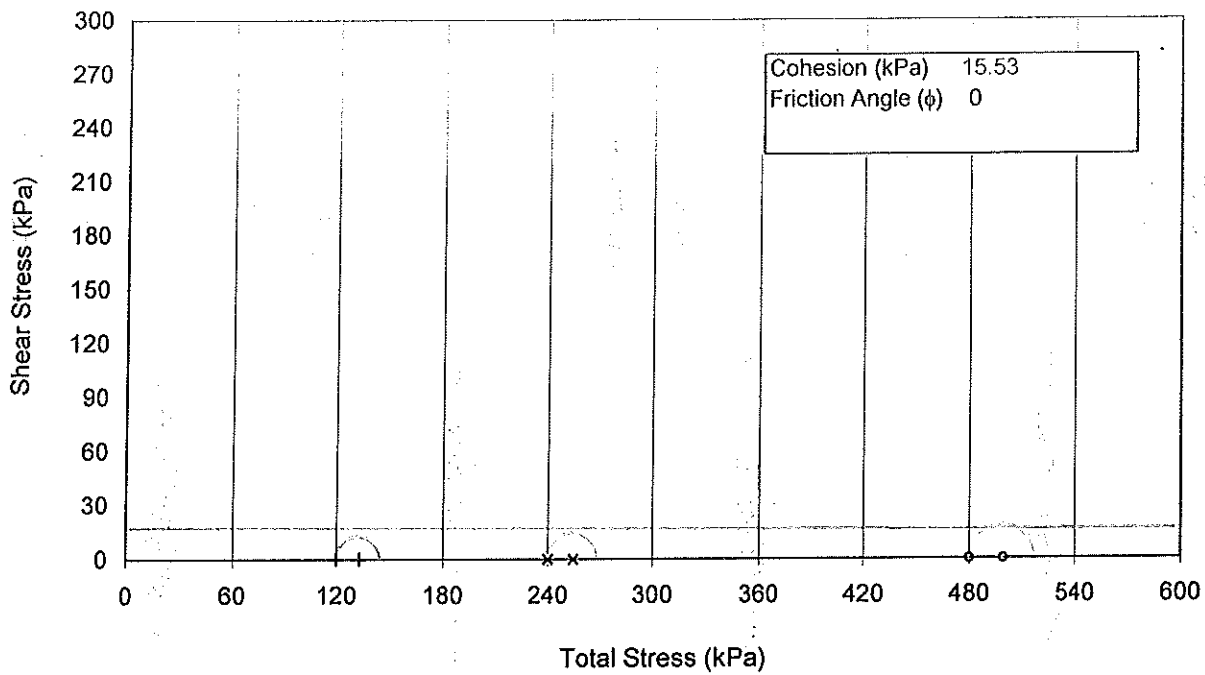
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator : Shyam Nath
 Checked : Chris

Sample : UD5
 Borehole : BH28
 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 : 30.01.19

Sample : UD5
Borehole : BH28

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 28 / D 15 (37.50 m)

Test Size : 60 mm x 60 mm x 20 mm

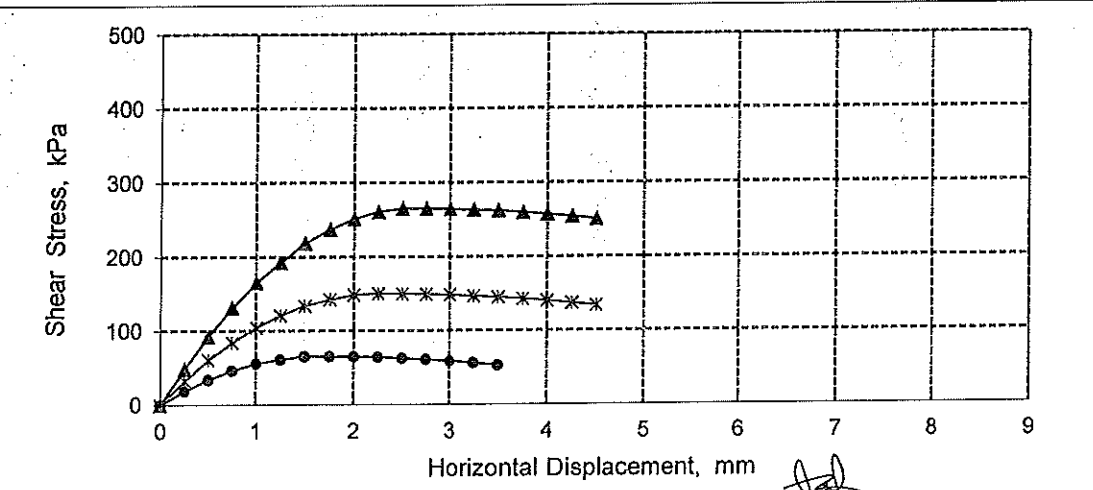
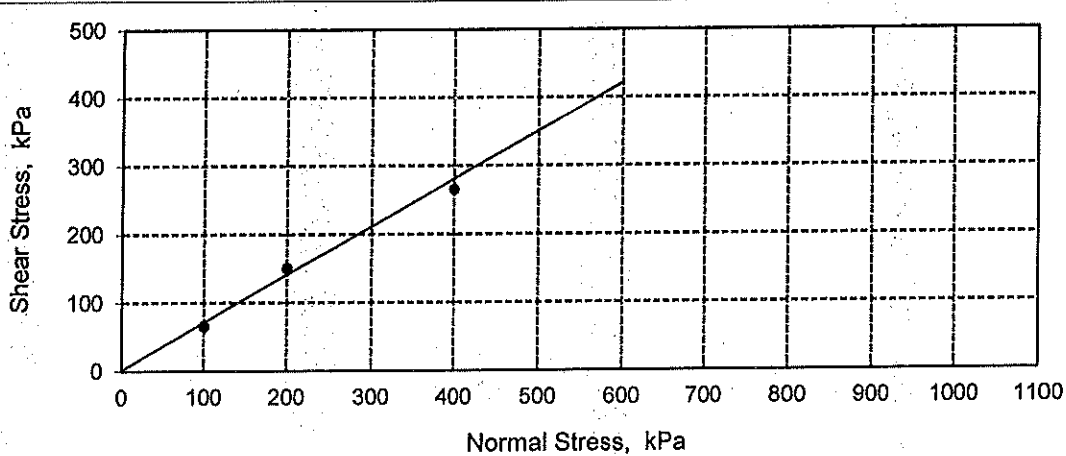
Date Tested : 4 / 2 / 2019

INITIAL CONDITIONS			
Specimen No.	S 1	S 2	S 3
Specimen Weight (g)	148.8	148.8	148.9
Moisture Content (%)	16.5	16.4	15.5
Bulk Density (Mg/m ³)	2.067	2.066	2.068
Dry Density (Mg/m ³)	1.774	1.775	1.790

SHEARING STAGE			
Normal Stress (kPa)	100	200	400
Max. Shear Stress (kPa)	65.5	150.6	265.6
Displ. at Failure (mm)	1.5	2.3	2.5
Settlement (mm)	0.1	0.2	0.4

c' 2 kPa

φ' 35 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	18.02.19
Sample No.	BH28 / UD1 / 3.00m	Test Started	28.01.19
Soil Description	Greenish grey CLAY with little sand	Ring No.	A11

BEFORE TEST

Moist. Content from trimmings:	=	74	%	SG (Measured)	=	2.610	
Wt of sample + Ring	=	121.13	gm	Diameter (D)	=	50	mm
Wt of Ring	=	60.78	gm	Area (A)	=	1964	mm ²
Wt of sample	=	60.35	gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	34.88	gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	25.47	gm	Bulk Density (P)	=	1.536	Mg/m ³
Initial Moisture Content, M _o	=	73	%	Dry Density (PD)	=	0.888	Mg/m ³

Initial Void Ratio, e _o , SG/P _D - 1	=	1.9397	
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	98	%
V. Ratio Change Factor F _v , $\frac{H}{1+e_o}$	=	0.1470	mm ⁻¹
Height of Solid H _s	=	6.803	mm

AFTER TEST

Wt of sample + Ring	=	116.52	gm	Overall settlement	=	2.568	mm
Wt of Dry sample + Ring	=	95.66	gm	Volume Change	=	5.044	cm ³
Wt of Ring	=	60.78	gm	Final Volume	=	34.24	cm ³
Wt of Wet sample	=	55.74	gm	Final Bulk Density	=	1.628	Mg/m ³
Wt of Dry sample	=	34.88	gm	Final Dry Density	=	1.019	Mg/m ³
Wt of Moisture	=	20.86	gm	Final Void Ratio, e _r	=	1.5622	
Final Moisture Content, M _f	=	60	%				
Final Saturation, S _o , $\frac{M_f \times SG}{e_r}$	=	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	18.02.19
Sample No	BH28 / UD1 / 3.00m	Test started	28.01.19
		Ring No.	A11

Pressure (P) kN/m ²	Settlement ΔH (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
		$A_v = F_v \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	0.0000	1.9397	0.0000	0				
6.25	0.676	0.0994	1.8403	0.0994	6.25	5.6015	3.61	11.89	-0.3301
12.5	0.970	0.1426	1.7971	0.0432	6.25	2.4738	2.56	15.95	-0.1436
25.0	1.524	0.2240	1.7157	0.0814	12.5	2.4006	2.25	17.35	-0.2705
50.0	2.160	0.3175	1.6222	0.0935	25.0	1.4271	3.61	10.14	-0.3106
100	3.060	0.4498	1.4899	0.1323	50.0	1.0634	1.69	19.86	-0.4395
50	2.984	0.4386	1.5011	-0.0112	-50.0				
25	2.724	0.4004	1.5393	-0.0382	-25.0				
12.5	2.568	0.3775	1.5622	-0.0229	-12.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing

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

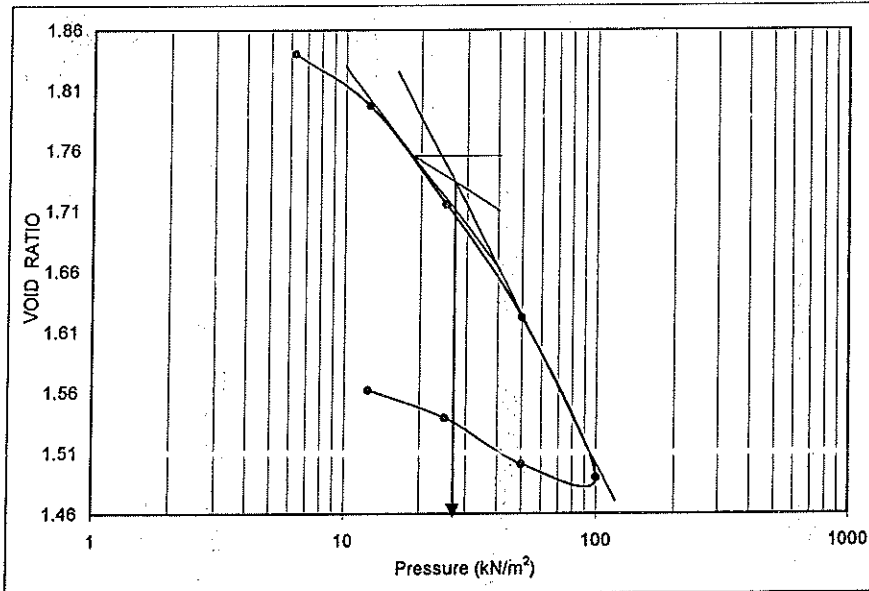


ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

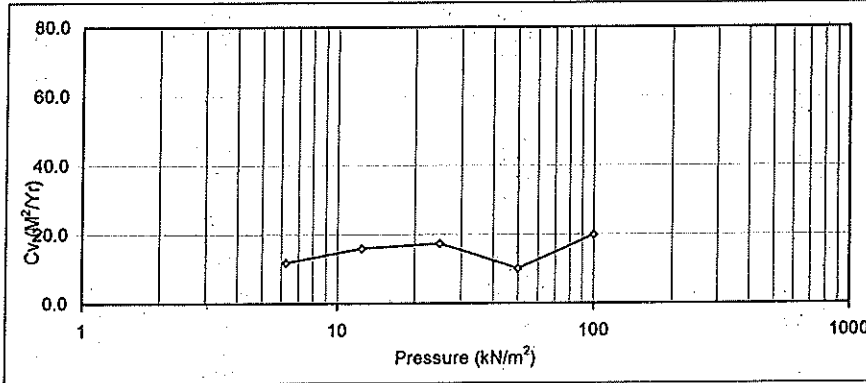
BH REF BH28 / UD1 / 3.00m
 SOIL SAMPLE Greenish grey CLAY with little sand

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. A11



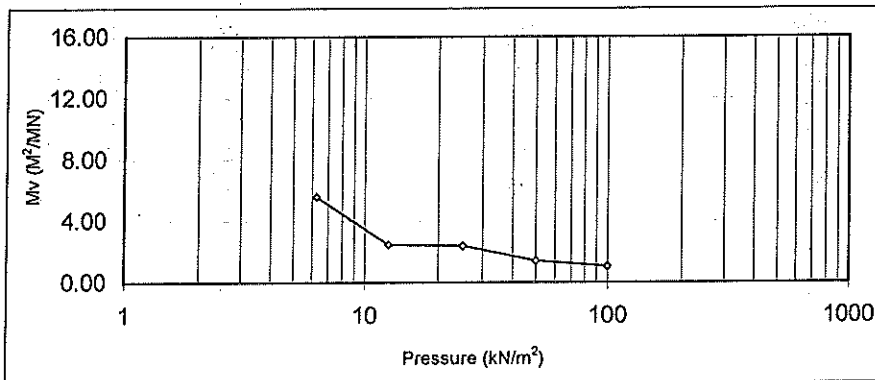
INITIAL

Water content	73	%
Dry Density	0.89	Mg/m ³
Void Ratio	1.9397	
Saturation	98	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.610	



FINAL

Water content	60	%
Dry Density	1.02	Mg/m ³
Void Ratio	1.5622	
Saturation	100	%
Height	17	mm
Comp. Index, C _c	0.4395	
Precons. Load	27	kN/m ²



Comp. Ratio, C_R 0.150



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	18.02.19
Sample No.	BH28 / UD5 / 15.00m	Test Started	28.01.19
Soil Description	Greenish grey CLAY	Ring No.	A12

BEFORE TEST

Moist. Content from trimmings:	=	52	%	SG (Measured)	=	2.580	
Wt of sample + Ring	=	127.03	gm	Diameter (D)	=	50	mm
Wt of Ring	=	61.53	gm	Area (A)	=	1964	mm ²
Wt of sample	=	65.5	gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	43.25	gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	22.25	gm	Bulk Density (P)	=	1.667	Mg/m ³
Initial Moisture Content, M _o	=	51	%	Dry Density (PD)	=	1.101	Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.3435					
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	99	%				
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1172	mm ⁻¹				
Height of Solid H _s	=	8.534	mm				

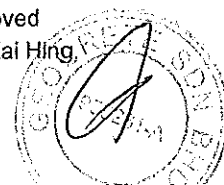
AFTER TEST

Wt of sample + Ring	=	124.16	gm	Overall settlement	=	1.862	mm
Wt of Dry sample + Ring	=	104.78	gm	Volume Change	=	3.658	cm ³
Wt of Ring	=	61.53	gm	Final Volume	=	35.63	cm ³
Wt of Wet sample	=	62.63	gm	Final Bulk Density	=	1.758	Mg/m ³
Wt of Dry sample	=	43.25	gm	Final Dry Density	=	1.214	Mg/m ³
Wt of Moisture	=	19.38	gm	Final Void Ratio, e _r	=	1.1253	
Final Moisture Content, M _f	=	45	%				
Final Saturation, S _o , $\frac{M_f \times SG}{e_r}$	=	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

BH28 / UD5 / 15.00m

Date of Report

18.02.19

Test started

28.01.19

Ring No.

A12

Sample No

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	1.3435	0.0000	0					
6.25	0.684	19.316	0.0801	1.2634	0.0801	6.25	5.6701	4.00	10.72		-0.2663
12.5	0.872	19.128	0.1022	1.2413	0.0220	6.25	1.5738	1.21	33.89		-0.0732
25.0	1.250	18.750	0.1465	1.1970	0.0443	12.5	1.6140	7.84	5.08		-0.1472
50.0	1.710	18.290	0.2004	1.1431	0.0539	25.0	1.0068	1.44	26.44		-0.1791
100	2.308	17.692	0.2704	1.0731	0.0701	50.0	0.6765	1.69	21.26		-0.2328
50	2.274	17.726	0.2665	1.0771	-0.0040	-50.0					
25	2.082	17.918	0.2440	1.0996	-0.0225	-25.0					
12.5	1.862	18.138	0.2182	1.1253	-0.0258	-12.5					

Operator

Shyam Nath

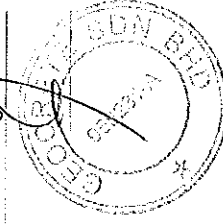
Checked

Chris

Approved

Lee Kai Hing

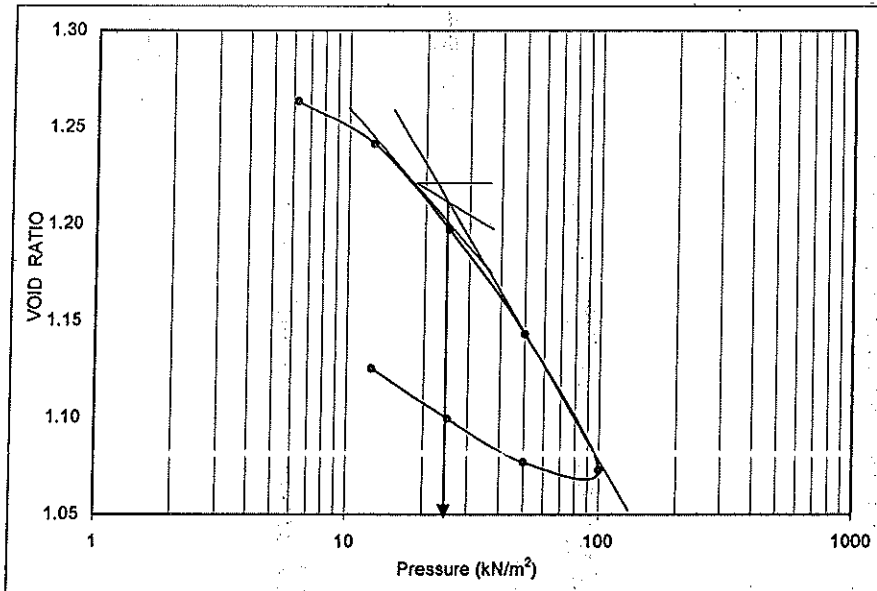
GEOCRETE SDN. BHD.
(Co. No. 958231-A)



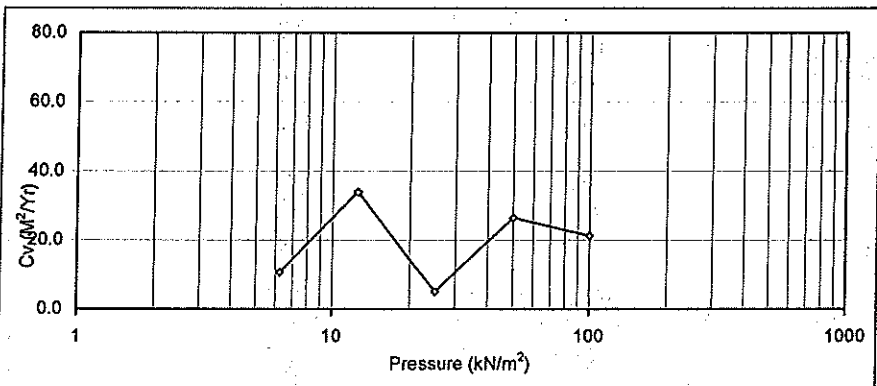
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 BH REF BH28 / UD5 / 15.00m
 SOIL SAMPLE Greenish grey CLAY

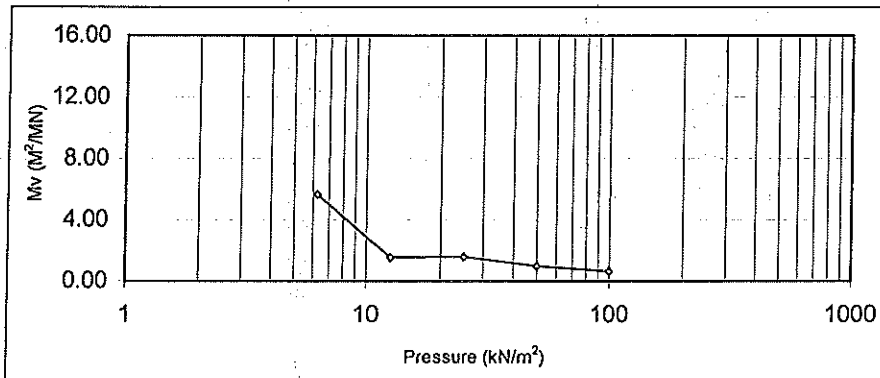
Date of Report 18.02.19
 Test started 28.01.19
 Ring No. A12



INITIAL
 Water content 51 %
 Dry Density 1.10 Mg/m³
 Void Ratio 1.3435
 Saturation 99 %
 Height 20 mm
 Diameter 50 mm
 Sp. Gravity 2.680



FINAL
 Water content 45 %
 Dry Density 1.21 Mg/m³
 Void Ratio 1.1253
 Saturation 103 %
 Height 18 mm
 Comp. Index, C_c 0.2663
 Precons. Load 24 kN/m²



Comp. Ratio, C_R 0.114



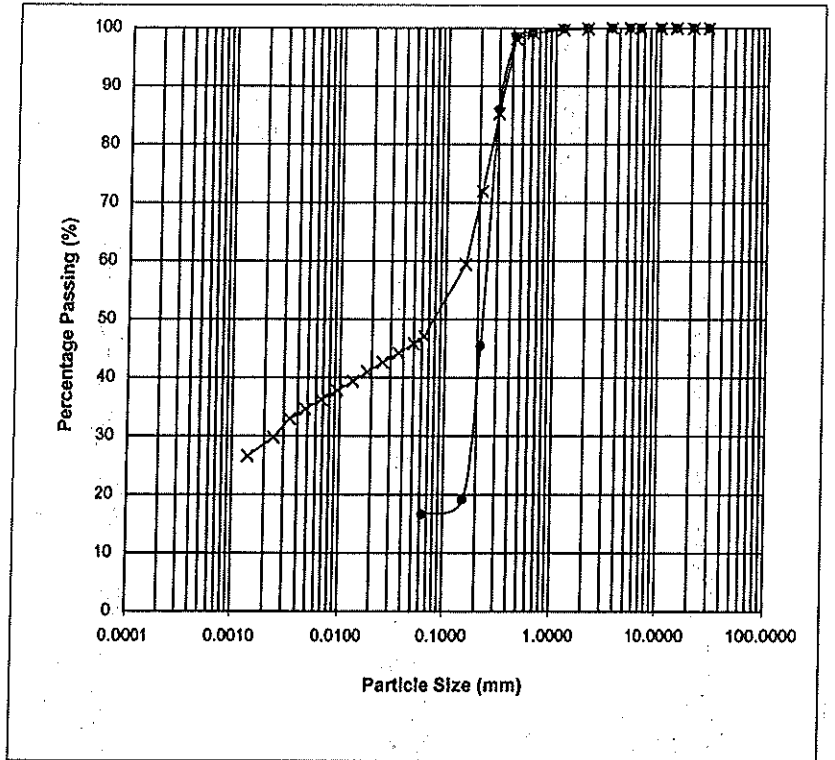
PARTICLE SIZE DISTRIBUTION

(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

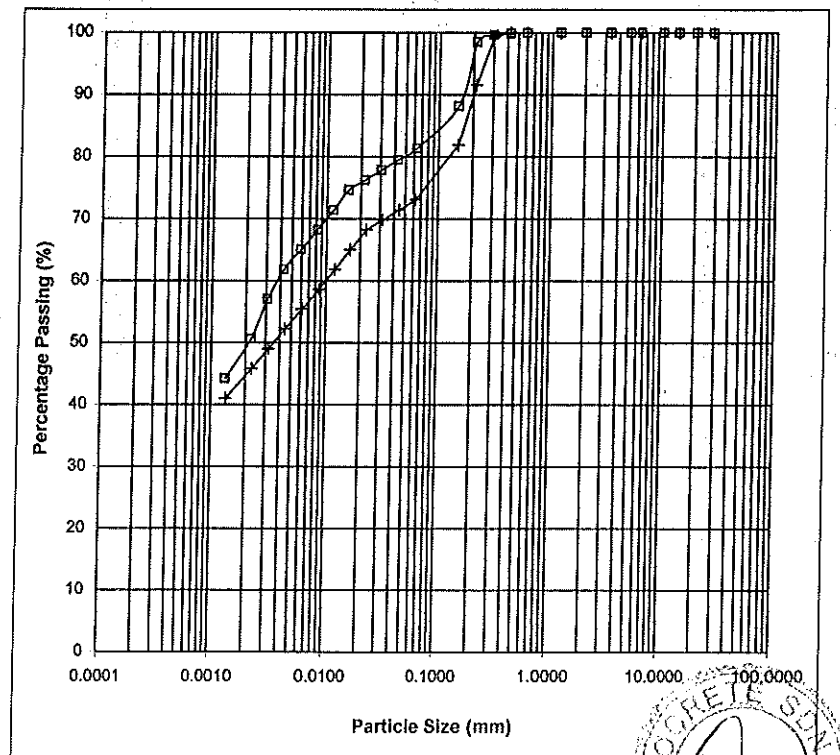
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	99
0.425	99	0.425	98
0.300	86	0.300	85
0.212	46	0.212	72
0.150	19	0.150	59
0.063	17	0.063	47
		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 (%)	28
Silt (%)	17	Silt (%)	19
Sand (%)	83	Sand (%)	53
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH29	UD1	3.00	21.01.19
X	BH29	UD2	6.00	21.01.19



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	99
0.212	99	0.212	92
0.150	88	0.150	82
0.063	81	0.063	73
0.0427	79	0.0445	71
0.0305	78	0.0317	70
0.0217	76	0.0226	68
0.0155	75	0.0162	65
0.0115	71	0.0120	62
0.0083	68	0.0086	59
0.0059	65	0.0062	55
0.0043	62	0.0044	52
0.0031	57	0.0032	49
0.0022	51	0.0023	46
0.0013	44	0.0013	41
Clay (%)	47	Clay (%)	43
Silt (%)	34	Silt (%)	30
Sand (%)	19	Sand (%)	27
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH29	UD3	9.00	21.01.19
+	BH29	UD5	15.00	21.01.19



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

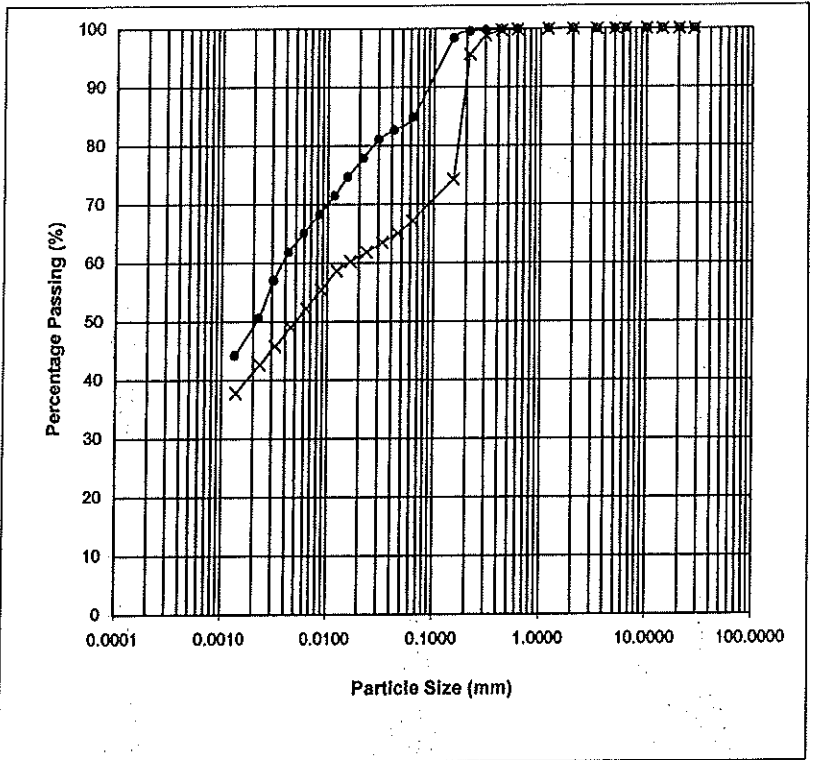
PARTICLE SIZE DISTRIBUTION

(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

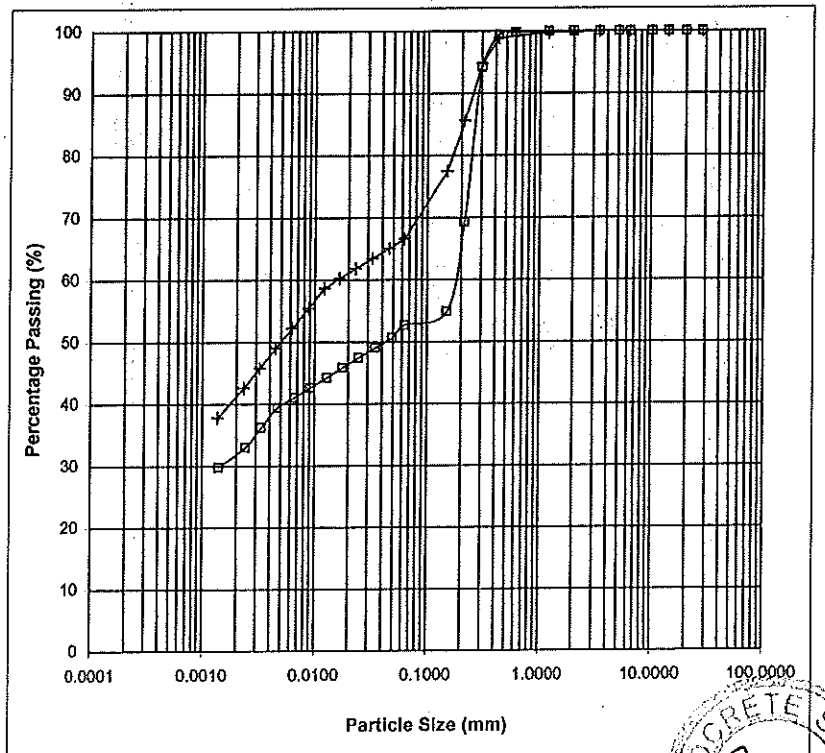
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	99
0.212	100	0.212	96
0.150	98	0.150	74
0.063	85	0.063	67
0.0420	83	0.0459	65
0.0300	81	0.0327	63
0.0215	78	0.0233	62
0.0155	75	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	57	0.0032	46
0.0022	51	0.0023	43
0.0013	44	0.0014	38
Clay (%)	48	Clay (%)	40
Silt (%)	37	Silt (%)	27
Sand (%)	15	Sand (%)	33
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH29	UD7	21.00	21.01.19
X	BH29	UD10	30.00	21.01.19



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	94	0.300	95
0.212	89	0.212	86
0.150	55	0.150	77
0.063	53	0.063	67
0.0489	51	0.0459	65
0.0348	49	0.0327	63
0.0248	47	0.0233	62
0.0178	46	0.0166	60
0.0130	44	0.0122	59
0.0092	43	0.0088	55
0.0066	41	0.0063	52
0.0047	39	0.0045	49
0.0033	36	0.0032	46
0.0024	33	0.0023	43
0.0014	30	0.0014	38
Clay (%)	32	Clay (%)	40
Silt (%)	21	Silt (%)	27
Sand (%)	47	Sand (%)	33
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH29	D12	33.00	21.01.19
+	BH29	D17	40.50	21.01.19



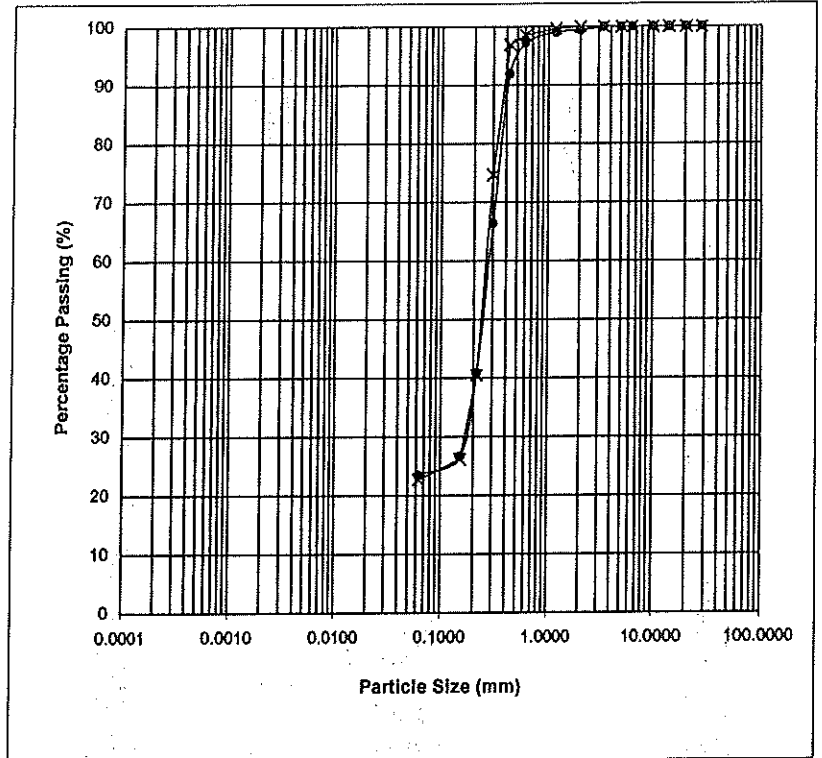
PARTICLE SIZE DISTRIBUTION

(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

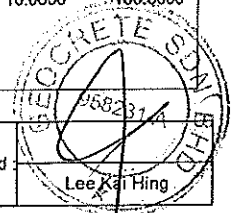
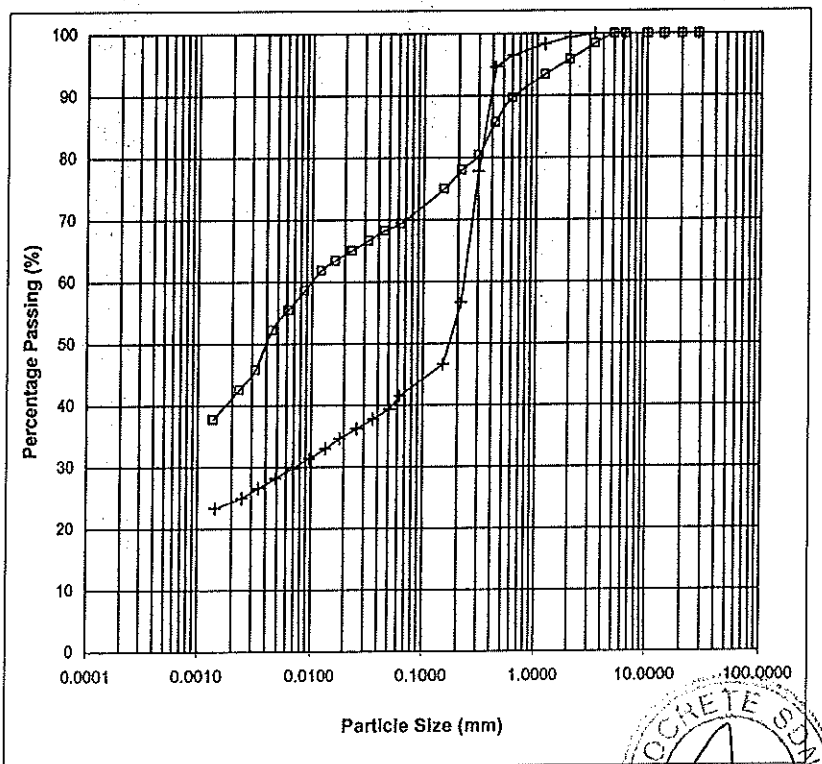
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	99	2.00	100	
1.18	99	1.18	100	
0.600	97	0.600	99	
0.425	92	0.425	97	
0.300	66	0.300	75	
0.212	41	0.212	41	
0.150	27	0.150	26	
0.063	24	0.063	23	
Clay (%)		23	Clay (%)	23
Silt (%)			Silt (%)	
Sand (%)		76	Sand (%)	77
Gravel (%)		1	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH29	D21	46.50	21.01.19
x	BH29	D23	49.50	21.01.19



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	98	3.35	100	
2.00	96	2.00	99	
1.18	93	1.18	98	
0.600	90	0.600	97	
0.425	86	0.425	95	
0.300	80	0.300	78	
0.212	78	0.212	67	
0.150	75	0.150	47	
0.063	69	0.063	42	
0.0452	68	0.0512	39	
0.0322	67	0.0364	38	
0.0230	65	0.0259	36	
0.0164	63	0.0184	35	
0.0120	62	0.0135	33	
0.0086	59	0.0096	31	
0.0062	55	0.0068	30	
0.0044	52	0.0049	28	
0.0032	46	0.0035	27	
0.0023	43	0.0025	25	
0.0014	38	0.0014	23	
Clay (%)		40	Clay (%)	24
Silt (%)		29	Silt (%)	17
Sand (%)		27	Sand (%)	58
Gravel (%)		4	Gravel (%)	1
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH29	D26	54.00	21.01.19
+	BH29	D30	60.00	21.01.19



GEOCRETE SDN BHD (Company No. 958231-A)

Tested : Shyam Nath

Checked : Chris

Approved

Lee Kai Ping

Total Stress Triaxial Compression

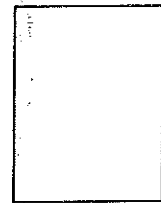
Unconsolidated Undrained

Sample details

Depth : 15.00m
 Description : 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)	148.41	150.25	151.30
Bulk Density ρ (Mg/m ³)	1.723	1.744	1.756
Particle Density ρ_s	2.64	2.64	2.64

Sketch showing specimen location in original sample

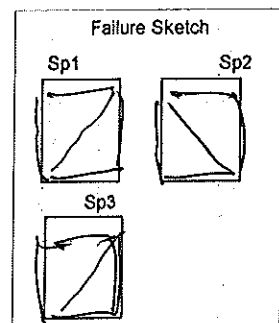


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	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	14391	14391	14391
Moisture Content w_0 %	40	40	38
Dry Density ρ_{d0} (Mg/m ³)	1.23	1.24	1.27
Voids Ratio e_0	1.15	1.12	1.07
Deg of Saturation S_0 %	92.27	94.53	93.34

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	88.52	93.30	103.94
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	88.32	93.10	103.74
Strain at Failure ϵ_f %	14.47	13.49	14.01
Shear Strength c_u (kPa)	44.26	46.65	51.97
Moisture Content w_f %	40	40	38
Dry Density ρ_{df} (Mg/m ³)	1.23	1.24	1.27
Voids Ratio e_f	1.15	1.12	1.07
Deg of Saturation S_f %	92.27	94.53	93.34



Notes : Shear Shear Shear

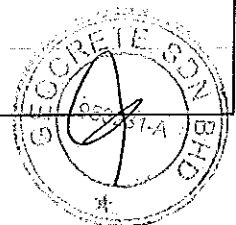
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

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

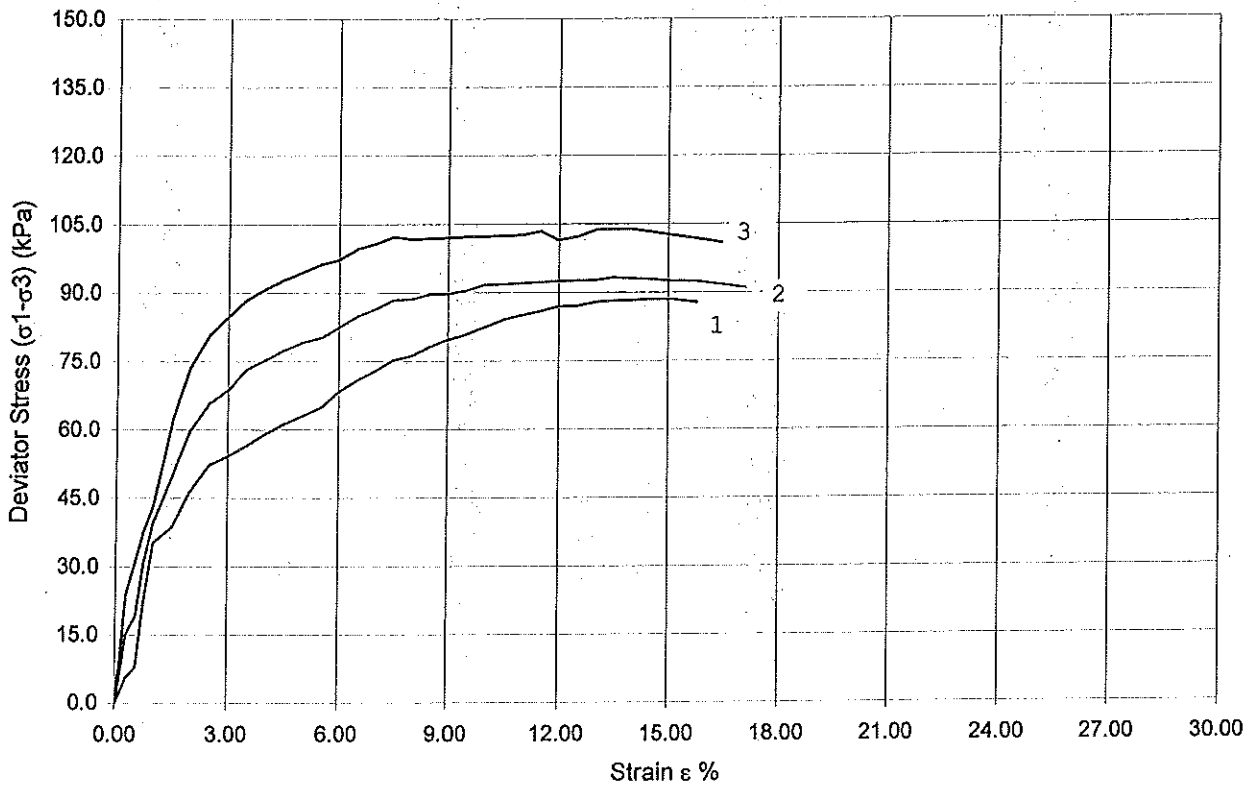
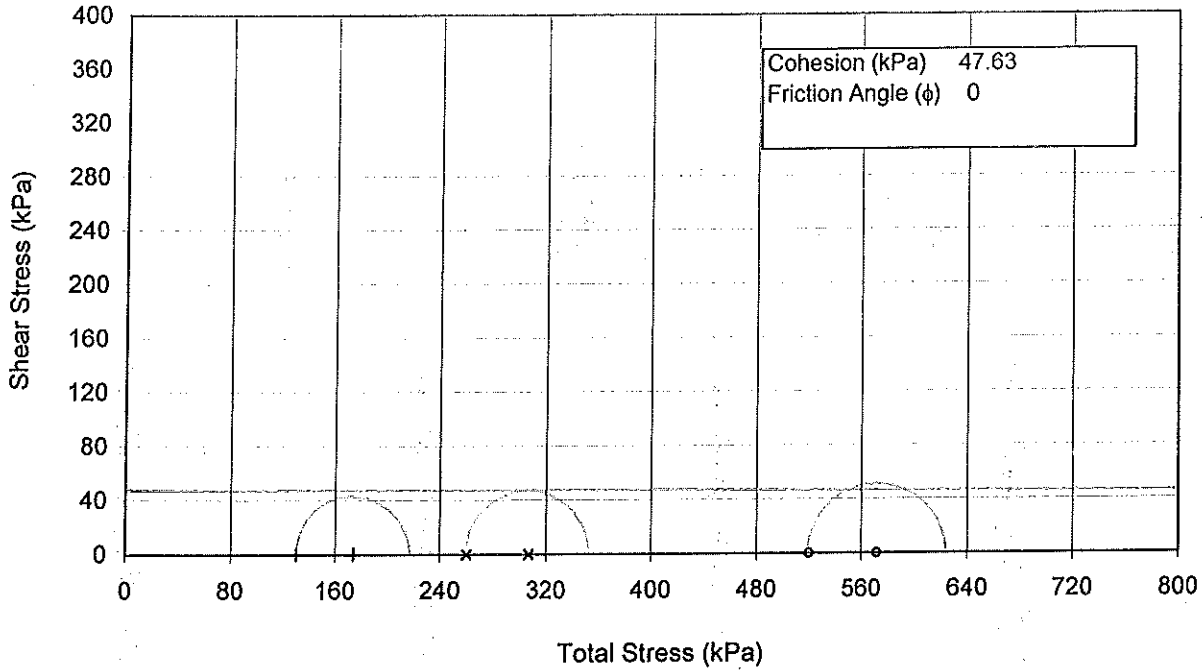
Sample : UD5
 Borehole : BH29
 Approved
 Lee Kai Hing

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

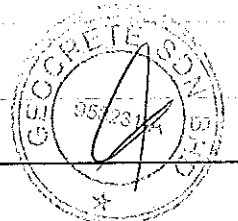
Test Name : UU
 Date of Test : 15.01.19

Sample : UD5
 Borehole : BH29

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	24.01.19
	BH29 / UD5 / 15.00m	Test Started	14.01.19
Sample No.	Grey CLAY with some sand	Ring No.	A10
Soil Description			

BEFORE TEST

Moist. Content from trimmings:	=	59 %	SG (Measured)	=	2.640
Wt of sample + Ring	=	122.04 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.53 gm	Area (A)	=	1964 mm ²
Wt of sample	=	60.51 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	39.52 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	20.99 gm	Bulk Density (P)	=	1.540 Mg/m ³
Initial Moisture Content, M ₀	=	53 %	Dry Density (PD)	=	1.006 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.6244			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	86 %			
V. Ratio Change Factor F _v , $\frac{1+e_0}{H}$	=	0.1312 mm ⁻¹			
Height of Solid H _s	=	7.621 mm			

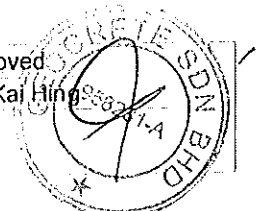
AFTER TEST

Wt of sample + Ring	=	119.65 gm	Overall settlement	=	1.724 mm
Wt of Dry sample + Ring	=	101.05 gm	Volume Change	=	3.386 cm ³
Wt of Ring	=	61.53 gm	Final Volume	=	35.90 cm ³
Wt of Wet sample	=	58.12 gm	Final Bulk Density	=	1.619 Mg/m ³
Wt of Dry sample	=	39.52 gm	Final Dry Density	=	1.101 Mg/m ³
Wt of Moisture	=	18.60 gm	Final Void Ratio, e _f	=	1.3981
Final Moisture Content, M _f	=	47 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	89 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



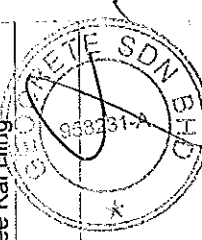
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project: PROPOSED EXPANSION OF CONTAINER TERMINAL Date of Report: 24.01.19
CT10 - CT19 AND ITS ASSOCIATED WORKS AT Test started: 14.01.19
WESTPORT, PULAU INDAH, SELANGOR Ring No.: A10
 Sample No: BH29 / UD5 / 15.00m

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_c-\Delta H$ (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	Cc
0	0.000	20.000	0.0000	1.6244	0.0000	0					
3.12	0.924	19.076	0.1212	1.5031	0.1212	3.12	15.5120	29.16	1.45		-0.4028
6.2	1.204	18.796	0.1580	1.4664	0.0367	3.12	4.7706	47.61	0.84		-0.1221
12.5	1.580	18.420	0.2073	1.4170	0.0493	6.2	3.2685	6.25	6.15		-0.1639
25.0	2.230	17.770	0.2926	1.3317	0.0853	12.5	2.9285	44.89	0.81		-0.2834
12.49	2.164	17.836	0.2840	1.3404	-0.0087	-12.5					
6.25	1.960	18.040	0.2572	1.3672	-0.0268	-6.2					
3.12	1.724	18.276	0.2262	1.3981	-0.0310	-3.1					

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



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

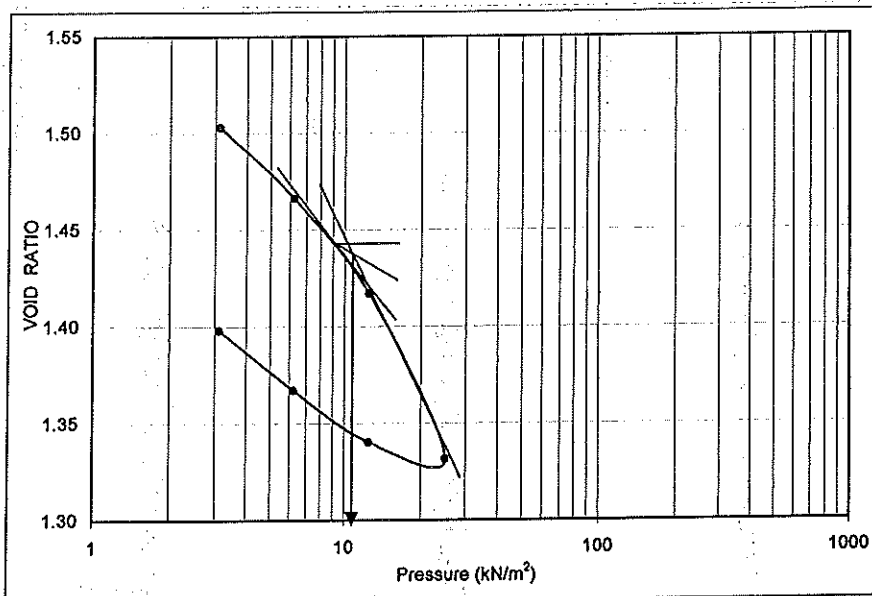
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH29 / UD5 / 15.00m

SOIL SAMPLE Grey CLAY with some sand

Date of Report 24.01.19
 Test started 14.01.19
 Ring No. A10



INITIAL

Water content 53 %

Dry Density 1.01 Mg/m³

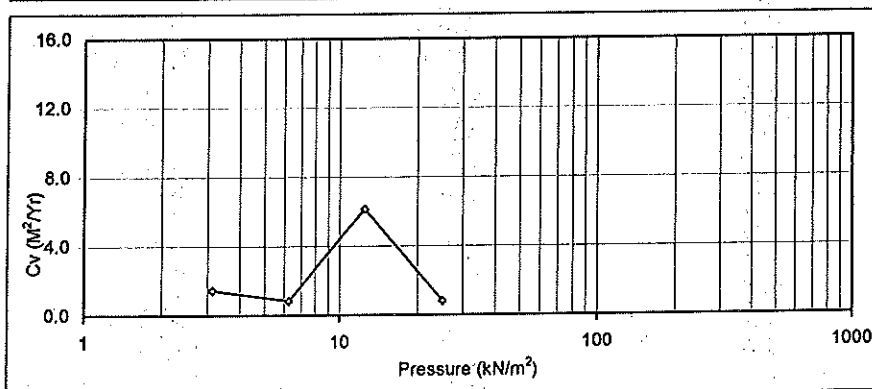
Void Ratio 1.6244

Saturation 86 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.640



FINAL

Water content 47 %

Dry Density 1.10 Mg/m³

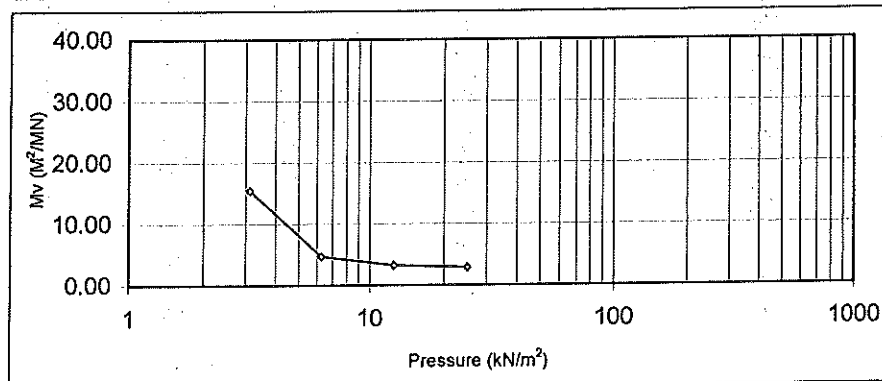
Void Ratio 1.3981

Saturation 89 %

Height 18 mm

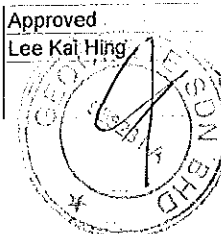
Comp. Index, C_c 0.4028

Precons. Load 11 kN/m²



Comp. Ratio, C_R 0.153

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



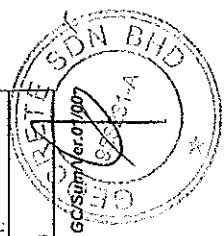
SUMMARY OF TEST RESULTS

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 : 08.02.19																							
SAMPLE AND SPECIMEN DETAILS.	Borehole No.	Specimen	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)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)				
	BH30	UD1	3.00	61	1.68	1.08	61	28	33		47	29	24	0											1.7	0.09	0.48	8.1					
		UD3	9.00	55	1.64	1.10	58	27	31	13.5	44	25	31	0																			
		UD5	15.00	48	1.52	1.03	82	31	51	15.6	62	38	0	0																			
		UD7	21.00	67	1.82	1.09	44	22	22		31	21	48	0	2.66																		
		UD10	30.00	58	1.61	1.03	73	31	42	14.8	54	38	8	0	2.58																		
		D12	33.00	44	1.71	1.23																											
		D15	37.50	32	NA	NA																											
		D17	40.50	32	NA	NA																											
		D18	42.00	25	NA	NA	51	22	29	10.6	38	23	39	0																			
		D23	49.50	32	NA	NA	46	23	23		31	22	47	0																			
		D27	55.50	32	NA	NA	43	24	19		40	29	24	7																			
		D30	60.00	36	NA	NA	50	26	24		43	32	20	5																			

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.

Checked by: CHRIS Approved by: LEE KAI HING



SUM

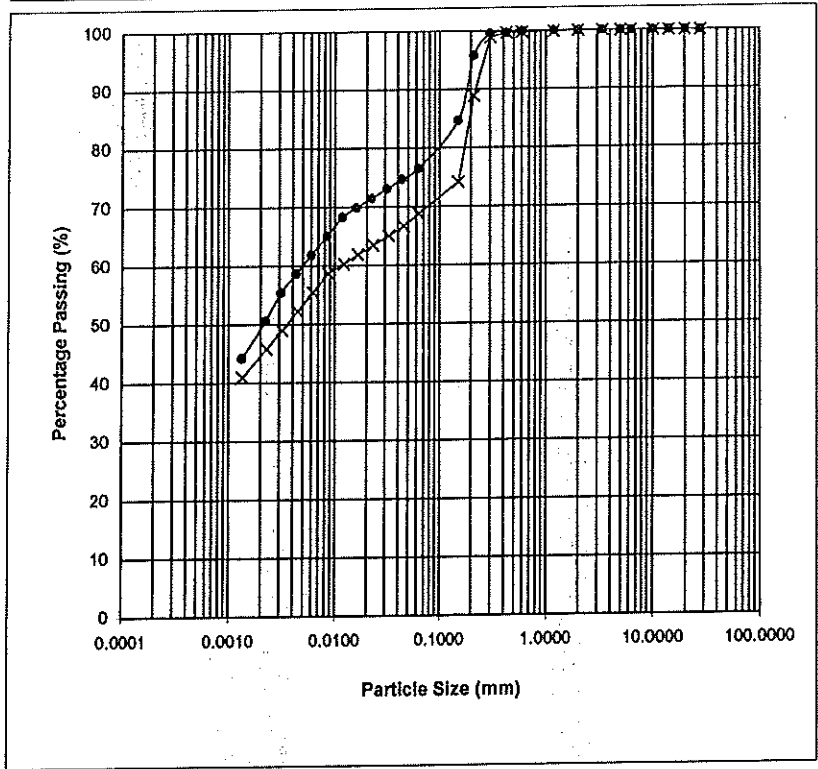
PARTICLE SIZE DISTRIBUTION

(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

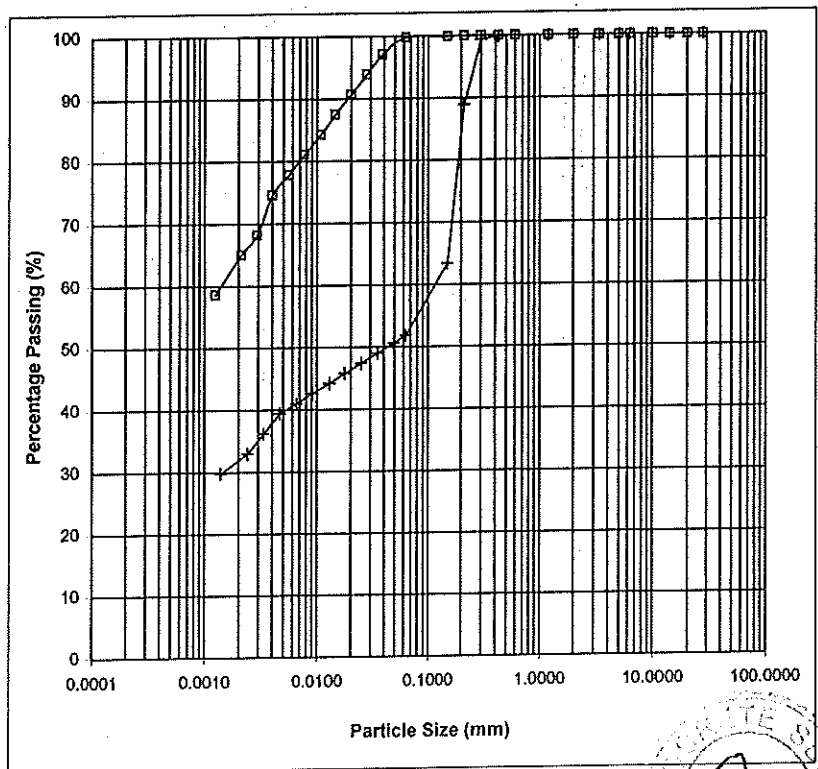
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	99
0.212	96	0.212	89
0.150	85	0.150	74
0.063	77	0.063	69
0.0438	75	0.0456	67
0.0312	73	0.0325	65
0.0223	71	0.0231	63
0.0159	70	0.0165	62
0.0117	68	0.0121	60
0.0084	65	0.0086	59
0.0060	62	0.0062	55
0.0043	59	0.0044	52
0.0031	55	0.0032	49
0.0022	51	0.0023	46
0.0013	44	0.0013	41
Clay (%)	47	Clay (%)	44
Silt (%)	29	Silt (%)	25
Sand (%)	24	Sand (%)	31
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH30	UD1	3.00	30.01.19
X	BH30	UD3	9.00	30.01.19



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	99
0.212	100	0.212	89
0.150	100	0.150	63
0.063	100	0.063	52
0.0384	97	0.0489	51
0.0278	94	0.0348	49
0.0200	91	0.0248	47
0.0144	87	0.0176	46
0.0107	84	0.0130	44
0.0077	81	0.0092	43
0.0056	78	0.0066	41
0.0040	75	0.0047	39
0.0029	68	0.0033	36
0.0021	65	0.0024	33
0.0012	59	0.0014	30
Clay (%)	62	Clay (%)	31
Silt (%)	38	Silt (%)	21
Sand (%)	0	Sand (%)	48
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH30	UD5	15.00	30.01.19
+	BH30	UD7	21.00	30.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Ka Hing <div style="text-align: right;"> </div>
	(The stamp contains the text 'GEOCRETE SDN BHD' and a signature 'Lee Ka Hing')					

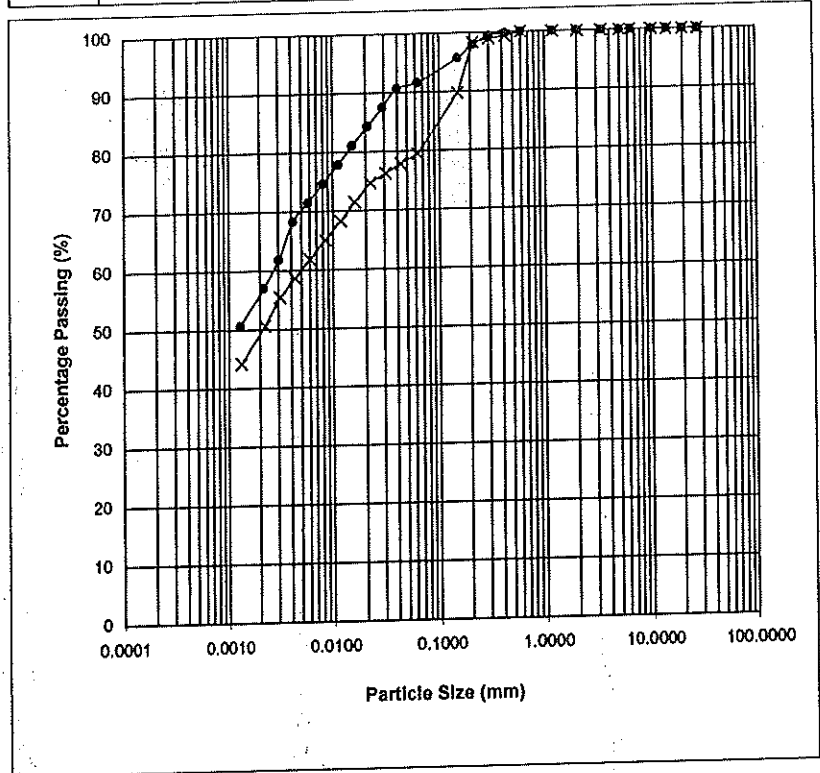
PARTICLE SIZE DISTRIBUTION

(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

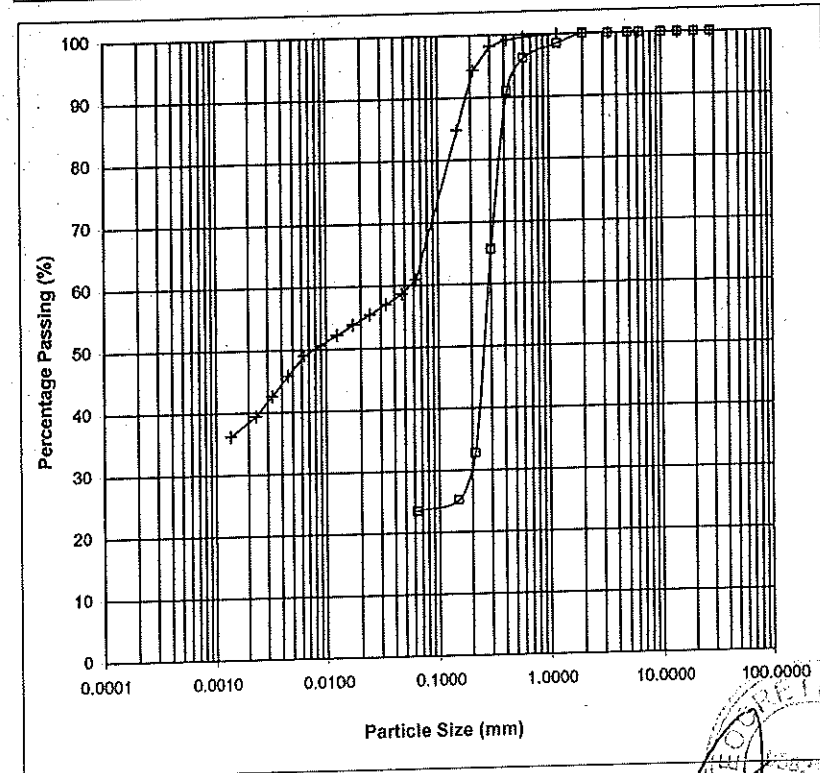
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	99
0.300	99	0.300	99
0.212	98	0.212	98
0.150	96	0.150	90
0.063	92	0.063	80
0.0401	91	0.0431	78
0.0289	87	0.0307	76
0.0208	84	0.0219	75
0.0150	81	0.0157	71
0.0111	78	0.0117	68
0.0080	75	0.0084	65
0.0058	71	0.0060	62
0.0041	68	0.0043	59
0.0030	62	0.0031	55
0.0022	57	0.0022	51
0.0013	51	0.0013	44
Clay (%)	64	Clay (%)	47
Silt (%)	38	Silt (%)	32
Sand (%)	8	Sand (%)	21
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH30	UD10	30.00	30.01.19
X	BH30	D15	37.50	30.01.19



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	96	0.600	100
0.425	91	0.425	99
0.300	66	0.300	98
0.212	33	0.212	94
0.150	25	0.150	85
0.063	24	0.063	61
		0.0473	59
		0.0337	57
		0.0240	55
		0.0171	54
		0.0126	52
		0.0089	51
		0.0064	49
		0.0046	46
		0.0033	43
		0.0023	39
		0.0014	36
Clay (%)	24	Clay (%)	38
Silt (%)		Silt (%)	23
Sand (%)	76	Sand (%)	39
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH30	D17	40.50	30.01.19
+	BH30	D18	42.00	30.01.19



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

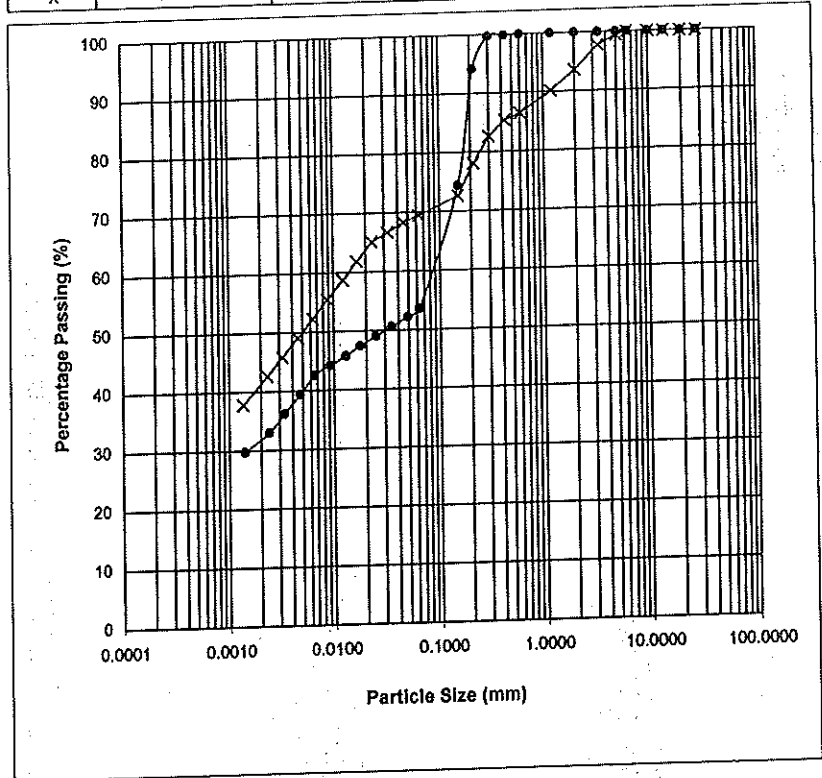
PARTICLE SIZE DISTRIBUTION

(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

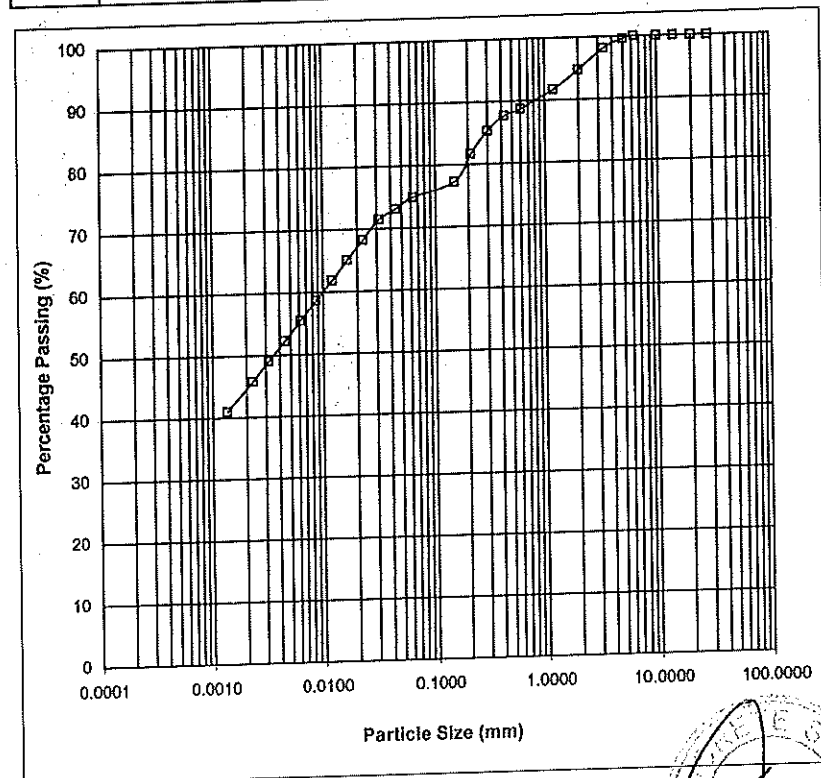
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	99
3.35	100	3.35	98
2.00	100	2.00	94
1.18	100	1.18	90
0.600	100	0.600	86
0.425	100	0.425	85
0.300	100	0.300	83
0.212	94	0.212	78
0.150	74	0.150	73
0.063	54	0.063	69
0.0486	52	0.0452	68
0.0346	51	0.0322	67
0.0246	49	0.0230	65
0.0175	47	0.0165	62
0.0129	46	0.0122	59
0.0092	44	0.0088	55
0.0065	43	0.0063	52
0.0047	39	0.0045	49
0.0033	36	0.0032	46
0.0024	33	0.0023	43
0.0014	30	0.0014	38
Clay (%)	31	Clay (%)	40
Silt (%)	22	Silt (%)	29
Sand (%)	47	Sand (%)	24
Gravel (%)	0	Gravel (%)	7
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH30	D23	49.50	30.01.19
X	BH30	D27	55.50	30.01.19



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	98		
2.00	95		
1.18	92		
0.600	89		
0.425	88		
0.300	85		
0.212	82		
0.150	77		
0.063	76		
0.0442	73		
0.0315	71		
0.0226	68		
0.0162	65		
0.0120	62		
0.0086	59		
0.0062	55		
0.0044	52		
0.0032	49		
0.0023	46		
0.0013	41		
Clay (%)	43		
Silt (%)	32		
Sand (%)	20		
Gravel (%)	5		
Total (%)	100		

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH30	D30	60.00	30.01.19
+				



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

Total Stress Triaxial Compression

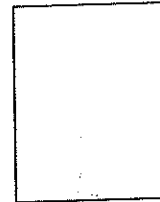
Unconsolidated Undrained

Sample details

Depth : 9.00m
 Description : Greenish 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)	138.25	141.29	143.55
Bulk Density ρ (Mg/m ³)	1.605	1.640	1.666
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)	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

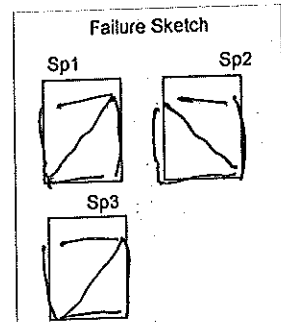
Load Channel : 14391 14391 14391

Moisture Content w_0 %	50	49	48
Dry Density ρ_{d0} (Mg/m ³)	1.07	1.10	1.12
Voids Ratio e_0	1.48	1.39	1.35
Deg of Saturation S_0 %	90.32	92.10	94.54

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	29.58	37.92	41.59
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	29.38	37.72	41.39
Strain at Failure ϵ_f %	4.01	4.01	5.99
Shear Strength c_u (kPa)	14.79	18.96	20.80

Moisture Content w_f %	50	49	48
Dry Density ρ_{df} (Mg/m ³)	1.07	1.10	1.12
Voids Ratio e_f	1.48	1.39	1.35
Deg of Saturation S_f %	90.32	92.10	94.54



Notes : Shear Shear Shear

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

(*delete as appropriate)

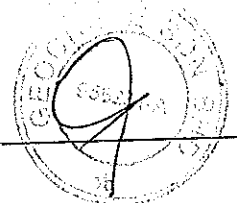
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator
 Shyam Nath

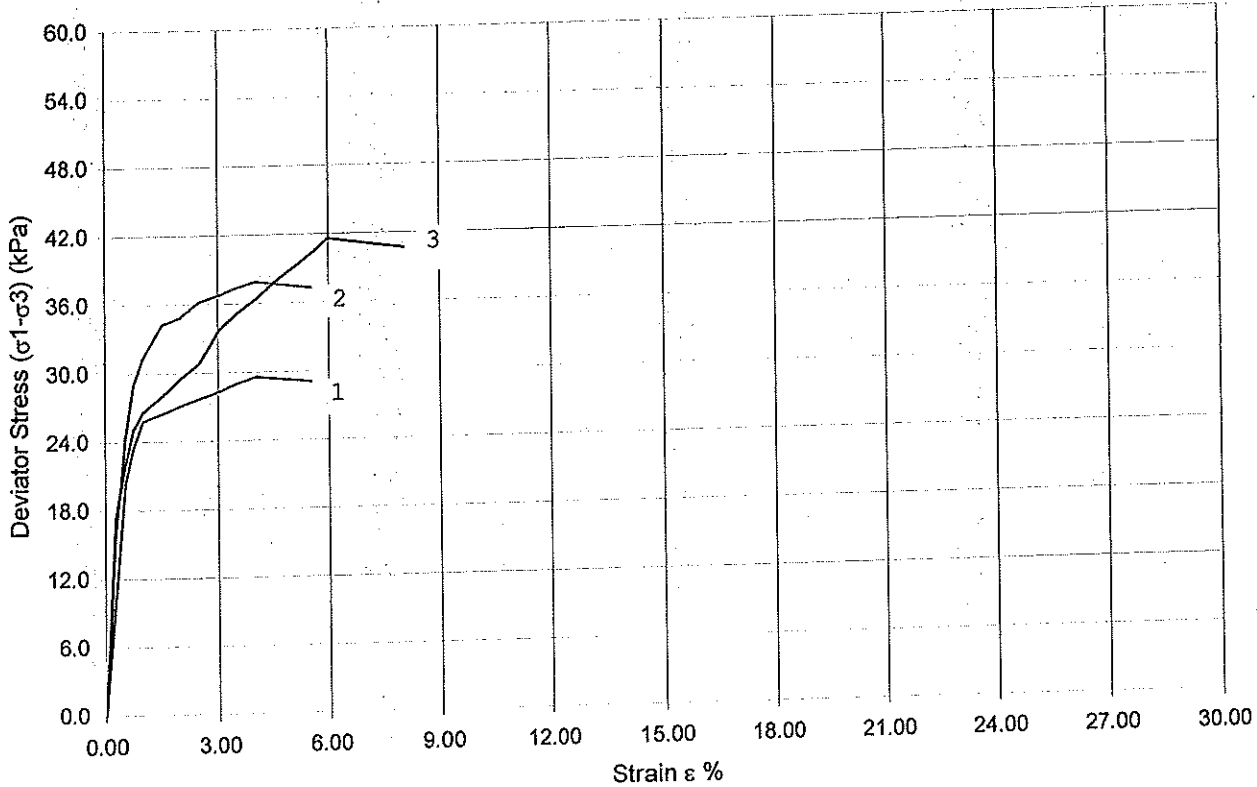
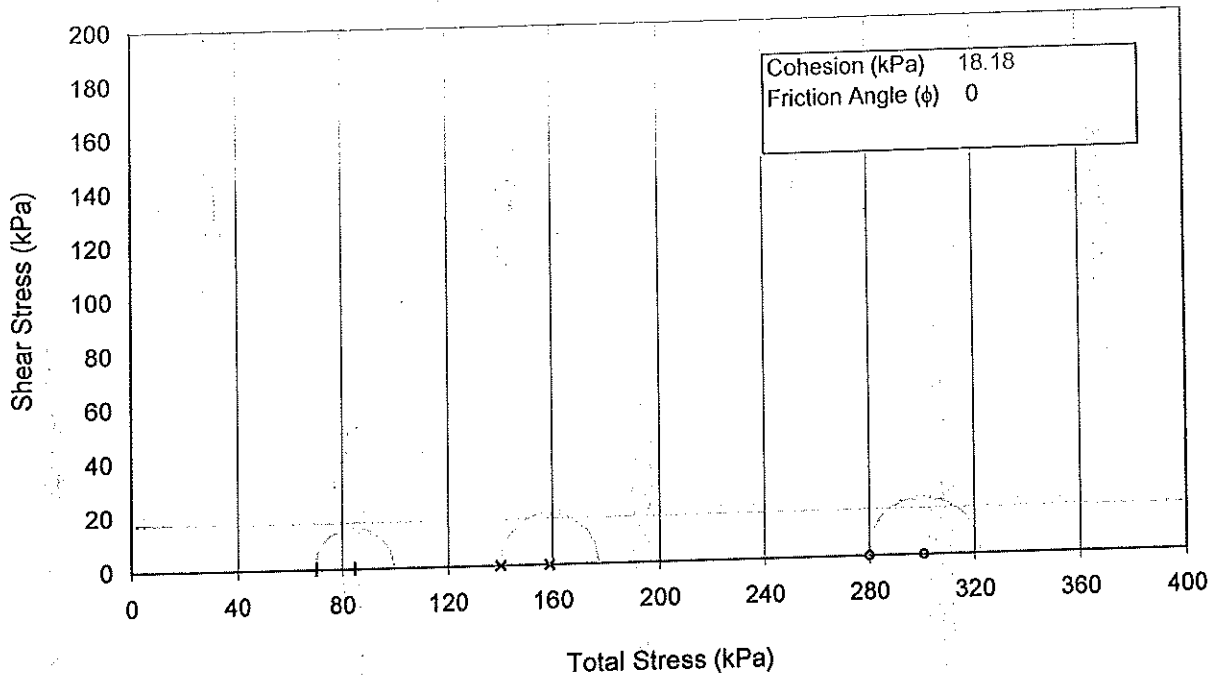
Checked
 Chris

Test Name : UU
 Date of Test : 30.01.19

Sample : UD3
 Borehole : BH30
 Approved
 Lee Kai Hing

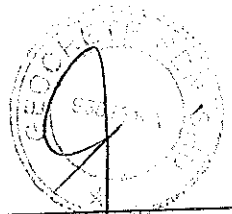


Total Stress Triaxial Compression Unconsolidated Undrained



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 : 30.01.19
 Sample : UD3
 Borehole : BH30
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

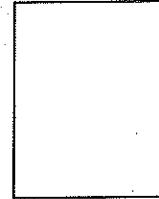
Unconsolidated Undrained

Sample details

Depth : 30.00m
 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)	134.22	138.26	142.84
Bulk Density ρ (Mg/m ³)	1.558	1.605	1.658
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)	240	480	960
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

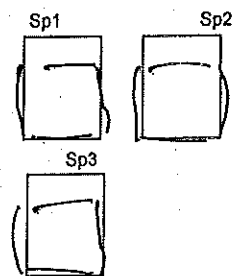
Load Channel	14391	14391	14391
--------------	-------	-------	-------

Moisture Content w_0 %	58	56	54
Dry Density ρ_{d0} (Mg/m ³)	0.99	1.03	1.08
Voids Ratio e_0	1.61	1.50	1.39
Deg of Saturation S_0 %	92.35	95.53	99.61

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	101.58	104.88	129.35
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	101.38	104.68	129.15
Strain at Failure ϵ_f %	7.50	6.51	7.50
Shear Strength c_u (kPa)	50.79	52.44	64.68

Failure Sketch



Moisture Content w_f %	58	56	54
Dry Density ρ_{df} (Mg/m ³)	0.99	1.03	1.08
Voids Ratio e_f	1.61	1.50	1.39
Deg of Saturation S_f %	92.35	95.53	99.61

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

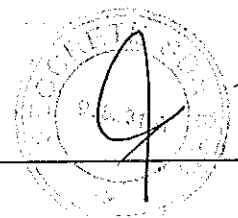
Operator
 Shyam Nath

Checked
 Chris

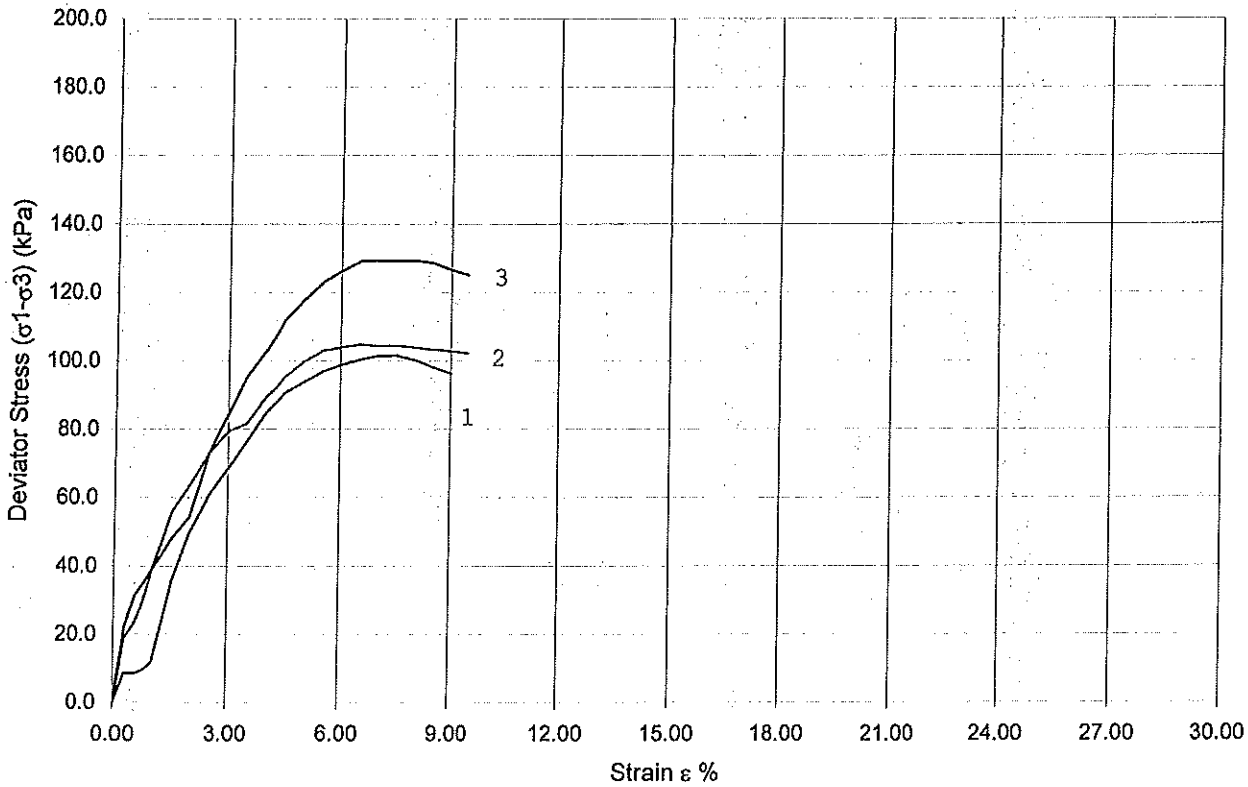
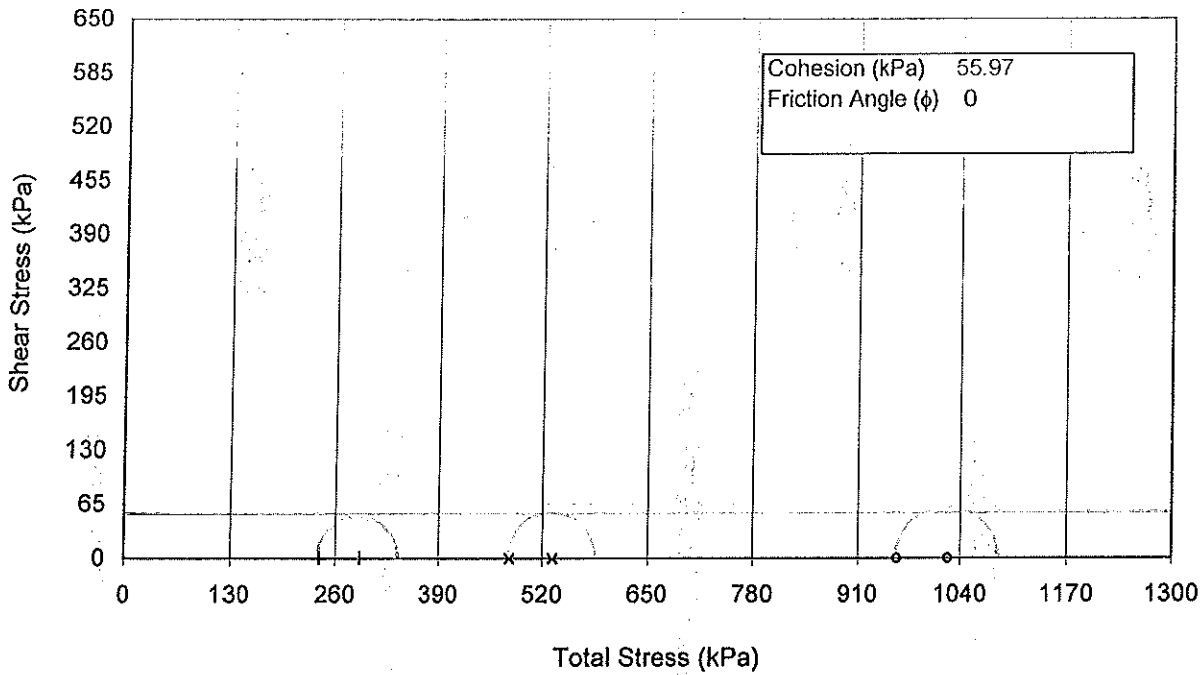
Test Name : UU

Date of Test : 30.01.19

Sample : UD10
 Borehole : BH30
 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

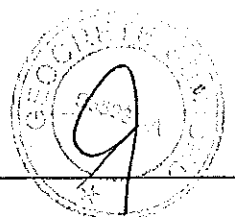
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 30.01.19

Sample : UD10
Borehole : BH30

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 30 / D 12 (33.00 m)

Test Size : 60 mm x 60 mm x 20 mm

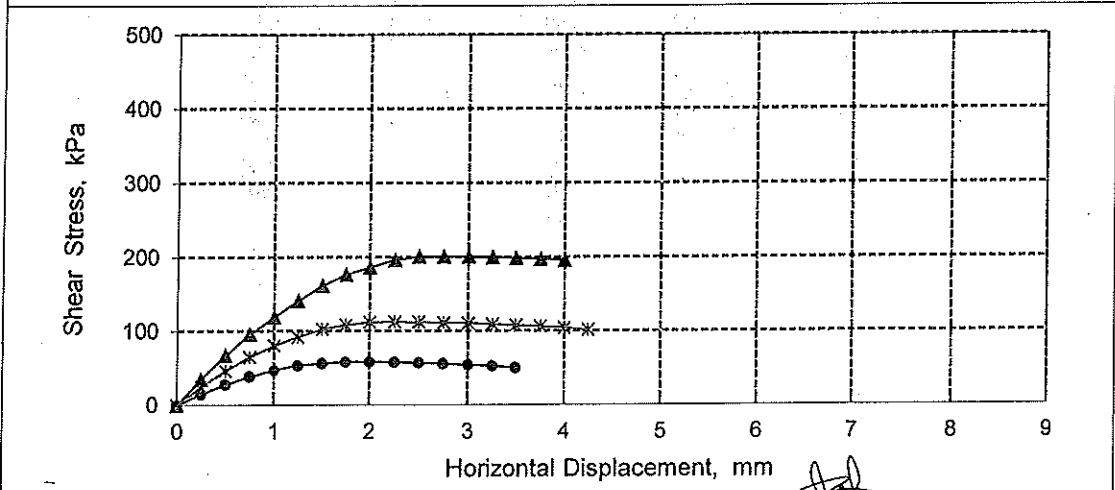
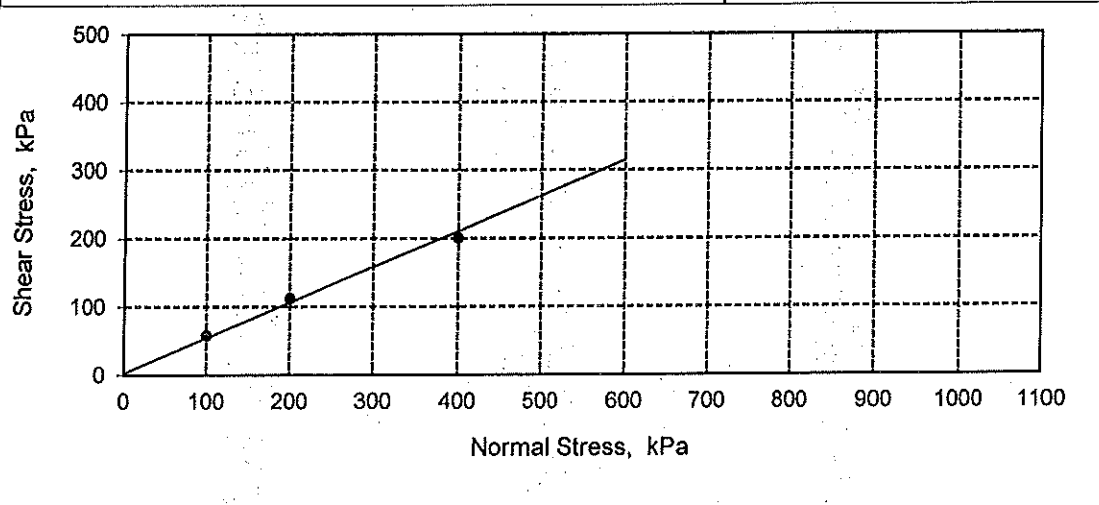
Date Tested : 4 / 2 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		122.7	123.3	122.5
Moisture Content (%)		39.0	39.5	39.0
Bulk Density (Mg/m ³)		1.704	1.713	1.701
Dry Density (Mg/m ³)		1.226	1.228	1.224

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		58.4	112.5	200.7
Displ. at Failure (mm)		1.8	2.3	2.5
Settlement (mm)		0.1	0.2	0.3

c' 3 kPa

φ' 27.5 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	18.02.19
Sample No.	BH30 / UD3 / 9.00m	Test Started	28.01.19
Soil Description	Greenish grey sandy CLAY	Ring No.	A13

BEFORE TEST

Moist. Content from trimmings:	=	61 %	SG (Measured)	=	2.640
Wt of sample + Ring	=	117.49 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.51 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.98 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	37.05 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.93 gm	Bulk Density (P)	=	1.501 Mg/m ³
Initial Moisture Content, M _o	=	59 %	Dry Density (PD)	=	0.943 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.7993			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	87 %			
V. Ratio Change Factor F, $\frac{1+e_o}{H}$	=	0.1400 mm ⁻¹			
Height of Solid H _s	=	7.145 mm			

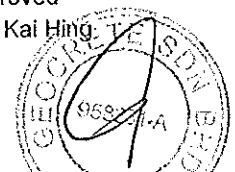
AFTER TEST

Wt of sample + Ring	=	115.35 gm	Overall settlement	=	1.860 mm
Wt of Dry sample + Ring	=	95.56 gm	Volume Change	=	3.654 cm ³
Wt of Ring	=	58.51 gm	Final Volume	=	35.63 cm ³
Wt of Wet sample	=	56.84 gm	Final Bulk Density	=	1.595 Mg/m ³
Wt of Dry sample	=	37.05 gm	Final Dry Density	=	1.040 Mg/m ³
Wt of Moisture	=	19.79 gm	Final Void Ratio, e _f	=	1.5390
Final Moisture Content, M _f	=	53 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	92 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



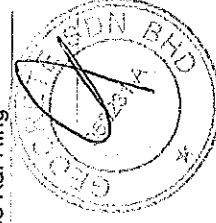
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	18.02.19
Sample No	BH30 / UD3 / 9.00m	Test started	28.01.19
		Ring No.	A13

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 ₅₀ (min)	Cv for t ₅₀ (m ² /yr)	
0	0.000	0.0000	1.7993	0.0000	0				
6.25	0.504	0.0705	1.7288	0.0705	6.25	4.1394	11.56	3.74	-0.2344
12.5	0.892	0.1248	1.6745	0.0543	6.25	3.2514	29.16	1.42	-0.1804
25.0	1.554	0.2175	1.5818	0.0927	12.5	2.8733	12.25	3.19	-0.3078
50.0	2.390	0.3345	1.4648	0.1170	25.0	1.9004	2.56	14.09	-0.3887
25	2.282	0.3194	1.4799	-0.0151	-25.0				
12.5	2.068	0.2894	1.5099	-0.0300	-12.5				
6.25	1.860	0.2603	1.5390	-0.0291	-6.2				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



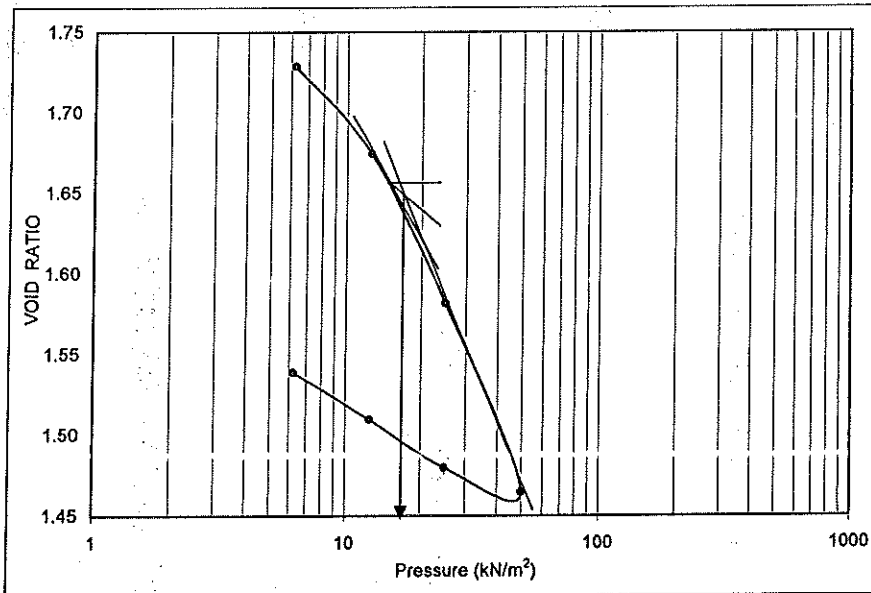
GEocrete SDN. BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

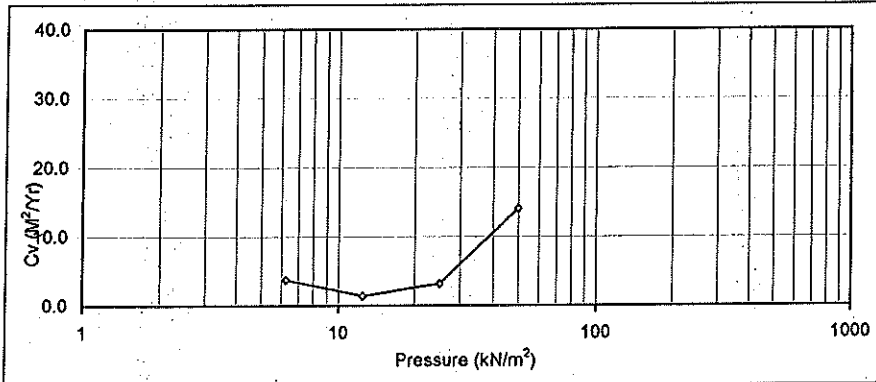
BH REF BH30 / UD3 / 9.00m
 SOIL SAMPLE Greenish grey sandy CLAY

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. A13



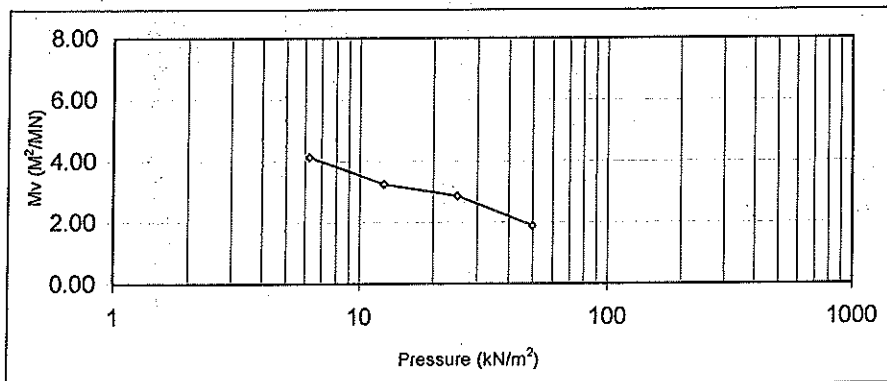
INITIAL

Water content	59	%
Dry Density	0.94	Mg/m ³
Void Ratio	1.7993	
Saturation	87	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.640	



FINAL

Water content	53	%
Dry Density	1.04	Mg/m ³
Void Ratio	1.5390	
Saturation	92	%
Height	18	mm
Comp. Index, C _c	0.3887	
Precons. Load	17	kN/m ²



Comp. Ratio, C_R 0.139



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	18.02.19
Sample No.	BH30 / UD10 / 30.00m	Test Started	28.01.19
Soil Description	Greenish grey CLAY	Ring No.	A14

BEFORE TEST

Moist. Content from trimmings:	=	65 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	120.68 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.51 gm	Area (A)	=	1964 mm ²
Wt of sample	=	60.17 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	37.92 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	22.25 gm	Bulk Density (P)	=	1.532 Mg/m ³
Initial Moisture Content, M ₀	=	59 %	Dry Density (PD)	=	0.965 Mg/m ³
Initial Void Ratio, e ₀ , $\frac{SG}{P_D} - 1$	=	1.6729			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	90 %			
V. Ratio Change Factor F, $\frac{1+e_0}{H}$	=	0.1336 mm ⁻¹			
Height of Solid H _s	=	7.482 mm			

AFTER TEST

Wt of sample + Ring	=	118.20 gm	Overall settlement	=	2.218 mm
Wt of Dry sample + Ring	=	98.43 gm	Volume Change	=	4.357 cm ³
Wt of Ring	=	60.51 gm	Final Volume	=	34.93 cm ³
Wt of Wet sample	=	57.69 gm	Final Bulk Density	=	1.652 Mg/m ³
Wt of Dry sample	=	37.92 gm	Final Dry Density	=	1.086 Mg/m ³
Wt of Moisture	=	19.77 gm	Final Void Ratio, e _f	=	1.3765
Final Moisture Content, M _f	=	52 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	98 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. A14

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. A14

Project PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No BH30 / UD10 / 30.00m

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 ₅₀ (min)	Cv for t ₅₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.6729	0.0000	0				
6.25	0.062	19.938	0.0083	1.6646	0.0083	6.25	0.4979	2.56	17.29	-0.0275
12.5	0.144	19.856	0.0192	1.6537	0.0110	6.25	0.6613	4.00	10.99	-0.0364
25.0	0.344	19.656	0.0460	1.6269	0.0267	12.5	0.8146	3.24	13.37	-0.0888
50.0	0.692	19.308	0.0925	1.5804	0.0465	25.0	0.7215	4.00	10.53	-0.1545
100	1.332	18.668	0.1780	1.4949	0.0855	50.0	0.6862	4.84	8.27	-0.2842
200	2.794	17.206	0.3734	1.2995	0.1954	99.9	0.8504	4.84	7.38	-0.6491
100	2.686	17.314	0.3590	1.3139	-0.0144	-99.9				
50	2.454	17.546	0.3280	1.3450	-0.0310	-50.0				
12.5	2.218	17.782	0.2964	1.3765	-0.0315	-37.5				

Operator Shyam Nath

Checked Chris

Approved Lee Kai Hing

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

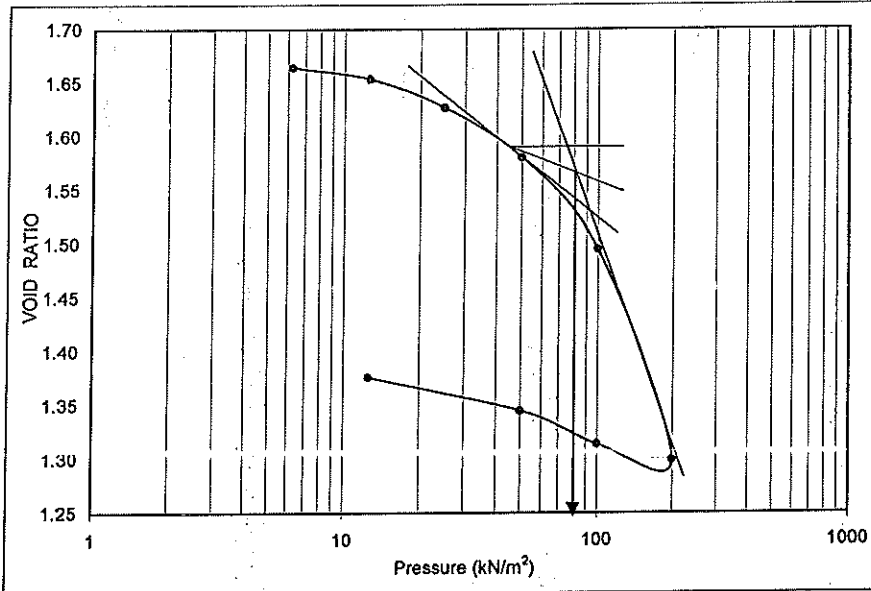


ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

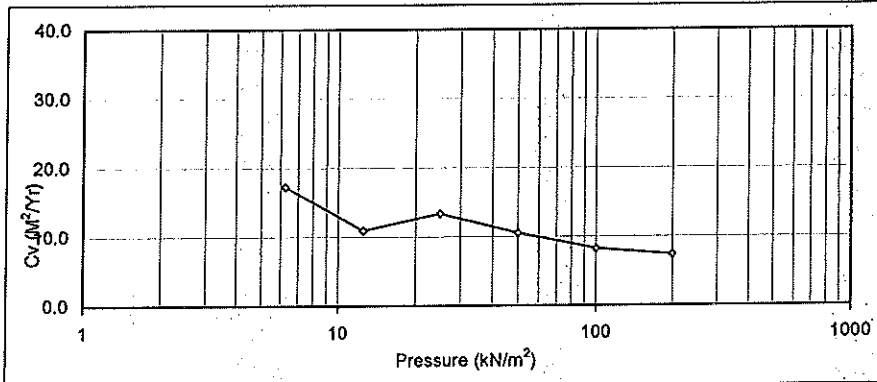
BH REF BH30 / UD10 / 30.00m
 SOIL SAMPLE Greenish grey CLAY

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. A14



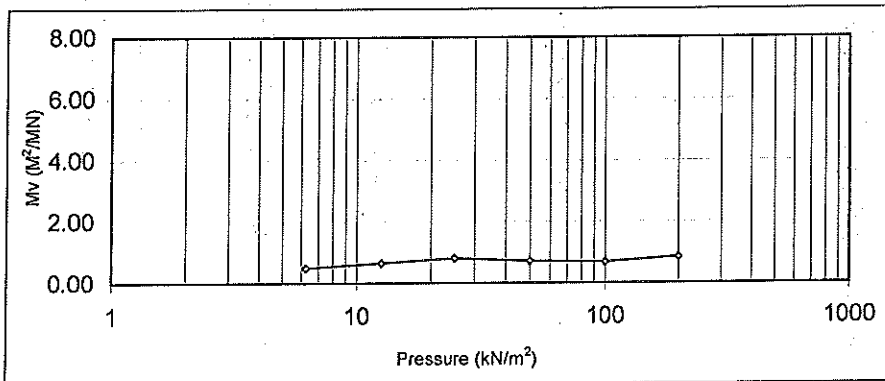
INITIAL

Water content	59	%
Dry Density	0.97	Mg/m^3
Void Ratio	1.6729	
Saturation	90	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.580	



FINAL

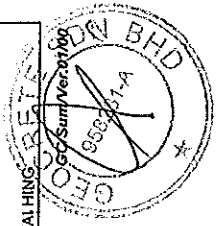
Water content	52	%
Dry Density	1.09	Mg/m^3
Void Ratio	1.3765	
Saturation	98	%
Height	18	mm
Comp. Index, C_c	0.6491	
Precons. Load	80	kN/m^2



Comp. Ratio, C_R 0.243



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 : 27.01.19														
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'	ϕ'	Cu'	ϕ	Pc	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)	
										(%)	(%)	(%)	(%)	(kPa)	(Deg)	(kPa)	(Deg)	(kPa)	(kPa)	(kPa)	(%)	(%)	(%)	(%)	(%)	
BH31	UD1	3.00	46	1.72	1.20	80	29	51	14.4	58	37	5	0	2.58												
	UD3	9.00	43	1.74	1.22	71	26	45		48	38	14	0									1.5	0.09	0.61	8.0	
	UD5	15.00		1.68	1.09					54	39	7	0													
	UD7	21.00	49	1.71	1.13	51	25	26	10.1	40	30	30	0	2.65												
	UD9	27.00	38	1.80	1.30	48	22	26		31	22	47	0									0.8	0.11	0.31	8.2	
	D12	34.50	23	NA	NA	53	25	28	10.7	47	35	16	2	2.63												
	D15	39.00	39	NA	NA					39	27	34	0									1.4	0.19	0.37	7.5	
	D19	45.00	51	NA	NA	45	21	24		40	29	30	1													
	D22	49.50	39	NA	NA	41	22	19	6.1	35	29	36	0	2.65								2.4	0.20	0.42	7.4	
	D24	52.50	26	NA	NA					28	17	55	0													
	D29	60.00	51	NA	NA					54	34	12	0													
Note :		NES = NOT ENOUGH SAMPLE										NP = NON PLASTIC										NA = NOT APPLICABLE				
Remarks																										
																						APPROVED BY: LEE KAL HING				
																						CHECKED BY: CHRIS				
																										
SUM																										

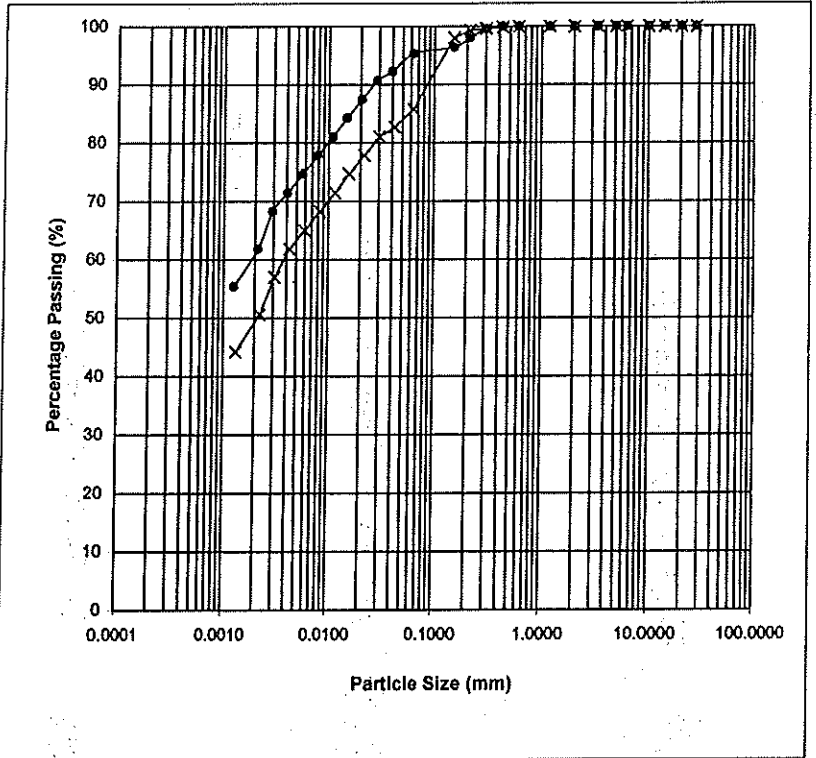
PARTICLE SIZE DISTRIBUTION

(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

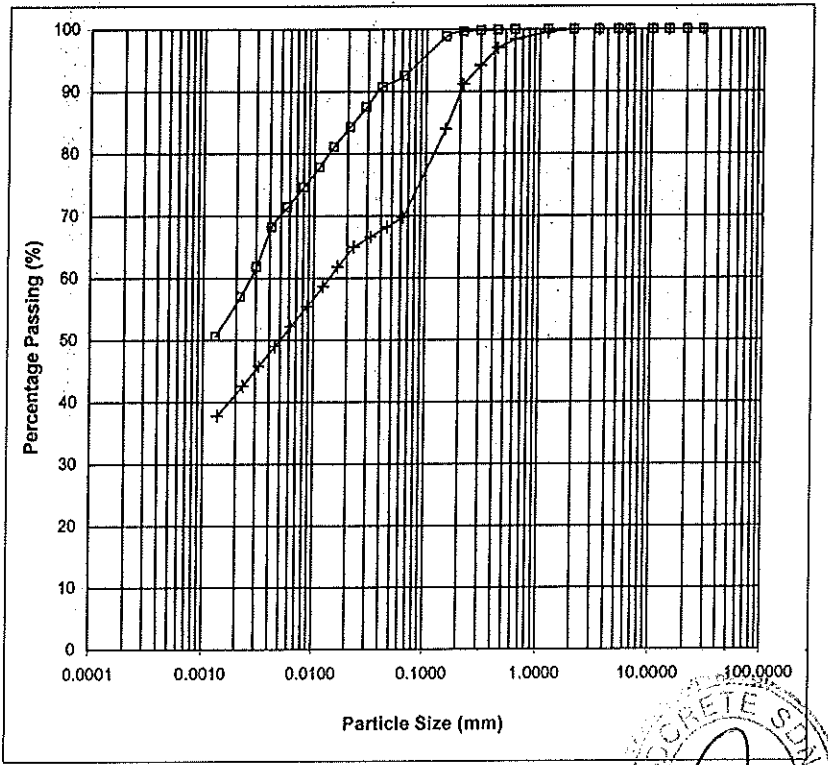
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	100
0.212	98	0.212	99
0.150	96	0.150	98
0.063	95	0.063	86
0.0397	92	0.0420	83
0.0283	91	0.0300	81
0.0204	87	0.0215	78
0.0147	84	0.0155	75
0.0109	81	0.0115	71
0.0079	78	0.0083	68
0.0057	75	0.0059	65
0.0041	71	0.0043	62
0.0029	68	0.0031	57
0.0021	62	0.0022	51
0.0013	55	0.0013	44
Clay (%)	58	Clay (%)	48
Silt (%)	37	Silt (%)	38
Sand (%)	5	Sand (%)	14
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH31	UD1	3.00	21.01.19
X	BH31	UD3	9.00	21.01.19



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	97
0.300	100	0.300	94
0.212	100	0.212	91
0.150	99	0.150	84
0.063	93	0.063	70
0.0401	91	0.0452	68
0.0289	87	0.0322	67
0.0208	84	0.0230	65
0.0150	81	0.0165	62
0.0111	78	0.0122	59
0.0080	75	0.0088	55
0.0058	71	0.0063	52
0.0041	68	0.0045	49
0.0030	62	0.0032	46
0.0022	57	0.0023	43
0.0013	51	0.0014	38
Clay (%)	54	Clay (%)	40
Silt (%)	39	Silt (%)	30
Sand (%)	7	Sand (%)	30
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH31	UD5	15.00	21.01.19
+	BH31	UD7	21.00	21.01.19



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

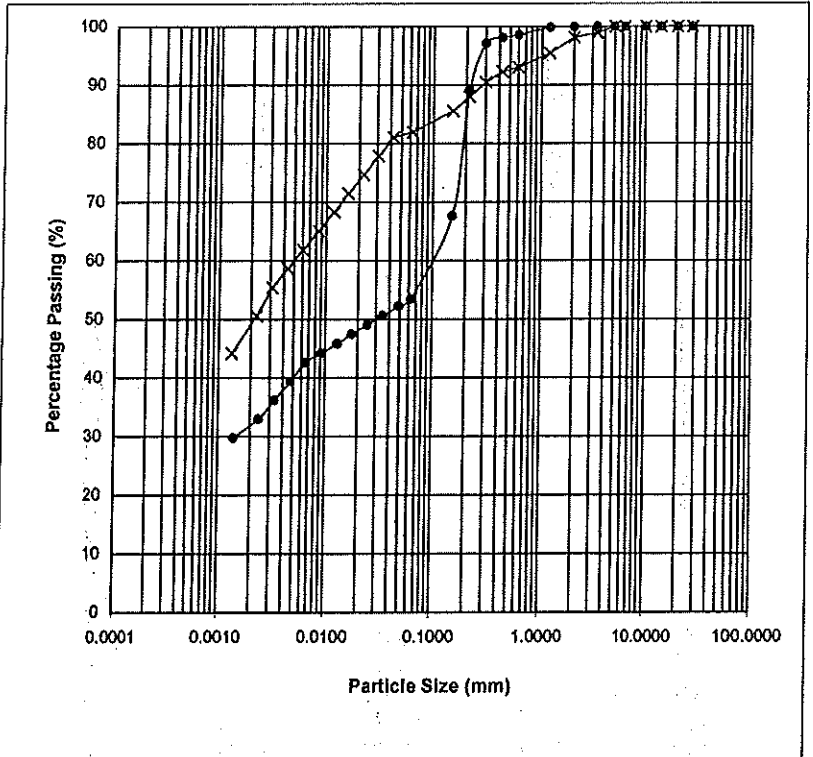
PARTICLE SIZE DISTRIBUTION

(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

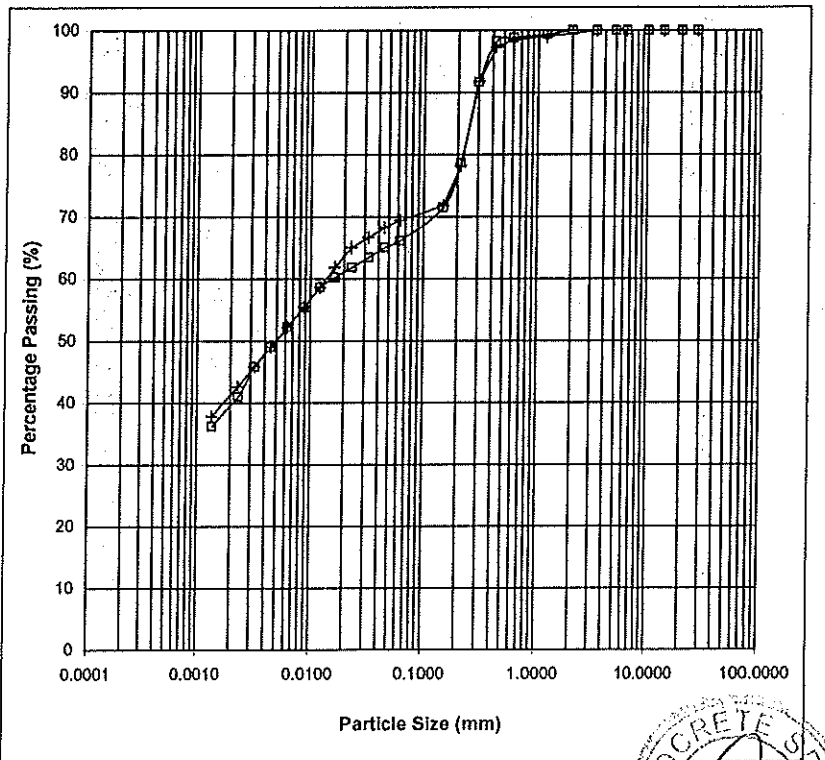
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	99
2.00	100	2.00	98
1.18	100	1.18	95
0.600	99	0.600	93
0.425	98	0.425	92
0.300	97	0.300	91
0.212	89	0.212	88
0.150	68	0.150	86
0.063	53	0.063	82
0.0486	52	0.0424	81
0.0346	51	0.0305	78
0.0246	49	0.0219	75
0.0175	47	0.0157	71
0.0129	46	0.0117	68
0.0092	44	0.0084	65
0.0065	43	0.0060	62
0.0047	39	0.0043	59
0.0033	36	0.0031	55
0.0024	33	0.0022	51
0.0014	30	0.0013	44
Clay (%)	31	Clay (%)	47
Silt (%)	22	Silt (%)	35
Sand (%)	47	Sand (%)	16
Gravel (%)	0	Gravel (%)	2
Total (%)	100	Total (%)	100


Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH31	UD9	27.00	21.01.19
x	BH31	D12	34.50	21.01.19



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	99
1.18	99	1.18	99
0.600	99	0.600	99
0.425	98	0.425	97
0.300	92	0.300	92
0.212	79	0.212	78
0.150	71	0.150	72
0.063	66	0.063	69
0.0459	65	0.0452	68
0.0327	63	0.0322	67
0.0233	62	0.0230	65
0.0166	60	0.0165	62
0.0122	59	0.0122	59
0.0088	55	0.0088	55
0.0063	52	0.0063	52
0.0045	49	0.0045	49
0.0032	46	0.0032	46
0.0023	41	0.0023	43
0.0014	36	0.0014	38
Clay (%)	39	Clay (%)	40
Silt (%)	27	Silt (%)	29
Sand (%)	34	Sand (%)	30
Gravel (%)	0	Gravel (%)	1
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH31	D15	39.00	21.01.19
+	BH31	D19	45.00	21.01.19



GEocreTE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	 Lea Kai Fing
--	----------	------------	-----------	-------	------------	---

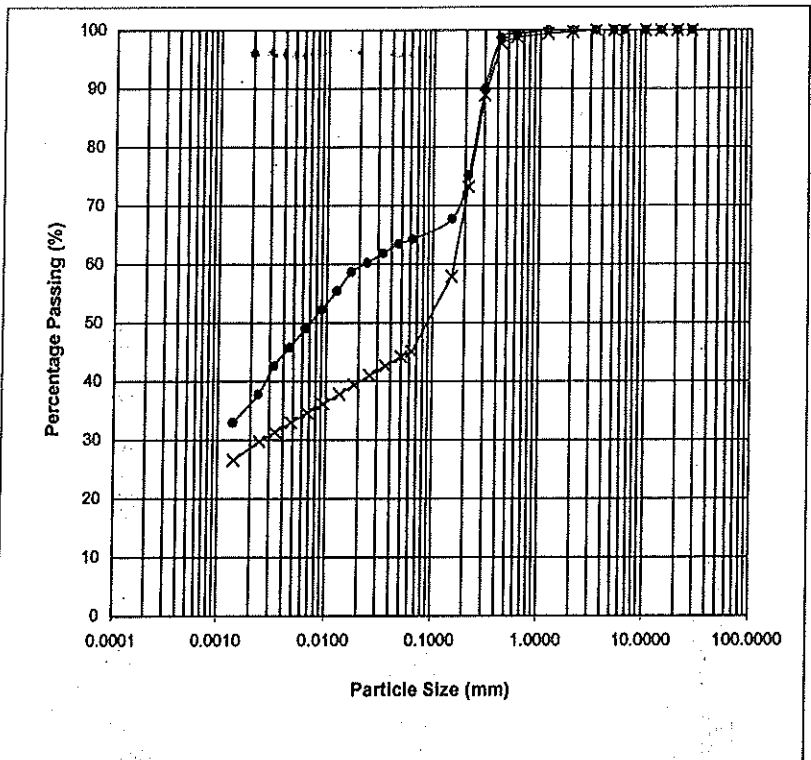
PARTICLE SIZE DISTRIBUTION

(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

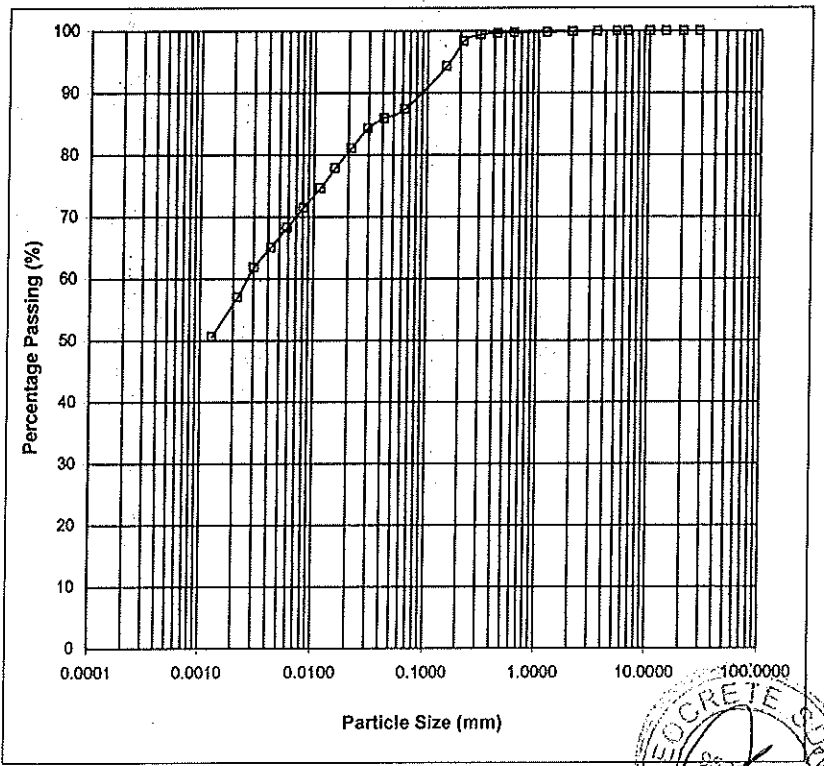
Particle Size Distribution				
●		x		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	99	
0.600	99	0.600	99	
0.425	99	0.425	98	
0.300	90	0.300	89	
0.212	75	0.212	73	
0.150	68	0.150	58	
0.063	64	0.063	45	
0.0463	63	0.0502	44	
0.0330	62	0.0357	43	
0.0235	60	0.0254	41	
0.0167	59	0.0181	39	
0.0124	55	0.0133	38	
0.0089	52	0.0095	36	
0.0064	49	0.0067	35	
0.0046	46	0.0048	33	
0.0033	43	0.0034	31	
0.0023	38	0.0024	30	
0.0014	33	0.0014	27	
Clay (%)		35	Clay (%)	28
Silt (%)		29	Silt (%)	17
Sand (%)		36	Sand (%)	55
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH31	D22	49.50	21.01.19
x	BH31	D24	52.50	21.01.19



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	98		
0.150	94		
0.063	87		
0.0412	86		
0.0294	84		
0.0212	81		
0.0152	78		
0.0113	75		
0.0081	71		
0.0058	68		
0.0042	65		
0.0030	62		
0.0022	57		
0.0013	51		
Clay (%)		54	
Silt (%)		34	
Sand (%)		12	
Gravel (%)		0	
Total (%)		100	

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH31	D29	60.00	21.01.19
+				



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

SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERAH (Co. No. 958231 - A)		PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR												REF : L/08/18/139/18 DATE : 12.01.19														
Borehole No.	Specime n	SAMPLE AND SPECIMEN DETAILS.				ATTERBERG LIMITS			SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator)			SHEAR BOX		CIU		UU Triaxial CONSOLIDATION		CHEMICAL TEST						
		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 TEST	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)	
BH32	UD1	3.00	46	1.62	1.11					54	41	5	0															
	UD3	9.00	46	1.68	1.09	54	24	30	10.8	47	38	15	0	2.62				29.16	0		45	0.339	2.4	0.63	8.0			
	UD6	18.00	51	1.65	1.09	46	23	23		41	34	25	0															
	UD10	30.00	51	1.75	1.16	45	24	21	8.3	39	34	27	0	2.64				18.12	0		60	0.381						
	D12	33.00	37	NA	NA					43	30	26	1															
	D14	36.00	15	1.89	1.59		NP			18	12	70	0															
	D17	40.50	23	NA	NA					9		91	0															
	D18	42.00	17	NA	NA					4		96	0															
	D20	45.00	18	NA	NA		NP			18		79	3															
	D22	48.00	23	NA	NA					7		93	0	2.70														
	D25	52.50	54	NA	NA	50	23	27		48	37	15	0															
	D30	60.00	72	NA	NA					52	47	1	0															

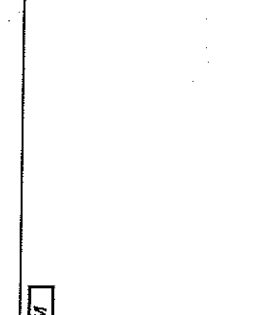
Note : NES = NOT ENOUGH SAMPLE
NP = NON PLASTIC
NA = NOT APPLICABLE

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

SUM

APPROVED BY:
LEE KAI HING

CHECKED BY:
CHRIS



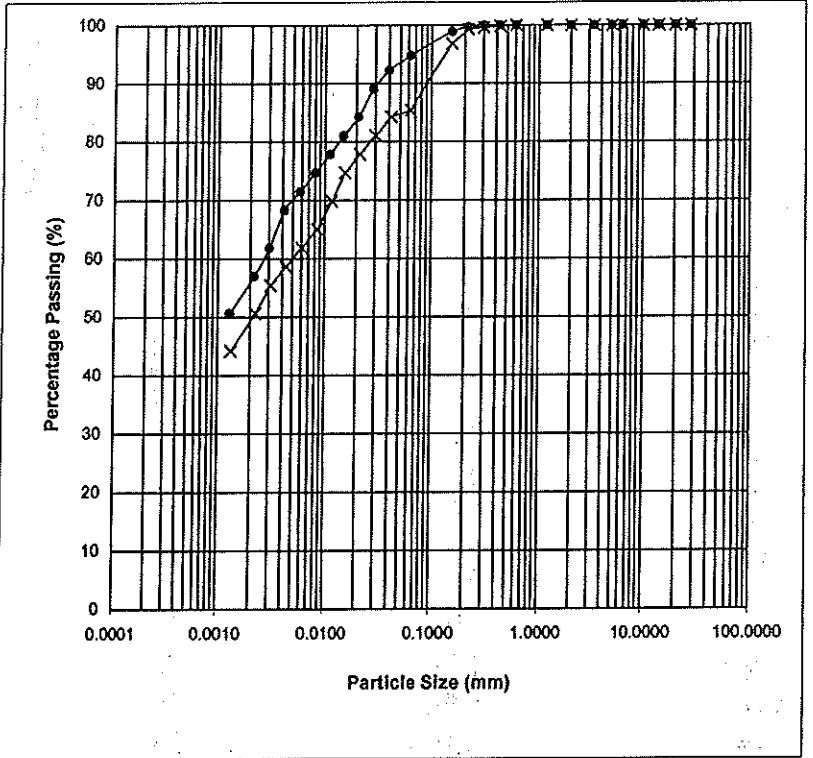
PARTICLE SIZE DISTRIBUTION

(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

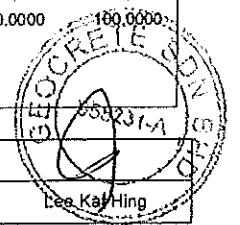
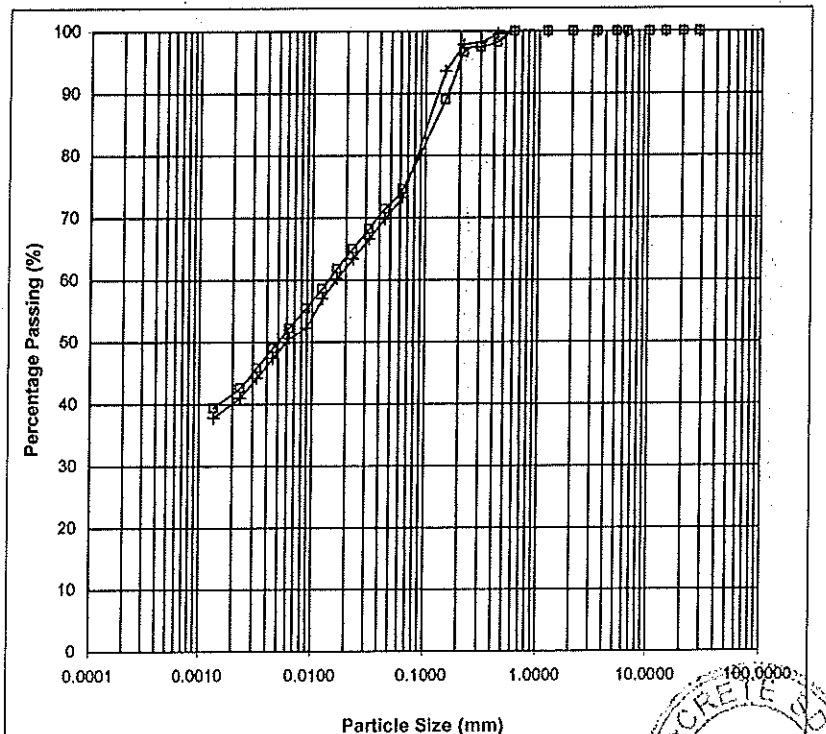
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.800	100	0.600	100	
0.425	100	0.425	100	
0.300	100	0.300	100	
0.212	100	0.212	99	
0.150	99	0.150	97	
0.063	95	0.063	85	
0.0397	92	0.0416	84	
0.0286	89	0.0300	81	
0.0208	84	0.0215	78	
0.0150	81	0.0155	75	
0.0111	78	0.0116	70	
0.0080	75	0.0084	65	
0.0058	71	0.0060	62	
0.0041	68	0.0043	59	
0.0030	62	0.0031	55	
0.0022	57	0.0022	51	
0.0013	51	0.0013	44	
Clay (%)		54	Clay (%)	47
Silt (%)		41	Silt (%)	38
Sand (%)		5	Sand (%)	15
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH32	UD1	3.00	05.01.19
X	BH32	UD3	9.00	05.01.19



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	98	0.425	100	
0.300	97	0.300	98	
0.212	97	0.212	98	
0.150	89	0.150	94	
0.063	75	0.063	73	
0.0445	71	0.0449	70	
0.0320	68	0.0322	67	
0.0230	65	0.0231	63	
0.0165	62	0.0166	60	
0.0122	59	0.0123	57	
0.0088	55	0.0089	52	
0.0063	52	0.0063	51	
0.0045	49	0.0045	47	
0.0032	46	0.0032	44	
0.0023	43	0.0023	41	
0.0013	39	0.0014	38	
Clay (%)		41	Clay (%)	39
Silt (%)		34	Silt (%)	34
Sand (%)		25	Sand (%)	27
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH32	UD6	18.00	05.01.19
+	BH32	UD10	30.00	05.01.19



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

Total Stress Triaxial Compression

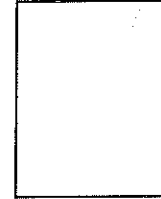
Unconsolidated Undrained

Sample details

Depth : 9.00m
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)	142.24	144.27	145.10
Bulk Density ρ (Mg/m ³)	1.651	1.675	1.684
Particle Density ρ_s	2.62	2.62	2.62

Sketch showing specimen location in original sample

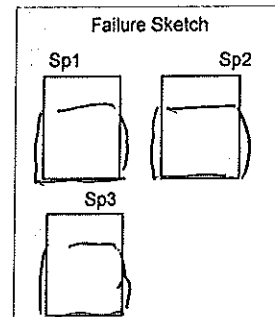


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	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 %	55	54	52
Dry Density ρ_{d0} (Mg/m ³)	1.07	1.09	1.11
Voids Ratio e_0	1.45	1.41	1.37
Deg of Saturation S_0 %	98.38	100.38	99.93

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	49.29	57.04	68.62
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	49.09	56.84	68.42
Strain at Failure ϵ_f %	4.01	5.00	3.49
Shear Strength c_u (kPa)	24.65	28.52	34.31
Moisture Content w_f %	55	54	52
Dry Density ρ_{df} (Mg/m ³)	1.07	1.09	1.11
Voids Ratio e_f	1.45	1.41	1.37
Deg of Saturation S_f %	98.38	100.38	99.93



Notes : Plastic Plastic Plastic

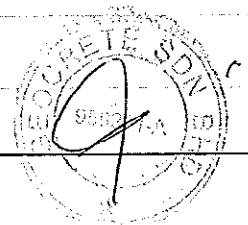
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

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

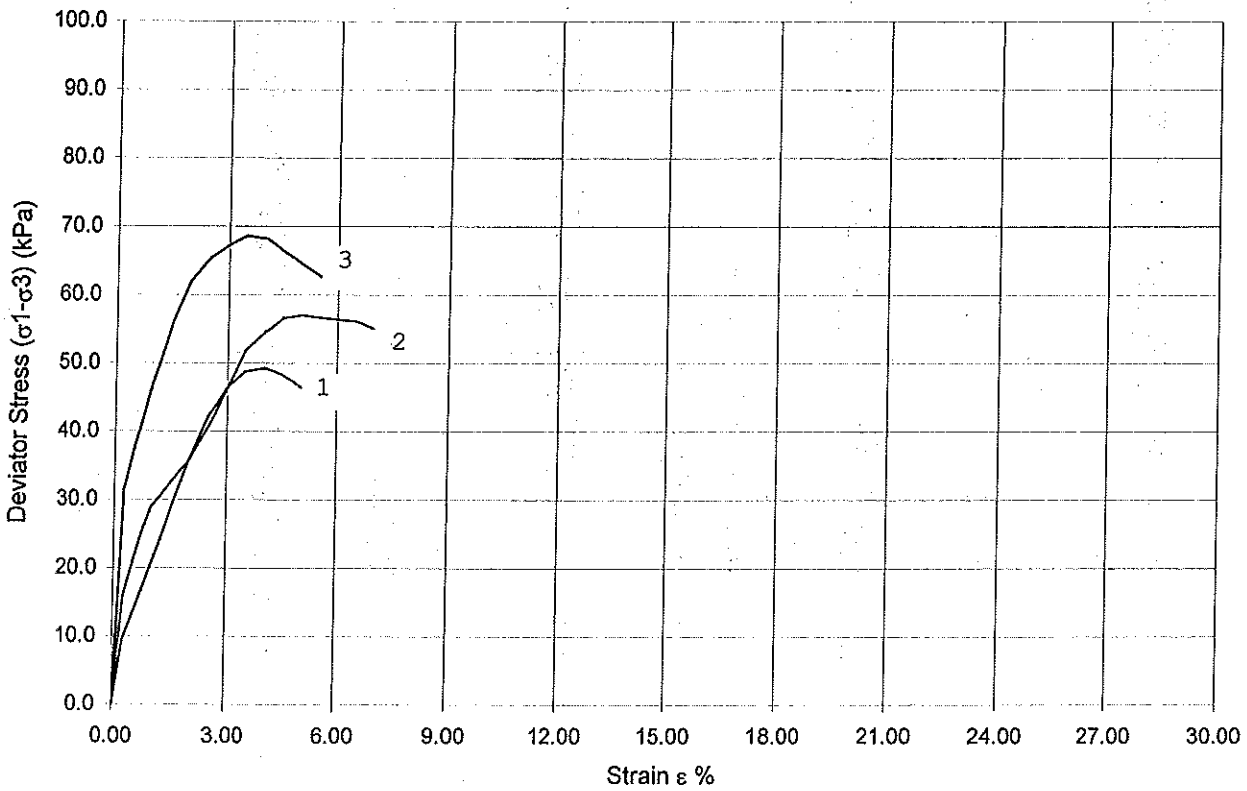
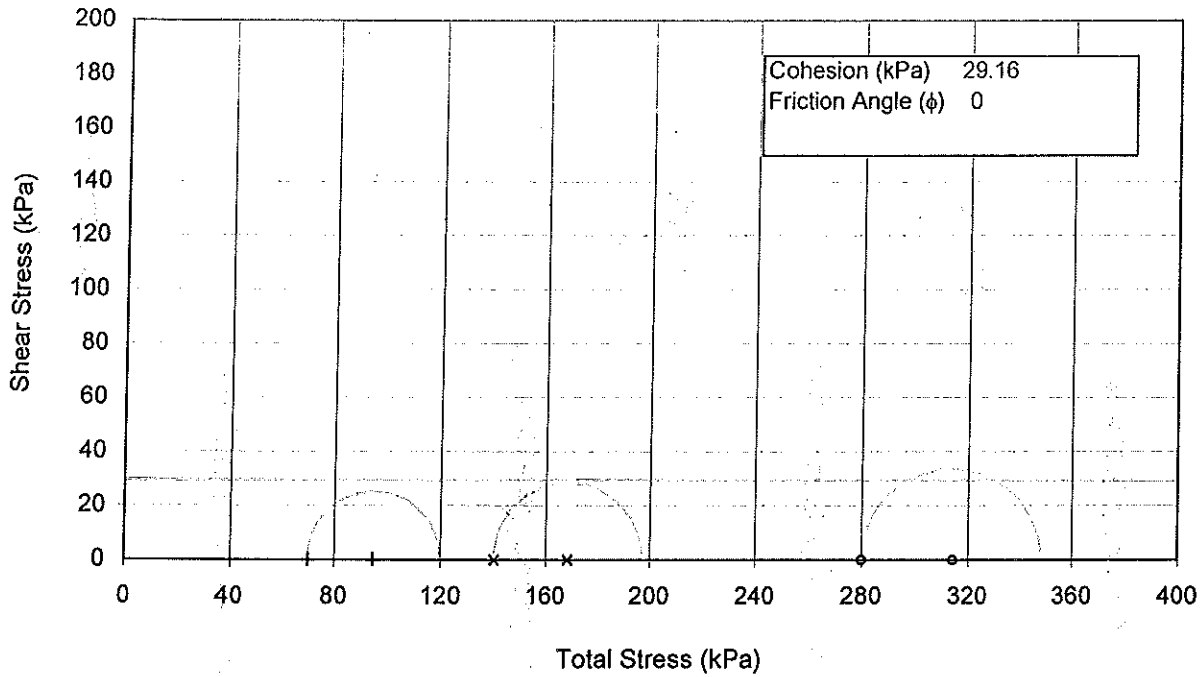
Sample : UD3
Borehole : BH32
Approved
Lee Kai Hing

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

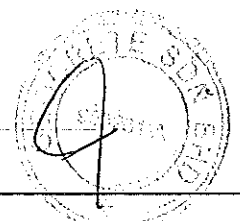
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 05.01.19

Sample : UD3
Borehole : BH32

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_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	148.51	151.10	152.82
Bulk Density ρ (Mg/m ³)	1.724	1.754	1.774
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)	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

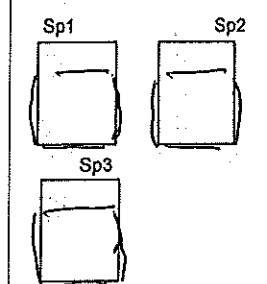
Load Channel 14391 14391 14391

Moisture Content w_0 %	52	51	51
Dry Density ρ_{d0} (Mg/m ³)	1.13	1.16	1.17
Voids Ratio e_0	1.34	1.28	1.25
Deg of Saturation S_0 %	103.78	106.00	108.20

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	25.88	37.78	45.05
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	25.68	37.58	44.85
Strain at Failure ϵ_f %	9.01	8.03	8.03
Shear Strength c_u (kPa)	12.94	18.89	22.53

Failure Sketch



Moisture Content w_f %	52	51	51
Dry Density ρ_{df} (Mg/m ³)	1.13	1.16	1.17
Voids Ratio e_f	1.34	1.28	1.25
Deg of Saturation S_f %	103.78	106.00	108.20

Notes : Plastic Plastic Plastic

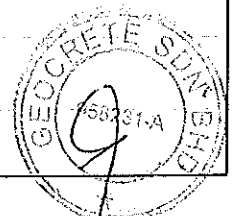
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

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

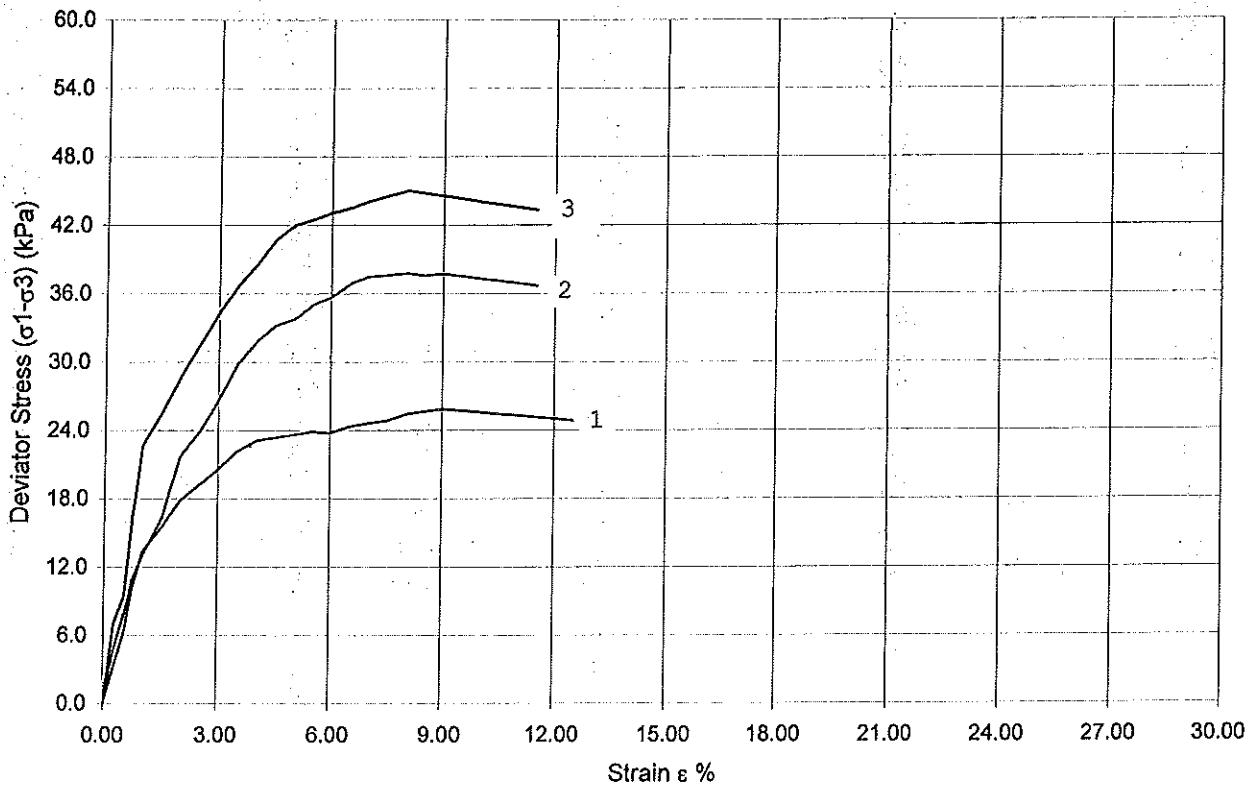
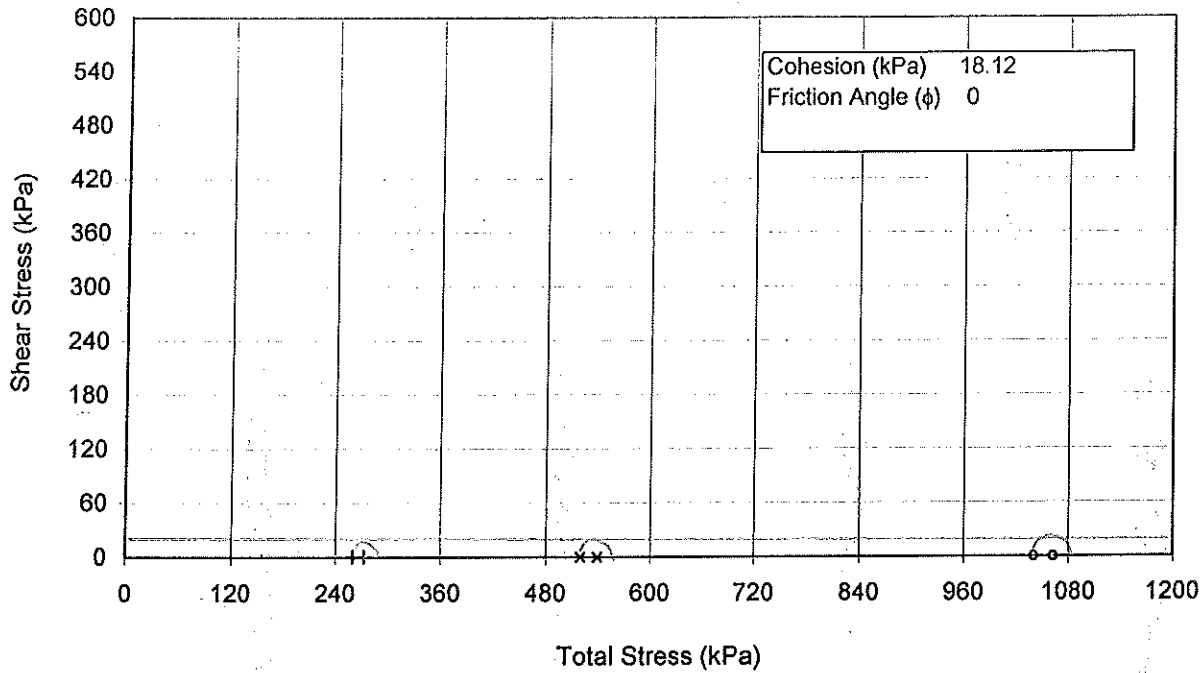
Sample : UD10
 Borehole : BH32
 Approved
 Lee Kai Hing

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 : 05.01.19

Sample : UD10
 Borehole : BH32

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 32 / D 14 (36.00 m)

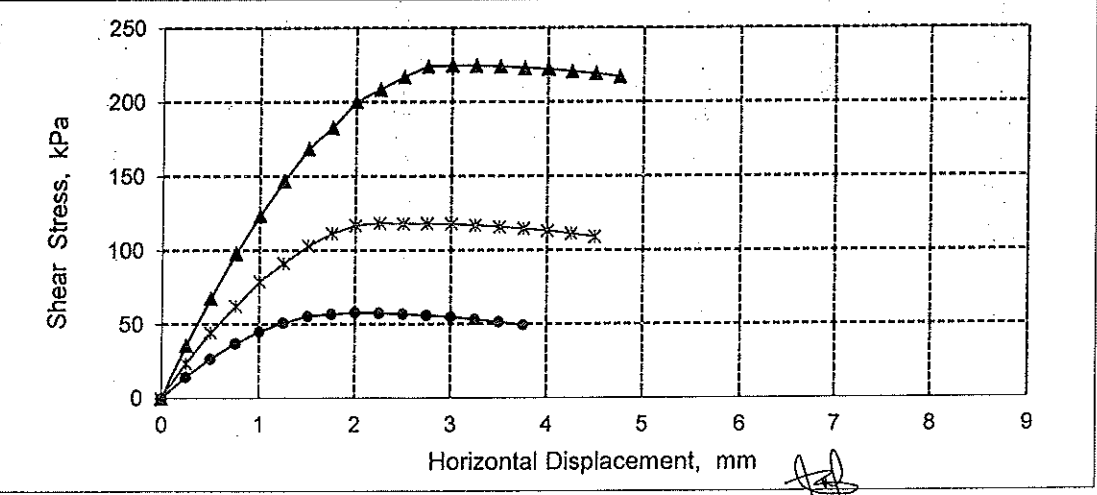
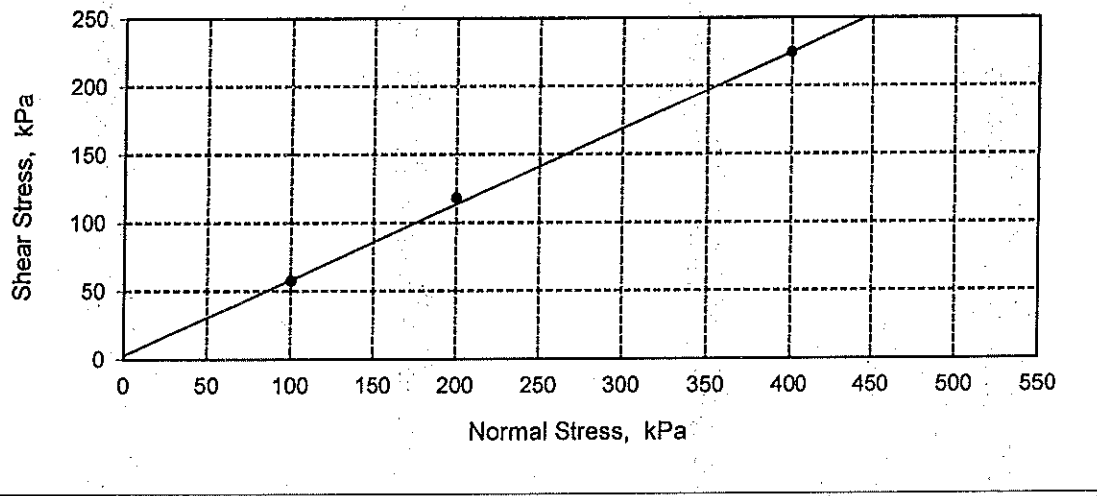
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 10 / 1 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		135.8	135.9	136.6
Moisture Content (%)		19.4	18.6	19.4
Bulk Density (Mg/m ³)		1.886	1.887	1.897
Dry Density (Mg/m ³)		1.580	1.591	1.589

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		57.8	118.4	224.7
Displ. at Failure (mm)		2.0	2.3	3.0
Settlement (mm)		0.2	0.4	0.7

	c' 3 kPa
	φ' 29 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.	BH32 / UD3 / 9.00m	Test Started	03.01.19
Soil Description	Grey CLAY with little sand	Ring No.	A1

BEFORE TEST

Moist. Content from trimmings:	=	53 %	SG (Measured)	=	2.620
Wt of sample + Ring	=	121.30 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.00 gm	Area (A)	=	1964 mm ²
Wt of sample	=	63.3 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	42.12 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.18 gm	Bulk Density (P)	=	1.611 Mg/m ³
Initial Moisture Content, M _o	=	50 %	Dry Density (PD)	=	1.072 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.4437			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	91 %			
V. Ratio Change Factor F, $\frac{1+e_o}{H}$	=	0.1222 mm ⁻¹			
Height of Solid H _s	=	8.184 mm			

AFTER TEST

Wt of sample + Ring	=	118.96 gm	Overall settlement	=	1.880 mm
Wt of Dry sample + Ring	=	100.12 gm	Volume Change	=	3.693 cm ³
Wt of Ring	=	58.00 gm	Final Volume	=	35.59 cm ³
Wt of Wet sample	=	60.96 gm	Final Bulk Density	=	1.713 Mg/m ³
Wt of Dry sample	=	42.12 gm	Final Dry Density	=	1.183 Mg/m ³
Wt of Moisture	=	18.84 gm	Final Void Ratio, e _r	=	1.2140
Final Moisture Content, M _r	=	45 %			
Final Saturation, S _o ; $\frac{M_r \times SG}{e_r}$	=	97 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

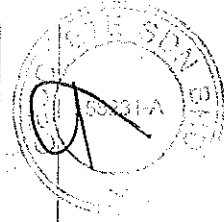
Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH32 / UD3 / 9.00m

Date of Report 13.01.19
 Test started 03.01.19
 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 /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.4437	0.0000	0				
6.25	0.150	19.850	0.0183	1.4254	0.0183	6.25	1.2100	2.25	19.59	-0.0609
12.5	0.244	19.756	0.0298	1.4139	0.0115	6.25	0.7619	1.00	43.53	-0.0382
25.0	0.426	19.574	0.0521	1.3916	0.0222	12.5	0.7444	3.61	11.89	-0.0739
50.0	0.732	19.268	0.0894	1.3543	0.0374	25.0	0.6357	2.89	14.49	-0.1242
100	1.464	18.536	0.1789	1.2648	0.0894	50.0	0.7904	1.21	32.78	-0.2971
200	2.298	17.702	0.2808	1.1629	0.1019	99.9	0.4715	3.24	11.25	-0.3385
100	2.242	17.758	0.2739	1.1698	-0.0068	-99.9				
50	2.122	17.878	0.2593	1.1844	-0.0147	-50.0				
12.5	1.880	18.120	0.2297	1.2140	-0.0296	-37.5				

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

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



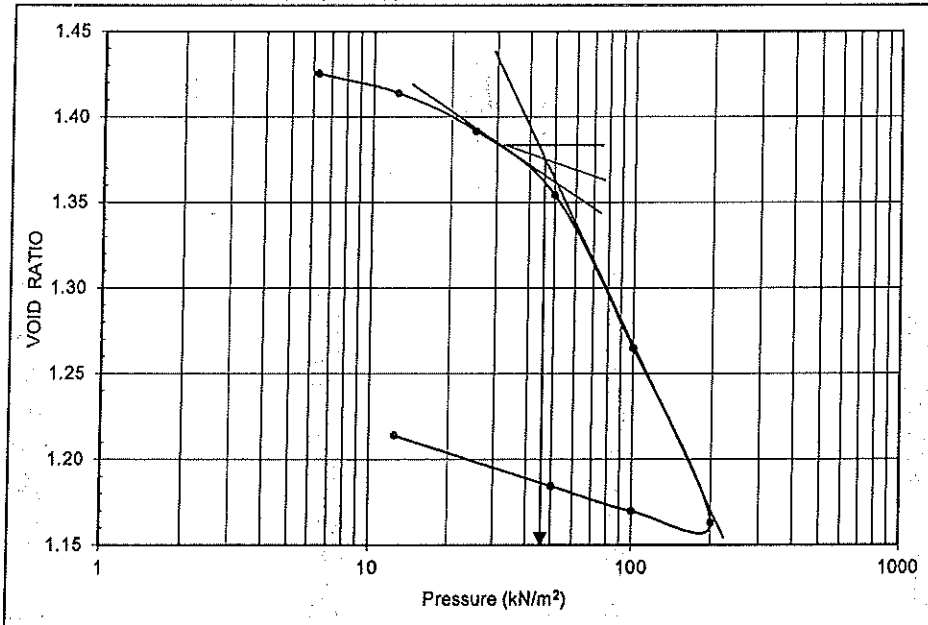
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

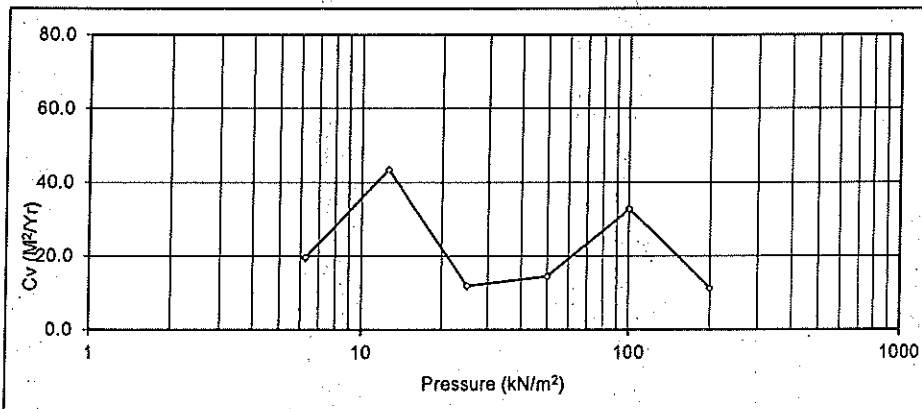
BH REF BH32 / UD3 / 9.00m

SOIL SAMPLE Grey CLAY with little sand

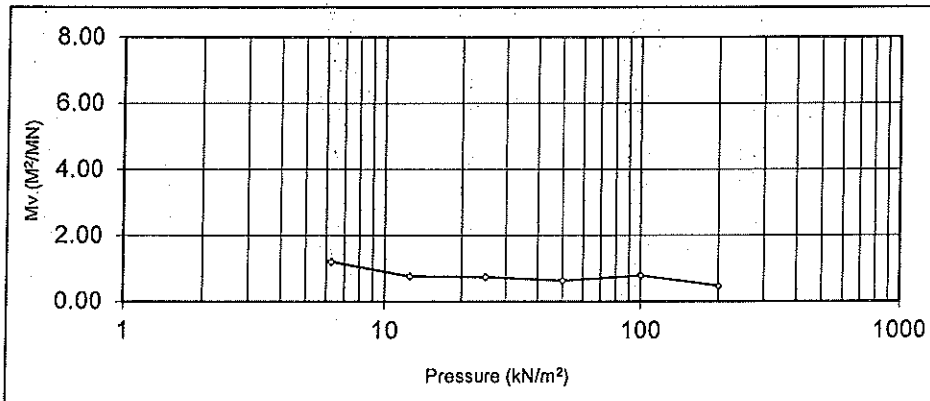
Date of Report 13.01.19
 Test started 03.01.19
 Ring No. A1



INITIAL		
Water content	50	%
Dry Density	1.07	Mg/m ³
Void Ratio	1.4437	
Saturation	91	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.620	



FINAL		
Water content	45	%
Dry Density	1.18	Mg/m ³
Void Ratio	1.2140	
Saturation	97	%
Height	18	mm
Comp. Index, C _c	0.3385	
Precons. Load	45	kN/m ²



Comp. Ratio, C_R 0.139



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.	BH32 / UD10 / 30.00m	Test Started	03.01.19
Soil Description	Grey CLAY with some sand	Ring No.	A2

BEFORE TEST

Moist. Content from trimmings:	=	56 %	SG (Measured)	=	2.640
Wt of sample + Ring	=	124.35 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.50 gm	Area (A)	=	1964 mm ²
Wt of sample	=	62.85 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	40.44 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	22.41 gm	Bulk Density (P)	=	1.600 Mg/m ³
Initial Moisture Content, M _o	=	55 %	Dry Density (PD)	=	1.029 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.5646			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	94 %			
V. Ratio Change Factor F _v , $\frac{H}{1+e_o}$	=	0.1282 mm ⁻¹			
Height of Solid	=	7.798 mm			

AFTER TEST

Wt of sample + Ring	=	119.98 gm	Overall settlement	=	2.580 mm
Wt of Dry sample + Ring	=	101.94 gm	Volume Change	=	5.068 cm ³
Wt of Ring	=	61.50 gm	Final Volume	=	34.22 cm ₃
Wt of Wet sample	=	58.48 gm	Final Bulk Density	=	1.709 Mg/m ³
Wt of Dry sample	=	40.44 gm	Final Dry Density	=	1.182 Mg/m ³
Wt of Moisture	=	18.04 gm	Final Void Ratio, e _f	=	1.2338
Final Moisture Content, M _f	=	45 %			
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

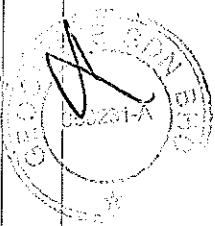
BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH32 / UD10 / 30.00m

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. A2

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 /MN)		t_{90} (min)
0	0.000	20.000	0.0000	1.5646	0.0000	0			
12.5	0.508	19.492	0.0651	1.4995	0.0651	12.5	2.0866	4.00	10.82
25.0	0.790	19.210	0.1013	1.4633	0.0362	12.5	1.1753	4.41	9.43
50.0	1.260	18.740	0.1616	1.4031	0.0603	25.0	1.0040	1.69	23.65
100	1.900	18.100	0.2436	1.3210	0.0821	50.0	0.7077	3.61	10.43
200	2.794	17.206	0.3583	1.2064	0.1146	99.9	0.5200	1.96	17.65
100	2.750	17.250	0.3526	1.2120	-0.0056	-99.9			
50	2.680	17.320	0.3437	1.2210	-0.0090	-50.0			
12.5	2.580	17.420	0.3308	1.2338	-0.0128	-37.5			

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



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

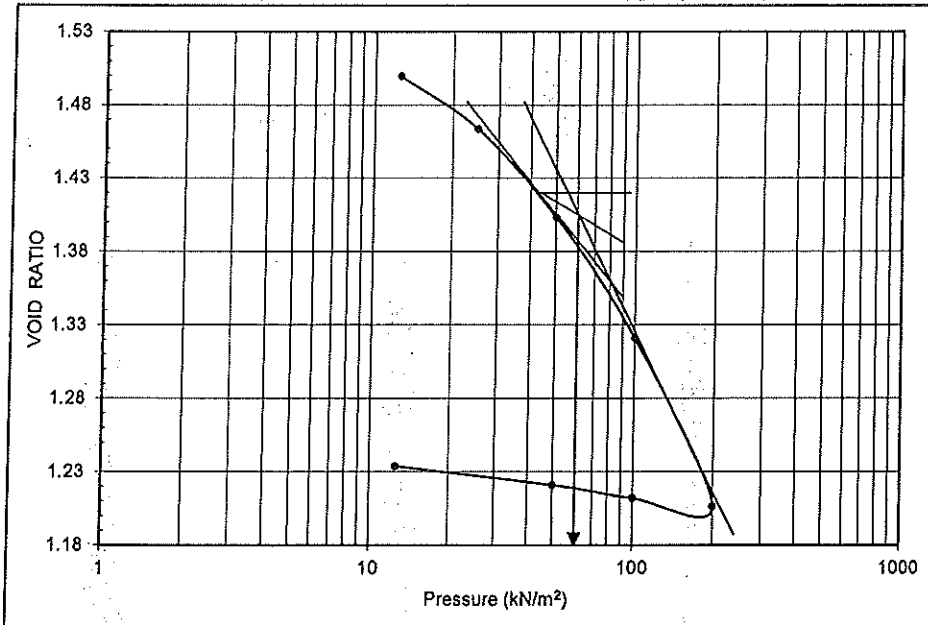
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH32 / UD10 / 30.00m

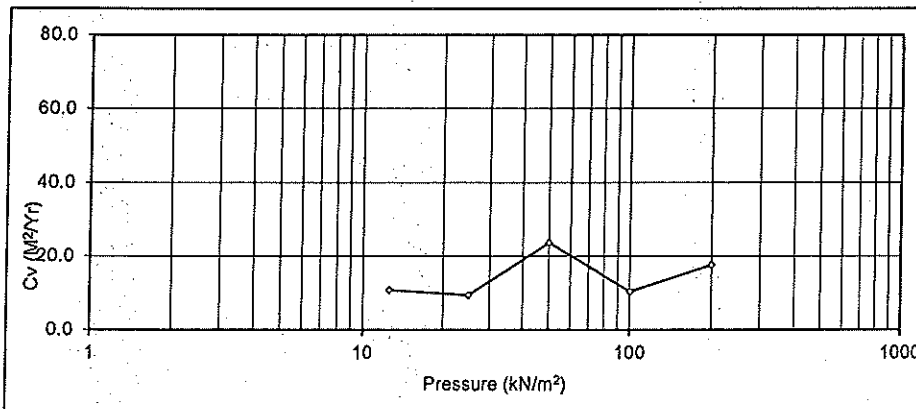
SOIL SAMPLE Grey CLAY with some sand

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. A2



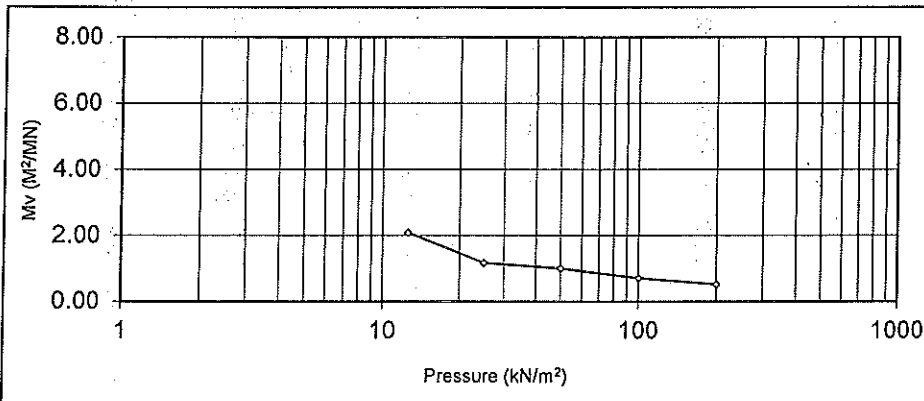
INITIAL

Water content	55	%
Dry Density	1.03	Mg/m ³
Void Ratio	1.5646	
Saturation	94	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.640	



FINAL

Water content	45	%
Dry Density	1.18	Mg/m ³
Void Ratio	1.2338	
Saturation	95	%
Height	17	mm
Comp. Index, Cc	0.3809	
Precons. Load	60	kN/m ²



Comp. Ratio, Cr 0.149



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
	BH33 / UD4 / 12.00m	Test Started	03.01.19
Sample No.	Greenish grey CLAY	Ring No.	A3
Soil Description			

BEFORE TEST

Moist. Content from trimmings:	=	53 %	SG (Measured)	=	2.600
Wt of sample + Ring	=	122.06 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.20 gm	Area (A)	=	1964 mm ²
Wt of sample	=	61.86 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	41.14 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	20.72 gm	Bulk Density (P)	=	1.575 Mg/m ³
Initial Moisture Content, M _o	=	50 %	Dry Density (PD)	=	1.047 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.4828			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	88 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1241 mm ⁻¹			
Height of Solid	=	8.055 mm			

AFTER TEST

Wt of sample + Ring	=	119.86 gm	Overall settlement	=	2.084 mm
Wt of Dry sample + Ring	=	101.34 gm	Volume Change	=	4.094 cm ³
Wt of Ring	=	60.20 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	=	41.14 gm	Final Dry Density	=	1.169 Mg/m ³
Wt of Moisture	=	18.52 gm	Final Void Ratio, e _f	=	1.2241
Final Moisture Content, M _f	=	45 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	96 %			

	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 BH33 / UD4 / 12.00m

Date of Report

Test started

Ring No.

13.01.19

03.01.19

A3

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 ₅₀ (min)	Cv for t ₅₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.4828	0.0000	0				
6.25	0.107	19.893	0.0133	1.4695	0.0133	6.25	0.8613	3.61	12.23	-0.0441
12.5	0.239	19.761	0.0297	1.4531	0.0164	6.25	1.0696	1.44	30.30	-0.0544
25.0	0.406	19.594	0.0504	1.4324	0.0207	12.5	0.6824	2.25	19.10	-0.0689
50.0	0.641	19.359	0.0796	1.4032	0.0292	25.0	0.4859	1.21	34.80	-0.0969
100	1.021	18.979	0.1267	1.3561	0.0472	50.0	0.4007	1.96	20.81	-0.1567
200	1.623	18.377	0.2015	1.2813	0.0747	99.9	0.3278	5.29	7.32	-0.2483
400	2.466	17.534	0.3061	1.1767	0.1047	199.8	0.2406	1.44	24.85	-0.3477
200	2.382	17.618	0.2957	1.1871	-0.0104	-199.8				
50	2.202	17.798	0.2734	1.2095	-0.0223	-149.9				
12.5	2.084	17.916	0.2587	1.2241	-0.0146	-37.5				

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



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

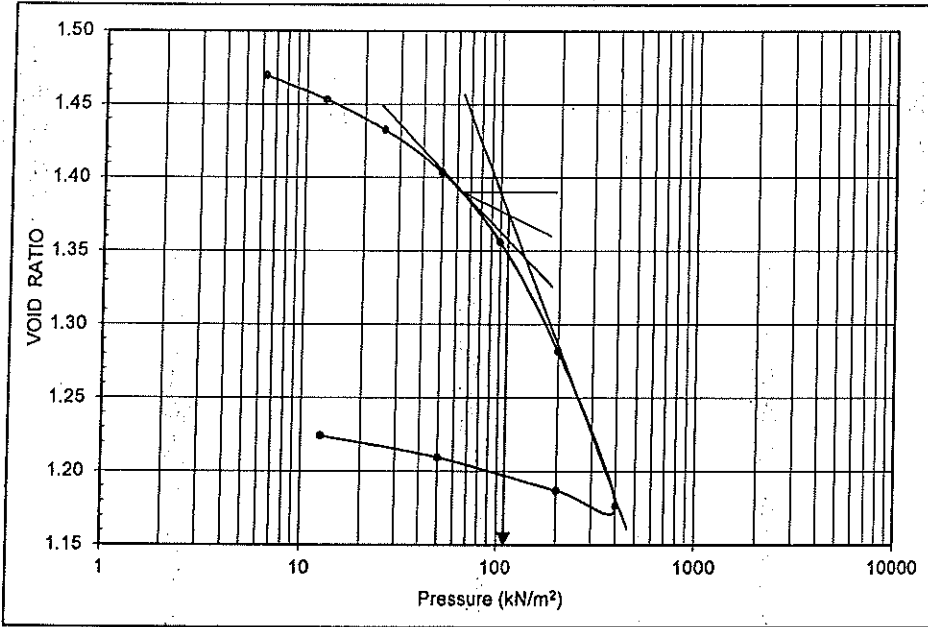
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH33 / UD4 / 12.00m

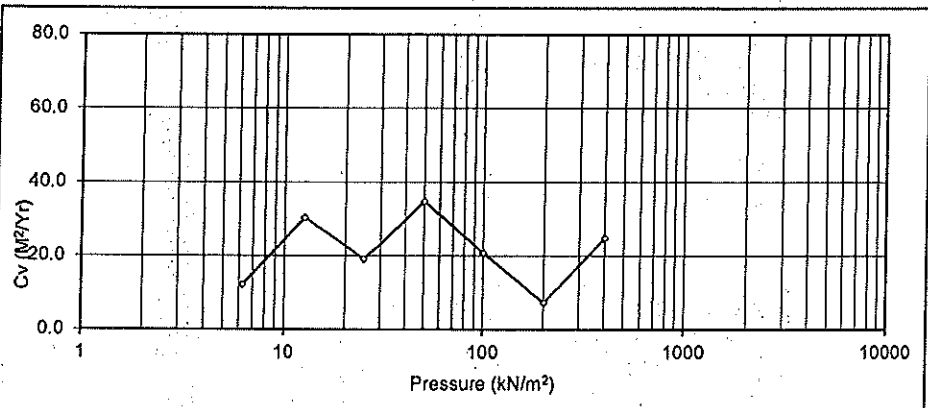
SOIL SAMPLE Greenish grey CLAY

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. A3



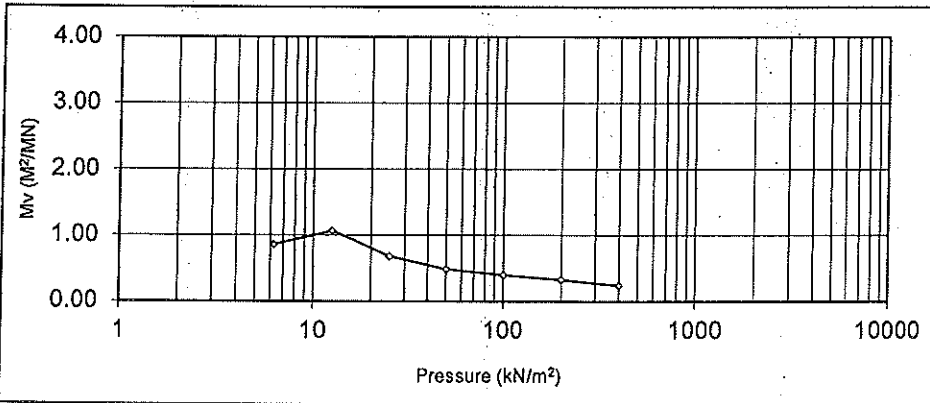
INITIAL

Water content	50	%
Dry Density	1.05	Mg/m ³
Void Ratio	1.4828	
Saturation	88	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.600	



FINAL

Water content	45	%
Dry Density	1.17	Mg/m ³
Void Ratio	1.2241	
Saturation	96	%
Height	18	mm
Comp. Index, C _c	0.3477	
Precons. Load	110	kN/m ²

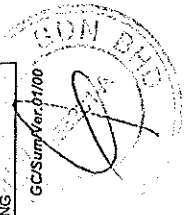


Comp. Ratio, C_R 0.140



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/08/1/18/199/18 DATE : 12.01.19		CHEMICAL TEST																									
						Soluble Sulphate (mg/L)	pH	Chloride (%)	Total Sulphate (%)	Organic Content (%)	Cc	Pc (kPa)	φ (Deg)	Cu (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu' (kPa)											
SAMPLE AND SPECIMEN DETAILS.		ATTERBERG LIMITS		SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator)		CIU TEST		UU Triaxial CONSOLIDATION TEST																			
														Borehole No.	Specime	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			
BH33	D1	1.50	47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
	UD4	12.00	51	1.64	1.04	1.28	1.14	1.34	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	UD5	15.00	31	1.68	1.68	1.28	1.14	1.34	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	UD7	21.00	45	1.65	1.65	1.28	1.14	1.34	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	UD10	30.00	34	1.76	1.76	1.28	1.14	1.34	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	D13	34.50	56	NA	NA	NA	NA	NA	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	D14	36.00	16	2.02	2.02	1.72	1.72	1.72	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	D17	40.50	32	NA	NA	NA	NA	NA	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	D20	45.00	18	2.02	2.02	1.72	1.72	1.72	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	D21	46.50	39	NA	NA	NA	NA	NA	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	D24	51.00	61	NA	NA	NA	NA	NA	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
	D30	60.00	54	NA	NA	NA	NA	NA	NA	NA	1.75	32	43	13.5	7	0	2.60	17.08	0	110	0.348	1.5	0.12	0.39	8.0	0.7	0.11	0.39	7.2		
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.																													
SUM																															
		CHECKED BY: CHRIS										APPROVED BY: LEE KAI HING																			



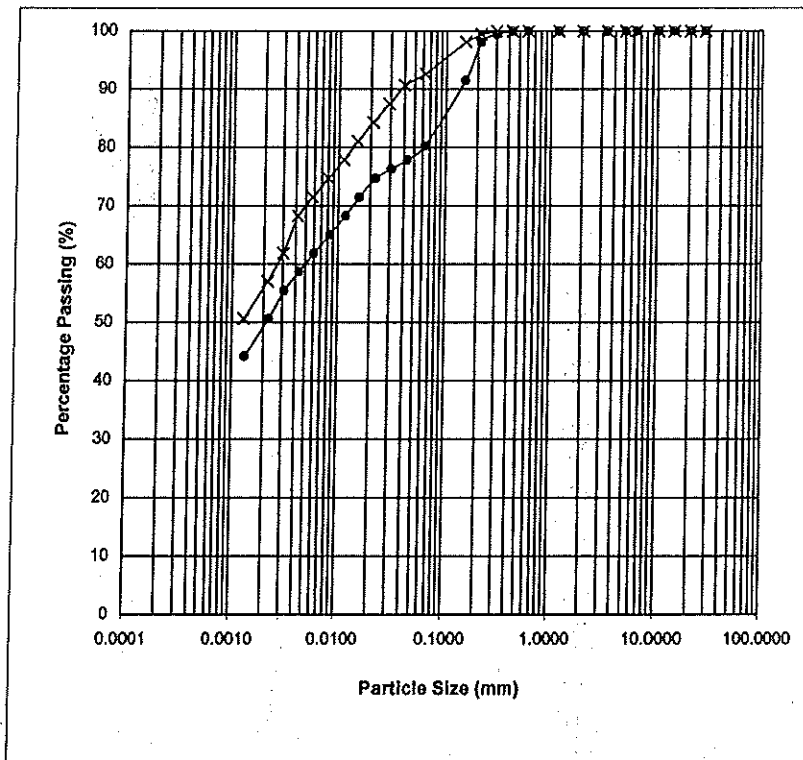
PARTICLE SIZE DISTRIBUTION

(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

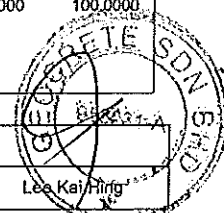
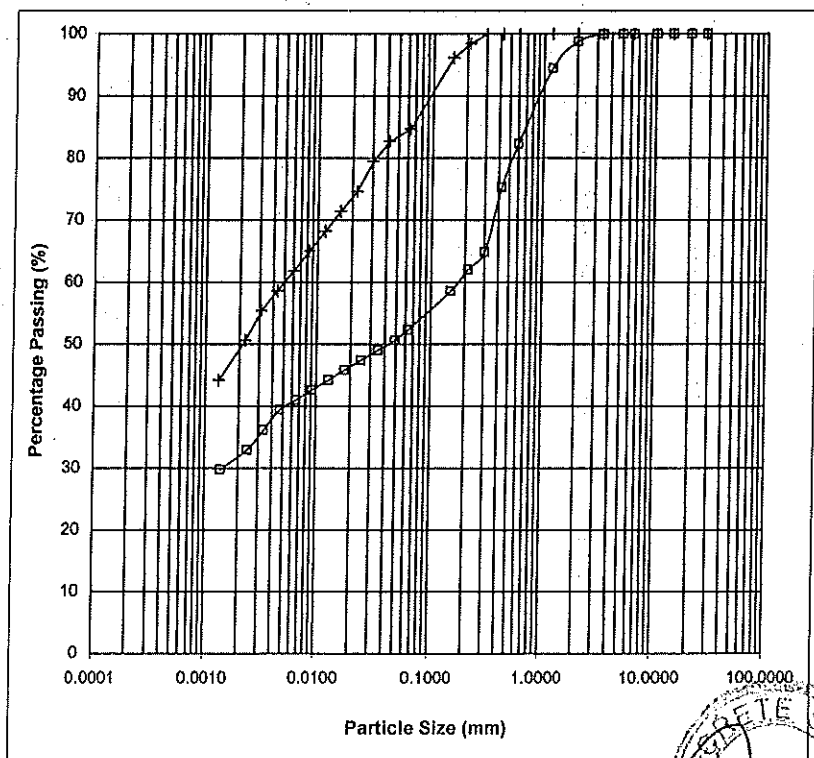
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	99	0.300	100	
0.212	98	0.212	99	
0.150	92	0.150	98	
0.063	80	0.063	93	
0.0431	78	0.0401	91	
0.0307	76	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	57	
0.0013	44	0.0013	51	
Clay (%)		47	Clay (%)	54
Silt (%)		33	Silt (%)	39
Sand (%)		20	Sand (%)	7
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH33	D1	1.50	05.01.19
x	BH33	UD4	12.00	05.01.19



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	99	2.00	100	
1.18	94	1.18	100	
0.600	82	0.600	100	
0.425	75	0.425	100	
0.300	65	0.300	100	
0.212	62	0.212	98	
0.150	59	0.150	96	
0.063	52	0.063	85	
0.0489	51	0.0420	83	
0.0348	49	0.0302	79	
0.0248	47	0.0219	75	
0.0176	46	0.0157	71	
0.0130	44	0.0117	68	
0.0092	43	0.0084	65	
0.0066	41	0.0060	62	
0.0047	39	0.0043	59	
0.0033	36	0.0031	55	
0.0024	33	0.0022	51	
0.0014	30	0.0013	44	
Clay (%)		32	Clay (%)	48
Silt (%)		21	Silt (%)	37
Sand (%)		46	Sand (%)	15
Gravel (%)		1	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH33	UD5	15.00	05.01.19
+	BH33	UD7	21.00	05.01.19



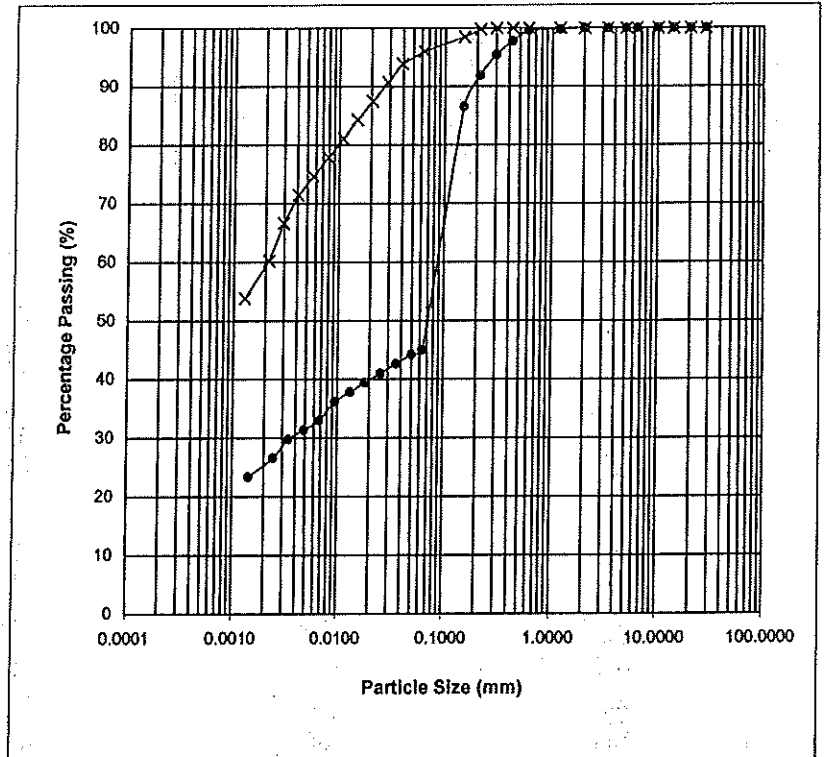
PARTICLE SIZE DISTRIBUTION

(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

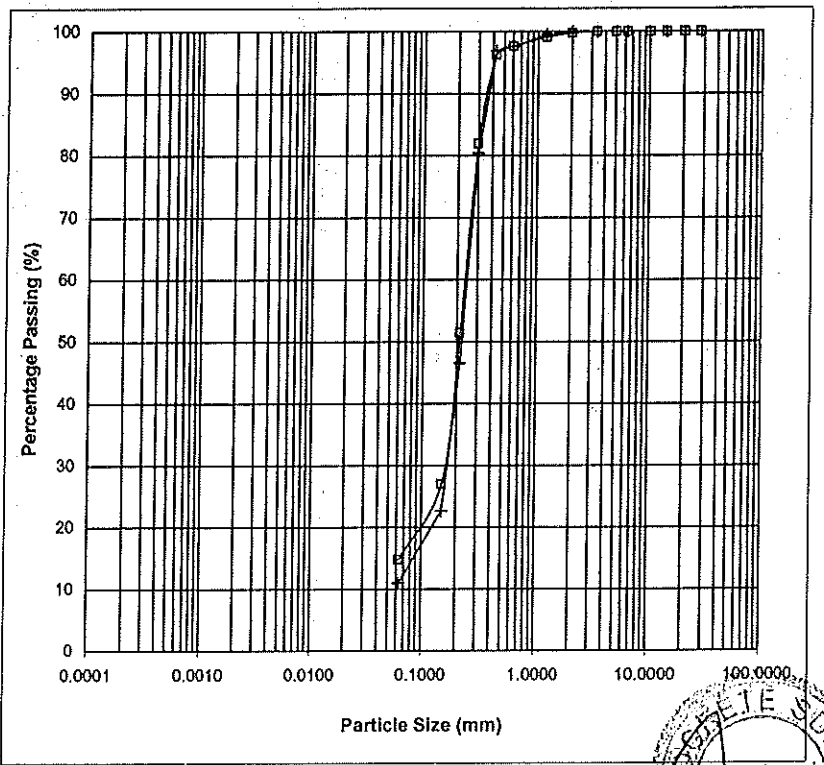
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	98	0.425	100	
0.300	95	0.300	100	
0.212	92	0.212	100	
0.150	87	0.150	98	
0.063	45	0.063	96	
0.0502	44	0.0393	94	
0.0357	43	0.0283	91	
0.0254	41	0.0204	87	
0.0181	39	0.0147	84	
0.0133	38	0.0109	81	
0.0095	36	0.0079	78	
0.0068	33	0.0057	75	
0.0048	31	0.0041	71	
0.0034	30	0.0029	67	
0.0024	27	0.0021	60	
0.0014	23	0.0013	54	
Clay (%)		25	Clay (%)	57
Silt (%)		20	Silt (%)	39
Sand (%)		55	Sand (%)	4
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH33	UD10	30.00	05.01.19
x	BH33	D13	34.50	05.01.19



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	99	
0.600	98	0.600	98	
0.425	96	0.425	97	
0.300	82	0.300	80	
0.212	51	0.212	47	
0.150	27	0.150	23	
0.063	15	0.063	11	
Clay (%)		15	Clay (%)	11
Silt (%)		85	Silt (%)	89
Sand (%)		0	Sand (%)	0
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH33	D14	36.00	05.01.19
+	BH33	D17	40.50	05.01.19



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

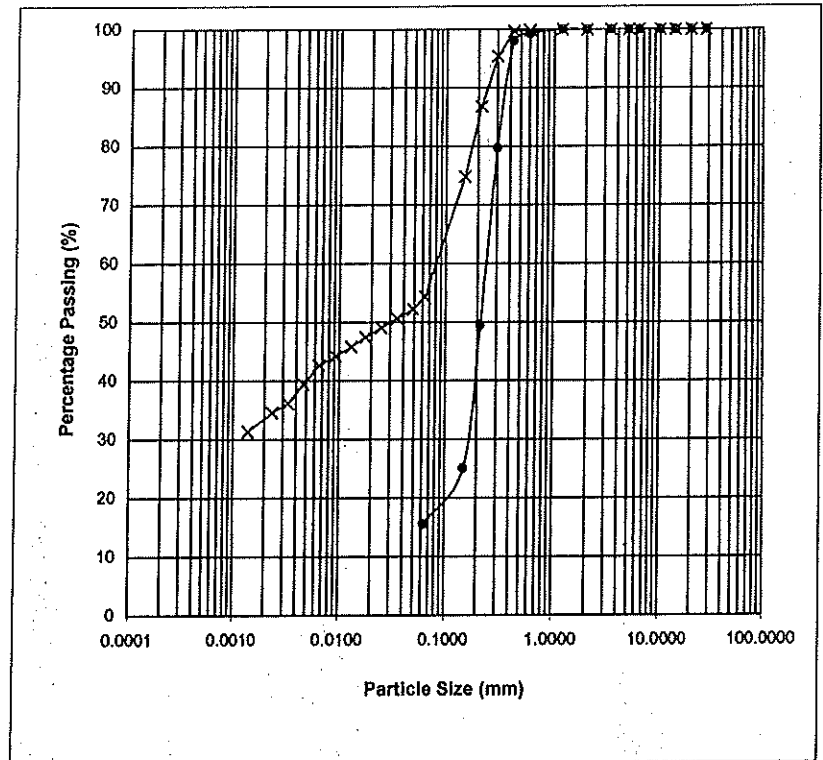
PARTICLE SIZE DISTRIBUTION

(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

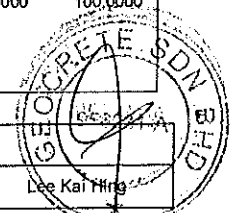
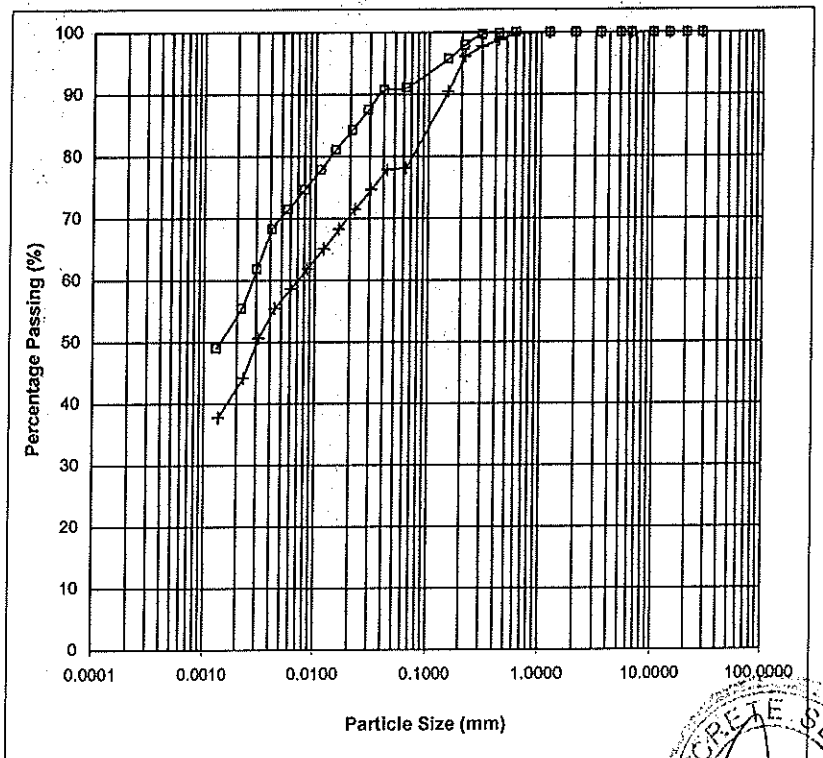
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	100
0.425	98	0.425	100
0.300	80	0.300	95
0.212	50	0.212	87
0.150	25	0.150	75
0.063	16	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	35
		0.0014	31
Clay (%)	16	Clay (%)	33
Silt (%)		Silt (%)	21
Sand (%)	84	Sand (%)	46
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH33	D20	45.00	05.01.19
X	BH33	D21	46.50	05.01.19



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	99
0.300	100	0.300	98
0.212	98	0.212	96
0.150	96	0.150	90
0.063	91	0.063	78
0.0401	91	0.0431	78
0.0289	87	0.0310	75
0.0208	84	0.0223	71
0.0150	81	0.0160	68
0.0111	78	0.0119	65
0.0080	75	0.0085	62
0.0058	71	0.0061	59
0.0041	68	0.0044	55
0.0030	62	0.0032	51
0.0022	55	0.0023	44
0.0013	49	0.0014	38
Clay (%)	52	Clay (%)	41
Silt (%)	39	Silt (%)	37
Sand (%)	9	Sand (%)	22
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH33	D24	51.00	05.01.19
+	BH33	D30	60.00	05.01.19



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

Total Stress Triaxial Compression

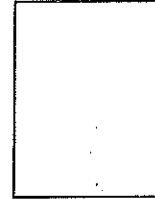
Unconsolidated Undrained

Sample details

Depth : 12.00m
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)	138.92	141.52	143.20
Bulk Density ρ (Mg/m ³)	1.613	1.643	1.662
Particle Density ρ_s	2.60	2.60	2.60

Sketch showing specimen location in original sample



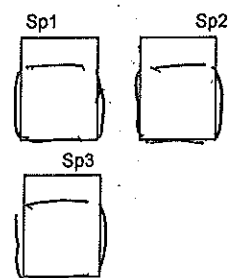
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	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 %	59	57	56
Dry Density ρ_{d0} (Mg/m ³)	1.01	1.04	1.07
Voids Ratio e_0	1.57	1.49	1.44
Deg of Saturation S_0 %	98.33	100.08	100.88

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	28.97	33.24	40.25
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	28.77	33.04	40.05
Strain at Failure ϵ_f %	5.99	6.51	9.01
Shear Strength c_u (kPa)	14.48	16.62	20.13
Moisture Content w_f %	59	57	56
Dry Density ρ_{df} (Mg/m ³)	1.01	1.04	1.07
Voids Ratio e_f	1.57	1.49	1.44
Deg of Saturation S_f %	98.33	100.08	100.88

Failure Sketch



Notes : Plastic Plastic Plastic

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

Test Name : UU
Date of Test : 06.01.19

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

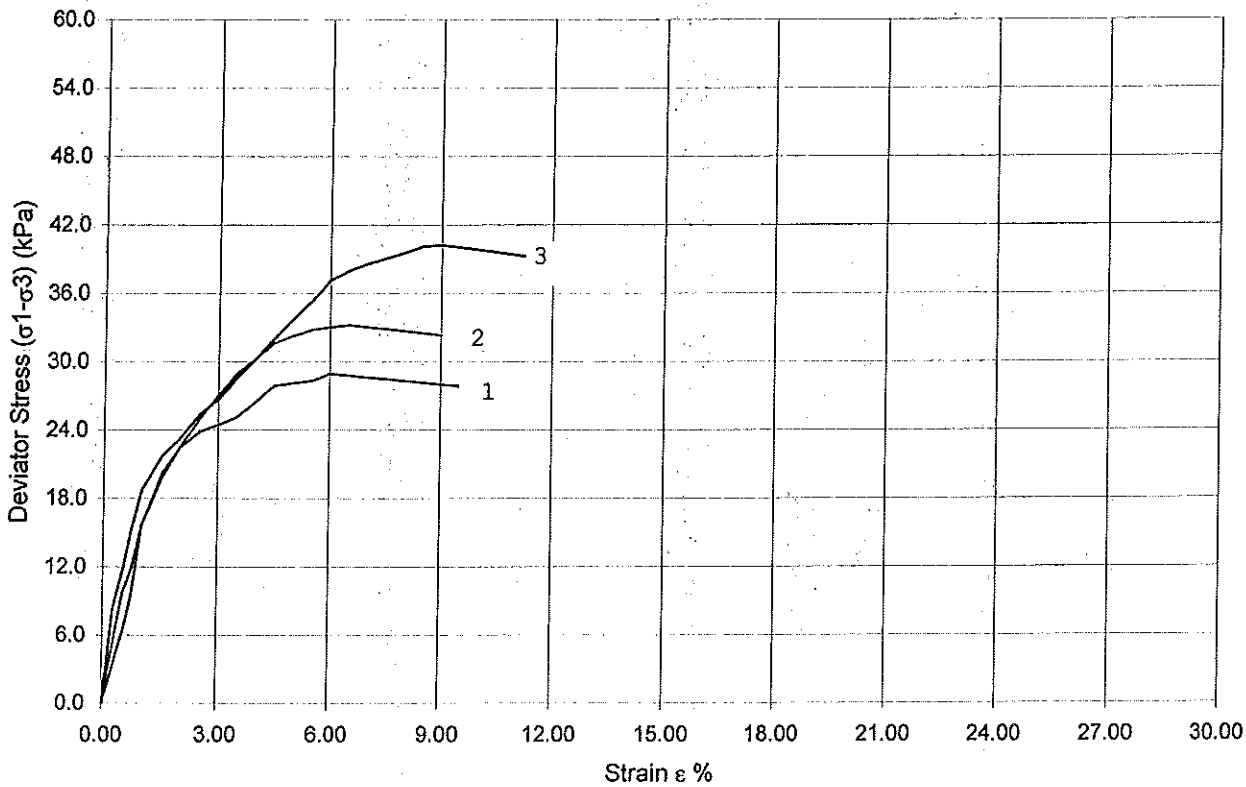
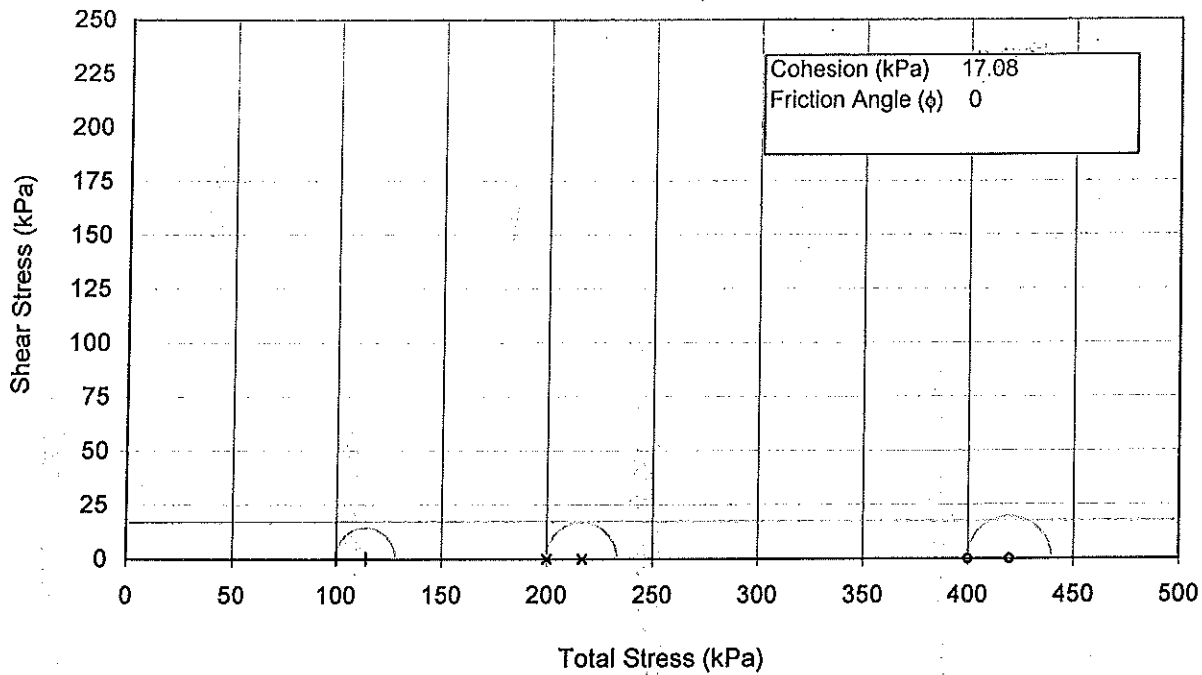
Sample : UD4
Borehole : BH33
Approved
Lee Kai Hing

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

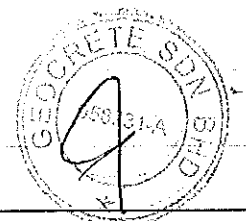
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 06.01.19

Sample : UD4
Borehole : BH33

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

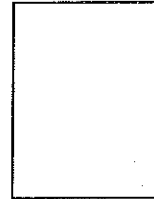
Unconsolidated Undrained

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)	150.25	151.33	153.02
Bulk Density ρ (Mg/m ³)	1.744	1.757	1.776
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)	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

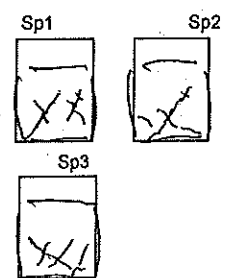
Load Channel	Specimen 1	Specimen 2	Specimen 3
	14391	14391	14391

Moisture Content w_0 %	32	31	30
Dry Density ρ_{d0} (Mg/m ³)	1.32	1.34	1.36
Voids Ratio e_0	1.02	1.00	0.97
Deg of Saturation S_0 %	82.99	83.74	84.28

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	67.96	86.76	113.00
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	67.76	86.56	112.80
Strain at Failure ϵ_f %	7.50	8.49	9.47
Shear Strength c_u (kPa)	33.98	43.38	56.50

Failure Sketch



Moisture Content w_f %	32	31	30
Dry Density ρ_{df} (Mg/m ³)	1.32	1.34	1.36
Voids Ratio e_f	1.02	1.00	0.97
Deg of Saturation S_f %	82.99	83.74	84.28

Notes : Intermediate Intermediate Intermediate

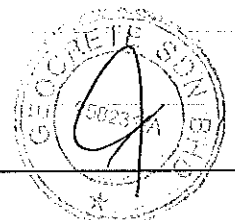
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 06.01.19

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

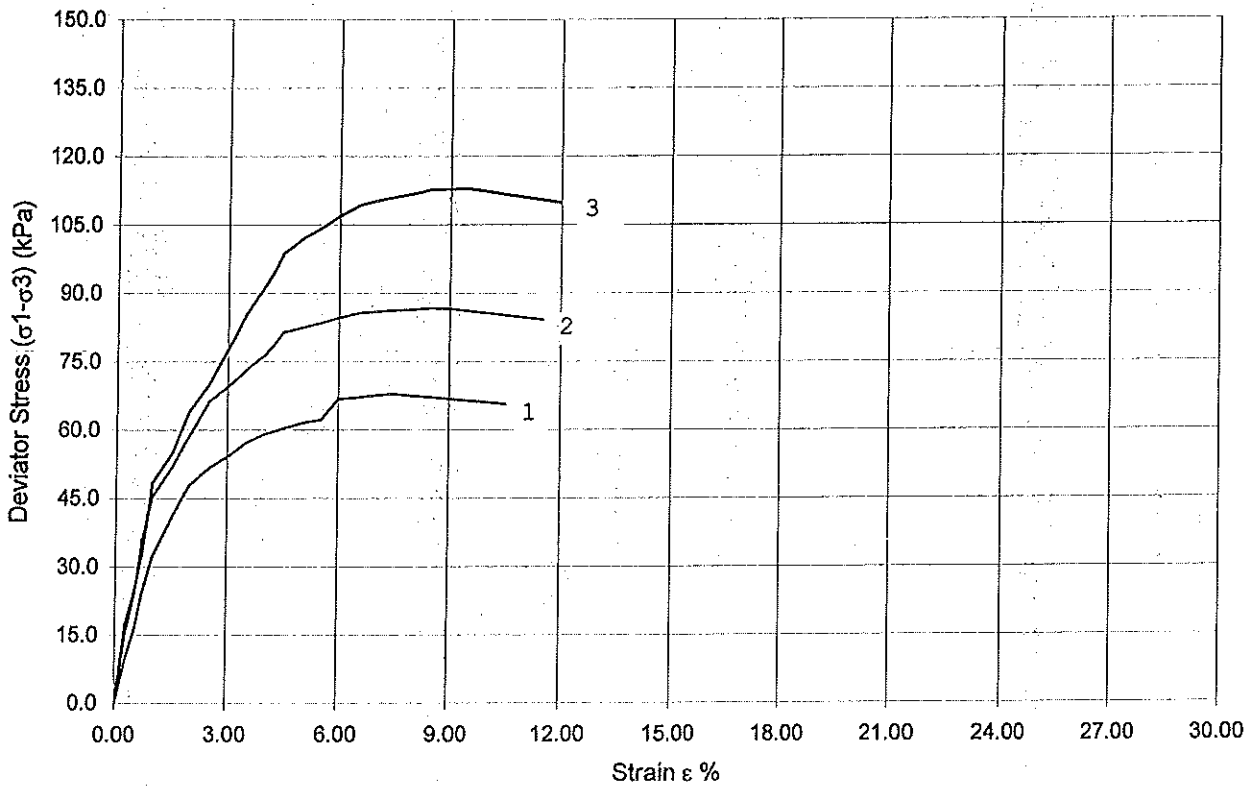
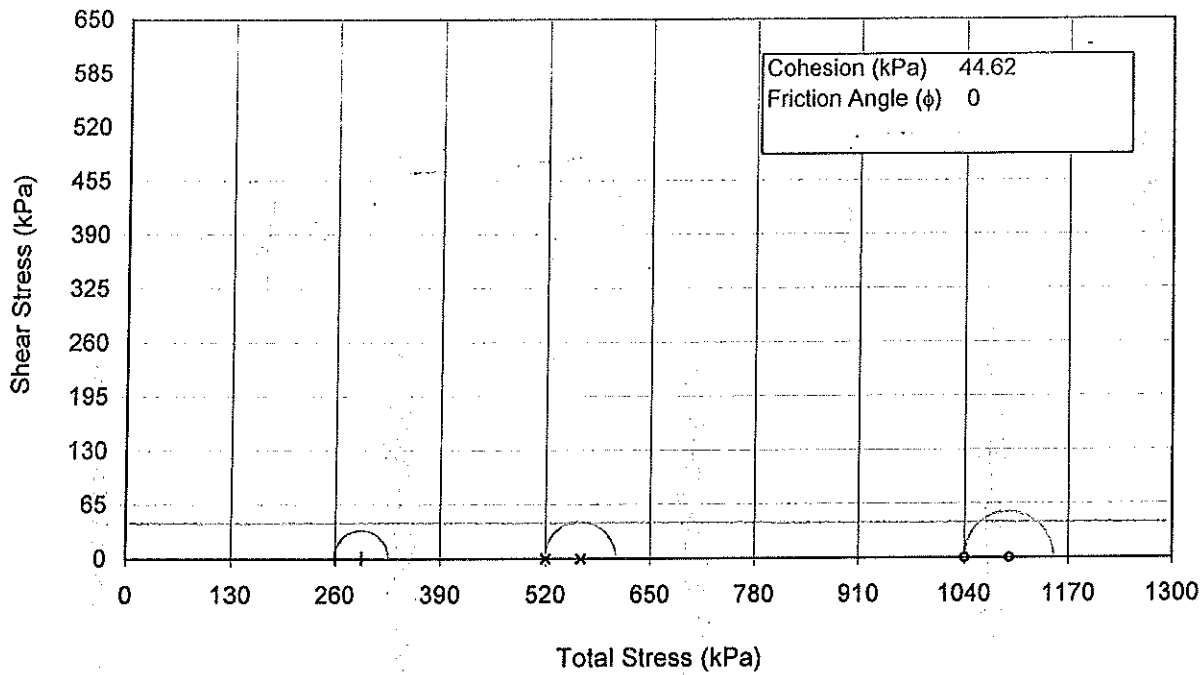
Sample : UD10
Borehole : BH33
Approved
Lee Kai Hing

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

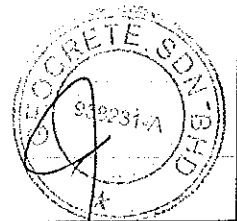
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 06.01.19

Sample : UD10
Borehole : BH33

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 33 / D 14 (36.00 m)

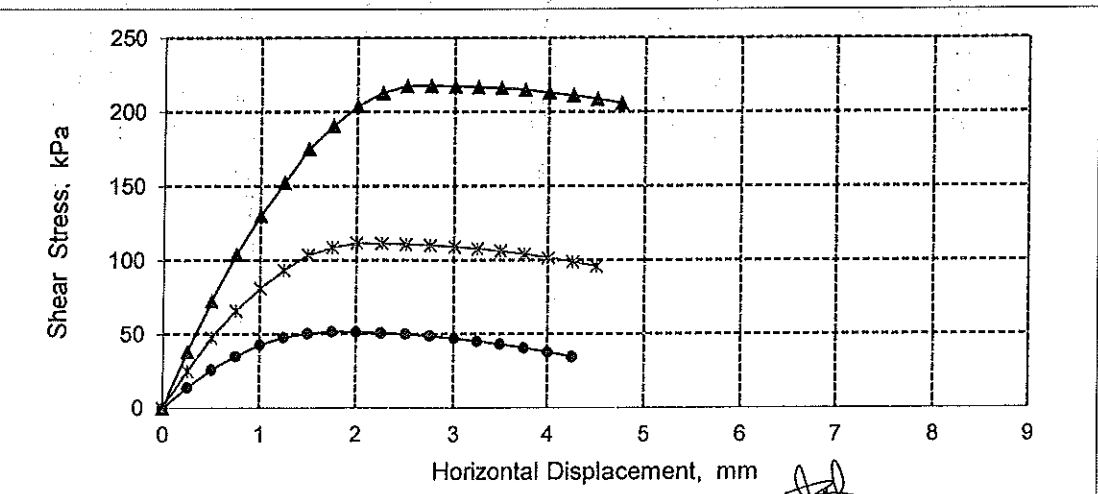
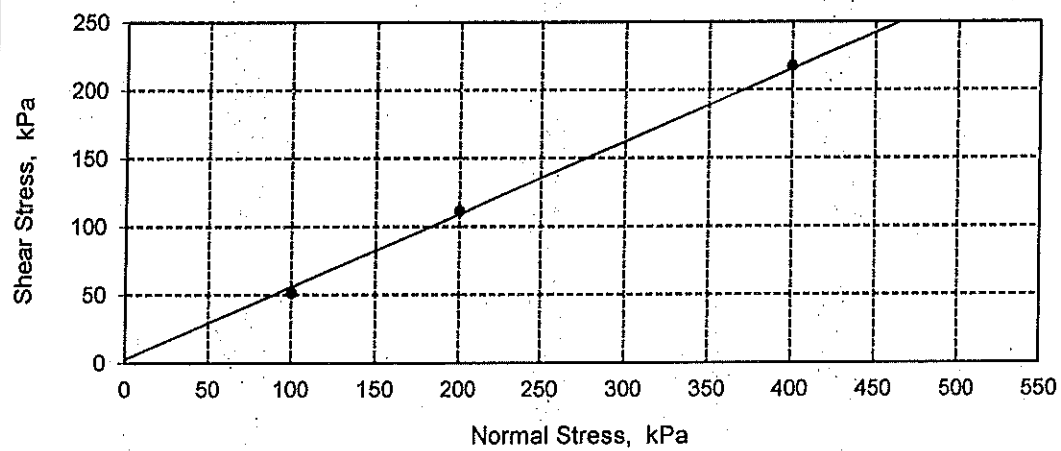
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 10 / 1 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		145.8	145.2	145.5
Moisture Content (%)		14.7	15.1	14.5
Bulk Density (Mg/m ³)		2.025	2.017	2.021
Dry Density (Mg/m ³)		1.765	1.752	1.765
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		51.7	111.5	217.8
Displ. at Failure (mm)		1.8	2.0	2.5
Settlement (mm)		0.2	0.4	0.7

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 33 / D 20 (45.00 m)

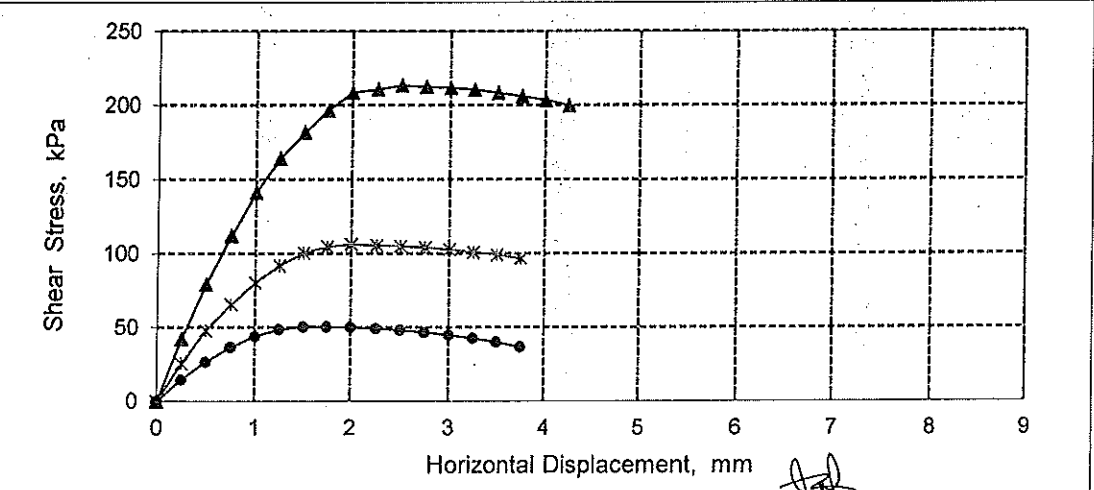
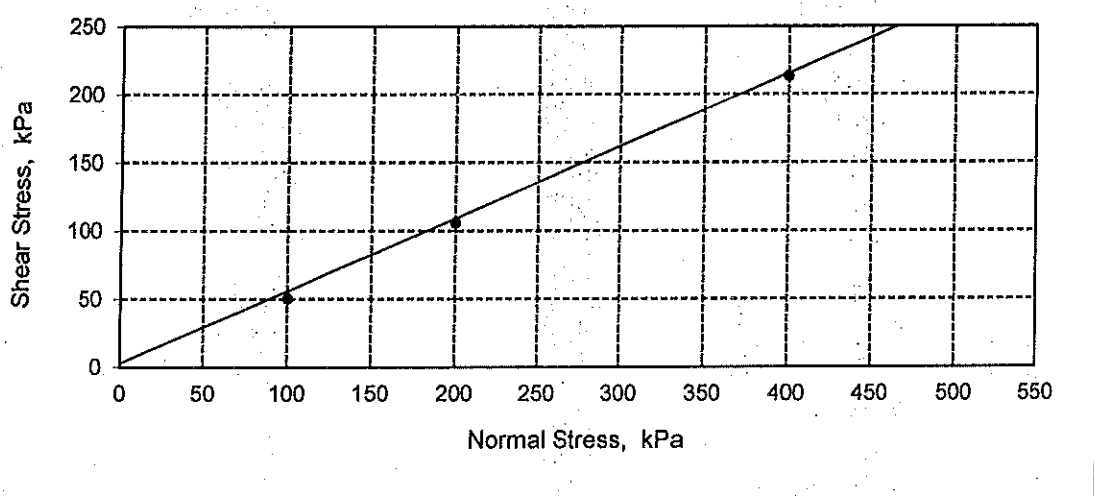
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 10 / 1 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		145.3	145.1	145.7
Moisture Content (%)		18.5	17.5	18.4
Bulk Density (Mg/m ³)		2.018	2.015	2.024
Dry Density (Mg/m ³)		1.703	1.715	1.709

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		50.6	106.1	213.5
Displ. at Failure (mm)		1.5	2.0	2.5
Settlement (mm)		0.2	0.3	0.5

	c' 3 kPa
	φ' 28 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.	BH33 / UD10 / 30.00m	Test Started	03.01.19
Soil Description	Grey sandy CLAY	Ring No.	A4

BEFORE TEST

Moist. Content from trimmings:	=	40 %	SG (Measured)	=	2.680
Wt of sample + Ring	=	122.30 gm	Diameter (D)	=	50 mm
Wt of Ring	=	59.13 gm	Area (A)	=	1964 mm ²
Wt of sample	=	63.17 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	45.93 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	17.24 gm	Bulk Density (P)	=	1.608 Mg/m ³
Initial Moisture Content, M ₀	=	38 %	Dry Density (PD)	=	1.169 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.2923			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	78 %			
V. Ratio Change Factor F, $\frac{1+e_0}{H}$	=	0.1146 mm ⁻¹			
Height of Solid H _s	=	8.725 mm			

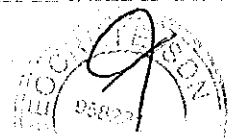
AFTER TEST

Wt of sample + Ring	=	119.85 gm	Overall settlement	=	2.428 mm
Wt of Dry sample + Ring	=	105.06 gm	Volume Change	=	4.769 cm ³
Wt of Ring	=	59.13 gm	Final Volume	=	34.52 cm ³
Wt of Wet sample	=	60.72 gm	Final Bulk Density	=	1.759 Mg/m ³
Wt of Dry sample	=	45.93 gm	Final Dry Density	=	1.331 Mg/m ³
Wt of Moisture	=	14.79 gm	Final Void Ratio, e _f	=	1.0140
Final Moisture Content, M _f	=	32 %			
Final Saturation, S _f , $\frac{M_f \times SG}{e_f}$	=	85 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



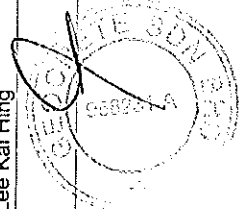
ONE DIMENSIONAL CONSOLIDATION TEST

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	BH33 / UD10 / 30.00m	Test started	03.01.19
		Ring No.	A4

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)	$\Delta e = F \times \Delta H$	$e = e_0 - e_t$	de	dp kN/m ²	Mv (M ² /MIN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	Cc	
0	20.000	0.000	0.0000	1.2923	0.0000	0					
12.5	19.588	0.412	0.0472	1.2451	0.0472	12.5	1.6839	1.44	30.20	-0.1569	
25.0	19.380	0.620	0.0711	1.2212	0.0238	12.5	0.8593	7.84	5.37	-0.0792	
50.0	19.026	0.974	0.1116	1.1807	0.0406	25.0	0.7448	1.96	20.88	-0.1348	
100	18.480	1.520	0.1742	1.1181	0.0626	50.0	0.5914	4.84	8.07	-0.2079	
200	17.820	2.180	0.2499	1.0424	0.0756	99.9	0.3707	1.21	30.22	-0.2513	
400	17.078	2.922	0.3349	0.9574	0.0850	199.8	0.2174	1.44	23.47	-0.2825	
200	17.136	2.864	0.3283	0.9641	-0.0066	-199.8					
50	17.376	2.624	0.3008	0.9916	-0.0275	-149.9					
12.5	17.572	2.428	0.2783	1.0140	-0.0225	-37.5					

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



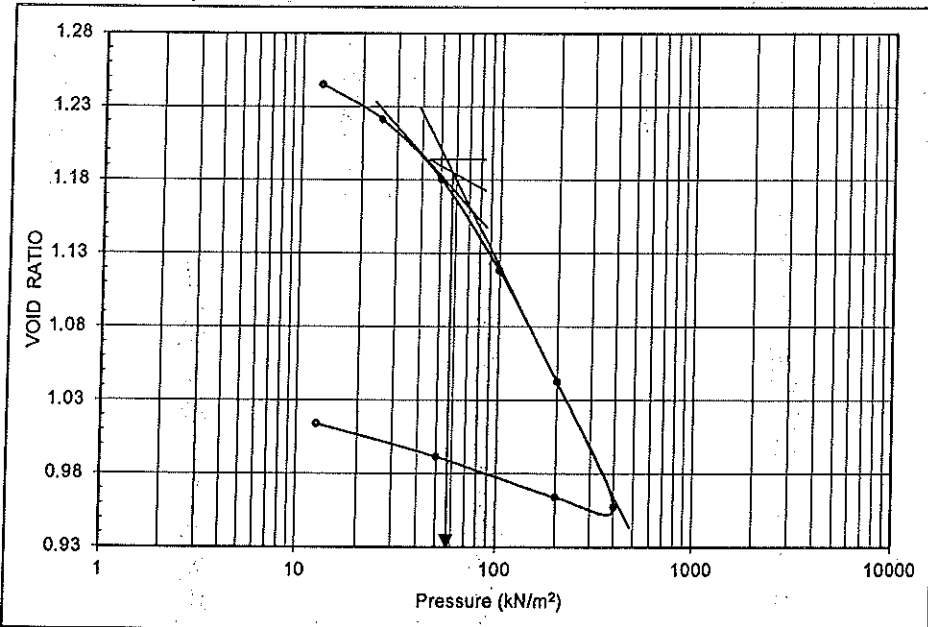
GEocrete SDN. BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

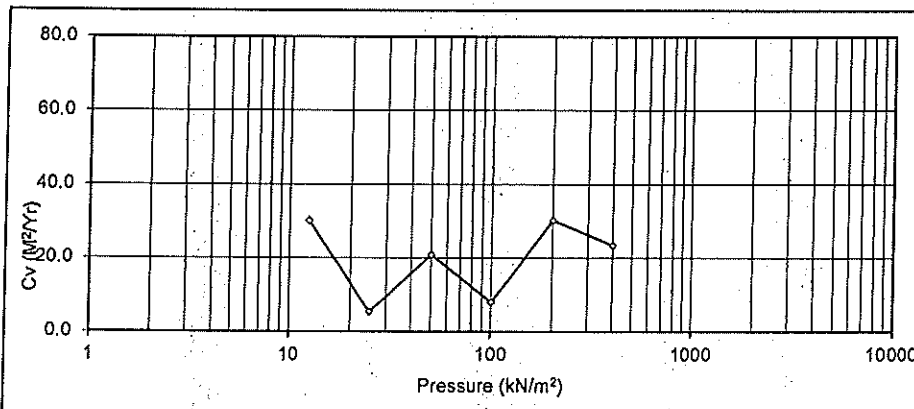
BH REF BH33 / UD10 / 30.00m
 SOIL SAMPLE Grey sandy CLAY

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. A4



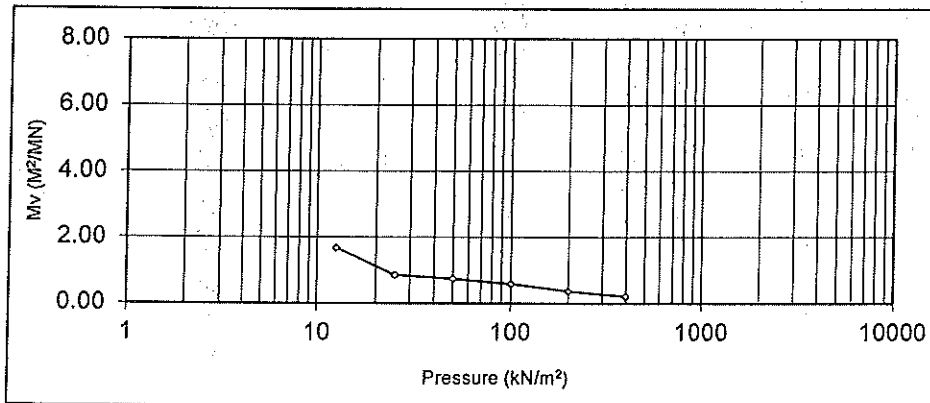
INITIAL

Water content	38	%
Dry Density	1.17	Mg/m ³
Void Ratio	1.2923	
Saturation	78	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.680	



FINAL

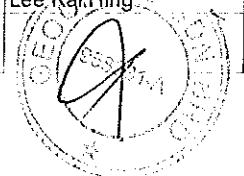
Water content	32	%
Dry Density	1.33	Mg/m ³
Void Ratio	1.0140	
Saturation	85	%
Height	18	mm
Comp. Index, C_c	0.2825	
Precons. Load	57	kN/m ²



Comp. Ratio, C_R 0.123

Operator Shyam Nath	Checked Chris
------------------------	------------------

Approved Lee Kai Hing



SUMMARY OF TEST RESULTS

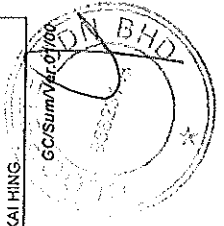
GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)		PROJECT :										PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU JINDAH, SELANGOR					REF : L/0817/18/139/18 DATE : 11.02.19										
SAMPLE AND SPECIMEN DETAILS		ATTERBERG LIMITS				SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CU TEST		UU Triaxial TEST		CONSOLIDATION TEST			CHEMICAL TEST						
		Dry Density (Mg/m3)	Bulk Density (Mg/m3)	Moisture Content (%)	Depth (m)	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	Soluble Sulphate (mg/L)	
BH34	UD1	3.00	1.35	40	1.79	1.11	51	21	30	12.2	39	29	32	0	2.65												
	UD2	6.00	1.65	50	1.72	1.26	58	24	34		44	33	18	5							0.248	1.1	0.08	0.47	7.5		
	UD4	12.00	1.72	31	1.69	1.12	38	21	17		27	16	57	0							0.350						
	UD6	18.00	1.69	60	1.12	1.12	71	28	43	14.7	54	31	15	0	2.62												
	D8	22.50	NA	33	NA	NA					43	29	28	0													
	D12	28.50	NA	25	NA	NA					39	30	26	5													
	D16	34.50	1.91	21	1.52						26	74	0	2.69													
	D19	39.00	NA	20	NA	NA					26	73	1														
	D22	43.50	NA	33	NA	NA					48	24	25	13													
	D26	49.50	NA	30	NA	NA					53	25	22	6	2.65												
	D29	54.00	NA	23	NA	NA					43	29	22	0													
	D33	60.00	NA	24	NA	NA					43	27	24	6													

Notes : 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

Checked by: CHRIS Approved by: LEE KAI HING



SUM

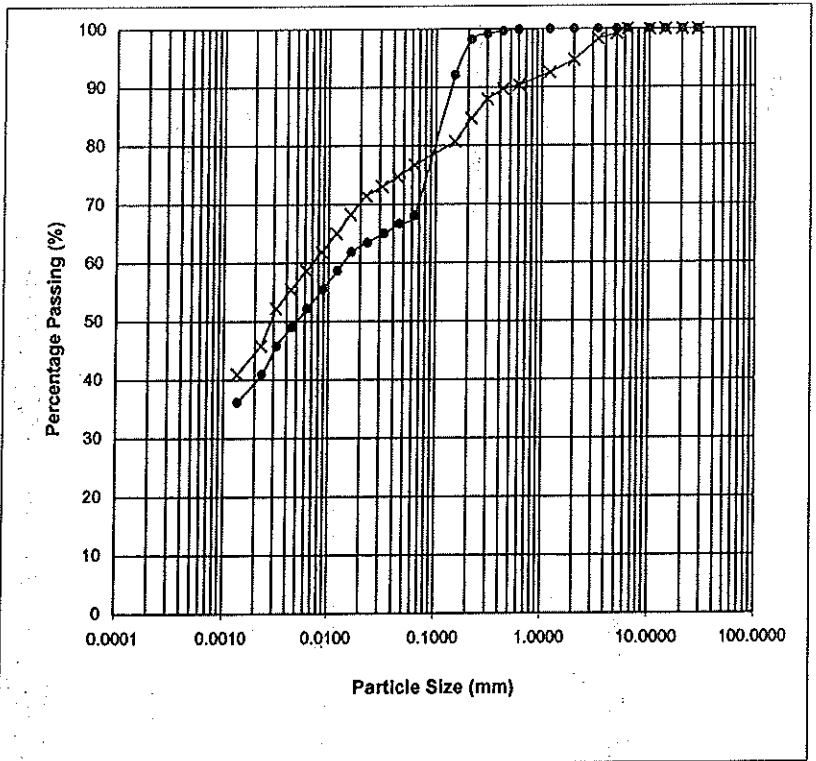
PARTICLE SIZE DISTRIBUTION

(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

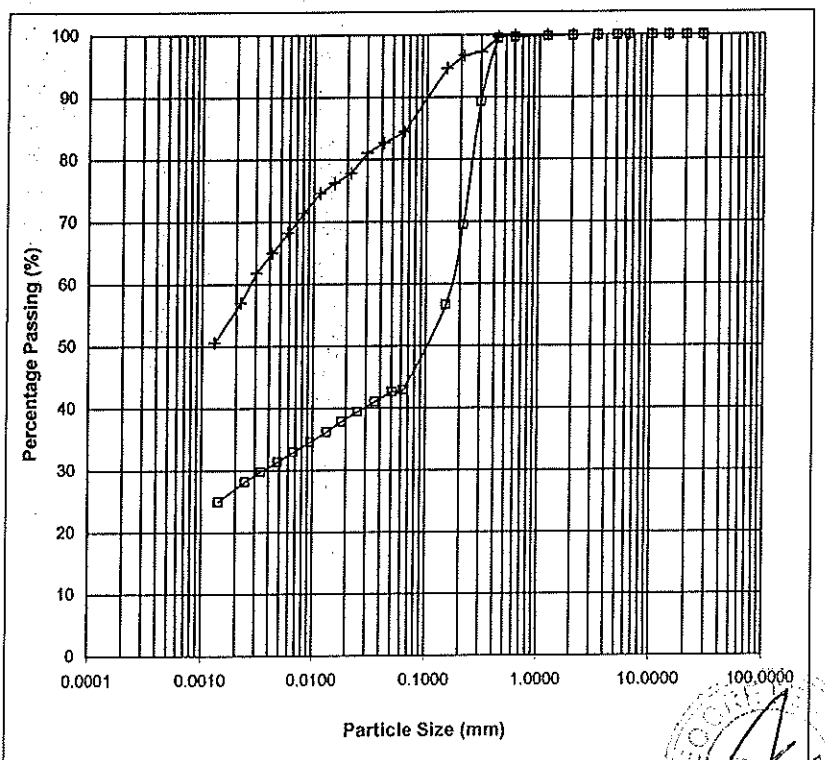
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	99	
3.35	100	3.35	98	
2.00	100	2.00	95	
1.18	100	1.18	93	
0.600	100	0.600	90	
0.425	100	0.425	90	
0.300	99	0.300	88	
0.212	98	0.212	85	
0.150	92	0.150	81	
0.063	68	0.063	77	
0.0456	67	0.0438	75	
0.0325	65	0.0312	73	
0.0231	63	0.0223	71	
0.0165	62	0.0160	68	
0.0122	59	0.0119	65	
0.0088	55	0.0085	62	
0.0063	52	0.0061	59	
0.0045	49	0.0044	55	
0.0032	46	0.0031	52	
0.0023	41	0.0023	46	
0.0014	36	0.0013	41	
Clay (%)		39	Clay (%)	44
Silt (%)		29	Silt (%)	33
Sand (%)		32	Sand (%)	18
Gravel (%)		0	Gravel (%)	5
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH34	UD1	3.00	31.01.19
x	BH34	UD2	6.00	31.01.19



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	89	0.300	97	
0.212	70	0.212	97	
0.150	57	0.150	95	
0.063	43	0.063	84	
0.0505	43	0.0420	83	
0.0360	41	0.0300	81	
0.0256	39	0.0215	78	
0.0182	38	0.0154	76	
0.0134	36	0.0113	75	
0.0095	35	0.0081	71	
0.0068	33	0.0058	68	
0.0048	31	0.0042	65	
0.0034	30	0.0030	62	
0.0024	28	0.0022	57	
0.0014	25	0.0013	51	
Clay (%)		27	Clay (%)	54
Silt (%)		16	Silt (%)	31
Sand (%)		57	Sand (%)	15
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH34	UD4	12.00	31.01.19
+	BH34	UD6	18.00	31.01.19



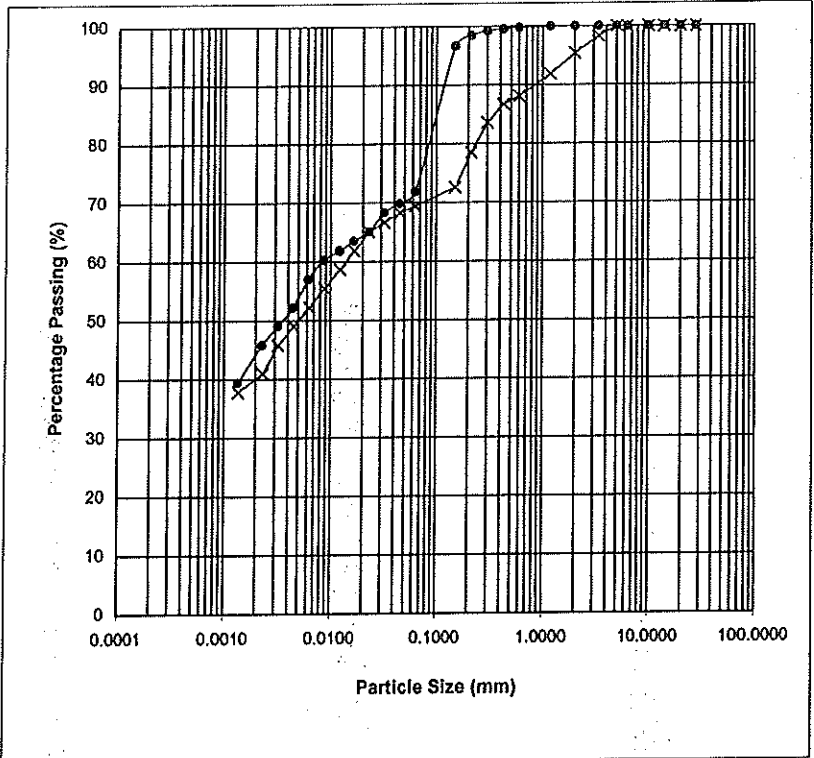
PARTICLE SIZE DISTRIBUTION

(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

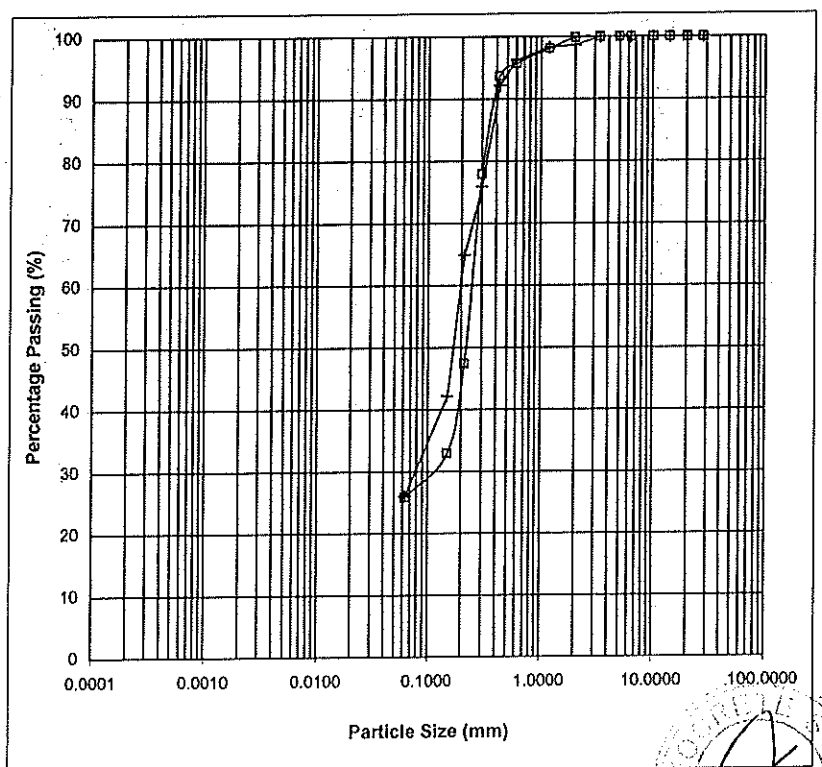
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	98	
2.00	100	2.00	95	
1.18	100	1.18	92	
0.600	100	0.600	88	
0.425	100	0.425	87	
0.300	99	0.300	84	
0.212	98	0.212	79	
0.150	97	0.150	73	
0.063	72	0.063	69	
0.0449	70	0.0452	68	
0.0320	68	0.0322	67	
0.0230	65	0.0230	65	
0.0164	63	0.0165	62	
0.0120	62	0.0122	59	
0.0086	60	0.0088	55	
0.0061	57	0.0063	52	
0.0044	52	0.0045	49	
0.0032	49	0.0032	46	
0.0023	46	0.0023	41	
0.0013	39	0.0014	38	
Clay (%)		43	Clay (%)	39
Silt (%)		29	Silt (%)	30
Sand (%)		28	Sand (%)	26
Gravel (%)		0	Gravel (%)	5
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH34	D8	22.50	31.01.19
x	BH34	D12	28.50	31.01.19



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	99	
1.18	98	1.18	98	
0.600	96	0.600	96	
0.425	94	0.425	92	
0.300	78	0.300	76	
0.212	47	0.212	65	
0.150	33	0.150	42	
0.063	26	0.063	26	
Clay (%)		26	Clay (%)	26
Silt (%)			Silt (%)	
Sand (%)		74	Sand (%)	73
Gravel (%)		0	Gravel (%)	1
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH34	D16	34.50	31.01.19
+	BH34	D19	39.00	31.01.19



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

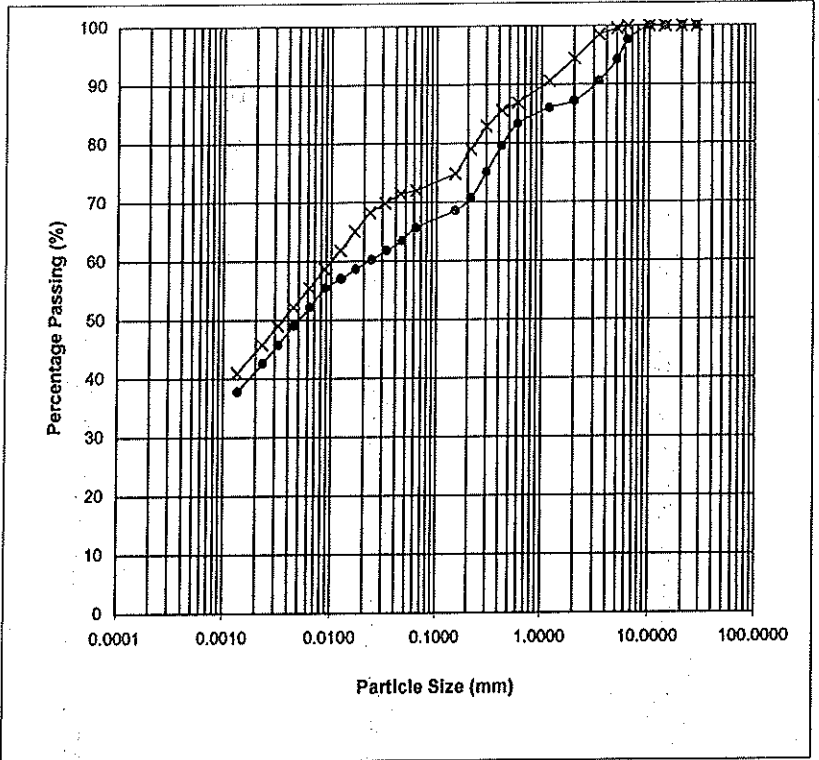
PARTICLE SIZE DISTRIBUTION

(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

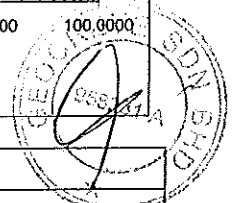
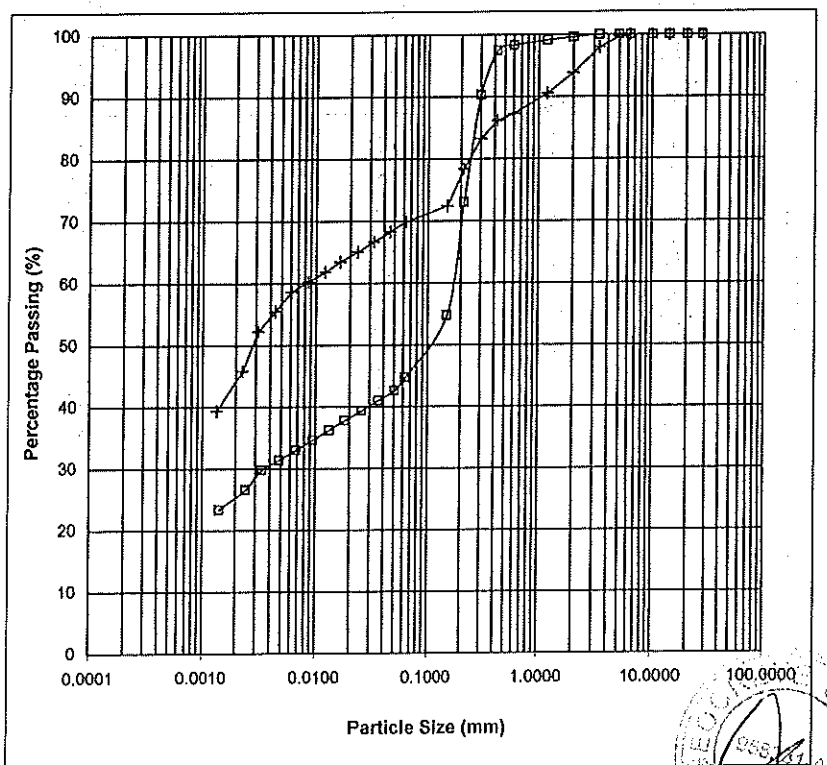
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	98	6.30	100
5.00	94	5.00	100
3.35	91	3.35	99
2.00	87	2.00	94
1.18	86	1.18	91
0.600	83	0.600	87
0.425	80	0.425	86
0.300	75	0.300	83
0.212	71	0.212	79
0.150	69	0.150	75
0.083	66	0.083	72
0.0463	63	0.0445	71
0.0330	62	0.0317	70
0.0235	60	0.0226	68
0.0167	59	0.0162	65
0.0123	57	0.0120	62
0.0088	55	0.0086	59
0.0063	52	0.0062	55
0.0045	49	0.0044	52
0.0032	46	0.0032	49
0.0023	43	0.0023	46
0.0014	38	0.0013	41
Clay (%)		40	Clay (%) 43
Silt (%)		25	Silt (%) 29
Sand (%)		22	Sand (%) 22
Gravel (%)		13	Gravel (%) 6
Total (%)		100	Total (%) 100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH34	D22	43.50	31.01.19
x	BH34	D26	49.50	31.01.19



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	98
2.00	100	2.00	94
1.18	99	1.18	91
0.600	98	0.600	87
0.425	97	0.425	86
0.300	90	0.300	83
0.212	73	0.212	78
0.150	55	0.150	72
0.063	45	0.063	70
0.0505	43	0.0452	68
0.0360	41	0.0322	67
0.0256	39	0.0230	65
0.0182	38	0.0164	63
0.0134	36	0.0120	62
0.0095	35	0.0086	60
0.0068	33	0.0061	59
0.0048	31	0.0044	55
0.0034	30	0.0031	52
0.0024	27	0.0023	46
0.0014	23	0.0013	39
Clay (%)		25	Clay (%) 43
Silt (%)		20	Silt (%) 27
Sand (%)		55	Sand (%) 24
Gravel (%)		0	Gravel (%) 6
Total (%)		100	Total (%) 100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH34	D29	54.00	31.01.19
+	BH34	D33	60.00	31.01.19



GEocrete SDN BHD (Company No. 958231-A)	Tested :	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 34 / D 16 (34.50 m)

Test Size : 60 mm x 60 mm x 20 mm

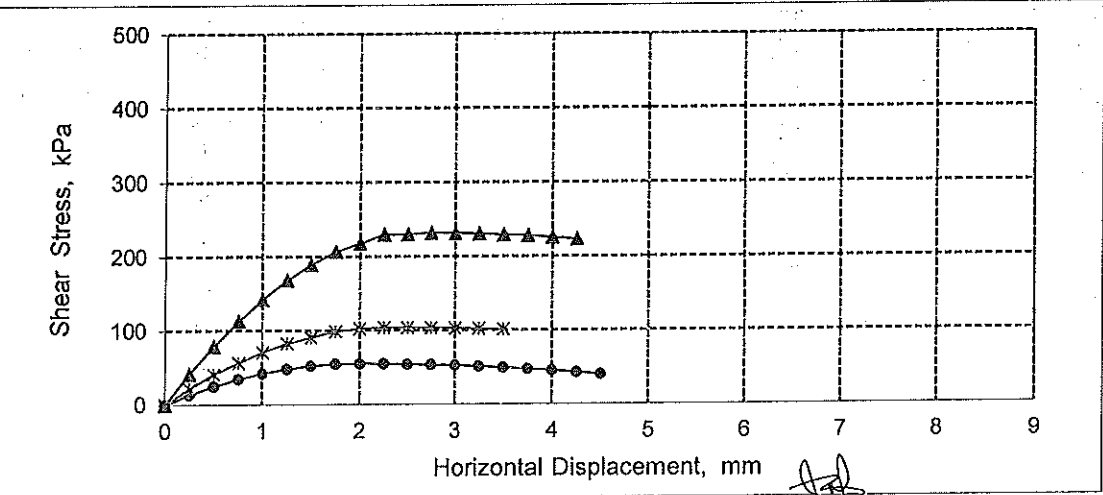
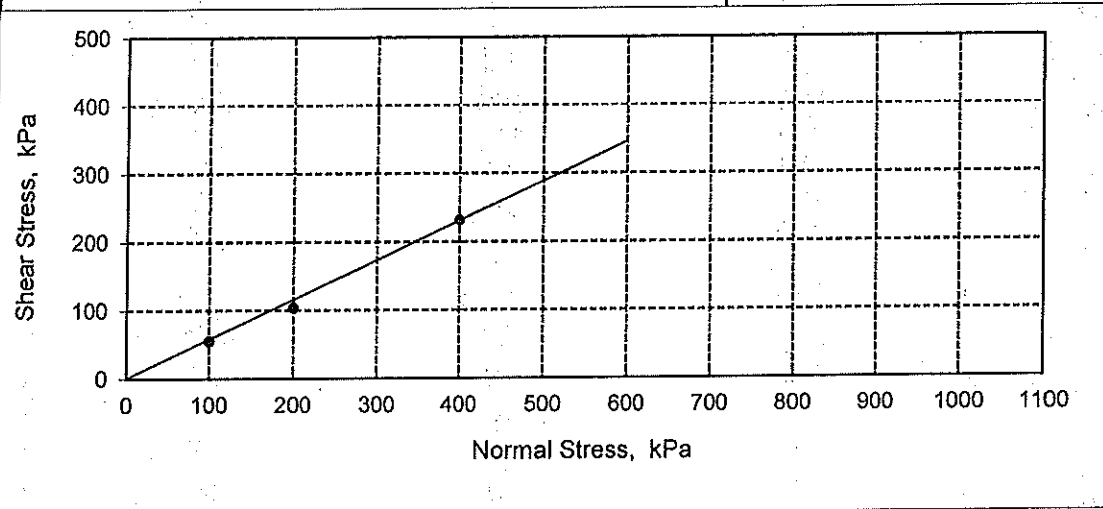
Date Tested : 11 / 2 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		138.7	137.4	137.5
Moisture Content (%)		25.6	25.7	25.6
Bulk Density (Mg/m ³)		1.926	1.909	1.910
Dry Density (Mg/m ³)		1.533	1.519	1.521

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		55.2	104.0	231.9
Displ. at Failure (mm)		2.0	2.3	2.8
Settlement (mm)		0.1	0.2	0.4

$c' = 1 \text{ kPa}$

$\phi' = 30 \text{ deg.}$



Total Stress Triaxial Compression

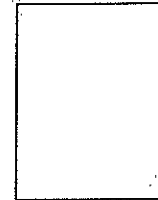
Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Greenish grey sandy CLAY

Sketch showing specimen location in original sample

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)	152.16	154.25	157.12
Bulk Density ρ (Mg/m ³)	1.766	1.791	1.824
Particle Density ρ_s	2.65	2.65	2.65

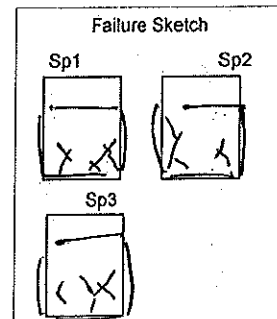


Initial Conditions

	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 %	33	32	31
Dry Density ρ_{d0} (Mg/m ³)	1.32	1.35	1.39
Voids Ratio e_0	1.00	0.96	0.91
Deg of Saturation S_0 %	88.29	89.22	91.13

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	27.65	59.09	145.41
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	27.45	58.89	145.21
Strain at Failure ϵ_f %	12.50	13.03	11.51
Shear Strength c_u (kPa)	13.83	29.55	72.70
Moisture Content w_f %	33	32	31
Dry Density ρ_{df} (Mg/m ³)	1.32	1.35	1.39
Voids Ratio e_f	1.00	0.96	0.91
Deg of Saturation S_f %	88.29	89.22	91.13



Notes : Intermediate Intermediate Intermediate

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

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

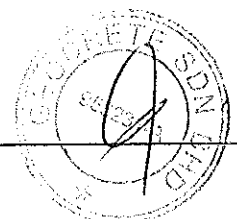
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator : Shyam Nath
 Checked : Chris

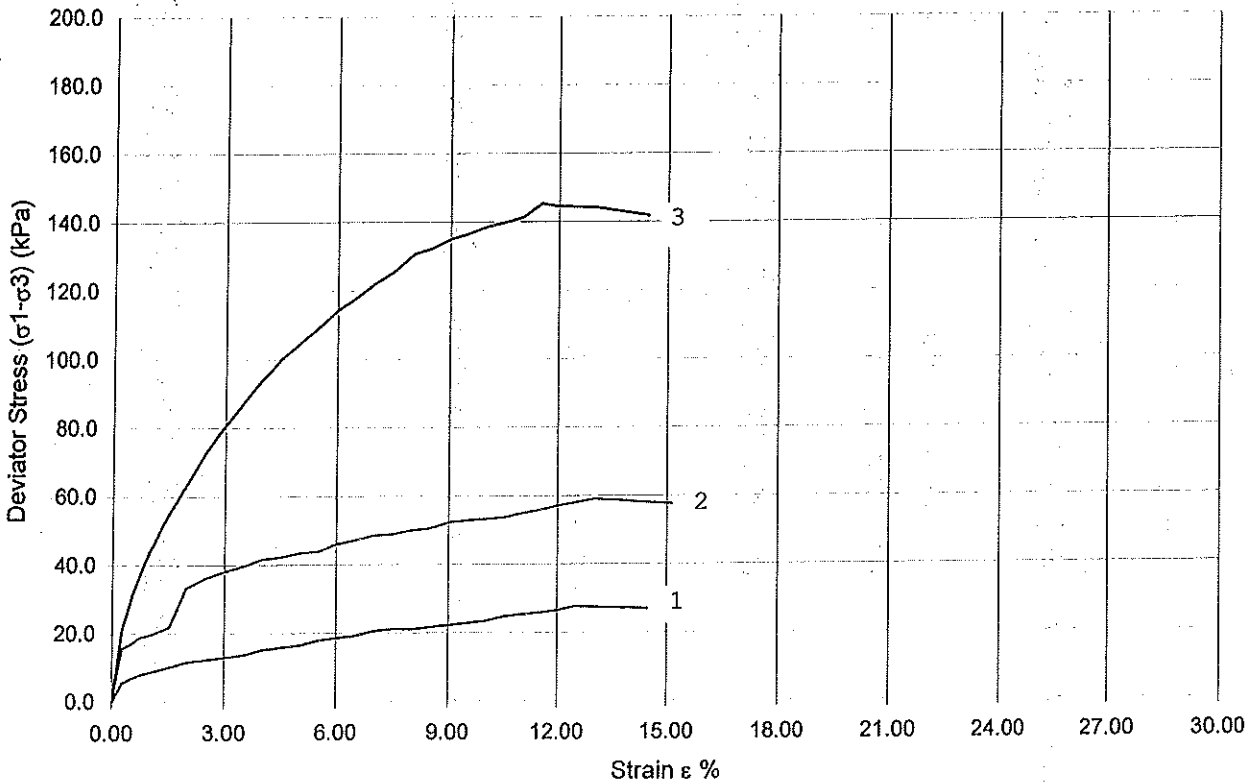
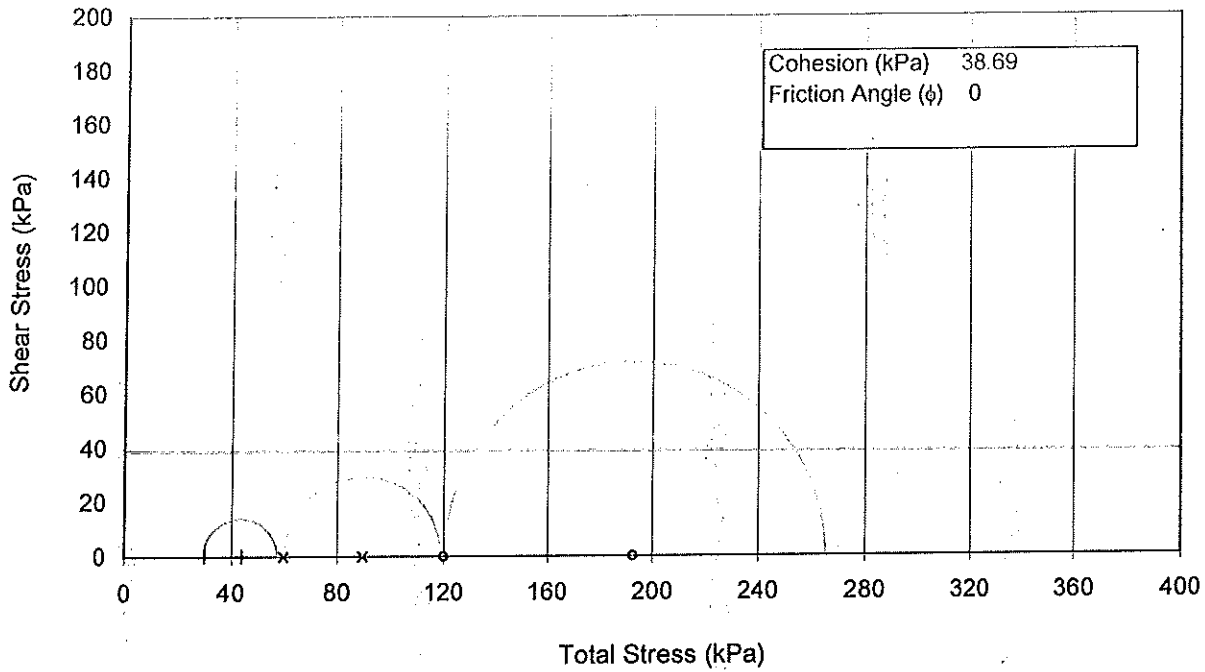
Test Name : UU

Date of Test : 01.02.19

Sample : UD1
 Borehole : BH34
 Approved : Lee Kai Hing

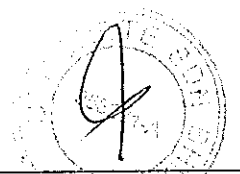


Total Stress Triaxial Compression Unconsolidated Undrained



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 : 01.02.19
 Sample : UD1
 Borehole : BH34
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

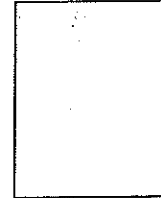
Unconsolidated Undrained

Sample details

Depth : 12.00m
 Description : Greenish 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)	147.05	148.52	150.14
Bulk Density ρ (Mg/m ³)	1.707	1.724	1.743
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)	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
--------------	-------	-------	-------

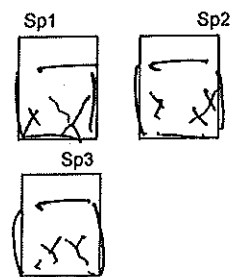
Moisture Content w_0 %	37	36	33
Dry Density ρ_{d0} (Mg/m ³)	1.25	1.26	1.31
Voids Ratio e_0	1.14	1.12	1.05
Deg of Saturation S_0 %	85.63	87.03	84.94

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	43.34	49.93	66.76
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	43.14	49.73	66.56
Strain at Failure ϵ_f %	11.51	10.99	11.97
Shear Strength c_u (kPa)	21.67	24.97	33.38

Moisture Content w_f %	37	36	33
Dry Density ρ_{df} (Mg/m ³)	1.25	1.26	1.31
Voids Ratio e_f	1.14	1.12	1.05
Deg of Saturation S_f %	85.63	87.03	84.94

Failure Sketch



Notes : Intermediate Intermediate Intermediate

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

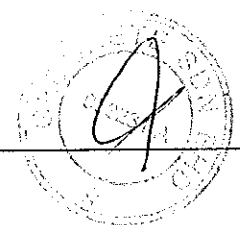
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator
 Shyam Nath

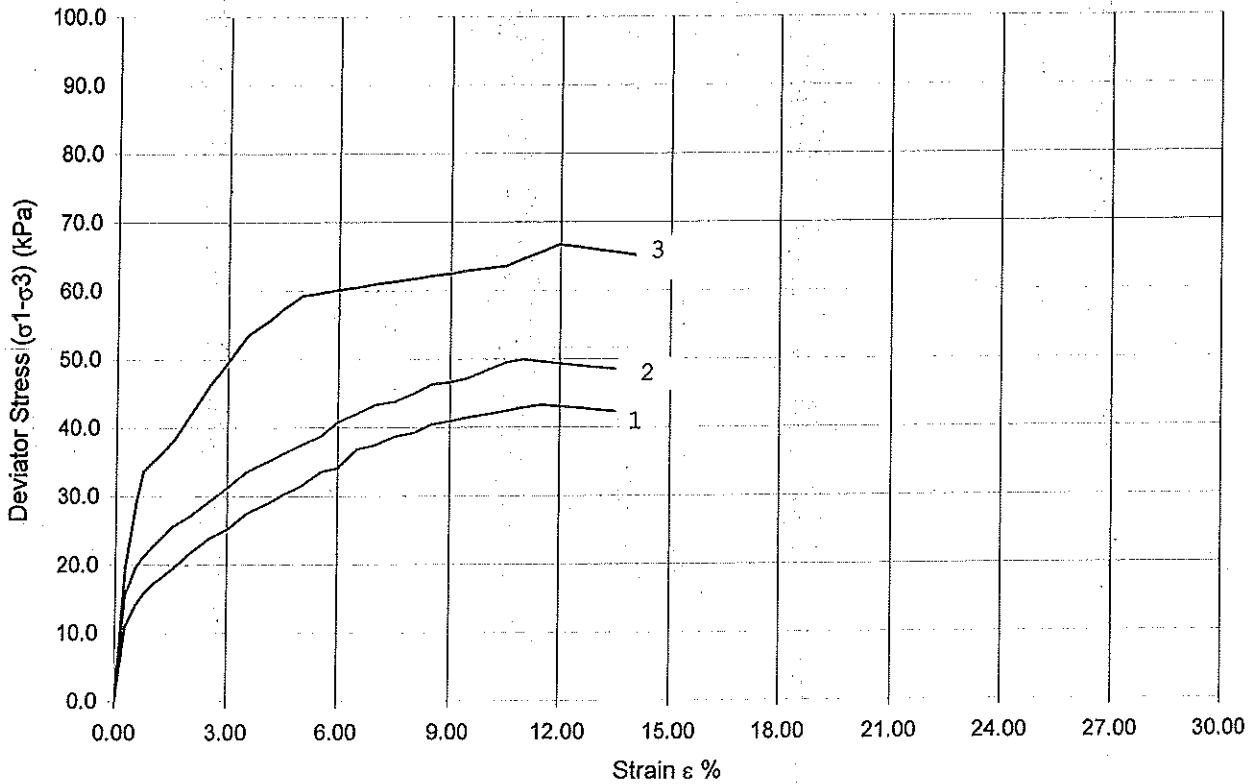
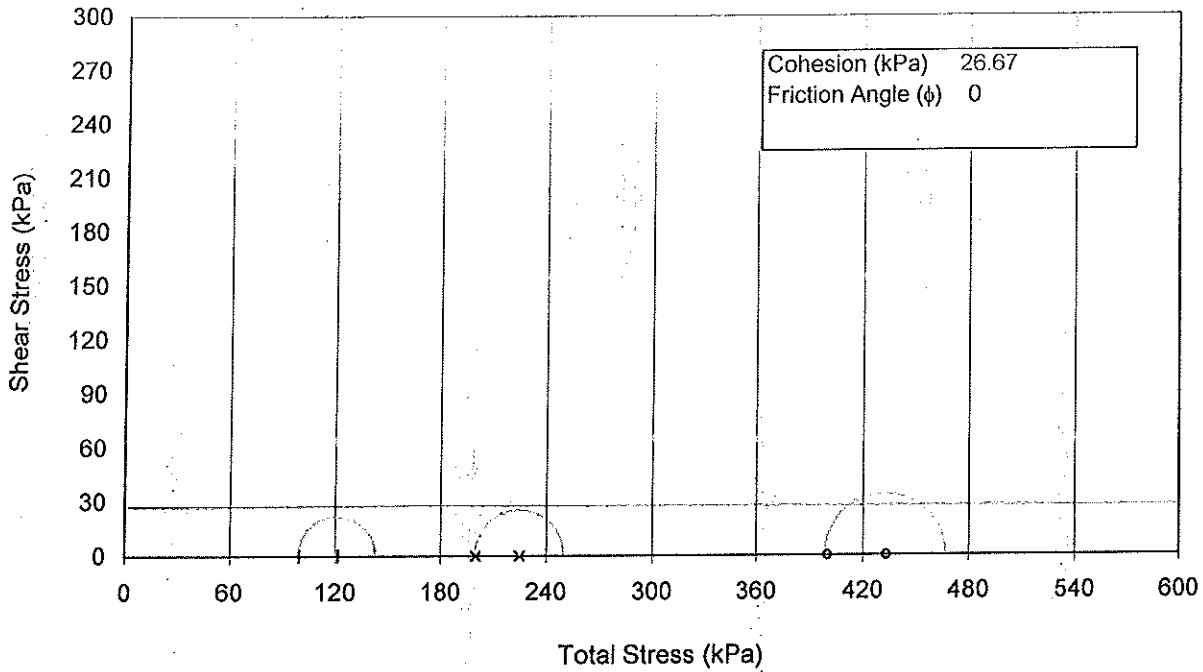
Checked
 Chris

Test Name : UU
 Date of Test : 01.02.19

Sample : UD4
 Borehole : BH34
 Approved
 Lee Kai Hing

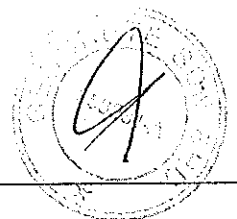


Total Stress Triaxial Compression Unconsolidated Undrained



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 : 01.02.19
 Sample : UD4
 Borehole : BH34
 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	09.02.19
Sample No.	BH34 / UD1 / 3.00m	Test Started	29.01.19
Soil Description	Greenish grey sandy CLAY	Ring No.	5

BEFORE TEST

Moist. Content from trimmings:	=	41 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	122.04 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.34 gm	Area (A)	=	1964 mm ²
Wt of sample	=	63.7 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	45.88 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	17.82 gm	Bulk Density (P)	=	1.621 Mg/m ³
Initial Moisture Content, M _o	=	39 %	Dry Density (PD)	=	1.168 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.2691			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	81 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1135 mm ⁻¹			
Height of Solid H _s	=	8.814 mm			

AFTER TEST

Wt of sample + Ring	=	120.10 gm	Overall settlement	=	2.182 mm
Wt of Dry sample + Ring	=	104.22 gm	Volume Change	=	4.286 cm ³
Wt of Ring	=	58.34 gm	Final Volume	=	35.00 cm ³
Wt of Wet sample	=	61.76 gm	Final Bulk Density	=	1.765 Mg/m ³
Wt of Dry sample	=	45.88 gm	Final Dry Density	=	1.311 Mg/m ³
Wt of Moisture	=	15.88 gm	Final Void Ratio, e _f	=	1.0216
Final Moisture Content, M _f	=	35 %			
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

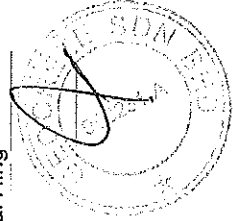
BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
Sample No BH34 / UD1 / 3.00m

Date of Report 09.02.19
Test started 29.01.19
Ring No. 5

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)	
0	0.000	0.0000	1.2691	0.0000	0			
12.5	0.346	0.0393	1.2299	0.0393	12.5	1.4094	1.69	25.82
25.0	0.516	0.0585	1.2106	0.0193	12.5	0.6985	1.00	42.51
50.0	0.850	0.0964	1.1727	0.0379	25.0	0.6982	1.44	28.76
100	1.320	0.1498	1.1194	0.0533	50.0	0.5036	1.21	32.82
200	1.944	0.2206	1.0486	0.0708	99.9	0.3459	1.44	26.01
400	2.602	0.2952	0.9739	0.0747	199.8	0.1892	3.24	10.77
200	2.542	0.2884	0.9807	-0.0068	-199.8			
50	2.362	0.2680	1.0011	-0.0204	-149.9			
12.5	2.182	0.2476	1.0216	-0.0204	-37.5			

Operator Shyam Nath
Checked Chris
Approved Lee Kai Hing



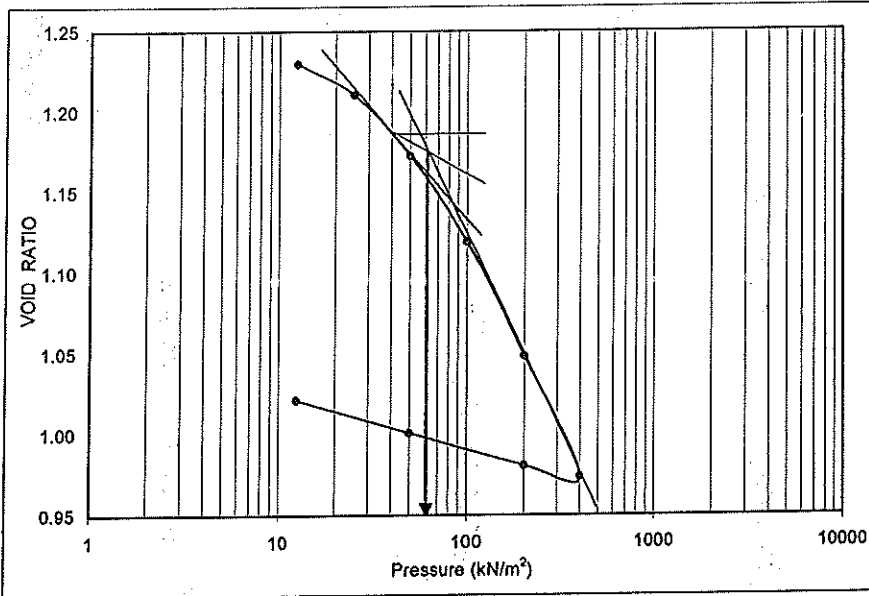
GEOCRETE SDN. BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

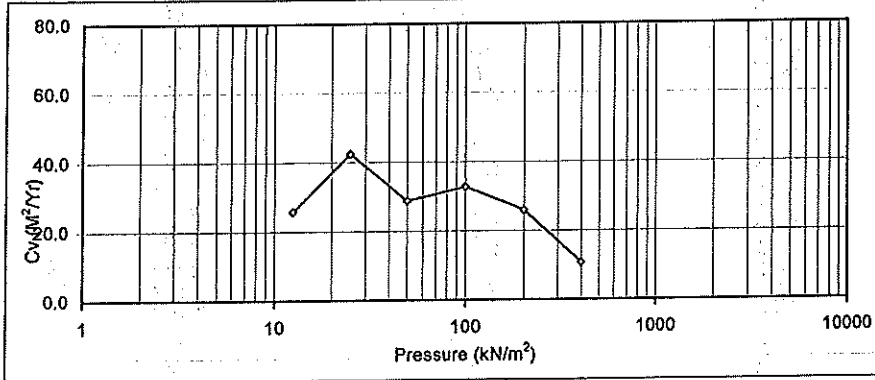
BH REF BH34 / UD1 / 3.00m
 SOIL SAMPLE Greenish grey sandy CLAY

Date of Report 09.02.19
 Test started 29.01.19
 Ring No. 5



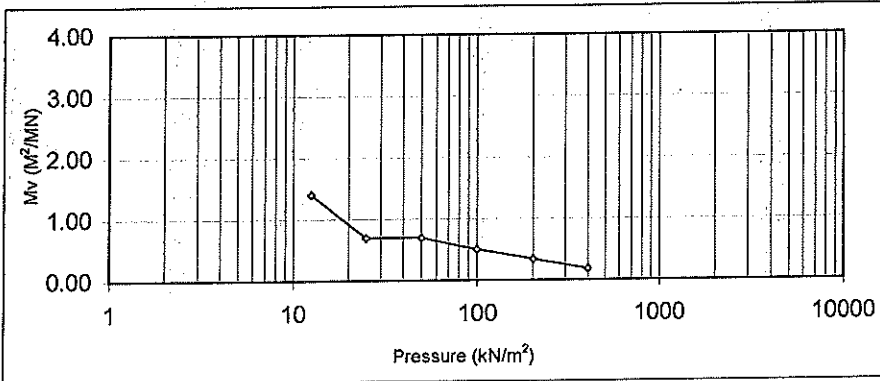
INITIAL

Water content	39	%
Dry Density	1.17	Mg/m ³
Void Ratio	1.2691	
Saturation	81	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.650	

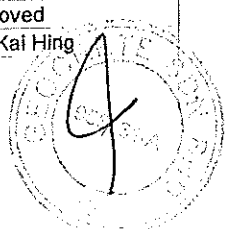


FINAL

Water content	35	%
Dry Density	1.31	Mg/m ³
Void Ratio	1.0216	
Saturation	90	%
Height	18	mm
Comp. Index, C _c	0.2480	
Precons. Load	60	kN/m ²



Comp. Ratio, C_R 0.109



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	09.02.19
Sample No.	BH34 / UD4 / 12.00m	Test Started	29.01.19
Soil Description	Greenish grey sandy CLAY	Ring No.	6

BEFORE TEST

Moist. Content from trimmings:	=	53 %	SG (Measured)	=	2.680
Wt of sample + Ring	=	124.08 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.41 gm	Area (A)	=	1964 mm ²
Wt of sample	=	62.67 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	41.43 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.24 gm	Bulk Density (P)	=	1.595 Mg/m ³
Initial Moisture Content, M_o	=	51 %	Dry Density (PD)	=	1.055 Mg/m ³
Initial Void Ratio, e_o , $\frac{SG}{P_D} - 1$	=	1.5413			
Initial Saturation, S_o ; $\frac{M_o \times SG}{e_o}$	=	89 %			
V. Ratio Change Factor F_v , $\frac{H}{1+e_o}$	=	0.1271 mm ⁻¹			
Height of Solid H_s	=	7.870 mm			

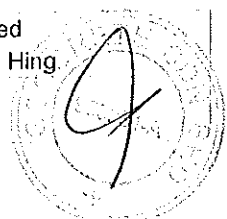
AFTER TEST

Wt of sample + Ring	=	120.75 gm	Overall settlement	=	2.274 mm
Wt of Dry sample + Ring	=	102.84 gm	Volume Change	=	4.467 cm ³
Wt of Ring	=	61.41 gm	Final Volume	=	34.82 cm ³
Wt of Wet sample	=	59.34 gm	Final Bulk Density	=	1.704 Mg/m ³
Wt of Dry sample	=	41.43 gm	Final Dry Density	=	1.190 Mg/m ³
Wt of Moisture	=	17.91 gm	Final Void Ratio, e_f	=	1.2523
Final Moisture Content, M_f	=	43 %			
Final Saturation, S_o , $\frac{M_f \times SG}{e_f}$	=	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

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No

BH34 / UD4 / 12.00m

Date of Report

09.02.19

Test started

29.01.19

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 ₅₀ (min)	Cv for t ₅₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.5413	0.0000	0				
6.25	0.192	19.808	0.0244	1.5169	0.0244	6.25	1.5521	1.96	22.44	-0.0811
12.5	0.366	19.634	0.0465	1.4948	0.0221	6.25	1.4190	1.00	43.17	-0.0735
25.0	0.648	19.352	0.0823	1.4590	0.0358	12.5	1.1667	1.21	34.86	-0.1190
50.0	1.140	18.860	0.1449	1.3964	0.0625	25.0	1.0443	1.21	33.49	-0.2077
100	1.968	18.032	0.2501	1.2912	0.1052	50.0	0.9191	1.21	31.21	-0.3495
200	2.780	17.220	0.3532	1.1881	0.1032	99.9	0.4719	1.44	23.95	-0.3428
100	2.686	17.314	0.3413	1.2000	-0.0119	-99.9				
50	2.496	17.504	0.3172	1.2241	-0.0241	-50.0				
12.5	2.274	17.726	0.2889	1.2523	-0.0282	-37.5				

Operator

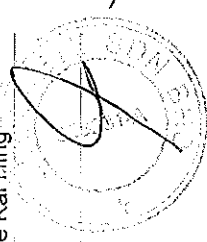
Shyam Nath

Checked

Chris

Approved

Lee Kai Hing



GEocrete SDN. BHD.

(Co. No. 958231-A)

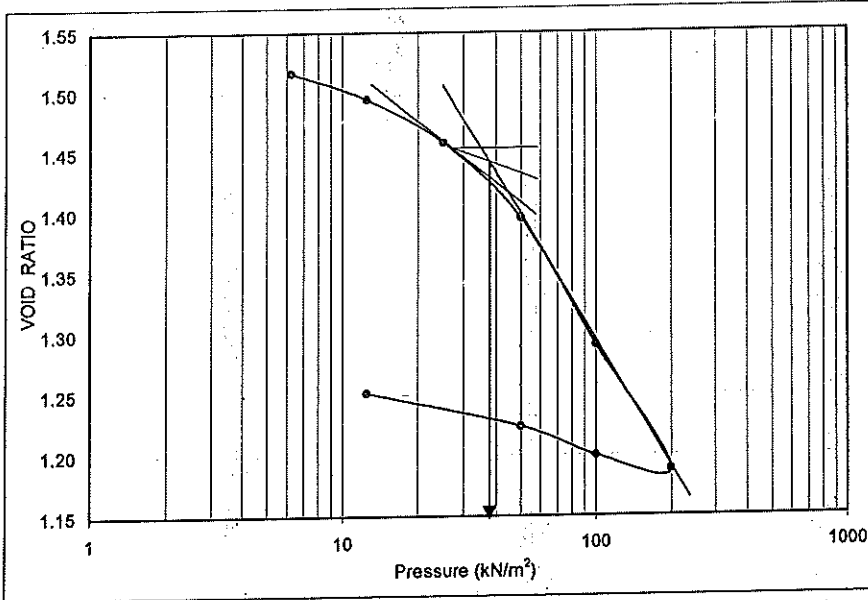
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH34 / UD4 / 12.00m

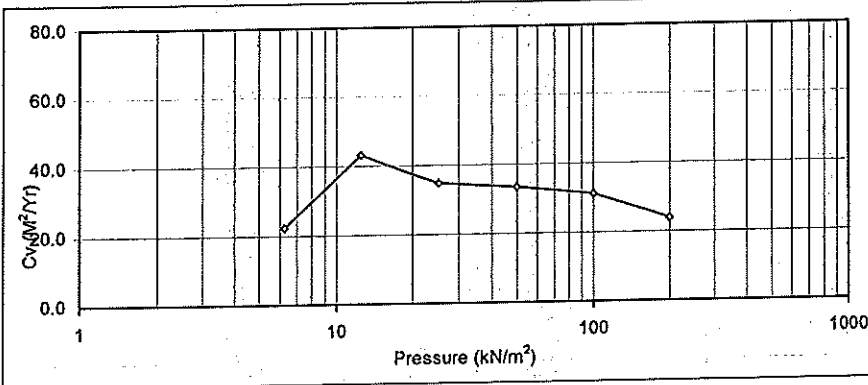
SOIL SAMPLE Greenish grey sandy CLAY

Date of Report 09.02.19
 Test started 29.01.19
 Ring No. 6



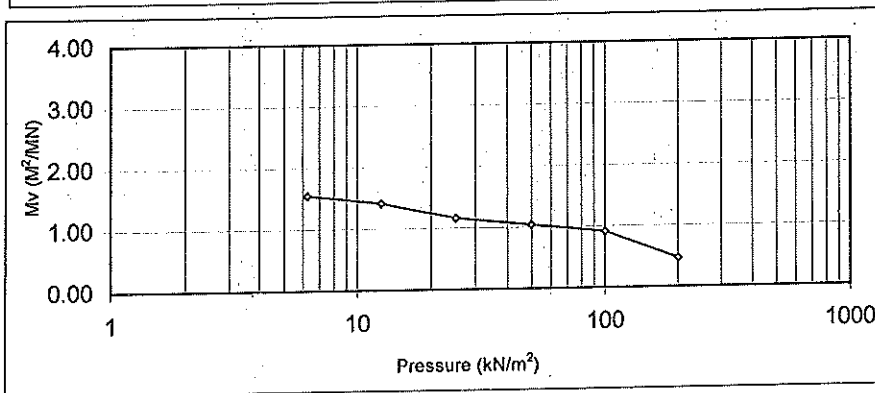
INITIAL

Water content	51	%
Dry Density	1.05	Mg/m ³
Void Ratio	1.5413	
Saturation	89	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.680	



FINAL

Water content	43	%
Dry Density	1.19	Mg/m ³
Void Ratio	1.2523	
Saturation	93	%
Height	18	mm
Comp. Index, Cc	0.3495	
Precons. Load	38	kN/m ²

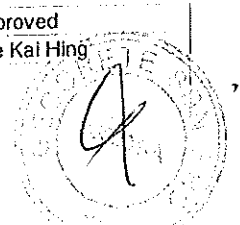


Comp. Ratio, C_R 0.138

Operator
 Shyam Nath

Checked
 Chris

Approved
 Lee Kai Hing

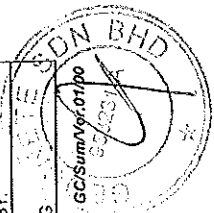


SUMMARY OF TEST RESULTS

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 : L081/18/139/18 DATE : 08.02.19											
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				
		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)	Cc	Pe (kPa)	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)	
BH35	UD1	20	2.06	1.72	NA	NA	NP	22	78	0	2.70	NA	NA	NA	NA	NA	NA	NA	1.1	0.06	0.23	7.6			
	UD3	30	1.91	1.42	38	20	18	22	16	62	0														
	UD5	80	1.66	0.92	53	26	27	47	36	17	0														
	UD7	71	1.70	1.23	50	25	25	44	37	19	0	2.61	11.74	0	25	0.296	7.6			2.1	0.14	0.63			
	D10	33	NA	NA				28	18	54	0														
	D14	18	1.73	1.35			NP	23	77	0	2.70	3	30				1.4	0.10	0.39	7.8					
	D18	33	NA	NA				21	15	64	0														
	D20	29	NA	NA				25	75	0															
	D23	34	NA	NA	45	22	23	41	31	28	0	2.63													
	D26	44	NA	NA				53	31	16	0									1.6	0.13	0.55	7.5		
	D28	42	NA	NA	52	23	29	48	34	18	0														
	D33	16	NA	NA				22	66	12	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. * BH35 UD1 - TRIAXIAL (UU) & CONSOLIDATION TESTS CANNOT BE CARRIED OUT DUE TO NON-PLASTICITY NATURE OF SPECIMEN. (NP)

Checked by: CHRIS
 Approved by: LEE KAI HING



SLUM

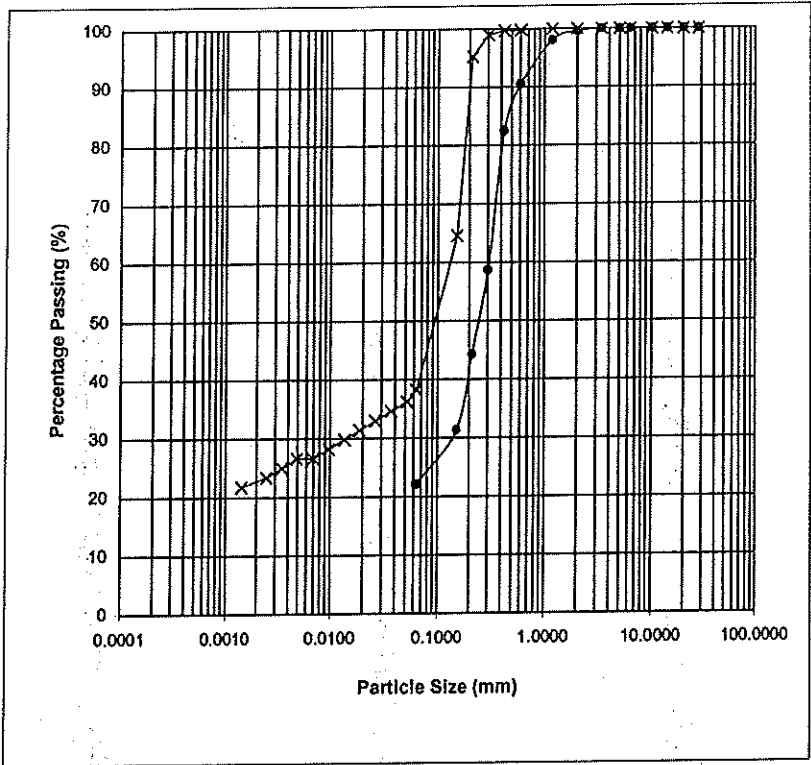
PARTICLE SIZE DISTRIBUTION

(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

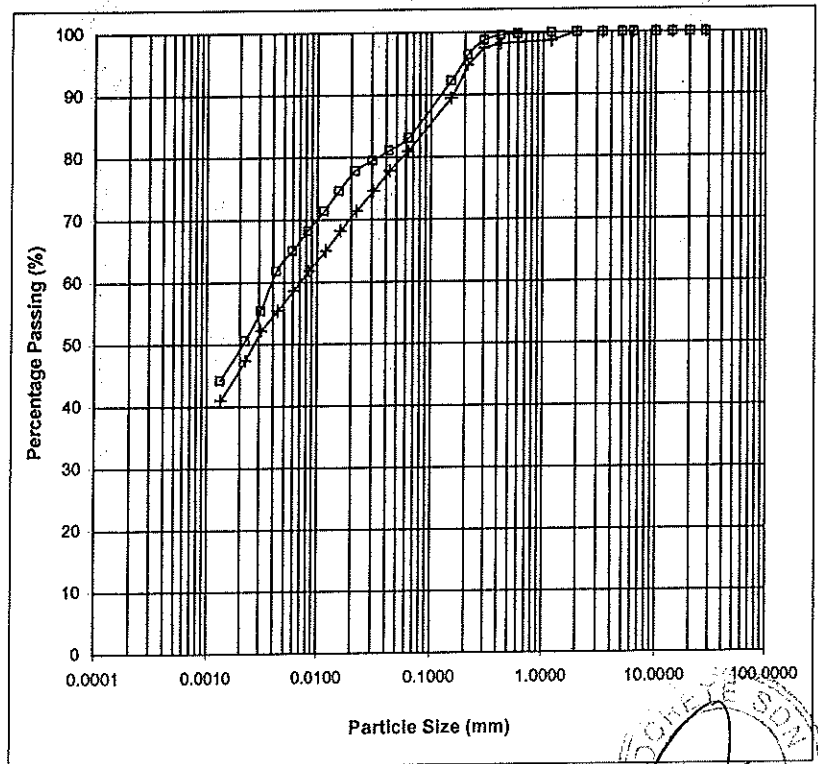
Particle Size Distribution			
●		x	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	98	1.18	100
0.600	91	0.600	100
0.425	83	0.425	100
0.300	59	0.300	99
0.212	44	0.212	95
0.150	31	0.150	65
0.063	22	0.063	38
		0.0518	36
		0.0368	35
		0.0262	33
		0.0188	31
		0.0137	30
		0.0097	28
		0.0069	27
		0.0049	27
		0.0035	25
		0.0025	23
		0.0014	22
Clay (%)	22	Clay (%)	22
Silt (%)		Silt (%)	16
Sand (%)	78	Sand (%)	62
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH35	UD1	3.00	30.01.19
x	BH35	UD3	9.00	30.01.19



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	99
0.600	100	0.600	98
0.425	100	0.425	98
0.300	99	0.300	98
0.212	96	0.212	95
0.150	92	0.150	89
0.063	83	0.063	81
0.0424	81	0.0431	78
0.0302	79	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	55	0.0031	52
0.0022	51	0.0023	47
0.0013	44	0.0013	41
Clay (%)	47	Clay (%)	44
Silt (%)	36	Silt (%)	37
Sand (%)	17	Sand (%)	19
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH35	UD5	15.00	30.01.19
+	BH35	UD7	21.00	30.01.19



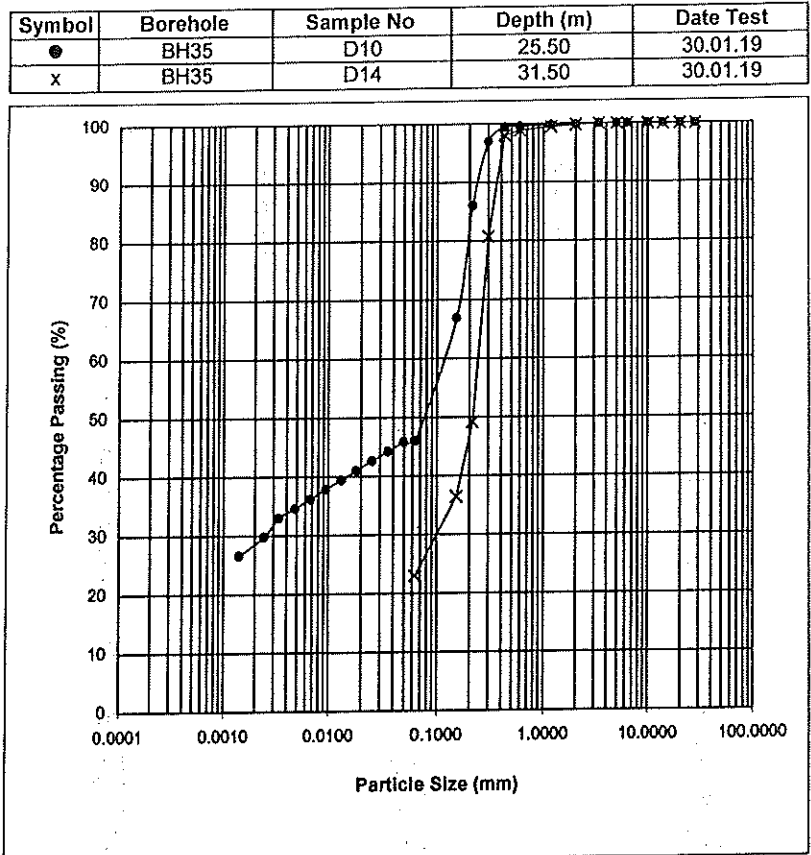
GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved	
	Lee Kai Hing					

PARTICLE SIZE DISTRIBUTION

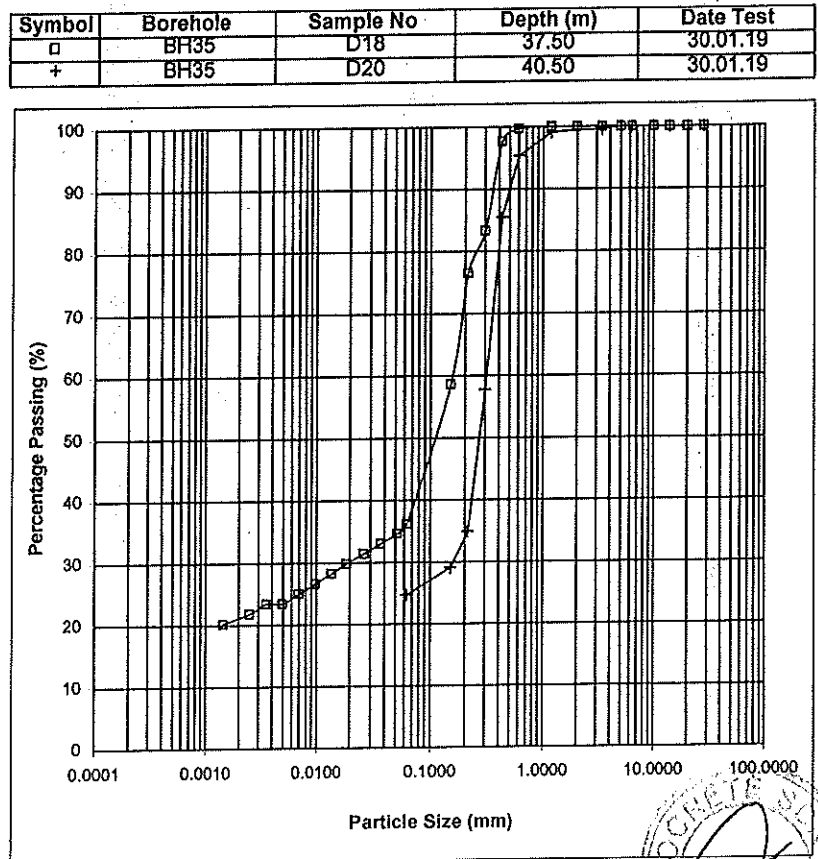
(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

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	99
0.600	100	0.600	99
0.425	99	0.425	98
0.300	97	0.300	81
0.212	86	0.212	49
0.150	67	0.150	36
0.063	46	0.063	23
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 (%)	28	Clay (%)	23
Silt (%)	18	Silt (%)	
Sand (%)	54	Sand (%)	77
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	99
1.18	100	1.18	99
0.600	100	0.600	95
0.425	98	0.425	85
0.300	83	0.300	58
0.212	77	0.212	35
0.150	59	0.150	29
0.063	36	0.063	25
0.0521	35		
0.0370	33		
0.0263	31		
0.0187	30		
0.0138	28		
0.0098	27		
0.0070	25		
0.0049	23		
0.0035	23		
0.0025	22		
0.0014	20		
Clay (%)	21	Clay (%)	25
Silt (%)	15	Silt (%)	
Sand (%)	64	Sand (%)	75
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100



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

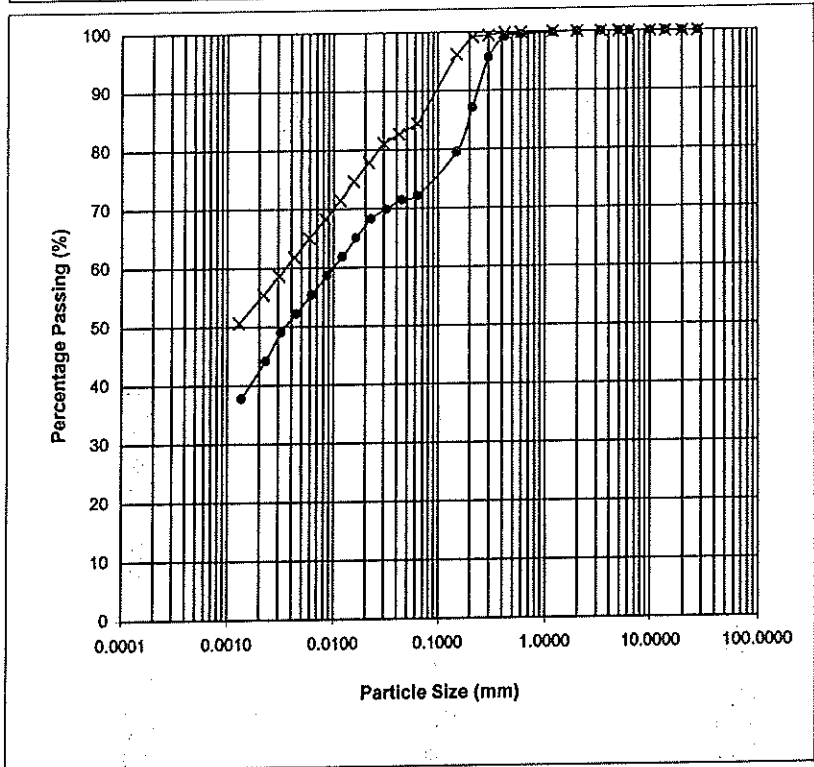
PARTICLE SIZE DISTRIBUTION

(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

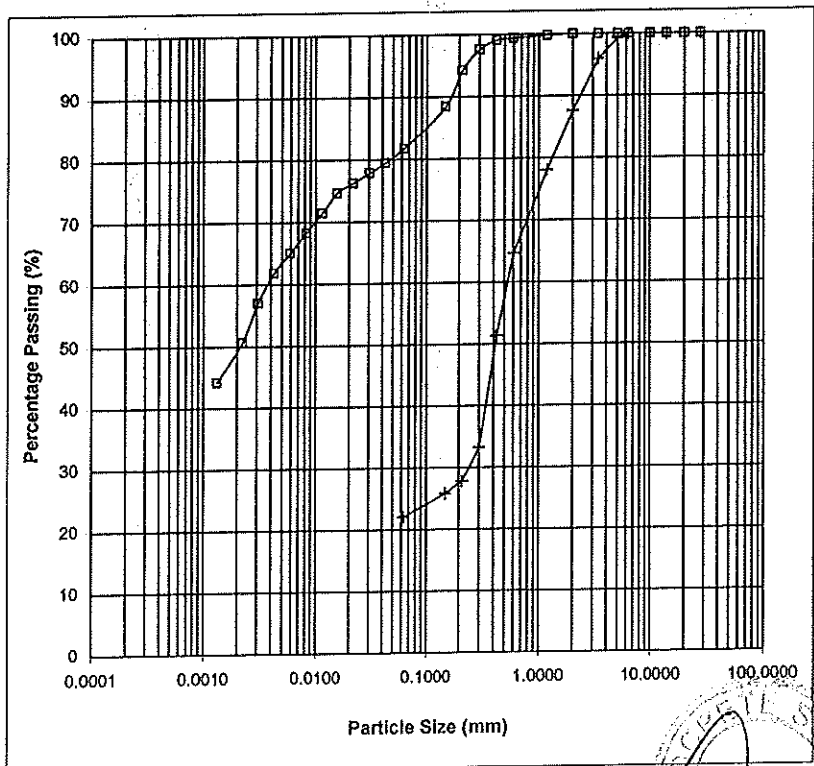
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	99	0.425	100
0.300	96	0.300	99
0.212	87	0.212	99
0.150	80	0.150	96
0.063	72	0.063	84
0.0445	71	0.0420	83
0.0317	70	0.0300	81
0.0226	68	0.0215	78
0.0162	65	0.0155	75
0.0120	62	0.0115	71
0.0086	59	0.0083	68
0.0062	55	0.0059	65
0.0044	52	0.0043	62
0.0032	49	0.0031	59
0.0023	44	0.0022	55
0.0014	38	0.0013	51
Clay (%)	41	Clay (%)	53
Silt (%)	31	Silt (%)	31
Sand (%)	28	Sand (%)	16
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH35	D23	45.00	30.01.19
X	BH35	D26	49.50	30.01.19



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	96
2.00	100	2.00	88
1.18	100	1.18	78
0.600	99	0.600	65
0.425	99	0.425	51
0.300	98	0.300	33
0.212	94	0.212	28
0.150	88	0.150	26
0.063	82	0.063	22
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	57		
0.0022	51		
0.0013	44		
Clay (%)	48	Clay (%)	22
Silt (%)	34	Silt (%)	
Sand (%)	18	Sand (%)	66
Gravel (%)	0	Gravel (%)	12
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH35	D28	52.50	30.01.19
+	BH35	D33	60.00	30.01.19



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

Total Stress Triaxial Compression

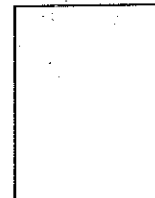
Unconsolidated Undrained

Sample details

Depth : 21.00m
 Description : Greenish 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)	144.08	146.05	147.14
Bulk Density ρ (Mg/m ³)	1.672	1.695	1.708
Particle Density ρ_s	2.61	2.61	2.61

Sketch showing specimen location in original sample



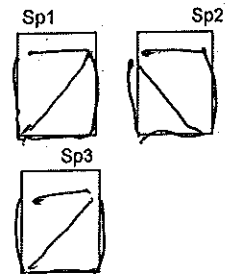
Initial Conditions

	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 %	39	38	36
Dry Density ρ_{d0} (Mg/m ³)	1.20	1.23	1.25
Voids Ratio e_0	1.18	1.12	1.09
Deg of Saturation S_0 %	87.49	88.18	87.69

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	15.76	25.25	29.40
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	15.56	25.05	29.20
Strain at Failure ϵ_f %	5.00	5.99	6.97
Shear Strength c_u (kPa)	7.88	12.63	14.70
Moisture Content w_f %	39	38	36
Dry Density ρ_{df} (Mg/m ³)	1.20	1.23	1.25
Voids Ratio e_f	1.18	1.12	1.09
Deg of Saturation S_f %	87.49	88.18	87.69

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

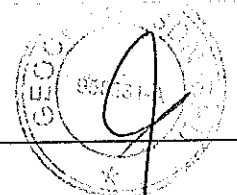
Date of Test :

30.01.19

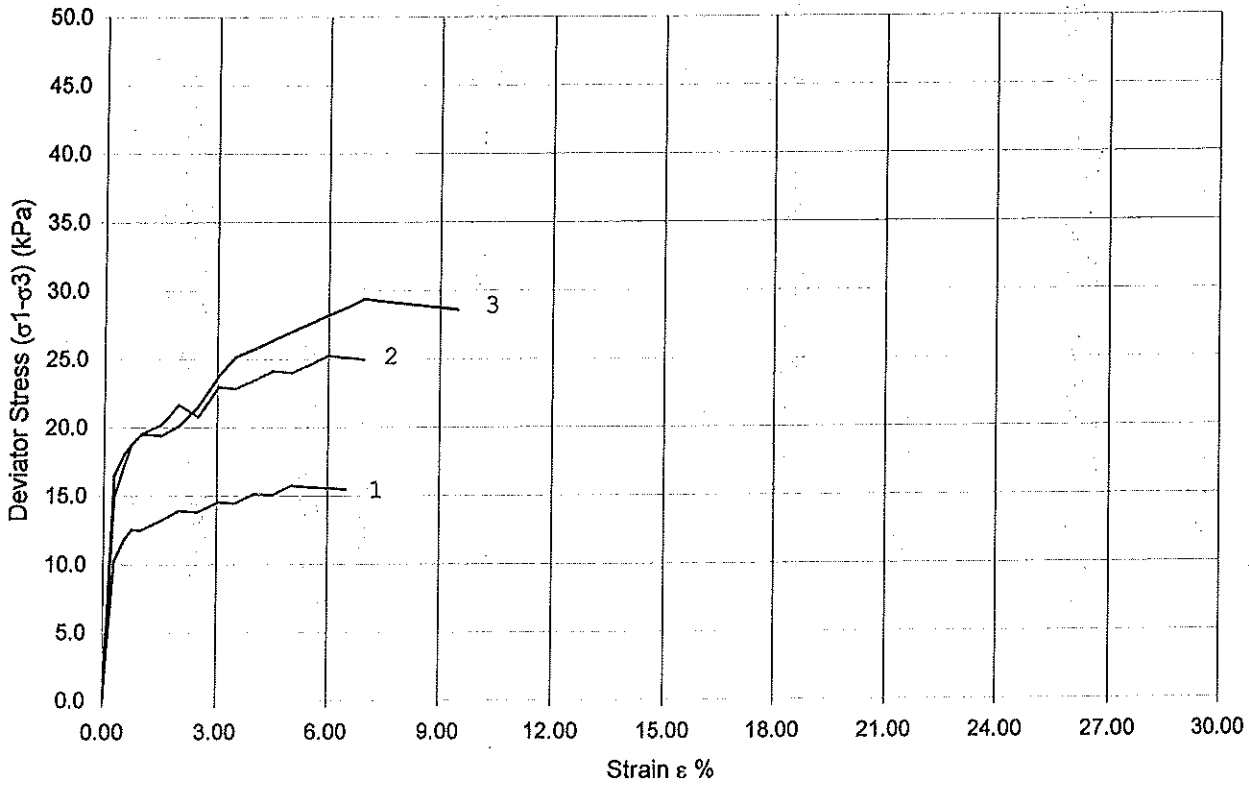
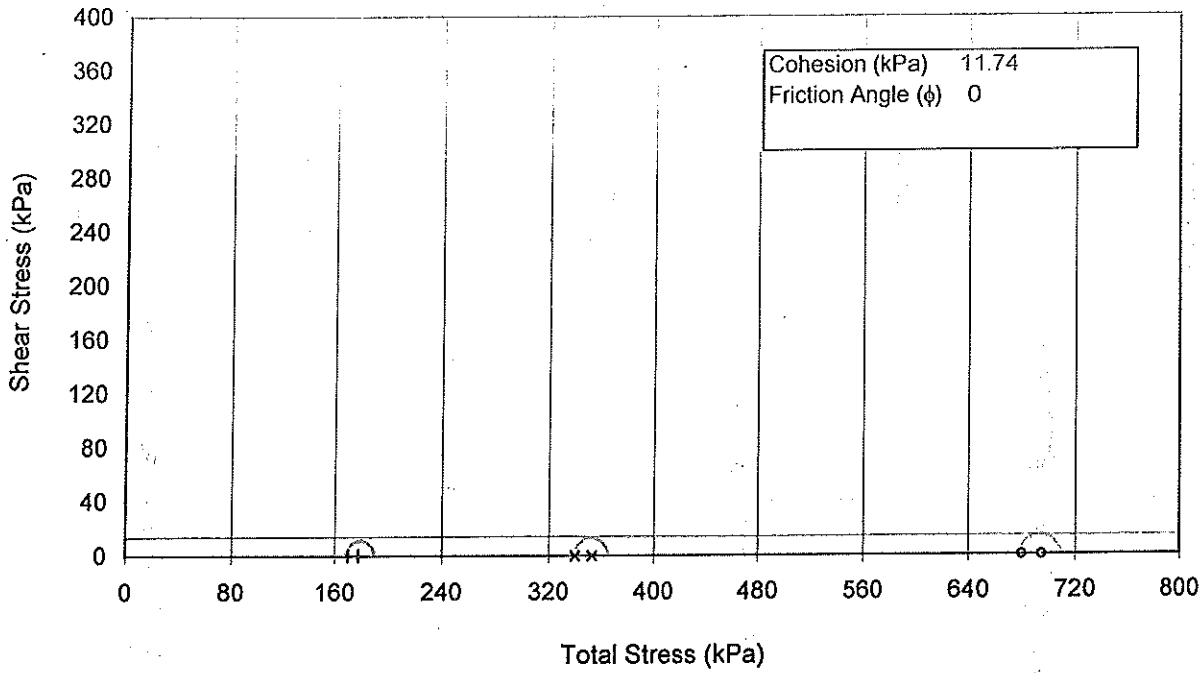
Sample : UD7

Borehole : BH35

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 : 30.01.19

Sample : UD7
Borehole : BH35

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.

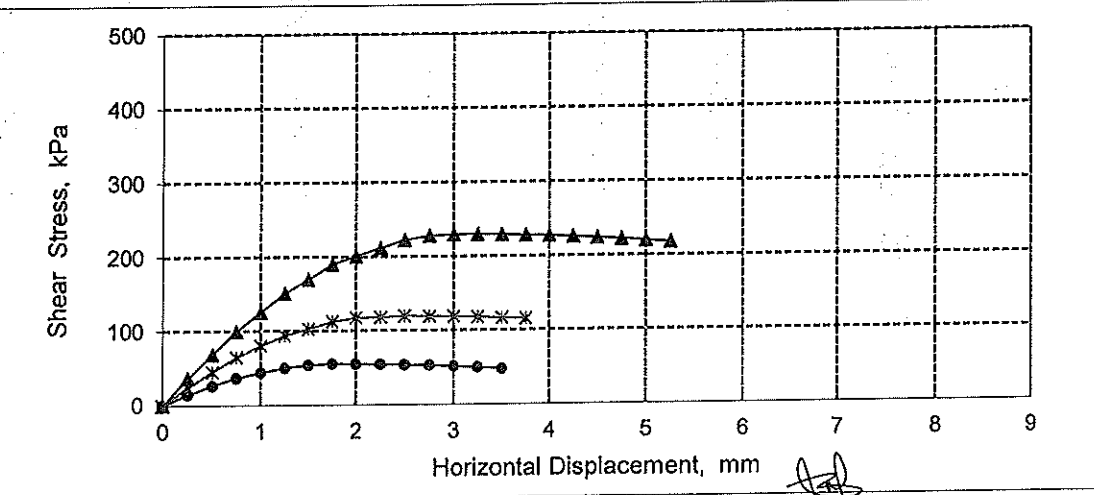
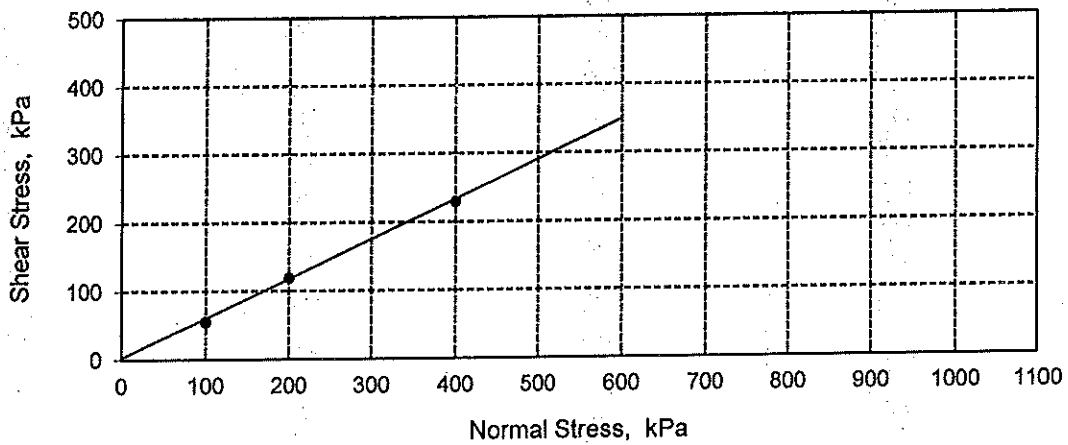
Sample No. : BH 35 / D 14 (31.50 m)

Test Size : 60 mm x 60 mm x 20 mm Date Tested : 4 / 2 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		123.3	124.8	124.9
Moisture Content (%)		28.1	28.0	28.4
Bulk Density (Mg/m ³)		1.713	1.733	1.735
Dry Density (Mg/m ³)		1.337	1.354	1.351

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		55.3	119.7	229.8
Displ. at Failure (mm)		1.8	2.5	3.3
Settlement (mm)		0.3	0.5	0.9

	c' 3 kPa
	φ' 30 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	18.02.19
Sample No.	BH35 / UD7 / 21.00m	Test Started	28.01.19
Soil Description	Greenish grey CLAY with little sand	Ring No.	A15

BEFORE TEST

Moist. Content from trimmings:	=	43 %	SG (Measured)	=	2.610
Wt of sample + Ring	=	123.32 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.67 gm	Area (A)	=	1964 mm ²
Wt of sample	=	61.65 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	47.15 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	14.5 gm	Bulk Density (P)	=	1.569 Mg/m ³
Initial Moisture Content, M_o	=	31 %	Dry Density (PD)	=	1.200 Mg/m ³
Initial Void Ratio, e_o , $\frac{SG}{P_D} - 1$	=	1.1747			
Initial Saturation, S_o ; $\frac{M_o \times SG}{e_o}$	=	68 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1087 mm ⁻¹			
Height of Solid $\frac{H}{H_s}$	=	9.197 mm			

AFTER TEST

Wt of sample + Ring	=	121.35 gm	Overall settlement	=	1.962 mm
Wt of Dry sample + Ring	=	108.82 gm	Volume Change	=	3.854 cm ³
Wt of Ring	=	61.67 gm	Final Volume	=	35.43 cm ³
Wt of Wet sample	=	59.68 gm	Final Bulk Density	=	1.684 Mg/m ³
Wt of Dry sample	=	47.15 gm	Final Dry Density	=	1.331 Mg/m ³
Wt of Moisture	=	12.53 gm	Final Void Ratio, e_f	=	0.9613
Final Moisture Content, M_f	=	27 %			
Final Saturation, S_o , $\frac{M_f \times SG}{e_f}$	=	72 %			

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 BH35 / UD7 / 21.00m

Date of Report

18.02.19

Test started

28.01.19

Ring No.

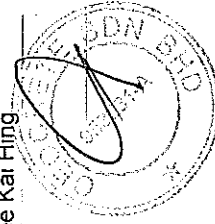
A15

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	1.1747	0.0000	0				
6.25	0.390	19.610	0.0424	1.1323	0.0424	6.25	3.1845	8.41	5.18	-0.1409
12.5	0.622	19.378	0.0676	1.1070	0.0252	6.25	1.9170	10.89	3.87	-0.0838
25.0	1.040	18.960	0.1131	1.0616	0.0455	12.5	1.7651	9.00	4.53	-0.1510
50.0	1.666	18.334	0.1812	0.9935	0.0681	25.0	1.3668	8.41	4.59	-0.2261
100	2.484	17.516	0.2701	0.9046	0.0889	50.0	0.9347	4.41	8.09	-0.2955
50	2.366	17.634	0.2573	0.9174	-0.0128	-50.0				
25	2.182	17.818	0.2373	0.9374	-0.0200	-25.0				
12.5	1.962	18.038	0.2133	0.9613	-0.0239	-12.5				

Operator Shyam Nath

Checked Chris

Approved Lee Kai Hing



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

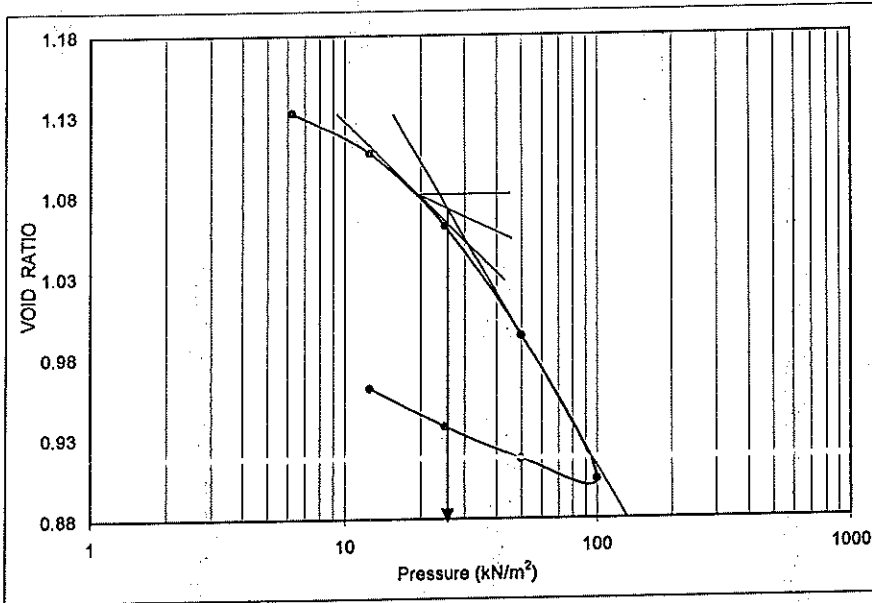
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH35 / UD7 / 21.00m

SOIL SAMPLE Greenish grey CLAY with little sand

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. A15



INITIAL

Water content 31 %

Dry Density 1.20 Mg/m³

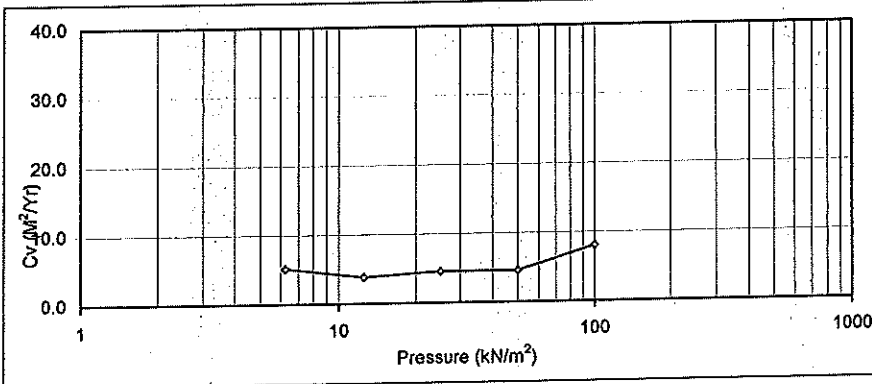
Void Ratio 1.1747

Saturation 68 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.610



FINAL

Water content 27 %

Dry Density 1.33 Mg/m³

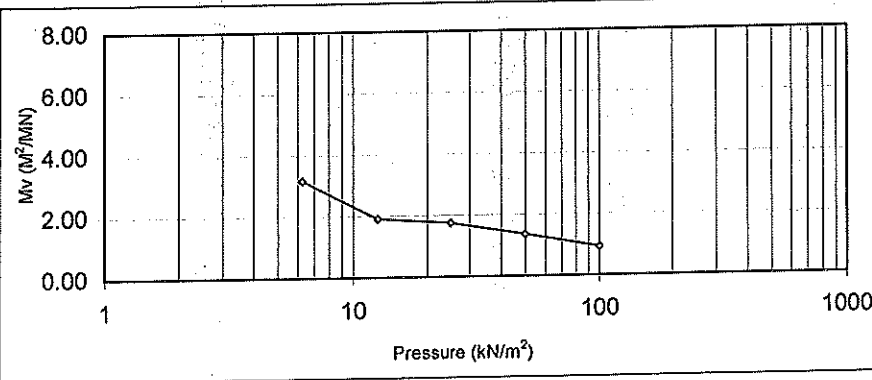
Void Ratio 0.9613

Saturation 72 %

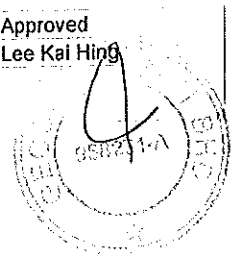
Height 18 mm

Comp. Index, Cc 0.2955

Precons. Load 25 kN/m²



Comp. Ratio, C_R 0.136

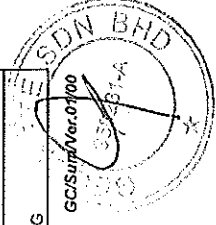


SUMMARY OF TEST RESULTS

SAMPLE AND SPECIMEN DETAILS		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 : 08.02.19																
		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)				
BH36	UD1	3.00	44	1.61	1.12	1.23	75	33	42	15.7	54	29	17	0	2.62					13.86	0		0.216	2.2	0.13	0.46	7.9						
	UD3	9.00	41	1.74	1.08	1.23					40	23	37	0																			
	UD5	15.00	59	1.61	1.08	1.23	60	24	36	14.5	42	33	25	0						11.48	0		0.355	2.9	0.15	0.63	7.8						
	UD7	21.00	25	1.89	1.51	1.23	42	20	22	8.4	28	21	51	0	2.67																		
	D10	27.00	46	NA	NA	NA	79	33	46		57	35	8	0																			
	D11	28.50	34	1.98	1.63	1.23					35	25	40	0	2.66					1	29				1.0	0.28	0.44	7.4					
	D13	31.50	19	NA	NA	NA					22	22	78	0																			
	D16	36.00	16	NA	NA	NA					24	76	0																				
	D18	39.00	16	NA	NA	NA					21	79	0																				
	D20	42.00	41	NA	NA	NA	48	23	25	10.1	40	23	37	0	2.66																		
	D25	49.50	30	NA	NA	NA	35	21	14		23	18	59	0																			
	D27	52.50	63	NA	NA	NA	78	31	47		59	35	6	0																			
	D29	55.50	11	NA	NA	NA																											
	D32	60.00	20	NA	NA	NA					23	77	0																				
Notes :																																	

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

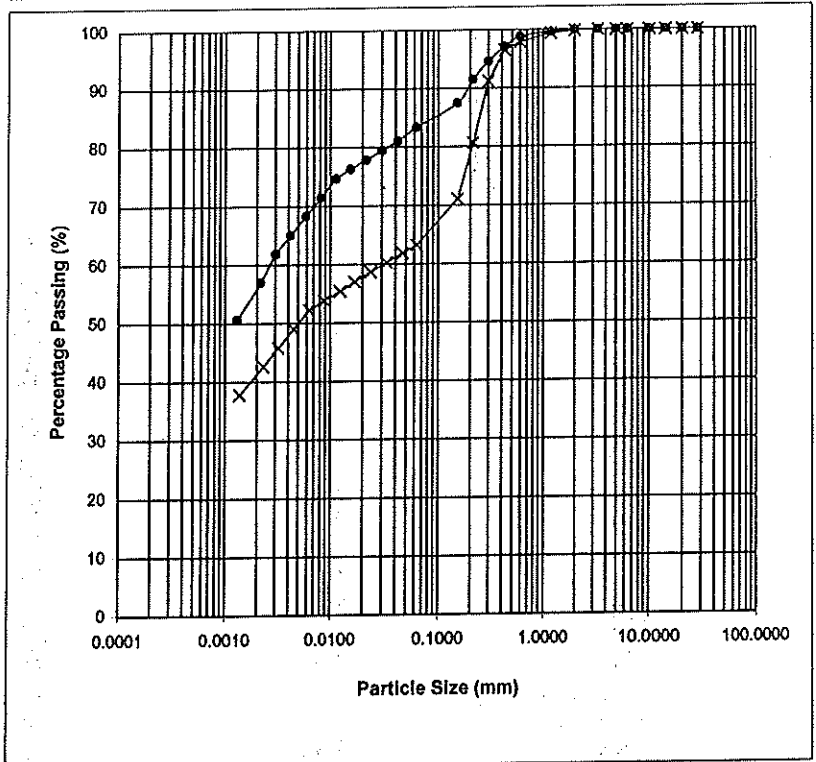
PARTICLE SIZE DISTRIBUTION

(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

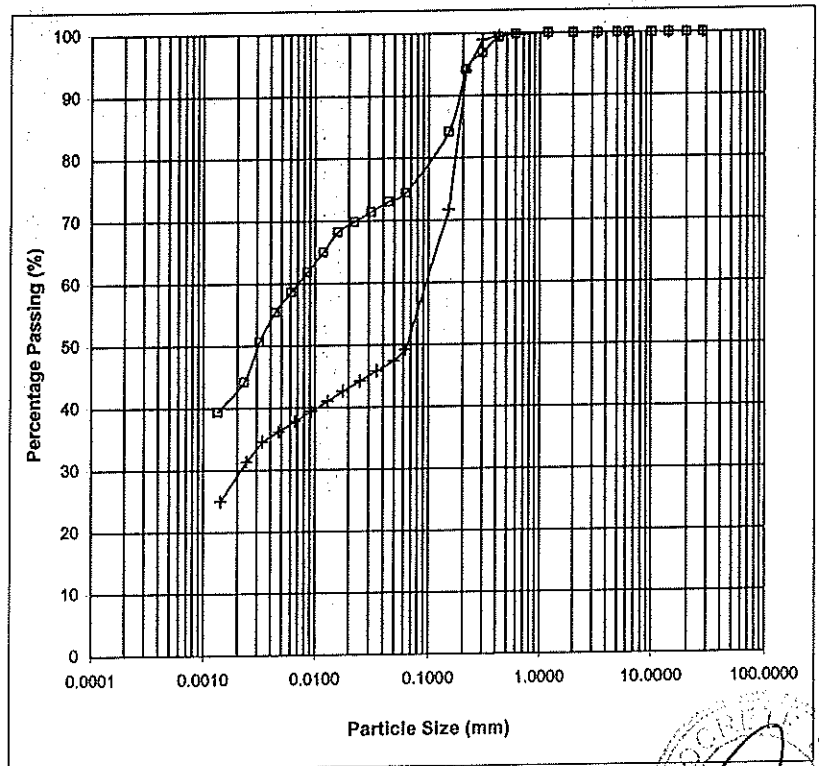
Particle Size Distribution			
●		x	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	99
0.600	99	0.600	98
0.425	97	0.425	97
0.300	95	0.300	91
0.212	92	0.212	81
0.150	88	0.150	71
0.063	83	0.063	63
0.0424	81	0.0468	62
0.0302	79	0.0332	60
0.0215	78	0.0237	59
0.0154	76	0.0168	57
0.0113	75	0.0124	55
0.0081	71	0.0088	54
0.0058	68	0.0063	52
0.0042	65	0.0045	49
0.0030	62	0.0032	46
0.0022	57	0.0023	43
0.0013	51	0.0014	38
Clay (%)	54	Clay (%)	40
Silt (%)	29	Silt (%)	23
Sand (%)	17	Sand (%)	37
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH36	UD1	3.00	30.01.19
x	BH36	UD3	9.00	30.01.19



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	99
0.212	94	0.212	94
0.150	84	0.150	72
0.063	74	0.063	49
0.0442	73	0.0496	47
0.0315	71	0.0353	46
0.0224	70	0.0251	44
0.0160	68	0.0179	43
0.0119	65	0.0131	41
0.0085	62	0.0093	39
0.0061	59	0.0066	38
0.0044	55	0.0047	36
0.0032	51	0.0034	35
0.0023	44	0.0024	31
0.0013	39	0.0014	25
Clay (%)	42	Clay (%)	28
Silt (%)	33	Silt (%)	21
Sand (%)	25	Sand (%)	51
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH36	UD5	15.00	30.01.19
+	BH36	UD7	21.00	30.01.19



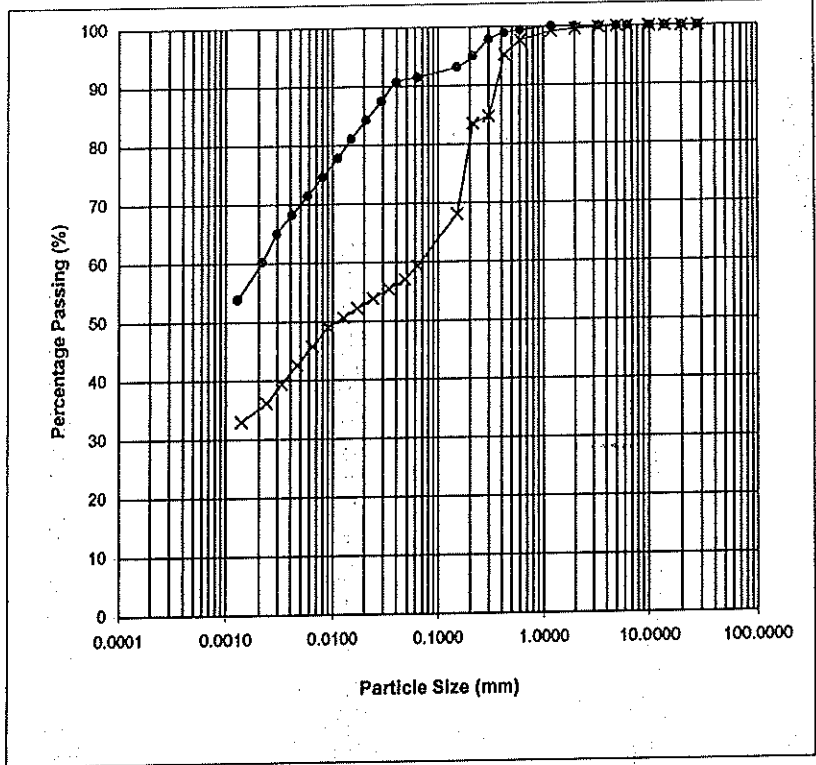
PARTICLE SIZE DISTRIBUTION

(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

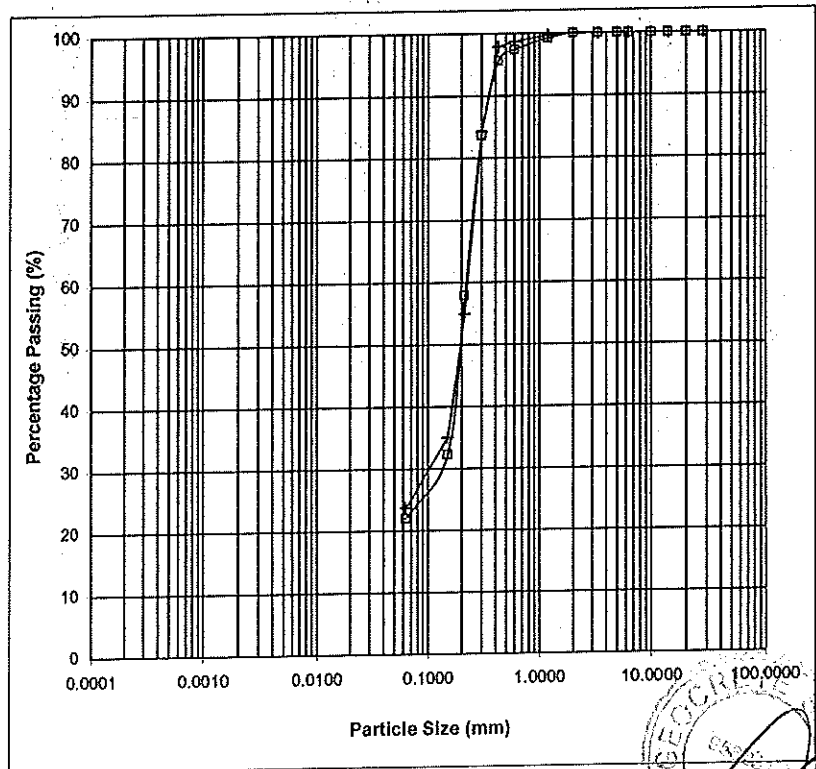
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	99
0.600	99	0.600	98
0.425	99	0.425	95
0.300	98	0.300	85
0.212	95	0.212	84
0.150	93	0.150	88
0.063	92	0.063	59
0.0401	91	0.0476	57
0.0289	87	0.0339	55
0.0208	84	0.0241	54
0.0150	81	0.0172	52
0.0111	78	0.0126	51
0.0080	75	0.0090	49
0.0058	71	0.0064	46
0.0041	68	0.0046	43
0.0030	65	0.0033	39
0.0021	60	0.0024	36
0.0013	54	0.0014	33
Clay (%)		Clay (%)	35
Silt (%)		Silt (%)	25
Sand (%)		Sand (%)	40
Gravel (%)		Gravel (%)	0
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH36	D10	27.00	30.01.19
x	BH36	D11	28.50	30.01.19



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	97	0.600	99
0.425	96	0.425	98
0.300	84	0.300	84
0.212	58	0.212	55
0.150	32	0.150	35
0.063	22	0.063	24
Clay (%)		Clay (%)	24
Silt (%)		Silt (%)	24
Sand (%)		Sand (%)	76
Gravel (%)		Gravel (%)	0
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH36	D13	31.50	30.01.19
+	BH36	D16	36.00	30.01.19



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

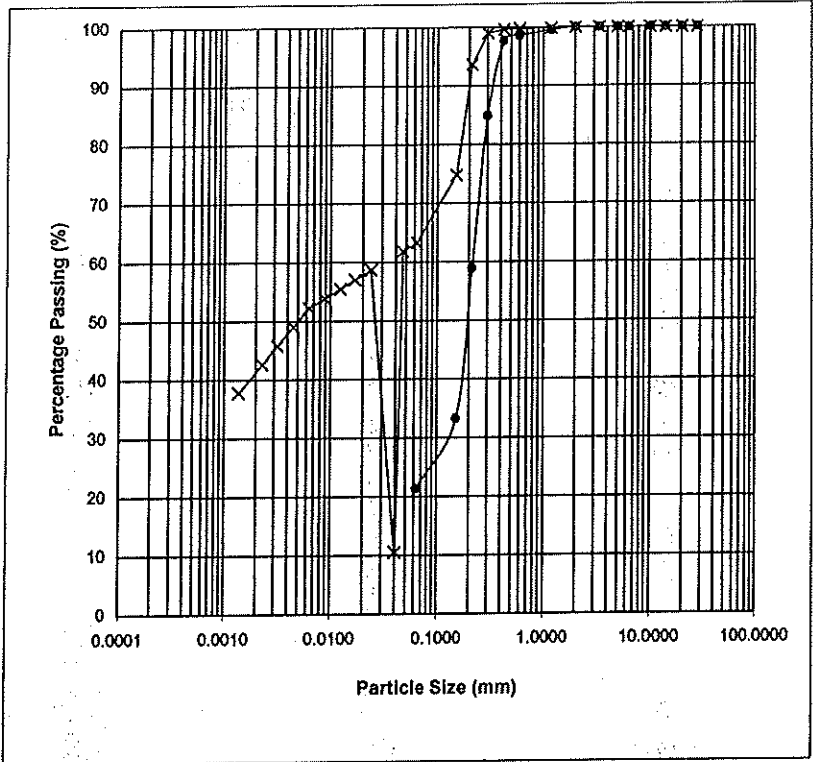
PARTICLE SIZE DISTRIBUTION

(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

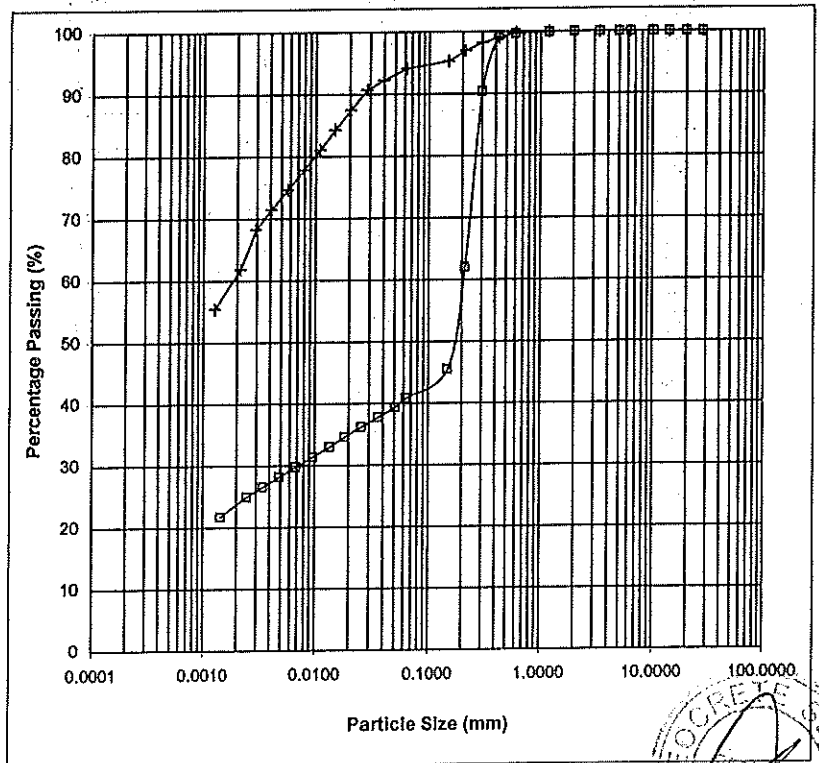
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	100
0.425	98	0.425	100
0.300	85	0.300	99
0.212	59	0.212	94
0.150	33	0.150	75
0.063	21	0.063	83
		0.0466	62
		0.0399	11
		0.0237	59
		0.0168	57
		0.0124	55
		0.0088	54
		0.0063	52
		0.0045	49
		0.0032	46
		0.0023	43
		0.0014	38
Clay (%)		Clay (%)	40
Silt (%)	21	Silt (%)	23
Sand (%)	79	Sand (%)	37
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH36	D18	39.00	30.01.19
x	BH36	D20	42.00	30.01.19



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	99
0.300	90	0.300	98
0.212	62	0.212	97
0.150	46	0.150	95
0.063	41	0.063	94
0.0512	39	0.0397	92
0.0364	38	0.0283	91
0.0259	36	0.0204	87
0.0184	35	0.0147	84
0.0135	33	0.0109	81
0.0096	31	0.0079	78
0.0068	30	0.0057	75
0.0049	28	0.0041	71
0.0035	27	0.0029	68
0.0025	25	0.0021	62
0.0014	22	0.0013	55
Clay (%)	23	Clay (%)	59
Silt (%)	18	Silt (%)	35
Sand (%)	59	Sand (%)	6
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH36	D25	49.50	30.01.19
+	BH36	D27	52.50	30.01.19



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

Total Stress Triaxial Compression

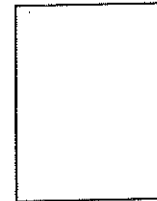
Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Greenish grey CLAY with 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_D (gr)	136.41	138.75	140.82
Bulk Density ρ (Mg/m ³)	1.583	1.611	1.635
Particle Density ρ_s	2.62	2.62	2.62

Sketch showing specimen location in original sample

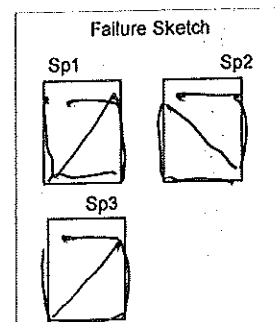


Initial Conditions

	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	14391	14391	14391
Moisture Content w_0 %	44	43	42
Dry Density ρ_{d0} (Mg/m ³)	1.10	1.12	1.15
Voids Ratio e_0	1.39	1.33	1.27
Deg of Saturation S_0 %	83.79	85.37	86.07

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	24.61	26.02	32.52
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	24.41	25.82	32.32
Strain at Failure ϵ_f %	10.99	10.99	10.53
Shear Strength c_u (kPa)	12.31	13.01	16.26
Moisture Content w_f %	44	43	42
Dry Density ρ_{df} (Mg/m ³)	1.10	1.12	1.15
Voids Ratio e_f	1.39	1.33	1.27
Deg of Saturation S_f %	83.79	85.37	86.07



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 :

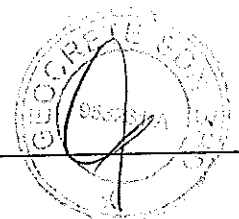
30.01.19

Sample : UD1

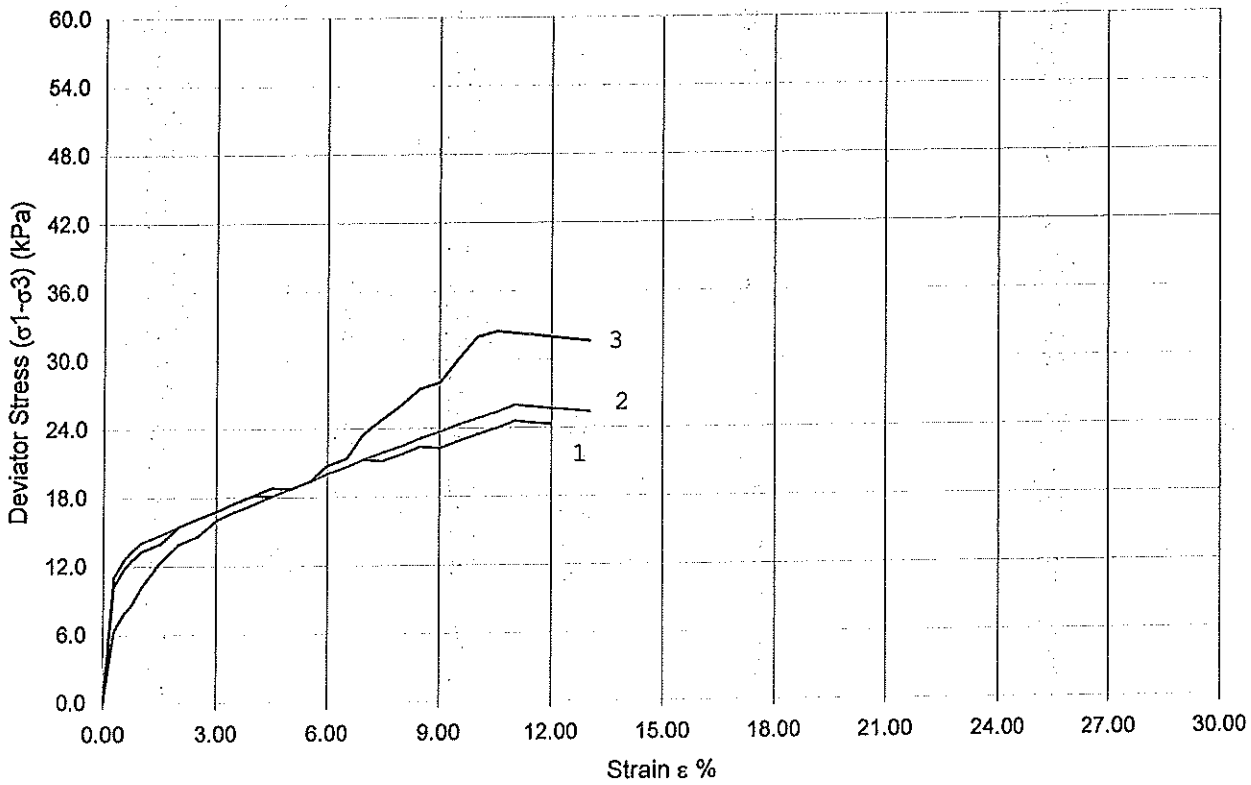
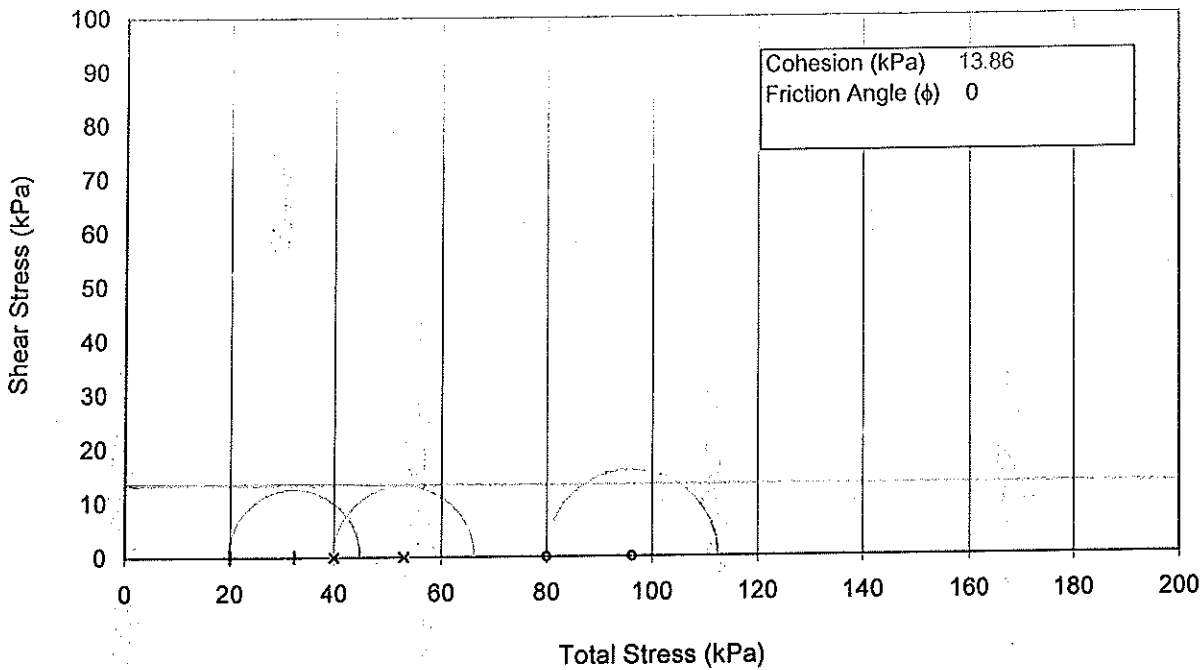
Borehole : BH36

Approved

Lee Kai Hing

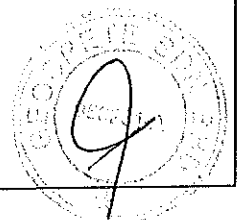


Total Stress Triaxial Compression Unconsolidated Undrained



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 : 30.01.19
 Sample : UD1
 Borehole : BH36
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

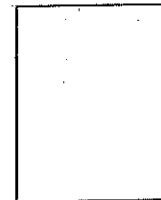
Unconsolidated Undrained

Sample details

Depth : 15.00m
 Description : 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)	137.07	138.60	142.22
Bulk Density ρ (Mg/m ³)	1.591	1.609	1.651
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

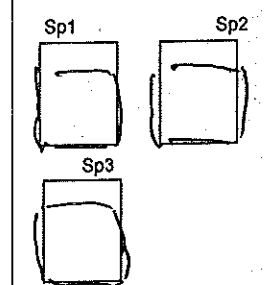
Load Channel	14391	14391	14391
--------------	-------	-------	-------

Moisture Content w_0 %	50	49	47
Dry Density ρ_{d0} (Mg/m ³)	1.06	1.08	1.12
Voids Ratio e_0	1.49	1.45	1.36
Deg of Saturation S_0 %	88.76	89.72	92.10

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	17.83	24.02	27.02
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	17.63	23.82	26.82
Strain at Failure ϵ_f %	5.99	5.00	5.00
Shear Strength c_u (kPa)	8.91	12.01	13.51

Failure Sketch



Moisture Content w_f %	50	49	47
Dry Density ρ_{df} (Mg/m ³)	1.06	1.08	1.12
Voids Ratio e_f	1.49	1.45	1.36
Deg of Saturation S_f %	88.76	89.72	92.10

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 :

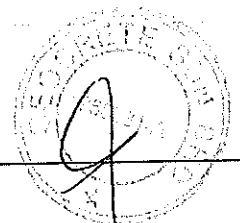
30.01.19

Sample : UD5

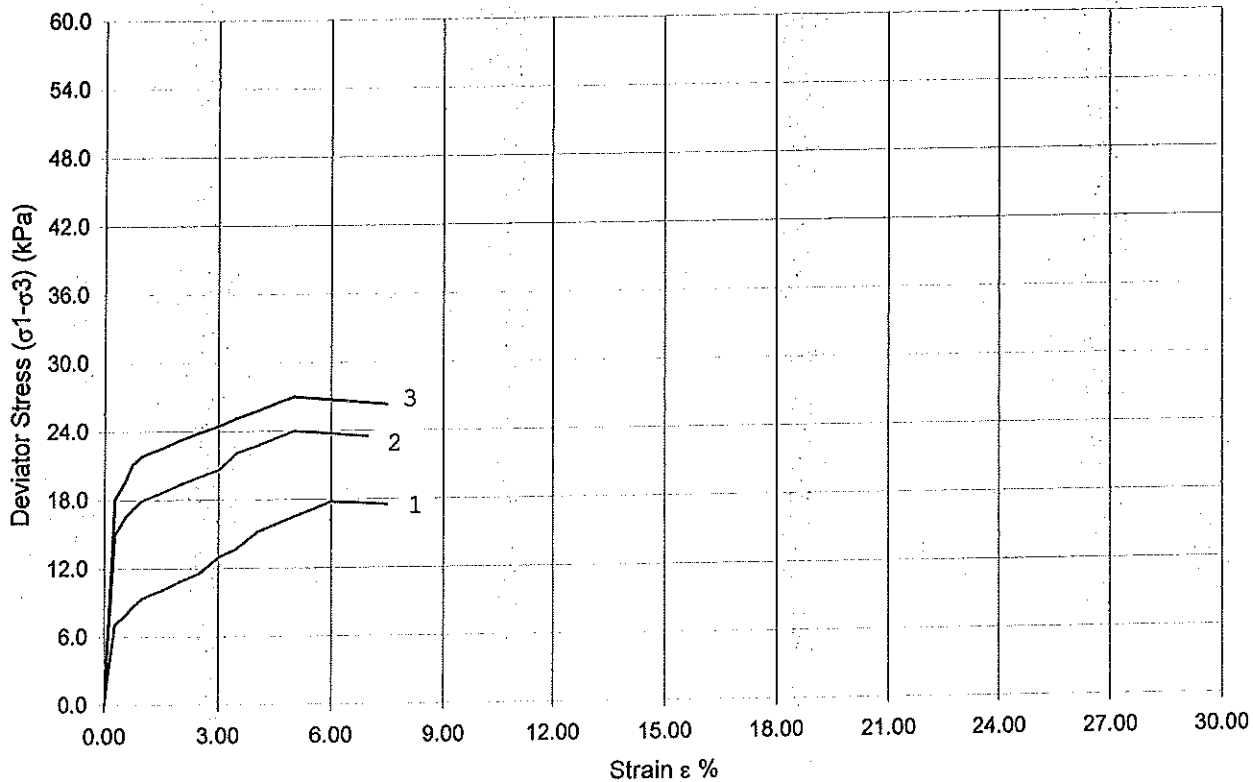
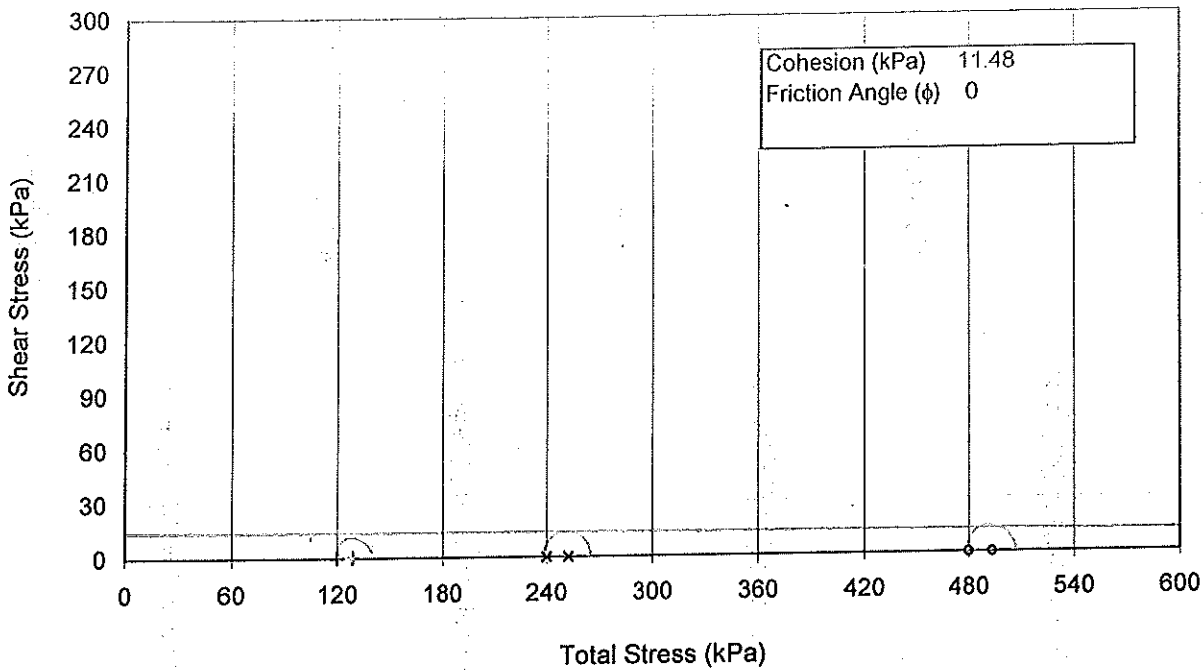
Borehole : BH36

Approved

Lee Kai Hing

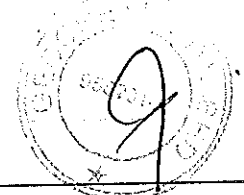


Total Stress Triaxial Compression Unconsolidated Undrained



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 : 30.01.19
 Sample : UD5
 Borehole : BH36
 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.

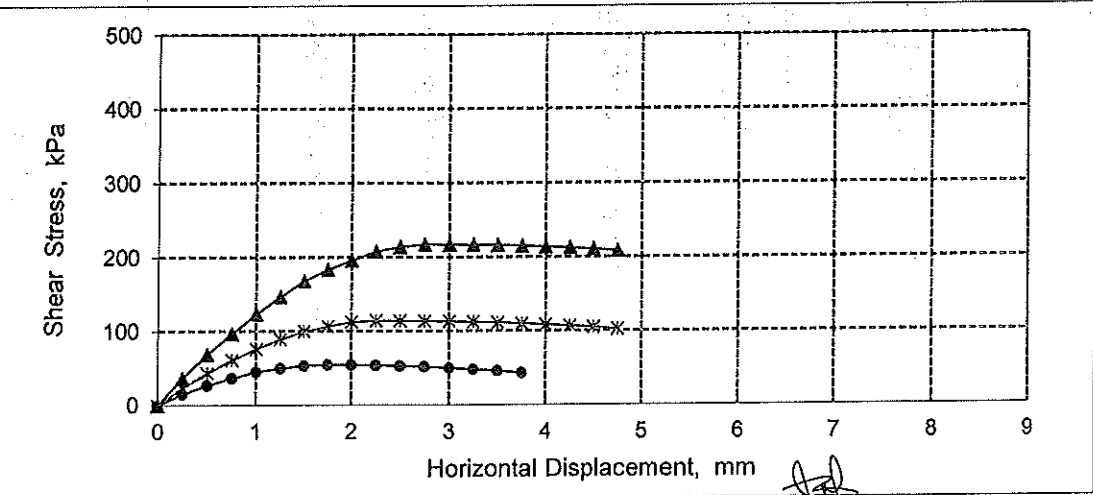
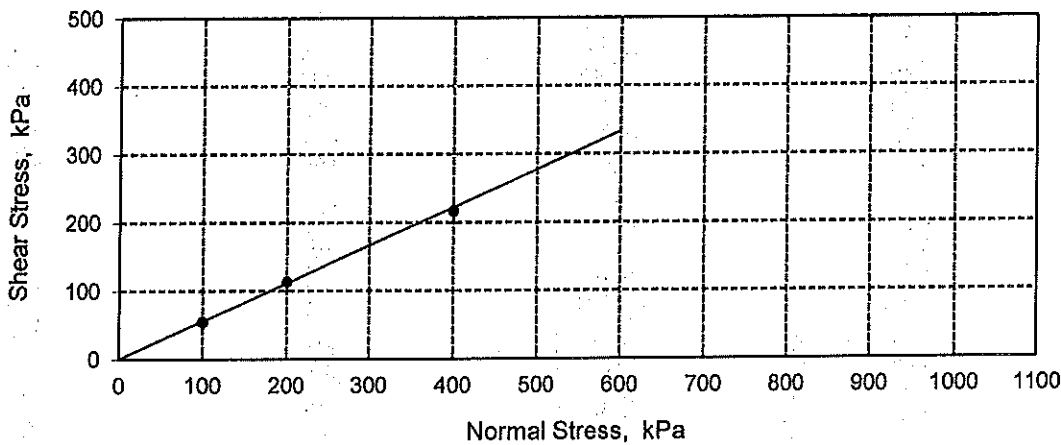
Sample No. : BH 36 / D 11 (28.50 m)

Test Size : 60 mm x 60 mm x 20 mm Date Tested : 2 / 2 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		142.2	142.7	142.3
Moisture Content (%)		21.9	21.5	21.7
Bulk Density (Mg/m ³)		1.975	1.982	1.977
Dry Density (Mg/m ³)		1.620	1.631	1.624
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		54.7	114.1	217.2
Displ. at Failure (mm)		1.8	2.3	2.8
Settlement (mm)		0.2	0.4	0.7

c' 1 kPa

ϕ' 29 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	18.02.19
Sample No.	BH36 / UD1 / 3.00m	Test Started	28.01.19
Soil Description	Greenis grey CLAY with little sand	Ring No.	1

BEFORE TEST

Moist. Content from trimmings:	=	53	%	SG (Measured)	=	2.620	
Wt of sample + Ring	=	123.99	gm	Diameter (D)	=	50	mm
Wt of Ring	=	57.99	gm	Area (A)	=	1964	mm ²
Wt of sample	=	66	gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	43.31	gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	22.69	gm	Bulk Density (P)	=	1.680	Mg/m ³
Initial Moisture Content, M _o	=	52	%	Dry Density (PD)	=	1.102	Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.3766					
Initial Saturation, S _o ;	$\frac{M_o \times SG}{e_o}$	=	100	%			
V. Ratio Change Factor F _v ,	$\frac{H}{1+e_o}$	=	0.1188	mm ⁻¹			
Height of Solid	H _s	=	8.416	mm			

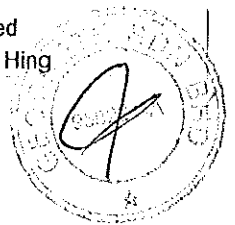
AFTER TEST

Wt of sample + Ring	=	122.06	gm	Overall settlement	=	1.728	mm
Wt of Dry sample + Ring	=	101.30	gm	Volume Change	=	3.394	cm ³
Wt of Ring	=	57.99	gm	Final Volume	=	35.89	cm ³
Wt of Wet sample	=	64.07	gm	Final Bulk Density	=	1.785	Mg/m ³
Wt of Dry sample	=	43.31	gm	Final Dry Density	=	1.207	Mg/m ³
Wt of Moisture	=	20.76	gm	Final Void Ratio, e _r	=	1.1712	
Final Moisture Content, M _r	=	48	%				
Final Saturation, S _o	$\frac{M_r \times SG}{e_r}$	=	107	%			

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 BH36 / UD1 / 3.00m

Date of Report

18.02.19

Test started

28.01.19

Ring No.

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	1.3766	0.0000	0				
6.25	0.548	19.452	0.0651	1.3114	0.0651	6.25	4.5110	1.21	35.70	-0.2163
12.5	0.704	19.296	0.0837	1.2929	0.0185	6.25	1.2945	2.25	18.52	-0.0616
25.0	0.936	19.064	0.1112	1.2653	0.0276	12.5	0.9743	2.56	15.95	-0.0916
50.0	1.268	18.732	0.1507	1.2259	0.0395	25.0	0.7095	1.00	39.64	-0.1311
100	1.734	18.266	0.2060	1.1705	0.0554	50.0	0.5106	1.44	26.38	-0.1840
200	2.250	17.750	0.2674	1.1092	0.0613	99.9	0.2909	1.21	29.75	-0.2037
100	2.164	17.836	0.2571	1.1194	-0.0102	-99.9				
50	1.968	18.032	0.2339	1.1427	-0.0233	-50.0				
12.5	1.728	18.272	0.2053	1.1712	-0.0285	-37.5				

Operator

Shyam Nath

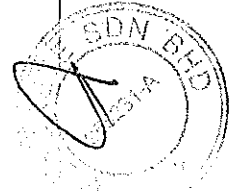
Checked

Chris

Approved

Lee Kai Hing

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



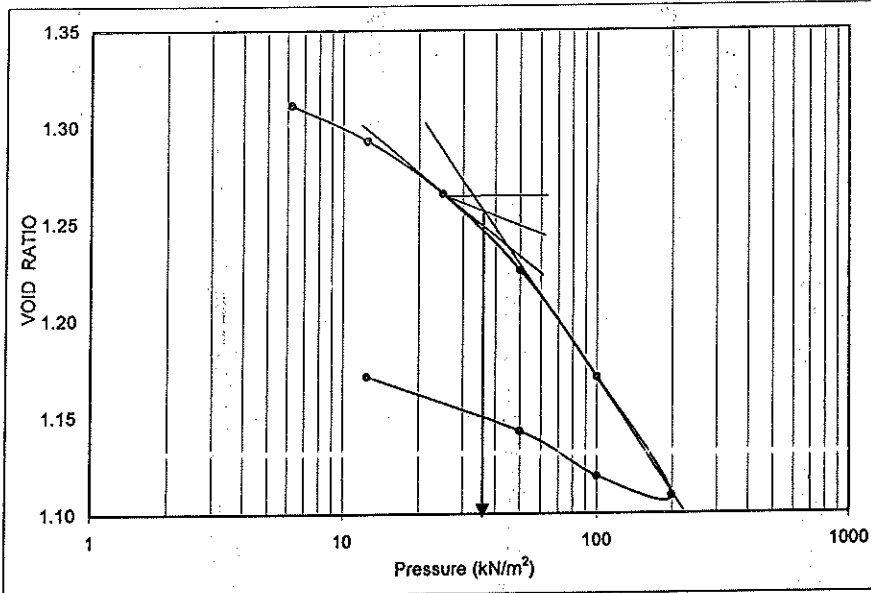
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH36 / UD1 / 3.00m

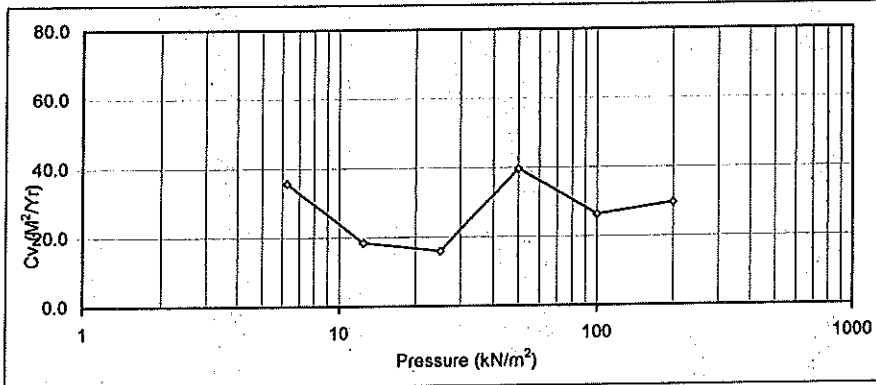
SOIL SAMPLE Greenis grey CLAY with little sand

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. 1



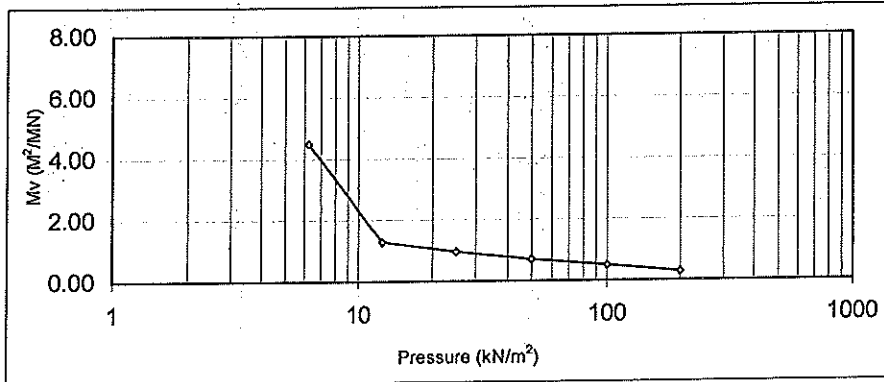
INITIAL

Water content	52	%
Dry Density	1.10	Mg/m ³
Void Ratio	1.3766	
Saturation	100	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.620	



FINAL

Water content	48	%
Dry Density	1.21	Mg/m ³
Void Ratio	1.1712	
Saturation	107	%
Height	18	mm
Comp. Index, C _c	0.2163	
Precons. Load	36	kN/m ²



Comp. Ratio, C_R 0.091



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	18.02.19
Sample No.	BH36 / UD5 / 15.00m	Test Started	28.01.19
Soil Description	Grey CLAY with some sand	Ring No.	2

BEFORE TEST

Moist. Content from trimmings:	=	57	%	SG (Measured)	=	2.640
Wt of sample + Ring	=	122.69	gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.12	gm	Area (A)	=	1964 mm ²
Wt of sample	=	61.57	gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	39.46	gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	22.11	gm	Bulk Density (P)	=	1.567 Mg/m ³
Initial Moisture Content, M _o	=	56	%	Dry Density (PD)	=	1.004 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.6283				
Initial Saturation, S _o ;	=	91	%			
	=	$\frac{M_o \times SG}{e_o}$				
V. Ratio Change Factor F _v	=	0.1314		mm ⁻¹		
	=	$\frac{1+e_o}{H}$				
Height of Solid	=	7.609	mm			

AFTER TEST

Wt of sample + Ring	=	119.27	gm	Overall settlement	=	2.180	mm
Wt of Dry sample + Ring	=	100.58	gm	Volume Change	=	4.282	cm ³
Wt of Ring	=	61.12	gm	Final Volume	=	35.00	cm ³
Wt of Wet sample	=	58.15	gm	Final Bulk Density	=	1.661	Mg/m ³
Wt of Dry sample	=	39.46	gm	Final Dry Density	=	1.127	Mg/m ³
Wt of Moisture	=	18.69	gm	Final Void Ratio, e _f	=	1.3419	
Final Moisture Content, M _f	=	47	%				
Final Saturation, S _o	=	93	%				
	=	$\frac{M_f \times SG}{e_f}$					

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	18.02.19
	CT10 - CT19 AND ITS ASSOCIATED WORKS AT	Test started	28.01.19
	WESTPORT, PULAU INDAH, SELANGOR	Ring No.	2
Sample No	BH36 / UD5 / 15.00m		

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_c-\Delta H$ (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	1.6283	0.0000	0				
6.25	0.480	19.520	0.0631	1.5653	0.0631	6.25	3.9374	6.76	6.41	-0.2096
12.5	0.802	19.198	0.1054	1.5229	0.0423	6.25	2.6857	10.89	3.82	-0.1406
25.0	1.200	18.800	0.1577	1.4706	0.0523	12.5	1.6949	4.00	10.02	-0.1738
50.0	1.828	18.172	0.2402	1.3881	0.0825	25.0	1.3834	4.00	9.48	-0.2742
100	2.640	17.360	0.3469	1.2814	0.1067	50.0	0.9362	4.00	8.76	-0.3545
50	2.566	17.434	0.3372	1.2911	-0.0097	-50.0				
25	2.382	17.618	0.3130	1.3153	-0.0242	-25.0				
12.5	2.180	17.820	0.2865	1.3419	-0.0265	-12.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



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

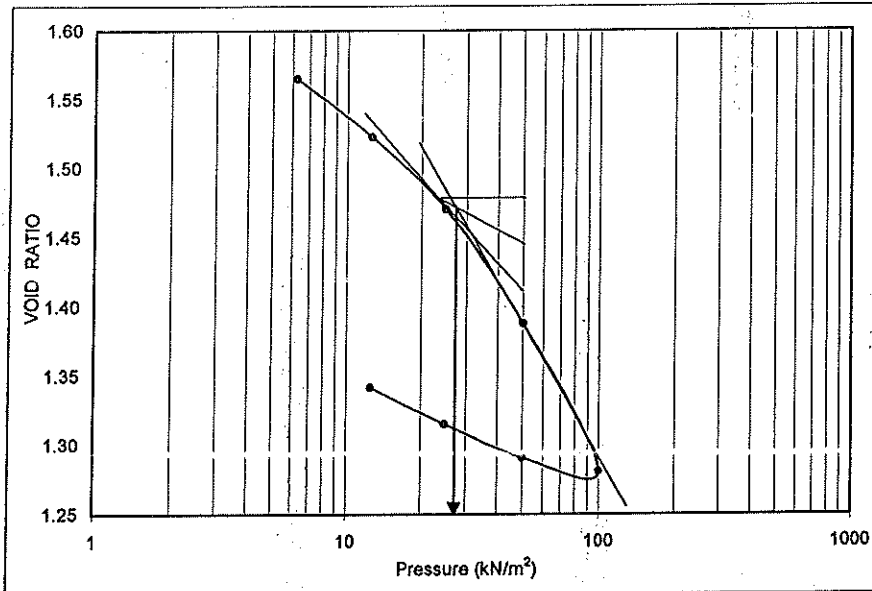
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH36 / UD5 / 15.00m

SOIL SAMPLE Grey CLAY with some sand

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. 2



INITIAL

Water content 56 %

Dry Density 1.00 Mg/m³

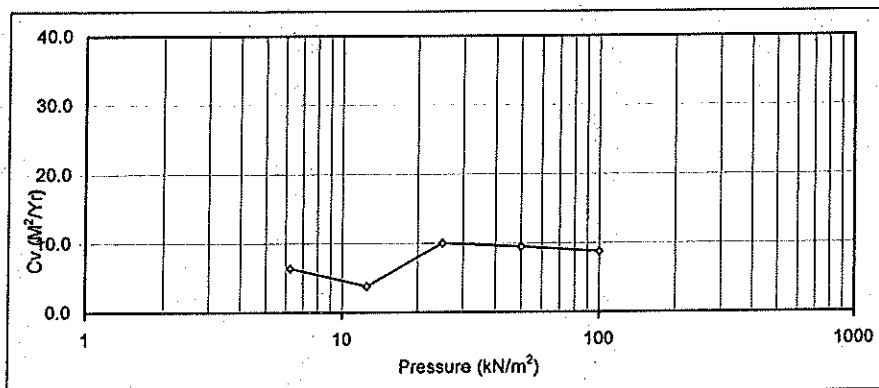
Void Ratio 1.6283

Saturation 91 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.640



FINAL

Water content 47 %

Dry Density 1.13 Mg/m³

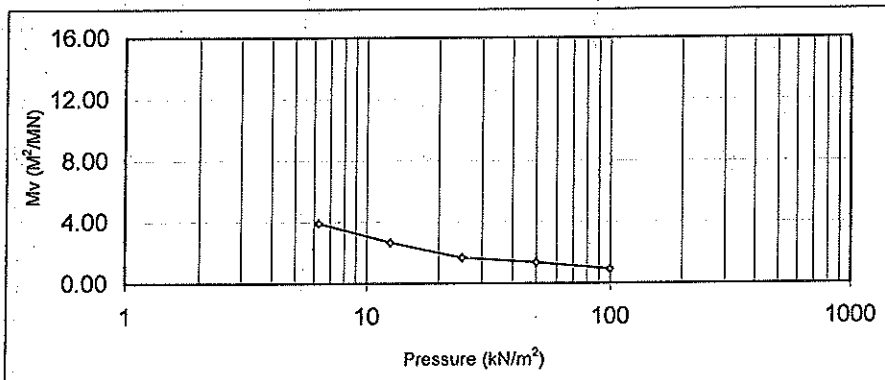
Void Ratio 1.3419

Saturation 93 %

Height 18 mm

Comp. Index, Cc 0.3545

Precons. Load 28 kN/m²



Comp. Ratio, C_R 0.135



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 : 11.02.19																	
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)						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)
BH37	D1	1.50	12	NA	NA	NA	NA					11	89	0	2.71										0.3	0.09	0.45	7.5	
	D3	4.50	18	NA	NA	NA	NA					15	82	3															
	D6	9.00	26	NA	NA	NA	NA					19	81	0															
	UD1	15.00	26	2.04	1.62	NA	NP				NA	4	96	0	2.71						NA	NA			1.5	0.14	0.47	7.8	
	D12	19.50	23	NA	NA	NA						13	87	0															
	UD2	24.00	25	1.91	1.49	NA	33	22	11	4.8	4.8	24	16	60	0						67.33	0	350	0.128					
	D17	28.50	19	NA	NA	NA						10	89	1	2.71										0.2	0.08	0.35	7.7	
	D21	34.50	25	NA	NA	NA						12	88	0															
	D25	40.50	21	NA	NA	NA						11	89	0	2.71														
	D28	45.00	17	NA	NA	NA						15	80	5															
	D31	49.50	48	NA	NA	NA						43	33	23	1														
	D32	51.00	34	1.57	0.98	NA	79	33	46	15.3	15.3	59	37	4	0										50.3	1.03	0.46	7.6	
	D36	57.00	46	NA	NA	NA	70	28	42	14.8	14.8	53	46	1	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. ** BH37 UD1 - TRIAXIAL (UU) & CONSOLIDATION TESTS CANNOT BE CARRIED OUT DUE TO NON-PLASTICITY NATURE OF SPECIMEN (NP). *** BH37 D6 - INSUFFICIENT SAMPLE TO CARRY OUT SHEAR BOX TESTS.

CHECKED BY: _____
APPROVED BY: _____
CHRIS LEE KAI HING



SUM

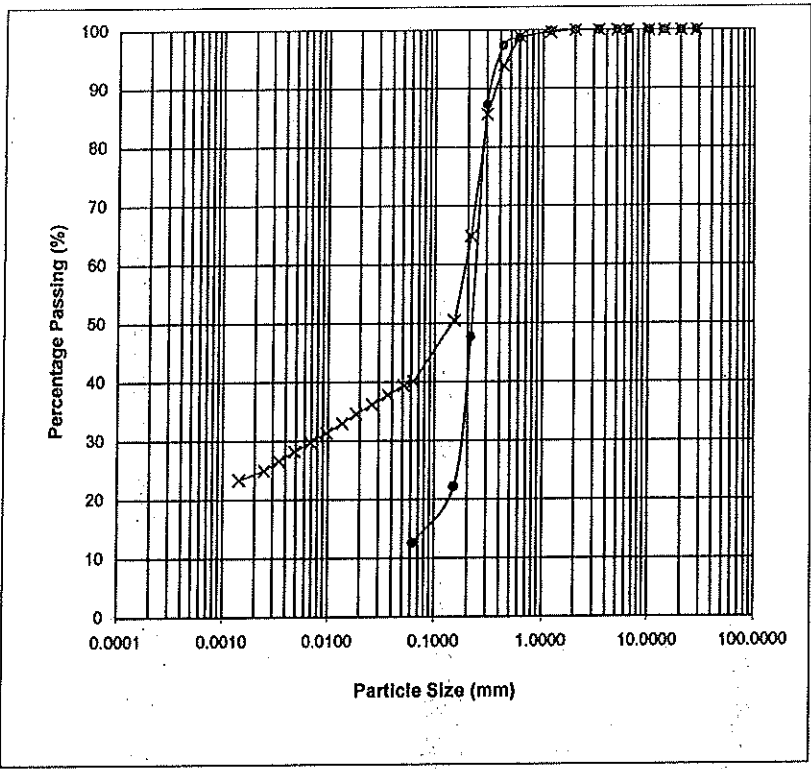
PARTICLE SIZE DISTRIBUTION

(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

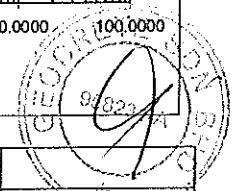
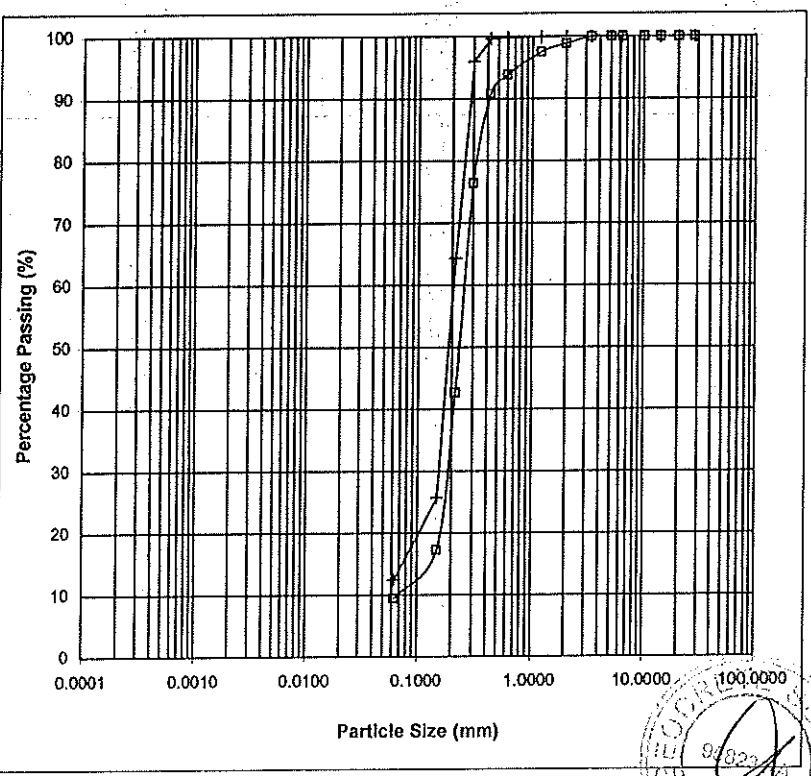
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	99
0.425	97	0.425	94
0.300	87	0.300	86
0.212	48	0.212	65
0.150	22	0.150	50
0.063	13	0.063	40
		0.0512	39
		0.0364	38
		0.0259	36
		0.0184	35
		0.0135	33
		0.0096	31
		0.0068	30
		0.0049	28
		0.0035	27
		0.0025	25
		0.0014	23
Clay (%)	13	Clay (%)	24
Silt (%)		Silt (%)	16
Sand (%)	87	Sand (%)	60
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH37	D12	19.50	31.01.19
x	BH37	UD2	24.00	31.01.19



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	99	2.00	100
1.18	98	1.18	100
0.600	94	0.600	100
0.425	91	0.425	100
0.300	78	0.300	96
0.212	43	0.212	64
0.150	17	0.150	26
0.063	9	0.063	12
Clay (%)	10	Clay (%)	12
Silt (%)		Silt (%)	
Sand (%)	89	Sand (%)	88
Gravel (%)	1	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH37	D17	28.50	31.01.19
+	BH37	D21	34.50	31.01.19



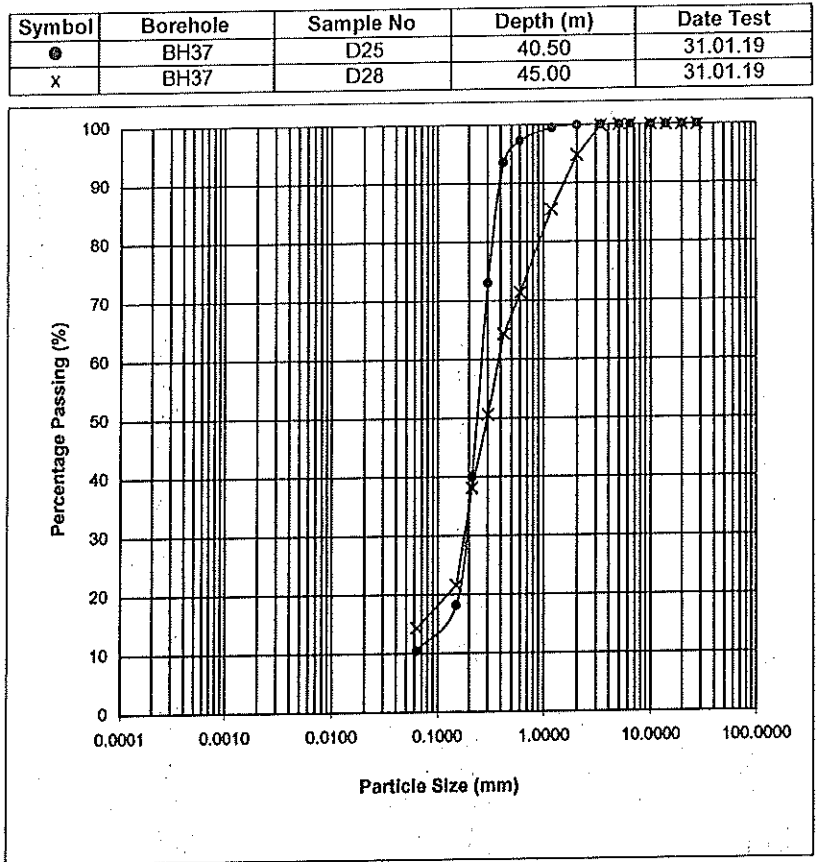
GEOCRETE SDN BHD (Company No. 958231-A)	Tested : Shyam Nath	Checked : Chris	Approved : Lee Kai Hing
--	------------------------	--------------------	----------------------------

PARTICLE SIZE DISTRIBUTION

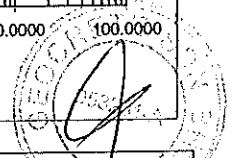
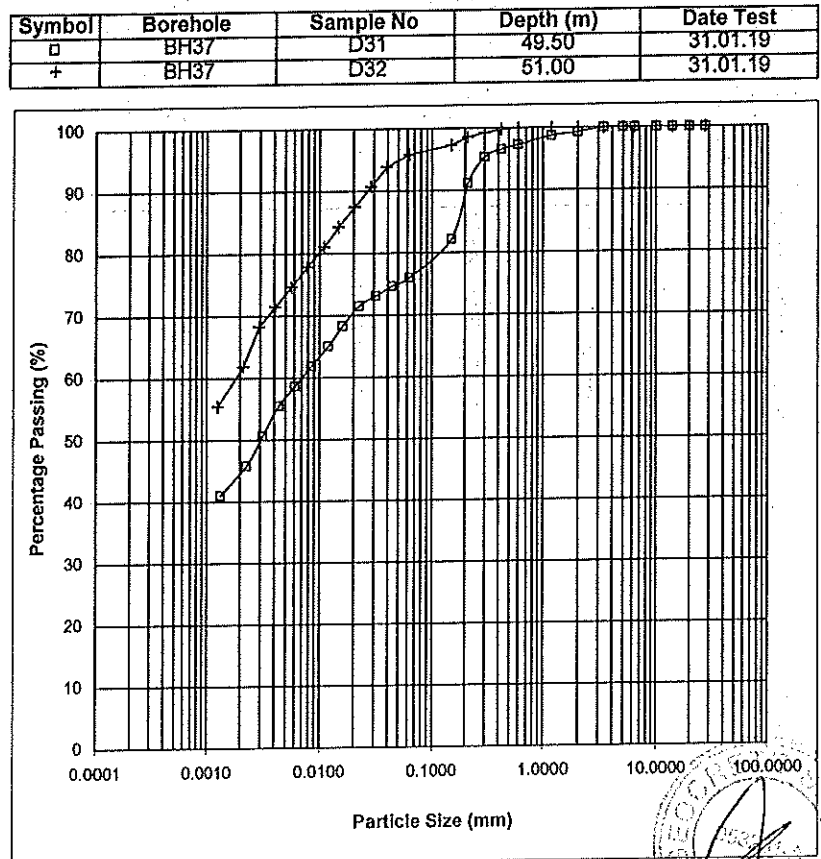
(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

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	95	
1.18	99	1.18	86	
0.600	97	0.600	71	
0.425	94	0.425	64	
0.300	73	0.300	51	
0.212	40	0.212	38	
0.150	18	0.150	22	
0.063	10	0.063	14	
Clay (%)		11	Clay (%)	15
Silt (%)		89	Silt (%)	80
Sand (%)		0	Sand (%)	5
Gravel (%)		0	Gravel (%)	5
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	99	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	91	0.212	99	
0.150	82	0.150	97	
0.063	76	0.063	96	
0.0438	75	0.0393	94	
0.0312	73	0.0283	91	
0.0223	71	0.0204	87	
0.0160	68	0.0147	84	
0.0119	65	0.0109	81	
0.0085	62	0.0079	78	
0.0061	59	0.0057	75	
0.0044	55	0.0041	71	
0.0032	51	0.0029	68	
0.0023	46	0.0021	62	
0.0013	41	0.0013	55	
Clay (%)		43	Clay (%)	59
Silt (%)		33	Silt (%)	37
Sand (%)		23	Sand (%)	4
Gravel (%)		1	Gravel (%)	0
Total (%)		100	Total (%)	100



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	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 37 / D 32 (51.00 m)

Test Size : 60 mm x 60 mm x 20 mm

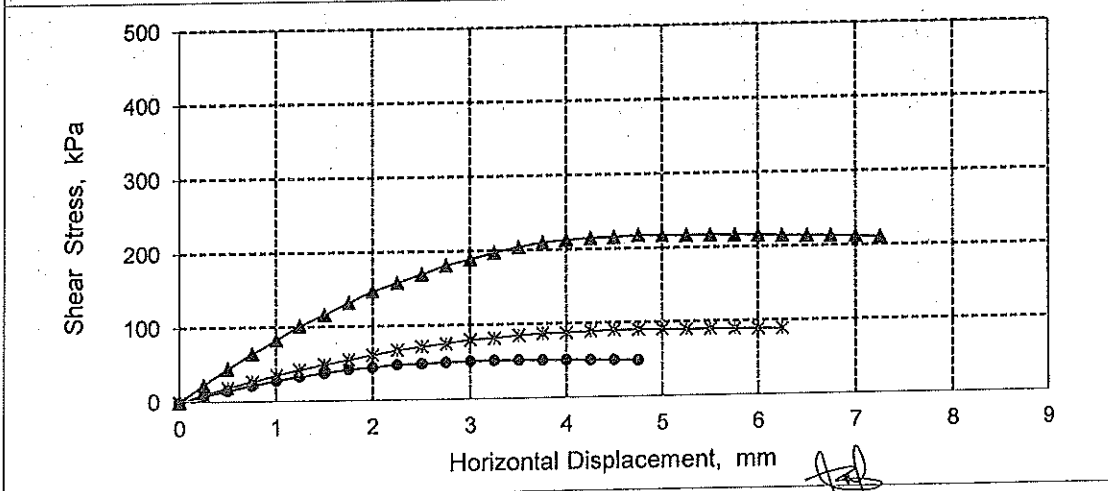
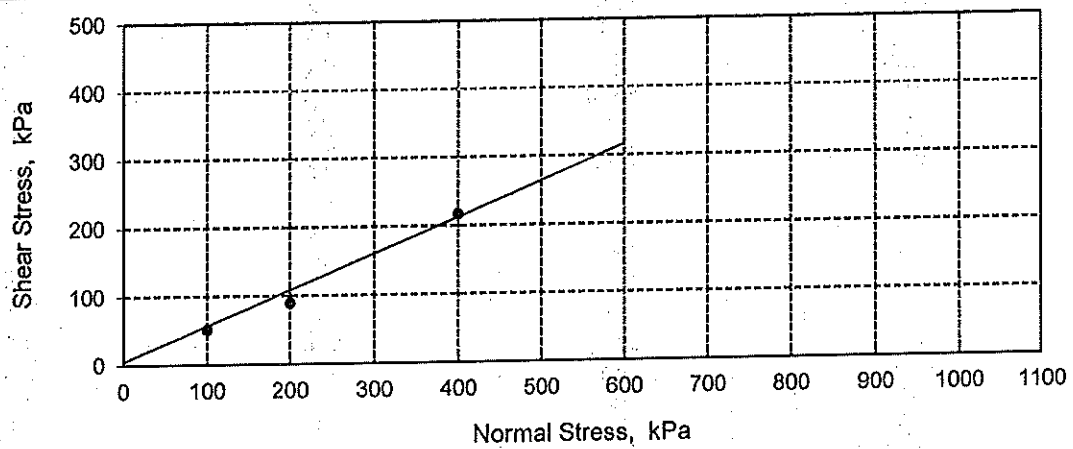
Date Tested : 11 / 2 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight	(g)	113.8	112.7	113.3
Moisture Content	(%)	59.8	60.2	59.6
Bulk Density	(Mg/m ³)	1.580	1.565	1.574
Dry Density	(Mg/m ³)	0.989	0.977	0.986

SHEARING STAGE				
Normal Stress		100	200	400
Max. Shear Stress	(kPa)	51.4	90.0	217.5
Displ. at Failure	(mm)	3.3	4.8	4.8
Settlement	(mm)	0.4	0.6	0.9

c' 5 kPa

φ' 27.5 deg.



Total Stress Triaxial Compression

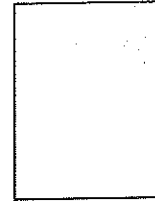
Unconsolidated Undrained

Sample details

Depth : 24.00m
 Description : 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)	162.53	164.11	165.82
Bulk Density ρ (Mg/m ³)	1.887	1.905	1.925
Particle Density ρ_s	2.68	2.68	2.68



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	220	440	880
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

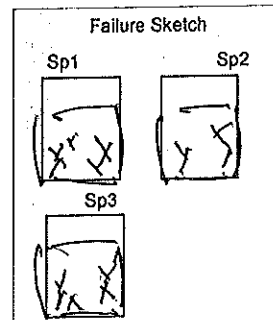
Strain Channel

	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)	1.48	1.49	1.51
Voids Ratio e_0	0.82	0.80	0.77
Deg of Saturation S_0 %	91.53	93.25	94.61

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	114.29	139.45	150.24
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	114.09	139.25	150.04
Strain at Failure ϵ_f %	9.01	9.01	9.01
Shear Strength c_u (kPa)	57.15	69.73	75.12



Moisture Content w_f %	28	28	27
Dry Density ρ_{df} (Mg/m ³)	1.48	1.49	1.51
Voids Ratio e_f	0.82	0.80	0.77
Deg of Saturation S_f %	91.53	93.25	94.61

Notes : Intermediate Intermediate Intermediate

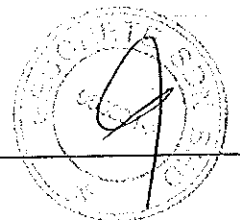
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 01.02.19

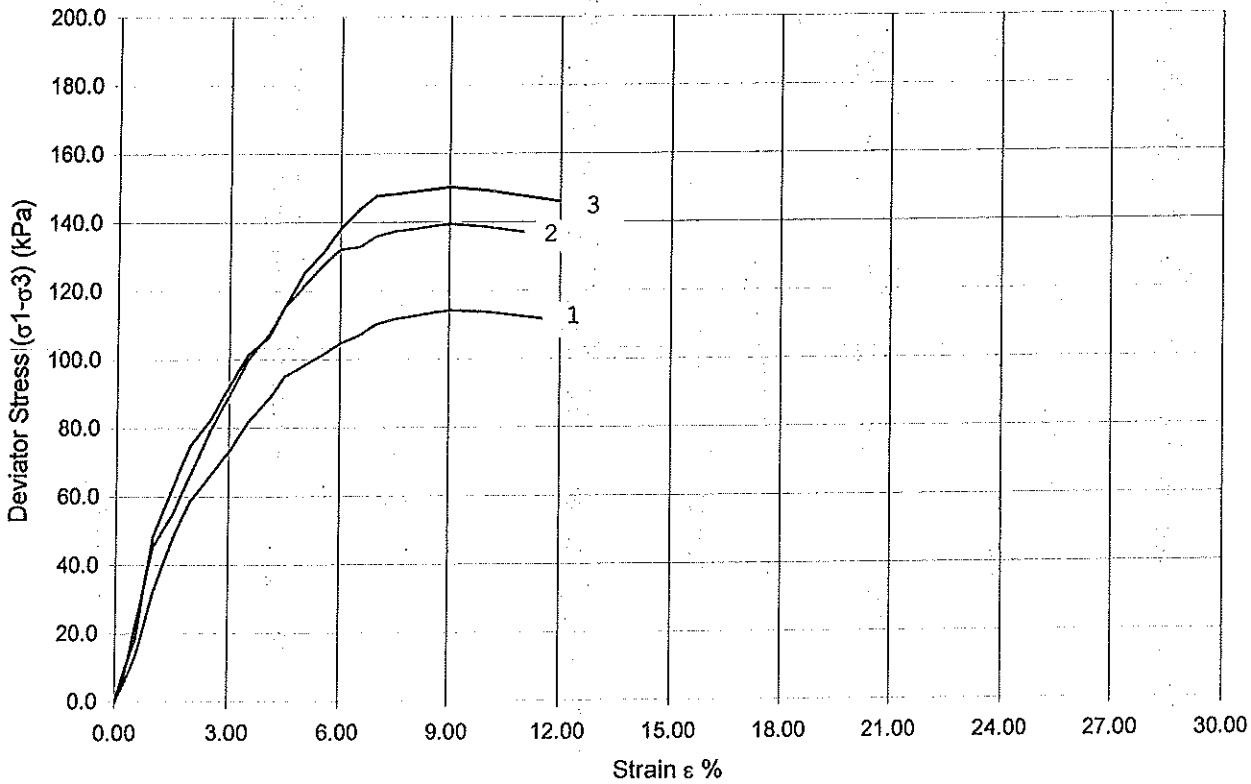
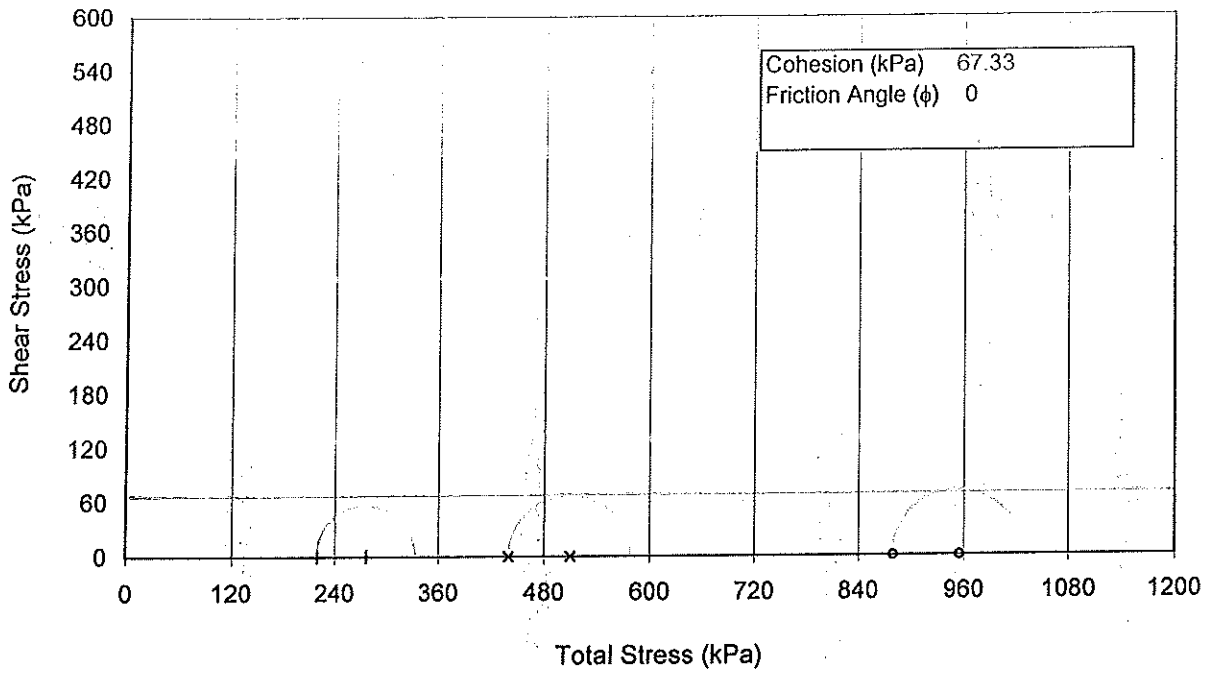
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Sample : UD2
 Borehole : BH37
 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

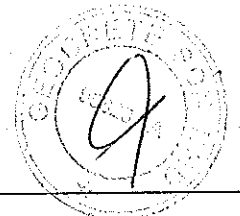
Date of Test : 01.02.19

Sample : UD2

Borehole : BH37

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	09.02.19
Sample No.	BH37 / UD2 / 24.00m	Test Started	29.01.19
Soil Description	Grey sandy CLAY	Ring No.	7

BEFORE TEST

Moist. Content from trimmings:	=	39 %	SG (Measured)	=	2.680
Wt of sample + Ring	=	127.94 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.44 gm	Area (A)	=	1964 mm ²
Wt of sample	=	66.5 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	48.40 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	18.1 gm	Bulk Density (P)	=	1.693 Mg/m ³
Initial Moisture Content, M _o	=	37 %	Dry Density (PD)	=	1.232 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.1753			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	85 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1088 mm ⁻¹			
Height of Solid H _s	=	9.194 mm			

AFTER TEST

Wt of sample + Ring	=	126.34 gm	Overall settlement	=	1.302 mm
Wt of Dry sample + Ring	=	109.84 gm	Volume Change	=	2.558 cm ³
Wt of Ring	=	61.44 gm	Final Volume	=	36.73 cm ³
Wt of Wet sample	=	64.90 gm	Final Bulk Density	=	1.767 Mg/m ³
Wt of Dry sample	=	48.40 gm	Final Dry Density	=	1.318 Mg/m ³
Wt of Moisture	=	16.50 gm	Final Void Ratio, e _f	=	1.0337
Final Moisture Content, M _f	=	34 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	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

Sample No

CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
BH37 / UJ2 / 24.00m

Date of Report

09.02.19

Test started

29.01.19

Ring No.

7

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 ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	Cc	
0	20.000	0.000	0.0000	1.1753	0.0000	0					
12.5	19.874	0.126	0.0137	1.1616	0.0137	12.5	0.5076	1.21	36.46		-0.0455
25.0	19.804	0.196	0.0213	1.1540	0.0076	12.5	0.2830	1.69	25.85		-0.0253
50.0	19.722	0.278	0.0302	1.1451	0.0089	25.0	0.1664	1.69	25.65		-0.0296
100	19.602	0.398	0.0433	1.1320	0.0131	50.0	0.1225	1.69	25.39		-0.0434
200	19.462	0.538	0.0585	1.1168	0.0152	99.9	0.0720	2.56	16.54		-0.0506
400	19.272	0.728	0.0792	1.0961	0.0207	199.8	0.0493	1.21	34.41		-0.0687
800	19.000	1.000	0.1088	1.0666	0.0296	400.7	0.0357	1.44	28.23		-0.0983
1600	18.690	1.310	0.1425	1.0328	0.0337	799.4	0.0207	1.69	23.33		-0.1120
3200	18.336	1.664	0.1810	0.9943	0.0385	1599.8	0.0121	3.24	11.74		-0.1279
1600	18.412	1.588	0.1727	1.0026	-0.0083	-1599.8					
400	18.578	1.422	0.1547	1.0207	-0.0181	-1200.1					
100	18.698	1.302	0.1416	1.0337	-0.0131	-299.8					

Operator

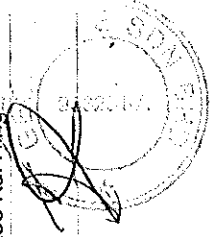
Shyam Nath

Checked

Chris

Approved

Lee Kai Hing



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

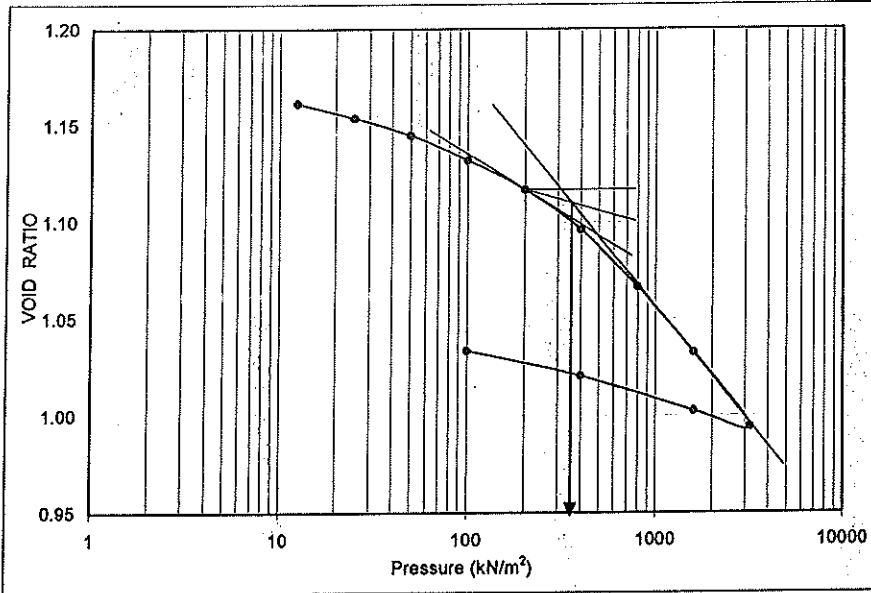
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH37 / UD2 / 24.00m

SOIL SAMPLE Grey sandy CLAY

Date of Report 09.02.19
 Test started 29.01.19
 Ring No. 7



INITIAL

Water content 37 %

Dry Density 1.23 Mg/m³

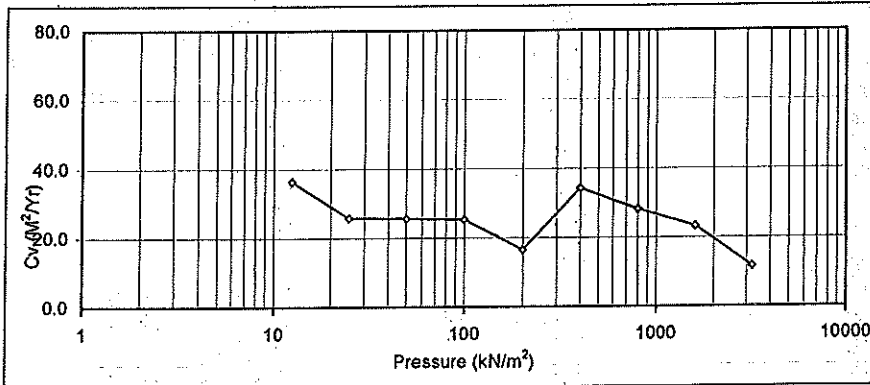
Void Ratio 1.1753

Saturation 85 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.680



FINAL

Water content 34 %

Dry Density 1.32 Mg/m³

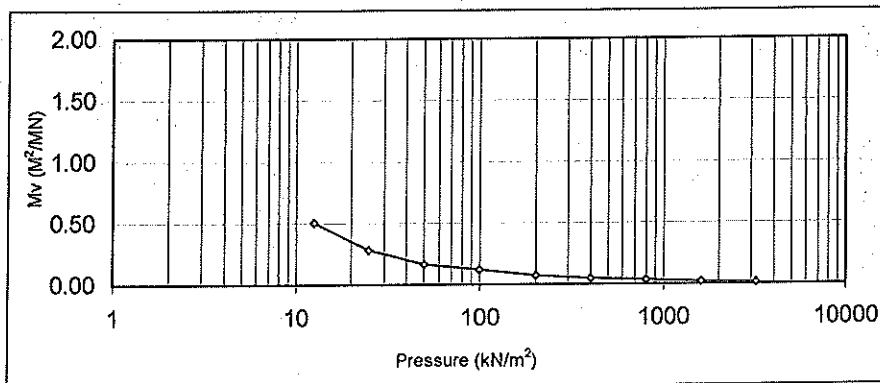
Void Ratio 1.0337

Saturation 88 %

Height 19 mm

Comp. Index, C_c 0.1279

Precons. Load 350 kN/m²



Comp. Ratio, C_R 0.059

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

SUMMARY OF TEST RESULTS

SAMPLE AND SPECIMEN DETAILS		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/081/18/139118 DATE : 08.02.19																					
		Borehole No.	Specimen	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)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)									
		UD1	UD4	UD6	D8	D13	D17	D21	D24	D27	D29	D32	D34																										
BH38	UD1	3.00	76	1.50	1.03	1.17	0.99	25	23	42	15.8	62	37	1	0	2.57						28.55	0				68	0.795	4.2	0.19	0.74	7.4							
	UD4	12.00	42	1.76	1.17	0.99	25	23	42	15.8	43	24	33	0								32.54	0				42	0.549	12.9	0.23	0.60	6.5							
	UD6	18.00	65	1.51	0.99	0.99	25	23	42	15.0	62	37	1	0																									
	D8	21.00	25	NA	NA	NA	NA	NA	NA			17			2.71																								
	D13	28.50	23	NA	NA	NA	NA	NA	NA			18																											
	D17	34.50	42	NA	NA	NA	NA	NA	NA			29	17	0	2.61																								
	D21	40.50	22	NA	NA	NA	NA	NA	NA			9	91	0																									
	D24	45.00	22	NA	NA	NA	NA	NA	NA			9	91	0																									
	D27	49.50	12	2.19	1.97							14	86	0	2.71																								
	D29	52.50	41	NA	NA	NA	NA	NA	NA			40	1	0																									
	D32	57.00	21	NA	NA	NA	NA	NA	NA			25	75	0																									
	D34	60.00	20	NA	NA	NA	NA	NA	NA			27	21	52	0																								

Note : NES = NOT ENOUGH SAMPLE
 NP = NON PLASTIC
 NA = NOT APPLICABLE
 CHKRSD BY: CHRIS
 APPROVED BY: LEE KAI HING
 Remarks * BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE, ONLY AVAILABLE IF REMOULDDED SHEAR BOX TEST WAS CARRIED OUT.



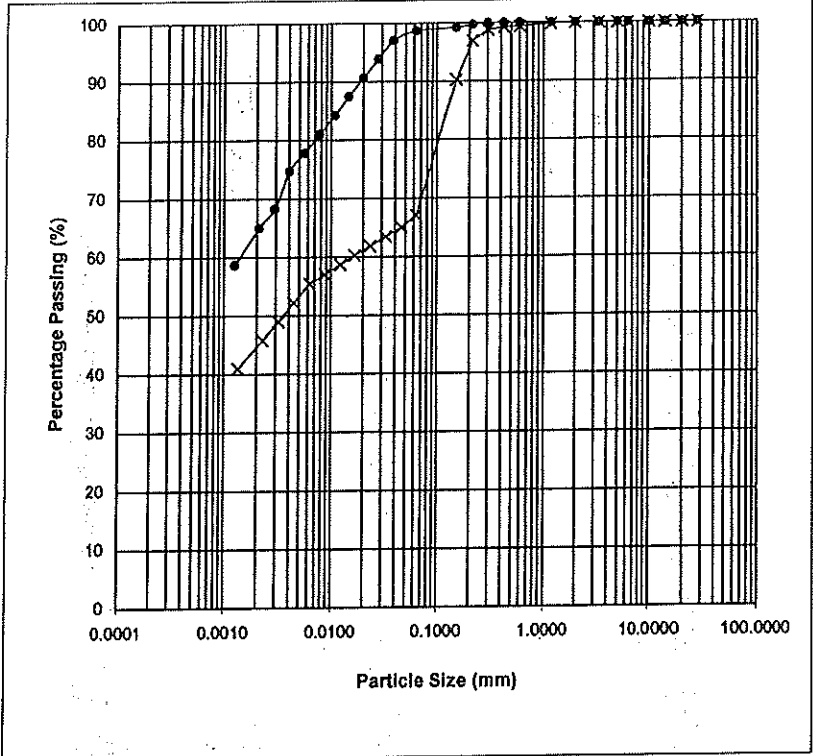
PARTICLE SIZE DISTRIBUTION

(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

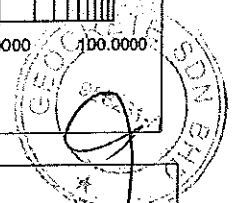
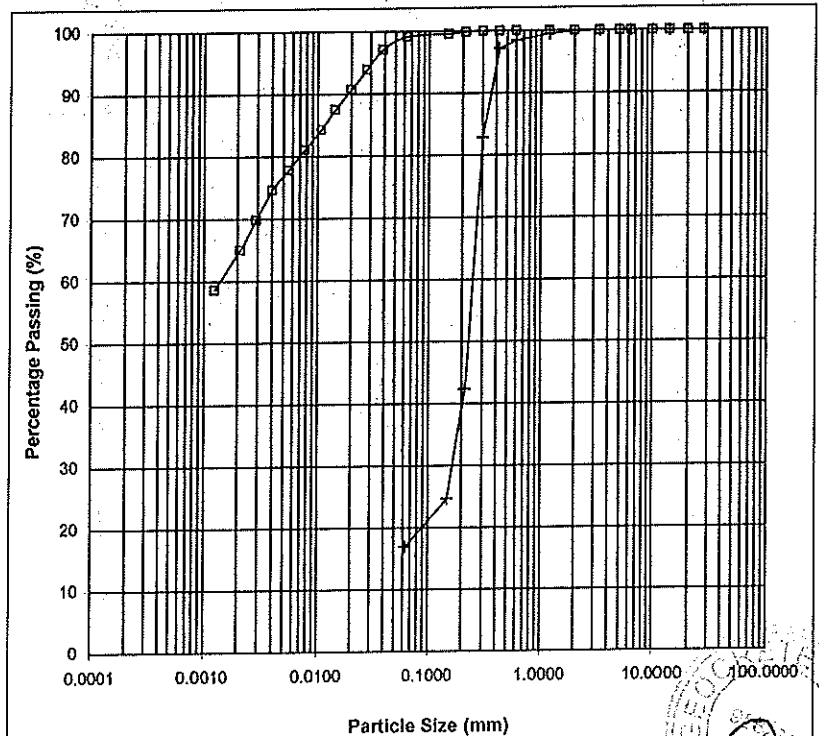
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	100	0.425	99
0.300	100	0.300	99
0.212	100	0.212	97
0.150	99	0.150	90
0.063	99	0.063	67
0.0384	97	0.0459	65
0.0278	94	0.0327	63
0.0200	91	0.0233	62
0.0144	87	0.0166	60
0.0107	84	0.0122	59
0.0077	81	0.0087	57
0.0056	78	0.0062	55
0.0040	75	0.0044	52
0.0029	68	0.0032	49
0.0021	65	0.0023	46
0.0012	59	0.0013	41
Clay (%)		Clay (%)	43
Silt (%)		Silt (%)	24
Sand (%)		Sand (%)	33
Gravel (%)		Gravel (%)	0
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH38	UD1	3.00	30.01.19
X	BH38	UD4	12.00	30.01.19



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	99
0.600	100	0.600	98
0.425	100	0.425	97
0.300	100	0.300	83
0.212	100	0.212	42
0.150	100	0.150	25
0.063	99	0.063	17
0.0384	97		
0.0278	94		
0.0200	91		
0.0144	87		
0.0107	84		
0.0077	81		
0.0056	78		
0.0040	75		
0.0029	70		
0.0021	65		
0.0012	59		
Clay (%)		Clay (%)	17
Silt (%)		Silt (%)	
Sand (%)		Sand (%)	83
Gravel (%)		Gravel (%)	0
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH38	UD6	18.00	30.01.19
+	BH38	D8	21.00	30.01.19



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

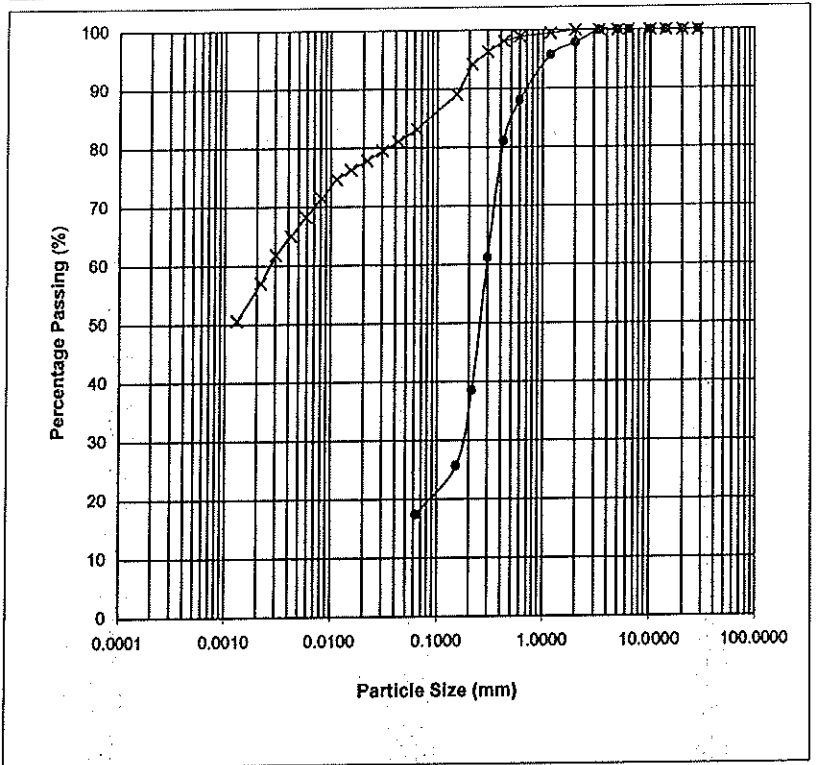
PARTICLE SIZE DISTRIBUTION

(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

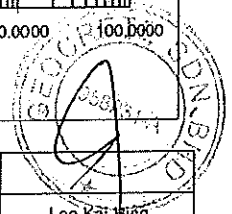
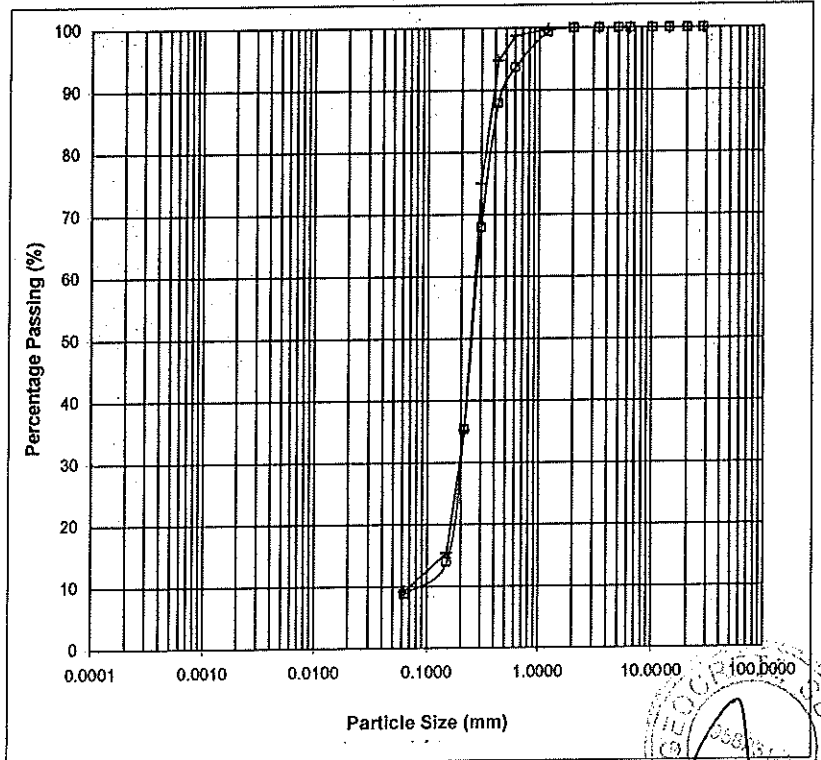
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	98	2.00	100
1.18	96	1.18	99
0.600	88	0.600	99
0.425	81	0.425	98
0.300	61	0.300	96
0.212	39	0.212	94
0.150	26	0.150	89
0.063	17	0.063	83
		0.0424	81
		0.0302	79
		0.0215	78
		0.0154	76
		0.0113	75
		0.0081	71
		0.0058	68
		0.0042	65
		0.0030	62
		0.0022	57
		0.0013	51
Clay (%)	18	Clay (%)	54
Silt (%)		Silt (%)	28
Sand (%)	80	Sand (%)	17
Gravel (%)	2	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH38	D13	28.50	30.01.19
X	BH38	D17	34.50	30.01.19



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	94	0.600	99
0.425	88	0.425	95
0.300	68	0.300	75
0.212	35	0.212	35
0.150	14	0.150	15
0.063	9	0.063	9
Clay (%)	9	Clay (%)	9
Silt (%)		Silt (%)	
Sand (%)	91	Sand (%)	91
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH38	D21	40.50	30.01.19
+	BH38	D24	45.00	30.01.19



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

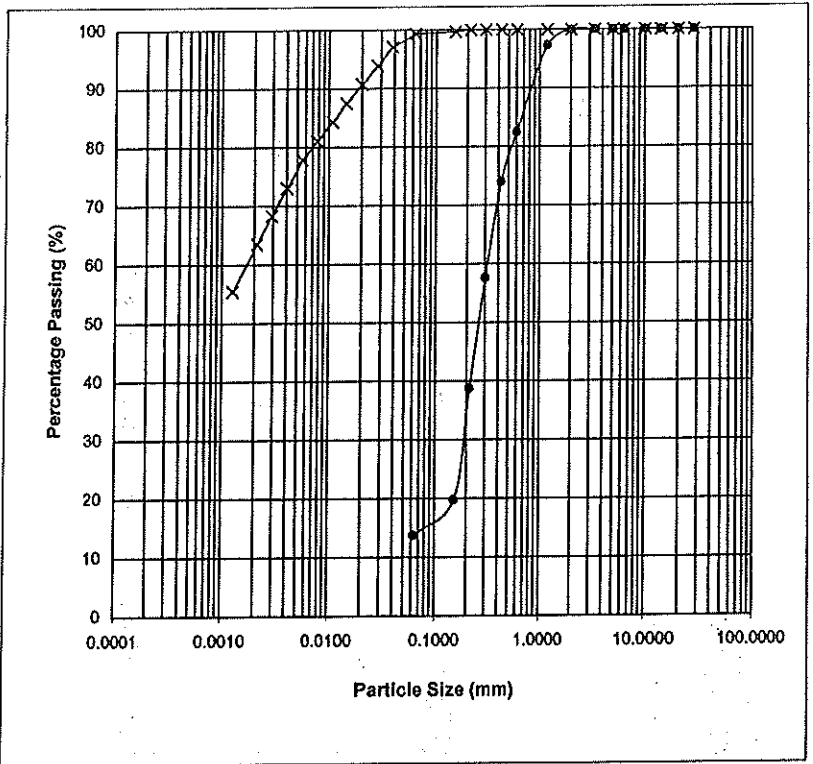
PARTICLE SIZE DISTRIBUTION

(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

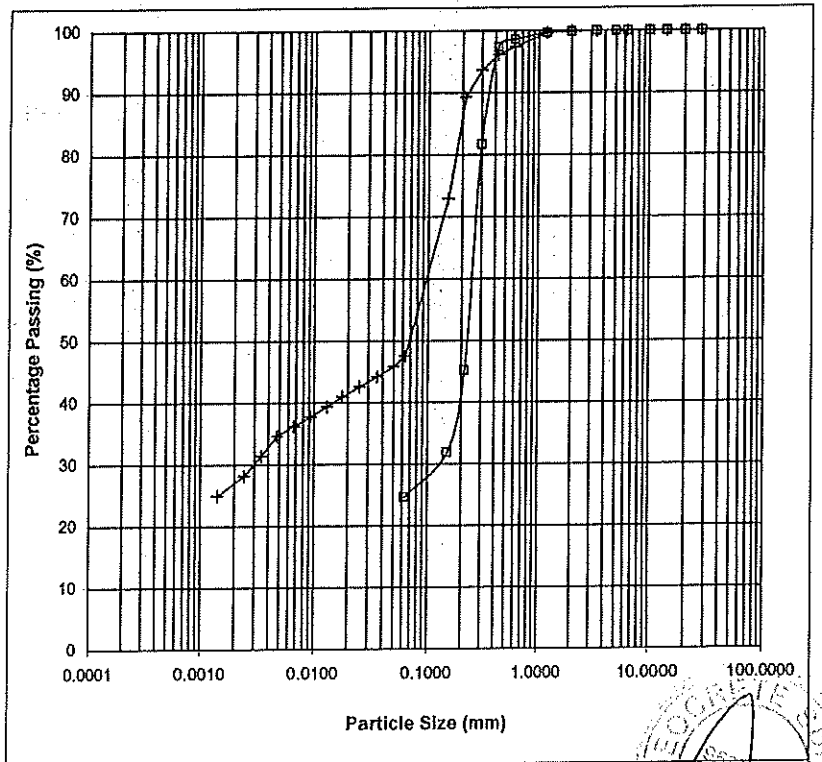
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	97	1.18	100
0.600	82	0.600	100
0.425	74	0.425	100
0.300	58	0.300	100
0.212	39	0.212	100
0.150	20	0.150	100
0.063	14	0.063	99
		0.0384	97
		0.0278	94
		0.0200	91
		0.0144	87
		0.0107	84
		0.0077	81
		0.0056	78
		0.0040	73
		0.0029	68
		0.0021	63
		0.0013	55
Clay (%)	14	Clay (%)	59
Silt (%)		Silt (%)	40
Sand (%)	86	Sand (%)	1
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH38	D27	49.50	30.01.19
X	BH38	D29	52.50	30.01.19



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	97
0.425	97	0.425	96
0.300	82	0.300	94
0.212	45	0.212	89
0.150	32	0.150	73
0.063	25	0.063	48
		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	31
		0.0024	28
		0.0014	25
Clay (%)	25	Clay (%)	27
Silt (%)		Silt (%)	21
Sand (%)	75	Sand (%)	52
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH38	D32	57.00	30.01.19
+	BH38	D34	60.00	30.01.19



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

Total Stress Triaxial Compression

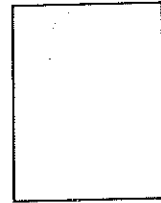
Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Greenish 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)	125.63	128.88	130.70
Bulk Density ρ (Mg/m ³)	1.458	1.496	1.517
Particle Density ρ_s	2.57	2.57	2.57

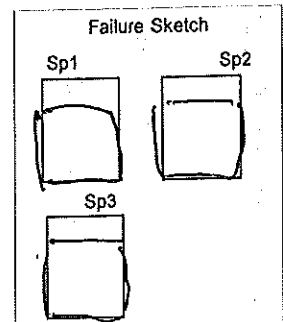


Initial Conditions

	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 %	47	45	43
Dry Density ρ_{d0} (Mg/m ³)	0.99	1.03	1.06
Voids Ratio e_0	1.59	1.48	1.42
Deg of Saturation S_0 %	75.76	77.26	77.43

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	51.60	56.43	63.29
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	51.40	56.23	63.09
Strain at Failure ϵ_f %	10.53	9.01	10.99
Shear Strength c_u (kPa)	25.80	28.21	31.65
Moisture Content w_f %	47	45	43
Dry Density ρ_{df} (Mg/m ³)	0.99	1.03	1.06
Voids Ratio e_f	1.59	1.48	1.42
Deg of Saturation S_f %	75.76	77.26	77.43



Notes : Plastic Plastic Plastic

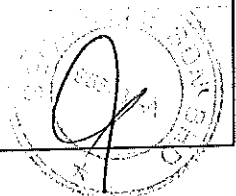
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 31.01.19

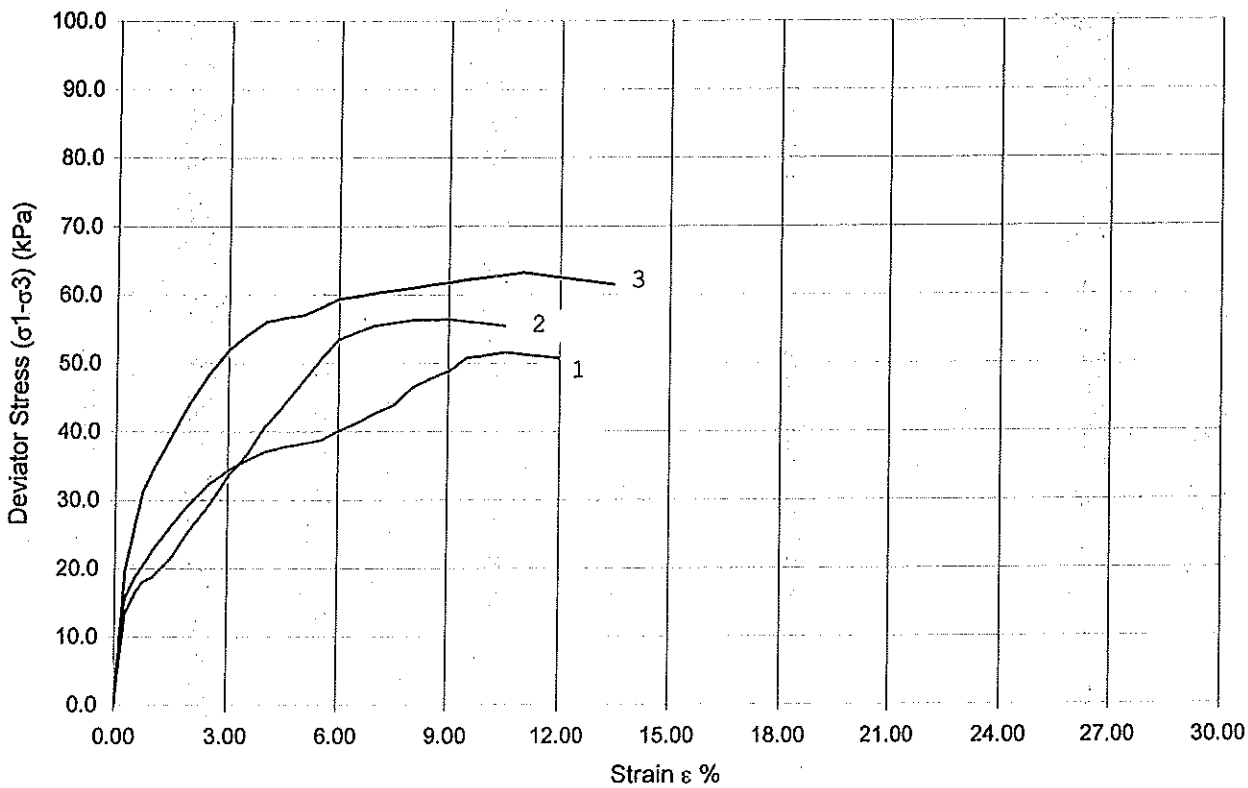
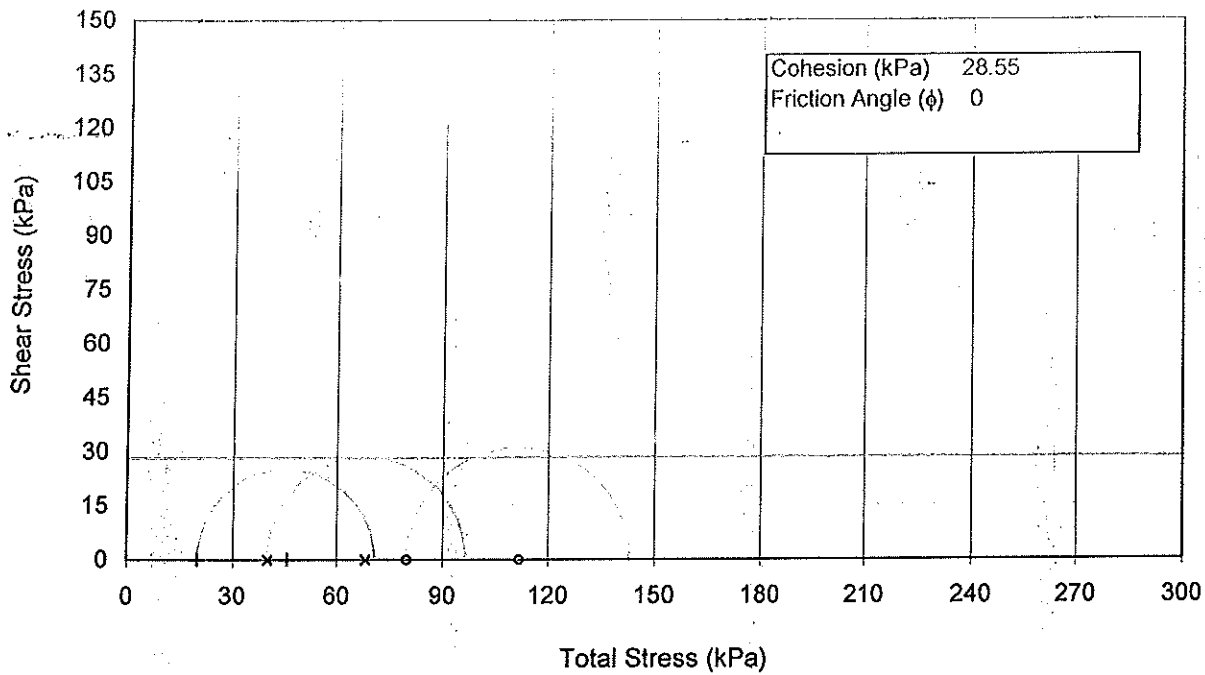
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator : Shyam Nath
 Checked : Chris

Sample : UD1
 Borehole : BH38
 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

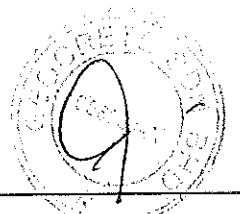
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 31.01.19

Sample : UD1
Borehole : BH38

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained

Sample details

Depth : 18.00m
 Description : Greenish grey CLAY

Sketch showing specimen location in original sample

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)	128.91	130.15	131.34
Bulk Density ρ (Mg/m ³)	1.496	1.511	1.525
Particle Density ρ_s	2.57	2.57	2.57



Initial Conditions

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

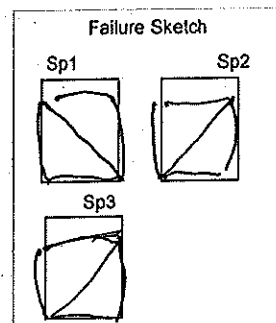
Strain Channel

Load Channel	14391	14391	14391
--------------	-------	-------	-------

Moisture Content w_0 %	53	52	51
Dry Density ρ_{d0} (Mg/m ³)	0.98	0.99	1.01
Voids Ratio e_0	1.62	1.59	1.55
Deg of Saturation S_0 %	83.34	84.49	85.10

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	53.91	62.90	78.43
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	53.71	62.70	78.23
Strain at Failure ϵ_f %	9.01	8.49	5.00
Shear Strength c_u (kPa)	26.96	31.45	39.22



Moisture Content w_f %	53	52	51
Dry Density ρ_{df} (Mg/m ³)	0.98	0.99	1.01
Voids Ratio e_f	1.62	1.59	1.55
Deg of Saturation S_f %	83.34	84.49	85.10

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 :

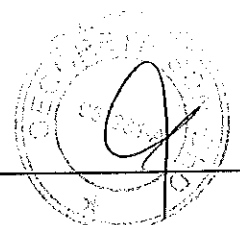
31.01.19

Sample : UD6

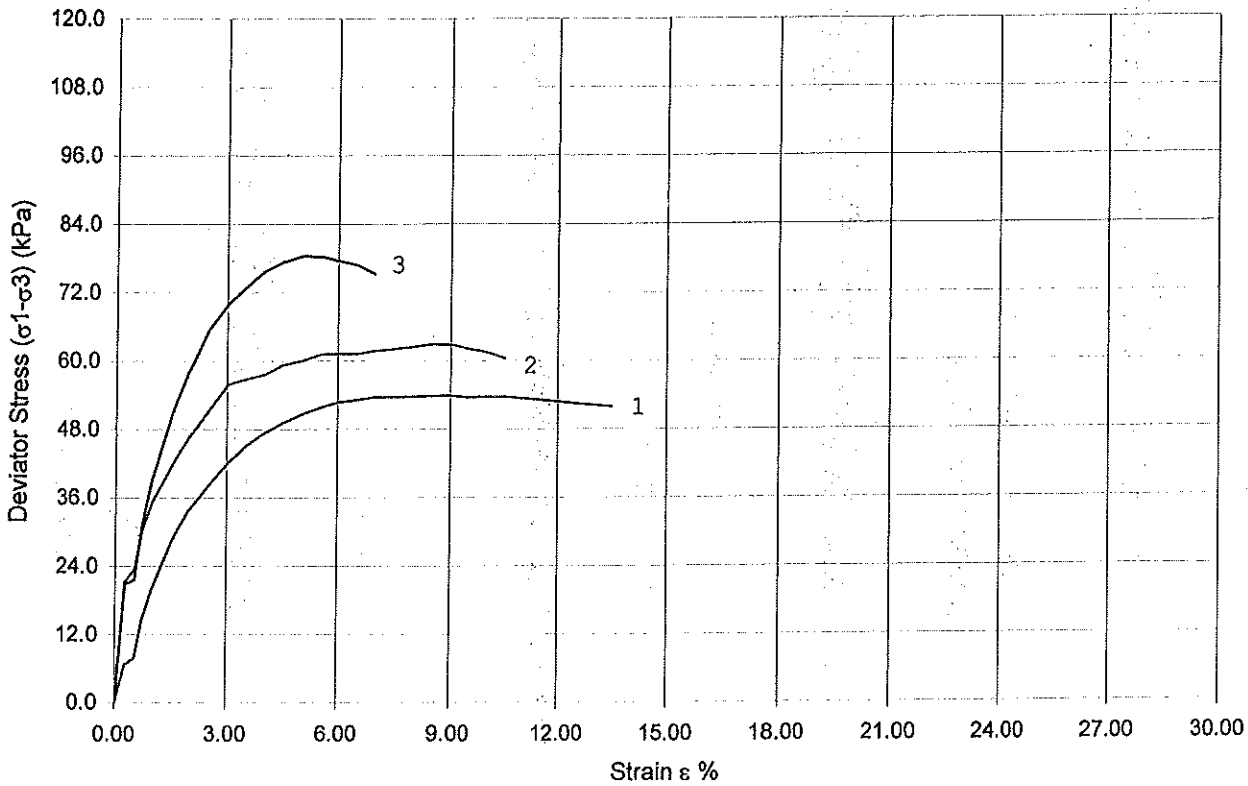
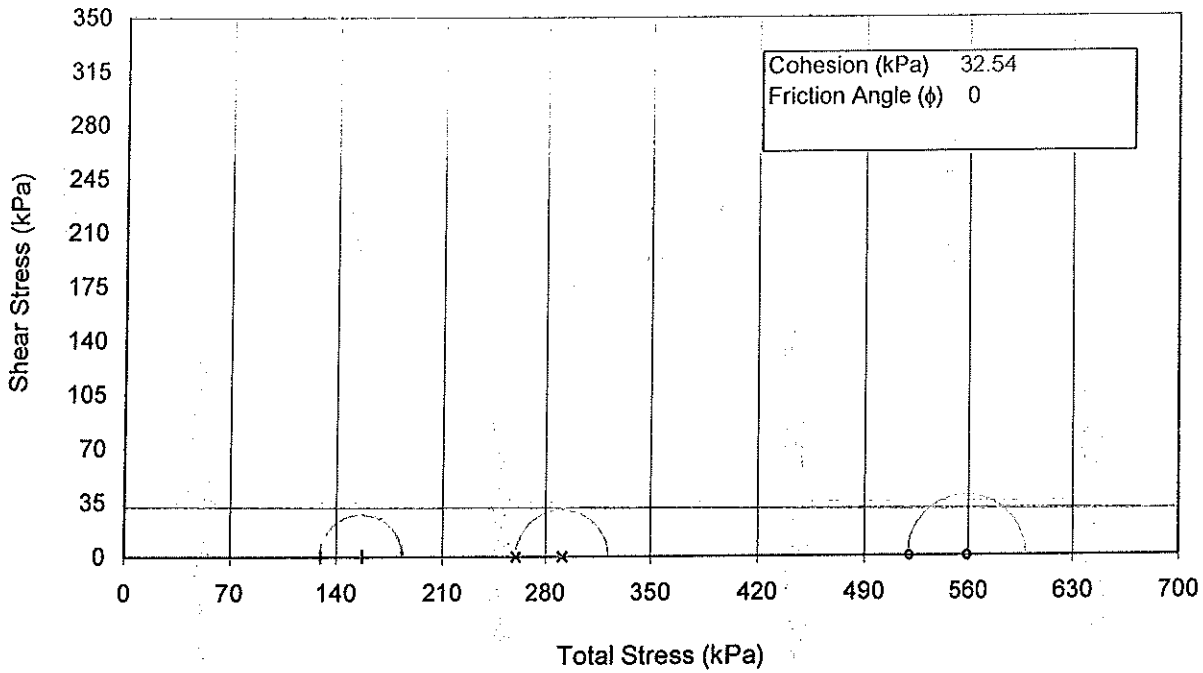
Borehole : BH38

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 : 31.01.19
 Sample : UD6
 Borehole : BH38
 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 38 / D 27 (49.50 m)

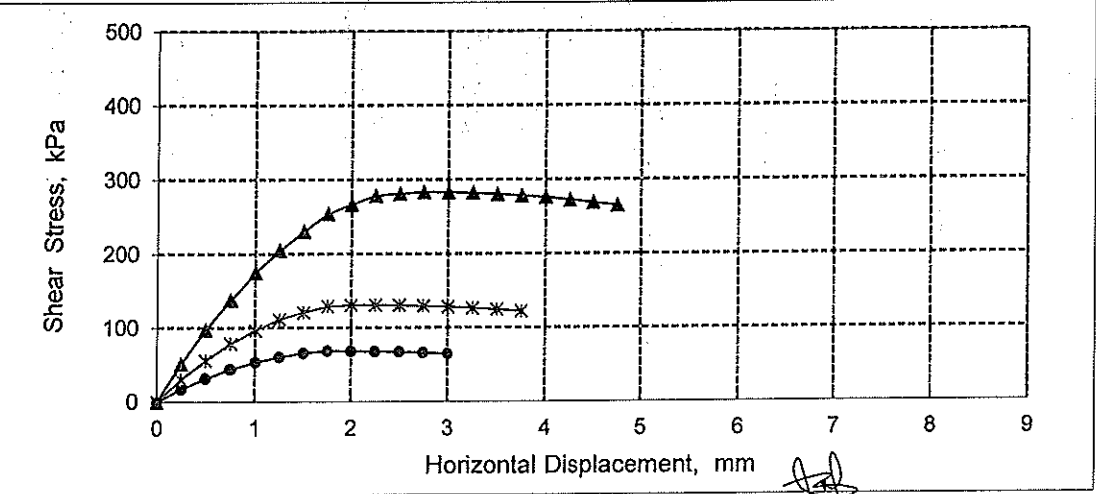
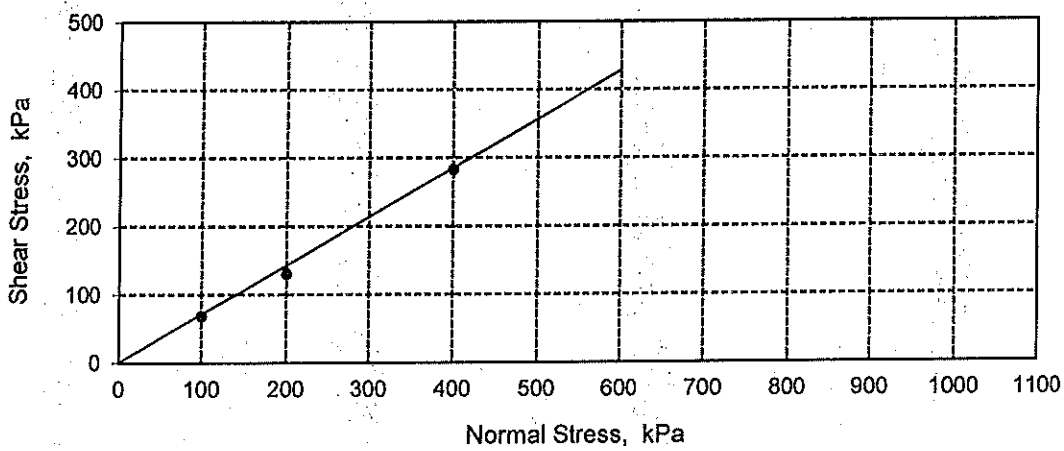
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 2 / 2 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		158.1	157.5	157.0
Moisture Content (%)		10.7	11.2	11.5
Bulk Density (Mg/m ³)		2.196	2.187	2.181
Dry Density (Mg/m ³)		1.984	1.967	1.956
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		68.7	130.7	283.5
Displ. at Failure (mm)		1.8	2.0	2.8
Settlement (mm)		0.2	0.4	0.7

c' 1 kPa

φ' 35.5 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	18.02.19
Sample No.	BH38 / UD1 / 3.00m	Test Started	28.01.19
Soil Description	Greenish grey CLAY	Ring No.	3

BEFORE TEST

Moist. Content from trimmings:	=	73 %	SG (Measured)	=	2.570
Wt of sample + Ring	=	115.26 gm	Diameter (D)	=	50 mm
Wt of Ring	=	59.10 gm	Area (A)	=	1964 mm ²
Wt of sample	=	56.16 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	33.46 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	22.7 gm	Bulk Density (P)	=	1.430 Mg/m ³
Initial Moisture Content, M_o	=	68 %	Dry Density (PD)	=	0.852 Mg/m ³
Initial Void Ratio, e_o , $\frac{SG}{P_D} - 1$	=	2.0175			
Initial Saturation, S_o ; $\frac{M_o \times SG}{e_o}$	=	86 %			
V. Ratio Change Factor F_v , $\frac{1+e_o}{H}$	=	0.1509 mm ⁻¹			
Height of Solid H_s	=	6.628 mm			

AFTER TEST

Wt of sample + Ring	=	112.11 gm	Overall settlement	=	2.724 mm
Wt of Dry sample + Ring	=	92.56 gm	Volume Change	=	5.351 cm ³
Wt of Ring	=	59.10 gm	Final Volume	=	33.94 cm ³
Wt of Wet sample	=	53.01 gm	Final Bulk Density	=	1.562 Mg/m ³
Wt of Dry sample	=	33.46 gm	Final Dry Density	=	0.986 Mg/m ³
Wt of Moisture	=	19.55 gm	Final Void Ratio, e_f	=	1.6065
Final Moisture Content, M_f	=	58 %			
Final Saturation, S_o , $\frac{M_f \times SG}{e_f}$	=	93 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



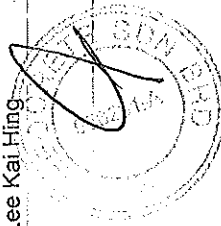
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	18.02.19
Sample No	BH38 / UD1 / 3.00m	Test started	28.01.19
		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)	ΔH (mm)	$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	20.000	0.000	0.0000	2.0175	0.0000	0				
6.25	19.962	0.038	0.0057	2.0117	0.0057	6.25	0.3048	1.69	26.22	-0.0190
12.5	19.880	0.120	0.0181	1.9994	0.0124	6.25	0.6605	5.29	8.33	-0.0411
25.0	19.714	0.286	0.0431	1.9743	0.0250	12.5	0.6741	4.84	8.99	-0.0832
50.0	19.310	0.690	0.1041	1.9134	0.0610	25.0	0.8375	9.00	4.70	-0.2025
100	18.366	1.634	0.2465	1.7709	0.1424	50.0	1.0288	19.36	2.03	-0.4732
200	16.780	3.220	0.4858	1.5317	0.2393	99.9	0.9459	23.04	1.49	-0.7950
100	16.836	3.164	0.4774	1.5401	-0.0084	-99.9				
50	17.038	2.962	0.4469	1.5706	-0.0305	-50.0				
12.5	17.276	2.724	0.4110	1.6065	-0.0359	-37.5				

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



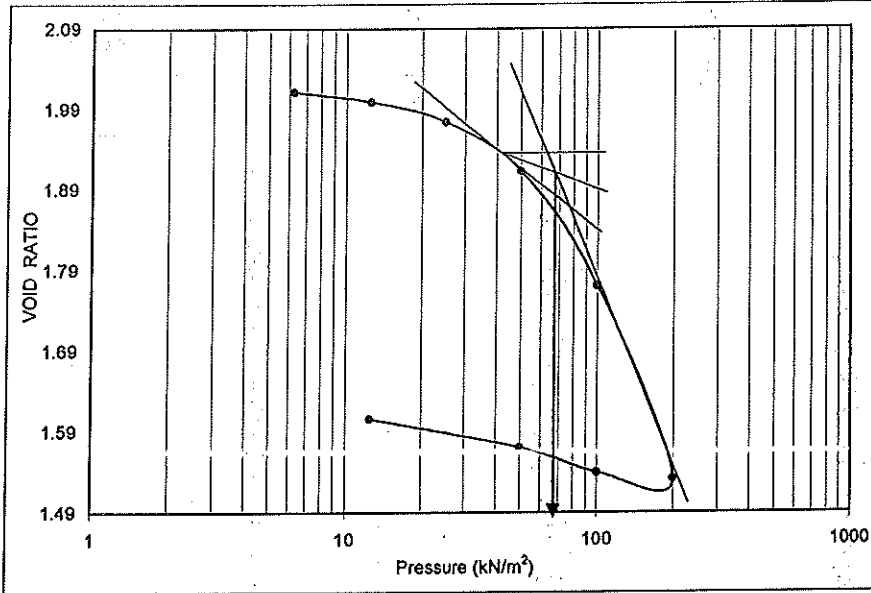
GEOCRETE SDN. BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

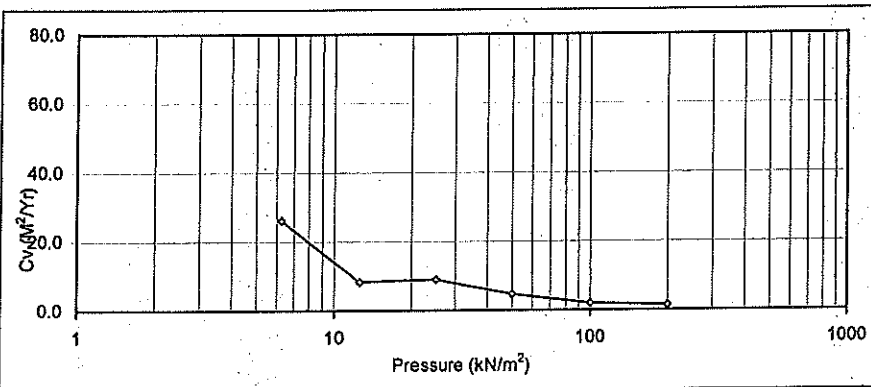
BH REF BH38 / UD1 / 3.00m
 SOIL SAMPLE Greenish grey CLAY

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. 3



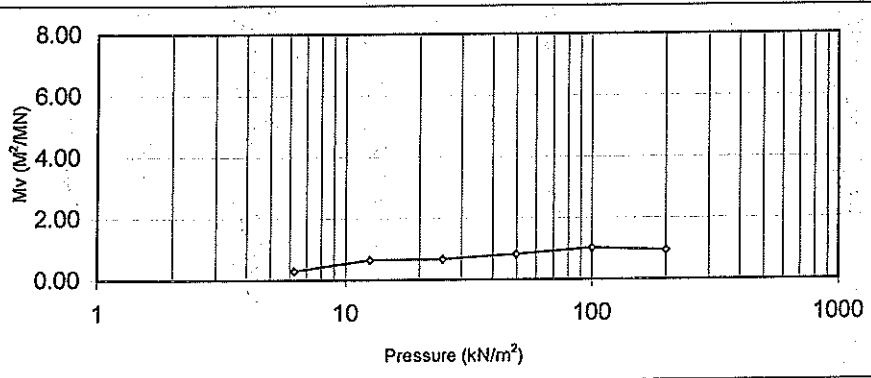
INITIAL

Water content	68	%
Dry Density	0.85	Mg/m ³
Void Ratio	2.0175	
Saturation	86	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.570	



FINAL

Water content	68	%
Dry Density	0.99	Mg/m ³
Void Ratio	1.6065	
Saturation	93	%
Height	17	mm
Comp. Index, C _c	0.7950	
Precons. Load	68	kN/m ²



Comp. Ratio, C_R 0.263



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
Sample No. BH38 / UD6 / 18.00m
Soil Description Greenish grey CLAY

Date of Report 18.02.19
Test Started 28.01.19
Ring No. 4

BEFORE TEST

Moist. Content from trimmings:	=	65 %	SG (Measured)	=	2.570
Wt of sample + Ring	=	115.50 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.91 gm	Area (A)	=	1964 mm ²
Wt of sample	=	56.59 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	36.65 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	19.94 gm	Bulk Density (P)	=	1.440 Mg/m ³
Initial Moisture Content, M_o	=	54 %	Dry Density (PD)	=	0.933 Mg/m ³
Initial Void Ratio, e_o , $\frac{SG}{P_D} - 1$	=	1.7548			
Initial Saturation, S_o ; $\frac{M_o \times SG}{e_o}$	=	80 %			
V. Ratio Change Factor F_v , $\frac{H}{1+e_o}$	=	0.1377 mm ⁻¹			
Height of Solid H_s	=	7.260 mm			

AFTER TEST

Wt of sample + Ring	=	114.70 gm	Overall settlement	=	2.060 mm
Wt of Dry sample + Ring	=	95.56 gm	Volume Change	=	4.046 cm ³
Wt of Ring	=	58.91 gm	Final Volume	=	35.24 cm ³
Wt of Wet sample	=	55.79 gm	Final Bulk Density	=	1.583 Mg/m ³
Wt of Dry sample	=	36.65 gm	Final Dry Density	=	1.040 Mg/m ³
Wt of Moisture	=	19.14 gm	Final Void Ratio, e_f	=	1.4711
Final Moisture Content, M_f	=	52 %			
Final Saturation, S_o , $\frac{M_f \times SG}{e_f}$	=	91 %			

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 BH38 / UD6 / 18.00m

Date of Report

18.02.19

Test started

28.01.19

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		
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	COMPRESSION INDEX	Cc
0	0.000	20.000	0.0000	1.7548	0.0000	0					
6.25	0.062	19.938	0.0085	1.7463	0.0085	6.25	0.4979	9.61	4.61		-0.0284
12.5	0.240	19.760	0.0331	1.7218	0.0245	6.25	1.4424	16.00	2.73		-0.0815
25.0	0.592	19.408	0.0815	1.6733	0.0485	12.5	1.4521	10.89	3.91		-0.1611
50.0	1.300	18.700	0.1791	1.5768	0.0975	25.0	1.5156	25.00	1.61		-0.3240
100	2.500	17.500	0.3444	1.4105	0.1653	50.0	1.3725	59.29	0.61		-0.5491
50	2.422	17.578	0.3336	1.4212	-0.0107	-50.0					
25	2.238	17.762	0.3083	1.4466	-0.0253	-25.0					
12.5	2.060	17.940	0.2837	1.4711	-0.0245	-12.5					

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

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



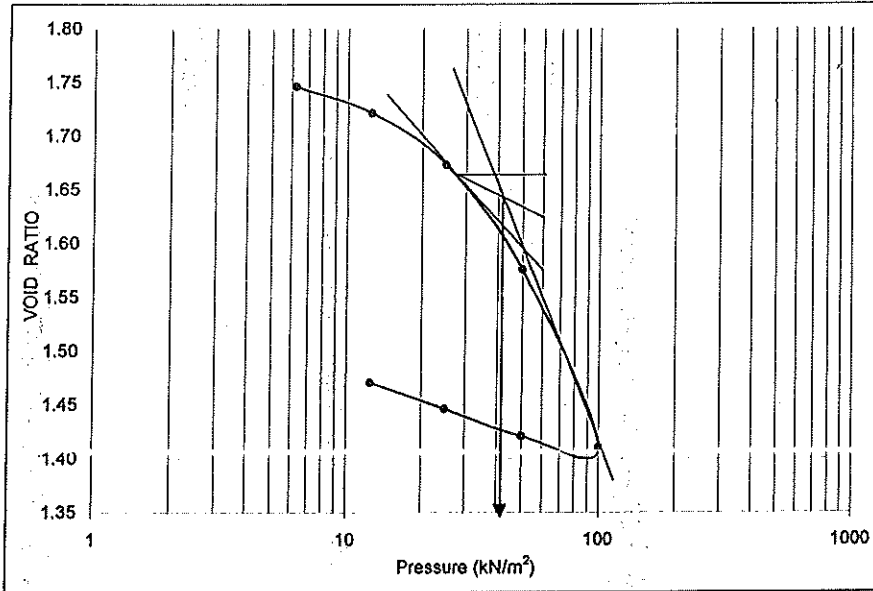
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH38 / UD6 / 18.00m

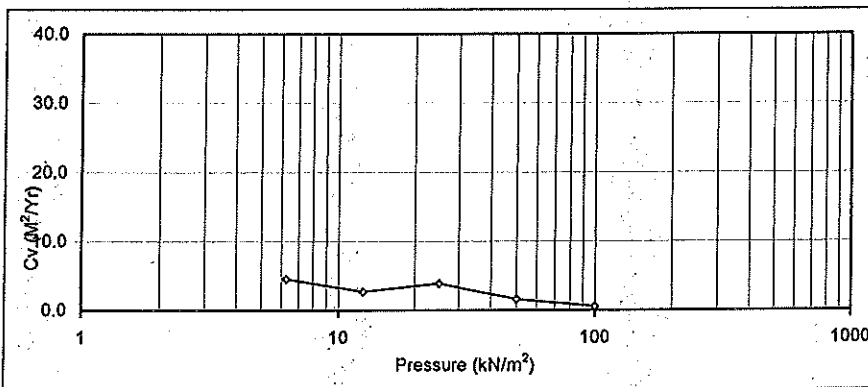
SOIL SAMPLE Greenish grey CLAY

Date of Report 18.02.19
 Test started 28.01.19
 Ring No. 4



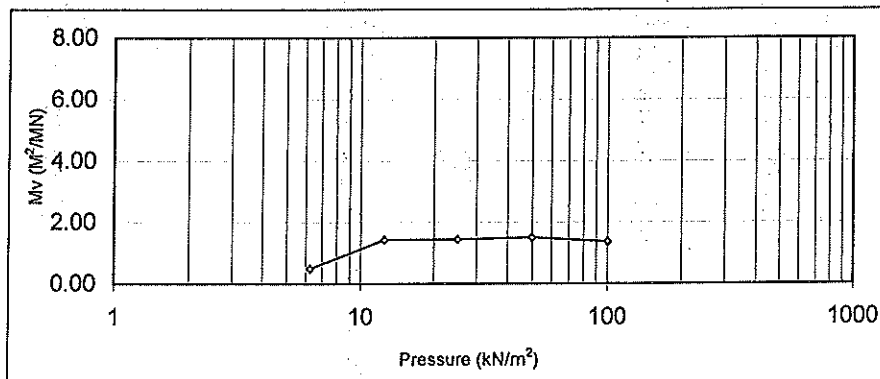
INITIAL

Water content	54	%
Dry Density	0.93	Mg/m ³
Void Ratio	1.7548	
Saturation	80	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.570	



FINAL

Water content	52	%
Dry Density	1.04	Mg/m ³
Void Ratio	1.4711	
Saturation	91	%
Height	18	mm
Comp. Index, Cc	0.5491	
Precons. Load	42	kN/m ²



Comp. Ratio, C_R 0.199



SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)		PROJECT :															REF : L/081/18/139/18 DATE : 11.02.19																				
SAMPLE AND SPECIMEN DETAILS.		PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR																																			
Borehole No.	Specimen	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)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)									
BH39	D1	1.50	19	NA	NA					20	80	0																									
	UD1	3.00	55	1.68	1.07	33	50	15.5	0	37	4	0	2.58		19.12	0				180	0.870			2.0	0.16	0.55							7.9				
	UD3	10.50	30	1.90	1.50	24	37	12.0	0	43	24	0			71.02	0				190	0.307																
	UD5	16.50	78	1.62	0.97	31	44	14.3	0	54	5	0	2.58																								
	UD6	19.50																																			
	D8	21.00	1.89	1.58							13	79	8																								
	D10	24.00	20	NA	NA						16	81	3																								
	D14	30.00	18	NA	NA						8	92	0	2.71																							
	D17	34.50	20	NA	NA						18	79	3																								
	D20	39.00	19	NA	NA						8	92	0																								
	D24	45.00	20	NA	NA						14	83	3																								
	D29	52.50	55	NA	NA	68	27	41	12.7	57	41	2	2.60																								
	D31	55.50				53	23	30																													
	D34	60.00	17	NA	NA						10	88	2																								



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

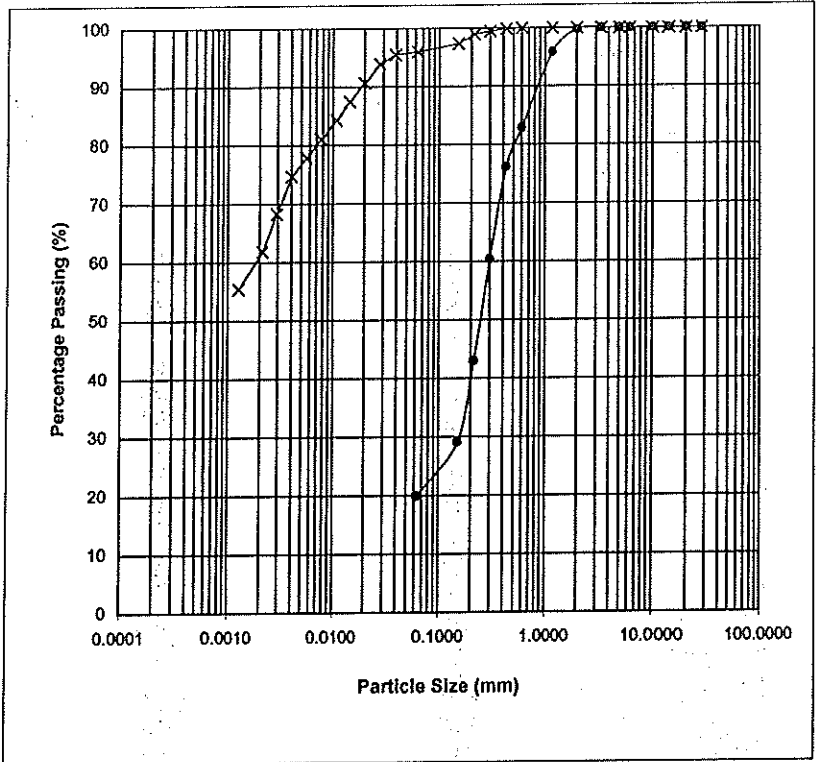
PARTICLE SIZE DISTRIBUTION

(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

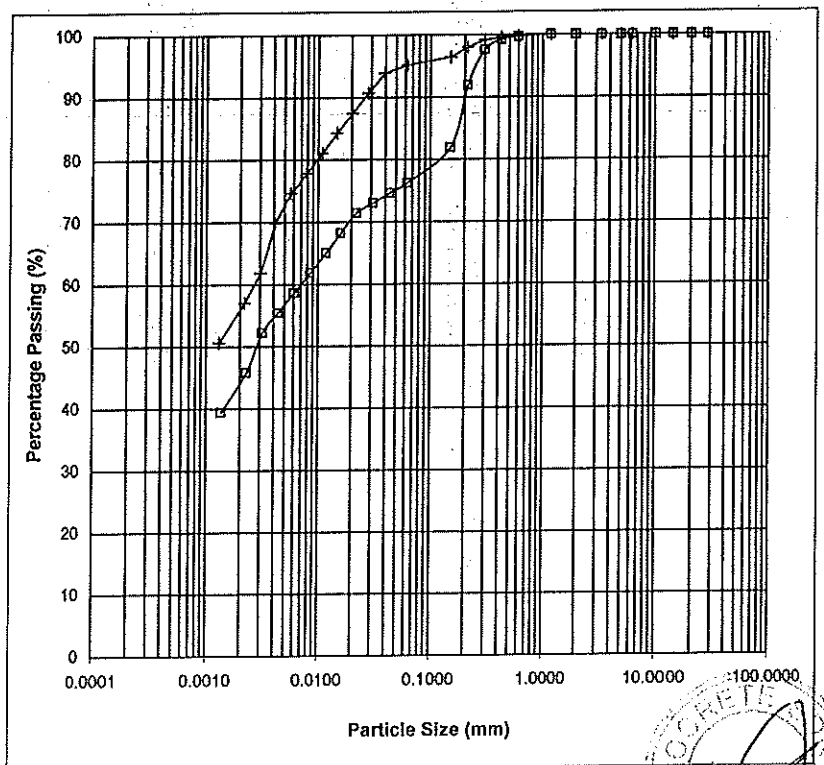
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	96	1.18	100
0.600	83	0.600	100
0.425	76	0.425	100
0.300	60	0.300	99
0.212	43	0.212	99
0.150	29	0.150	97
0.063	20	0.063	96
		0.0389	96
		0.0278	94
		0.0200	91
		0.0144	87
		0.0107	84
		0.0077	81
		0.0056	78
		0.0040	75
		0.0029	68
		0.0021	62
		0.0013	55
Clay (%)		Clay (%)	59
Silt (%)	20	Silt (%)	37
Sand (%)	80	Sand (%)	4
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH39	D1	1.50	31.01.19
X	BH39	UD1	3.00	31.01.19



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	98	0.300	99
0.212	92	0.212	98
0.150	82	0.150	96
0.063	76	0.063	95
0.0438	75	0.0393	94
0.0312	73	0.0283	91
0.0223	71	0.0204	87
0.0160	68	0.0147	84
0.0119	65	0.0109	81
0.0085	62	0.0079	78
0.0061	59	0.0057	75
0.0044	55	0.0041	70
0.0031	52	0.0030	62
0.0023	46	0.0022	67
0.0013	39	0.0013	51
Clay (%)	43	Clay (%)	54
Silt (%)	33	Silt (%)	41
Sand (%)	24	Sand (%)	5
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH39	UD3	10.50	31.01.19
+	BH39	UD5	16.50	31.01.19



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

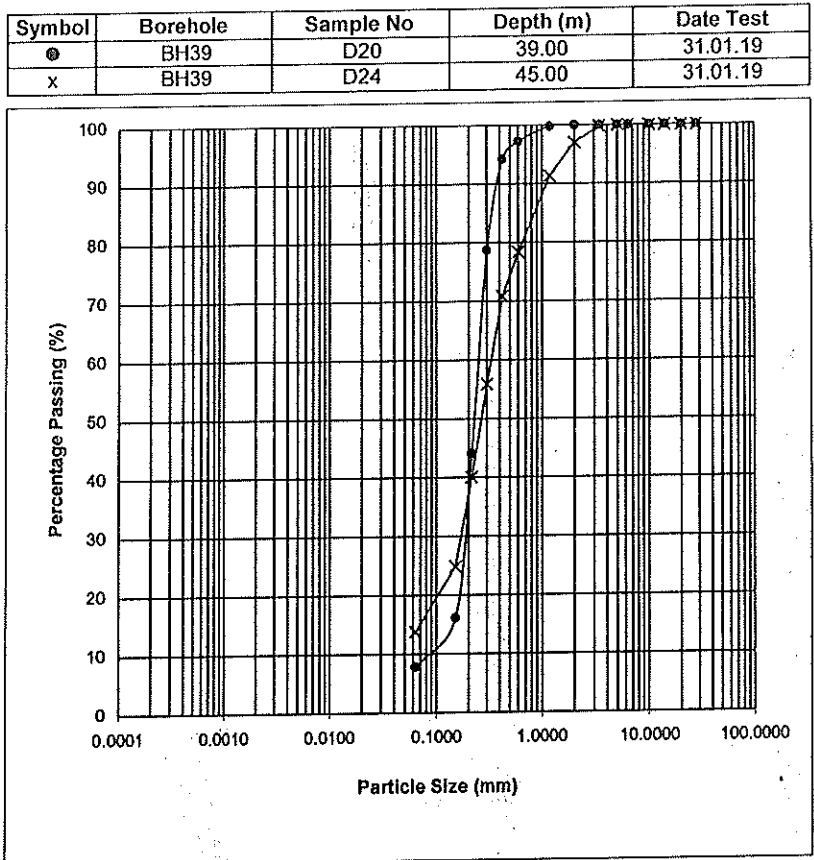
PARTICLE SIZE DISTRIBUTION

(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

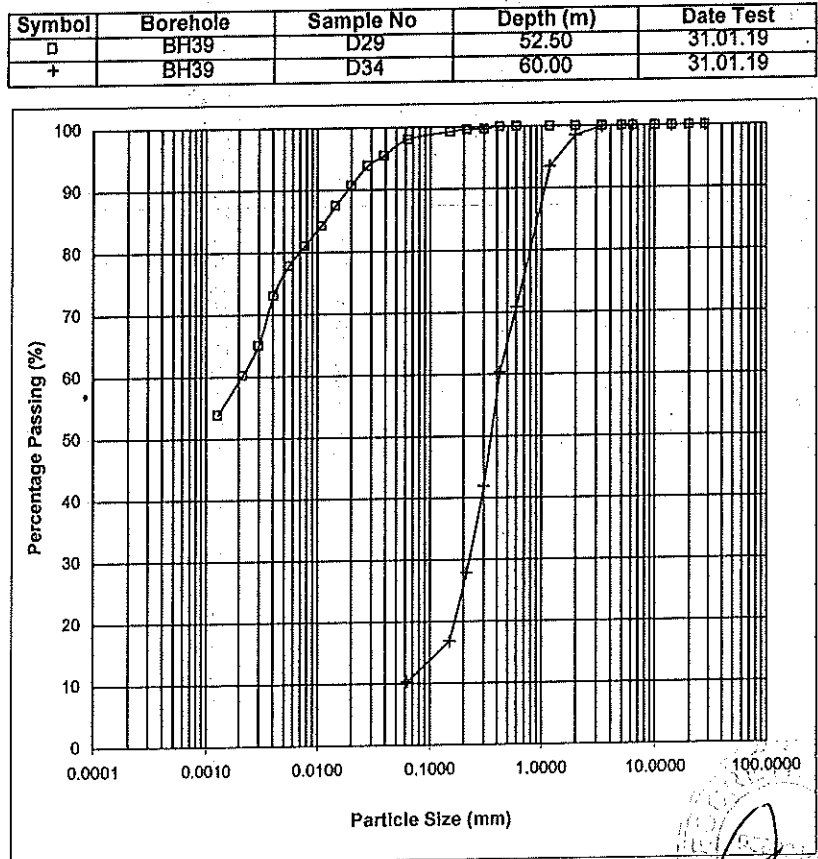
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	97
1.18	100	1.18	91
0.600	97	0.600	78
0.425	94	0.425	71
0.300	79	0.300	56
0.212	44	0.212	40
0.150	16	0.150	25
0.063	8	0.063	14

Clay (%)	8	Clay (%)	14
Silt (%)		Silt (%)	
Sand (%)	92	Sand (%)	83
Gravel (%)	0	Gravel (%)	3
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	99
1.18	100	1.18	94
0.600	100	0.600	71
0.425	100	0.425	60
0.300	100	0.300	42
0.212	100	0.212	28
0.150	99	0.150	17
0.063	98	0.063	10
0.0389	96		
0.0278	94		
0.0200	91		
0.0144	87		
0.0107	84		
0.0077	81		
0.0056	78		
0.0040	73		
0.0030	65		
0.0021	60		
0.0013	54		

Clay (%)	57	Clay (%)	10
Silt (%)	41	Silt (%)	
Sand (%)	2	Sand (%)	88
Gravel (%)	0	Gravel (%)	2
Total (%)	100	Total (%)	100



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.

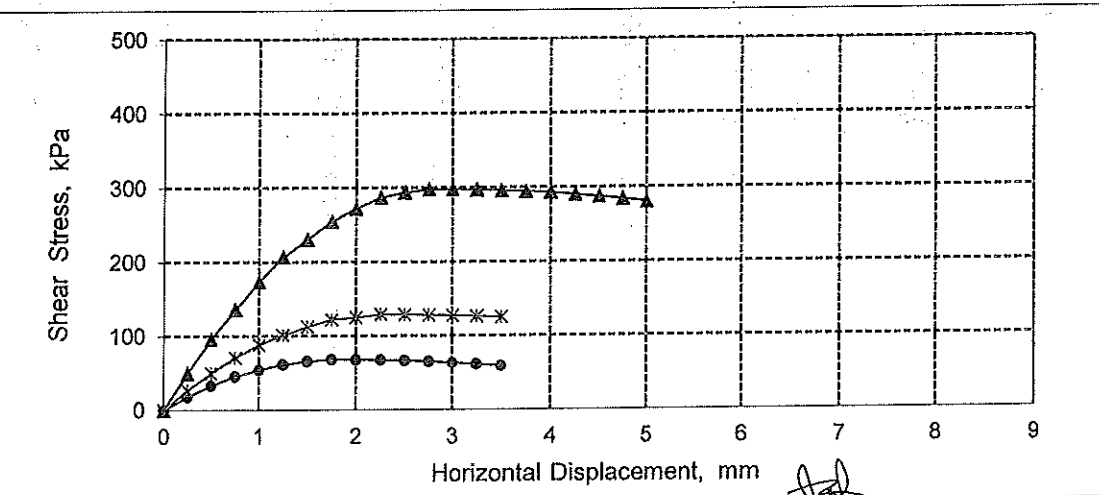
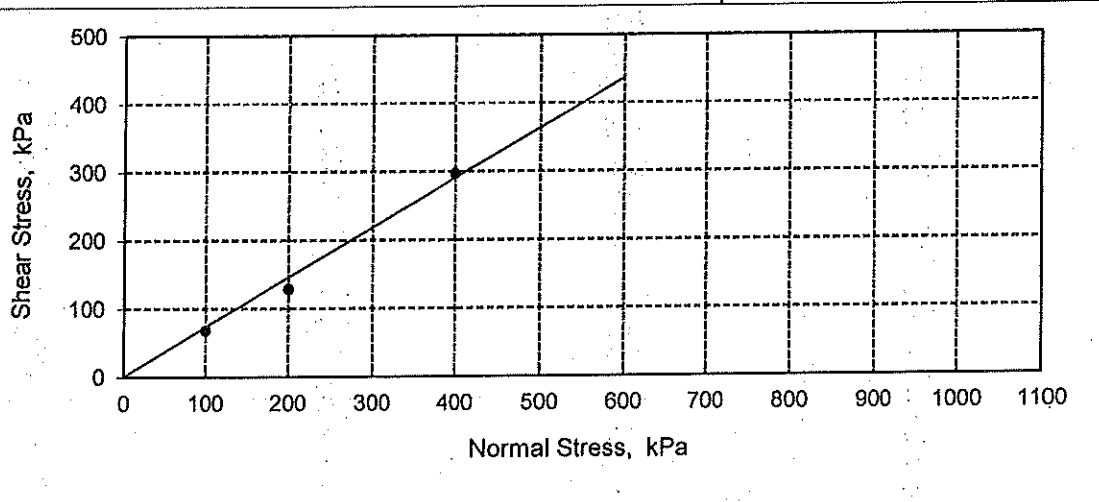
Sample No. : BH 39 / D 8 (21.00 m)

Test Size : 60 mm x 60 mm x 20 mm Date Tested : 12 / 2 / 2019

INITIAL CONDITIONS			
Specimen No.	S 1	S 2	S 3
Specimen Weight (g)	135.8	135.9	135.7
Moisture Content (%)	20.5	19.8	20.0
Bulk Density (Mg/m ³)	1.886	1.887	1.885
Dry Density (Mg/m ³)	1.565	1.575	1.571

SHEARING STAGE			
Normal Stress (kPa)	100	200	400
Max. Shear Stress (kPa)	68.2	129.0	298.0
Displ. at Failure (mm)	1.8	2.3	2.8
Settlement (mm)	0.1	0.2	0.4

	c' 1.5 kPa φ' 36 deg.
--	--



Total Stress Triaxial Compression

Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Greenish 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)	143.02	144.28	146.31
Bulk Density ρ (Mg/m ³)	1.660	1.675	1.698
Particle Density ρ_s	2.58	2.58	2.58



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

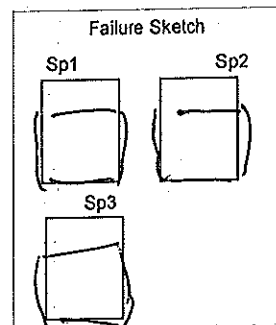
Strain Channel

	Specimen 1	Specimen 2	Specimen 3
Load Channel	14391	14391	14391

Moisture Content w_0 %	57	56	54
Dry Density ρ_{d0} (Mg/m ³)	1.06	1.07	1.10
Voids Ratio e_0	1.44	1.40	1.34
Deg of Saturation S_0 %	102.34	102.99	104.13

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	31.81	36.62	46.27
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	31.61	36.42	46.07
Strain at Failure ϵ_f %	10.53	10.00	8.49
Shear Strength c_u (kPa)	15.90	18.31	23.14



Moisture Content w_f %	57	56	54
Dry Density ρ_{df} (Mg/m ³)	1.06	1.07	1.10
Voids Ratio e_f	1.44	1.40	1.34
Deg of Saturation S_f %	102.34	102.99	104.13

Notes : Plastic Plastic Plastic

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

Test Name : UU

(*delete as appropriate)

Date of Test : 01.02.19

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

Sample : UD1

Borehole : BH39

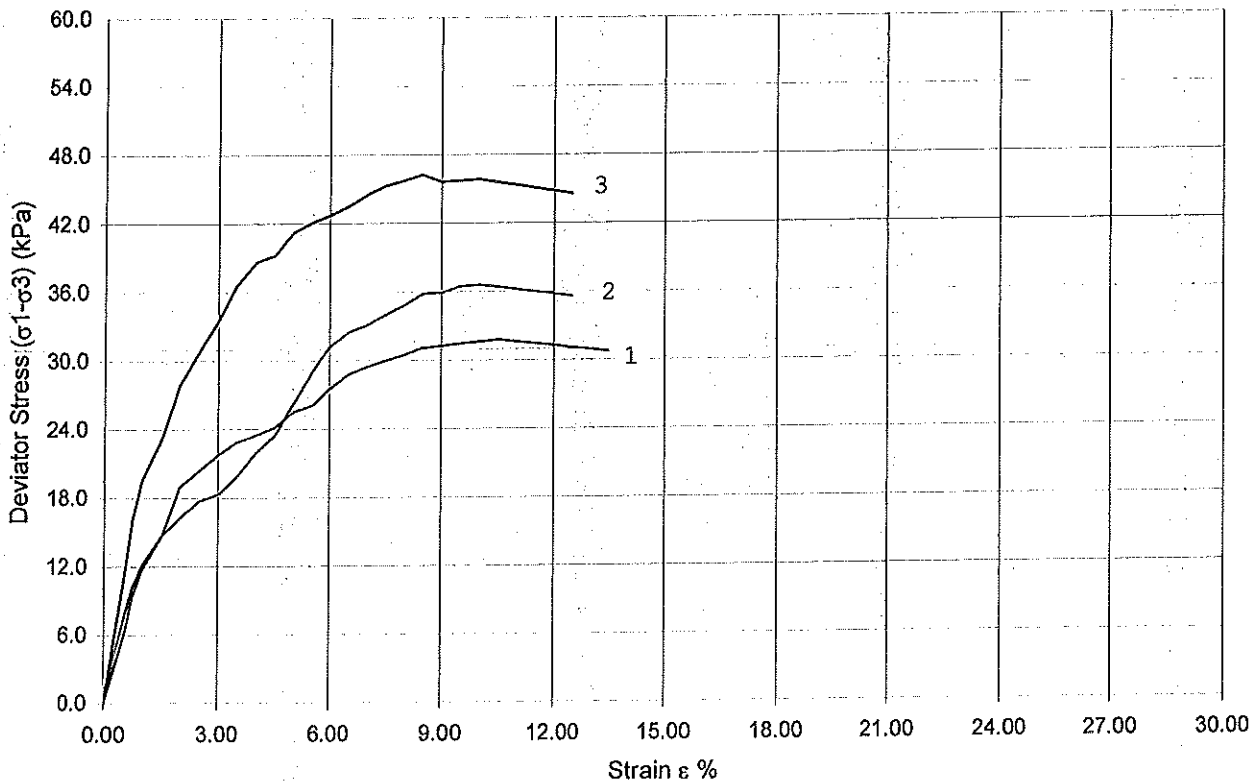
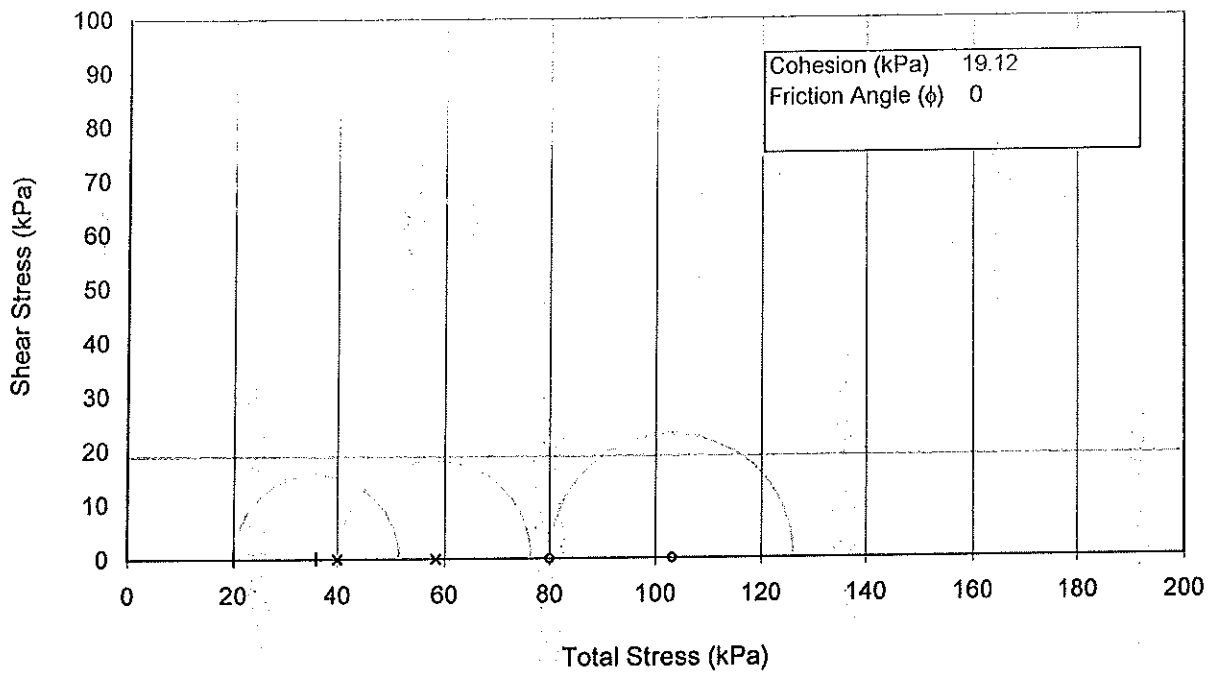
Operator
 Shyam Nath

Checked
 Chris

Approved
 Lee Kai Hing

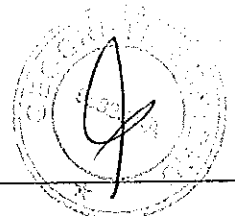


Total Stress Triaxial Compression Unconsolidated Undrained



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 : 01.02.19
 Sample : UD1
 Borehole : BH39
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

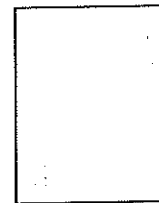
Unconsolidated Undrained

Sample details

Depth : 10.50m
 Description : Greenish grey CLAY with some 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)	162.86	163.41	165.02
Bulk Density ρ (Mg/m ³)	1.890	1.897	1.916
Particle Density ρ_s	2.63	2.63	2.63



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

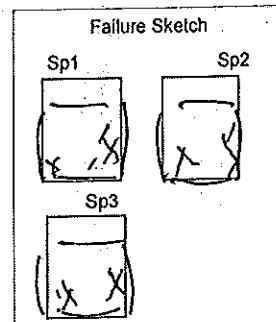
Strain Channel

	Specimen 1	Specimen 2	Specimen 3
Load Channel	14391	14391	14391

Moisture Content w_0 %	28	27	27
Dry Density ρ_{d0} (Mg/m ³)	1.47	1.50	1.51
Voids Ratio e_0	0.78	0.76	0.74
Deg of Saturation S_0 %	94.69	93.01	95.34

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	129.35	142.58	154.20
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	129.15	142.38	154.00
Strain at Failure ϵ_f %	7.50	6.97	7.50
Shear Strength c_u (kPa)	64.67	71.29	77.10



Moisture Content w_f %	28	27	27
Dry Density ρ_{df} (Mg/m ³)	1.47	1.50	1.51
Voids Ratio e_f	0.78	0.76	0.74
Deg of Saturation S_f %	94.69	93.01	95.34

Notes : Intermediate Intermediate Intermediate

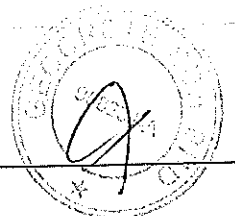
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 01.02.19

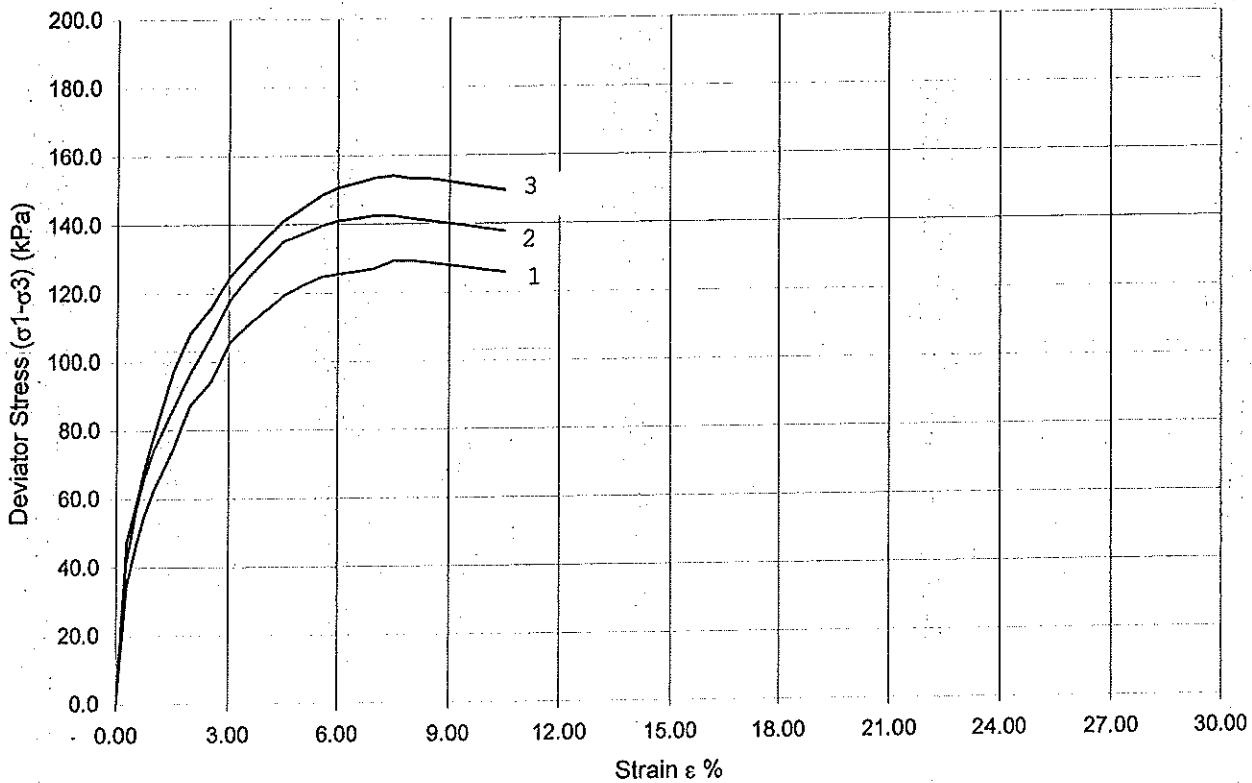
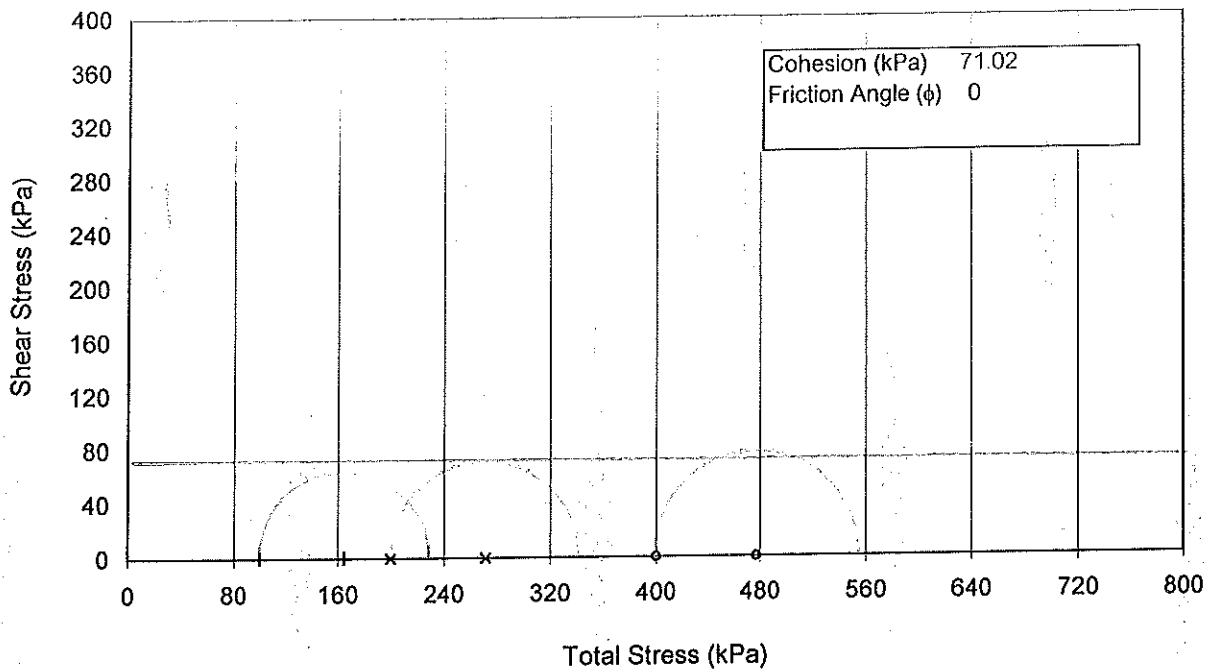
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Sample : UD3
 Borehole : BH39
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris

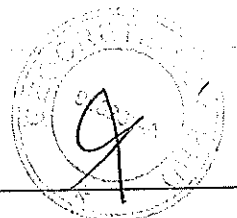


Total Stress Triaxial Compression Unconsolidated Undrained



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 : 01.02.19
 Sample : UD3
 Borehole : BH39
 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	09.02.19
Sample No.	BH39 / UD1 / 3.00m	Test Started	29.01.19
Soil Description	Greenish grey CLAY	Ring No.	8

BEFORE TEST

Moist. Content from trimmings:	=	72 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	120.43 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.44 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.99 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	35.89 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	23.1 gm	Bulk Density (P)	=	1.502 Mg/m ³
Initial Moisture Content, M _o	=	64 %	Dry Density (PD)	=	0.914 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.8241			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	91 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1412 mm ⁻¹			
Height of Solid H _s	=	7.082 mm			

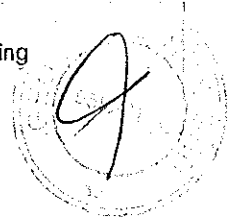
AFTER TEST

Wt of sample + Ring	=	117.25 gm	Overall settlement	=	2.924 mm
Wt of Dry sample + Ring	=	97.33 gm	Volume Change	=	5.744 cm ³
Wt of Ring	=	61.44 gm	Final Volume	=	33.54 cm ³
Wt of Wet sample	=	55.81 gm	Final Bulk Density	=	1.664 Mg/m ³
Wt of Dry sample	=	35.89 gm	Final Dry Density	=	1.070 Mg/m ³
Wt of Moisture	=	19.92 gm	Final Void Ratio, e _f	=	1.4112
Final Moisture Content, M _f	=	56 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	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 BH39 / UD1 / 3.00m

Date of Report

09.02.19

Test started

29.01.19

Ring No.

8

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)	
0	0.000	20.000	0.0000	1.8241	0.0000	0			
12.5	0.126	19.874	0.0178	1.8063	0.0178	12.5	1.44	30.64	-0.0591
25.0	0.256	19.744	0.0361	1.7880	0.0184	12.5	3.61	12.07	-0.0610
50.0	0.474	19.526	0.0669	1.7572	0.0308	25.0	4.41	9.70	-0.1023
100	0.828	19.172	0.1169	1.7072	0.0500	50.0	1.96	21.20	-0.1661
200	1.628	18.372	0.2299	1.5942	0.1130	99.9	1.96	19.96	-0.3753
400	3.482	16.518	0.4917	1.3324	0.2618	199.8	5.76	5.86	-0.8698
200	3.386	16.614	0.4781	1.3460	-0.0136	-199.8			
50	3.152	16.848	0.4451	1.3790	-0.0330	-149.9			
12.5	2.924	17.076	0.4129	1.4112	-0.0322	-37.5			

Operator

Shyam Nath

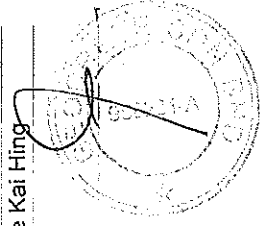
Checked

Chris

Approved

Lee Kai Hing

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

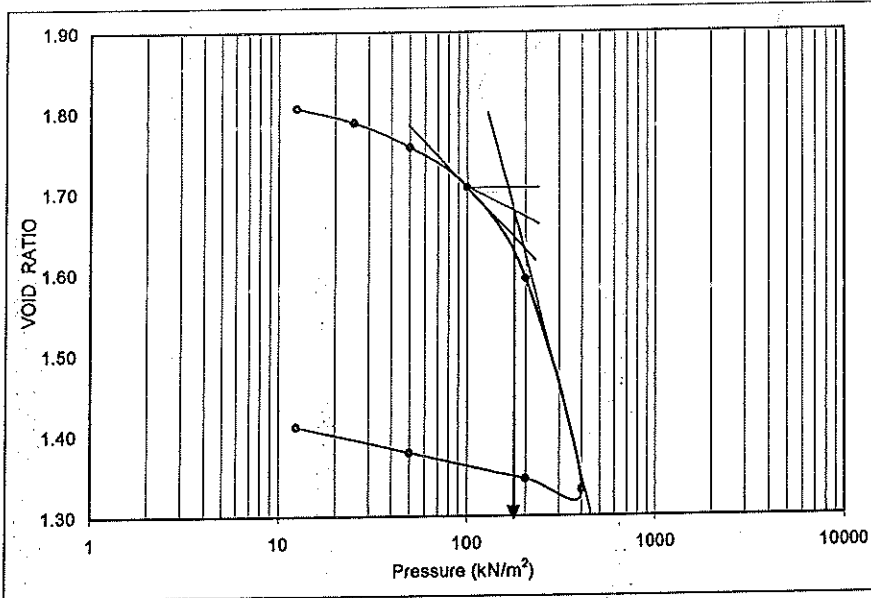


ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

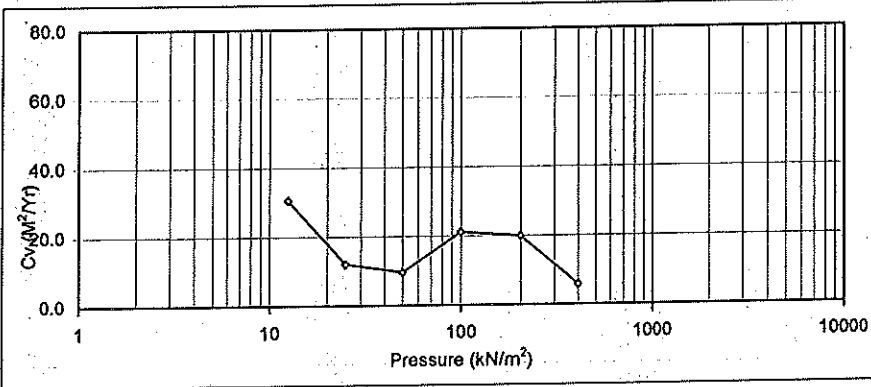
BH REF BH39 / UD1 / 3.00m
 SOIL SAMPLE Greenish grey CLAY

Date of Report 09.02.19
 Test started 29.01.19
 Ring No. 8



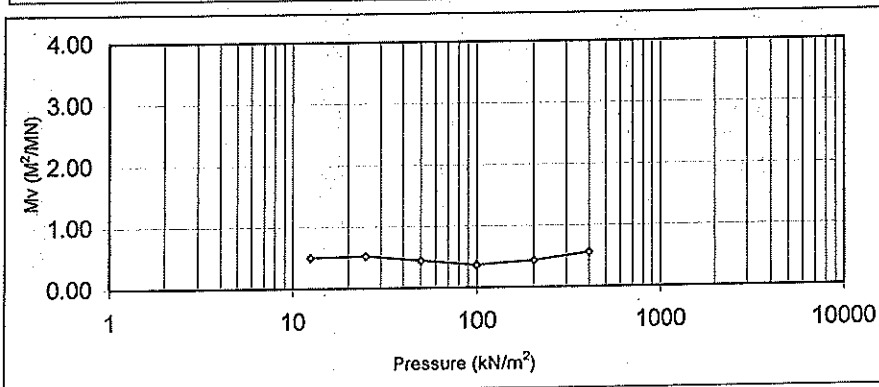
INITIAL

Water content	64	%
Dry Density	0.91	Mg/m ³
Void Ratio	1.8241	
Saturation	91	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.580	



FINAL

Water content	56	%
Dry Density	1.07	Mg/m ³
Void Ratio	1.4112	
Saturation	101	%
Height	17	mm
Comp. Index, C _c	0.8698	
Precons. Load	180	kN/m ²



Comp. Ratio, C_R 0.308



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	09.02.19
Sample No.	BH39 / UD3 / 10.50m	Test Started	29.01.19
Soil Description	Greenish grey with some sand	Ring No.	9

BEFORE TEST

Moist. Content from trimmings:	=	40 %	SG (Measured)	=	2.630
Wt of sample + Ring	=	127.02 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.33 gm	Area (A)	=	1964 mm ²
Wt of sample	=	68.69 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	49.70 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	18.99 gm	Bulk Density (P)	=	1.748 Mg/m ³
Initial Moisture Content, M _o	=	38 %	Dry Density (PD)	=	1.265 Mg/m ³
Initial Void Ratio, e _o , $\frac{SG}{P_D} - 1$	=	1.0789			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	93 %			
V. Ratio Change Factor F, $\frac{H}{H_s} \frac{e_o}{1+e_o}$	=	0.1039 mm ⁻¹			
Height of Solid	=	9.620 mm			

AFTER TEST

Wt of sample + Ring	=	124.36 gm	Overall settlement	=	1.842 mm
Wt of Dry sample + Ring	=	108.03 gm	Volume Change	=	3.618 cm ³
Wt of Ring	=	58.33 gm	Final Volume	=	35.67 cm ³
Wt of Wet sample	=	66.03 gm	Final Bulk Density	=	1.851 Mg/m ³
Wt of Dry sample	=	49.70 gm	Final Dry Density	=	1.393 Mg/m ³
Wt of Moisture	=	16.33 gm	Final Void Ratio, e _r	=	0.8874
Final Moisture Content, M _r	=	33 %			
Final Saturation, S _o , $\frac{M_r \times SG}{e_r}$	=	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

Sample No

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

BH39 / UD3 / 10.50m

Date of Report

09.02.19

Test started

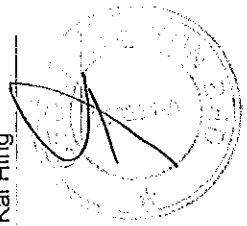
29.01.19

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	
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	d_e	d_p 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	1.0789	0.0000	0					
25.0	0.050	19.950	0.0052	1.0737	0.0052	25.0	0.1003	1.21	36.60		-0.0173
50.0	0.174	19.826	0.0181	1.0608	0.0129	25.0	0.2504	5.29	8.30		-0.0428
100	0.406	19.594	0.0422	1.0367	0.0241	50.0	0.2370	2.25	19.17		-0.0801
200	0.810	19.190	0.0842	0.9947	0.0420	99.9	0.2107	6.25	6.68		-0.1395
400	1.480	18.520	0.1538	0.9251	0.0696	199.8	0.1810	4.41	8.95		-0.2314
800	2.368	17.632	0.2461	0.8328	0.0923	400.7	0.1257	16.81	2.16		-0.3067
400	2.282	17.718	0.2372	0.8417	-0.0089	-400.7					
100	2.096	17.904	0.2179	0.8610	-0.0193	-299.8					
25	1.842	18.158	0.1915	0.8874	-0.0264	-74.9					

Operator Shyam Nath Checked Chris Approved Lee Kai Hing



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

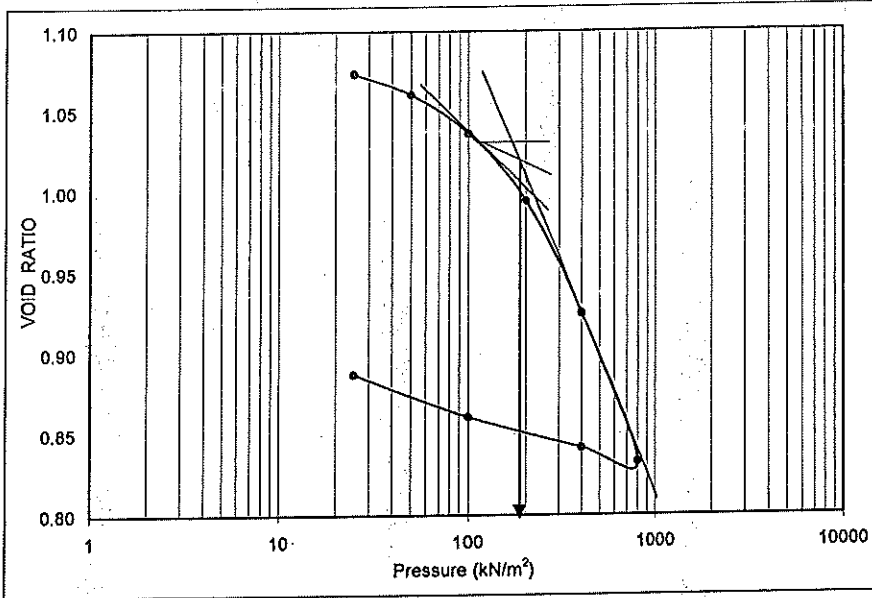
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH39 / UD3 / 10.50m

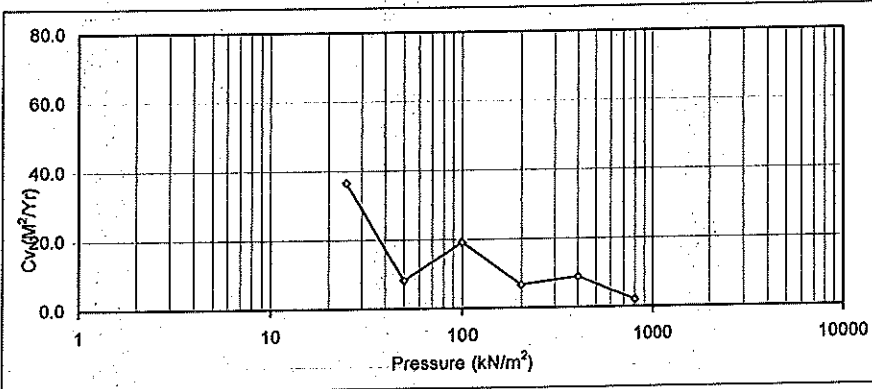
SOIL SAMPLE Greenish grey with some sand

Date of Report 09.02.19
 Test started 29.01.19
 Ring No. 9



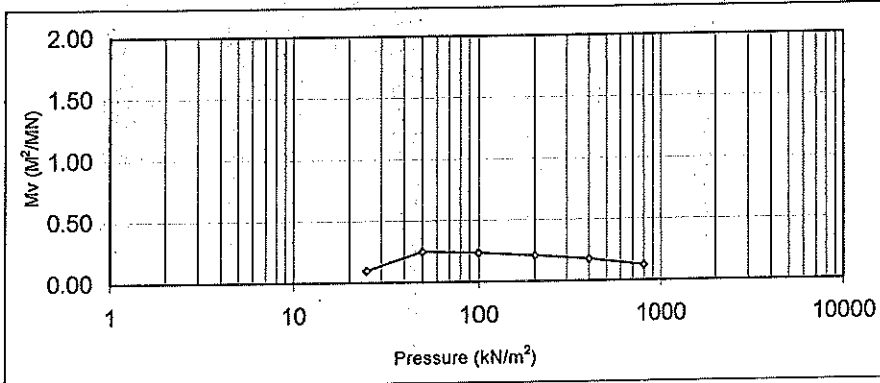
INITIAL

Water content	38	%
Dry Density	1.27	Mg/m ³
Void Ratio	1.0789	
Saturation	93	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.630	

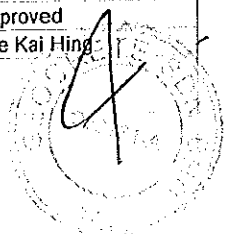


FINAL

Water content	33	%
Dry Density	1.39	Mg/m ³
Void Ratio	0.8874	
Saturation	97	%
Height	18	mm
Comp. Index, Cc	0.3067	
Precons. Load	190	kN/m ²



Comp. Ratio, C_R 0.148



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/081/18/139/1S DATE : 11.02.19															
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								
		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)	
Borehole No.	Specimen	Depth (m)																									
BH40	D1	1.50	19	NA	NA	NA	10	90	0	0	2.68						22.74	0	30	0.368		0.4	<0.01	0.22	7.9		
	UD1	4.50	40	1.68	33	22	11	4.7	24	13	62	1	2.68														
	UD2	7.50	43	1.71	36	20	16		29	20	51	0															
	UD3	15.00	30	1.86	35	21	14	5.8	28	15	57	0	2.68				57.02	0	325	-0.177		0.6	<0.01	0.36	7.9		
	D11	21.00	14	NA	NP	NP			6	93	1																
	D14	25.50	12	NA	NP	NP		NA	9	90	1	2.71															
	D19	33.00	11	NA	NP	NP			7	93	0																
	D21	36.00	21	NA	NA	NA			25	75	0																
	D24	40.50	8	NA	NA	NA			8	91	1																
	D27	45.00	22	NA	NA	NA			18	81	1	2.71															
	D30	49.50	22	NA	NA	NA			21	14	64	1															
	D33	54.00	31	NA	35	22	13	5.5	28	18	53	1															
	D37	60.00	21	NA	NA	NA			19	78	3																

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

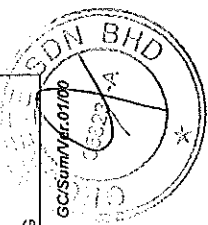
Remarks

* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE

SUM

CHECKED BY: CHRIS

APPROVED BY: LEE KAI HING



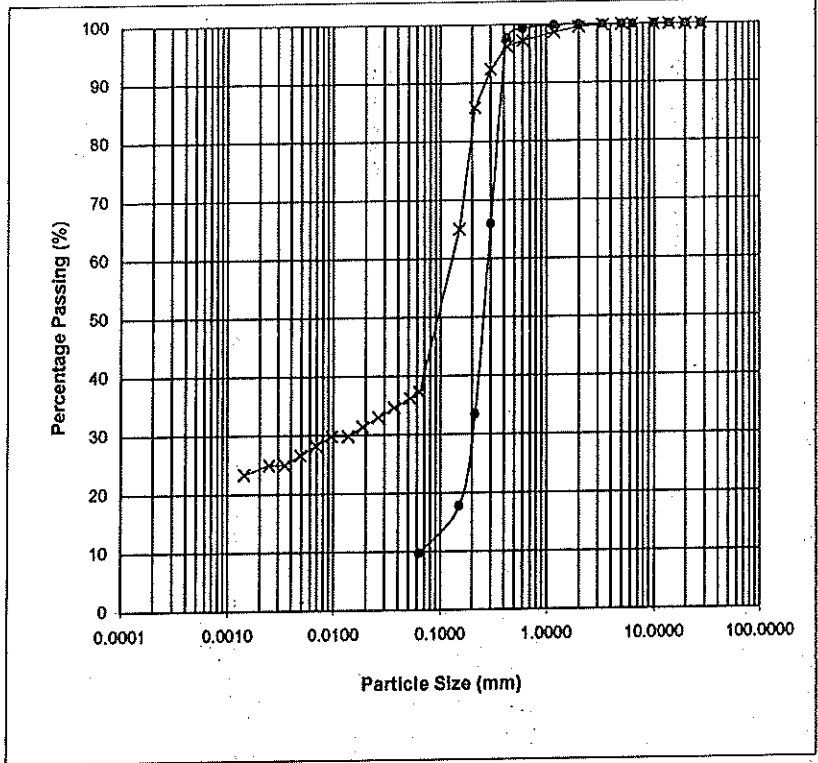
PARTICLE SIZE DISTRIBUTION

(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

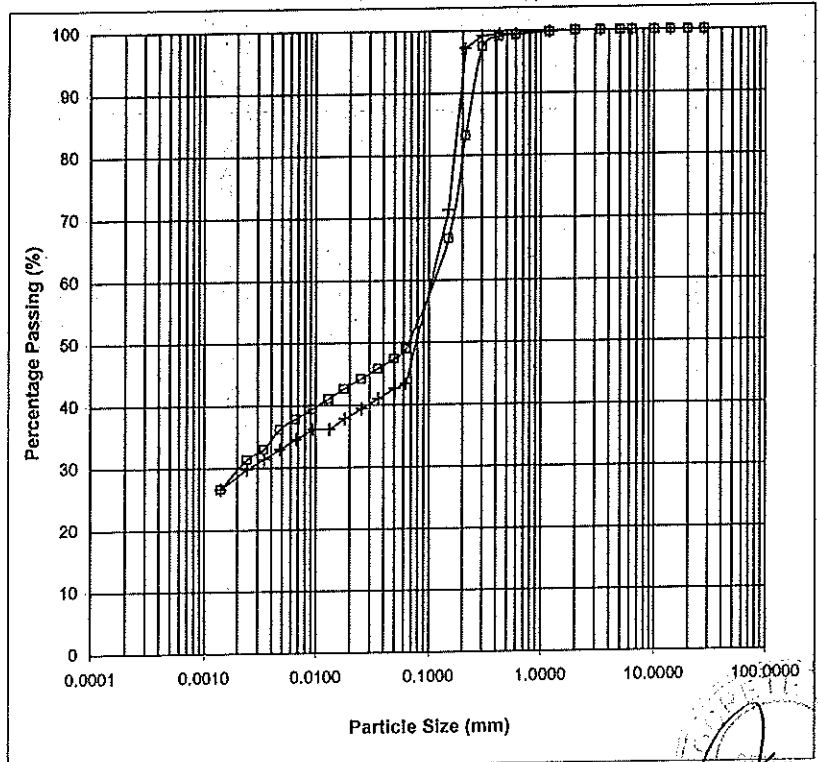
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	99
0.600	99	0.600	97
0.425	98	0.425	96
0.300	66	0.300	92
0.212	33	0.212	86
0.150	18	0.150	65
0.063	10	0.063	37
		0.0518	36
		0.0368	35
		0.0262	33
		0.0186	31
		0.0137	30
		0.0097	30
		0.0069	28
		0.0049	27
		0.0035	25
		0.0025	25
		0.0014	23
Clay (%)		Clay (%)	24
Silt (%)	10	Silt (%)	13
Sand (%)	90	Sand (%)	62
Gravel (%)	0	Gravel (%)	1
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH40	D1	1.50	31.01.19
x	BH40	UD1	4.50	31.01.19



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	100
0.425	99	0.425	99
0.300	98	0.300	99
0.212	83	0.212	97
0.150	67	0.150	71
0.063	49	0.063	43
0.0496	47	0.0505	43
0.0353	46	0.0360	41
0.0251	44	0.0258	39
0.0179	43	0.0182	38
0.0131	41	0.0134	36
0.0093	39	0.0095	36
0.0066	38	0.0067	35
0.0047	36	0.0048	33
0.0034	33	0.0034	31
0.0024	31	0.0024	30
0.0014	27	0.0014	27
Clay (%)	29	Clay (%)	28
Silt (%)	20	Silt (%)	15
Sand (%)	51	Sand (%)	57
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH40	UD2	7.50	31.01.19
+	BH40	UD3	15.00	31.01.19



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

PARTICLE SIZE DISTRIBUTION

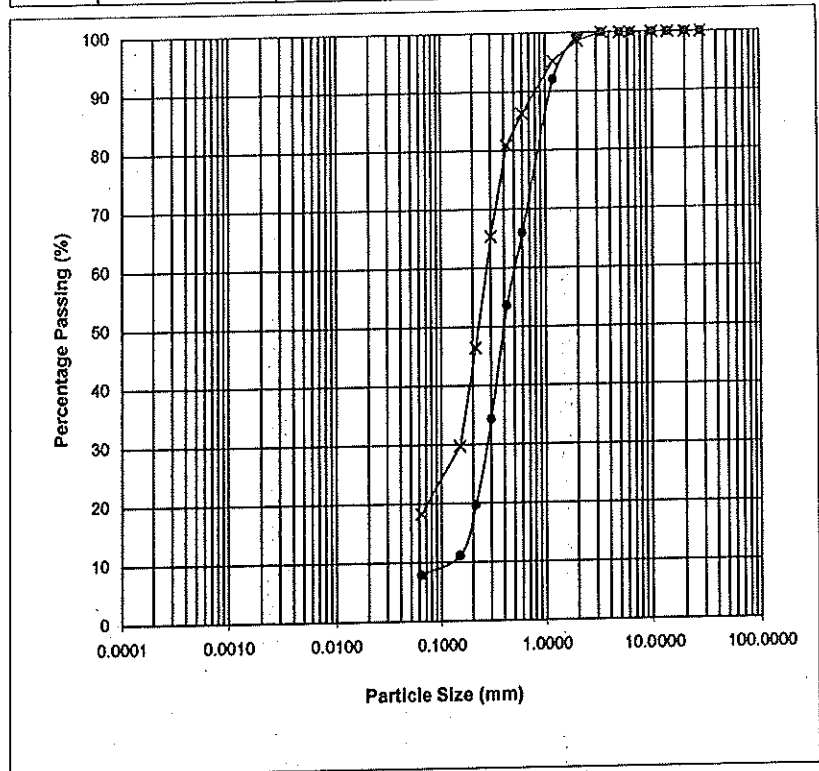
(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990))

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	99	2.00	99
1.18	92	1.18	95
0.600	66	0.600	86
0.425	54	0.425	81
0.300	34	0.300	65
0.212	20	0.212	46
0.150	11	0.150	30
0.063	8	0.063	18

Clay (%)	8	Clay (%)	18
Silt (%)		Silt (%)	
Sand (%)	91	Sand (%)	81
Gravel (%)	1	Gravel (%)	1
Total (%)	100	Total (%)	100

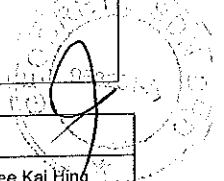
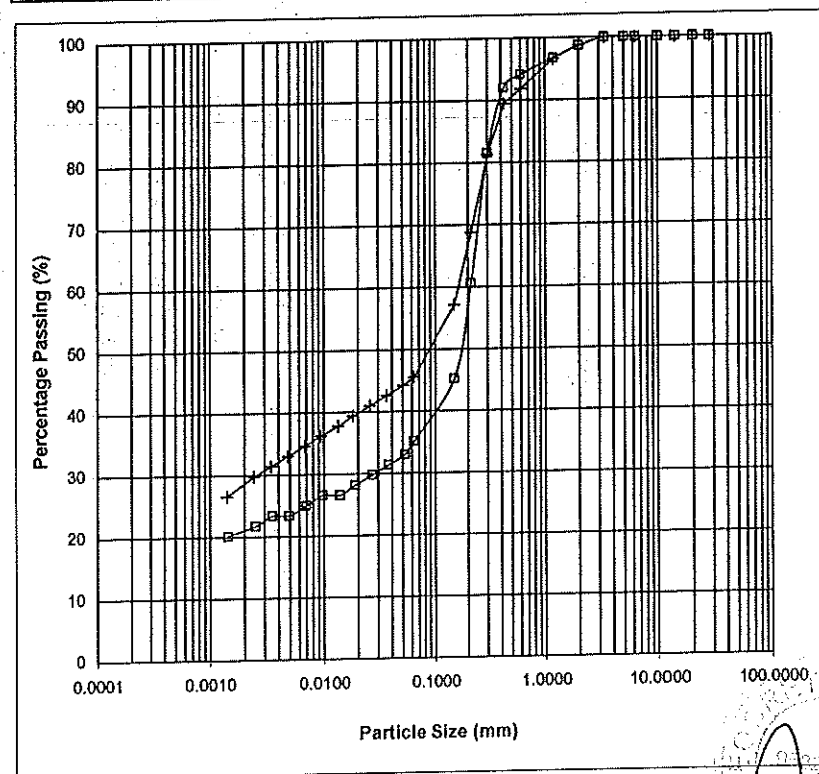
Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH40	D24	40.50	31.01.19
x	BH40	D27	45.00	31.01.19



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	99	2.00	99
1.18	97	1.18	97
0.600	94	0.600	92
0.425	92	0.425	89
0.300	82	0.300	81
0.212	61	0.212	69
0.150	45	0.150	57
0.063	35	0.063	46
0.0524	33	0.0502	44
0.0373	31	0.0357	43
0.0265	30	0.0254	41
0.0188	28	0.0181	39
0.0138	27	0.0133	38
0.0098	27	0.0095	36
0.0070	25	0.0067	35
0.0049	23	0.0048	33
0.0035	23	0.0034	31
0.0025	22	0.0024	30
0.0014	20	0.0014	27

Clay (%)	21	Clay (%)	28
Silt (%)	14	Silt (%)	18
Sand (%)	64	Sand (%)	53
Gravel (%)	1	Gravel (%)	1
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH40	D30	49.50	31.01.19
+	BH40	D33	54.00	31.01.19



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

Total Stress Triaxial Compression

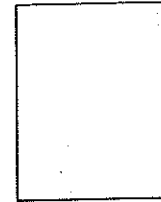
Unconsolidated Undrained

Sample details

Depth : 4.50m
 Description : Greenish 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)	144.02	145.08	146.62
Bulk Density ρ (Mg/m ³)	1.672	1.684	1.702
Particle Density ρ_s	2.68	2.68	2.68



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	40	80	160
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

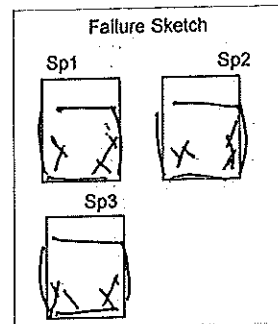
Strain Channel

	Specimen 1	Specimen 2	Specimen 3
Load Channel	14391	14391	14391

Moisture Content w_0 %	45	44	43
Dry Density ρ_{d0} (Mg/m ³)	1.15	1.17	1.19
Voids Ratio e_0	1.32	1.29	1.26
Deg of Saturation S_0 %	90.87	91.31	92.53

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	29.40	42.66	64.37
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	29.20	42.46	64.17
Strain at Failure ϵ_f %	6.97	10.00	9.47
Shear Strength c_u (kPa)	14.70	21.33	32.18



Moisture Content w_f %	45	44	43
Dry Density ρ_{df} (Mg/m ³)	1.15	1.17	1.19
Voids Ratio e_f	1.32	1.29	1.26
Deg of Saturation S_f %	90.87	91.31	92.53

Notes : Intermediate Intermediate Intermediate

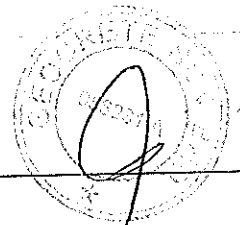
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 02.02.19

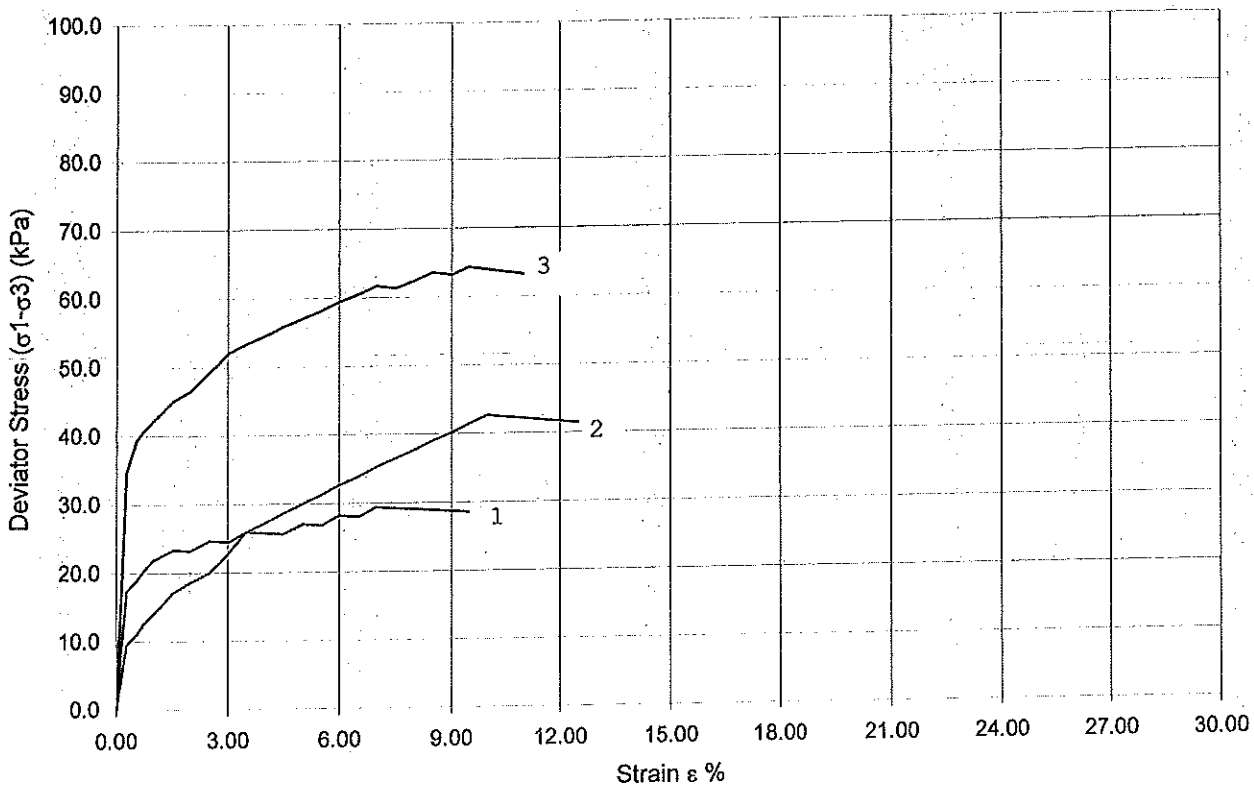
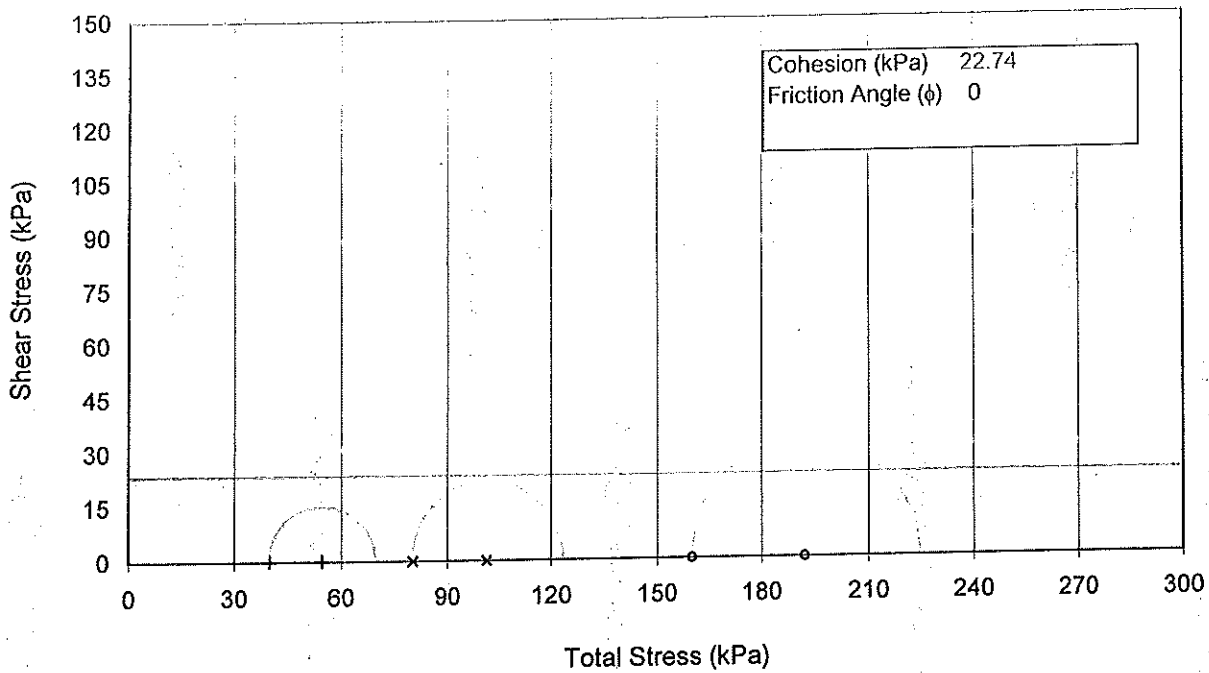
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator : Shyam Nath
 Checked : Chris

Sample : UD1
 Borehole : BH40
 Approved : Lee Kai Hing

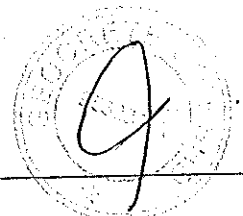


Total Stress Triaxial Compression Unconsolidated Undrained



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 : JU
 Date of Test : 02.02.19
 Sample : UD1
 Borehole : BH40
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

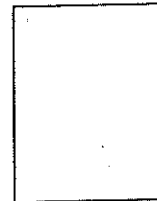
Unconsolidated Undrained

Sample details

Depth : 15.00m
 Description : Greenish 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)	159.71	160.44	161.35
Bulk Density ρ (Mg/m ³)	1.854	1.862	1.873
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)	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

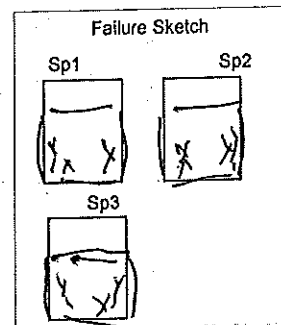
Strain Channel

	Specimen 1	Specimen 2	Specimen 3
Load Channel	14391	14391	14391

Moisture Content w_0 %	30	30	29
Dry Density ρ_{d0} (Mg/m ³)	1.42	1.43	1.45
Voids Ratio e_0	0.88	0.87	0.85
Deg of Saturation S_0 %	91.74	92.70	92.39

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	96.32	117.09	128.74
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	96.12	116.89	128.54
Strain at Failure ϵ_f %	9.01	10.99	9.47
Shear Strength c_u (kPa)	48.16	58.54	64.37



Moisture Content w_f %	30	30	29
Dry Density ρ_{df} (Mg/m ³)	1.42	1.43	1.45
Voids Ratio e_f	0.88	0.87	0.85
Deg of Saturation S_f %	91.74	92.70	92.39

Notes : Intermediate Intermediate Intermediate

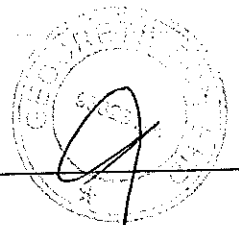
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 02.02.19

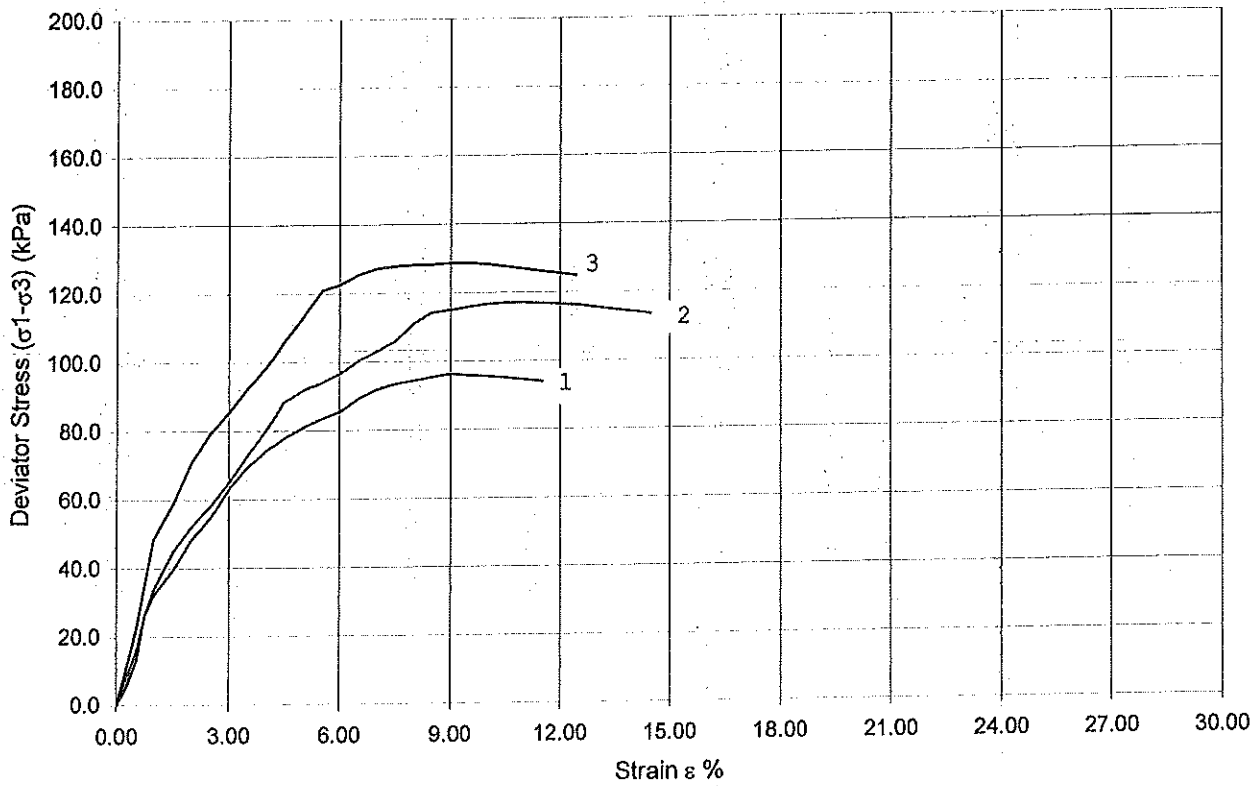
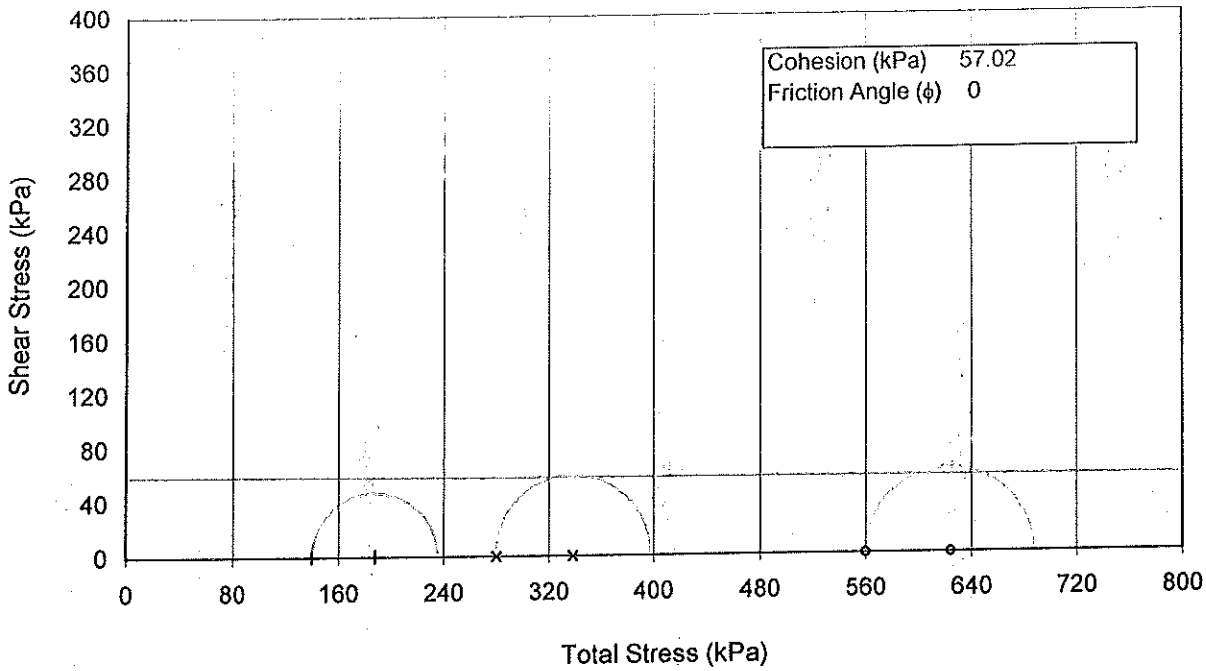
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator : Shyam Nath
 Checked : Chris

Sample : UD3
 Borehole : BH40
 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

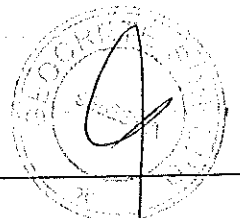
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 02.02.19

Sample : UD3
Borehole : BH40

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	09.02.19
Sample No.	BH40 / UD1 / 4.50m	Test Started	29.01.19
Soil Description	Greenish grey sandy CLAY	Ring No.	10

BEFORE TEST

Moist. Content from trimmings:	=	58 %	SG (Measured)	=	2.680	
Wt of sample + Ring	=	121.58 gm	Diameter (D)	=	50	mm
Wt of Ring	=	60.43 gm	Area (A)	=	1964	mm ²
Wt of sample	=	61.15 gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	39.43 gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	21.72 gm	Bulk Density (P)	=	1.557	Mg/m ³
Initial Moisture Content, M _o	=	55 %	Dry Density (PD)	=	1.004	Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.6702				
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	88 %				
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1335 mm ⁻¹				
Height of Solid	=	7.490 mm				

AFTER TEST

Wt of sample + Ring	=	118.83 gm	Overall settlement	=	2.228	mm
Wt of Dry sample + Ring	=	99.86 gm	Volume Change	=	4.376	cm ³
Wt of Ring	=	60.43 gm	Final Volume	=	34.91	cm ₃
Wt of Wet sample	=	58.40 gm	Final Bulk Density	=	1.673	Mg/m ³
Wt of Dry sample	=	39.43 gm	Final Dry Density	=	1.129	Mg/m ³
Wt of Moisture	=	18.97 gm	Final Void Ratio, e _r	=	1.3727	
Final Moisture Content, M _r	=	48 %				
Final Saturation, S _o , $\frac{M_r \times SG}{e_r}$	=	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

Sample No

CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
BH40 / UD1 / 4.50m

Date of Report

09.02.19

Test started

29.01.19

Ring No.

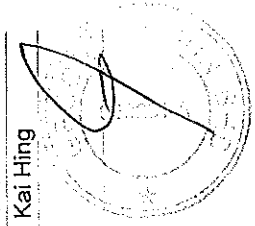
10

Pressure (P) kN/m ²	Settlement ΔH (mm)	H=H ₀ - ΔH (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 /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.6702	0.0000	0				
6.25	0.510	19.490	0.0681	1.6021	0.0681	6.25	4.1900	2.89	14.97	-0.2262
12.5	0.820	19.180	0.1095	1.5607	0.0414	6.25	2.5880	4.41	9.41	-0.1375
25.0	1.280	18.720	0.1709	1.4993	0.0614	12.5	1.9673	2.25	17.72	-0.2040
50.0	1.920	18.080	0.2563	1.4139	0.0854	25.0	1.4170	4.00	9.40	-0.2839
100	2.750	17.250	0.3672	1.3030	0.1108	50.0	0.9631	1.44	24.05	-0.3681
50	2.648	17.352	0.3535	1.3167	-0.0136	-50.0				
25	2.426	17.574	0.3239	1.3463	-0.0296	-25.0				
12.5	2.228	17.772	0.2975	1.3727	-0.0264	-12.5				

Operator Shyam Nath

Checked Chris

Approved Lee Kai Hing



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

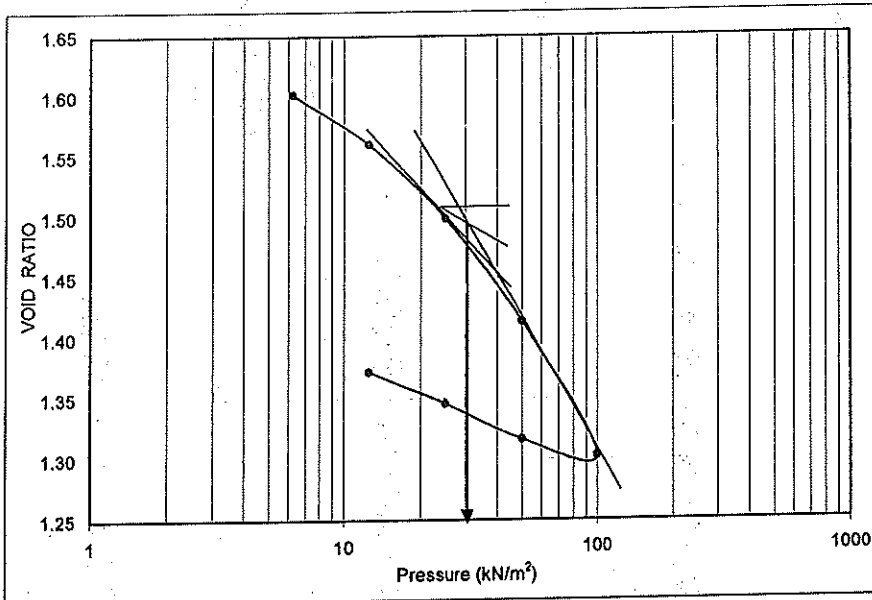
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH40 / UD1 / 4.50m

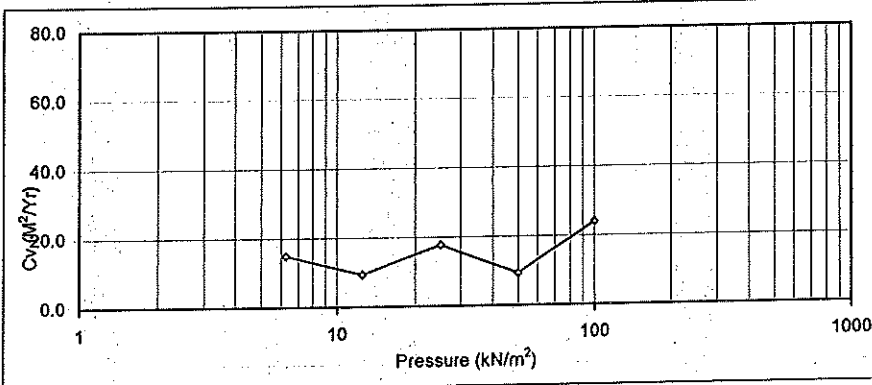
SOIL SAMPLE Greenish grey sandy CLAY

Date of Report 09.02.19
 Test started 29.01.19
 Ring No. 10



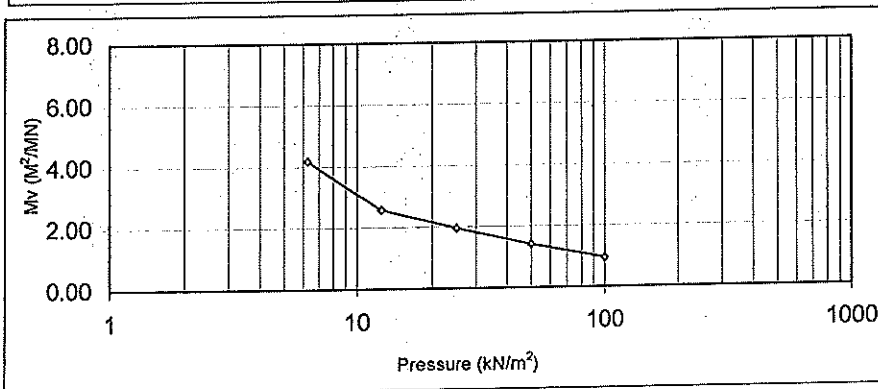
INITIAL

Water content	55	%
Dry Density	1.00	Mg/m ³
Void Ratio	1.6702	
Saturation	88	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.680	

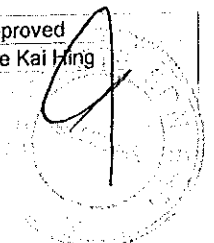


FINAL

Water content	48	%
Dry Density	1.13	Mg/m ³
Void Ratio	1.3727	
Saturation	94	%
Height	18	mm
Comp. Index, Cc	0.3681	
Precons. Load	30	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	09.02.19
Sample No.	BH40 / UD3 / 15.00m	Test Started	29.01.19
Soil Description	Greenish grey sandy CLAY	Ring No.	11

BEFORE TEST

Moist. Content from trimmings:	=	45 %	SG (Measured)	=	2.680
Wt of sample + Ring	=	130.48 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.45 gm	Area (A)	=	1964 mm ²
Wt of sample	=	69.03 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	48.11 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	20.92 gm	Bulk Density (P)	=	1.757 Mg/m ³
Initial Moisture Content, M _o	=	43 %	Dry Density (PD)	=	1.225 Mg/m ³
Initial Void Ratio, e _o , $\frac{SG}{P_D} - 1$	=	1.1884			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	98 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1094 mm ⁻¹			
Height of Solid H _s	=	9.139 mm			

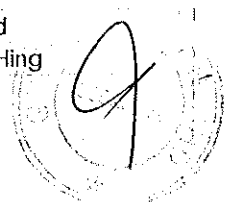
AFTER TEST

Wt of sample + Ring	=	127.12 gm	Overall settlement	=	2.108 mm
Wt of Dry sample + Ring	=	109.56 gm	Volume Change	=	4.141 cm ³
Wt of Ring	=	61.45 gm	Final Volume	=	35.15 cm ³
Wt of Wet sample	=	65.67 gm	Final Bulk Density	=	1.869 Mg/m ³
Wt of Dry sample	=	48.11 gm	Final Dry Density	=	1.369 Mg/m ³
Wt of Moisture	=	17.56 gm	Final Void Ratio, e _f	=	0.9578
Final Moisture Content, M _f	=	36 %			
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 BH40 / UD3 / 15.00m

Date of Report 09.02.19
 Test started 29.01.19
 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	
			$\Delta e = F \times \Delta H$	$e=e_0 - e_1$	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	1.1884	0.0000	0					
6.25	0.190	19.810	0.0208	1.1676	0.0208	6.25	1.5358	6.25	7.04		-0.0691
12.5	0.254	19.746	0.0278	1.1606	0.0070	6.25	0.5190	3.61	12.03		-0.0233
25.0	0.350	19.650	0.0383	1.1501	0.0105	12.5	0.3911	2.81	15.33		-0.0349
50.0	0.460	19.540	0.0503	1.1381	0.0120	25.0	0.2254	1.21	35.22		-0.0400
100	0.664	19.336	0.0727	1.1158	0.0223	50.0	0.2112	2.56	16.38		-0.0742
200	0.896	19.104	0.0980	1.0904	0.0254	99.9	0.1215	1.96	20.92		-0.0843
400	1.190	18.810	0.1302	1.0582	0.0322	199.8	0.0782	1.69	23.60		-0.1069
800	1.560	18.440	0.1707	1.0177	0.0405	400.7	0.0501	1.21	31.82		-0.1345
1600	1.928	18.072	0.2110	0.9775	0.0403	799.4	0.0255	1.44	25.69		-0.1338
3200	2.416	17.584	0.2644	0.9241	0.0534	1599.8	0.0173	1.44	24.50		-0.1774
1600	2.368	17.632	0.2591	0.9293	-0.0053	-1599.8					
400	2.226	17.774	0.2436	0.9449	-0.0155	-1200.1					
100	2.108	17.892	0.2307	0.9578	-0.0129	-299.8					

Operator Shyam Nath Checked Chris Approved Lee Kai Hing



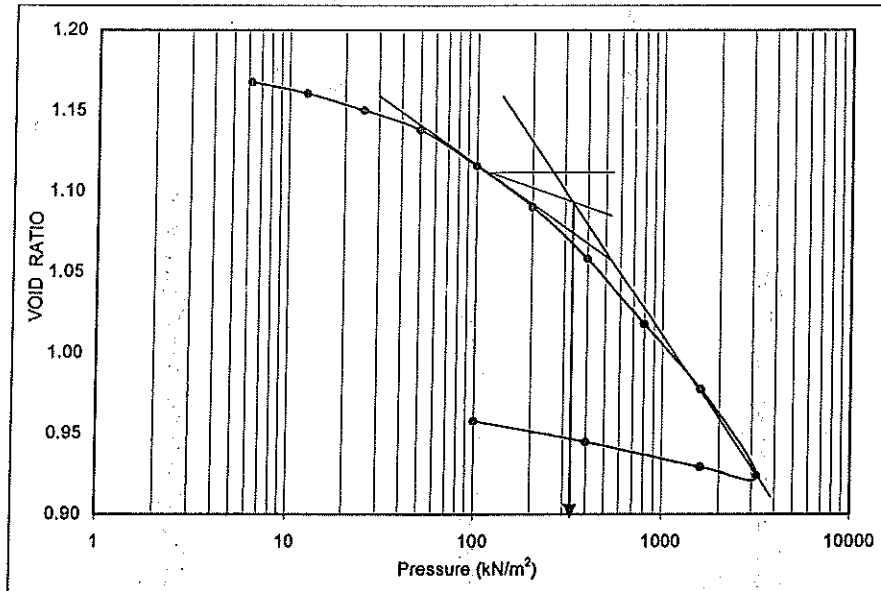
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

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

BH REF BH40 / UD3 / 15.00m

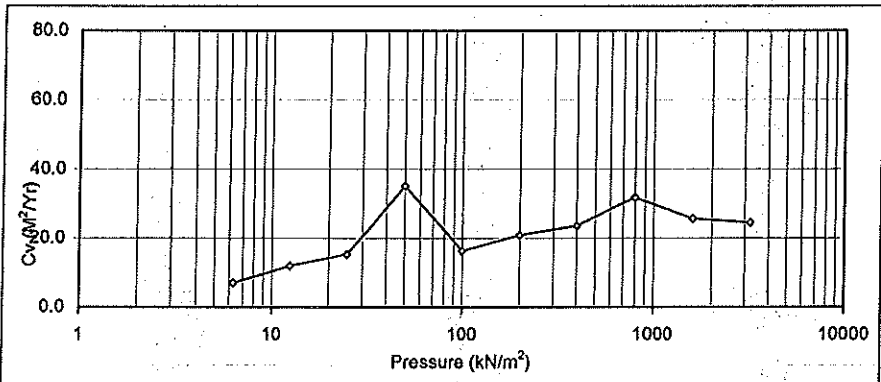
SOIL SAMPLE Greenish grey sandy CLAY

Date of Report 09.02.19
 Test started 29.01.19
 Ring No. 11



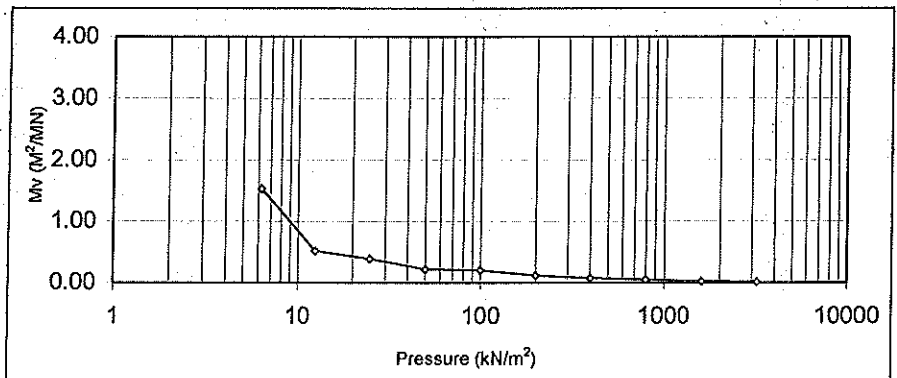
INITIAL

Water content	43	%
Dry Density	1.22	Mg/m ³
Void Ratio	1.1884	
Saturation	98	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.680	

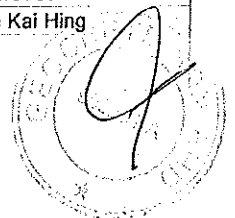


FINAL

Water content	36	%
Dry Density	1.37	Mg/m ³
Void Ratio	0.9578	
Saturation	102	%
Height	18	mm
Comp. Index, C _c	0.1774	
Precons. Load	325	kN/m ²



Comp. Ratio, C_R 0.081





ARCHITEST
Your Exploration, Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.
Tel : 03-5124 8379 Fax : 03 - 5121 3088
Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



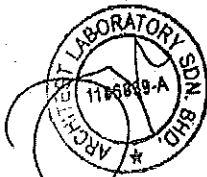
DATE ISSUED : 24 October 2018
LAB REFERENCE NO. : ATL/CHEM/1810-061
COMPANY : Geocrete Sdn Bhd,
No. 22 Jalan P4/8, Seksyen 4,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03-8724 2829 Fax : 03-8724 2824
DATE SAMPLE RECEIVED : 17 October 2018
DATE OF MEASUREMENT : 18 October 2018 to 23 October 2018
SAMPLE DESCRIPTION : Four soil samples
TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3
PROJECT : Proposed Expansion Of Container Terminal CT10-CT19 And Its Associated Works At Westport, Pulau Indah, Selangor.

ANALYSIS RESULTS (As per sample received)

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₃ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 11	UD1	3.00	7.5	0.12	0.84	1.5
	UD3	9.00	7.7	0.08	0.58	1.2
	D13	27.00	7.7	0.01	0.26	0.6
	D28	49.50	7.0	0.05	0.24	0.5

Notes:

- 1) ND – Not detected.



Neo Pei Fern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST
Your Exploration , Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.
Tel : 03-5124 8379 Fax : 03 - 5121 3088
Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



MS ISO/IEC 17025
TESTING
SMM NO.876

DATE ISSUED : 7 December 2018
LAB REFERENCE NO. : ATL/CHEM/1811-051
COMPANY : Geocrete Sdn Bhd,
No. 22 Jalan P4/8, Seksyen 4,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03-8724 2829 Fax : 03-8724 2824
DATE SAMPLE RECEIVED : 30 November 2018
DATE OF MEASUREMENT : 3 December 2018 to 6 December 2018
SAMPLE DESCRIPTION : Twelve soil samples
TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3
PROJECT : Proposed Expansion Of Container Terminal CT10 – CT19 And Its
Associated Works At Westport, Pulau Indah, Selangor.

ANALYSIS RESULTS
(As per sample received)

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₃ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 6	UD1	3.00	7.2	0.11	0.59	5.3
	UD4	12.00	3.6	0.21	0.52	10.6
	D19	36.00	7.3	ND(<0.01)	0.29	5.6
	D27	46.50	7.0	ND(<0.01)	0.30	4.2
BH 9	UD1	3.00	7.3	0.11	0.51	6.2
	UD3	9.00	7.6	0.11	0.50	5.2
	D12	25.50	7.9	0.23	0.84	5.8
	D25	43.50	7.7	ND(<0.01)	0.27	4.2
BH 10	UD1	3.00	7.6	0.11	0.28	5.4
	D11	24.00	7.8	ND(<0.01)	0.44	5.1
	D17	33.00	7.7	0.16	0.60	5.4
	D30	52.50	7.9	0.18	0.77	5.5

Notes:

1) ND – Not detected.



Neo Pei Fong
BSc (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST

Your Exploration, Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)

15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.

Tel : 03-5124 8379 Fax : 03 - 5121 3088

Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



MS ISO/IEC 17025
TESTING
SAMM NO.876

DATE ISSUED : 26 December 2018

LAB REFERENCE NO. : ATL/CHEM/1812-056

COMPANY : Geocrete Sdn Bhd,
No. 22 Jalan P4/8, Seksyen 4,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03-8724 2829 Fax : 03-8724 2824

DATE SAMPLE RECEIVED : 18 December 2018

DATE OF MEASUREMENT : 19 December 2018 to 24 December 2018

SAMPLE DESCRIPTION : Twelve soil samples

TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3

PROJECT : Proposed Expansion Of Container Terminal CT10-CT19 And Its
Associated Works At Westports, Pulau Indah, Selangor.

ANALYSIS RESULTS (As per sample received)

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₃ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 2	UD 1	3.00	7.2	0.15	0.72	1.9
	UD 6	18.00	7.0	0.13	0.57	2.5
	D 25	46.50	5.4	ND(<0.01)	0.21	0.7
	D 29	52.50	7.3	0.09	0.40	3.0
BH 21	UD 1	3.00	7.5	0.13	0.60	1.7
	UD 11	33.00	7.8	0.12	0.64	2.0
	D 18	43.50	7.6	ND(<0.01)	0.27	0.6
	D 22	49.50	7.5	ND(<0.01)	0.36	0.7
BH 26	UD 1	3.00	7.5	0.18	0.82	3.0
	UD 8	24.00	7.7	ND(<0.01)	0.37	0.9
	D 12	34.50	7.8	0.08	0.38	1.0
	D 22	49.50	7.7	ND(<0.01)	0.23	0.6

Notes:

- 1) ND – Not detected.



Neo Pei Fern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST
Your Exploration, Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.
Tel : 03-5124 8379 Fax : 03 - 5121 3088
Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



MS ISO/IEC 17025
TESTING
SAMM NO.876

DATE ISSUED : 15 December 2018

LAB REFERENCE NO. : ATL/CHEM/1812-028 (R1)

COMPANY : Geocrete Sdn Bhd,
No. 22 Jalan P4/8, Seksyen 4,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03-8724 2829 Fax : 03-8724 2824

DATE SAMPLE RECEIVED : 7 December 2018

DATE OF MEASUREMENT : 10 December 2018 to 14 December 2018

SAMPLE DESCRIPTION : Sixteen soil samples

TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3

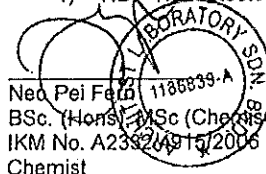
PROJECT : Proposed Expansion Of Container Terminal CT10 – CT19 And Its
Associated Works At Westport, Pulau Indah, Selangor.

ANALYSIS RESULTS (As per sample received)

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₃ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 1	D1	0.00	5.2	0.11	0.44	1.4
	UD6	18.00	7.4	ND(<0.01)	0.37	0.3
	D16	31.50	7.7	0.23	0.74	2.2
	D29	49.50	4.7	0.20	0.45	2.0
BH 19	UD1	3.00	7.6	0.14	0.76	1.2
	D11	28.50	7.7	0.07	0.33	0.2
	D15	34.50	7.8	0.08	0.41	0.8
	D26	51.00	7.9	ND(<0.01)	0.29	0.4
BH 20	UD1	3.00	7.9	0.14	0.33	1.7
	UD7	21.00	8.2	0.09	1.08	2.3
	D15	37.50	6.2	0.38	0.61	1.4
	D23	49.50	7.8	0.23	0.66	1.0
BH 27	UD1	3.00	8.1	0.09	0.50	1.2
	UD5	15.00	8.3	0.08	1.00	2.0
	UD9	27.00	7.4	0.15	0.71	2.2
	D20	46.50	8.0	ND(<0.01)	0.31	0.3

Notes:

1) ND - Not detected.


Neo Pei Fen 1186839-A
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/15/2008
Chemist



ARCHITEST

Your Exploration, Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.
Tel : 03-5124 8379 Fax : 03 - 5121 3088
Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



MS ISO/IEC 17025
TESTING
SAMM NO.876

DATE ISSUED : 16 January 2019

LAB REFERENCE NO. : ATL/CHEM/1901-004

COMPANY : Geocrete Sdn Bhd,
No. 22 Jalan P4/8, Seksyen 4,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03-8724 2829 Fax : 03-8724 2824

DATE SAMPLE RECEIVED : 4 January 2019

DATE OF MEASUREMENT : 8 January 2019 to 15 January 2019

SAMPLE DESCRIPTION : Sixteen soil samples

TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3

PROJECT : Proposed Expansion Of Container Terminal CT10 – CT19 And Its
Associated Works At Westport, Pulau Indah, Selangor.

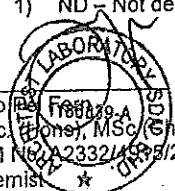
ANALYSIS RESULTS
(As per sample received)

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₃ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 3	UD1	3.00	7.2	0.10	0.33	1.7
	UD7	21.00	7.3	0.07	0.46	2.1
	D19	39.00	2.3	0.17	0.26	1.3
	D26	49.50	3.4	0.13	0.36	2.2
BH 4	D4	10.50	4.3	0.15	0.30	1.9
	D9	24.00	3.2	0.12	0.23	1.1
	D15	33.00	7.4	0.08	0.19	1.8
	D26	49.50	7.5	0.09	0.32	1.5
BH 16	UD5	15.00	7.7	0.20	1.07	3.0
	UD10	30.00	7.7	0.17	1.21	3.6
	D17	40.50	7.7	0.17	0.84	2.7
	D23	49.50	3.8	0.23	0.38	2.1
BH 23	UD1	3.00	7.8	0.08	0.64	2.7
	UD5	15.00	7.8	0.11	0.45	2.5
	D13	36.00	3.4	0.15	0.23	1.5
	D21	48.00	2.2	0.28	0.21	0.9

Notes:

1) ND – Not detected.

Neo Bee Fong A
BSc (Hons), MSc (Chemistry), AMIC
IKM No. A2332/1998/2006
Chemist





ARCHITEST
Your Exploration , Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.
Tel : 03-5124 8379 Fax : 03 - 5121 3088
Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



MS ISO/IEC 17025
TESTING
SMM NO.876

DATE ISSUED : 17 January 2019

LAB REFERENCE NO. : ATLCHEM/1901-005

COMPANY : Geocrete Sdn Bhd
No. 22 Jalan P4/8,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03- 8724 2829 Fax : 03- 8724 2824

DATE SAMPLE RECEIVED : 8 January 2019

DATE OF MEASUREMENT : 9 January 2019 to 16 January 2019

SAMPLE DESCRIPTION : Twenty soil samples

TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3

PROJECT : Proposed Expansion Of Container Terminal CT10-CT19 And Its Associated Works At Westport, Pulau Indah, Selangor.

ANALYSIS RESULTS (As per sample received) : Refer Page 2 of 2



Neo Pei Fern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST LABORATORY SDN BHD (1186839-A)

15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.

Tel : 03-5124 8379 Fax : 03 - 5121 3088

Email : info@archilest.com.my Website : www.archilest.com.my

ARCHITEST

Your Exploration , Our Expertise

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₃ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 7	UD4	12.00	7.7	0.11	0.55	1.1
	UD8	24.00	7.8	0.11	0.89	1.1
	D17	37.50	7.6	0.21	0.66	1.0
	D25	49.50	7.7	ND(<0.01)	0.51	1.0
BH 18	UD1	3.00	7.7	0.15	0.61	1.0
	UD7	21.00	8.0	0.12	0.57	1.2
	UD11	33.00	7.9	ND(<0.01)	0.94	1.8
	D23	51.00	7.8	0.27	0.84	0.9
BH 22	UD1	3.00	7.8	0.15	0.77	2.5
	UD7	21.00	7.7	0.11	0.64	1.8
	D14	37.50	7.8	0.07	0.25	0.2
	D22	49.50	7.6	ND(<0.01)	0.24	0.1
BH 24	UD1	3.00	6.9	0.20	0.47	6.9
	UD7	21.00	5.7	0.15	0.48	7.7
	D16	39.00	7.3	0.11	0.28	0.3
	D23	49.50	7.7	0.08	0.42	1.3
BH 25	UD1	3.00	7.4	0.11	0.59	2.4
	UD5	15.00	7.5	0.15	0.82	1.3
	UD10	30.00	7.8	0.12	0.93	1.4
	D23	49.50	7.8	0.07	0.20	0.2

Notes:-

- 1) ND – Not detected.



Neo Rei Fern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST
Your Exploration , Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.
Tel : 03-5124 8379 Fax : 03 - 5121 3088
Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



MS ISO/IEC 17025
TESTING
SAMM NO.876

DATE ISSUED : 3 January 2019

LAB REFERENCE NO. : ATL/CHEM/1812-069

COMPANY : Geocrete Sdn Bhd
No. 22 Jalan P4/8,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel: 03- 8724 2829 Fax : 03- 8724 2824

DATE SAMPLE RECEIVED : 26 December 2018

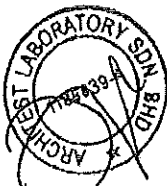
DATE OF MEASUREMENT : 27 December 2018 to 2 January 2019

SAMPLE DESCRIPTION : Twenty soil samples

TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3

PROJECT : Proposed Expansion Of Container Terminal CT10-CT19 And Its Associated Works At Westport, Pulau Indah, Selangor.

ANALYSIS RESULTS : Refer Page 2 of 2
(As per sample received)



Neo Pei Fern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST LABORATORY SDN BHD (1186839-A)

15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.

Tel : 03-5124 8379 Fax : 03 - 5121 3088

Email : info@architest.com.my Website : www.architest.com.my

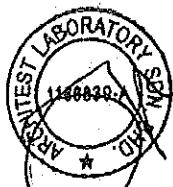
ARCHITEST

Your Exploration , Our Expertise

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₃ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 5	UD2	6.00	7.5	0.12	0.73	2.2
	UD5	15.00	7.5	0.11	0.66	2.7
	D18	37.50	7.7	ND(<0.01)	0.18	1.0
	D26	49.50	7.4	ND(<0.01)	0.31	0.2
BH 15	UD1	3.00	7.3	0.16	0.36	2.9
	UD7	21.00	7.7	0.07	0.75	2.3
	D15	37.50	7.7	0.10	0.42	0.6
	D24	51.00	7.9	0.14	0.53	1.5
BH 17	UD3	9.00	7.8	0.18	0.75	2.8
	UD6	18.00	8.0	ND(<0.01)	0.40	1.4
	UD11	33.00	8.1	0.09	0.84	2.6
	D20	46.50	7.6	0.11	0.36	0.9
BH 32	UD3	9.00	8.0	0.08	0.63	2.4
	D14	36.00	7.7	0.11	0.36	0.9
	D20	45.00	7.7	0.07	0.18	1.2
	D25	52.50	7.5	0.31	0.48	2.3
BH 33	UD5	15.00	8.0	0.12	0.39	1.5
	UD10	30.00	8.2	0.07	0.40	2.1
	D17	40.50	7.2	0.11	0.39	0.7
	D24	51.00	7.7	0.28	0.56	2.4

Notes:-

- 1) ND – Not detected.



Neo Pal Fern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST
Your Exploration . Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.
Tel : 03-5124 8379 Fax : 03 - 5121 3088
Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



MS ISO/IEC 17025
TESTING
SAMM NO.876

DATE ISSUED : 31 January 2019
LAB REFERENCE NO. : ATL/CHEM/1901-051
COMPANY : Geocrete Sdn Bhd,
No. 22 Jalan P4/8, Seksyen 4,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03-8724 2829 Fax : 03-8724 2824
DATE SAMPLE RECEIVED : 25 January 2019
DATE OF MEASUREMENT : 28 January 2019 to 31 January 2019
SAMPLE DESCRIPTION : Four soil samples
TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3
PROJECT : Proposed Expansion Of Container Terminal CT10-CT19 And Its
Associated Works At Westport, Pulau Indah, Selangor.

ANALYSIS RESULTS (As per sample received)

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Chloride as Cl ⁻ (%)	Total Sulphates as SO ₃ (%)	Organic Matter (%)
BH 29	UD1	3.00	7.5	0.44	0.07	0.6
	UD5	15.00	7.8	0.49	0.09	1.6
	D12	33.00	7.4	0.45	0.21	0.7
	D23	49.50	7.4	0.31	0.11	0.7

Notes:

- 1) ND – Not detected.



Neo Pei Fern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST
Your Exploration, Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.
Tel : 03-5124 8379 Fax : 03 - 5121 3088
Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



MS ISO/IEC 17025
TESTING
SMM NO.876

DATE ISSUED : 31 January 2019

LAB REFERENCE NO. : ATL/CHEM/1901-050

COMPANY : Geocrete Sdn Bhd
No. 22 Jalan P4/8,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03- 8724 2829 Fax : 03- 8724 2824

DATE SAMPLE RECEIVED : 25 January 2019

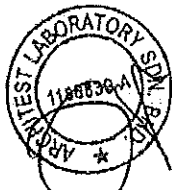
DATE OF MEASUREMENT : 25 January 2019 to 31 January 2019

SAMPLE DESCRIPTION : Twenty soil samples

TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3

PROJECT : Proposed Expansion Of Container Terminal CT10-CT19 And Its Associated Works At Westport, Pulau Indah, Selangor.

ANALYSIS RESULTS (As per sample received) : Refer Page 2 of 2



Néo Pei Fern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST LABORATORY SDN BHD (1186839-A)

15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.

Tel : 03-5124 8379 Fax : 03 - 5121 3088

Email : info@architest.com.my Website : www.architest.com.my

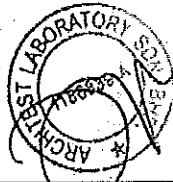
ARCHITEST

Your Exploration , Our Expertise

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₃ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 8	UD1	3.00	7.7	0.14	0.28	1.1
	UD4	12.00	7.6	ND(<0.01)	0.51	0.7
	D10	25.50	7.4	0.17	0.46	1.4
	D25	48.00	5.8	0.55	0.49	8.3
BH 12	UD2	6.00	7.6	0.12	0.84	6.8
	UD6	18.00	8.1	0.08	0.61	1.9
	UD10	30.00	7.2	0.30	0.61	3.7
	D23	49.50	7.1	ND(<0.01)	0.22	0.3
BH 13	UD1	3.00	7.9	0.15	0.67	2.1
	UD7	21.00	8.1	0.10	0.36	1.8
	D13	36.00	7.6	0.07	0.27	0.3
	D23	51.00	7.4	0.27	0.49	1.0
BH 14	UD1	3.00	7.9	0.07	0.34	0.7
	UD5	15.00	7.8	ND(<0.01)	0.45	1.0
	UD9	27.00	8.0	0.26	0.67	1.9
	D20	43.50	7.5	ND(<0.01)	0.21	0.1
BH 31	UD3	9.00	8.0	0.09	0.61	1.5
	UD9	27.00	8.2	0.11	0.31	0.8
	D15	39.00	7.5	0.19	0.37	1.4
	D22	49.50	7.4	0.20	0.42	2.4

Notes:-

- 1) ND – Not detected.



Neo Pei Eern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST

Your Exploration . Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.
Tel : 03-5124 8379 Fax : 03 - 5121 3088
Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



DATE ISSUED : 18 February 2019

LAB REFERENCE NO. : ATL/CHEM/1902-012

COMPANY : Geocrete Sdn Bhd
No. 22 Jalan P4/8,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03- 8724 2829 Fax : 03- 8724 2824

DATE SAMPLE RECEIVED : 11 February 2019

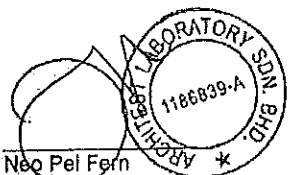
DATE OF MEASUREMENT : 12 February 2019 to 16 February 2019

SAMPLE DESCRIPTION : Twenty soil samples

TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3

PROJECT : Proposed Expansion Of Container Terminal CT10-CT19 And Its Associated Works At Westport, Pulau Indah, Selangor.

ANALYSIS RESULTS : Refer Page 2 of 2
(As per sample received)



Ngo Pel Fern
BSc. (Hons), MSc (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist



ARCHITEST LABORATORY SDN BHD (1186839-A)

15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.

Tel : 03-5124 8379 Fax : 03 - 5121 3088


Email : info@architest.com.my Website : www.architest.com.my

Your Exploration, Our Expertise

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₃ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 28	UD1	3.00	7.7	0.17	0.75	2.9
	UD7	21.00	7.6	0.15	0.63	2.8
	D15	37.50	7.6	0.09	0.42	0.8
	D23	49.50	7.8	0.14	0.64	1.8
BH 30	UD1	3.00	8.1	0.09	0.48	1.7
	UD5	15.00	8.1	0.05	0.48	2.0
	UD10	30.00	7.8	0.05	0.55	2.9
	D23	49.50	7.6	0.14	0.43	1.2
BH 35	UD1	3.00	7.6	0.06	0.23	1.1
	UD7	21.00	7.6	0.14	0.63	2.1
	D14	31.50	7.8	0.10	0.39	1.4
	D26	49.50	7.5	0.13	0.55	1.6
BH 36	UD1	3.00	7.9	0.13	0.46	2.2
	UD5	15.00	7.8	0.15	0.63	2.9
	D11	28.50	7.4	0.28	0.44	1.0
	D25	49.50	7.6	0.20	0.48	2.0
BH 38	UD1	3.00	7.4	0.19	0.74	4.2
	UD6	18.00	6.5	0.23	0.60	12.9
	D21	40.50	7.0	0.06	0.26	2.4
	D29	52.50	7.5	0.06	0.45	1.0

Notes:-

- 1) ND - Not detected.


Neo Pei Fern
BSc. (Hons), MSc. (Chemistry), AMIC
IKM No. A2332/4815/2006
Chemist



ARCHITEST

Your Exploration, Our Expertise

ARCHITEST LABORATORY SDN BHD (1186839-A)
15, Jalan Anggerik Mokara F31/F, Kota Kemuning, Seksyen 31, 40460 Shah Alam, Selangor.

Tel : 03-5124 8379 Fax : 03 - 5121 3038

Email : info@architest.com.my Website : www.architest.com.my

CERTIFICATE OF ANALYSIS



MS ISO/IEC 17025
TESTING
SAMM NO.876

DATE ISSUED : 20 February 2019

LAB REFERENCE NO. : ATL/CHEM/1902-013

COMPANY : Geocrete Sdn Bhd,
No. 22 Jalan P4/8, Seksyen 4,
Bandar Teknologi Kajang,
43500 Semenyih, Selangor.
Tel : 03-8724 2829 Fax : 03-8724 2824

DATE SAMPLE RECEIVED : 13 February 2019

DATE OF MEASUREMENT : 13 February 2019 to 20 February 2019

SAMPLE DESCRIPTION : Sixteen soil samples

TEST METHOD : Determination of pH – BS1377 : Part 3 : 1990, Clause 9
Determination of Chloride Content – BS 1377 : Part 3 : 1990, Clause 7
Determination of Sulphate Content – BS 1377 : Part 3 : 1990, Clause 5
Determination of Organic Matter – BS 1377 : Part 3 : 1990, Clause 3

PROJECT : Proposed Expansion Of Container Terminal CT10 – CT19 And Its
Associated Works At Westport, Pulau Indah, Selangor.

ANALYSIS RESULTS (As per sample received)

Sample Marking			Results			
Borehole No.	Sample No.	Depth, m	pH	Total Sulphates as SO ₄ (%)	Chloride as Cl ⁻ (%)	Organic Matter (%)
BH 34	UD1	3.00	7.5	0.08	0.47	1.1
	UD6	18.00	7.5	0.19	0.75	2.4
	D12	28.50	7.5	0.34	1.00	2.0
	D26	49.50	7.4	0.35	1.01	1.8
BH 37	D1	1.50	7.5	0.09	0.45	0.3
	UD1	15.00	7.8	0.14	0.47	1.5
	D17	28.50	7.7	0.08	0.35	0.2
	D31	42.20	4.6	1.03	0.46	50.3
BH 39	UD1	4.50	7.9	0.16	0.55	2.0
	UD6	19.50	7.2	0.09	0.22	0.9
	D17	34.50	7.3	0.09	0.41	0.3
	D28	51.00	6.6	0.19	0.45	1.5
BH 40	D1	1.50	7.9	ND (<0.01)	0.22	0.4
	UD3	15.00	7.9	ND (<0.01)	0.36	0.6
	D14	25.50	5.8	0.20	0.22	1.3
	D33	54.00	7.3	0.16	0.73	1.7

Notes:

1) ND - Not Detected

Neo Pei Fern
BSc. (Hons), MSc. (Chemistry), AMIC
IKM No. A2332/4915/2006
Chemist

APPENDIX E
SITE PHOTOGRAPH

**SOIL INVESTIGATION AT WESTPORTS, PULAU INDAH, SELANGOR.
BOREHOLE NO.: 1-40, DATE STARTED: 21/09/2018, DATE COMPLETED: 22/01/2019**



Location of BH1



Location of BH2



Location of BH3



Location of BH4



Location of BH5



Location of BH6



Location of BH7



Location of BH8



Location of BH9



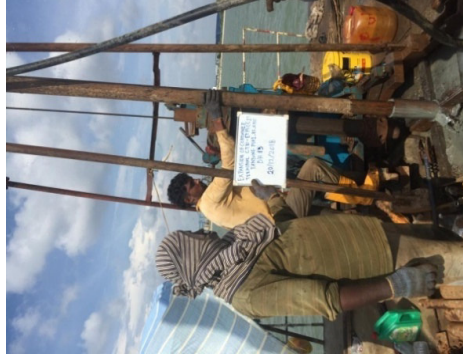
Location of BH10



Location of BH11



Location of BH12



Location of BH13



Location of BH14



Location of BH15



Location of BH16



Location of BH17



Location of BH18



Location of BH19



Location of BH20



Location of BH21



Location of BH22



Location of BH23



Location of BH24



Location of BH25



Location of BH26



Location of BH27



Location of BH28



Location of BH29



Location of BH30



Location of BH31



Location of BH32



Location of BH33



Location of BH34



Location of BH35



Location of BH36



Location of BH37



Location of BH38



Location of BH39



Location of BH40

**MACKINTOSH PROBES TEST AT WESTPORTS, PULAU INDAH, SELANGOR.
TEST REF. NO.: 1-30, DATE STARTED: 28/09/2018, DATE COMPLETED: 13/10/2018**



Location of MP1



Location of MP2



Location of MP3



Location of MP4



Location of MP5



Location of MP6



Location of MP7



Location of MP8



Location of MP9



Location of MP10



Location of MP11



Location of MP12



Location of MP13



Location of MP14



Location of MP15



Location of MP16



Location of MP17



Location of MP18



Location of MP19



Location of MP20



Location of MP21



Location of MP22



Location of MP23



Location of MP24



Location of MP25



Location of MP27



Location of MP28



Location of MP26



Location of MP29



Location of MP30