TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage : 1		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 37	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
08/12	11:55	10.40	7.23	0.686	173	1.709	437.2	583.8	146.6	365.2	218.6	292.3	3.98
	12:00	10.55	7.33	0.688	173	1.728	438.1	585.5	147.4	366.5	219.1	293.4	3.97
	12:05	10.93	7.59	0.693	171	1.778	440.2	589.5	149.3	369.4	220.1	296.0	3.95
	12:10	11.26	7.82	0.687	169	1.821	435.0	585.9	150.9	368.4	217.5	295.9	3.88
	12:15	11.56	8.03	0.702	168	1.859	444.2	596.5	152.3	374.4	222.1	300.4	3.92
	12:20	11.84	8.23	0.705	166	1.896	445.3	598.9	153.6	376.2	222.6	302.0	3.90
	12:25	12.13	8.42	0.709	165	1.930	447.0	601.9	154.9	378.4	223.5	303.9	3.89
	12:30	12.41	8.62	0.713	164	1.966	448.7	604.8	156.1	380.5	224.4	305.7	3.87
	12:35	12.72	8.83	0.717	163	2.003	450.3	607.7	157.4	382.6	225.2	307.5	3.86
	12:40	12.97	9.01	0.720	162	2.035	451.5	610.0	158.5	384.2	225.7	309.0	3.85
	12:45	13.20	9.17	0.723	161	2.063	452.7	612.2	159.5	385.8	226.3	310.4	3.84
	12:50	13.52	9.39	0.726	157	2.101	453.5	617.0	163.5	390.3	226.8	314.7	3.77
	12:55	13.78	9.57	0.729	158	2.132	454.6	616.5	161.9	389.2	227.3	313.4	3.81
	13:00	14.02	9.73	0.732	157	2.159	455.8	618.5	162.7	390.6	227.9	314.6	3.80
	13:05	14.38	9.99	0.737	156	2.202	457.8	622.1	164.3	393.2	228.9	316.9	3.79
	13:10	14.71	10.22	0.742	154	2.241	459.9	625.6	165.7	395.6	229.9	319.0	3.78
	13:15	14.97	10.40	0.745	153	2.270	460.9	627.6	166.7	397.2	230.5	320.3	3.77
	13:20	15.30	10.63	0.751	152	2.308	463.7	631.7	168.0	399.8	231.8	322.6	3.76
	13:25	15.55	10.80	0.754	151	2.336	464.7	633.7	169.0	401.4	232.4	323.9	3.75
	13:30	15.87	11.02	0.759	150	2.371	466.9	637.1	170.2	403.6	233.4	325.8	3.74
	13:35	16.19	11.24	0.764	149	2.406	469.0	640.5	171.5	406.0	234.5	327.8	3.73
	13:40	16.45	11.42	0.767	148	2.434	469.9	642.4	172.5	407.5	235.0	329.1	3.72
	13:45	16.71	11.60	0.771	147	2.463	471.6	645.1	173.5	409.3	235.8	330.7	3.72
	13:50	17.00	11.80	0.775	145	2.494	473.1	647.7	174.6	411.1	236.5	332.3	3.71
	13:55	17.28	12.00	0.778	144	2.525	474.0	649.7	175.7	412.7	237.0	333.7	3.70
	14:00	17.56	12.20	0.782	143	2.556	475.5	652.3	176.8	414.5	237.7	335.3	3.69
	14:05	17.84	12.39	0.785	142	2.585	476.3	654.1	177.8	416.0	238.2	336.6	3.68
	14:10	18.12	12.59	0.789	141	2.615	477.8	656.7	178.9	417.8	238.9	338.2	3.67
	14:15	18.39	12.77	0.791	140	2.642	478.1	658.0	179.9	418.9	239.0	339.3	3.66
	14:20	18.72	13.00	0.796	139	2.677	480.0	661.1	181.1	421.1	240.0	341.1	3.65
	14:25	18.97	13.18	0.799	138	2.703	481.0	663.1	182.1	422.6	240.5	342.4	3.64
	14:30	19.27	13.39	0.802	137	2.734	481.7	665.0	183.3	424.1	240.8	343.9	3.63
	14:35	19.55	13.58	0.806	136	2.762	483.2	667.5	184.3	425.9	241.6	345.4	3.62
	14:40	19.84	13.78	0.810	135	2.792	484.6	669.9	185.3	427.6	242.3	346.8	3.61
	14:45	20.12	13.97	0.814	134	2.819	486.0	672.4	186.4	429.4	243.0	348.4	3.61
	14:50	20.41	14.17	0.818	133	2.848	487.4	674.9	187.5	431.2	243.7	350.0	3.60
	14:55	20.69	14.37	0.822	131	2.877	488.8	677.4	188.6	433.0	244.4	351.5	3.59
	15:00	20.98	14.57	0.827	130	2.906	490.7	680.4	189.7	435.1	245.4	353.3	3.59
	15:05	21.23	14.75	0.831	129	2.932	492.2	682.9	190.7	436.8	246.1	354.8	3.58
	15:10	21.47	14.91	0.835	128	2.955	493.8	685.4	191.6	438.5	246.9	356.2	3.58
	15:15	21.76	15.11	0.840	127	2.983	495.7	688.5	192.8	440.7	247.9	358.0	3.57

Borehole No. : WCH-BH09 — **Sample Depth m:- 7.00 - 8.00**

Sample No. : 9 — **Specimen Depth m:- 7.60 - 7.80**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 37	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
08/12	15:20	22.08	15.34	0.845	126	3.016	497.5	691.6	194.1	442.9	248.8	359.9	3.56
	15:25	22.46	15.60	0.851	124	3.052	499.7	695.3	195.6	445.4	249.8	362.2	3.55
	15:30	22.63	15.72	0.854	124	3.069	500.9	697.2	196.3	446.7	250.4	363.3	3.55
	15:35	22.93	15.92	0.858	123	3.097	502.1	699.6	197.5	448.6	251.1	364.9	3.54
	15:40	23.18	16.10	0.862	122	3.122	503.5	702.0	198.5	450.2	251.7	366.3	3.54
	15:45	23.48	16.31	0.867	120	3.152	505.3	705.0	199.7	452.4	252.7	368.1	3.53
	15:50	23.78	16.51	0.871	119	3.180	506.5	707.4	200.9	454.2	253.3	369.7	3.52
	15:55	24.04	16.70	0.875	118	3.206	507.9	709.9	202.0	455.9	253.9	371.3	3.51
	16:00	24.32	16.89	0.879	117	3.233	509.1	712.3	203.2	457.8	254.6	372.9	3.51
	16:05	24.65	17.12	0.882	116	3.265	509.5	714.0	204.5	459.3	254.8	374.3	3.49
	16:10	24.88	17.28	0.885	115	3.287	510.3	715.7	205.4	460.6	255.2	375.5	3.48
	16:15	25.16	17.48	0.888	114	3.315	510.9	717.4	206.5	462.0	255.5	376.8	3.47
	16:20	25.45	17.67	0.891	112	3.341	511.5	719.1	207.6	463.4	255.8	378.1	3.46
	16:25	25.73	17.87	0.894	112	3.369	512.1	720.6	208.5	464.6	256.1	379.2	3.46
	16:30	26.04	18.08	0.897	111	3.398	512.6	722.0	209.4	465.7	256.3	380.3	3.45
	16:35	26.35	18.30	0.900	109	3.429	513.0	723.6	210.6	467.1	256.5	381.6	3.44
	16:40	26.60	18.47	0.902	109	3.452	513.1	724.5	211.4	467.9	256.5	382.4	3.43
	16:45	**26.89**	**18.68**	**0.905**	**108**	**3.482**	**513.6**	**725.9**	**212.3**	**469.1**	**256.8**	**383.5**	**3.42**
	16:50	27.24	18.92	0.906	107	3.515	512.6	725.9	213.3	469.6	256.3	384.2	3.40
	16:55	27.43	19.05	0.906	106	3.533	511.7	725.5	213.8	469.7	255.9	384.4	3.39
	17:00	27.74	19.26	0.910	105	3.563	512.7	727.3	214.6	471.0	256.4	385.5	3.39
	17:05	28.00	19.45	0.910	105	3.589	511.5	726.9	215.4	471.2	255.8	385.9	3.37
	17:10	28.33	19.67	0.913	104	3.620	511.9	728.1	216.2	472.1	255.9	386.8	3.37
	17:15	28.63	19.88	0.917	103	3.650	512.9	729.9	217.0	473.4	256.4	388.0	3.36
	17:20	28.89	20.07	0.920	102	3.677	513.4	731.4	218.0	474.7	256.7	389.1	3.36
	17:25	29.16	20.25	0.922	101	3.702	513.4	732.0	218.6	475.3	256.7	389.7	3.35
	17:30	29.49	20.48	0.924	100	3.735	513.1	732.7	219.6	476.1	256.5	390.6	3.34

Borehole No. : WCH-BH09 — **Sample Depth m:- 7.00 - 8.00**

Sample No. : 9 — **Specimen Depth m:- 7.60 - 7.80**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

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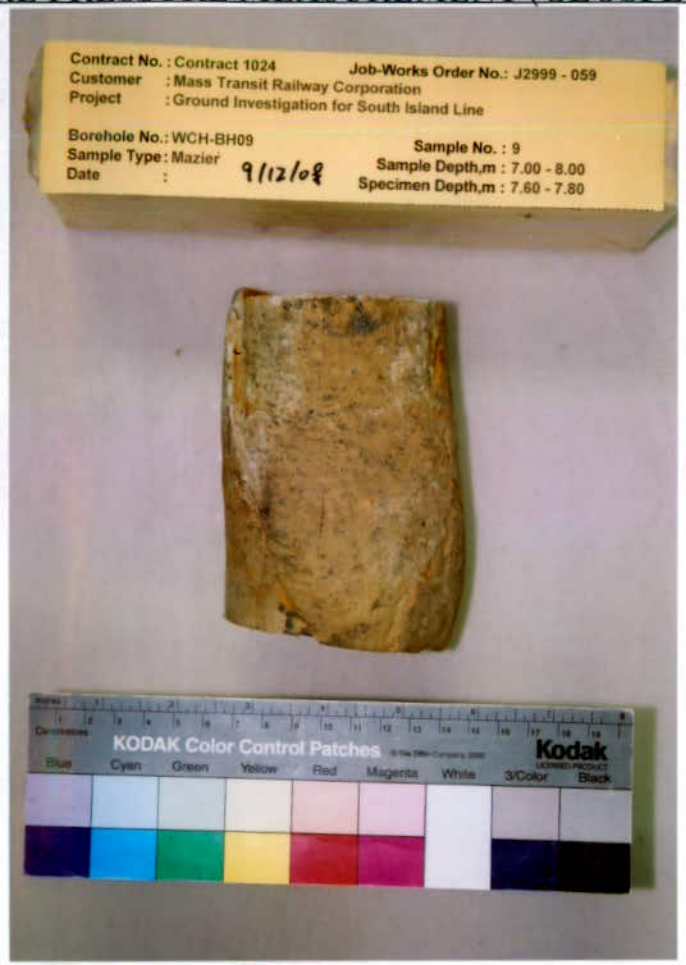
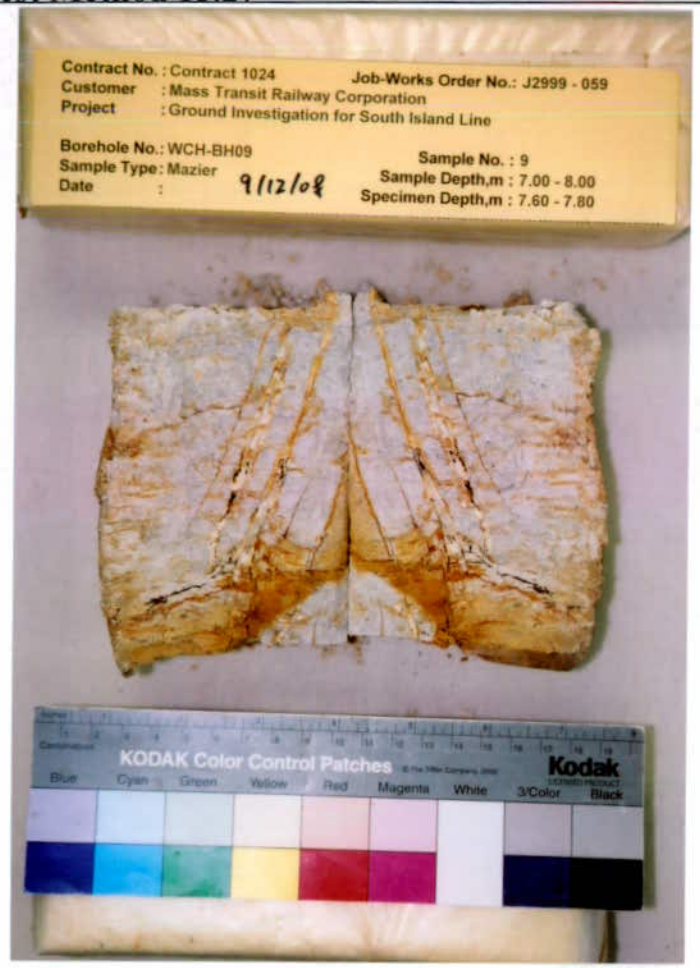
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)





Description : Brown, sandy SILT | **Sample Origin : CDT‡** | ‡ Information provided by customer

Borehole No. : WCH-BH09	**Sample No. : 9**	**Sample Depth m:- 7.00 - 8.00**	**Specimen Depth m:- 7.60 - 7.80**
Customer : Mass Transit Railway Corporation		**Contract No. : Contract 1024**	Compiled by W S Wat
Project : Ground Investigation for South Island Line		**Job No. : J2999**	
		Works Order No.: 059	Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH09	WCH-BH09	WCH-BH09
Sample		no	9	9	9
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	7.00 - 8.00	7.00 - 8.00	7.00 - 8.00
Specimen Depth		m	7.80 - 8.00	7.80 - 8.00	7.80 - 8.00
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.2	74.6	75.0
Height	(H_o)	mm	145.0	141.5	139.3
Moisture Content	(W_o)	%	17	16	16
Bulk density	(ρ_o)	Mg/m^3	2.15	2.17	2.17
Dry density	(ρ_d)	Mg/m^3	1.84	1.86	1.87
Particle density	(ρ_s)		2.65	2.65	2.65
Voids Ratio	(e_o)		0.44	0.42	0.41
Degree of Saturation	(S_r)	%	101.5	102.7	102.8
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.97		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	255	290	325
Back Pressure	(u_b)	kPa	220	220	220
Effective Pressure	(σ'_3)	kPa	35	70	105
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	861.21	1208.06	1521.34
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.43	0.13	0.09
Coefficient of Permeability (k)		m/s	1.15E-07	5.01E-08	4.08E-08
COMPRESSION TERMINATION CRITERION			MAXIMUM STRESS RATIO		MAX ($\sigma'1$ - $\sigma'3$)
COMPRESSION - INITIAL					
Moisture Content	(w)	%	16	16	16
Pore Pressure at the End of Consolidation		kPa	220	220	220
Effective Stress at the End of Consolidation		kPa	35	70	105
Bulk density	(ρ_o)	Mg/m^3	2.17	2.17	2.18
Dry density	(ρ_d)	Mg/m^3	1.86	1.87	1.88
Voids Ratio	(e)		0.42	0.41	0.41
Degree of Saturation	(S_r)	%	102.7	102.8	102.8

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat Checked By : Name : H W Chung Approved By : Signatory : **Lau Wai Cheong**

Tested Date: 03/12/2008 Date : 19/12/2008 Date : 19/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH09	WCH-BH09	WCH-BH09
Sample		no	9	9	9
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	7.00 - 8.00	7.00 - 8.00	7.00 - 8.00
Specimen Depth		m	7.80 - 8.00	7.80 - 8.00	7.80 - 8.00
COMPRESSION - FAILURE					
Cell Pressure		kPa	255	290	325
Rate of Strain		mm/min	0.048	0.047	0.046
CONDITIONS AT MAXIMUM STRESS RATIO					
Major Effective Principal Stress (σ'_1)		kPa	174	297	454
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	140	235	353
Minor Effective Principal Stress (σ'_3)		kPa	35	63	101
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	105	180	278
$t = (\sigma_1 - \sigma_3)/2$		kPa	70	117	176
Expanded Uncertainty of s' ^		kPa	-	-	-
Expanded Uncertainty of t ^		kPa	-	-	-
Pore pressure parameter A_f			0.00	0.03	0.01
Strain at Failure	(εf)	%	1.9	3.4	4.9
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	16	16	16
Bulk density	(ρ_o)	Mg/m^3	2.17	2.17	2.18
Dry density	(ρ_d)	Mg/m^3	1.86	1.87	1.88
Voids Ratio	(e_f)		0.42	0.41	0.41
Degree of Saturation	(S_f)	%	102.7	102.8	102.8

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**

Compiled by W S Wat
Checked by H W Chung

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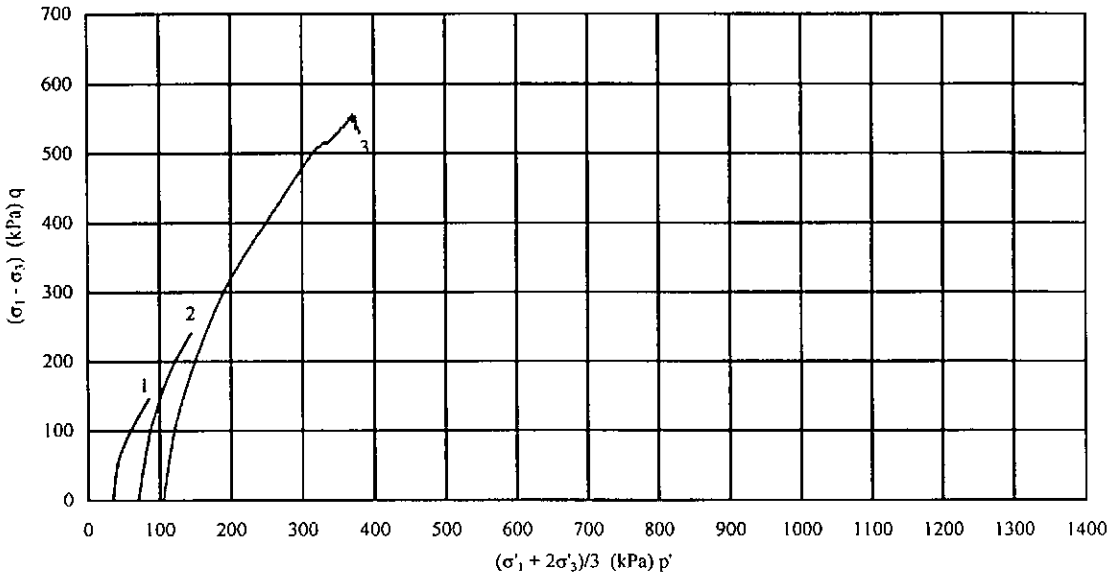
Form : GESR009.7 / Nov.10.06 / Issue 1 / Rev 1

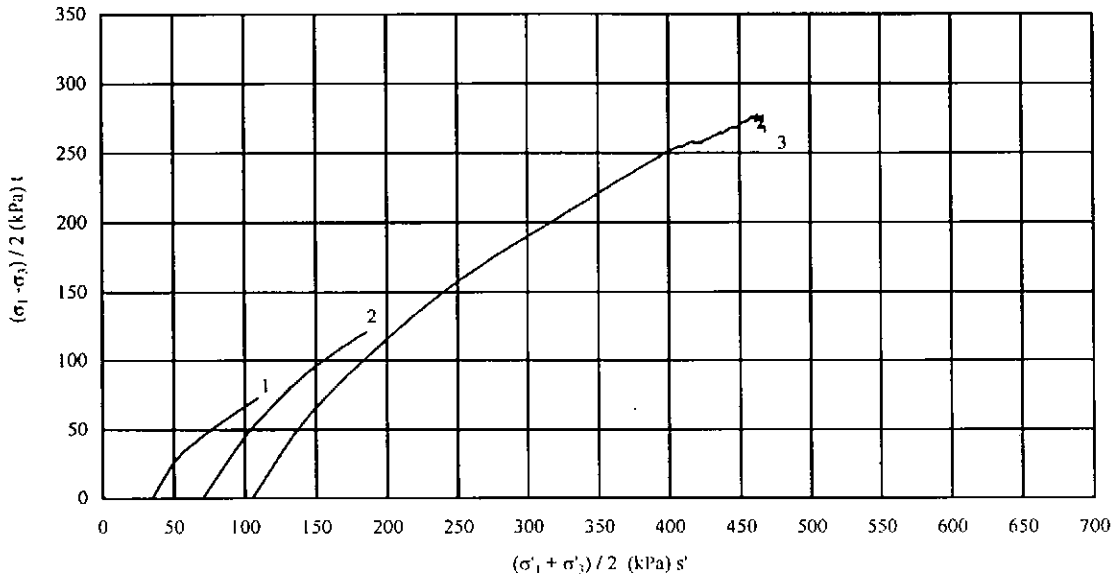
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH09**	**Sample Depth m:- 7.00 - 8.00**	
Sample No. :	**9**	**Specimen Depth m:- 7.80 - 8.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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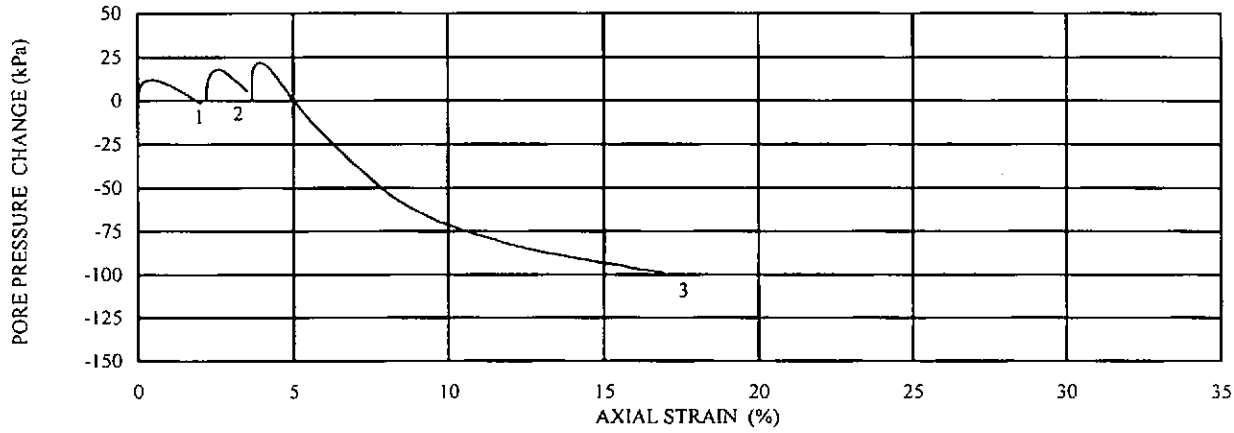
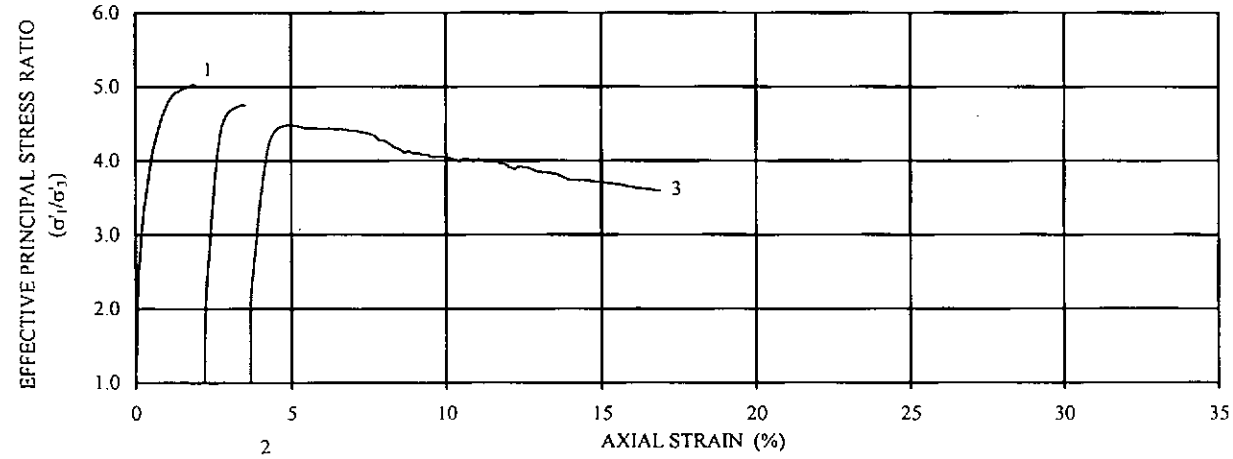
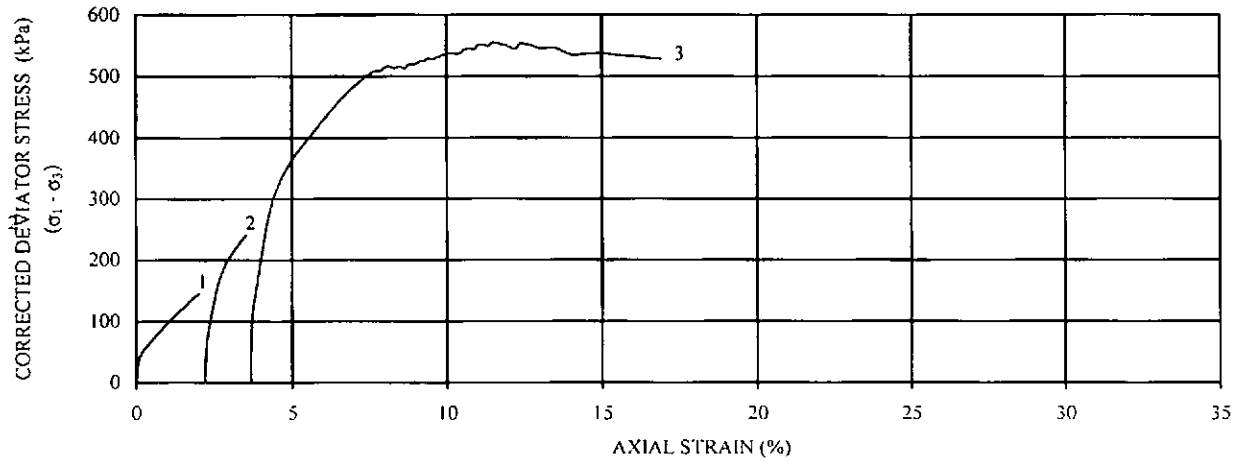
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH09**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.80 - 8.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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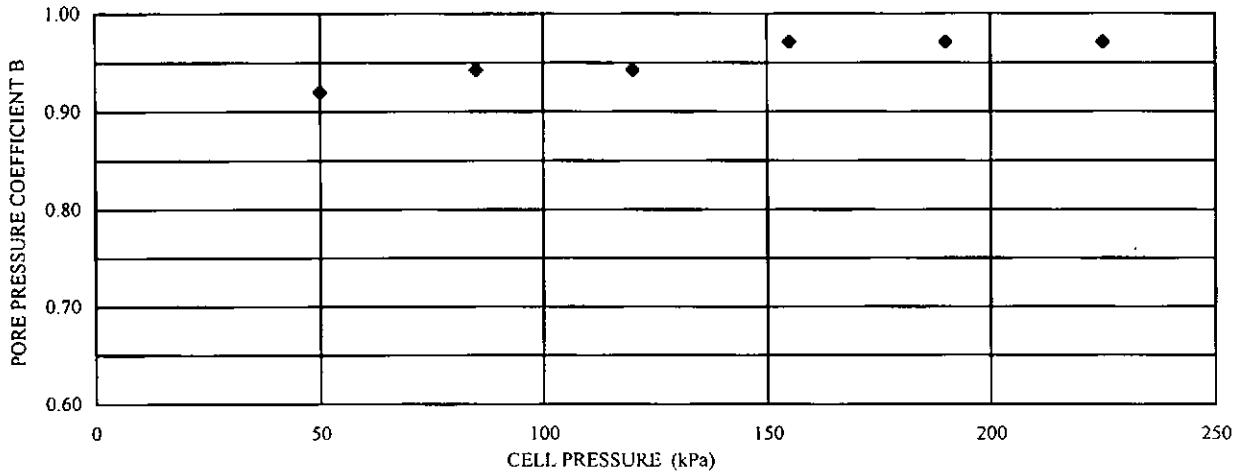
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Parameter B
04/12/2008	08:33	0	0	-	0.0	
	08:40	25	-	23		-
	08:57	25	20	20	-1.8	
	09:03	50	-	43		0.92
	09:21	50	45	45	-1.2	
	09:27	85	-	78		0.94
	09:50	85	80	80	-0.6	
	09:57	120	-	113		0.94
	10:32	120	115	115	0.6	
	10:40	155	-	149		0.97
	11:53	155	150	150	1.5	
	12:04	190	-	184		0.97
	13:20	190	185	185	2.0	
	13:30	225	-	219		0.97
05/12/2008	08:35	225	220	220	2.1	

Borehole No. : WCH-BH09 — **Sample Depth m:-** 7.00 - 8.00
Sample No. : 9 — **Specimen Depth m:-** 7.80 - 8.00
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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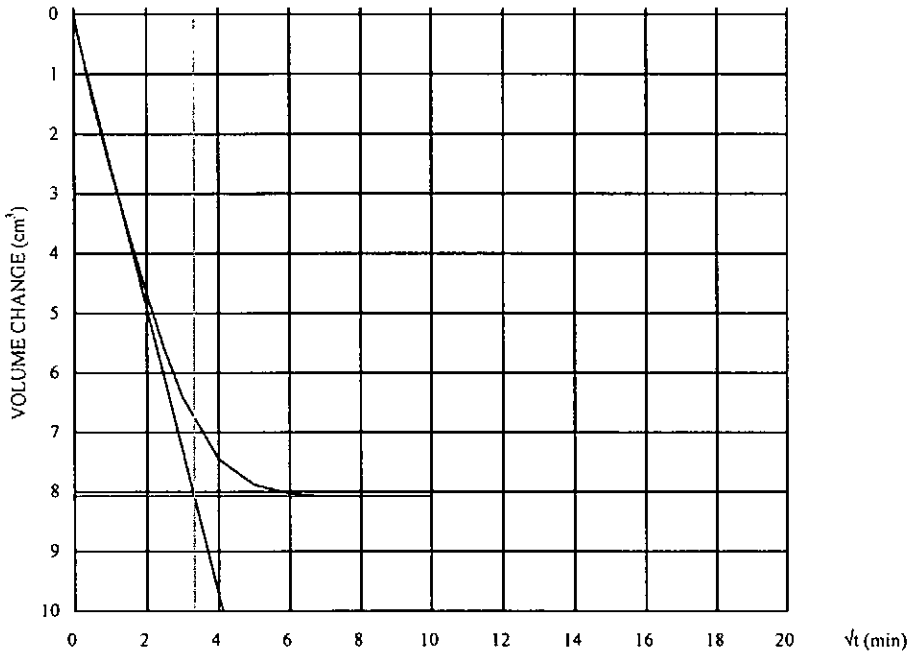
Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

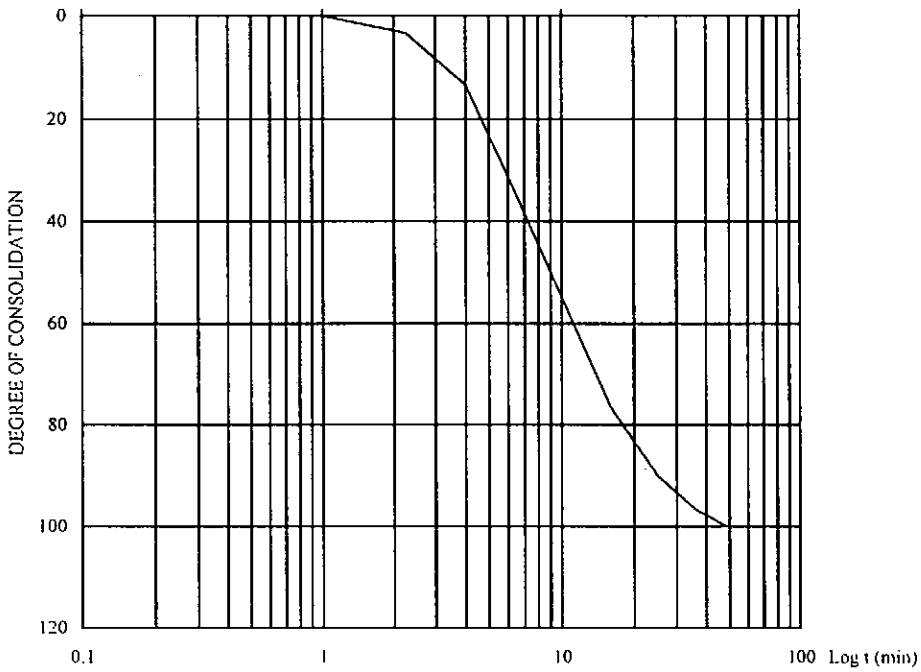


√t100 3.32 min

t100 10.99 min

tf 5.83 min

Calc. strain rate
1.734 mm/min



Borehole No. :	**WCH-BH09**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.80 - 8.00**
Customer :	**Mass Transit Railway Corporation**		Complied by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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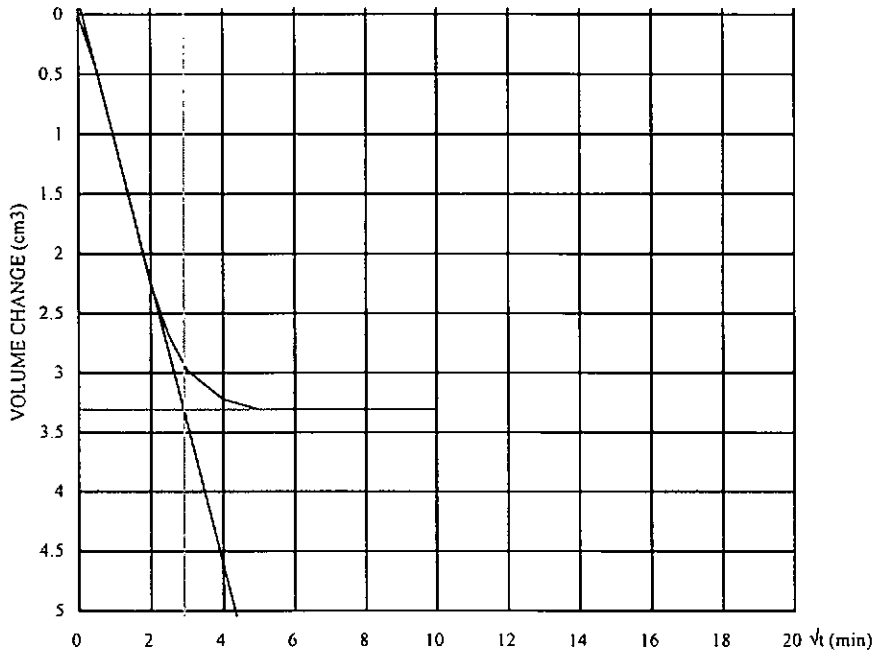
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 2

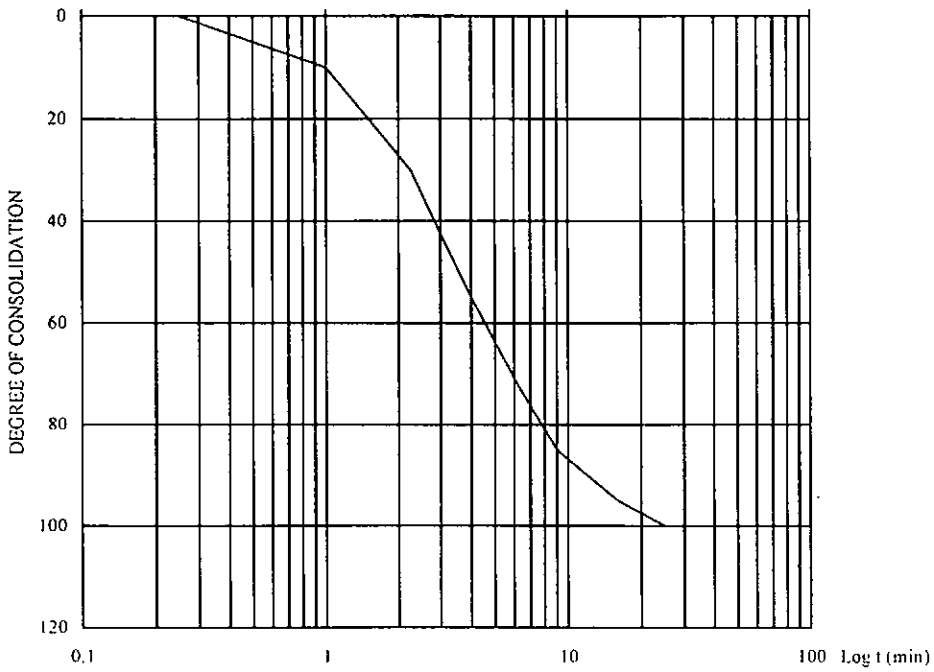


√t100 2.91 min

t100 8.45 min

tf 4.48 min

Calc. strain rate
2.208 mm/min



Borehole No. :	**WCH-BH09**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.80 - 8.00**
Customer :	**Mass Transit Railway Corporation**		Complied by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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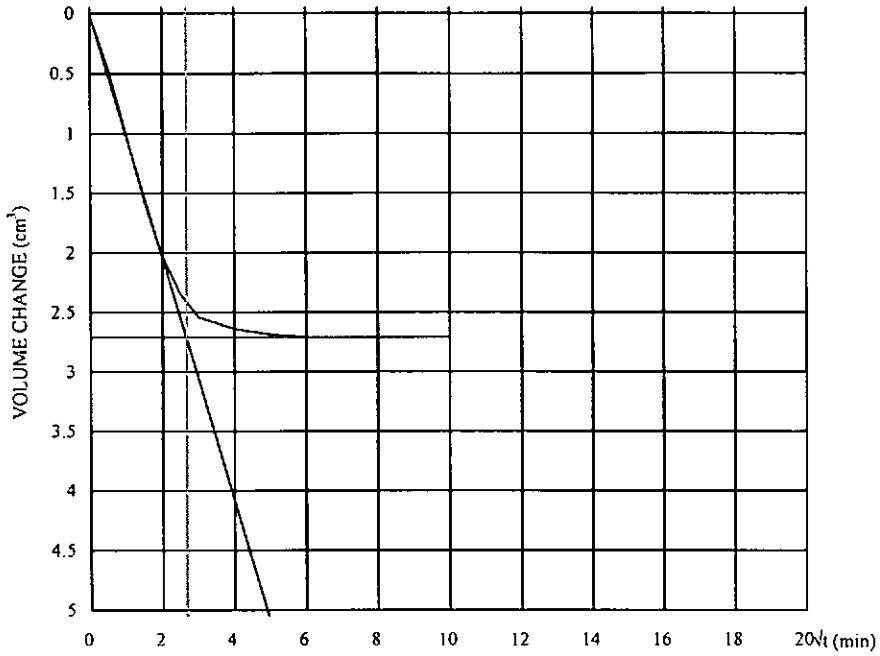
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 3

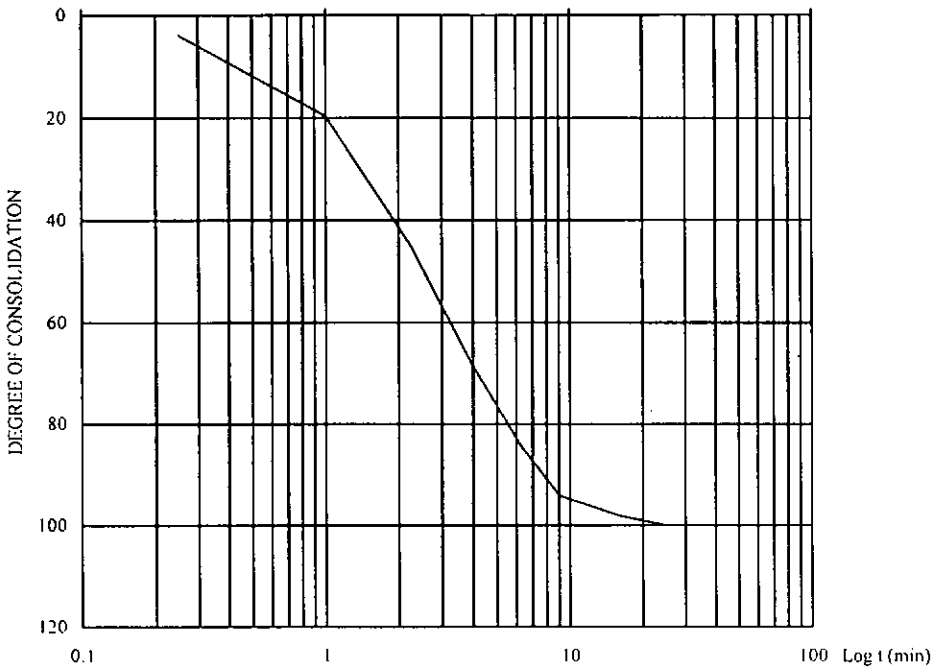


√t100 2.66 min

t100 7.06 min

tf 3.74 min

Calc. strain rate
2.601 mm/min



Borehole No. : WCH-BH09		**Sample Depth m:-** 7.00 - 8.00
Sample No. : 9		**Specimen Depth m:-** 7.80 - 8.00
Customer : Mass Transit Railway Corporation		Complied by
Project : Ground Investigation for South Island Line		W S Wat
	Contract No.: Contract 1024	Checked by
Job No.: J2999	**Works Order No.:** 059	H W Chung

Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

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TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	35 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr
FAILURE CRITERION					
Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 1	Applied Pressure (kPa) - Cell :	255	Back : 220	P.R. factor	1.6949 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 11 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
05/12	09:45	0.00	0.00	0.072	220	0.000	0.0	35.0	35.0	35.0	0.0	35.0	1.00
	09:50	0.12	0.08	0.162	228	0.023	35.5	62.5	27.0	44.8	17.8	38.8	2.32
	09:55	0.34	0.23	0.203	231	0.066	51.6	75.6	24.0	49.8	25.8	41.2	3.15
	10:00	0.52	0.36	0.225	232	0.103	60.2	83.4	23.2	53.3	30.1	43.3	3.59
	10:05	0.76	0.53	0.252	232	0.151	70.7	93.8	23.1	58.4	35.3	46.7	4.06
	10:10	0.97	0.67	0.272	231	0.190	78.4	102.0	23.6	62.8	39.2	49.7	4.32
	10:15	1.16	0.80	0.291	231	0.227	85.7	110.1	24.4	67.3	42.9	53.0	4.51
	10:20	1.35	0.93	0.310	230	0.262	93.0	118.3	25.3	71.8	46.5	56.3	4.68
	10:25	1.59	1.10	0.333	228	0.309	101.8	128.4	26.6	77.5	50.9	60.5	4.83
	10:30	1.79	1.24	0.353	227	0.347	109.4	137.4	28.0	82.7	54.7	64.5	4.91
	10:35	2.01	1.39	0.372	225	0.387	116.6	146.2	29.6	87.9	58.3	68.5	4.94
	10:40	2.25	1.56	0.393	224	0.432	124.6	155.9	31.3	93.6	62.3	72.8	4.98
	10:45	2.46	1.71	0.413	222	0.472	132.1	165.1	33.0	99.1	66.1	77.0	5.00
	10:50	**2.69**	**1.86**	**0.433**	**220**	**0.511**	**139.6**	**174.3**	**34.7**	**104.5**	**69.8**	**81.2**	**5.02**
	10:55	2.90	2.01	0.450	219	0.549	146.0	182.5	36.5	109.5	73.0	85.2	5.00

Borehole No. :	**WCH-BH09**	**Sample Depth m:- 7.00 - 8.00**	
Sample No. :	**9**	**Specimen Depth m:- 7.80 - 8.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage				P.W.P,B.P					Effective Pressure		70		kPa
Side drains		No	Selected Machine Speed			0.047		mm/min	Rate of Strain		2.00		% per hr
FAILURE CRITERION													
Max. deviator Stress				☐	Max. Stress ratio			☒	Axial Strain %				☐
Stage :	2	Applied Pressure (kPa) - Cell :				290	Back :	220	P.R. factor		1.6949		kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 11 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
05/12	11:40	3.15	2.19	0.082	220	0.000	0.0	70.0	70.0	70.0	0.0	70.0	1.00
	11:45	3.24	2.24	0.243	231	0.608	62.0	121.5	59.5	90.5	31.0	80.2	2.04
	11:50	3.42	2.37	0.342	236	0.641	100.3	154.2	53.9	104.1	50.2	87.3	2.86
	11:55	3.53	2.44	0.393	237	0.659	120.0	172.9	52.9	112.9	60.0	92.9	3.27
	12:00	3.70	2.57	0.471	238	0.691	150.0	202.1	52.1	127.1	75.0	102.1	3.88
	12:05	3.88	2.69	0.529	238	0.721	172.3	224.7	52.4	138.5	86.1	109.8	4.29
	12:10	4.04	2.80	0.568	237	0.748	187.1	240.5	53.4	147.0	93.6	115.8	4.50
	12:15	4.28	2.96	0.611	234	0.787	203.4	259.2	55.8	157.5	101.7	123.6	4.64
	12:20	4.48	3.10	0.640	232	0.821	214.2	272.2	58.0	165.1	107.1	129.4	4.69
	12:25	4.68	3.24	0.666	230	0.855	223.9	284.0	60.1	172.0	111.9	134.7	4.73
	12:30	**4.91**	**3.40**	**0.695**	**227**	**0.893**	**234.6**	**297.2**	**62.6**	**179.9**	**117.3**	**140.8**	**4.75**
	12:35	5.08	3.52	0.714	226	0.921	241.6	306.1	64.5	185.3	120.8	145.0	4.75

Borehole No. : WCH-BH09 — **Sample Depth m:- 7.00 - 8.00**

Sample No. : 9 — **Specimen Depth m:- 7.80 - 8.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by: W S Wat

Checked by: H W Chung

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TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	105 kPa
Side drains	No	Selected Machine Speed	0.046 mm/min	Rate of Strain	1.98 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐

Stage : 3	Applied Pressure (kPa) - Cell : 325	Back : 220	P.R. factor 3.1341 kN/mm	

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 2 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
08/12	08:40	5.28	3.66	0.046	220	0.000	0.0	105.0	105.0	105.0	0.0	105.0	1.00
	08:45	5.32	3.69	0.183	237	0.961	96.5	184.3	87.8	136.1	48.3	120.0	2.10
	08:50	5.58	3.86	0.270	242	1.001	158.1	241.3	83.2	162.2	79.0	135.9	2.90
	08:55	5.75	3.98	0.326	242	1.028	197.6	281.0	83.4	182.2	98.8	149.3	3.37
	09:00	5.88	4.07	0.367	241	1.049	226.4	310.5	84.1	197.3	113.2	159.6	3.69
	09:05	6.00	4.16	0.402	240	1.069	251.0	336.2	85.2	210.7	125.5	168.9	3.95
	09:10	6.18	4.28	0.443	238	1.097	279.6	366.9	87.3	227.1	139.8	180.5	4.20
	09:15	6.40	4.43	0.480	234	1.130	305.2	395.8	90.6	243.2	152.6	192.3	4.37
	09:20	6.61	4.58	0.508	231	1.164	324.5	418.8	94.3	256.5	162.2	202.5	4.44
	09:25	6.81	4.72	0.529	227	1.195	338.8	436.5	97.7	267.1	169.4	210.6	4.47
	09:30	**7.03**	**4.87**	**0.550**	**224**	**1.227**	**352.9**	**454.2**	**101.3**	**277.8**	**176.5**	**218.9**	**4.48**
	09:35	7.28	5.04	0.570	220	1.264	366.3	471.6	105.3	288.4	183.1	227.4	4.48
	09:40	7.51	5.21	0.588	216	1.301	378.2	487.2	109.0	298.1	189.1	235.1	4.47
	09:45	7.76	5.38	0.604	212	1.337	388.7	501.3	112.6	307.0	194.3	242.2	4.45
	09:50	7.94	5.50	0.616	210	1.362	396.5	511.7	115.2	313.5	198.3	247.4	4.44
	09:55	8.19	5.67	0.633	207	1.398	407.6	526.1	118.5	322.3	203.8	254.4	4.44
	10:00	8.37	5.80	0.645	204	1.425	415.4	536.2	120.8	328.5	207.7	259.3	4.44
	10:05	8.56	5.93	0.658	202	1.452	423.8	547.2	123.4	335.3	211.9	264.7	4.43
	10:10	8.80	6.09	0.673	199	1.484	433.4	559.7	126.3	343.0	216.7	270.8	4.43
	10:15	9.02	6.25	0.688	196	1.517	443.1	572.1	129.0	350.5	221.5	276.7	4.43
	10:20	9.24	6.40	0.701	193	1.547	451.3	583.1	131.8	357.5	225.7	282.2	4.42
	10:25	9.50	6.58	0.718	190	1.583	462.1	596.9	134.8	365.9	231.1	288.8	4.43
	10:30	9.69	6.71	0.729	188	1.608	469.0	606.2	137.2	371.7	234.5	293.5	4.42
	10:35	9.91	6.87	0.742	185	1.640	477.2	616.9	139.7	378.3	238.6	298.8	4.42
	10:40	10.11	7.00	0.751	183	1.665	482.6	624.4	141.8	383.1	241.3	302.7	4.40
	10:45	10.34	7.16	0.763	181	1.696	490.0	634.2	144.2	389.2	245.0	307.5	4.40
	10:50	10.58	7.33	0.775	178	1.728	497.3	644.2	146.9	395.5	248.6	312.7	4.39
	10:55	10.80	7.48	0.784	176	1.757	502.6	651.9	149.3	400.6	251.3	316.8	4.37
	11:00	11.09	7.68	0.795	173	1.794	509.0	661.3	152.3	406.8	254.5	322.0	4.34
	11:05	11.34	7.85	0.796	170	1.826	508.7	663.8	155.1	409.4	254.3	324.7	4.28
	11:10	11.53	7.99	0.806	168	1.852	514.7	671.9	157.2	414.6	257.4	328.8	4.27
	11:15	11.74	8.13	0.810	166	1.878	516.6	675.8	159.2	417.5	258.3	331.4	4.24
	11:20	12.00	8.31	0.807	164	1.910	513.5	674.9	161.4	418.1	256.7	332.6	4.18
	11:25	12.23	8.47	0.812	162	1.939	515.9	679.1	163.2	421.2	258.0	335.2	4.16
	11:30	12.48	8.65	0.810	160	1.971	513.6	678.7	165.1	421.9	256.8	336.3	4.11
	11:35	12.69	8.79	0.821	158	1.996	520.1	686.7	166.6	426.7	260.1	340.0	4.12
	11:40	12.94	8.96	0.822	157	2.026	519.8	687.8	168.0	427.9	259.9	341.3	4.09
	11:45	13.15	9.11	0.830	156	2.052	524.3	693.7	169.4	431.6	262.2	344.2	4.10
	11:50	13.40	9.28	0.834	154	2.082	526.0	696.9	170.9	433.9	263.0	346.2	4.08

Borehole No. :	**WCH-BH09**	**Sample Depth m:- 7.00 - 8.00**	
Sample No. :	**9**	**Specimen Depth m:- 7.80 - 8.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

Gammon

FAILURE CRITERION

Max. deviator Stress ☐ | Max. Stress ratio ☒ | Axial Strain % ☐

Stage : 3		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 2	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
08/12	11:55	13.57	9.40	0.841	153	2.103	529.9	701.9	172.0	437.0	265.0	348.6	4.08
	12:00	13.70	9.49	0.838	152	2.118	527.4	700.1	172.7	436.4	263.7	348.5	4.05
	12:05	14.02	9.71	0.846	150	2.155	531.4	706.1	174.7	440.4	265.7	351.8	4.04
	12:10	14.28	9.89	0.854	150	2.186	535.6	711.1	175.5	443.3	267.8	354.0	4.05
	12:15	14.53	10.07	0.858	148	2.216	537.2	713.9	176.7	445.3	268.6	355.8	4.04
	12:20	14.77	10.23	0.860	147	2.242	537.5	715.3	177.8	446.6	268.8	357.0	4.02
	12:25	15.05	10.42	0.860	146	2.274	536.3	715.6	179.3	447.5	268.2	358.1	3.99
	12:30	15.25	10.56	0.872	145	2.297	543.4	723.2	179.8	451.5	271.7	360.9	4.02
	12:35	15.51	10.75	0.877	144	2.327	545.6	726.5	180.9	453.7	272.8	362.8	4.02
	12:40	15.72	10.89	0.876	143	2.350	544.0	725.8	181.8	453.8	272.0	363.1	3.99
	12:45	15.91	11.02	0.888	143	2.371	551.1	733.5	182.4	457.9	275.5	366.1	4.02
	12:50	16.17	11.20	0.890	142	2.400	551.2	734.5	183.3	458.9	275.6	367.0	4.01
	12:55	16.40	11.36	0.889	141	2.425	549.5	733.7	184.2	459.0	274.8	367.4	3.98
	13:00	16.58	11.49	0.899	140	2.445	555.3	740.1	184.8	462.4	277.6	369.9	4.00
	13:05	16.88	11.70	0.898	139	2.478	553.3	739.3	186.0	462.6	276.6	370.4	3.97
	13:10	17.16	11.89	0.898	138	2.508	552.0	738.9	186.9	462.9	276.0	370.9	3.95
	13:15	17.37	12.04	0.893	137	2.531	547.8	735.5	187.7	461.6	273.9	370.3	3.92
	13:20	17.66	12.23	0.891	136	2.560	545.3	733.9	188.6	461.2	272.6	370.4	3.89
	13:25	17.84	12.36	0.905	136	2.580	553.5	742.6	189.1	465.9	276.8	373.6	3.93
	13:30	18.10	12.54	0.906	135	2.607	553.0	743.0	190.0	466.5	276.5	374.3	3.91
	13:35	18.37	12.72	0.905	134	2.635	551.2	741.8	190.6	466.2	275.6	374.3	3.89
	13:40	18.59	12.88	0.901	134	2.659	547.6	739.0	191.4	465.2	273.8	373.9	3.86
	13:45	18.78	13.01	0.900	133	2.678	546.1	737.9	191.8	464.8	273.0	373.8	3.85
	14:00	19.50	13.51	0.905	132	2.752	546.1	739.5	193.4	466.4	273.0	375.4	3.82
	14:15	20.20	14.00	0.893	130	2.824	535.3	730.5	195.2	462.8	267.6	373.6	3.74
	14:30	20.93	14.50	0.901	128	2.896	537.1	733.7	196.6	465.2	268.6	375.6	3.73
	14:45	21.65	15.00	0.908	127	2.967	538.3	736.8	198.5	467.6	269.1	377.9	3.71
	15:00	22.36	15.49	0.908	126	3.037	535.1	734.5	199.4	466.9	267.5	377.8	3.68
	15:15	22.98	15.92	0.910	124	3.097	533.5	734.9	201.4	468.2	266.8	379.2	3.65
	15:30	23.70	16.42	0.911	123	3.167	530.9	733.4	202.5	467.9	265.4	379.5	3.62
	15:45	24.41	16.91	0.912	121	3.235	528.3	732.0	203.7	467.8	264.1	379.8	3.59

Borehole No. : WCH-BH09 — **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 — **Specimen Depth m:-** 7.80 - 8.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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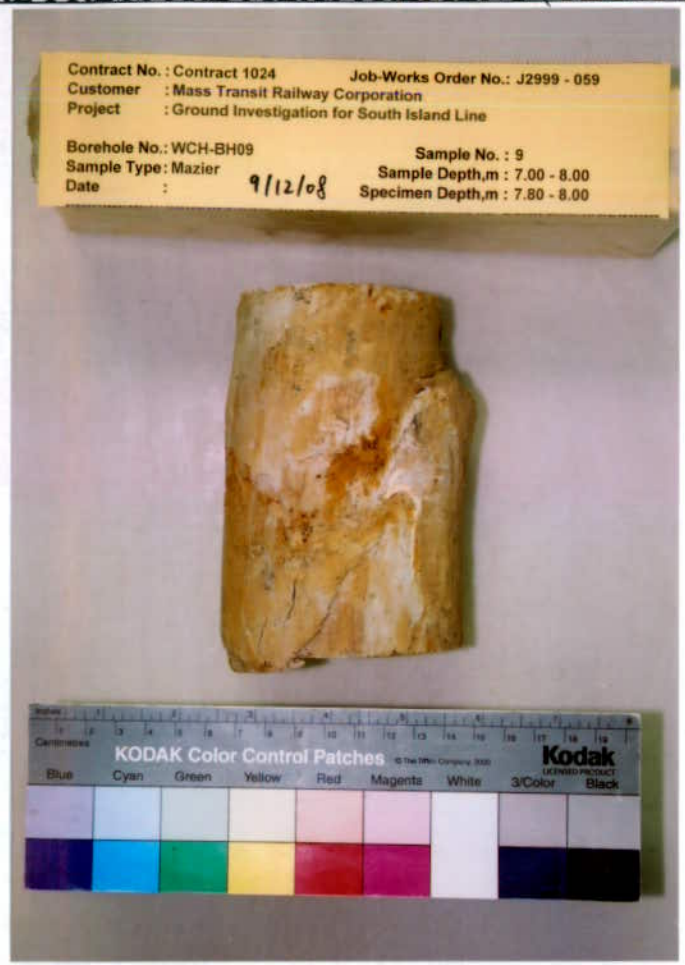
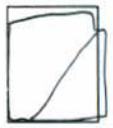
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)





Description : Brown, sandy SILT

Sample Origin : CDT ‡

‡ Information provided by customer

Borehole No. : WCH-BH09	Sample No. : 9	Sample Depth m:- 7.00 - 8.00	Specimen Depth m:- 7.80 - 8.00

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No.: Contract 1024
Job No.: J2999
Works Order No.: 059

Compiled by W S Wat
Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.60 - 3.80		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	73.9		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	23		
Bulk density	(ρ_o)	Mg/m^3	1.97		
Dry density	(ρ_d)	Mg/m^3	1.60		
Particle density	(ρ_s)		2.68		
Voids Ratio	(e_o)		0.67		
Degree of Saturation	(S_r)	%	92.6		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.97		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	230		
Back Pressure	(u_b)	kPa	200		
Effective Pressure	(σ'_3)	kPa	30		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	17101.67		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.24		
Coefficient of Permeability (k)		m/s	1.29E-06		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	24		
Pore Pressure at the End of Consolidation		kPa	200		
Effective Stress at the End of Consolidation		kPa	30		
Bulk density	(ρ_o)	Mg/m^3	2.00		
Dry density	(ρ_d)	Mg/m^3	1.61		
Voids Ratio	(e)		0.66		
Degree of Saturation	(S_r)	%	98.5		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Job No.: **J2999**
Contract No.: Contract 1024
Works Order No.: 059
Report No. : J2999-059.11

Technician : W S Wat
Checked By : Name : H W Chung Date : 16/12/2008
Approved By : Signatory : **Lau Wai Cheong** Date : 16/12/2008
Tested Date: 02/12/2008

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.60 - 3.80		
COMPRESSION - FAILURE					
Cell Pressure		kPa	230		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	298		
Corrected Deviator Stress (σ'_1 - σ'_3)		kPa	240		
Minor Effective Principal Stress (σ'_3)		kPa	58		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	178		
$t = (\sigma_1 - \sigma_3)/2$		kPa	120		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.11		
Strain at Failure	(εf)	%	9.8		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	24		
Bulk density	(ρ_o)	Mg/m^3	2.00		
Dry density	(ρ_d)	Mg/m^3	1.61		
Voids Ratio	(e_f)		0.66		
Degree of Saturation	(S_f)	%	98.5		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.68 (Determined)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

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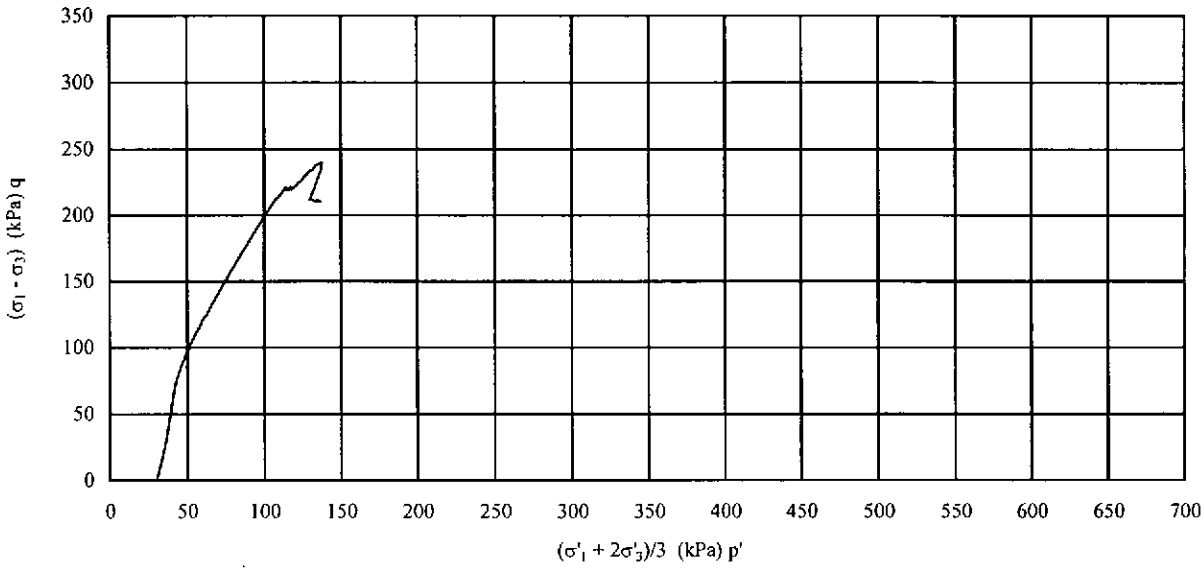
Form : GESR009.7 / Nov.10.06 / Issue 1 / Rev 1

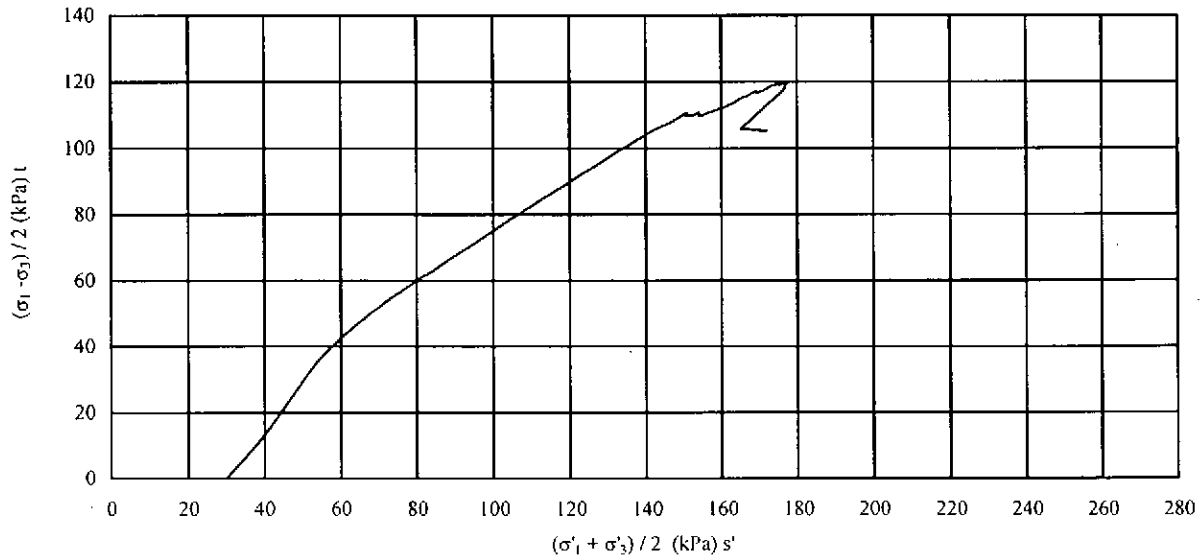
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH10**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.60 - 3.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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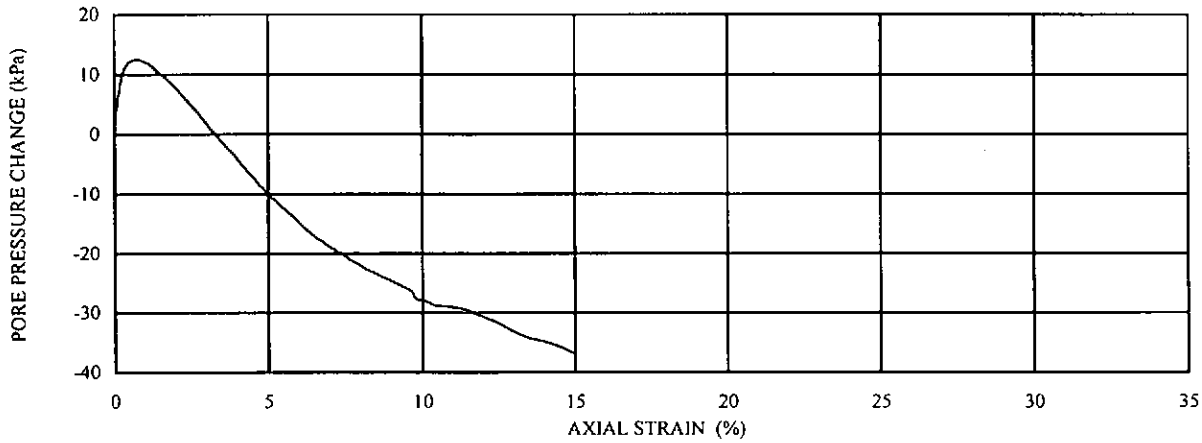
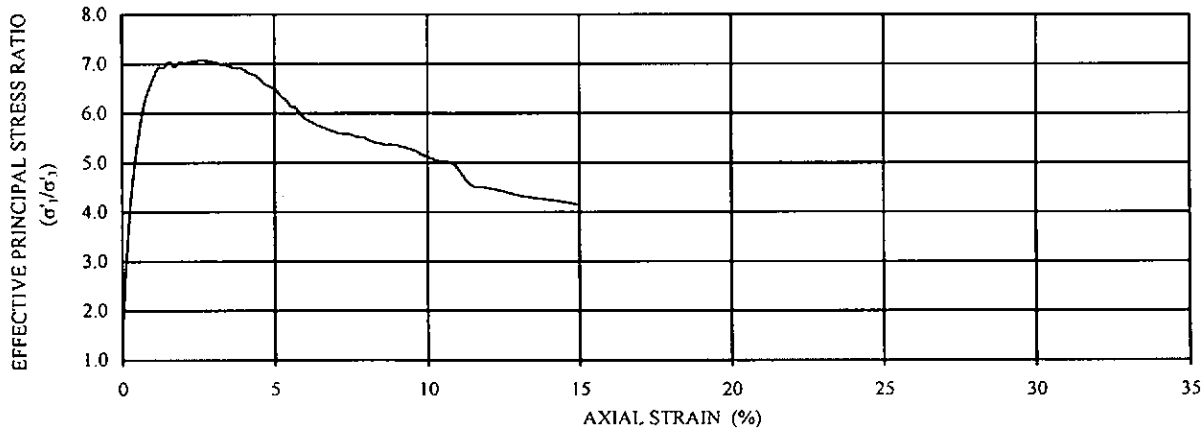
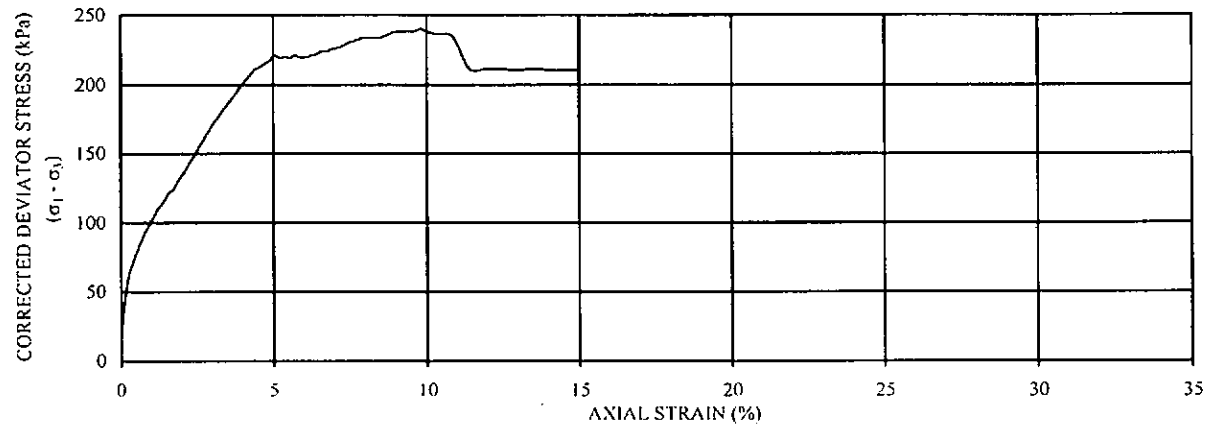
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. : WCH-BH10		**Sample Depth m:- 3.00 - 4.00**
Sample No. : 1		**Specimen Depth m:- 3.60 - 3.80**
Customer : Mass Transit Railway Corporation		Compiled by W S Wat
Project : Ground Investigation for South Island Line		
	Contract No.: Contract 1024	Checked by H W Chung
Job No.: J2999	**Works Order No.:** 059	

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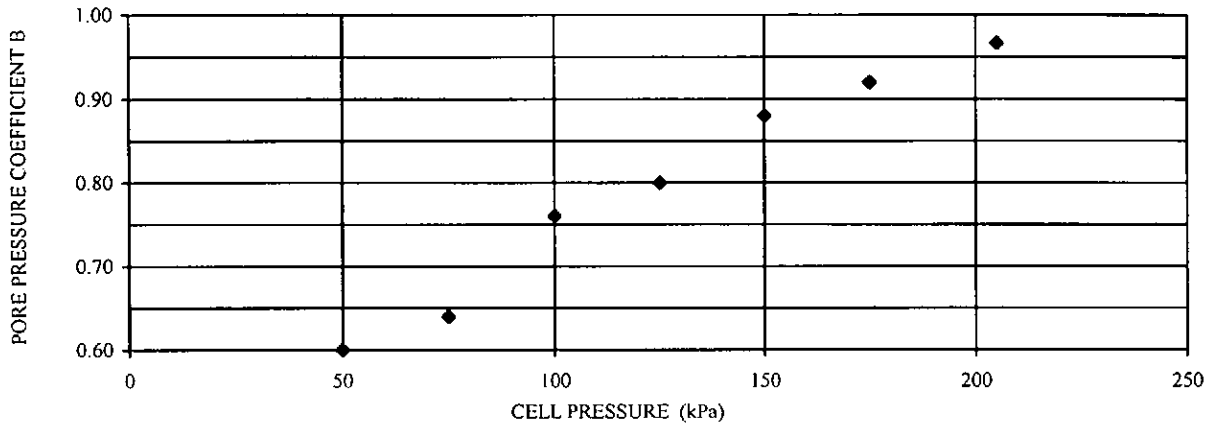
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
02/12/2008	16:06	0	0	-	0.0	
	16:14	25	-	20		-
	16:43	25	20	20	-1.1	
	16:51	50	-	35		0.60
03/12/2008	08:36	50	45	45	1.7	
	08:40	75	-	61		0.64
	09:22	75	70	70	6.5	
	09:26	100	-	89		0.76
	09:59	100	95	95	9.1	
	10:07	125	-	115		0.80
	10:55	125	120	120	10.4	
	11:05	150	-	142		0.88
	11:32	150	145	145	12.0	
	11:40	175	-	168		0.92
	13:10	175	170	170	12.7	
	13:18	205	-	199		0.97
04/12/2008	09:14	205	200	200	14.9	

Borehole No. WCH-BH10 — **Sample Depth m:-** 3.00 - 4.00
Sample No. : 1 — **Specimen Depth m:-** 3.60 - 3.80

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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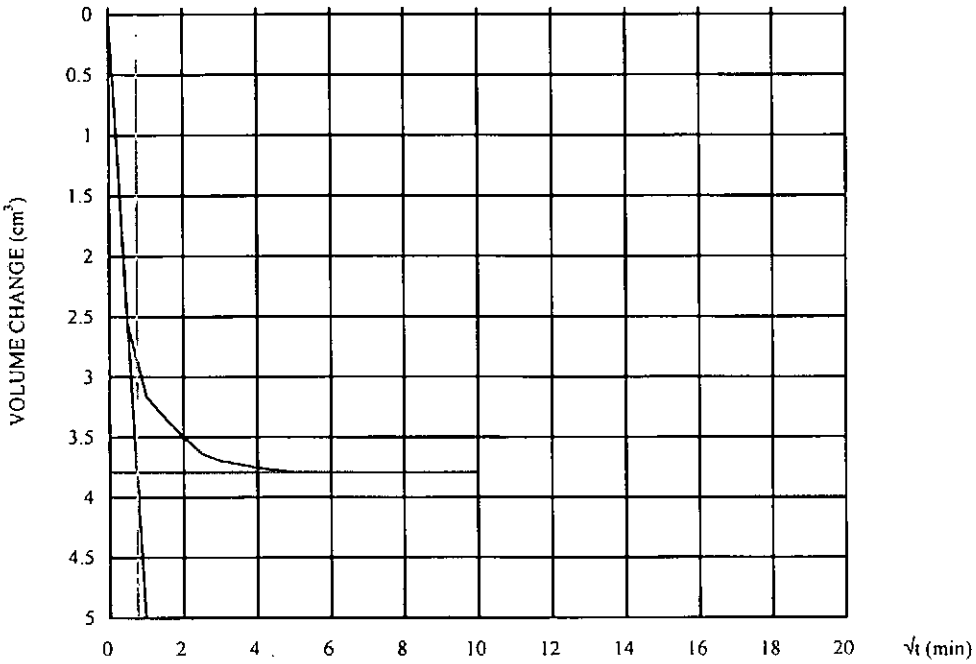
Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

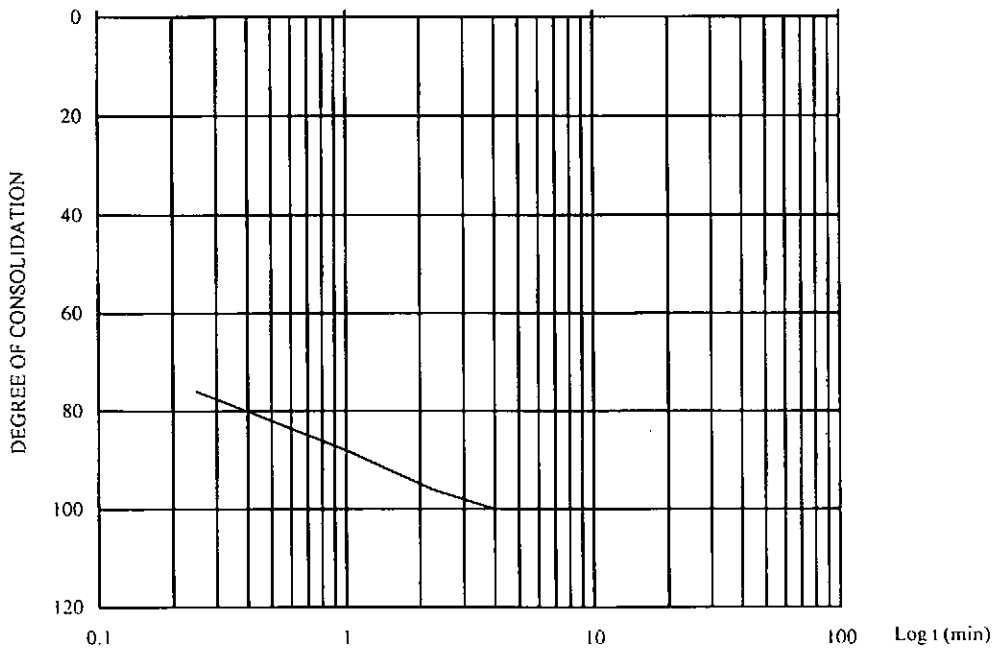


√t100 0.74 min

t100 0.547 min

tf 0.290 min

Calc. strain rate
34.930 mm/min



Borehole No. : WCH-BH10 **Sample Depth m:-** 3.00 - 4.00

Sample No. : 1 **Specimen Depth m:-** 3.60 - 3.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage		P.W.P,B.P		Effective Pressure	30 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	1.99 % per hr

FAILURE CRITERION

Max. deviator Stress ☒	Max. Stress ratio ☐	Axial Strain % ☐
Stage : 1	Applied Pressure (kPa) - Cell : 230 Back : 200	P.R. factor 3.1283 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 7 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
05/12	08:35	0.00	0.00	0.036	200	0.000	0.0	30.0	30.0	30.0	0.0	30.0	1.00
	08:40	0.06	0.04	0.073	203	0.012	27.1	53.8	26.7	40.2	13.5	35.7	2.01
	08:45	0.34	0.23	0.117	209	0.066	59.1	79.7	20.6	50.1	29.5	40.3	3.87
	08:50	0.58	0.40	0.134	212	0.115	71.3	89.7	18.4	54.1	35.7	42.2	4.88
	08:55	0.84	0.58	0.149	212	0.166	82.1	99.7	17.6	58.6	41.0	45.0	5.66
	09:00	1.09	0.75	0.162	213	0.213	91.3	108.8	17.5	63.2	45.7	47.9	6.22
	09:05	1.27	0.87	0.169	212	0.247	96.2	113.8	17.6	65.7	48.1	49.7	6.47
	09:10	1.56	1.08	0.181	212	0.304	104.7	122.8	18.1	70.4	52.3	53.0	6.78
	09:15	1.75	1.21	0.189	211	0.340	110.3	128.9	18.6	73.7	55.1	55.4	6.93
	09:20	1.98	1.37	0.195	211	0.383	114.4	133.7	19.3	76.5	57.2	57.4	6.93
	09:25	2.27	1.57	0.206	210	0.436	122.0	142.2	20.2	81.2	61.0	60.9	7.04
	09:30	2.49	1.72	0.209	209	0.476	124.0	144.9	20.9	82.9	62.0	62.2	6.93
	09:35	2.76	1.90	0.220	208	0.523	131.6	153.4	21.8	87.6	65.8	65.7	7.04
	09:40	2.99	2.07	0.227	207	0.567	136.3	159.0	22.7	90.9	68.2	68.1	7.01
	09:45	3.21	2.22	0.236	206	0.605	142.5	166.1	23.6	94.9	71.3	71.1	7.04
	09:50	3.44	2.38	0.244	206	0.646	148.0	172.5	24.5	98.5	74.0	73.8	7.04
	09:55	3.72	2.57	0.255	204	0.694	155.5	181.1	25.6	103.3	77.7	77.4	7.07
	10:00	3.92	2.71	0.262	204	0.729	160.2	186.6	26.4	106.5	80.1	79.8	7.07
	10:05	4.22	2.91	0.273	202	0.778	167.6	195.3	27.7	111.5	83.8	83.6	7.05
	10:10	4.46	3.08	0.282	201	0.819	173.7	202.5	28.8	115.6	86.8	86.7	7.03
	10:15	4.68	3.23	0.288	200	0.856	177.6	207.3	29.7	118.5	88.8	88.9	6.98
	10:20	4.90	3.38	0.296	199	0.891	183.0	213.6	30.6	122.1	91.5	91.6	6.98
	10:25	5.17	3.57	0.304	198	0.936	188.2	219.9	31.7	125.8	94.1	94.4	6.94
	10:30	5.40	3.73	0.311	197	0.974	192.8	225.4	32.6	129.0	96.4	96.9	6.91
	10:35	5.64	3.90	0.319	197	1.014	198.0	231.5	33.5	132.5	99.0	99.5	6.91
	10:40	5.89	4.07	0.326	195	1.053	202.6	237.2	34.6	135.9	101.3	102.1	6.85
	10:45	6.12	4.23	0.332	194	1.089	206.4	242.0	35.6	138.8	103.2	104.4	6.80
	10:50	6.35	4.39	0.339	193	1.125	210.9	247.5	36.6	142.1	105.5	106.9	6.76
	10:55	6.59	4.55	0.342	193	1.161	212.6	250.0	37.4	143.7	106.3	108.3	6.68
	11:00	6.79	4.69	0.345	192	1.192	214.4	252.7	38.3	145.5	107.2	109.8	6.60
	11:05	7.06	4.88	0.350	191	1.234	217.4	256.7	39.3	148.0	108.7	111.8	6.53
	11:10	7.29	5.04	0.356	190	1.269	221.1	261.4	40.3	150.9	110.6	114.0	6.49
	11:15	7.59	5.25	0.354	189	1.314	219.2	260.3	41.1	150.7	109.6	114.2	6.33
	11:20	7.81	5.40	0.356	188	1.346	220.2	262.1	41.9	152.0	110.1	115.3	6.26
	11:25	8.03	5.55	0.355	187	1.378	219.2	261.8	42.6	152.2	109.6	115.7	6.14
	11:30	8.26	5.71	0.359	187	1.411	221.5	264.8	43.3	154.1	110.8	117.1	6.12
	11:35	8.52	5.89	0.357	186	1.448	219.7	263.9	44.2	154.0	109.8	117.4	5.97
	11:40	8.76	6.05	0.358	185	1.481	219.9	265.0	45.1	155.1	110.0	118.4	5.88
	11:45	9.04	6.25	0.361	184	1.522	221.5	267.5	46.0	156.7	110.7	119.8	5.82

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.60 - 3.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 7	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
05/12	11:50	9.33	6.45	0.363	183	1.562	222.3	269.2	46.9	158.1	111.2	121.0	5.74
	11:55	9.51	6.57	0.366	183	1.586	224.1	271.5	47.4	159.4	112.0	122.1	5.73
	12:00	9.78	6.76	0.367	182	1.624	224.3	272.3	48.0	160.1	112.1	122.8	5.67
	12:05	10.03	6.93	0.370	181	1.657	225.9	274.6	48.7	161.6	112.9	124.0	5.64
	12:10	10.24	7.07	0.371	181	1.684	226.2	275.3	49.1	162.2	113.1	124.5	5.61
	12:15	10.54	7.28	0.375	180	1.725	228.3	278.1	49.8	164.0	114.2	125.9	5.58
	12:20	10.78	7.45	0.379	180	1.757	230.6	280.9	50.3	165.6	115.3	127.2	5.58
	12:25	11.02	7.62	0.381	179	1.789	231.5	282.5	51.0	166.7	115.7	128.2	5.54
	12:30	11.30	7.81	0.384	179	1.825	233.0	284.5	51.5	168.0	116.5	129.2	5.52
	12:35	11.48	7.94	0.386	178	1.849	234.0	285.9	51.9	168.9	117.0	129.9	5.51
	12:40	11.74	8.11	0.386	178	1.881	233.5	286.0	52.5	169.3	116.8	130.3	5.45
	12:45	11.98	8.28	0.387	177	1.912	233.7	286.6	52.9	169.8	116.9	130.8	5.42
	12:50	12.25	8.47	0.388	177	1.946	233.9	287.2	53.3	170.2	116.9	131.3	5.39
	12:55	12.47	8.62	0.390	176	1.973	234.8	288.6	53.8	171.2	117.4	132.1	5.36
	13:00	12.61	8.72	0.392	176	1.991	235.9	289.9	54.0	171.9	117.9	132.6	5.37
	13:05	12.94	8.94	0.396	176	2.030	237.9	292.4	54.5	173.4	118.9	133.8	5.37
	13:10	13.15	9.09	0.397	175	2.056	238.2	293.1	54.9	174.0	119.1	134.3	5.34
	13:15	13.39	9.26	0.398	175	2.086	238.3	293.6	55.3	174.5	119.2	134.7	5.31
	13:20	13.68	9.45	0.399	174	2.119	238.5	294.3	55.8	175.0	119.2	135.3	5.27
	13:25	13.93	9.63	0.400	174	2.149	238.6	294.9	56.3	175.6	119.3	135.8	5.24
	13:30	**14.15**	**9.78**	**0.403**	**172**	**2.175**	**240.2**	**297.8**	**57.6**	**177.7**	**120.1**	**137.7**	**5.17**
	13:35	14.50	10.02	0.401	172	2.215	238.2	296.1	57.9	177.0	119.1	137.3	5.11
	13:40	14.74	10.19	0.400	172	2.244	237.0	295.2	58.2	176.7	118.5	137.2	5.07
	13:45	15.03	10.39	0.400	171	2.277	236.5	295.2	58.7	176.9	118.2	137.5	5.03
	14:00	15.72	10.86	0.399	171	2.353	234.5	293.4	58.9	176.1	117.2	137.1	4.98
	14:15	16.48	11.39	0.366	171	2.438	211.6	271.0	59.4	165.2	105.8	129.9	4.56
	14:30	17.22	11.90	0.368	170	2.518	211.6	272.1	60.5	166.3	105.8	131.0	4.50
	14:45	17.97	12.42	0.370	168	2.598	211.5	273.1	61.6	167.4	105.8	132.1	4.43
	15:00	18.70	12.92	0.371	167	2.674	210.8	273.8	63.0	168.4	105.4	133.3	4.35
	15:15	19.48	13.47	0.374	166	2.756	211.3	275.5	64.2	169.9	105.7	134.6	4.29
	15:30	20.18	13.94	0.375	165	2.825	210.7	275.5	64.8	170.1	105.3	135.0	4.25
	15:45	20.91	14.45	0.377	164	2.899	210.6	276.2	65.6	170.9	105.3	135.8	4.21
	16:00	21.63	14.95	0.379	163	2.971	210.5	277.3	66.8	172.1	105.3	137.0	4.15

Borehole No. : WCH-BH10 — **Sample Depth m:-** 3.00 - 4.00

Sample No. : 1 — **Specimen Depth m:-** 3.60 - 3.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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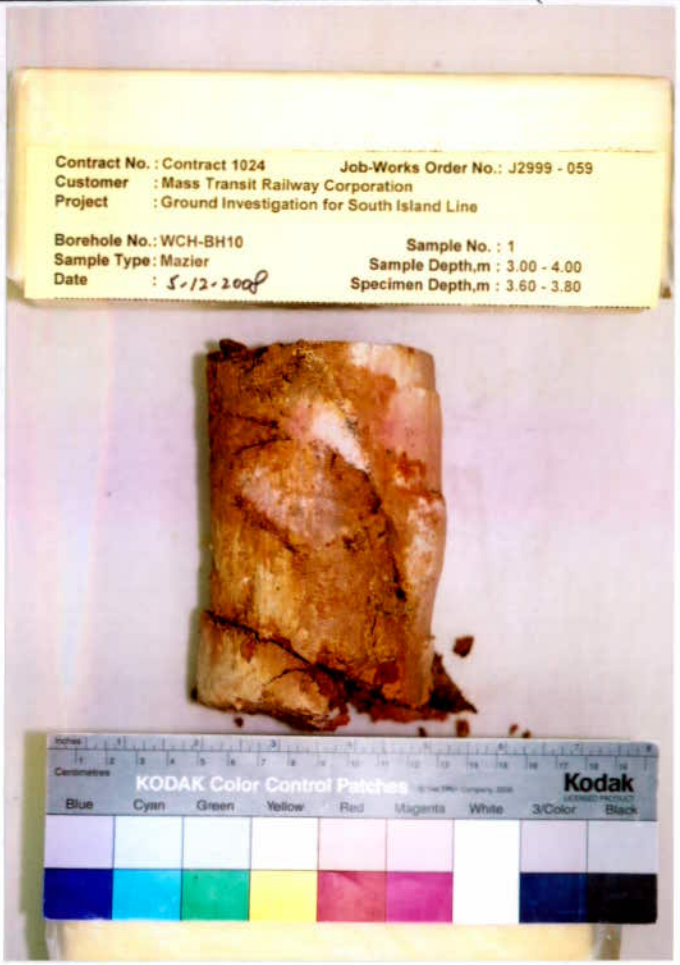
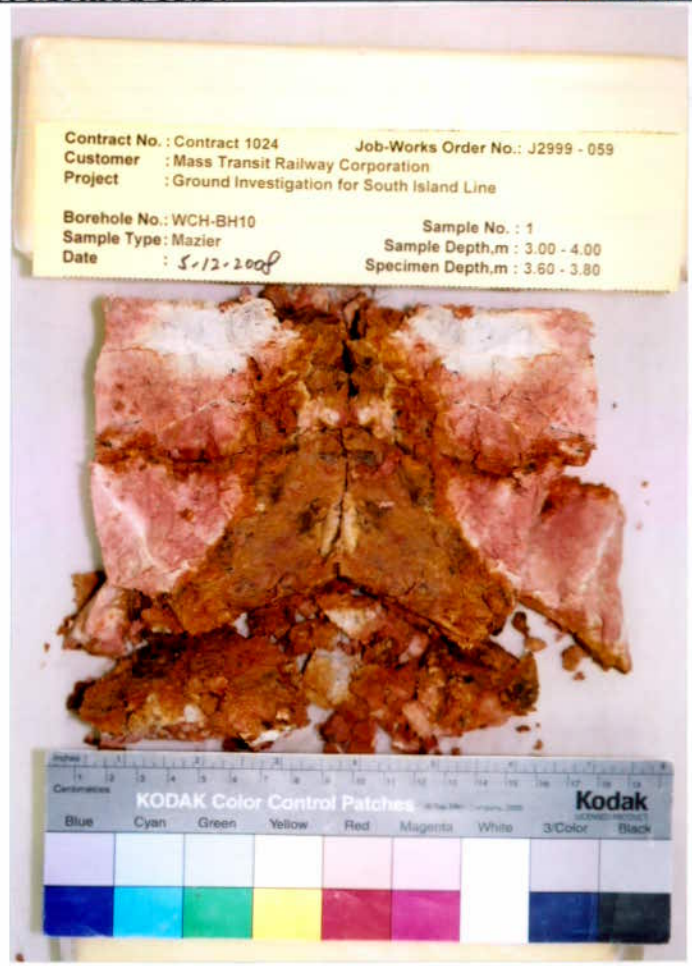
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)





Description : Orangish brown, slightly gravelly, slightly sandy SILT/CLAY **Sample Origin : COL‡** ‡ Information provided by customer

Borehole No. : WCH-BH10 **Sample No. : 1** **Sample Depth m:- 3.00 - 4.00** **Specimen Depth m:- 3.60 - 3.80**

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024
Job No. : J2999
Works Order No.: 059

Compiled by W S Wat
Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.80 - 4.00		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	73.9		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	26		
Bulk density	(ρ_o)	Mg/m^3	1.95		
Dry density	(ρ_d)	Mg/m^3	1.55		
Particle density	(ρ_s)		2.68		
Voids Ratio	(e_o)		0.73		
Degree of Saturation	(S_r)	%	95.2		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.98		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	240		
Back Pressure	(u_b)	kPa	200		
Effective Pressure	(σ'_3)	kPa	40		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	150.02		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.37		
Coefficient of Permeability (k)		m/s	1.73E-08		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	25		
Pore Pressure at the End of Consolidation		kPa	200		
Effective Stress at the End of Consolidation		kPa	40		
Bulk density	(ρ_o)	Mg/m^3	1.96		
Dry density	(ρ_d)	Mg/m^3	1.57		
Voids Ratio	(e)		0.71		
Degree of Saturation	(S_r)	%	94.9		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat
Checked By : Name : H W Chung Date : 19/12/2008
Approved By : Signatory : **Lau Wai Cheong** Date : 19/12/2008
Tested Date: 02/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.80 - 4.00		
COMPRESSION - FAILURE					
Cell Pressure		kPa	240		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	331		
Corrected Deviator Stress (σ'_1 - σ'_3)		kPa	245		
Minor Effective Principal Stress (σ'_3)		kPa	87		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	209		
$t = (\sigma_1 - \sigma_3)/2$		kPa	122		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.19		
Strain at Failure	(εf)	%	20.1		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	25		
Bulk density	(ρ_o)	Mg/m^3	1.96		
Dry density	(ρ_d)	Mg/m^3	1.57		
Voids Ratio	(e_f)		0.71		
Degree of Saturation	(S_f)	%	94.9		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.68 (Determined)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer :	**Mass Transit Railway Corporation**	Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	
	Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**

Technology Centre
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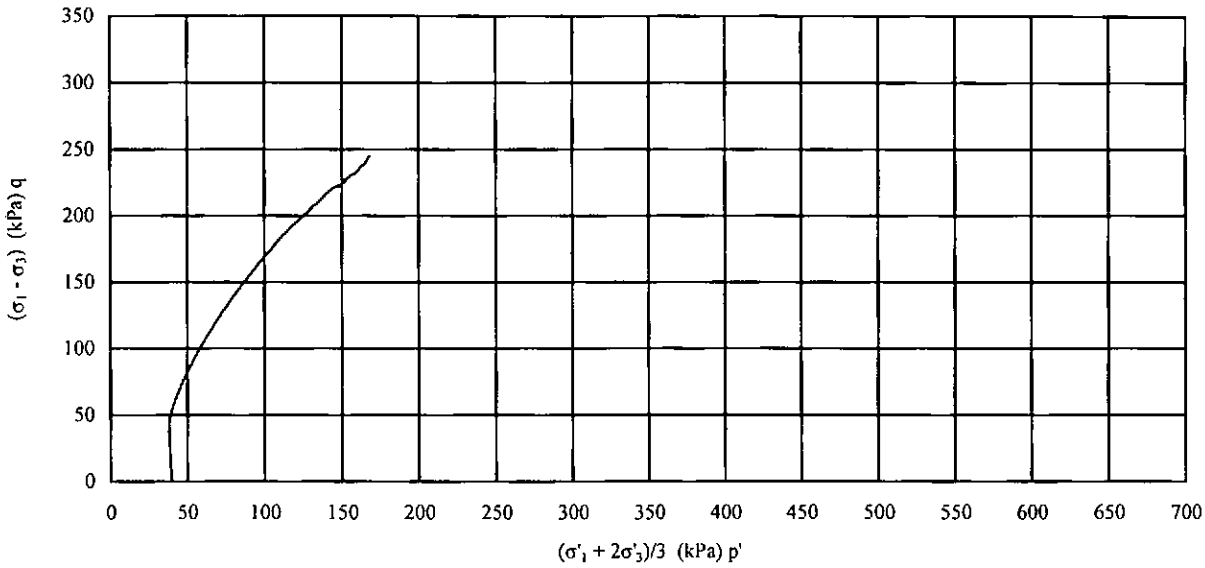
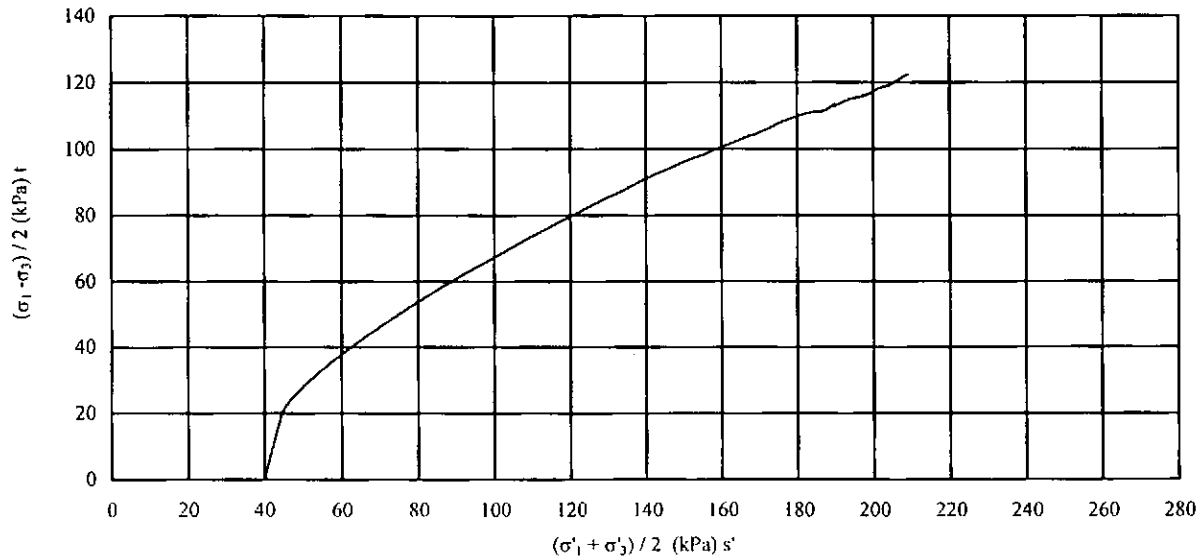
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**3.00 - 4.00**
Sample No. :	**1**	**Specimen Depth m:-**	**3.80 - 4.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.:	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
			Checked by H W Chung

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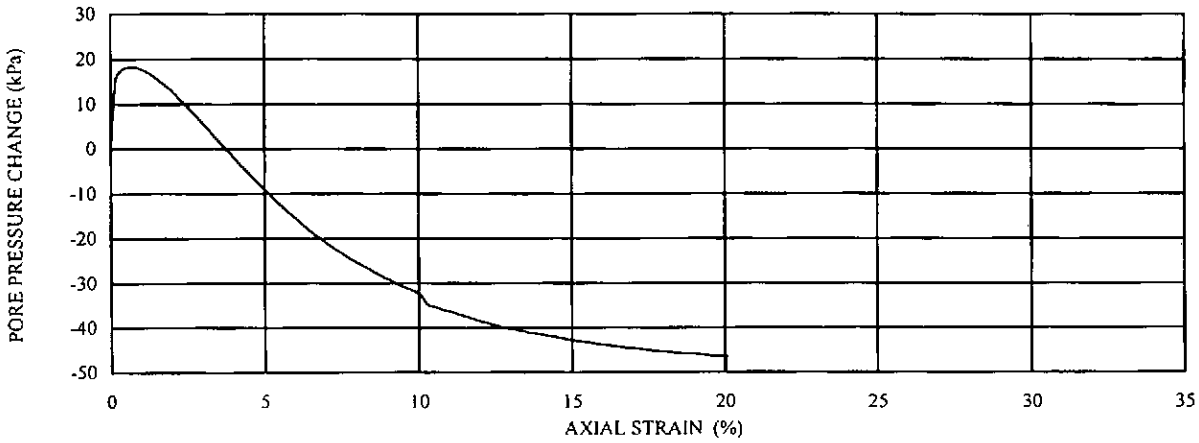
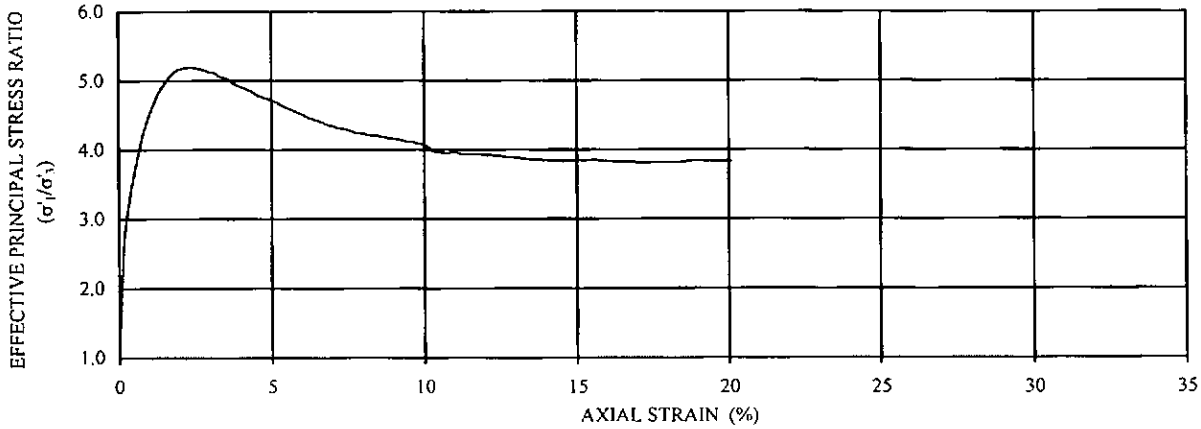
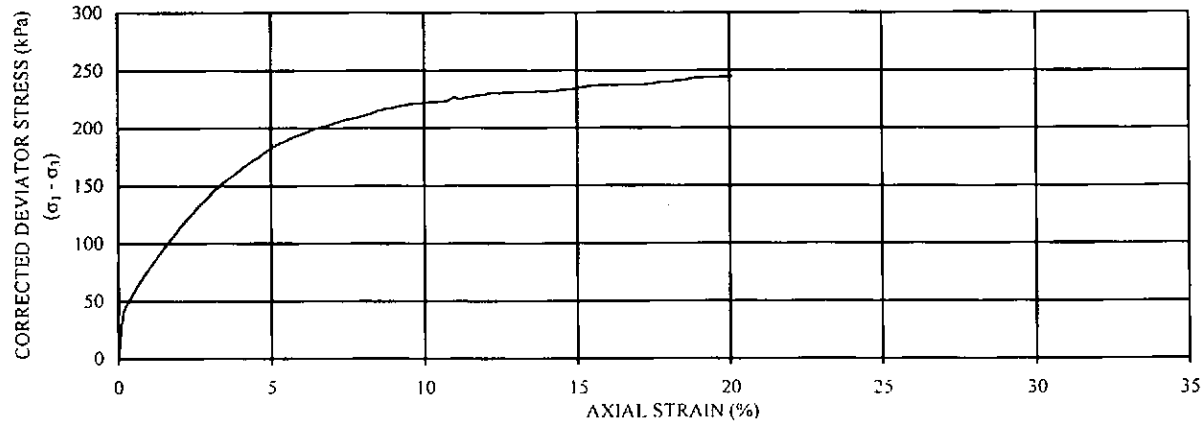
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH10**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.80 - 4.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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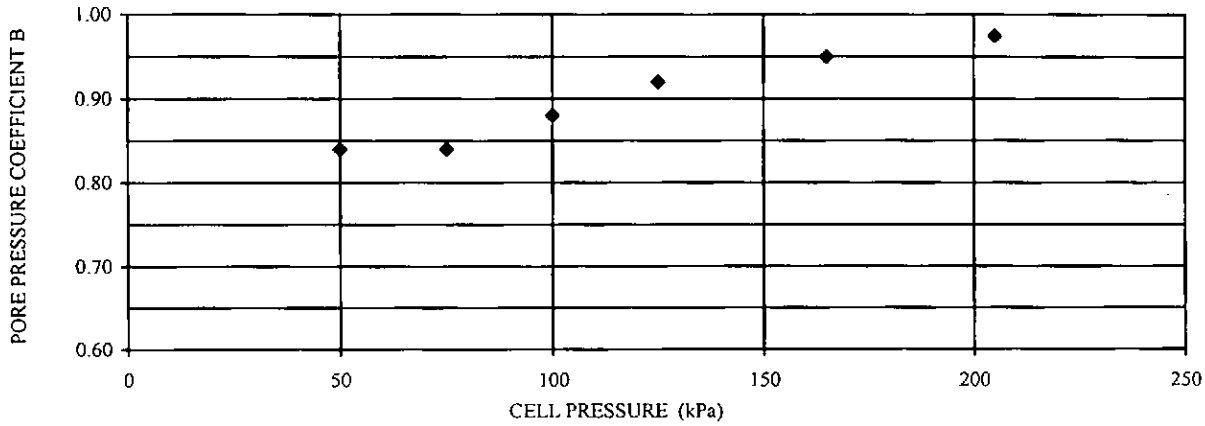
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
02/12/2008	15:56	0	0	-	0.0	
	16:11	25	-	24		-
	16:44	25	20	20	-2.0	
	16:55	50	-	41		0.84
03/12/2008	08:39	50	45	45	-2.0	
	08:45	75	-	66		0.84
	09:23	75	70	70	-1.7	
	09:28	100	-	92		0.88
	10:10	100	95	95	-1.6	
	10:19	125	-	118		0.92
	11:00	125	120	120	-1.4	
	11:09	165	-	158		0.95
	13:16	165	160	160	-1.3	
	13:25	205	-	199		0.98
		205	200	200	-0.3	

Borehole No. WCH-BH10 — **Sample Depth m:-** 3.00 - 4.00
Sample No. : 1 — **Specimen Depth m:-** 3.80 - 4.00
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

Technology Centre
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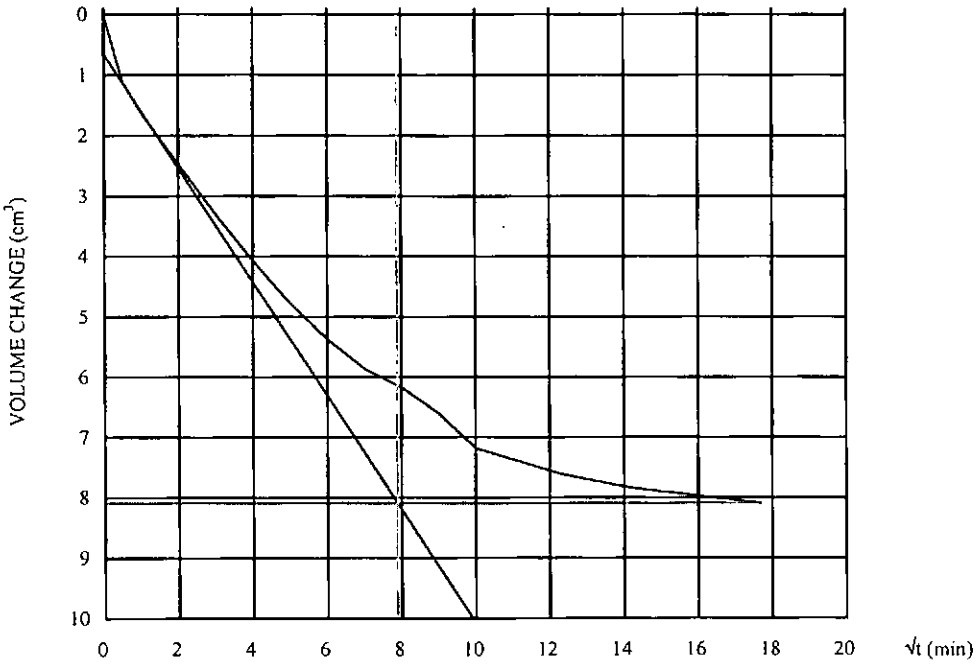
Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

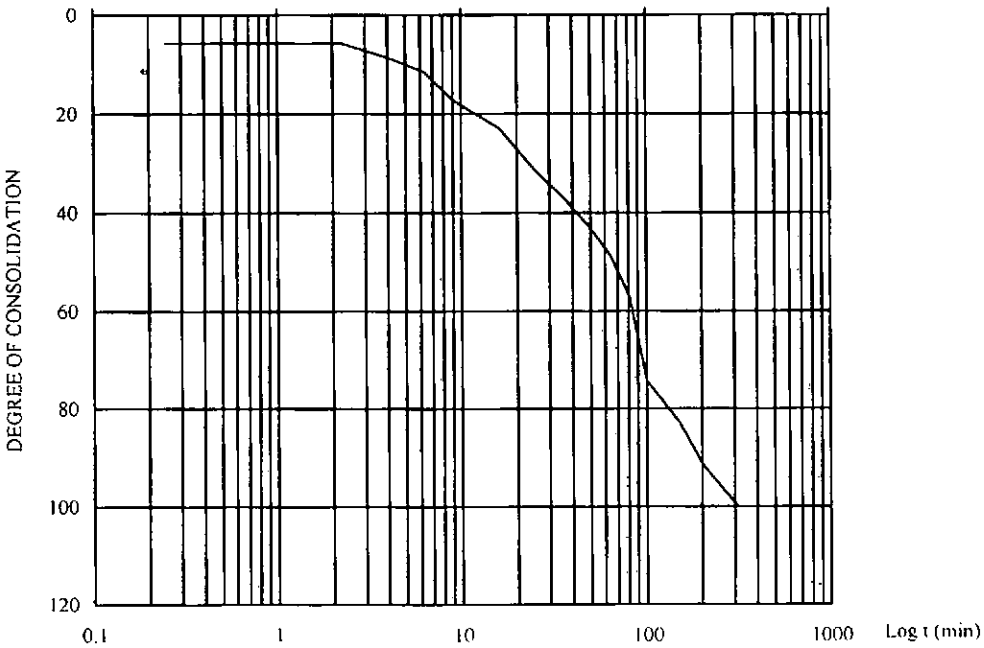


√t100 7.89 min

t100 62.219 min

tf 32.976 min

Calc. strain rate
0.306 mm/min



Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**3.00 - 4.00**
Sample No. :	**1**	**Specimen Depth m:-**	**3.80 - 4.00**
Customer :	**Mass Transit Railway Corporation**		Complied by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage				P.W.P.B.P					Effective Pressure		40		kPa
Side drains		No		Selected Machine Speed			0.048	mm/min	Rate of Strain		2.00		% per hr
FAILURE CRITERION													
Max. deviator Stress				☒	Max. Stress ratio			☐	Axial Strain %				☐
Stage :	1	Applied Pressure (kPa) - Cell :				240	Back :	200	P.R. factor		3.1069		kN/mm
		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 24	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
05/12	08:40	0.00	0.00	0.042	200	0.000	0.0	40.0	40.0	40.0	0.0	40.0	1.00
	08:45	0.24	0.17	0.097	215	0.049	40.1	64.7	24.6	44.6	20.0	38.0	2.63
	08:50	0.49	0.34	0.111	217	0.098	50.1	72.7	22.6	47.7	25.1	39.3	3.22
	08:55	0.74	0.51	0.122	218	0.146	58.0	79.9	21.9	50.9	29.0	41.2	3.65
	09:00	1.00	0.69	0.133	218	0.197	65.8	87.6	21.8	54.7	32.9	43.7	4.02
	09:05	1.19	0.82	0.140	218	0.233	70.7	92.5	21.8	57.2	35.4	45.4	4.25
	09:10	1.48	1.03	0.151	218	0.291	78.5	100.8	22.3	61.5	39.2	48.5	4.52
	09:15	1.67	1.16	0.158	217	0.326	83.4	106.1	22.7	64.4	41.7	50.5	4.67
	09:20	1.89	1.31	0.166	217	0.367	89.0	112.3	23.3	67.8	44.5	53.0	4.82
	09:25	2.18	1.51	0.176	216	0.420	96.0	120.3	24.3	72.3	48.0	56.3	4.95
	09:30	2.40	1.66	0.184	215	0.460	101.5	126.6	25.1	75.9	50.8	58.9	5.04
	09:35	2.67	1.85	0.193	214	0.510	107.7	133.8	26.1	80.0	53.9	62.0	5.13
	09:40	2.90	2.01	0.201	213	0.551	113.2	140.4	27.2	83.8	56.6	64.9	5.16
	09:45	3.13	2.16	0.208	212	0.590	118.0	146.2	28.2	87.2	59.0	67.5	5.18
	09:50	3.35	2.32	0.215	211	0.631	122.8	152.1	29.3	90.7	61.4	70.2	5.19
	09:55	3.62	2.51	0.223	209	0.679	128.2	158.8	30.6	94.7	64.1	73.3	5.19
	10:00	3.83	2.65	0.229	208	0.714	132.2	163.9	31.7	97.8	66.1	75.8	5.17
	10:05	4.12	2.86	0.237	207	0.766	137.6	170.8	33.2	102.0	68.8	79.1	5.14
	10:10	4.36	3.02	0.244	206	0.805	142.3	176.8	34.5	105.6	71.1	81.9	5.12
	10:15	4.58	3.17	0.250	204	0.841	146.2	181.8	35.6	108.7	73.1	84.3	5.11
	10:20	4.80	3.32	0.255	203	0.877	149.5	186.3	36.8	111.6	74.8	86.6	5.06
	10:25	5.07	3.51	0.262	202	0.922	154.1	192.3	38.2	115.3	77.1	89.6	5.03
	10:30	5.30	3.67	0.267	201	0.960	157.3	196.7	39.4	118.1	78.7	91.8	4.99
	10:35	5.55	3.84	0.272	199	1.000	160.5	201.2	40.7	121.0	80.3	94.2	4.94
	10:40	5.80	4.02	0.278	198	1.041	164.4	206.4	42.0	124.2	82.2	96.8	4.91
	10:45	6.03	4.18	0.283	197	1.078	167.6	210.8	43.2	127.0	83.8	99.1	4.88
	10:50	6.27	4.34	0.288	196	1.114	170.7	215.1	44.4	129.8	85.4	101.3	4.85
	10:55	6.51	4.51	0.292	194	1.152	173.2	218.8	45.6	132.2	86.6	103.3	4.80
	11:00	6.71	4.65	0.296	193	1.183	175.7	222.3	46.6	134.4	87.8	105.2	4.77
	11:05	6.98	4.83	0.302	192	1.223	179.5	227.4	47.9	137.6	89.7	107.7	4.75
	11:10	7.21	5.00	0.307	191	1.260	182.6	231.7	49.1	140.4	91.3	110.0	4.72
	11:15	7.51	5.20	0.312	190	1.303	185.6	236.0	50.4	143.2	92.8	112.3	4.68
	11:20	7.73	5.35	0.315	189	1.335	187.4	238.9	51.5	145.2	93.7	114.0	4.64
	11:25	7.93	5.50	0.318	188	1.367	189.1	241.5	52.4	147.0	94.6	115.4	4.61
	11:30	8.17	5.66	0.322	187	1.401	191.5	245.0	53.5	149.3	95.8	117.3	4.58
	11:35	8.42	5.83	0.325	186	1.436	193.2	247.7	54.5	151.1	96.6	118.9	4.54
	11:40	8.66	6.00	0.328	185	1.471	194.9	250.4	55.5	152.9	97.4	120.5	4.51
	11:45	8.94	6.19	0.331	183	1.510	196.5	253.2	56.7	154.9	98.2	122.2	4.47
	11:50	9.23	6.39	0.335	182	1.550	198.7	256.6	57.9	157.3	99.4	124.1	4.43

Borehole No. : **WCH-BH10** **Sample Depth m:- 3.00 - 4.00**

Sample No. : **1** **Specimen Depth m:- 3.80 - 4.00**

Customer : **Mass Transit Railway Corporation**

Project : **Ground Investigation for South Island Line**

Contract No.: Contract 1024

Job No.: **J2999** **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 24	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
05/12	11:55	9.39	6.51	0.337	182	1.574	199.8	258.3	58.5	158.4	99.9	125.1	4.42
	12:00	9.66	6.69	0.340	181	1.610	201.5	261.0	59.5	160.2	100.7	126.7	4.39
	12:05	9.91	6.86	0.342	180	1.644	202.4	262.7	60.3	161.5	101.2	127.8	4.36
	12:10	10.12	7.01	0.345	179	1.673	204.1	265.2	61.1	163.1	102.0	129.1	4.34
	12:15	10.41	7.21	0.348	178	1.712	205.6	267.7	62.1	164.9	102.8	130.6	4.31
	12:20	10.66	7.38	0.351	177	1.744	207.3	270.1	62.8	166.4	103.6	131.9	4.30
	12:25	10.90	7.55	0.353	177	1.776	208.2	271.7	63.5	167.6	104.1	132.9	4.28
	12:30	11.17	7.74	0.355	176	1.812	209.1	273.5	64.4	168.9	104.5	134.1	4.25
	12:35	11.36	7.87	0.357	175	1.836	210.1	275.0	64.9	169.9	105.0	134.9	4.24
	12:40	11.62	8.05	0.360	174	1.870	211.7	277.3	65.6	171.4	105.8	136.2	4.23
	12:45	11.86	8.22	0.362	174	1.901	212.6	278.9	66.3	172.6	106.3	137.2	4.21
	12:50	12.14	8.41	0.366	173	1.935	214.8	281.8	67.0	174.4	107.4	138.6	4.21
	12:55	12.36	8.56	0.368	172	1.962	215.7	283.3	67.6	175.5	107.9	139.5	4.19
	13:00	12.50	8.66	0.370	172	1.980	216.8	284.8	68.0	176.4	108.4	140.3	4.19
	13:05	12.82	8.88	0.372	171	2.019	217.6	286.4	68.8	177.6	108.8	141.3	4.16
	13:10	13.03	9.03	0.374	171	2.046	218.5	287.7	69.2	178.5	109.3	142.0	4.16
	13:15	13.28	9.20	0.376	170	2.075	219.4	289.2	69.8	179.5	109.7	142.9	4.14
	13:20	13.56	9.39	0.378	170	2.108	220.2	290.7	70.5	180.6	110.1	143.9	4.12
	13:25	13.81	9.57	0.380	169	2.139	221.1	292.1	71.0	181.5	110.5	144.7	4.11
	13:30	14.03	9.72	0.381	169	2.165	221.3	292.7	71.4	182.1	110.7	145.2	4.10
	13:35	14.28	9.89	0.382	168	2.193	221.5	293.4	71.9	182.7	110.8	145.7	4.08
	13:40	14.52	10.06	0.384	167	2.222	222.4	295.1	72.7	183.9	111.2	146.8	4.06
	13:45	14.82	10.27	0.385	165	2.257	222.5	297.2	74.7	186.0	111.3	148.9	3.98
	13:50	15.03	10.41	0.386	165	2.280	222.8	297.9	75.1	186.5	111.4	149.4	3.97
	13:55	15.36	10.64	0.388	164	2.318	223.5	299.1	75.6	187.3	111.7	150.1	3.96
	14:00	15.52	10.75	0.389	164	2.336	223.8	299.7	75.9	187.8	111.9	150.5	3.95
	14:05	15.85	10.98	0.395	164	2.373	227.1	303.4	76.3	189.9	113.6	152.0	3.98
	14:10	16.07	11.13	0.393	163	2.397	225.4	302.0	76.6	189.3	112.7	151.7	3.94
	14:15	16.29	11.29	0.395	163	2.422	226.3	303.3	77.0	190.1	113.1	152.4	3.94
	14:20	16.53	11.45	0.397	163	2.448	227.1	304.4	77.3	190.9	113.6	153.0	3.94
	14:25	16.75	11.60	0.399	162	2.471	228.0	305.6	77.6	191.6	114.0	153.6	3.94
	14:30	17.03	11.80	0.401	162	2.503	228.7	306.7	78.0	192.4	114.4	154.2	3.93
	14:35	17.25	11.95	0.402	162	2.526	229.0	307.4	78.4	192.9	114.5	154.7	3.92
	14:40	17.53	12.14	0.405	161	2.555	230.4	309.1	78.7	193.9	115.2	155.5	3.93
	14:45	17.81	12.33	0.406	161	2.585	230.5	309.6	79.1	194.3	115.2	155.9	3.91
	14:50	18.06	12.51	0.407	161	2.612	230.6	310.0	79.4	194.7	115.3	156.3	3.90
	14:55	18.27	12.65	0.408	160	2.633	230.8	310.5	79.7	195.1	115.4	156.6	3.90
	15:00	18.54	12.85	0.409	160	2.663	230.9	310.9	80.0	195.5	115.5	157.0	3.89
	15:05	18.76	12.99	0.410	160	2.684	231.1	311.3	80.2	195.8	115.6	157.2	3.88
	15:10	19.00	13.16	0.411	160	2.710	231.3	311.7	80.4	196.1	115.7	157.5	3.88
	15:15	19.32	13.38	0.412	159	2.743	231.3	312.0	80.7	196.4	115.7	157.8	3.87

Borehole No. : WCH-BH10 — **Sample Depth m:- 3.00 - 4.00**

Sample No. : 1 — **Specimen Depth m:- 3.80 - 4.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 24	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
05/12	15:20	19.55	13.55	0.413	159	2.768	231.5	312.5	81.0	196.7	115.7	158.2	3.86
	15:25	19.83	13.74	0.415	159	2.796	232.2	313.4	81.2	197.3	116.1	158.6	3.86
	15:30	20.01	13.86	0.415	159	2.813	231.8	313.2	81.4	197.3	115.9	158.7	3.85
	15:35	20.22	14.00	0.416	159	2.834	232.0	313.5	81.5	197.5	116.0	158.8	3.85
	15:40	20.50	14.20	0.417	158	2.863	232.1	313.9	81.8	197.9	116.1	159.2	3.84
	15:45	20.75	14.38	0.419	158	2.889	232.9	314.9	82.0	198.4	116.4	159.6	3.84
	15:50	20.99	14.54	0.420	158	2.912	233.0	315.2	82.2	198.7	116.5	159.9	3.83
	15:55	21.23	14.71	0.422	158	2.936	233.8	316.2	82.4	199.3	116.9	160.3	3.84
	16:00	21.50	14.89	0.424	157	2.962	234.5	317.1	82.6	199.8	117.2	160.8	3.84
	16:05	21.73	15.05	0.426	157	2.985	235.2	318.0	82.8	200.4	117.6	161.2	3.84
	16:10	21.98	15.23	0.428	157	3.011	236.0	319.0	83.0	201.0	118.0	161.7	3.84
	16:15	22.24	15.41	0.430	157	3.036	236.7	319.9	83.2	201.5	118.3	162.1	3.84
	16:20	22.55	15.62	0.432	157	3.066	237.3	320.7	83.4	202.0	118.6	162.5	3.84
	16:25	22.75	15.76	0.433	156	3.086	237.5	321.1	83.6	202.3	118.7	162.8	3.84
	16:30	23.03	15.96	0.434	156	3.114	237.5	321.3	83.8	202.5	118.7	163.0	3.83
	16:35	23.23	16.09	0.435	156	3.132	237.7	321.6	83.9	202.7	118.8	163.1	3.83
	16:40	23.47	16.26	0.435	156	3.156	237.2	321.2	84.0	202.6	118.6	163.1	3.82
	16:45	23.74	16.44	0.437	156	3.181	237.9	322.1	84.2	203.1	118.9	163.5	3.82
	16:50	23.96	16.60	0.438	156	3.204	238.0	322.4	84.4	203.4	119.0	163.7	3.82
	16:55	24.22	16.78	0.439	156	3.229	238.1	322.6	84.5	203.5	119.0	163.9	3.82
	17:00	24.48	16.96	0.440	155	3.254	238.1	322.7	84.6	203.7	119.1	164.0	3.81
	17:05	24.71	17.12	0.440	155	3.276	237.6	322.3	84.7	203.5	118.8	163.9	3.81
	17:10	24.99	17.31	0.442	155	3.303	238.2	323.1	84.9	204.0	119.1	164.3	3.81
	17:15	25.25	17.49	0.444	155	3.328	238.9	323.9	85.0	204.4	119.4	164.6	3.81
	17:20	25.51	17.67	0.446	155	3.353	239.6	324.8	85.2	205.0	119.8	165.1	3.81
	17:25	25.77	17.85	0.448	155	3.378	240.2	325.5	85.3	205.4	120.1	165.4	3.82
	17:30	26.05	18.05	0.449	155	3.406	240.2	325.6	85.4	205.5	120.1	165.5	3.81
	17:35	26.23	18.17	0.451	155	3.423	241.0	326.5	85.5	206.0	120.5	165.8	3.82
	17:40	26.49	18.35	0.452	154	3.448	241.0	326.6	85.6	206.1	120.5	165.9	3.82
	17:45	26.69	18.49	0.454	154	3.467	241.8	327.5	85.7	206.6	120.9	166.3	3.82
	17:50	27.01	18.71	0.457	154	3.498	242.9	328.7	85.8	207.2	121.4	166.8	3.83
	17:55	27.23	18.86	0.459	154	3.519	243.6	329.4	85.8	207.6	121.8	167.0	3.84
	18:00	27.47	19.03	0.460	154	3.543	243.6	329.5	85.9	207.7	121.8	167.1	3.84
	18:05	27.82	19.27	0.462	154	3.577	244.0	330.1	86.1	208.1	122.0	167.4	3.83
	18:10	28.08	19.45	0.463	154	3.602	244.1	330.3	86.2	208.2	122.0	167.6	3.83
	18:15	28.31	19.61	0.464	154	3.625	244.1	330.4	86.3	208.4	122.1	167.7	3.83
	18:20	28.62	19.83	0.466	154	3.656	244.6	331.0	86.4	208.7	122.3	167.9	3.83
	18:25	28.78	19.94	0.467	154	3.671	244.8	331.3	86.5	208.9	122.4	168.1	3.83
	18:30	**28.98**	**20.08**	**0.468**	**154**	**3.691**	**245.0**	**331.5**	**86.5**	**209.0**	**122.5**	**168.2**	**3.83**

Borehole No. : WCH-BH10 — **Sample Depth m:- 3.00 - 4.00**

Sample No. : 1 — **Specimen Depth m:- 3.80 - 4.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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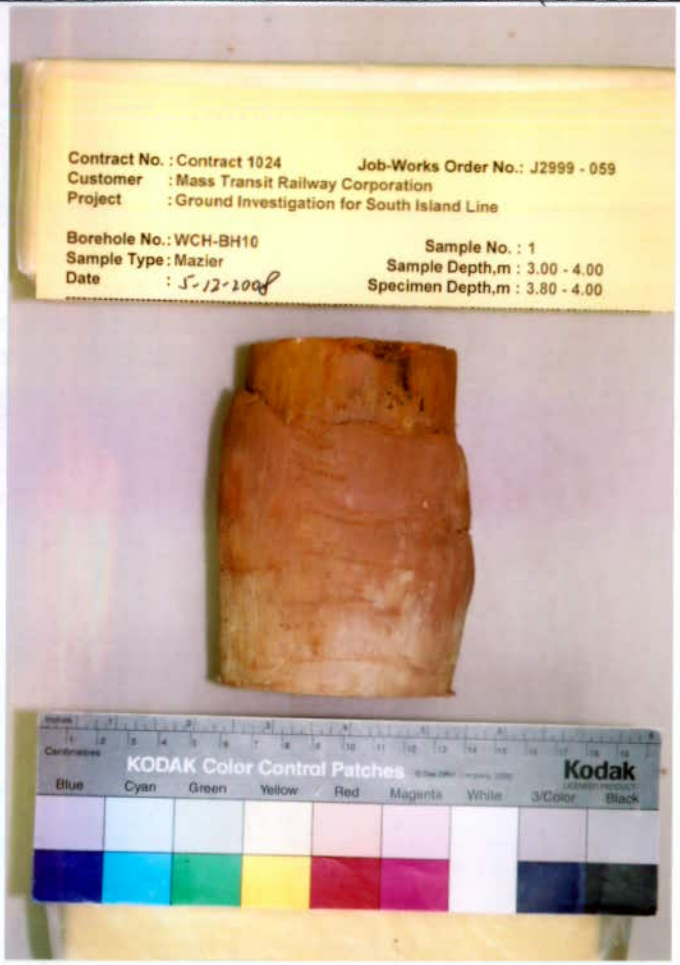
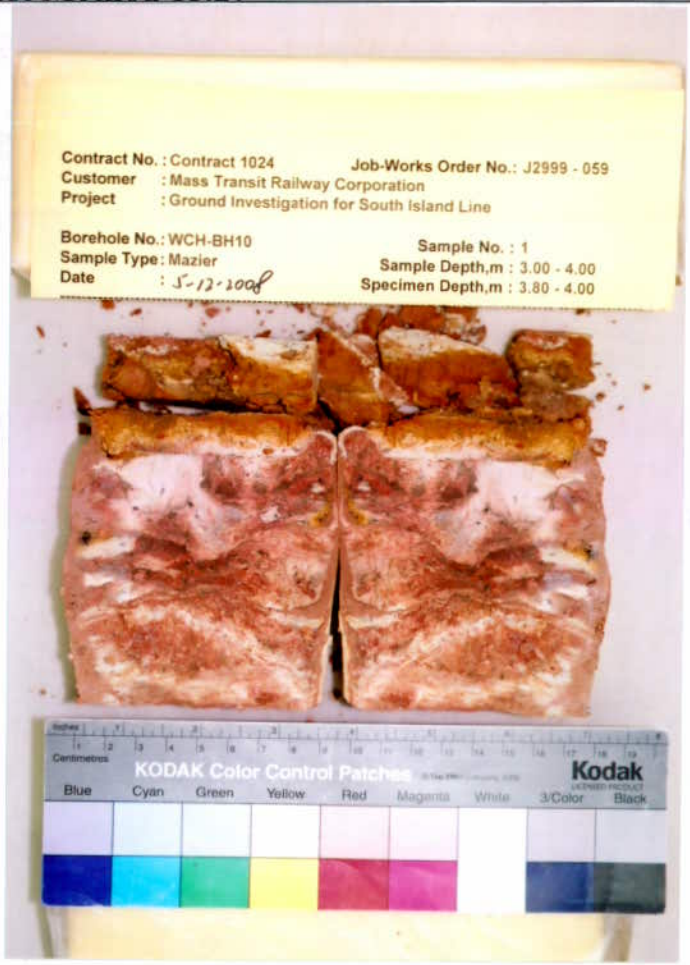
Form : GESR009.15 / Date: 15.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)





Description : Orangish brown, slightly gravelly, slightly sandy SILT/CLAY **Sample Origin : COL‡** ‡ Information provided by customer

Borehole No. : WCH-BH10	**Sample No. : 1**	**Sample Depth m:- 3.00 - 4.00**	**Specimen Depth m:- 3.80 - 4.00**
Customer : Mass Transit Railway Corporation		**Contract No. : Contract 1024**	Compiled by W S Wat
Project : Ground Investigation for South Island Line		**Job No. : J2999**	
		Works Order No.: 059	Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	5		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	5.00 - 6.00		
Specimen Depth		m	5.60 - 5.80		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	73.9		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	16		
Bulk density	(ρ_o)	Mg/m^3	2.16		
Dry density	(ρ_d)	Mg/m^3	1.87		
Particle density	(ρ_s)		2.65		
Voids Ratio	(e_o)		0.42		
Degree of Saturation	(S_r)	%	98.9		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.98		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	275		
Back Pressure	(u_b)	kPa	220		
Effective Pressure	(σ'_3)	kPa	55		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	1674.25		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.25		
Coefficient of Permeability (k)		m/s	1.29E-07		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	15		
Pore Pressure at the End of Consolidation		kPa	220		
Effective Stress at the End of Consolidation		kPa	55		
Bulk density	(ρ_o)	Mg/m^3	2.18		
Dry density	(ρ_d)	Mg/m^3	1.89		
Voids Ratio	(e)		0.40		
Degree of Saturation	(S_r)	%	101.2		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat Checked By : Name : H W Chung Approved By : Signatory : **Lau Wai Cheong**

Tested Date: 28/11/2008 Date : 16/12/2008 Date : 16/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	5		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	5.00 - 6.00		
Specimen Depth		m	5.60 - 5.80		
COMPRESSION - FAILURE					
Cell Pressure		kPa	275		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	847		
Corrected Deviator Stress (σ'_1 - σ'_3)		kPa	650		
Minor Effective Principal Stress (σ'_3)		kPa	196		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	521		
$t = (\sigma_1 - \sigma_3)/2$		kPa	325		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.22		
Strain at Failure	(εf)	%	18.2		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	15		
Bulk density	(ρ_o)	Mg/m^3	2.18		
Dry density	(ρ_d)	Mg/m^3	1.89		
Voids Ratio	(e_f)		0.40		
Degree of Saturation	(S_f)	%	101.2		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**		
	Contract No.: Contract 1024	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

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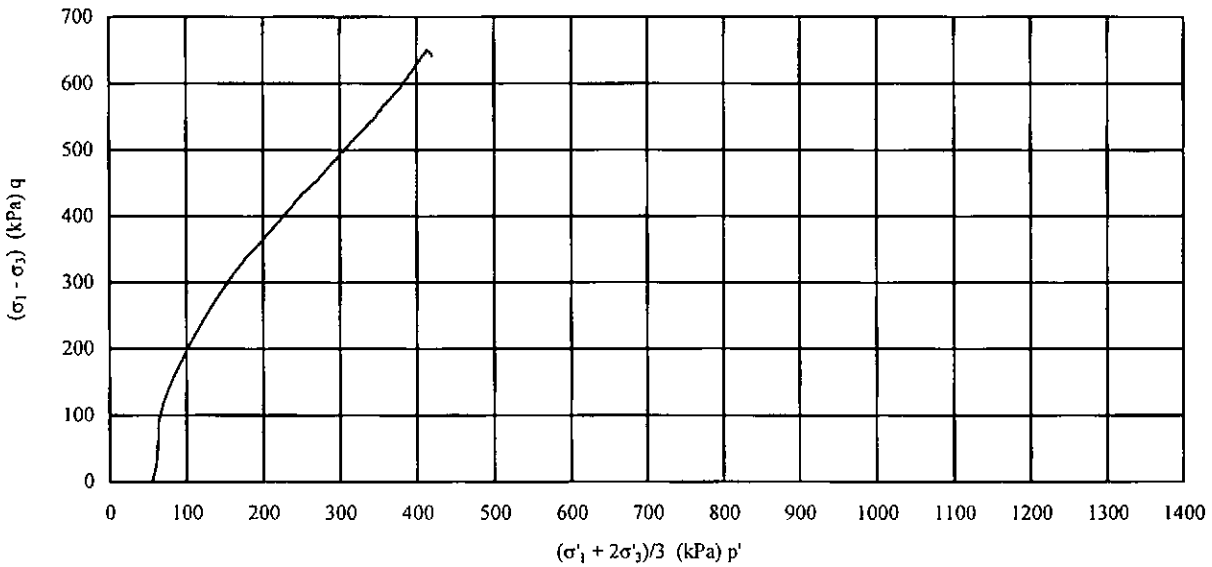
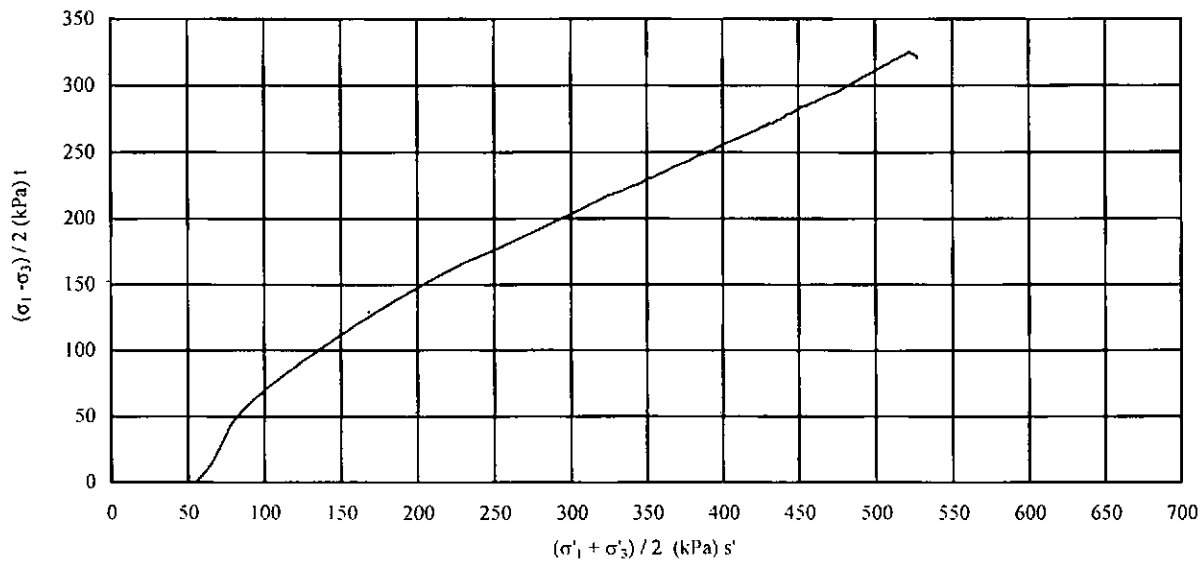
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. : WCH-BH10		**Sample Depth m:-** 5.00 - 6.00
Sample No. : 5		**Specimen Depth m:-** 5.60 - 5.80
Customer : Mass Transit Railway Corporation		Compiled by
Project : Ground Investigation for South Island Line		W S Wat
	Contract No.: Contract 1024	Checked by
Job No.: J2999	**Works Order No.:** 059	H W Chung

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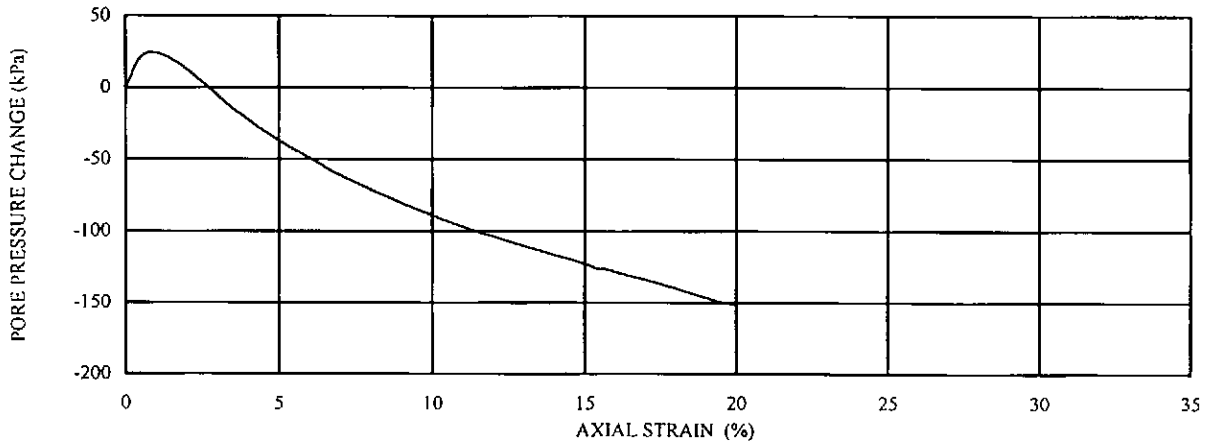
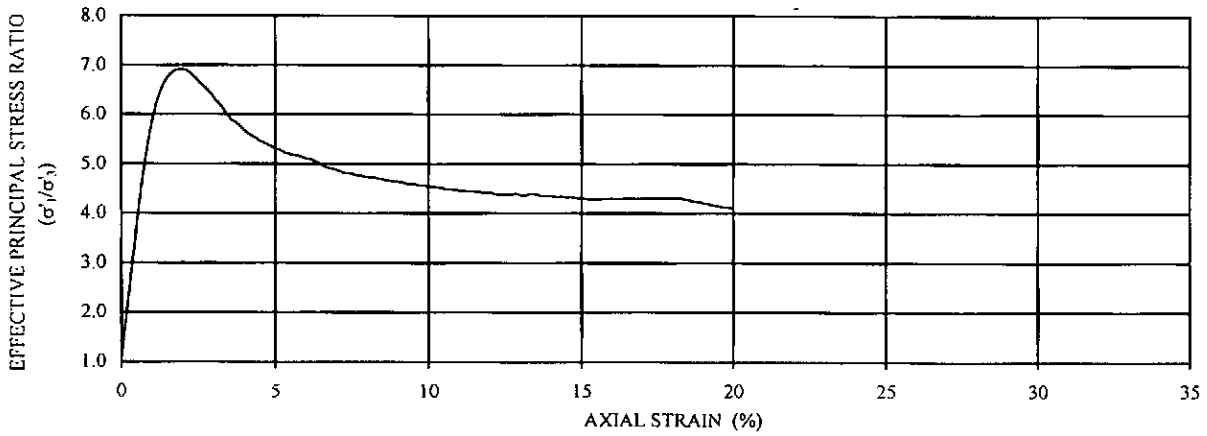
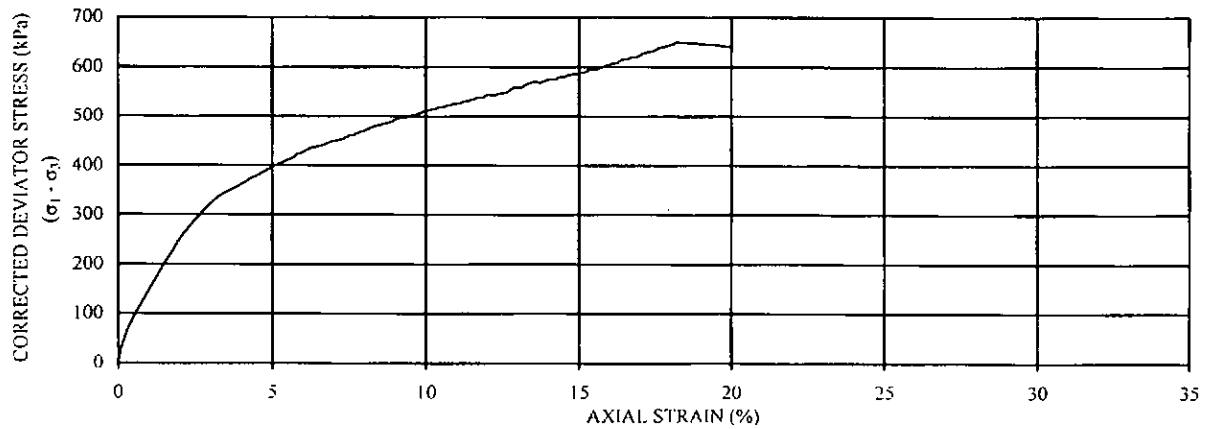
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**5.00 - 6.00**
Sample No. :	**5**	**Specimen Depth m:-**	**5.60 - 5.80**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.:	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
			Checked by H W Chung

Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

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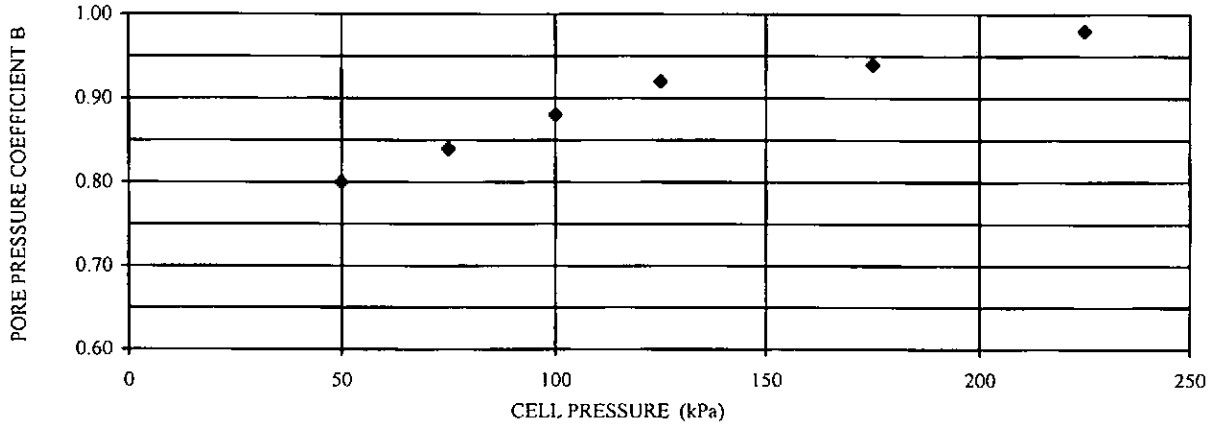
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
28/11/2008	15:07	0	0	-	0.0	
	15:14	25	-	25		-
	15:55	25	20	20	-6.2	
	16:03	50	-	40		0.80
	16:23	50	45	45	-4.4	
	16:30	75	-	66		0.84
	16:50	75	70	70	-2.8	
	16:59	100	-	92		0.88
29/11/2008	08:43	100	95	95	0.3	
	08:51	125	-	118		0.92
01/12/2008	08:36	125	120	120	3.0	
	08:44	175	-	167		0.94
	09:20	175	170	170	3.8	
	09:30	225	-	219		0.98
02/12/2008	08:34	225	220	220	4.1	

Borehole No. WCH-BH10 — **Sample Depth m:-** 5.00 - 6.00
Sample No. : 5 — **Specimen Depth m:-** 5.60 - 5.80
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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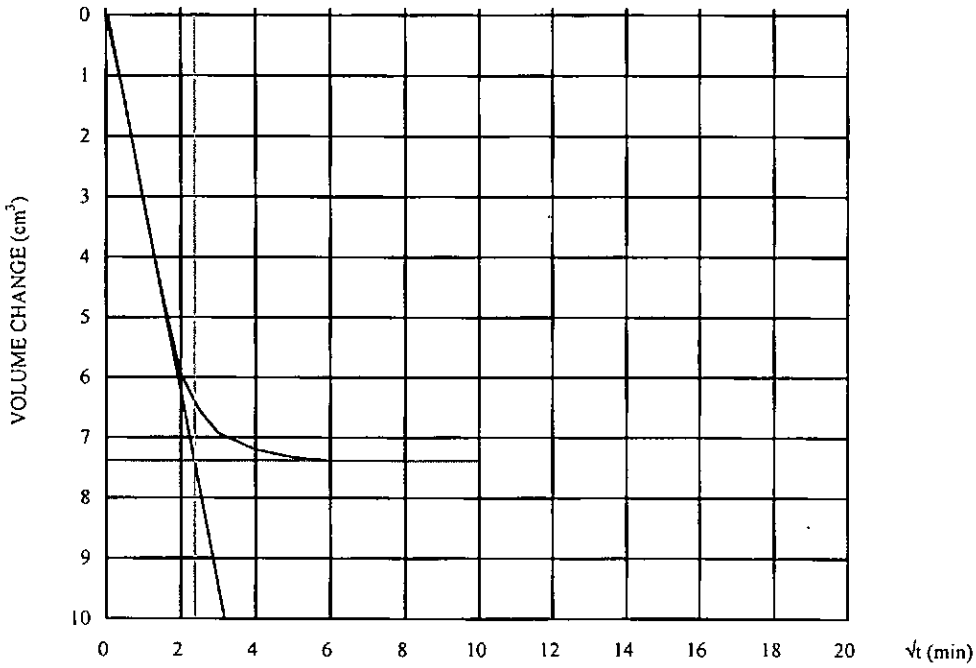
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

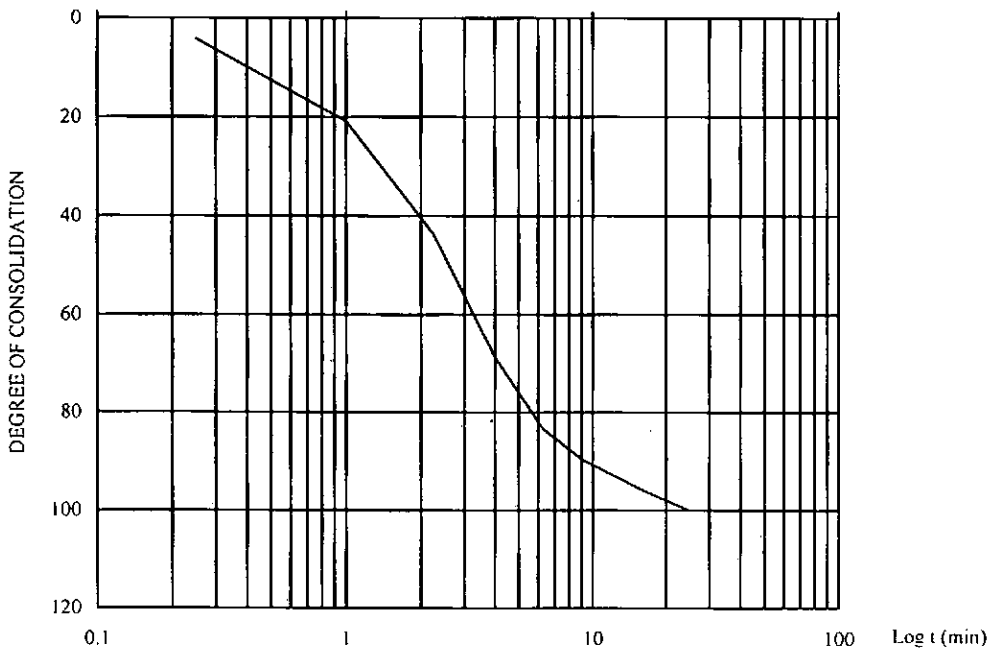


√t100 2.36 min

t100 5.558 min

tf 2.946 min

Calc. strain rate
3.432 mm/min



Borehole No. : WCH-BH10		**Sample Depth m:-** 5.00 - 6.00
Sample No. : 5		**Specimen Depth m:-** 5.60 - 5.80
Customer : Mass Transit Railway Corporation		Complied by
Project : Ground Investigation for South Island Line		W S Wat
	Contract No.: Contract 1024	Checked by
Job No.: J2999	**Works Order No.:** 059	H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage		P.W.P,B.P		Effective Pressure	55 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	1.99 % per hr

FAILURE CRITERION

Max. deviator Stress ☒	Max. Stress ratio ☐	Axial Strain % ☐
Stage : 1	Applied Pressure (kPa) - Cell : 275	Back : 220
P.R. factor 3.0328 kN/mm		

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 25 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
03/12	08:35	0.00	0.00	0.031	220	0.000	0.0	55.0	55.0	55.0	0.0	55.0	1.00
	08:40	0.11	0.08	0.068	223	0.023	26.4	78.1	51.7	64.9	13.2	60.5	1.51
	08:45	0.43	0.29	0.124	234	0.084	66.1	106.9	40.8	73.8	33.0	62.8	2.62
	08:50	0.63	0.44	0.150	240	0.126	84.4	119.7	35.3	77.5	42.2	63.4	3.39
	08:55	0.84	0.58	0.174	243	0.166	101.3	133.5	32.2	82.8	50.6	66.0	4.15
	09:00	1.06	0.73	0.197	244	0.208	117.4	148.0	30.6	89.3	58.7	69.7	4.84
	09:05	1.26	0.87	0.220	245	0.247	133.4	163.7	30.3	97.0	66.7	74.8	5.40
	09:10	1.50	1.04	0.246	244	0.294	151.5	182.2	30.7	106.5	75.8	81.2	5.94
	09:15	1.74	1.20	0.271	243	0.337	168.8	200.6	31.8	116.2	84.4	88.1	6.31
	09:20	1.95	1.35	0.294	242	0.378	184.7	217.9	33.2	125.6	92.4	94.8	6.56
	09:25	2.16	1.49	0.315	240	0.415	199.2	234.0	34.8	134.4	99.6	101.2	6.72
	09:30	2.40	1.66	0.340	238	0.460	216.3	253.3	37.0	145.2	108.2	109.1	6.85
	09:35	2.63	1.82	0.363	236	0.502	232.1	271.4	39.3	155.3	116.0	116.7	6.91
	09:40	2.81	1.94	0.381	234	0.534	244.3	285.6	41.3	163.5	122.2	122.7	6.92
	09:45	3.08	2.13	0.407	231	0.583	262.0	306.4	44.4	175.4	131.0	131.7	6.90
	09:50	3.33	2.31	0.427	228	0.629	275.4	322.8	47.4	185.1	137.7	139.2	6.81
	09:55	3.55	2.45	0.443	225	0.664	286.1	336.1	50.0	193.0	143.0	145.4	6.72
	10:00	3.74	2.59	0.456	223	0.699	294.7	347.1	52.4	199.7	147.3	150.6	6.62
	10:05	3.94	2.73	0.472	220	0.734	305.3	360.3	55.0	207.7	152.7	156.8	6.55
	10:10	4.22	2.92	0.491	216	0.781	317.8	376.4	58.6	217.5	158.9	164.5	6.42
	10:15	4.44	3.07	0.504	213	0.818	326.3	387.9	61.6	224.7	163.1	170.4	6.30
	10:20	4.64	3.21	0.517	211	0.851	334.8	399.1	64.3	231.7	167.4	175.9	6.21
	10:25	4.84	3.35	0.526	208	0.885	340.5	407.4	66.9	237.1	170.2	180.4	6.09
	10:30	5.16	3.57	0.538	204	0.937	347.9	418.8	70.9	244.8	173.9	186.9	5.91
	10:35	5.39	3.73	0.546	202	0.975	352.8	425.7	72.9	249.3	176.4	190.5	5.84
	10:40	5.57	3.86	0.553	200	1.005	357.1	432.1	75.0	253.5	178.5	194.0	5.76
	10:45	5.92	4.10	0.567	196	1.060	365.7	444.7	79.0	261.9	182.9	200.9	5.63
	10:50	6.05	4.19	0.573	195	1.081	369.4	449.8	80.4	265.1	184.7	203.5	5.59
	10:55	6.24	4.32	0.581	193	1.110	374.4	456.8	82.4	269.6	187.2	207.2	5.54
	11:00	6.48	4.49	0.589	190	1.149	379.1	464.0	84.9	274.5	189.6	211.3	5.47
	11:05	6.71	4.64	0.598	188	1.182	384.6	471.5	86.9	279.2	192.3	215.1	5.43
	11:10	6.96	4.82	0.608	186	1.222	390.6	479.9	89.3	284.6	195.3	219.5	5.37
	11:15	7.23	5.00	0.618	183	1.261	396.6	488.5	91.9	290.2	198.3	224.1	5.32
	11:20	7.46	5.17	0.627	181	1.298	402.0	496.0	94.0	295.0	201.0	228.0	5.28
	11:25	7.66	5.30	0.633	179	1.326	405.4	501.2	95.8	298.5	202.7	230.9	5.23
	11:30	7.94	5.50	0.644	177	1.368	412.0	510.3	98.3	304.3	206.0	235.6	5.19
	11:35	8.20	5.68	0.652	175	1.406	416.5	516.5	100.0	308.3	208.3	238.8	5.17
	11:40	8.42	5.83	0.663	173	1.437	423.2	525.3	102.1	313.7	211.6	243.2	5.15
	11:45	8.65	5.99	0.670	171	1.470	427.2	531.2	104.0	317.6	213.6	246.4	5.11

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 5.00 - 6.00**	
Sample No. :	5	**Specimen Depth m:- 5.60 - 5.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GE:SR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 25	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
03/12	11:50	8.93	6.18	0.682	169	1.509	434.3	540.6	106.3	323.4	217.1	251.1	5.09
	11:55	9.11	6.31	0.686	167	1.535	436.3	544.1	107.8	326.0	218.2	253.2	5.05
	12:00	9.26	6.41	0.689	166	1.556	437.8	546.8	109.0	327.9	218.9	254.9	5.02
	12:05	9.62	6.66	0.697	163	1.605	441.9	554.3	112.4	333.4	221.0	259.7	4.93
	12:10	9.95	6.89	0.708	160	1.651	448.1	562.9	114.8	338.9	224.1	264.2	4.90
	12:15	10.20	7.06	0.713	158	1.684	450.6	567.2	116.6	341.9	225.3	266.8	4.86
	12:20	10.48	7.26	0.718	156	1.723	452.9	571.5	118.6	345.0	226.4	269.6	4.82
	12:25	10.68	7.40	0.726	155	1.749	457.5	577.6	120.1	348.8	228.7	272.6	4.81
	12:30	10.88	7.53	0.733	154	1.774	461.4	582.8	121.4	352.1	230.7	275.2	4.80
	12:35	11.05	7.65	0.735	152	1.797	462.1	584.7	122.6	353.6	231.0	276.6	4.77
	12:40	11.33	7.85	0.746	150	1.834	468.3	593.0	124.7	358.8	234.1	280.8	4.76
	12:45	11.57	8.01	0.751	149	1.864	470.7	597.0	126.3	361.6	235.3	283.2	4.73
	12:50	11.82	8.19	0.761	147	1.897	476.3	604.2	127.9	366.1	238.2	286.7	4.72
	12:55	11.99	8.30	0.766	146	1.917	479.0	608.0	129.0	368.5	239.5	288.7	4.71
	13:00	12.21	8.46	0.771	145	1.946	481.4	611.8	130.4	371.1	240.7	290.9	4.69
	13:05	12.54	8.68	0.779	143	1.985	485.4	617.9	132.5	375.2	242.7	294.3	4.66
	13:10	12.79	8.85	0.784	141	2.016	487.7	621.8	134.1	377.9	243.8	296.7	4.64
	13:15	13.04	9.03	0.795	139	2.047	493.9	629.6	135.7	382.6	246.9	300.3	4.64
	13:20	13.28	9.19	0.801	138	2.075	496.8	634.0	137.2	385.6	248.4	302.8	4.62
	13:25	13.48	9.33	0.802	137	2.100	496.7	635.0	138.3	386.6	248.3	303.9	4.59
	13:30	13.76	9.53	0.812	135	2.134	502.0	642.0	140.0	391.0	251.0	307.3	4.59
	13:35	13.99	9.68	0.816	134	2.160	503.7	645.0	141.3	393.2	251.9	309.2	4.56
	13:40	14.26	9.87	0.826	132	2.192	509.1	652.0	142.9	397.4	254.5	312.6	4.56
	13:45	14.47	10.02	0.832	131	2.217	512.0	656.2	144.2	400.2	256.0	314.9	4.55
	13:50	14.68	10.16	0.836	130	2.240	513.8	659.2	145.4	402.3	256.9	316.7	4.53
	13:55	14.93	10.34	0.843	128	2.270	517.2	664.0	146.8	405.4	258.6	319.2	4.52
	14:00	15.15	10.49	0.847	127	2.295	518.9	666.9	148.0	407.4	259.4	321.0	4.51
	14:05	15.41	10.67	0.853	125	2.325	521.6	671.2	149.6	410.4	260.8	323.5	4.49
	14:10	15.66	10.84	0.860	124	2.352	525.0	675.9	150.9	413.4	262.5	325.9	4.48
	14:15	15.94	11.04	0.865	123	2.384	527.0	679.3	152.3	415.8	263.5	328.0	4.46
	14:20	16.23	11.24	0.873	121	2.416	530.9	684.6	153.7	419.1	265.4	330.7	4.45
	14:25	16.40	11.36	0.876	121	2.435	532.0	686.5	154.5	420.5	266.0	331.8	4.44
	14:30	16.67	11.54	0.883	119	2.464	535.3	691.0	155.7	423.3	267.6	334.1	4.44
	14:35	16.87	11.68	0.890	118	2.486	538.8	695.7	156.9	426.3	269.4	336.5	4.43
	14:40	17.09	11.84	0.891	117	2.511	538.5	696.3	157.8	427.0	269.2	337.3	4.41
	14:45	17.34	12.01	0.902	116	2.537	544.3	703.2	158.9	431.0	272.1	340.3	4.43
	14:50	17.61	12.20	0.901	115	2.567	542.5	702.7	160.2	431.4	271.2	341.0	4.39
	14:55	17.90	12.39	0.909	114	2.596	546.2	707.7	161.5	434.6	273.1	343.6	4.38
	15:00	18.07	12.51	0.913	113	2.614	548.0	710.2	162.2	436.2	274.0	344.9	4.38
	15:05	18.34	12.70	0.921	112	2.643	551.7	715.2	163.5	439.4	275.9	347.4	4.37
	15:10	18.55	12.84	0.933	111	2.664	558.3	722.6	164.3	443.4	279.1	350.4	4.40

Borehole No. : WCH-BH10 — **Sample Depth m:-** 5.00 - 6.00

Sample No. : 5 — **Specimen Depth m:-** 5.60 - 5.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

Technology Centre
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Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 25	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
03/12	15:15	18.84	13.05	0.934	109	2.696	557.5	723.2	165.7	444.5	278.8	351.5	4.36
	15:20	19.05	13.19	0.942	108	2.717	561.5	728.1	166.6	447.4	280.8	353.8	4.37
	15:25	19.27	13.34	0.953	107	2.739	567.3	734.9	167.6	451.3	283.7	356.7	4.39
	15:30	19.58	13.56	0.960	106	2.771	570.2	739.1	168.9	454.0	285.1	359.0	4.38
	15:35	19.81	13.72	0.959	105	2.795	568.5	738.4	169.9	454.2	284.3	359.4	4.35
	15:40	20.08	13.91	0.969	104	2.823	573.4	744.4	171.0	457.7	286.7	362.1	4.35
	15:45	20.34	14.08	0.974	103	2.848	575.3	747.4	172.1	459.7	287.6	363.9	4.34
	15:50	20.51	14.20	0.975	102	2.865	575.0	747.8	172.8	460.3	287.5	364.5	4.33
	15:55	20.74	14.36	0.984	101	2.888	579.4	753.1	173.7	463.4	289.7	366.8	4.34
	16:00	20.97	14.52	0.987	100	2.911	580.2	754.9	174.7	464.8	290.1	368.1	4.32
	16:05	21.19	14.67	0.996	99	2.933	584.6	760.3	175.7	468.0	292.3	370.6	4.33
	16:10	21.43	14.84	1.000	98	2.957	585.8	762.6	176.8	469.7	292.9	372.1	4.31
	16:15	21.73	15.05	1.006	97	2.987	588.0	766.1	178.1	472.1	294.0	374.1	4.30
	16:20	22.02	15.25	1.014	95	3.016	591.4	771.4	180.0	475.7	295.7	377.1	4.29
	16:25	22.16	15.34	1.021	94	3.029	595.0	775.9	180.9	478.4	297.5	379.2	4.29
	16:30	22.42	15.52	1.023	93	3.054	594.9	776.5	181.6	479.0	297.4	379.9	4.28
	16:35	22.68	15.70	1.032	93	3.080	599.0	780.6	181.6	481.1	299.5	381.3	4.30
	16:40	22.88	15.84	1.038	93	3.099	601.6	784.0	182.4	483.2	300.8	382.9	4.30
	16:45	23.14	16.02	1.048	91	3.125	606.2	789.8	183.6	486.7	303.1	385.7	4.30
	16:50	23.36	16.18	1.052	91	3.147	607.5	792.0	184.5	488.3	303.8	387.0	4.29
	16:55	23.66	16.38	1.066	89	3.175	614.3	800.0	185.7	492.9	307.2	390.5	4.31
	17:00	23.92	16.56	1.072	88	3.201	616.5	803.2	186.7	495.0	308.3	392.2	4.30
	17:05	24.15	16.72	1.079	87	3.223	619.5	807.1	187.6	497.4	309.8	394.1	4.30
	17:10	24.40	16.90	1.084	87	3.248	621.1	809.4	188.3	498.9	310.6	395.3	4.30
	17:15	24.70	17.10	1.098	85	3.276	627.8	817.6	189.8	503.7	313.9	399.1	4.31
	17:20	24.96	17.28	1.105	84	3.301	630.6	821.2	190.6	505.9	315.3	400.8	4.31
	17:25	25.12	17.40	1.108	84	3.318	631.4	822.7	191.3	507.0	315.7	401.8	4.30
	17:30	25.46	17.63	1.124	82	3.350	639.0	831.9	192.9	512.4	319.5	405.9	4.31
	17:35	25.68	17.78	1.129	81	3.371	640.8	834.6	193.8	514.2	320.4	407.4	4.31
	17:40	25.88	17.92	1.136	81	3.390	643.8	838.0	194.2	516.1	321.9	408.8	4.31
	17:45	26.10	18.07	1.142	79	3.411	646.0	841.6	195.6	518.6	323.0	410.9	4.30
	17:50	**26.28**	**18.19**	**1.151**	**79**	**3.428**	**650.3**	**846.6**	**196.3**	**521.5**	**325.2**	**413.1**	**4.31**
	17:55	26.52	18.36	1.152	78	3.452	649.5	847.0	197.5	522.3	324.8	414.0	4.29
	18:00	26.88	18.61	1.154	76	3.487	648.6	847.6	199.0	523.3	324.3	415.2	4.26
	18:15	27.51	19.05	1.157	73	3.549	646.8	848.6	201.8	525.2	323.4	417.4	4.21
	18:30	28.21	19.53	1.159	70	3.616	644.0	848.8	204.8	526.8	322.0	419.5	4.14
	18:45	28.88	20.00	1.160	68	3.683	640.8	847.4	206.6	527.0	320.4	420.2	4.10

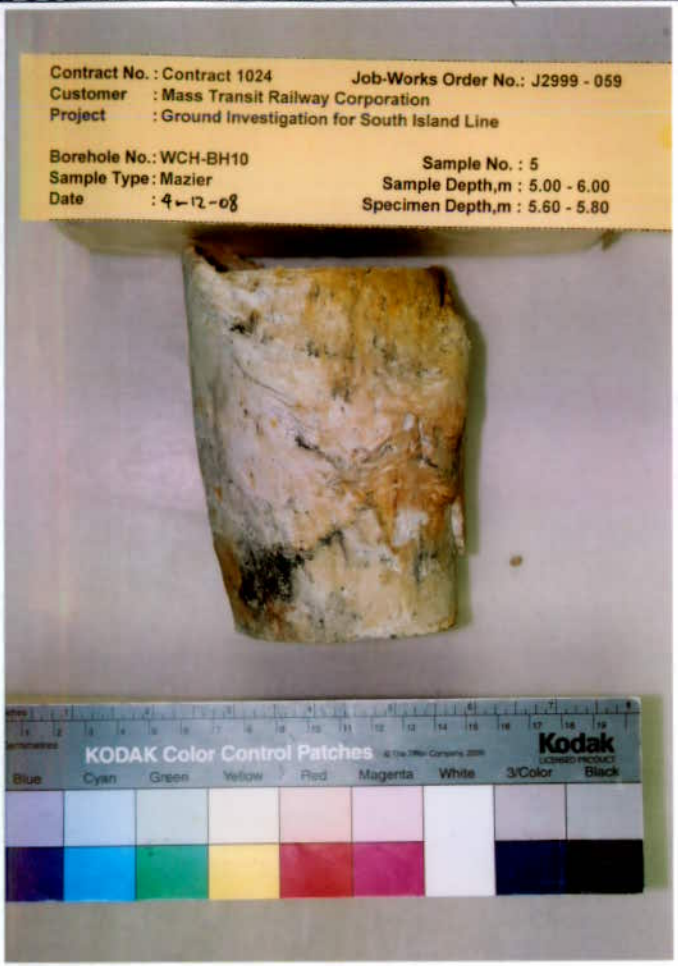
Borehole No. : WCH-BH10 — **Sample Depth m:-** 5.00 - 6.00
Sample No. : 5 — **Specimen Depth m:-** 5.60 - 5.80

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by: W S Wat
Checked by: H W Chung

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Light grey, slightly gravelly, sandy SILT/CLAY

Sample Origin : CDT‡

‡ Information provided by customer

Borehole No. : WCH-BH10 **Sample No. :** 5 **Sample Depth m:-** 5.00 - 6.00 **Specimen Depth m:-** 5.60 - 5.80

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024
Job No. : J2999
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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10	WCH-BH10	WCH-BH10
Sample		no	5	5	5
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	5.00 - 6.00	5.00 - 6.00	5.00 - 6.00
Specimen Depth		m	5.80 - 6.00	5.80 - 6.00	5.80 - 6.00
INITIAL CONDITIONS					
Diameter	(D_o)	mm	73.9	74.3	74.6
Height	(H_o)	mm	145.0	142.3	140.4
Moisture Content	(W_o)	%	13	13	13
Bulk density	(ρ_o)	Mg/m^3	2.22	2.23	2.23
Dry density	(ρ_d)	Mg/m^3	1.96	1.97	1.99
Particle density	(ρ_s)		2.65	2.65	2.65
Voids Ratio	(e_o)		0.35	0.34	0.33
Degree of Saturation	(S_r)	%	99.2	99.2	99.2
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			1.00		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	245	270	295
Back Pressure	(u_b)	kPa	220	220	220
Effective Pressure	(σ'_3)	kPa	25	50	75
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	219.15	290.82	337.44
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.38	0.18	0.13
Coefficient of Permeability (k)		m/s	2.60E-08	1.66E-08	1.33E-08
COMPRESSION TERMINATION CRITERION			MAXIMUM STRESS RATIO		MAX ($\sigma'1 - \sigma'3$)
COMPRESSION - INITIAL					
Moisture Content	(w)	%	13	13	12
Pore Pressure at the End of Consolidation		kPa	220	220	220
Effective Stress at the End of Consolidation		kPa	25	50	75
Bulk density	(ρ_o)	Mg/m^3	2.23	2.23	2.24
Dry density	(ρ_d)	Mg/m^3	1.97	1.99	2.00
Voids Ratio	(e)		0.34	0.33	0.33
Degree of Saturation	(S_r)	%	99.2	99.2	99.2

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat
Checked By : Name : H W Chung Date : 19/12/2008
Approved By : Signatory : **Lau Wai Cheong** Date : 19/12/2008
Tested Date: 28/11/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10	WCH-BH10	WCH-BH10
Sample		no	5	5	5
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	5.00 - 6.00	5.00 - 6.00	5.00 - 6.00
Specimen Depth		m	5.80 - 6.00	5.80 - 6.00	5.80 - 6.00
COMPRESSION - FAILURE					
Cell Pressure		kPa	245	270	295
Rate of Strain		mm/min	0.048	0.047	0.046
CONDITIONS AT MAXIMUM STRESS RATIO					
Major Effective Principal Stress (σ'_1)		kPa	172	272	382
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	148	228	315
Minor Effective Principal Stress (σ'_3)		kPa	25	44	68
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	98	158	225
$t = (\sigma_1 - \sigma_3)/2$		kPa	74	114	157
Expanded Uncertainty of s' ^		kPa	-	-	-
Expanded Uncertainty of t ^		kPa	-	-	-
Pore pressure parameter A_f			0.00	0.03	-0.02
Strain at Failure	(εf)	%	1.5	2.8	4.0
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	13	13	12
Bulk density	(ρ_o)	Mg/m^3	2.23	2.23	2.24
Dry density	(ρ_d)	Mg/m^3	1.97	1.99	2.00
Voids Ratio	(e_f)		0.34	0.33	0.33
Degree of Saturation	(S_f)	%	99.2	99.2	99.2

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :-
   Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

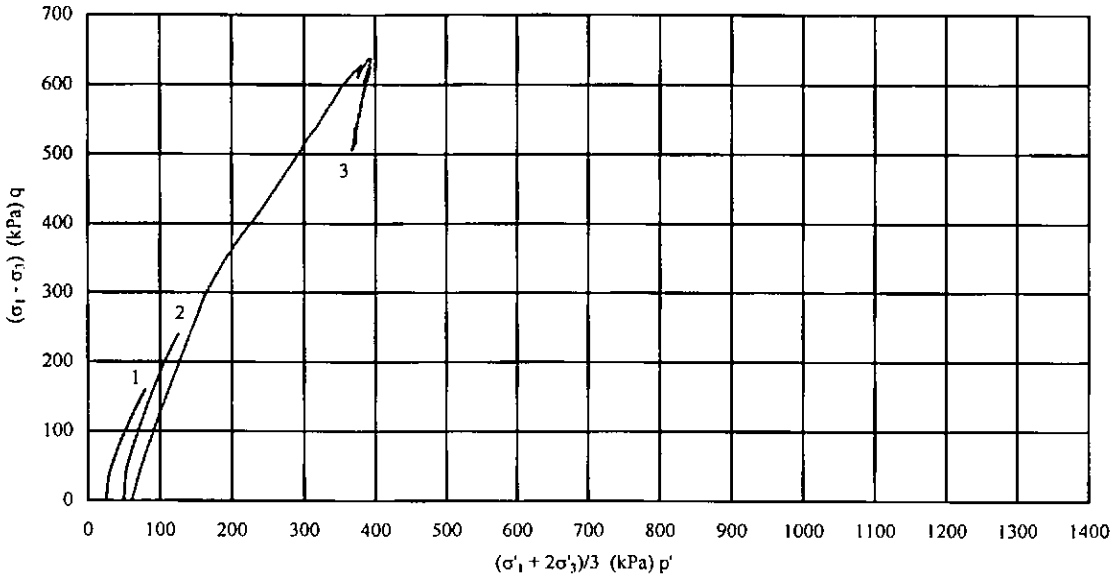
* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

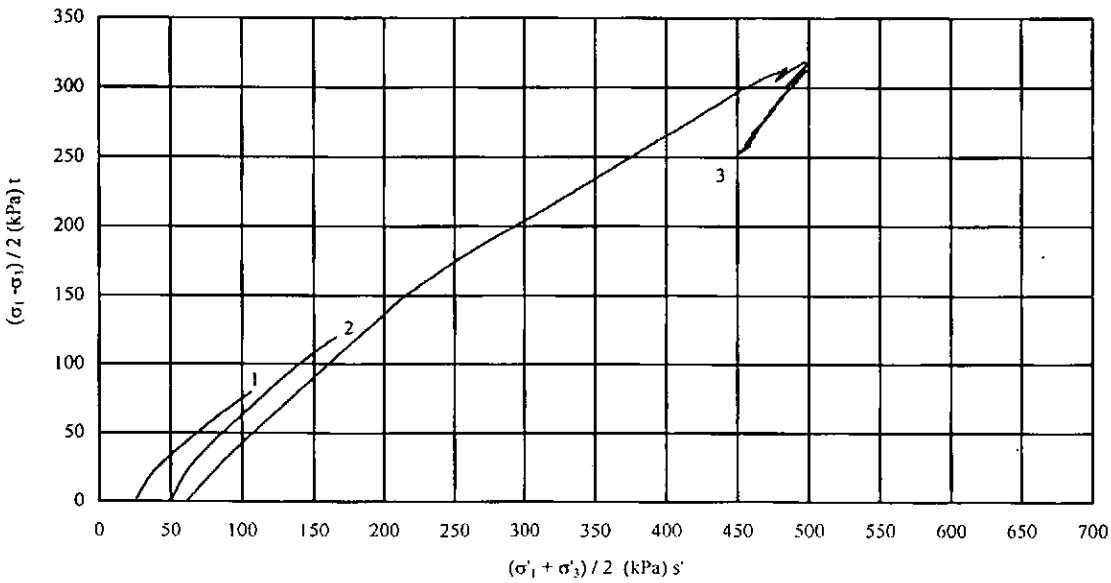
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**5.00 - 6.00**
Sample No. :	**5**	**Specimen Depth m:-**	**5.80 - 6.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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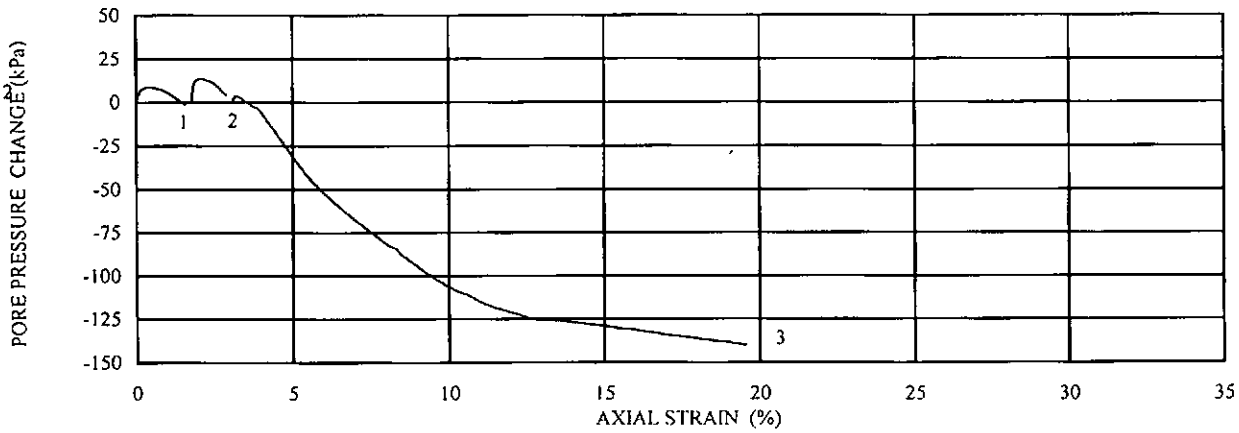
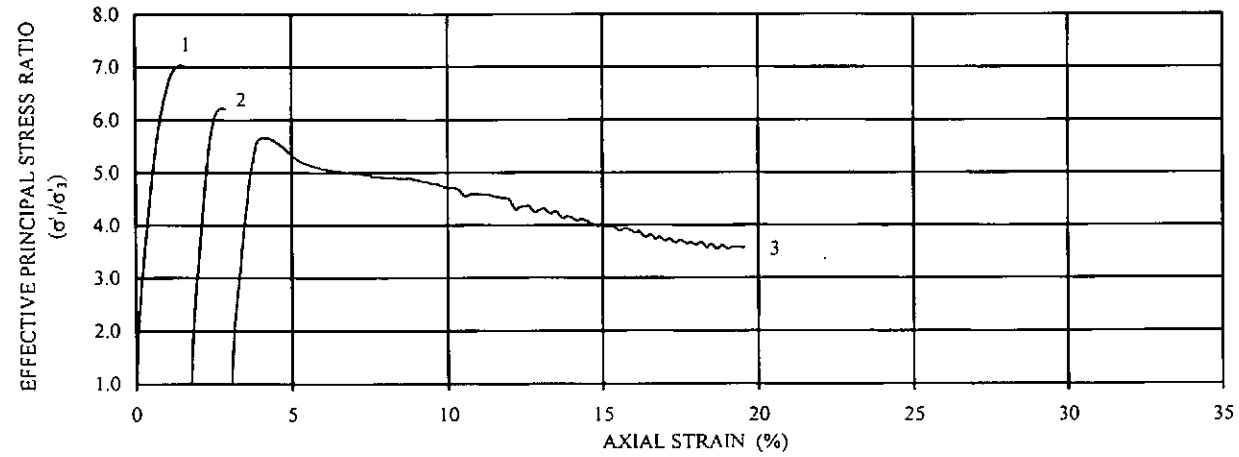
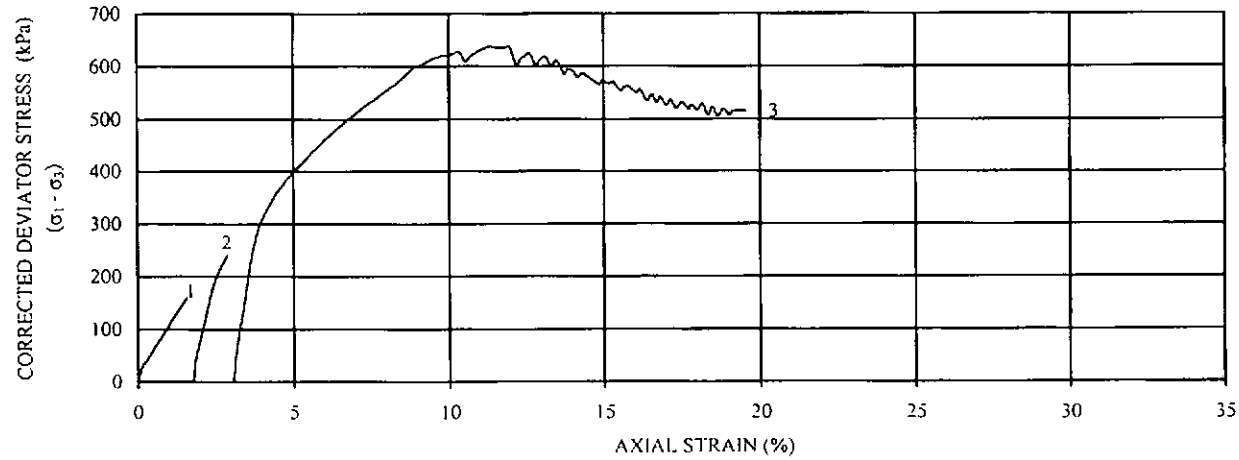
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**5.00 - 6.00**
Sample No. :	**5**	**Specimen Depth m:-**	**5.80 - 6.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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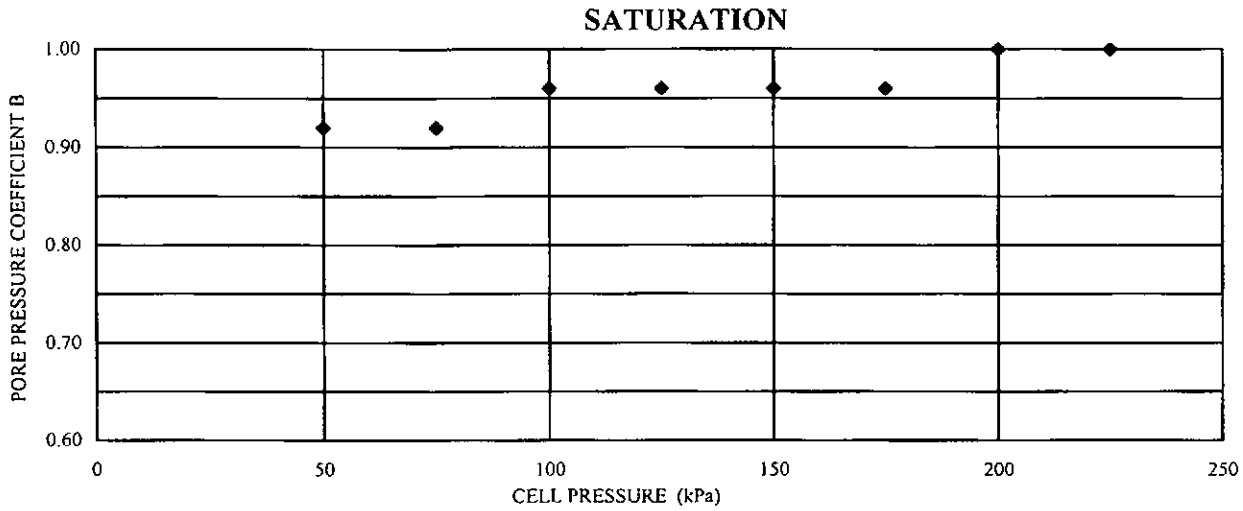
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Parameter B
28/11/2008	14:06	0	0	-	0.0	
	14:11	25	-	24		-
	14:51	25	20	20	-1.9	
	15:00	50	-	43		0.92
	15:51	50	45	45	-1.7	
	16:04	75	-	68		0.92
	16:45	75	70	70	-1.7	
	16:50	100	-	94		0.96
01/12/2008	08:35	100	95	95	-0.8	
	08:43	125	-	119		0.96
	09:04	125	120	120	-0.5	
	09:12	150	-	144		0.96
	09:29	150	145	145	-0.5	
	09:36	175	-	169		0.96
	09:59	175	170	170	-0.4	
	10:07	200	-	195		1.00
	10:42	200	195	195	-0.2	
	10:48	225	-	220		1.00
02/12/2008	08:35	225	220	220	0.1	

Borehole No. : WCH-BH10 **Sample Depth m:-** 5.00 - 6.00
Sample No. : 5 **Specimen Depth m:-** 5.80 - 6.00

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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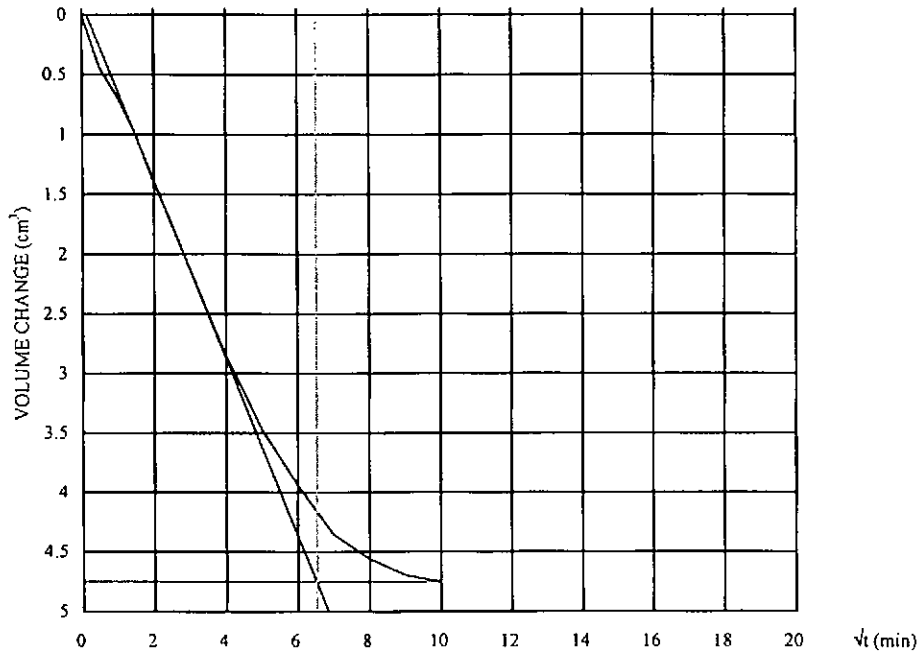
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

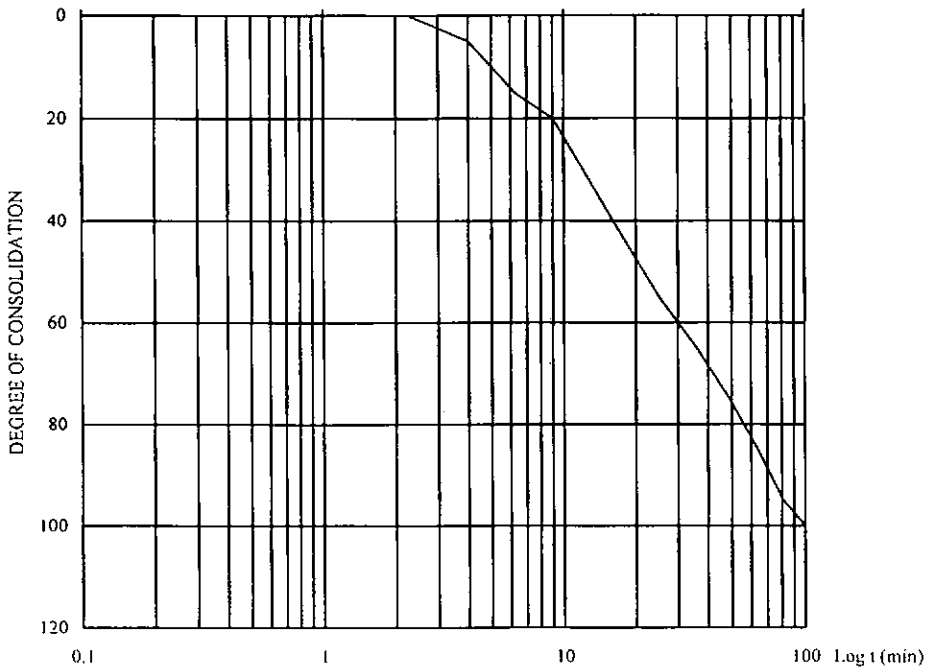


√t100 6.53 min

t100 42.61 min

tf 22.58 min

Calc. strain rate
0.448 mm/min



Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**5.00 - 6.00**
Sample No. :	**5**	**Specimen Depth m:-**	**5.80 - 6.00**
Customer :	**Mass Transit Railway Corporation**		Complied by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

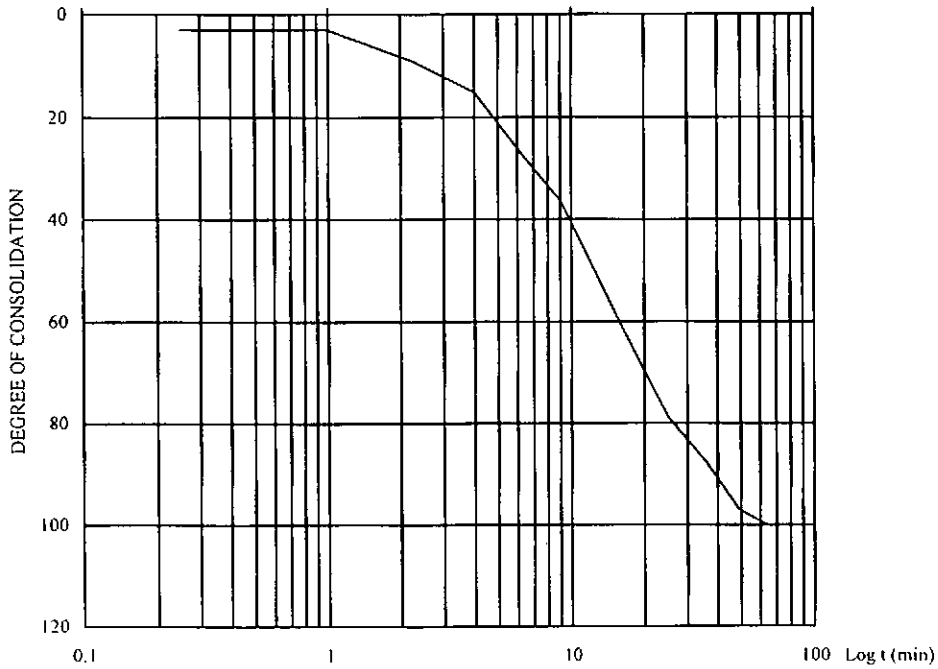
CONSOLIDATION (DRAINED PHASE) - Stage 2

√t100 5.84 min

t100 34.07 min

tf 18.06 min

Calc. strain rate
0.551 mm/min



Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**5.00 - 6.00**
Sample No. :	**5**	**Specimen Depth m:-**	**5.80 - 6.00**
Customer :	**Mass Transit Railway Corporation**		Complied by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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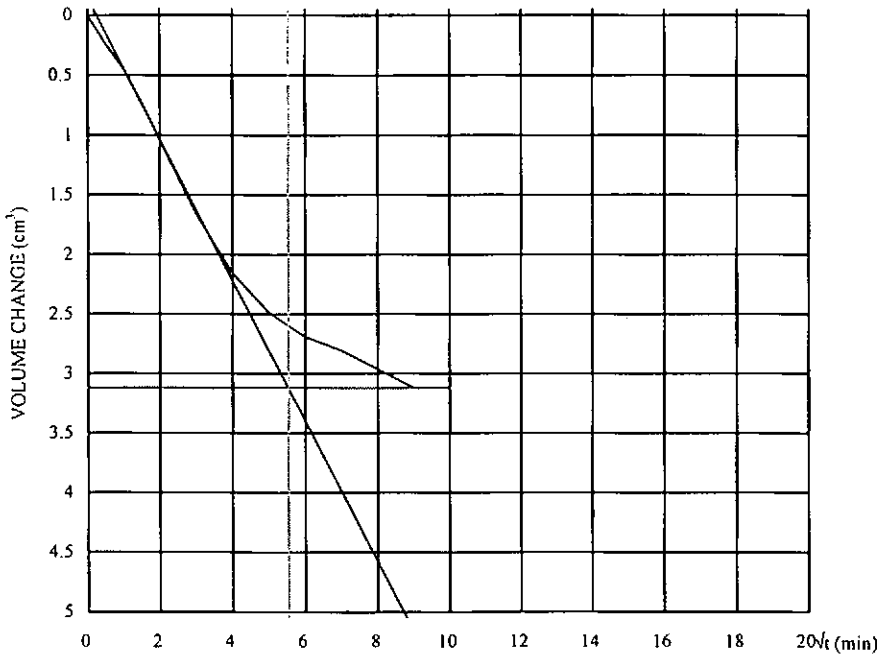
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 3

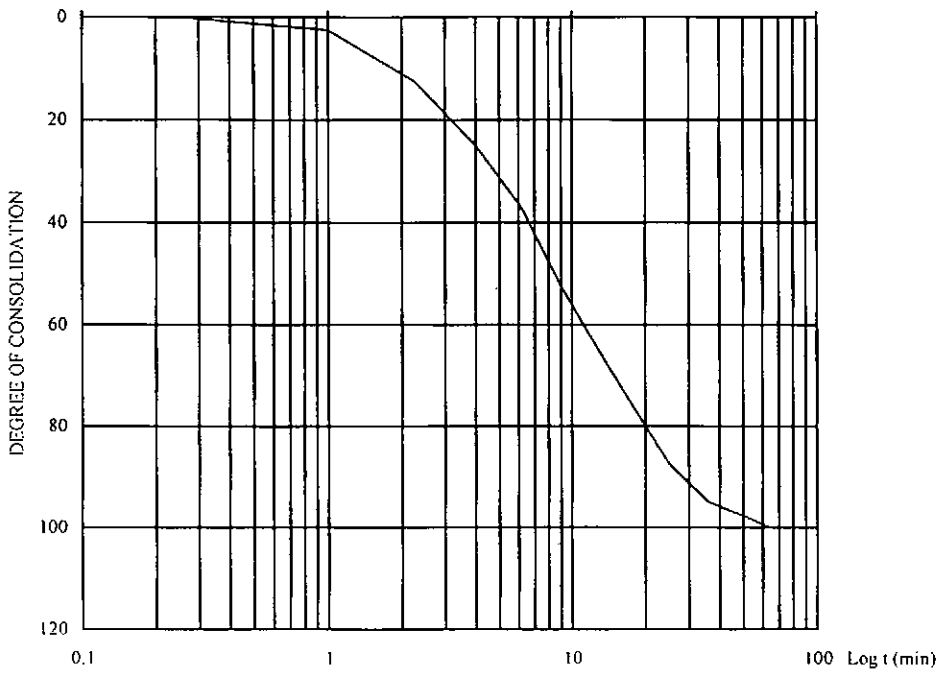


√t100 5.53 min

t100 30.61 min

tf 16.22 min

Calc. strain rate
0.605 mm/min



Borehole No. : WCH-BH10		Sample Depth m:- 5.00 - 6.00	
Sample No. : 5		Specimen Depth m:- 5.80 - 6.00	
Customer :	Mass Transit Railway Corporation		Complied by
Project :	Ground Investigation for South Island Line		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	J2999	Works Order No.: 059	H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	25 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	1.99 % per hr

FAILURE CRITERION

Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 1	Applied Pressure (kPa) - Cell :	245	Back : 220	P.R. factor	3.1341 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 2 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
02/12	10:30	0.00	0.00	0.035	220	0.000	0.0	25.0	25.0	25.0	0.0	25.0	1.00
	10:35	0.19	0.13	0.073	226	0.038	27.8	46.6	18.8	32.7	13.9	28.1	2.48
	10:40	0.41	0.28	0.090	228	0.081	40.2	57.0	16.8	36.9	20.1	30.2	3.39
	10:45	0.59	0.41	0.106	229	0.118	51.8	68.1	16.3	42.2	25.9	33.6	4.18
	10:50	0.80	0.55	0.124	229	0.157	64.8	81.3	16.5	48.9	32.4	38.1	4.93
	10:55	1.03	0.71	0.145	228	0.202	80.0	97.1	17.1	57.1	40.0	43.8	5.68
	11:00	1.22	0.85	0.162	227	0.241	92.2	110.1	17.9	64.0	46.1	48.6	6.15
	11:05	1.44	1.00	0.182	226	0.283	106.6	125.8	19.2	72.5	53.3	54.7	6.55
	11:10	1.68	1.16	0.204	224	0.326	122.4	143.3	20.9	82.1	61.2	61.7	6.85
	11:15	1.90	1.31	0.223	222	0.367	135.9	158.6	22.7	90.6	67.9	68.0	6.99
	11:20	**2.10**	**1.45**	**0.240**	**221**	**0.404**	**148.0**	**172.5**	**24.5**	**98.5**	**74.0**	**73.8**	**7.04**
	11:25	2.29	1.58	0.256	219	0.439	159.3	185.8	26.5	106.2	79.7	79.6	7.01

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 5.00 - 6.00**	
Sample No. :	**5**	**Specimen Depth m:- 5.80 - 6.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	50 kPa
Side drains	No	Selected Machine Speed	0.047 mm/min	Rate of Strain	1.99 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐
Stage : 2	Applied Pressure (kPa) - Cell : 270 Back : 220	P.R. factor 3.1341 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 2 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
02/12	12:50	2.58	1.78	0.046	220	0.000	0.0	50.0	50.0	50.0	0.0	50.0	1.00
	12:55	2.67	1.85	0.101	230	0.510	39.4	79.4	40.0	59.7	19.7	53.1	1.98
	13:00	2.79	1.93	0.132	233	0.531	61.8	99.1	37.3	68.2	30.9	57.9	2.66
	13:05	3.02	2.09	0.184	234	0.572	99.3	135.8	36.5	86.1	49.6	69.6	3.72
	13:10	3.21	2.22	0.231	233	0.605	133.1	170.1	37.0	103.5	66.5	81.4	4.60
	13:15	3.40	2.35	0.275	232	0.639	164.6	202.3	37.7	120.0	82.3	92.6	5.37
	13:20	3.56	2.46	0.306	231	0.666	186.7	225.4	38.7	132.1	93.4	100.9	5.83
	13:25	3.76	2.60	0.337	229	0.701	208.7	249.4	40.7	145.1	104.4	110.3	6.13
	13:30	**4.01**	**2.77**	**0.365**	**226**	**0.744**	**228.4**	**272.1**	**43.7**	**157.9**	**114.2**	**119.8**	**6.23**
	13:35	4.18	2.89	0.381	224	0.773	239.6	285.6	46.0	165.8	119.8	125.9	6.21

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 5.00 - 6.00**	
Sample No. :	**5**	**Specimen Depth m:- 5.80 - 6.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	75 kPa
Side drains	No	Selected Machine Speed	0.046 mm/min	Rate of Strain	1.97 % per hr

FAILURE CRITERION

Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 3	Applied Pressure (kPa) - Cell :	295	Back : 234.2	P.R. factor	3.1341 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 2 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
03/12	08:35	4.42	3.06	0.053	234	0.000	0.0	60.8	60.8	60.8	0.0	60.8	1.00
	08:40	4.57	3.16	0.140	238	0.839	61.7	119.1	57.4	88.3	30.9	78.0	2.08
	08:45	4.80	3.32	0.214	237	0.877	114.7	172.6	57.9	115.3	57.4	96.1	2.98
	08:50	4.95	3.42	0.266	236	0.901	151.9	211.0	59.1	135.0	75.9	109.7	3.57
	08:55	5.10	3.53	0.323	235	0.927	192.5	252.7	60.2	156.5	96.3	124.4	4.20
	09:00	5.27	3.64	0.380	234	0.953	233.1	294.5	61.4	177.9	116.5	139.1	4.80
	09:05	5.43	3.75	0.424	232	0.979	264.2	327.6	63.4	195.5	132.1	151.5	5.17
	09:10	5.63	3.89	0.464	231	1.011	292.4	356.4	64.0	210.2	146.2	161.5	5.57
	09:15	**5.85**	**4.04**	**0.496**	**227**	**1.046**	**314.7**	**382.3**	**67.6**	**224.9**	**157.3**	**172.5**	**5.65**
	09:20	6.04	4.18	0.519	224	1.078	330.6	401.7	71.1	236.4	165.3	181.3	5.65
	09:25	6.25	4.32	0.541	221	1.110	345.7	420.2	74.5	247.3	172.8	189.7	5.64
	09:30	6.48	4.48	0.563	216	1.146	360.7	439.3	78.6	258.9	180.3	198.8	5.59
	09:35	6.71	4.64	0.582	212	1.181	373.5	456.1	82.6	269.3	186.7	207.1	5.52
	09:40	6.88	4.76	0.596	209	1.208	382.9	468.6	85.7	277.1	191.4	213.3	5.47
	09:45	7.15	4.94	0.614	205	1.247	394.8	485.1	90.3	287.7	197.4	221.9	5.37
	09:50	7.39	5.11	0.629	201	1.284	404.7	499.2	94.5	296.8	202.3	229.4	5.28
	09:55	7.59	5.25	0.642	197	1.314	413.2	511.0	97.8	304.4	206.6	235.5	5.22
	10:00	7.77	5.37	0.654	194	1.340	421.1	521.7	100.6	311.1	210.5	241.0	5.19
	10:05	7.96	5.50	0.668	192	1.367	430.3	533.7	103.4	318.5	215.1	246.8	5.16
	10:10	8.22	5.68	0.685	188	1.405	441.3	548.3	107.0	327.7	220.7	254.1	5.12
	10:15	8.43	5.83	0.698	185	1.436	449.7	559.4	109.7	334.5	224.8	259.6	5.10
	10:20	8.63	5.96	0.710	183	1.463	457.4	569.5	112.1	340.8	228.7	264.6	5.08
	10:25	8.81	6.09	0.721	181	1.490	464.4	578.6	114.2	346.4	232.2	269.0	5.07
	10:30	9.12	6.30	0.739	177	1.533	475.9	593.6	117.7	355.6	237.9	276.3	5.04
	10:35	9.33	6.45	0.752	175	1.563	484.1	604.2	120.1	362.1	242.0	281.5	5.03
	10:40	9.50	6.57	0.761	173	1.587	489.7	611.6	121.9	366.8	244.9	285.1	5.02
	10:45	9.83	6.80	0.779	170	1.632	500.9	626.2	125.3	375.8	250.5	292.3	5.00
	10:50	9.96	6.88	0.786	168	1.648	505.3	632.0	126.7	379.3	252.6	295.1	4.99
	10:55	10.13	7.01	0.796	167	1.673	511.5	639.9	128.4	384.2	255.8	298.9	4.98
	11:00	10.37	7.17	0.809	164	1.704	519.5	650.1	130.6	390.4	259.8	303.8	4.98
	11:05	10.58	7.31	0.819	162	1.731	525.6	658.2	132.6	395.4	262.8	307.8	4.96
	11:10	10.81	7.48	0.831	160	1.764	532.9	667.8	134.9	401.3	266.4	312.5	4.95
	11:15	11.07	7.65	0.841	158	1.796	538.7	676.2	137.5	406.8	269.3	317.1	4.92
	11:20	11.29	7.80	0.853	156	1.824	546.0	685.4	139.4	412.4	273.0	321.4	4.92
	11:25	11.47	7.93	0.863	154	1.848	552.0	693.2	141.2	417.2	276.0	325.2	4.91
	11:30	11.74	8.12	0.877	151	1.883	560.4	704.1	143.7	423.9	280.2	330.5	4.90
	11:35	12.02	8.31	0.888	150	1.918	566.7	711.6	144.9	428.3	283.4	333.8	4.91
	11:40	12.19	8.43	0.900	147	1.939	574.1	721.8	147.7	434.8	287.1	339.1	4.89
	11:45	12.40	8.58	0.913	145	1.966	582.0	731.7	149.7	440.7	291.0	343.7	4.89

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 5.00 - 6.00**	
Sample No. :	**5**	**Specimen Depth m:- 5.80 - 6.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☐ | Max. Stress ratio ☒ | Axial Strain % ☐

Stage : 3		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 2	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
03/12	11:50	12.65	8.75	0.928	143	1.997	591.0	743.0	152.0	447.5	295.5	349.0	4.89
	11:55	12.83	8.87	0.938	141	2.018	597.0	750.6	153.6	452.1	298.5	352.6	4.89
	12:00	12.97	8.97	0.943	140	2.036	599.7	754.7	155.0	454.9	299.9	354.9	4.87
	12:05	13.30	9.20	0.955	137	2.076	606.2	764.2	158.0	461.1	303.1	360.1	4.84
	12:10	13.62	9.41	0.967	134	2.112	612.8	773.5	160.7	467.1	306.4	365.0	4.81
	12:15	13.83	9.56	0.974	132	2.138	616.5	779.1	162.6	470.8	308.2	368.1	4.79
	12:20	14.13	9.77	0.981	130	2.174	619.7	784.4	164.7	474.6	309.9	371.3	4.76
	12:25	14.30	9.89	0.984	129	2.194	620.9	787.3	166.4	476.9	310.5	373.4	4.73
	12:30	14.50	10.03	0.987	128	2.218	621.9	789.3	167.4	478.4	311.0	374.7	4.72
	12:35	14.69	10.15	0.993	126	2.238	625.0	793.7	168.7	481.2	312.5	377.0	4.70
	12:40	14.96	10.34	0.999	125	2.269	627.7	798.1	170.4	484.2	313.8	379.6	4.68
	12:45	15.23	10.53	0.974	124	2.300	609.7	781.2	171.5	476.4	304.9	374.7	4.56
	12:50	15.46	10.69	0.991	122	2.327	619.9	792.9	173.0	482.9	309.9	379.6	4.58
	12:55	15.62	10.80	0.998	121	2.344	623.7	797.6	173.9	485.8	311.9	381.8	4.59
	13:00	15.83	10.94	1.008	120	2.367	629.3	804.6	175.3	490.0	314.7	385.1	4.59
	13:05	16.13	11.16	1.019	118	2.402	635.0	812.1	177.1	494.6	317.5	388.8	4.59
	13:10	16.37	11.32	1.025	117	2.428	637.8	816.0	178.2	497.1	318.9	390.8	4.58
	13:15	16.62	11.49	1.023	116	2.455	635.2	814.5	179.3	496.9	317.6	391.0	4.54
	13:20	16.85	11.65	1.025	115	2.480	635.3	815.4	180.1	497.8	317.7	391.9	4.53
	13:25	17.05	11.79	1.027	114	2.502	635.6	816.4	180.8	498.6	317.8	392.7	4.52
	13:30	17.32	11.97	1.031	113	2.530	636.9	818.8	181.9	500.3	318.4	394.2	4.50
	13:35	17.60	12.17	0.982	112	2.561	603.5	786.2	182.7	484.4	301.7	383.9	4.30
	13:40	17.83	12.33	1.002	111	2.585	615.4	799.2	183.8	491.5	307.7	388.9	4.35
	13:45	18.04	12.47	1.012	110	2.607	620.8	805.5	184.7	495.1	310.4	391.6	4.36
	13:50	18.24	12.61	1.020	110	2.628	625.0	810.2	185.2	497.7	312.5	393.5	4.37
	13:55	18.52	12.80	0.989	109	2.657	603.5	789.7	186.2	488.0	301.8	387.4	4.24
	14:00	18.71	12.94	1.004	109	2.678	612.3	798.7	186.4	492.5	306.1	390.5	4.28
	14:05	18.97	13.11	1.016	109	2.703	618.7	805.2	186.5	495.9	309.4	392.7	4.32
	14:10	19.24	13.30	0.992	108	2.731	601.9	788.6	186.7	487.6	300.9	387.3	4.22
	14:15	19.51	13.49	1.008	108	2.760	610.8	797.7	186.9	492.3	305.4	390.5	4.27
	14:20	19.84	13.72	0.971	108	2.793	585.5	772.7	187.2	480.0	292.8	382.4	4.13
	14:25	20.00	13.83	0.985	108	2.810	593.7	781.1	187.4	484.2	296.8	385.3	4.17
	14:30	20.27	14.01	0.982	107	2.836	590.5	778.2	187.7	482.9	295.2	384.5	4.15
	14:35	20.49	14.17	0.965	107	2.859	578.5	766.5	188.0	477.3	289.3	380.8	4.08
	14:40	20.69	14.30	0.980	107	2.878	587.1	775.4	188.3	481.9	293.6	384.0	4.12
	14:45	20.94	14.48	0.972	106	2.904	580.9	769.6	188.7	479.1	290.4	382.3	4.08
	14:50	21.22	14.67	0.961	106	2.931	572.5	761.6	189.1	475.4	286.3	379.9	4.03
	14:55	21.51	14.87	0.952	106	2.960	565.4	754.9	189.5	472.2	282.7	378.0	3.98
	15:00	21.62	14.95	0.964	105	2.971	572.5	762.3	189.8	476.0	286.2	380.6	4.02
	15:05	21.94	15.17	0.957	105	3.003	566.6	756.8	190.2	473.5	283.3	379.1	3.98
	15:10	22.13	15.30	0.965	104	3.021	570.7	761.4	190.7	476.0	285.3	380.9	3.99

Borehole No. : WCH-BH10 — **Sample Depth m:- 5.00 - 6.00**

Sample No. : 5 — **Specimen Depth m:- 5.80 - 6.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

Gammon

FAILURE CRITERION

Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐

Stage : 3		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 2	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
03/12	15:15	22.45	15.52	0.942	104	3.053	554.8	745.9	191.1	468.5	277.4	376.0	3.90
	15:20	22.64	15.66	0.953	104	3.072	560.7	752.1	191.4	471.8	280.4	378.3	3.93
	15:25	22.85	15.80	0.958	103	3.092	562.9	754.7	191.8	473.2	281.4	379.4	3.93
	15:30	23.18	16.03	0.940	103	3.124	550.1	742.3	192.2	467.2	275.0	375.6	3.86
	15:35	23.40	16.18	0.951	102	3.146	555.9	748.5	192.6	470.6	278.0	377.9	3.89
	15:40	23.69	16.38	0.919	102	3.174	534.7	727.7	193.0	460.3	267.3	371.2	3.77
	15:45	23.93	16.55	0.940	102	3.197	546.6	740.1	193.5	466.8	273.3	375.7	3.82
	15:50	24.14	16.69	0.917	101	3.217	531.4	725.4	194.0	459.7	265.7	371.1	3.74
	15:55	24.34	16.83	0.935	101	3.237	541.6	736.0	194.4	465.2	270.8	374.9	3.79
	16:00	24.60	17.01	0.911	100	3.262	525.6	720.4	194.8	457.6	262.8	370.0	3.70
	16:05	24.80	17.15	0.931	100	3.281	537.0	732.2	195.2	463.7	268.5	374.2	3.75
	16:10	25.07	17.33	0.906	100	3.306	520.4	715.9	195.5	455.7	260.2	369.0	3.66
	16:15	25.33	17.51	0.928	99	3.331	532.7	728.6	195.9	462.3	266.4	373.5	3.72
	16:20	25.63	17.72	0.908	99	3.361	519.1	715.4	196.3	455.9	259.6	369.3	3.64
	16:25	25.77	17.82	0.923	98	3.375	527.7	724.4	196.7	460.5	263.8	372.6	3.68
	16:30	26.04	18.01	0.908	98	3.401	517.3	714.3	197.0	455.6	258.6	369.4	3.63
	16:35	26.28	18.17	0.929	98	3.423	529.0	726.4	197.4	461.9	264.5	373.7	3.68
	16:40	26.52	18.34	0.896	97	3.447	507.9	705.7	197.8	451.7	253.9	367.1	3.57
	16:45	26.75	18.49	0.922	97	3.468	522.6	720.7	198.1	459.4	261.3	372.3	3.64
	16:50	26.99	18.66	0.896	97	3.492	505.8	704.3	198.5	451.4	252.9	367.1	3.55
	16:55	27.24	18.84	0.921	96	3.517	519.7	718.6	198.9	458.8	259.9	372.1	3.61
	17:00	27.53	19.03	0.904	96	3.544	508.2	707.5	199.3	453.4	254.1	368.7	3.55
	17:05	27.71	19.16	0.917	95	3.562	515.2	715.0	199.8	457.4	257.6	371.5	3.58
	17:10	28.01	19.37	0.921	95	3.592	516.2	716.4	200.2	458.3	258.1	372.3	3.58
	17:15	28.31	19.57	0.923	94	3.620	516.1	716.9	200.8	458.8	258.0	372.8	3.57

Borehole No. :	**WCII-BH10**	**Sample Depth m:- 5.00 - 6.00**	
Sample No. :	**5**	**Specimen Depth m:- 5.80 - 6.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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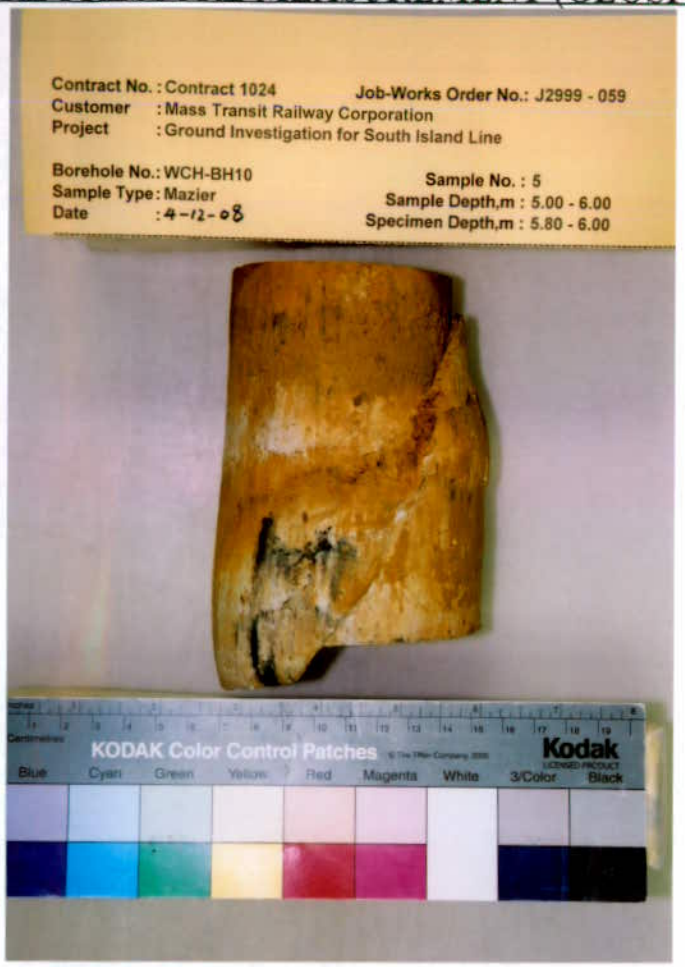
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Light grey, slightly gravelly, sandy SILT/CLAY

Sample Origin : CDT ‡

‡ Information provided by customer

Borehole No. : WCH-BH10 **Sample No. :** 5 **Sample Depth m:-** 5.00 - 6.00 **Specimen Depth m:-** 5.80 - 6.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024
Job No.: J2999
Works Order No.: 059

Compiled by W S Wat

Checked by H W Chung

Technology Centre
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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	9		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	7.00 - 8.00		
Specimen Depth		m	7.60 - 7.80		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.2		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	17		
Bulk density	(ρ_o)	Mg/m^3	2.11		
Dry density	(ρ_d)	Mg/m^3	1.81		
Particle density	(ρ_s)		2.65		
Voids Ratio	(e_o)		0.47		
Degree of Saturation	(S_r)	%	94.9		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.96		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	295		
Back Pressure	(u_b)	kPa	220		
Effective Pressure	(σ'_3)	kPa	75		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	1162.42		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.25		
Coefficient of Permeability (k)		m/s	8.98E-08		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	16		
Pore Pressure at the End of Consolidation		kPa	220		
Effective Stress at the End of Consolidation		kPa	75		
Bulk density	(ρ_o)	Mg/m^3	2.14		
Dry density	(ρ_d)	Mg/m^3	1.84		
Voids Ratio	(e)		0.44		
Degree of Saturation	(S_r)	%	98.5		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat
Checked By : Name : H W Chung Date : 19/12/2008
Approved By : Signatory : **Lau Wai Cheong** Date : 19/12/2008
Tested Date: 09/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	9		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	7.00 - 8.00		
Specimen Depth		m	7.60 - 7.80		
COMPRESSION - FAILURE					
Cell Pressure		kPa	295		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	592		
Corrected Deviator Stress (σ'_1 - σ'_3)		kPa	438		
Minor Effective Principal Stress (σ'_3)		kPa	153		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	373		
$t = (\sigma_1 - \sigma_3)/2$		kPa	219		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.18		
Strain at Failure	(εf)	%	15.8		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	16		
Bulk density	(ρ_o)	Mg/m^3	2.14		
Dry density	(ρ_d)	Mg/m^3	1.84		
Voids Ratio	(e_f)		0.44		
Degree of Saturation	(S_f)	%	98.5		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

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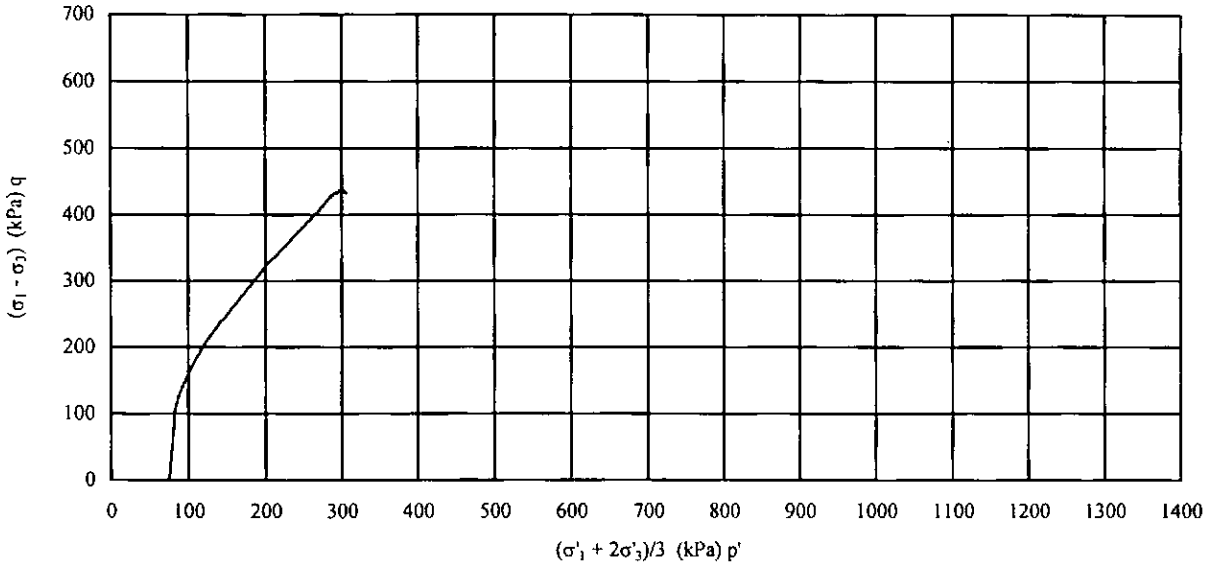
Form : GESR009.7 / Nov.10.06 / Issue 1 / Rev 1

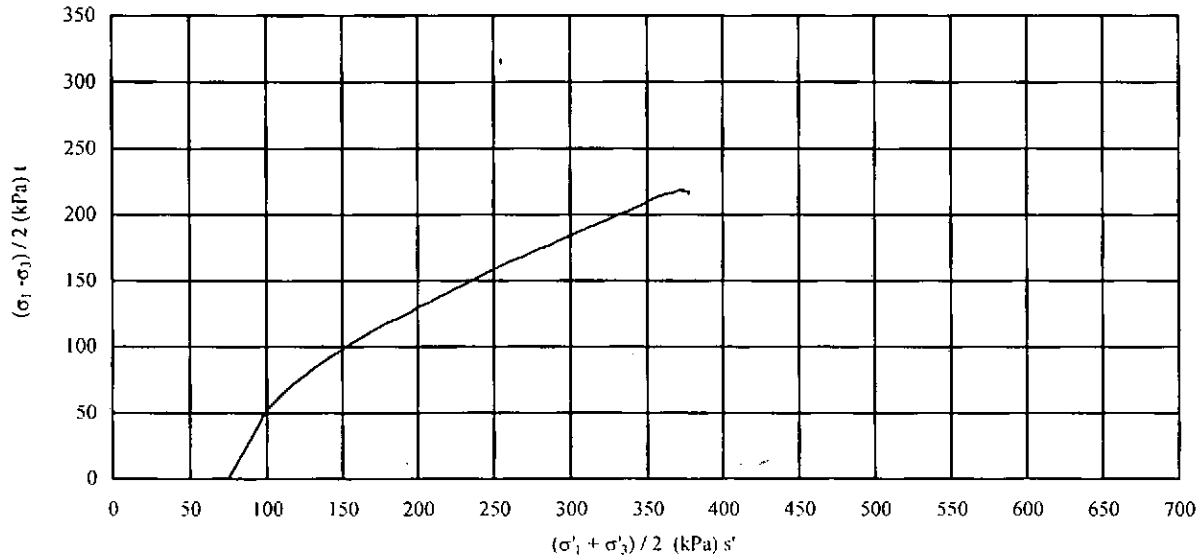
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.60 - 7.80**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.:	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
			Checked by H W Chung

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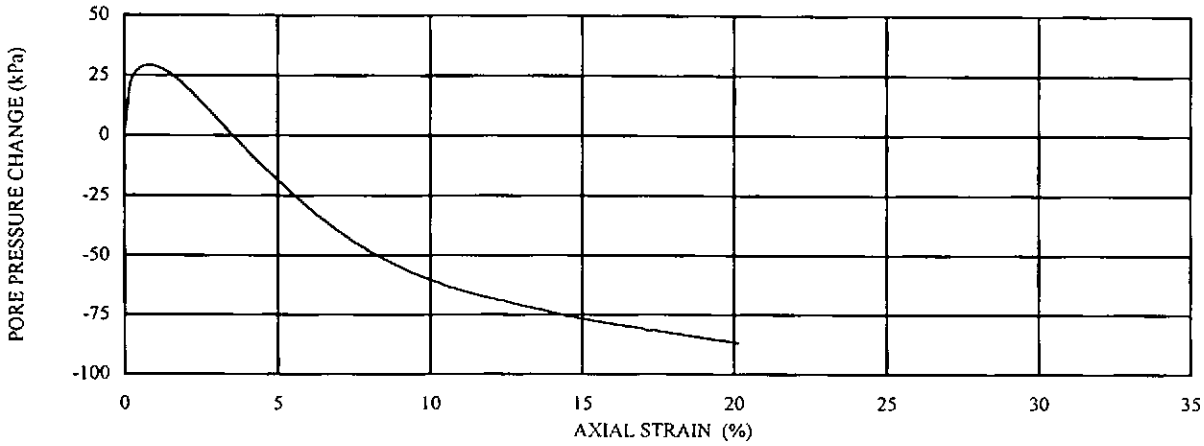
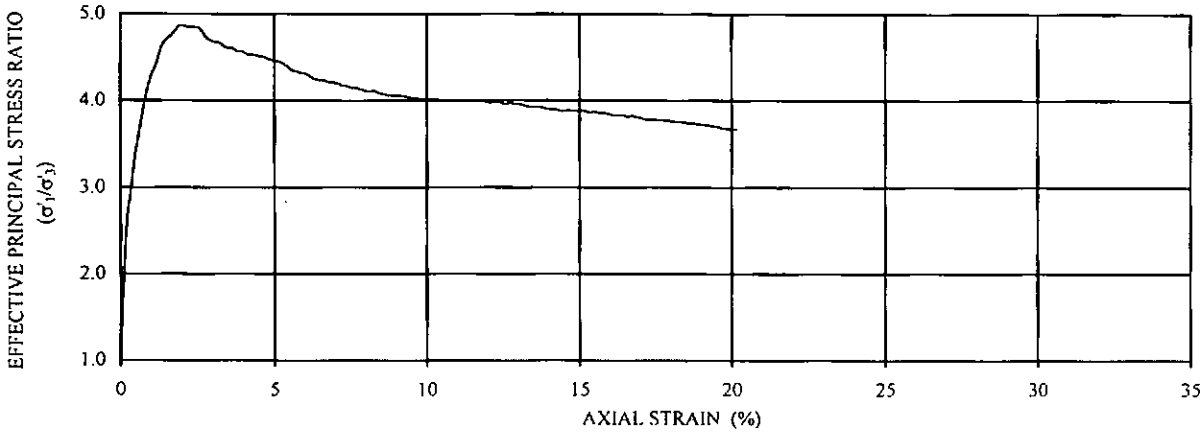
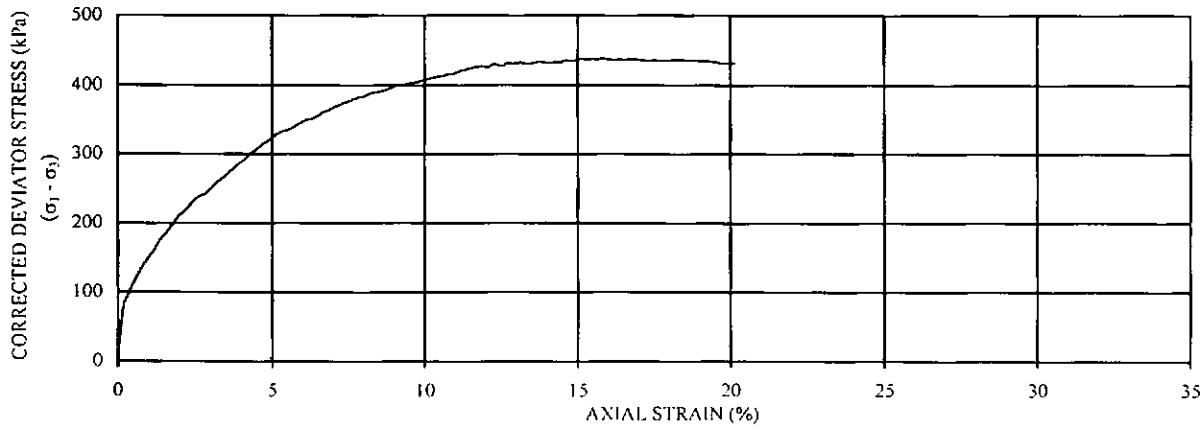
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.60 - 7.80**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

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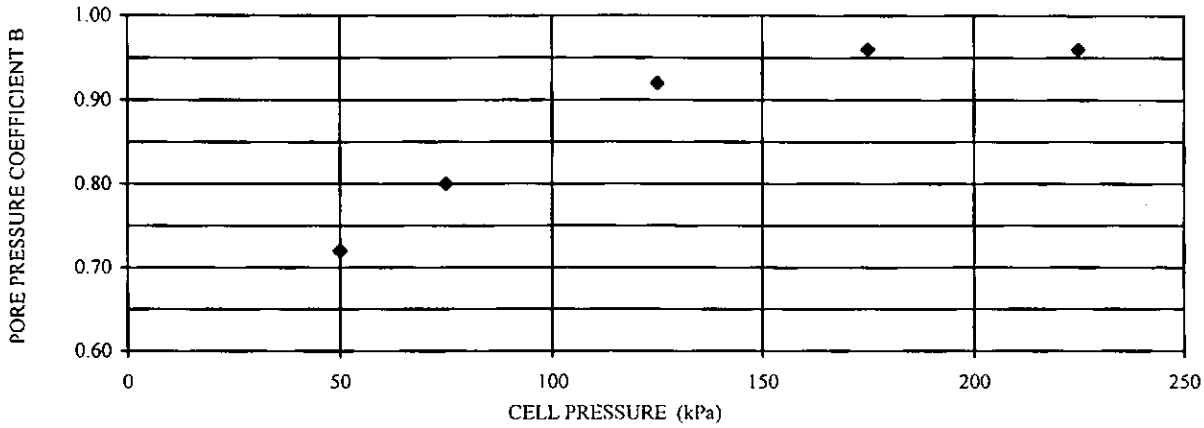
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
10/12/2008	15:06	0	0	-	0.0	
	15:15	25	-	24		-
11/12/2008	08:45	25	20	20	-1.1	
	08:54	50	-	38		0.72
	09:14	50	45	45	1.8	
	09:21	75	-	65		0.80
	09:40	75	70	70	2.8	
	09:47	100	-	925		34.20
	10:13	100	95	95	4.1	
	10:19	125	-	118		0.92
	11:11	125	120	120	6.1	
	11:20	175	-	168		0.96
	13:25	175	170	170	6.8	
	13:36	225	-	218		0.96
15/12/2008	10:23	225	220	220	7.2	

Borehole No. WCH-BH10 — **Sample Depth m:-** 7.00 - 8.00
Sample No. : 9 — **Specimen Depth m:-** 7.60 - 7.80
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

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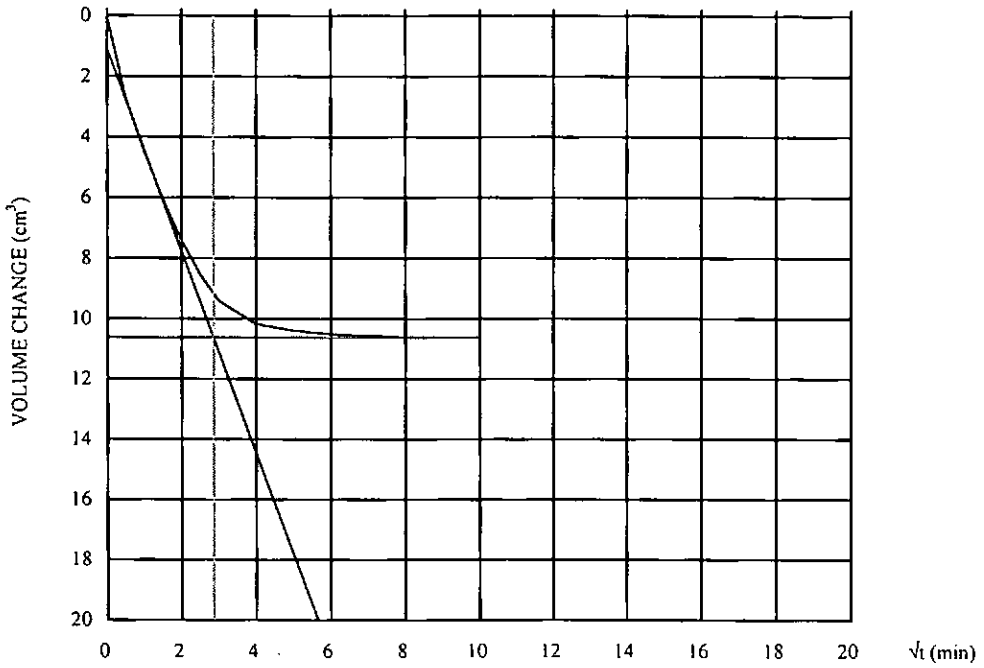
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

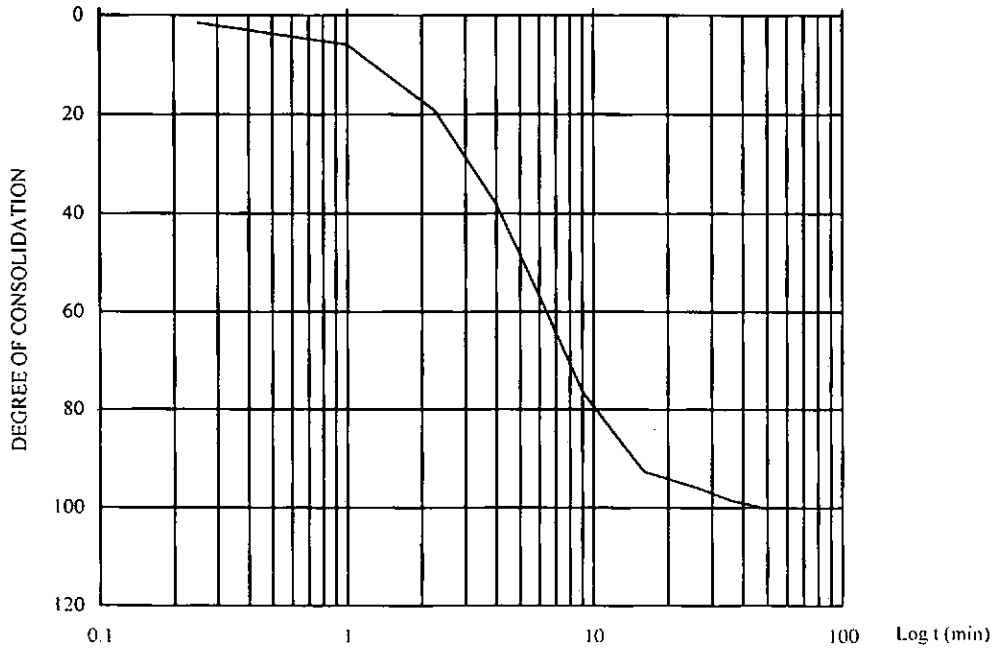


√t100 2.85 min

t100 8.150 min

tf 4.320 min

Calc. strain rate
2.336 mm/min



Borehole No. : WCH-BH10 — **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 — **Specimen Depth m:-** 7.60 - 7.80

Customer :	Mass Transit Railway Corporation	Complied by
Project :	Ground Investigation for South Island Line	W S Wat
	Contract No.: Contract 1024	Checked by
Job No.:	J2999 — **Works Order No.: 059**	H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage		P.W.P,B.P		Effective Pressure	75 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress	☒	Max. Stress ratio	☐	Axial Strain %	☐
Stage : 1	Applied Pressure (kPa) - Cell : 295	Back : 220		P.R. factor 11.3866 kN/mm	

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 31 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
16/12	08:35	0.00	0.00	0.016	220	0.000	0.0	75.0	75.0	75.0	0.0	75.0	1.00
	08:40	0.26	0.18	0.046	241	0.052	79.7	134.1	54.4	94.2	39.8	81.0	2.46
	08:45	0.46	0.32	0.052	245	0.092	95.4	145.2	49.8	97.5	47.7	81.6	2.92
	08:50	0.65	0.45	0.057	248	0.129	108.5	156.0	47.5	101.8	54.3	83.7	3.28
	08:55	0.88	0.61	0.062	249	0.174	121.5	167.7	46.2	107.0	60.8	86.7	3.63
	09:00	1.16	0.80	0.068	249	0.226	137.1	182.7	45.6	114.1	68.5	91.3	4.01
	09:05	1.42	0.98	0.073	249	0.276	150.0	196.0	46.0	121.0	75.0	96.0	4.26
	09:10	1.67	1.16	0.077	248	0.325	160.2	207.0	46.8	126.9	80.1	100.2	4.42
	09:15	1.92	1.33	0.082	247	0.371	173.0	220.8	47.8	134.3	86.5	105.5	4.62
	09:20	2.17	1.51	0.086	246	0.419	183.1	232.4	49.3	140.9	91.6	110.3	4.71
	09:25	2.38	1.65	0.089	244	0.456	190.7	241.5	50.8	146.1	95.3	114.4	4.75
	09:30	2.62	1.82	0.093	243	0.500	200.8	253.3	52.5	152.9	100.4	119.4	4.82
	09:35	2.78	1.93	0.096	241	0.529	208.3	262.1	53.8	158.0	104.2	123.2	4.87
	09:40	3.04	2.11	0.099	239	0.575	215.7	271.6	55.9	163.8	107.9	127.8	4.86
	09:45	3.27	2.27	0.102	237	0.616	223.1	281.0	57.9	169.5	111.6	132.3	4.85
	09:50	3.63	2.52	0.107	234	0.678	235.5	296.7	61.2	178.9	117.7	139.7	4.85
	09:55	3.87	2.68	0.109	232	0.718	240.2	303.6	63.4	183.5	120.1	143.5	4.79
	10:00	4.06	2.82	0.110	230	0.753	242.4	307.6	65.2	186.4	121.2	146.0	4.72
	10:05	4.42	3.07	0.114	226	0.814	252.1	320.7	68.6	194.6	126.0	152.6	4.67
	10:10	4.54	3.15	0.116	225	0.833	257.0	326.8	69.8	198.3	128.5	155.5	4.68
	10:15	4.83	3.35	0.119	222	0.881	264.1	336.7	72.6	204.7	132.1	160.6	4.64
	10:20	5.03	3.49	0.121	221	0.914	268.8	343.3	74.5	208.9	134.4	164.1	4.61
	10:25	5.26	3.65	0.124	219	0.951	276.1	352.6	76.5	214.5	138.0	168.5	4.61
	10:30	5.48	3.80	0.126	216	0.986	280.7	359.3	78.6	219.0	140.4	172.2	4.57
	10:35	5.70	3.96	0.129	214	1.023	287.9	368.5	80.6	224.5	143.9	176.6	4.57
	10:40	5.93	4.11	0.131	212	1.057	292.5	375.2	82.7	228.9	146.2	180.2	4.54
	10:45	6.17	4.28	0.134	210	1.096	299.6	384.4	84.8	234.6	149.8	184.7	4.53
	10:50	6.46	4.48	0.137	208	1.141	306.5	393.7	87.2	240.5	153.3	189.4	4.52
	10:55	6.74	4.67	0.140	206	1.183	313.5	403.0	89.5	246.2	156.7	194.0	4.50
	11:00	6.96	4.83	0.142	204	1.218	318.0	409.4	91.4	250.4	159.0	197.4	4.48
	11:05	7.25	5.03	0.145	201	1.261	324.9	418.7	93.8	256.2	162.4	202.1	4.46
	11:10	7.46	5.18	0.147	200	1.294	329.4	424.9	95.5	260.2	164.7	205.3	4.45
	11:15	7.77	5.39	0.149	197	1.338	333.6	431.6	98.0	264.8	166.8	209.2	4.40
	11:20	8.01	5.55	0.150	195	1.372	335.5	435.4	99.9	267.7	167.8	211.7	4.36
	11:25	8.24	5.72	0.152	193	1.407	339.9	441.6	101.7	271.7	170.0	215.0	4.34
	11:30	8.48	5.88	0.154	191	1.441	344.3	447.9	103.6	275.8	172.2	218.4	4.32
	11:35	8.71	6.04	0.156	190	1.473	348.7	454.0	105.3	279.6	174.3	221.5	4.31
	11:40	8.90	6.17	0.157	188	1.500	350.7	457.5	106.8	282.1	175.3	223.7	4.28
	11:45	9.15	6.35	0.158	186	1.536	352.5	461.1	108.6	284.8	176.2	226.1	4.25

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 7.00 - 8.00**	
Sample No. :	**9**	**Specimen Depth m:- 7.60 - 7.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 31	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
16/12	11:50	9.40	6.52	0.160	185	1.570	356.8	467.1	110.3	288.7	178.4	229.2	4.23
	11:55	9.61	6.67	0.162	183	1.600	361.1	472.8	111.7	292.3	180.6	232.1	4.23
	12:00	9.81	6.81	0.163	182	1.627	363.1	476.1	113.0	294.5	181.5	234.0	4.21
	12:05	10.19	7.07	0.166	180	1.678	369.4	484.8	115.4	300.1	184.7	238.5	4.20
	12:10	10.39	7.21	0.167	178	1.705	371.3	488.0	116.7	302.3	185.6	240.5	4.18
	12:15	10.67	7.40	0.169	177	1.741	375.4	493.8	118.4	306.1	187.7	243.5	4.17
	12:20	10.90	7.56	0.170	175	1.771	377.2	497.0	119.8	308.4	188.6	245.5	4.15
	12:25	11.15	7.73	0.172	174	1.803	381.4	502.5	121.1	311.8	190.7	248.2	4.15
	12:30	11.40	7.91	0.173	173	1.836	383.1	505.6	122.5	314.0	191.5	250.2	4.13
	12:35	11.65	8.08	0.174	171	1.867	384.7	508.5	123.8	316.2	192.4	252.0	4.11
	12:40	11.91	8.26	0.176	170	1.900	388.8	513.7	124.9	319.3	194.4	254.5	4.11
	12:45	12.21	8.47	0.177	169	1.938	390.3	516.8	126.5	321.7	195.2	256.6	4.09
	12:50	12.47	8.65	0.178	167	1.970	392.0	519.7	127.7	323.7	196.0	258.4	4.07
	12:55	12.65	8.77	0.179	167	1.992	393.9	522.4	128.5	325.4	196.9	259.8	4.07
	13:00	12.81	8.88	0.180	166	2.011	395.8	525.0	129.2	327.1	197.9	261.1	4.06
	13:05	13.11	9.09	0.182	165	2.048	399.7	530.1	130.4	330.2	199.8	263.6	4.06
	13:10	13.38	9.28	0.183	163	2.081	401.2	532.8	131.6	332.2	200.6	265.3	4.05
	13:15	13.65	9.47	0.184	162	2.113	402.8	535.4	132.6	334.0	201.4	266.9	4.04
	13:20	13.89	9.64	0.185	162	2.142	404.4	537.9	133.5	335.7	202.2	268.3	4.03
	13:25	14.20	9.85	0.186	160	2.178	405.8	540.5	134.7	337.6	202.9	270.0	4.01
	13:30	14.35	9.96	0.187	160	2.196	407.7	542.8	135.1	338.9	203.8	271.0	4.02
	13:35	14.57	10.11	0.188	159	2.221	409.4	545.2	135.8	340.5	204.7	272.3	4.01
	13:40	14.82	10.28	0.189	159	2.249	410.9	547.4	136.5	342.0	205.5	273.5	4.01
	13:45	15.09	10.47	0.190	158	2.281	412.4	549.9	137.5	343.7	206.2	275.0	4.00
	13:50	15.33	10.63	0.191	157	2.307	414.0	552.3	138.3	345.3	207.0	276.3	3.99
	13:55	15.55	10.78	0.192	156	2.331	415.7	554.5	138.8	346.6	207.8	277.4	3.99
	14:00	15.82	10.97	0.193	156	2.362	417.1	556.6	139.5	348.1	208.6	278.5	3.99
	14:05	16.10	11.17	0.195	155	2.394	420.9	561.2	140.3	350.7	210.4	280.6	4.00
	14:10	16.35	11.34	0.196	154	2.421	422.4	563.3	140.9	352.1	211.2	281.7	4.00
	14:15	16.73	11.61	0.198	153	2.463	425.8	567.7	141.9	354.8	212.9	283.8	4.00
	14:20	16.83	11.68	0.198	153	2.474	425.4	567.5	142.1	354.8	212.7	283.9	3.99
	14:25	17.09	11.86	0.199	152	2.502	426.9	569.5	142.6	356.0	213.4	284.9	3.99
	14:30	17.38	12.06	0.199	152	2.533	425.9	569.1	143.2	356.1	212.9	285.2	3.97
	14:35	17.60	12.21	0.201	151	2.556	429.8	573.5	143.7	358.6	214.9	287.0	3.99
	14:40	17.84	12.38	0.201	151	2.582	428.9	572.9	144.0	358.5	214.5	287.0	3.98
	14:45	18.09	12.55	0.201	150	2.607	428.1	572.7	144.6	358.6	214.0	287.3	3.96
	14:50	18.31	12.70	0.203	150	2.630	431.9	577.1	145.2	361.2	216.0	289.2	3.97
	14:55	18.55	12.87	0.203	149	2.656	431.1	576.8	145.7	361.2	215.5	289.4	3.96
	15:00	18.85	13.08	0.204	149	2.687	432.3	578.6	146.3	362.5	216.2	290.4	3.96
	15:05	19.04	13.21	0.204	148	2.706	431.6	578.3	146.7	362.5	215.8	290.6	3.94
	15:10	19.27	13.37	0.204	148	2.730	430.8	577.9	147.1	362.5	215.4	290.7	3.93

Borehole No. : WCH-BH10 — **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 — **Specimen Depth m:-** 7.60 - 7.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Job No.: J2999 — **Contract No.:** Contract 1024 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

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Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage : 1		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 31	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
16/12	15:15	19.55	13.56	0.205	147	2.758	432.1	579.8	147.7	363.8	216.1	291.7	3.93
	15:20	19.85	13.77	0.206	147	2.789	433.3	581.5	148.2	364.9	216.7	292.6	3.92
	15:25	20.05	13.91	0.206	146	2.809	432.6	581.3	148.7	365.0	216.3	292.9	3.91
	15:30	20.27	14.06	0.206	146	2.831	431.8	581.0	149.2	365.1	215.9	293.1	3.89
	15:35	20.57	14.27	0.207	145	2.861	433.0	582.7	149.7	366.2	216.5	294.0	3.89
	15:40	20.79	14.42	0.207	145	2.883	432.2	582.4	150.2	366.3	216.1	294.3	3.88
	15:45	21.07	14.61	0.209	144	2.910	435.8	586.4	150.6	368.5	217.9	295.9	3.89
	15:50	21.30	14.77	0.209	144	2.933	434.9	585.9	151.0	368.5	217.5	296.0	3.88
	15:55	21.54	14.94	0.210	144	2.957	436.3	587.8	151.5	369.7	218.2	296.9	3.88
	16:00	21.84	15.15	0.211	143	2.987	437.5	589.5	152.0	370.7	218.7	297.8	3.88
	16:05	22.10	15.33	0.211	143	3.013	436.5	589.0	152.5	370.7	218.2	298.0	3.86
	16:10	22.32	15.48	0.212	142	3.034	437.9	590.6	152.7	371.7	219.0	298.7	3.87
	16:15	22.53	15.63	0.212	142	3.055	437.2	590.2	153.0	371.6	218.6	298.7	3.86
	16:20	**22.78**	**15.80**	**0.213**	**142**	**3.079**	**438.5**	**591.9**	**153.4**	**372.6**	**219.2**	**299.6**	**3.86**
	16:25	23.04	15.98	0.213	141	3.104	437.5	591.3	153.8	372.5	218.7	299.6	3.84
	16:30	23.30	16.16	0.213	141	3.129	436.5	590.6	154.1	372.4	218.3	299.6	3.83
	16:35	23.62	16.38	0.214	140	3.160	437.6	592.2	154.6	373.4	218.8	300.5	3.83
	16:40	23.87	16.56	0.214	140	3.185	436.6	591.5	154.9	373.2	218.3	300.4	3.82
	16:45	24.09	16.71	0.215	140	3.206	438.0	593.1	155.1	374.1	219.0	301.1	3.82
	16:50	24.31	16.87	0.215	140	3.228	437.2	592.7	155.5	374.1	218.6	301.2	3.81
	16:55	24.51	17.00	0.215	139	3.246	436.4	592.2	155.8	374.0	218.2	301.3	3.80
	17:00	24.79	17.20	0.215	138	3.274	435.4	592.2	156.8	374.5	217.7	301.9	3.78
	17:05	24.98	17.33	0.215	139	3.292	434.7	591.1	156.4	373.7	217.3	301.3	3.78
	17:10	25.24	17.51	0.216	138	3.317	435.9	592.7	156.8	374.7	217.9	302.1	3.78
	17:15	25.51	17.70	0.216	138	3.343	434.9	592.0	157.1	374.5	217.4	302.1	3.77
	17:30	26.26	18.22	0.218	137	3.416	436.3	594.4	158.1	376.3	218.2	303.5	3.76
	17:45	27.05	18.76	0.219	136	3.491	435.5	594.7	159.2	377.0	217.8	304.4	3.74
	18:00	27.80	19.29	0.220	135	3.565	434.8	595.0	160.2	377.6	217.4	305.1	3.71
	18:15	28.60	19.84	0.220	134	3.642	431.7	592.9	161.2	377.0	215.8	305.1	3.68
	18:25	29.04	20.15	0.221	133	3.686	432.1	593.9	161.8	377.8	216.0	305.8	3.67

Borehole No. : WCH-BH10 — **Sample Depth m:-** 7.00 - 8.00
Sample No. : 9 — **Specimen Depth m:-** 7.60 - 7.80

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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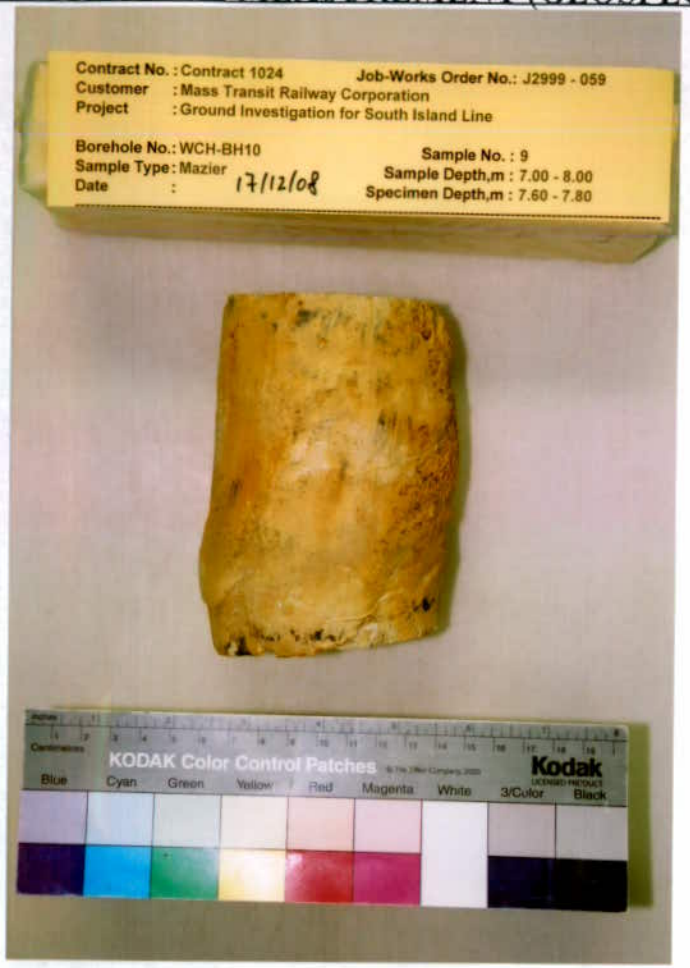
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Light brown, silty, gravelly SAND

Sample Origin : HDT‡

‡ Information provided by customer

Borehole No. : WCH-BH10 **Sample No. : 9** **Sample Depth m:- 7.00 - 8.00** **Specimen Depth m:- 7.60 - 7.80**

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024
Job No. : J2999
Works Order No.: 059

Compiled by W S Wat

Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10	WCH-BH10	WCH-BH10
Sample		no	9	9	9
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	7.00 - 8.00	7.00 - 8.00	7.00 - 8.00
Specimen Depth		m	7.80 - 8.00	7.80 - 8.00	7.80 - 8.00
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.2	74.6	75.2
Height	(H_o)	mm	145.0	141.5	138.4
Moisture Content	(W_o)	%	18	18	18
Bulk density	(ρ_o)	Mg/m^3	2.07	2.09	2.10
Dry density	(ρ_d)	Mg/m^3	1.75	1.77	1.78
Particle density	(ρ_s)		2.65	2.65	2.65
Voids Ratio	(e_o)		0.51	0.50	0.49
Degree of Saturation	(S_r)	%	93.3	96.8	96.8
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.97		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	235	270	305
Back Pressure	(u_b)	kPa	200	200	200
Effective Pressure	(σ'_3)	kPa	35	70	105
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	416.86	700.88	1053.03
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.42	0.17	0.10
Coefficient of Permeability (k)		m/s	5.39E-08	3.59E-08	3.42E-08
COMPRESSION TERMINATION CRITERION			MAXIMUM STRESS RATIO		MAX ($\sigma'1$ - $\sigma'3$)
COMPRESSION - INITIAL					
Moisture Content	(w)	%	18	18	17
Pore Pressure at the End of Consolidation		kPa	200	200	200
Effective Stress at the End of Consolidation		kPa	35	70	105
Bulk density	(ρ_o)	Mg/m^3	2.09	2.10	2.11
Dry density	(ρ_d)	Mg/m^3	1.77	1.78	1.79
Voids Ratio	(e)		0.50	0.49	0.48
Degree of Saturation	(S_r)	%	96.8	96.8	96.7

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Job No.: **J2999**
Contract No.: Contract 1024
Works Order No.: 059
Report No. : J2999-059.11

Technician : W S Wat
Checked By : Name : H W Chung Date : 19/12/2008
Approved By : Signatory : **Lau Wai Cheong** Date : 19/12/2008
Tested Date: 09/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10	WCH-BH10	WCH-BH10
Sample		no	9	9	9
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	7.00 - 8.00	7.00 - 8.00	7.00 - 8.00
Specimen Depth		m	7.80 - 8.00	7.80 - 8.00	7.80 - 8.00
COMPRESSION - FAILURE					
Cell Pressure		kPa	235	270	305
Rate of Strain		mm/min	0.048	0.047	0.046
CONDITIONS AT MAXIMUM STRESS RATIO					
Major Effective Principal Stress (σ'_1)		kPa	153	242	331
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	126	192	255
Minor Effective Principal Stress (σ'_3)		kPa	27	50	76
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	90	146	204
$t = (\sigma_1 - \sigma_3)/2$		kPa	63	96	127
Expanded Uncertainty of s' ^		kPa	-	-	-
Expanded Uncertainty of t ^		kPa	-	-	-
Pore pressure parameter A_f			0.06	0.10	0.11
Strain at Failure	(εf)	%	1.8	3.9	5.8
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	18	18	17
Bulk density	(ρ_o)	Mg/m^3	2.09	2.10	2.11
Dry density	(ρ_d)	Mg/m^3	1.77	1.78	1.79
Voids Ratio	(e_f)		0.50	0.49	0.48
Degree of Saturation	(S_f)	%	96.8	96.8	96.7

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

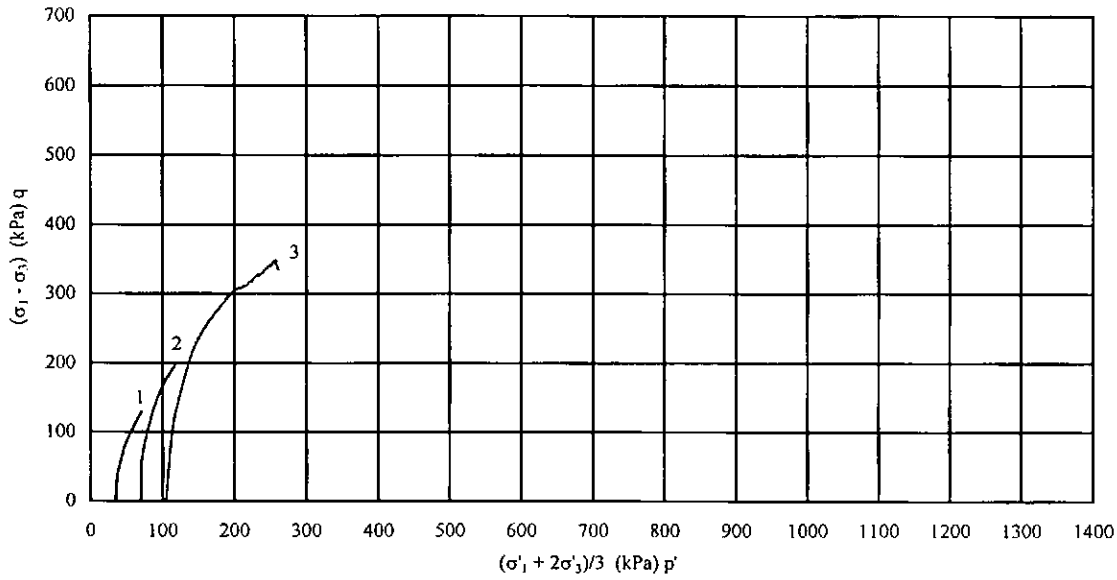
* Delete as appropriate ^ Upon request

Customer :	**Mass Transit Railway Corporation**	Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	
	Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999** **Works Order No.: 059**	

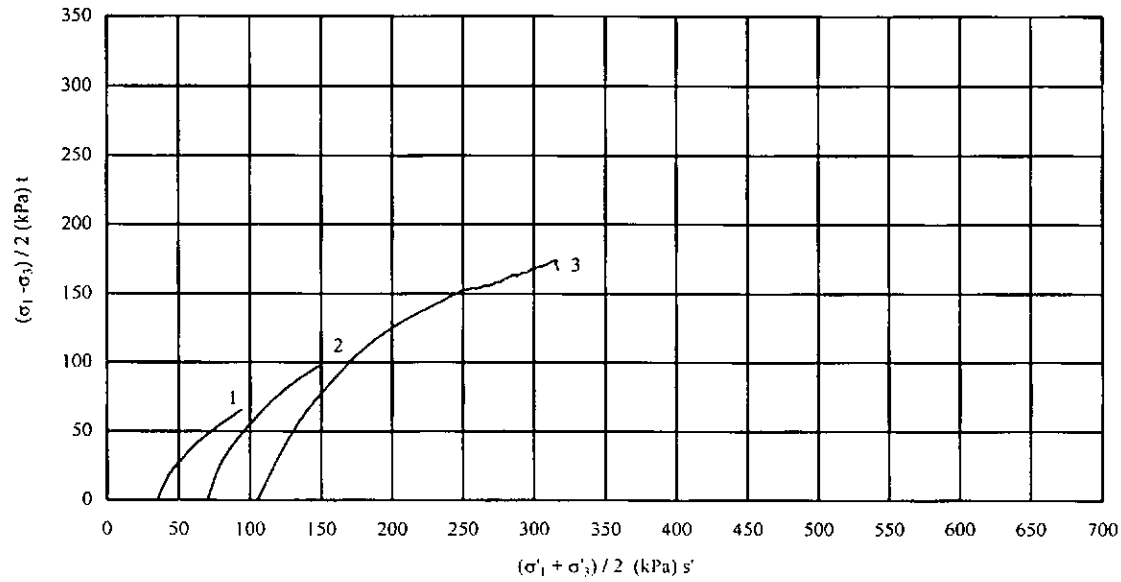
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. : WCH-BH10		Sample Depth m:- 7.00 - 8.00	
Sample No. : 9		Specimen Depth m:- 7.80 - 8.00	
Customer : Mass Transit Railway Corporation			Compiled by
Project : Ground Investigation for South Island Line			W S Wat
		Contract No.: Contract 1024	Checked by
Job No.: J2999		Works Order No.: 059	H W Chung

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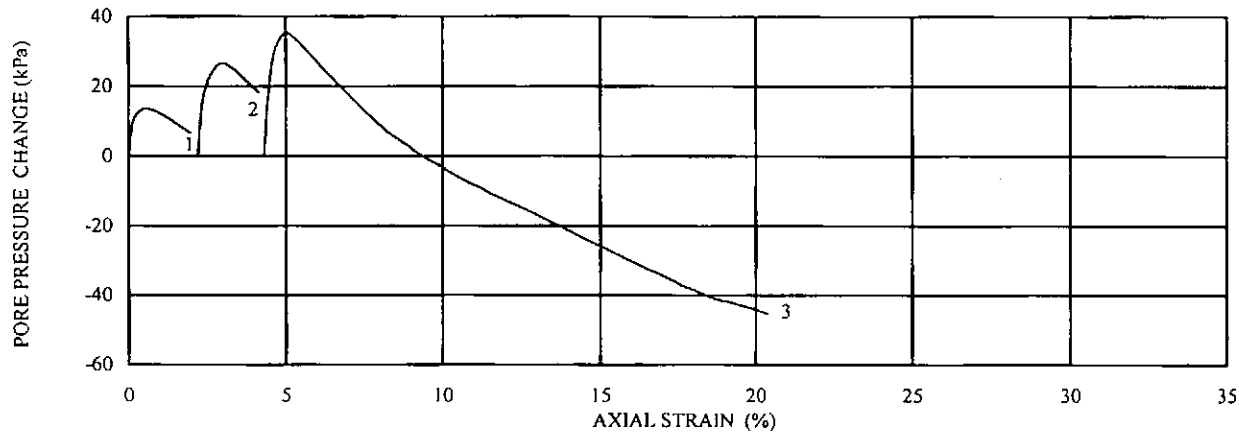
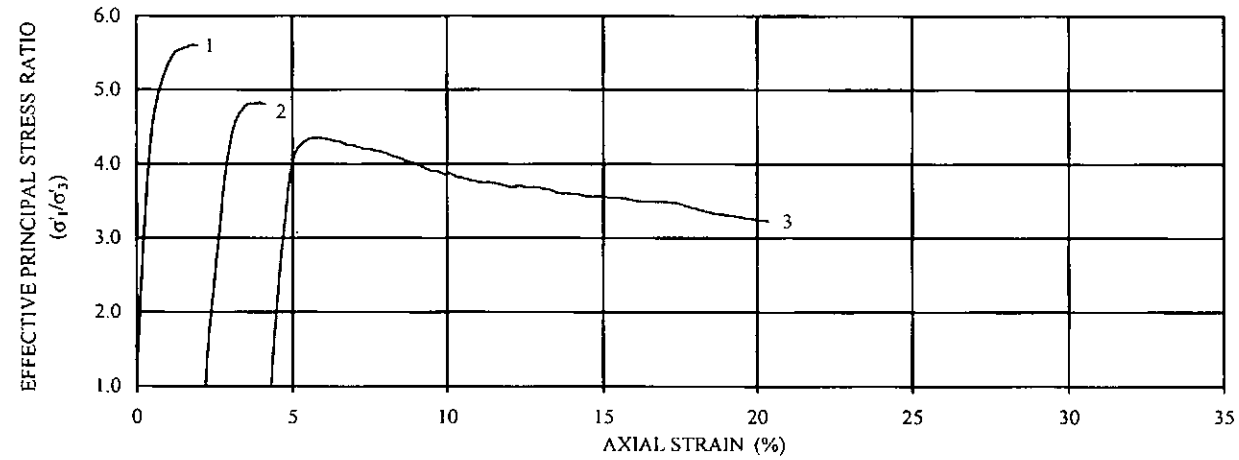
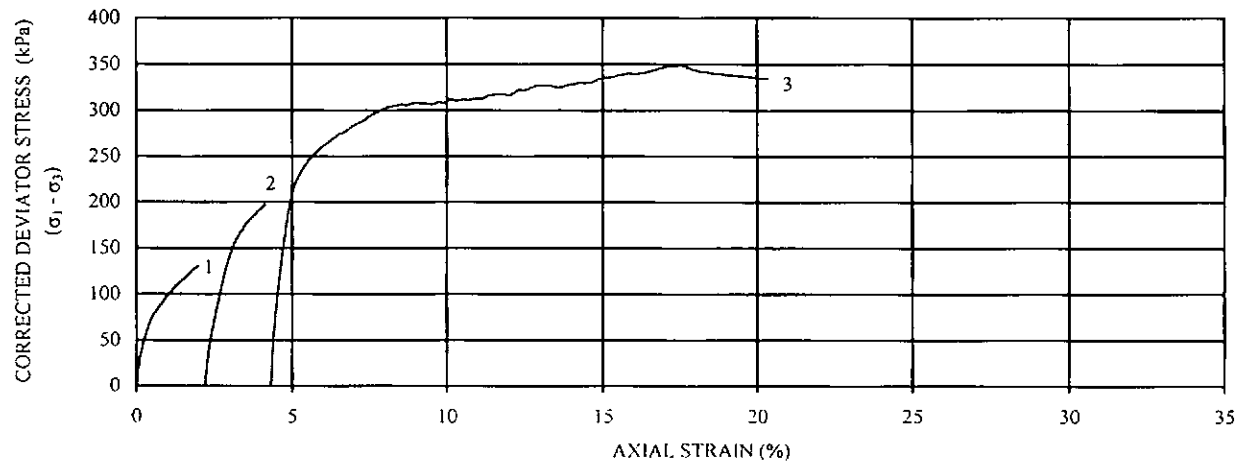
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.80 - 8.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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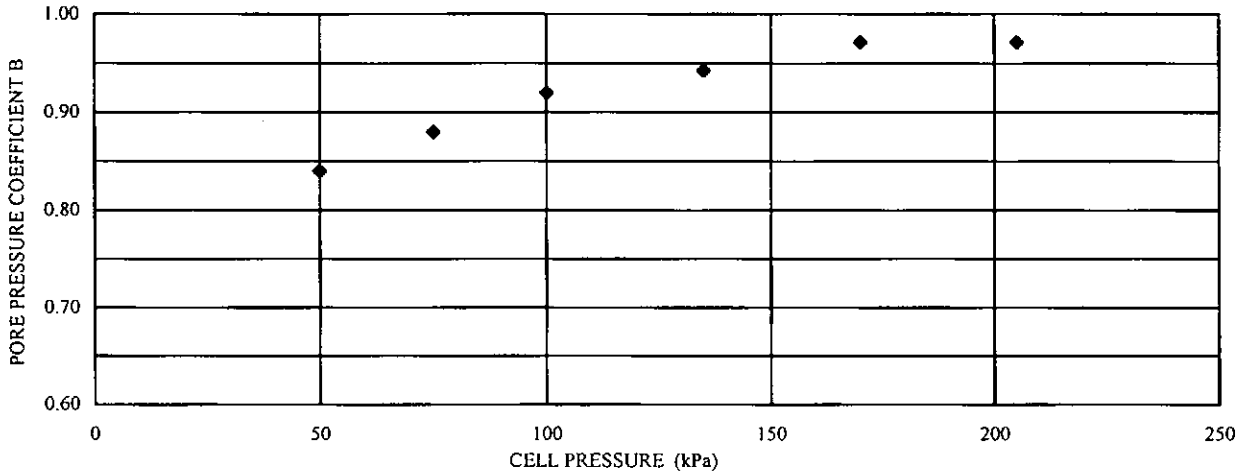
Form : GESR009.9 / Jun.02,03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Parameter B
10/12/2008	14:14	0	0	-	0.0	
	14:22	25	-	21		-
11/12/2008	08:40	25	20	20	-0.3	
	08:50	50	-	41		0.84
	09:13	50	45	45	1.2	
	09:20	75	-	67		0.88
	09:40	75	70	70	1.7	
	09:48	100	-	93		0.92
	10:19	100	95	95	2.7	
	10:27	135	-	128		0.94
	11:08	135	130	130	3.6	
	11:13	170	-	164		0.97
	13:20	170	165	165	3.9	
	13:31	205	-	199		0.97
12/12/2008	08:35	205	200	200	7.8	

Borehole No. : WCH-BH10 — **Sample Depth m:-** 7.00 - 8.00
Sample No. : 9 — **Specimen Depth m:-** 7.80 - 8.00

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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TEST REPORT
DETERMINATION OF
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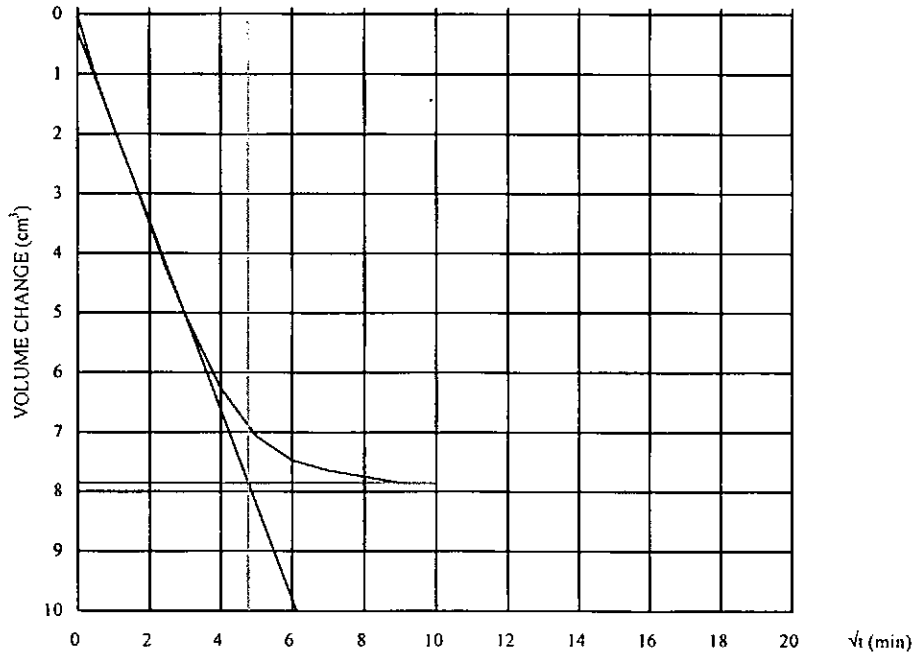
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

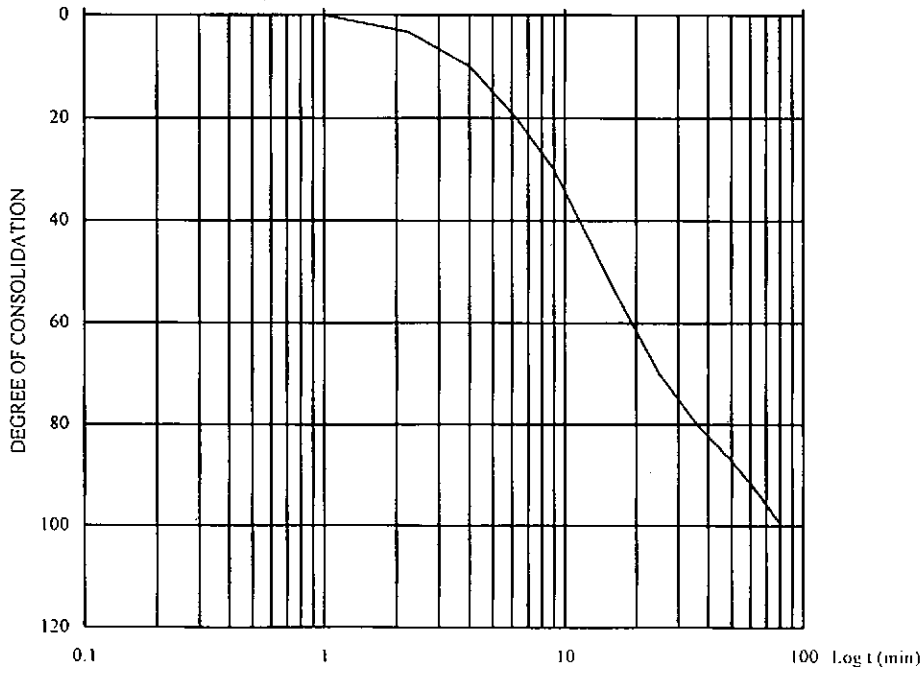


√t100 4.77 min

t100 22.77 min

tf 12.07 min

Calc. strain rate
0.837 mm/min



Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.80 - 8.00**
Customer :	**Mass Transit Railway Corporation**		Complied by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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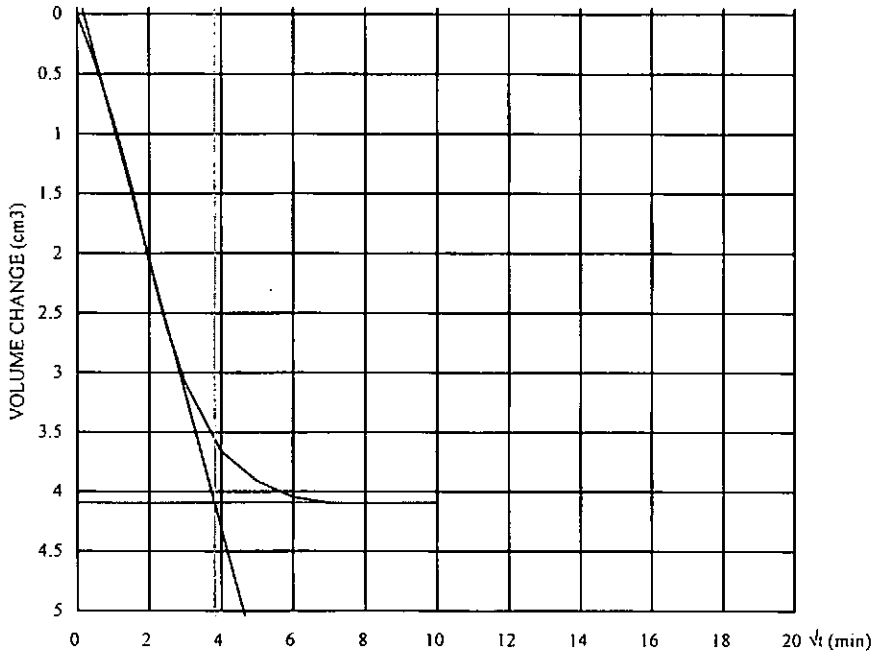
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 2

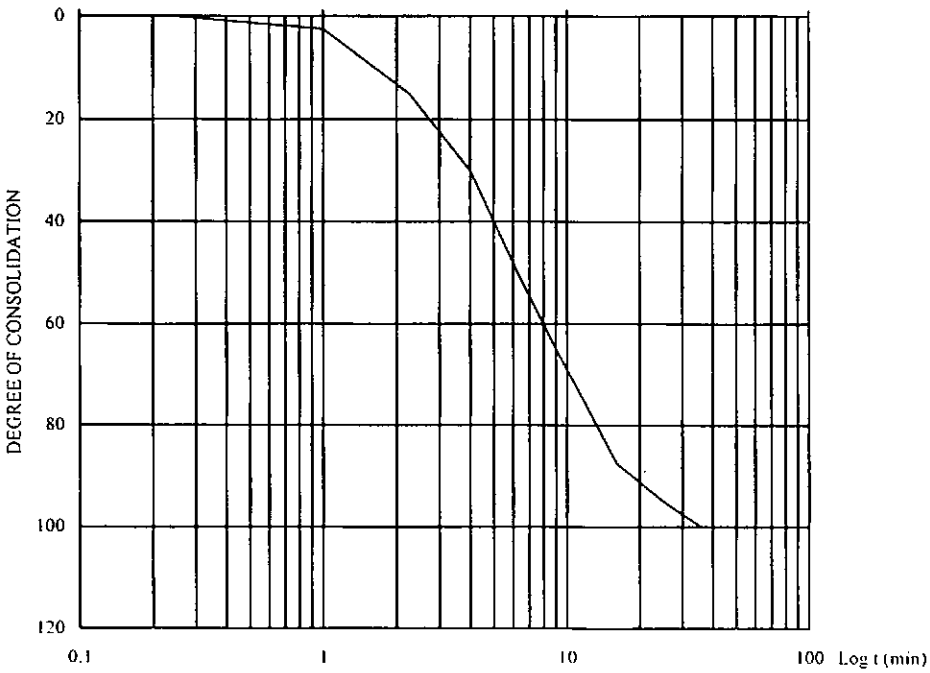


√t100 3.82 min

t100 14.57 min

tf 7.72 min

Calc. strain rate
1.280 mm/min



Borehole No. : WCH-BH10 — **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 — **Specimen Depth m:-** 7.80 - 8.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Complied by: W S Wat

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TEST REPORT
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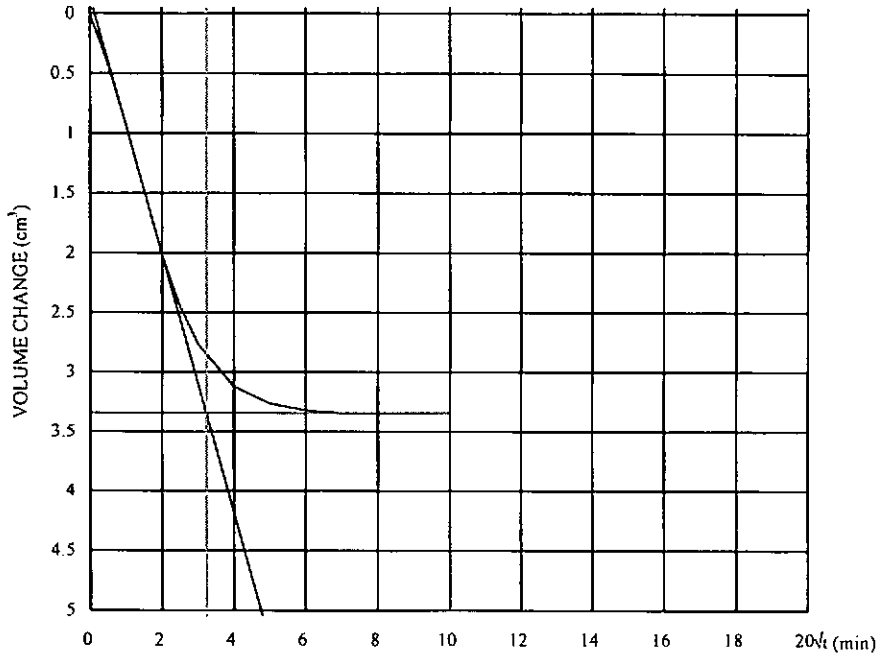
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 3

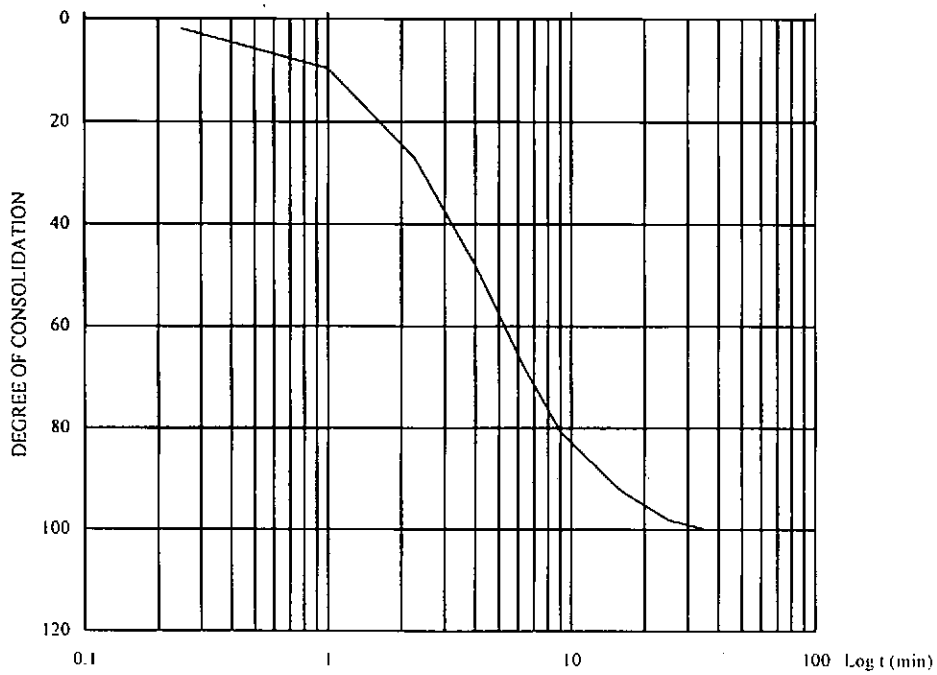


√t100 3.24 min

t100 10.47 min

tf 5.55 min

Calc. strain rate
1.743 mm/min



Borehole No. : WCH-BH10 — **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 — **Specimen Depth m:-** 7.80 - 8.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	35 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐
Stage : 1	Applied Pressure (kPa) - Cell : 235 Back : 200	P.R. factor 3.1341 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 2 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
12/12	10:05	0.00	0.00	0.035	200	0.000	0.0	35.0	35.0	35.0	0.0	35.0	1.00
	10:10	0.18	0.13	0.082	210	0.038	34.3	59.8	25.5	42.6	17.1	36.9	2.34
	10:15	0.41	0.29	0.111	212	0.083	55.3	78.1	22.8	50.4	27.6	41.2	3.42
	10:20	0.69	0.48	0.136	214	0.137	73.3	94.7	21.4	58.0	36.6	45.8	4.42
	10:25	0.96	0.67	0.151	214	0.190	84.0	105.5	21.5	63.5	42.0	49.5	4.91
	10:30	1.18	0.82	0.160	213	0.232	90.3	112.2	21.9	67.1	45.2	52.0	5.12
	10:35	1.42	0.98	0.171	212	0.276	98.1	120.8	22.7	71.7	49.0	55.4	5.32
	10:40	1.75	1.21	0.184	211	0.338	107.2	131.0	23.8	77.4	53.6	59.5	5.50
	10:45	2.00	1.38	0.192	210	0.384	112.7	137.5	24.8	81.2	56.4	62.4	5.55
	10:50	2.28	1.58	0.201	209	0.437	118.9	144.9	26.0	85.5	59.5	65.6	5.57
	10:55	**2.58**	**1.79**	**0.211**	**208**	**0.492**	**125.8**	**153.1**	**27.3**	**90.2**	**62.9**	**69.2**	**5.61**
	11:00	2.83	1.96	0.218	207	0.536	130.5	158.9	28.4	93.7	65.3	71.9	5.60

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 7.00 - 8.00**	
Sample No. :	**9**	**Specimen Depth m:- 7.80 - 8.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	70 kPa
Side drains	No	Selected Machine Speed	0.047 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐
Stage : 2	Applied Pressure (kPa) - Cell : 270 Back : 200	P.R. factor 3.1341 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 2 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
12/12	13:10	3.15	2.18	0.042	200	0.000	0.0	70.0	70.0	70.0	0.0	70.0	1.00
	13:15	3.35	2.32	0.103	214	0.628	43.2	98.8	55.6	77.2	21.6	70.0	1.78
	13:20	3.57	2.47	0.140	221	0.666	69.6	119.0	49.4	84.2	34.8	72.6	2.41
	13:25	3.82	2.65	0.179	224	0.711	97.4	143.4	46.0	94.7	48.7	78.5	3.12
	13:30	4.05	2.81	0.214	226	0.750	122.2	166.3	44.1	105.2	61.1	84.8	3.77
	13:35	4.30	2.98	0.242	227	0.792	141.9	185.3	43.4	114.4	71.0	90.7	4.27
	13:40	4.60	3.18	0.266	226	0.840	158.6	202.8	44.2	123.5	79.3	97.1	4.59
	13:45	4.87	3.38	0.282	225	0.888	169.6	215.1	45.5	130.3	84.8	102.0	4.73
	13:50	5.11	3.54	0.294	223	0.926	177.8	224.6	46.8	135.7	88.9	106.1	4.80
	13:55	5.41	3.75	0.305	221	0.975	185.2	233.8	48.6	141.2	92.6	110.3	4.81
[redacted]	**14:00**	**5.69**	**3.94**	**0.315**	**220**	**1.019**	**191.8**	**242.0**	**50.2**	**146.1**	**95.9**	**114.1**	**4.82**
	14:05	5.96	4.13	0.323	218	1.062	197.0	248.8	51.8	150.3	98.5	117.5	4.80

Borehole No. : WCH-BH10 **Sample Depth m:- 7.00 - 8.00**

Sample No. : 9 **Specimen Depth m:- 7.80 - 8.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	105 kPa
Side drains	No	Selected Machine Speed	0.046 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 3	Applied Pressure (kPa) - Cell : 305	Back : 200		P.R. factor	3.1341 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 2 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
15/12	08:35	6.21	4.30	0.057	200	0.000	0.0	105.0	105.0	105.0	0.0	105.0	1.00
	08:40	6.38	4.42	0.149	216	1.127	63.9	152.5	88.6	120.5	31.9	109.9	1.72
	08:45	6.63	4.59	0.227	228	1.165	118.8	195.6	76.8	136.2	59.4	116.4	2.55
	08:50	6.85	4.74	0.283	232	1.198	158.0	230.6	72.6	151.6	79.0	125.3	3.18
	08:55	7.08	4.90	0.334	235	1.233	193.5	263.7	70.2	167.0	96.8	134.7	3.76
	09:00	7.27	5.03	0.362	235	1.261	212.9	282.6	69.7	176.2	106.5	140.7	4.05
	09:05	7.51	5.20	0.384	234	1.298	227.9	298.5	70.6	184.6	114.0	146.6	4.23
	09:10	7.87	5.45	0.404	232	1.351	241.2	313.9	72.7	193.3	120.6	153.1	4.32
	09:15	8.11	5.62	0.415	231	1.387	248.4	322.6	74.2	198.4	124.2	157.0	4.35
	09:20	**8.38**	**5.81**	**0.425**	**229**	**1.426**	**254.9**	**331.0**	**76.1**	**203.5**	**127.4**	**161.1**	**4.35**
	09:25	8.63	5.98	0.433	227	1.461	259.9	337.6	77.7	207.7	130.0	164.3	4.35
	09:30	8.92	6.18	0.442	225	1.502	265.6	345.3	79.7	212.5	132.8	168.2	4.33
	09:35	9.17	6.35	0.449	224	1.536	269.9	351.4	81.5	216.4	134.9	171.5	4.31
	09:40	9.46	6.55	0.457	222	1.576	274.8	358.1	83.3	220.7	137.4	174.9	4.30
	09:45	9.72	6.73	0.461	220	1.611	277.0	361.9	84.9	223.4	138.5	177.2	4.26
	09:50	10.01	6.94	0.470	218	1.653	282.5	369.4	86.9	228.2	141.3	181.1	4.25
	09:55	10.30	7.13	0.476	216	1.689	286.0	374.6	88.6	231.6	143.0	183.9	4.23
	10:00	10.64	7.37	0.483	214	1.735	290.0	380.7	90.7	235.7	145.0	187.4	4.20
	10:05	10.86	7.52	0.490	213	1.763	294.3	386.4	92.1	239.3	147.2	190.2	4.20
	10:10	11.16	7.73	0.496	211	1.803	297.7	391.5	93.8	242.6	148.8	193.0	4.17
	10:15	11.42	7.91	0.502	210	1.836	301.2	396.5	95.3	245.9	150.6	195.7	4.16
	10:20	11.71	8.11	0.507	208	1.873	303.9	400.9	97.0	248.9	151.9	198.3	4.13
	10:25	12.02	8.33	0.510	206	1.913	305.1	403.7	98.6	251.2	152.6	200.3	4.09
	10:30	12.31	8.53	0.513	205	1.949	306.5	406.3	99.8	253.0	153.2	202.0	4.07
	10:35	12.57	8.71	0.513	204	1.981	305.8	406.7	100.9	253.8	152.9	202.8	4.03
	10:40	12.83	8.89	0.517	203	2.013	307.9	409.9	102.0	255.9	153.9	204.6	4.02
	10:45	13.20	9.14	0.519	201	2.056	308.3	412.0	103.7	257.9	154.2	206.5	3.97
	10:50	13.51	9.36	0.519	200	2.094	307.5	412.4	104.9	258.7	153.8	207.4	3.93
	10:55	13.75	9.52	0.519	199	2.122	306.9	412.7	105.8	259.3	153.5	208.1	3.90
	11:00	14.02	9.71	0.523	198	2.154	308.9	415.6	106.7	261.2	154.5	209.7	3.90
	11:05	14.33	9.93	0.523	197	2.191	308.2	416.0	107.8	261.9	154.1	210.5	3.86
	11:10	14.59	10.10	0.530	196	2.220	312.2	421.0	108.8	264.9	156.1	212.9	3.87
	11:15	14.88	10.31	0.528	195	2.254	310.1	420.0	109.9	264.9	155.0	213.3	3.82
	11:20	15.17	10.51	0.532	194	2.287	312.0	423.0	111.0	267.0	156.0	215.0	3.81
	11:25	15.45	10.71	0.532	193	2.320	311.3	423.2	111.9	267.5	155.6	215.7	3.78
	11:30	15.75	10.91	0.535	192	2.352	312.5	425.4	112.9	269.2	156.3	217.1	3.77
	11:35	16.03	11.11	0.536	191	2.384	312.4	426.0	113.6	269.8	156.2	217.7	3.75
	11:40	16.32	11.31	0.542	190	2.416	315.6	430.2	114.6	272.4	157.8	219.8	3.75
	11:45	16.59	11.49	0.545	190	2.444	316.9	432.4	115.5	274.0	158.5	221.1	3.74

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 7.00 - 8.00**	
Sample No. :	**9**	**Specimen Depth m:- 7.80 - 8.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate.
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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☐ Max. Stress ratio ☒ Axial Strain % ☐

Stage : 3		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 2	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
15/12	11:50	16.89	11.70	0.547	189	2.477	317.4	433.8	116.4	275.1	158.7	222.2	3.73
	11:55	17.12	11.86	0.548	188	2.502	317.5	434.6	117.1	275.8	158.7	222.9	3.71
	12:00	17.39	12.04	0.548	187	2.530	316.8	434.7	117.9	276.3	158.4	223.5	3.69
	12:05	17.75	12.29	0.557	186	2.568	321.7	440.5	118.8	279.6	160.8	226.0	3.71
	12:10	17.99	12.46	0.558	186	2.594	321.7	441.2	119.5	280.3	160.8	226.7	3.69
	12:15	18.25	12.64	0.562	185	2.621	323.6	443.9	120.3	282.1	161.8	228.2	3.69
	12:20	18.59	12.87	0.568	184	2.656	326.5	447.9	121.4	284.7	163.3	230.2	3.69
	12:25	18.84	13.05	0.569	183	2.683	326.5	448.7	122.2	285.4	163.2	231.0	3.67
	12:30	19.12	13.24	0.571	182	2.711	327.0	450.0	123.0	286.5	163.5	232.0	3.66
	12:35	19.51	13.51	0.570	181	2.751	325.3	449.6	124.3	287.0	162.7	232.7	3.62
	12:40	19.70	13.65	0.570	180	2.771	324.8	449.5	124.7	287.1	162.4	233.0	3.60
	12:45	20.04	13.88	0.576	179	2.805	327.7	453.5	125.8	289.6	163.8	235.0	3.60
	12:50	20.27	14.04	0.578	178	2.828	328.3	454.9	126.6	290.8	164.2	236.0	3.59
	12:55	20.55	14.24	0.582	178	2.857	330.1	457.6	127.5	292.5	165.0	237.5	3.59
	13:00	20.74	14.37	0.582	177	2.876	329.5	457.6	128.1	292.9	164.8	237.9	3.57
	13:05	21.10	14.62	0.585	176	2.912	330.4	459.6	129.2	294.4	165.2	239.3	3.56
	13:10	21.39	14.82	0.591	175	2.940	333.4	463.5	130.1	296.8	166.7	241.2	3.56
	13:15	21.67	15.01	0.595	174	2.967	335.1	466.0	130.9	298.5	167.6	242.6	3.56
	13:20	21.95	15.21	0.597	173	2.996	335.6	467.3	131.7	299.5	167.8	243.6	3.55
	13:25	22.23	15.40	0.601	172	3.022	337.3	469.9	132.6	301.2	168.6	245.0	3.54
	13:30	22.54	15.61	0.605	172	3.052	338.9	472.4	133.5	302.9	169.4	246.5	3.54
	13:35	22.85	15.83	0.608	171	3.083	339.8	474.3	134.5	304.4	169.9	247.8	3.53
	13:40	23.09	16.00	0.608	170	3.107	339.1	474.4	135.3	304.9	169.6	248.3	3.51
	13:45	23.38	16.20	0.611	169	3.135	340.1	476.2	136.1	306.2	170.1	249.5	3.50
	13:50	23.66	16.39	0.614	168	3.161	341.2	478.1	136.9	307.5	170.6	250.6	3.49
	13:55	23.93	16.58	0.618	167	3.188	342.8	480.5	137.7	309.1	171.4	252.0	3.49
	14:00	24.23	16.78	0.623	167	3.216	345.0	483.4	138.4	310.9	172.5	253.4	3.49
	14:05	24.51	16.98	0.627	166	3.243	346.7	485.9	139.2	312.5	173.3	254.8	3.49
	14:10	24.81	17.19	0.630	165	3.273	347.6	487.7	140.1	313.9	173.8	256.0	3.48
	14:15	25.14	17.42	0.633	164	3.305	348.4	489.5	141.1	315.3	174.2	257.2	3.47
	14:20	25.38	17.58	0.634	163	3.327	348.3	490.3	142.0	316.2	174.2	258.1	3.45
	14:25	25.74	17.83	0.631	162	3.362	345.4	488.3	142.9	315.6	172.7	258.0	3.42
	14:30	25.98	18.00	0.629	162	3.385	343.4	486.8	143.4	315.1	171.7	257.9	3.39
	14:45	26.94	18.66	0.628	159	3.477	339.9	485.8	145.9	315.9	170.0	259.2	3.33
	15:00	27.71	19.19	0.629	158	3.551	338.2	485.2	147.0	316.1	169.1	259.7	3.30
	15:15	28.63	19.83	0.630	156	3.641	336.0	484.6	148.6	316.6	168.0	260.6	3.26
	15:30	29.39	20.36	0.631	155	3.716	334.3	484.5	150.2	317.3	167.1	261.6	3.23

Borehole No. : WCH-BH10 **Sample Depth m:- 7.00 - 8.00**

Sample No. : 9 **Specimen Depth m:- 7.80 - 8.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)

Description : Light brown, silty, gravelly SAND

Sample Origin : HDT ‡

‡ Information provided by customer

Borehole No. : WCH-BH10	Sample No. : 9	Sample Depth m:- 7.00 - 8.00	Specimen Depth m:- 7.80 - 8.00

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No.: Contract 1024
Job No.: J2999
Works Order No.: 059

Compiled by W S Wat
Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	13		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	9.00 - 10.00		
Specimen Depth		m	9.60 - 9.80		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.2		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	16		
Bulk density	(ρ_o)	Mg/m^3	2.07		
Dry density	(ρ_d)	Mg/m^3	1.78		
Particle density	(ρ_s)		2.65		
Voids Ratio	(e_o)		0.48		
Degree of Saturation	(S_r)	%	88.1		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.96		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	315		
Back Pressure	(u_b)	kPa	220		
Effective Pressure	(σ'_3)	kPa	95		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	1310.22		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.21		
Coefficient of Permeability (k)		m/s	8.39E-08		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	16		
Pore Pressure at the End of Consolidation		kPa	220		
Effective Stress at the End of Consolidation		kPa	95		
Bulk density	(ρ_o)	Mg/m^3	2.11		
Dry density	(ρ_d)	Mg/m^3	1.82		
Voids Ratio	(e)		0.46		
Degree of Saturation	(S_r)	%	94.6		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Job No.: **J2999**
Contract No.: Contract 1024
Works Order No.: 059
Report No. : J2999-059.11

Technician : W S Wat
Tested Date: 15/12/2008

Checked By : Name : H W Chung
Date : 09/01/2009

Approved By : Signatory : **Lau Wai Cheong**
Date : 09/01/2009

Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10		
Sample		no	13		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	9.00 - 10.00		
Specimen Depth		m	9.60 - 9.80		
COMPRESSION - FAILURE					
Cell Pressure		kPa	315		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	539		
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	415		
Minor Effective Principal Stress (σ'_3)		kPa	125		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	332		
$t = (\sigma_1 - \sigma_3)/2$		kPa	207		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.07		
Strain at Failure	(εf)	%	20.1		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	16		
Bulk density	(ρ_o)	Mg/m^3	2.11		
Dry density	(ρ_d)	Mg/m^3	1.82		
Voids Ratio	(e_f)		0.46		
Degree of Saturation	(S_f)	%	94.6		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer :	**Mass Transit Railway Corporation**	Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	
	Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999** **Works Order No.: 059**	

Technology Centre
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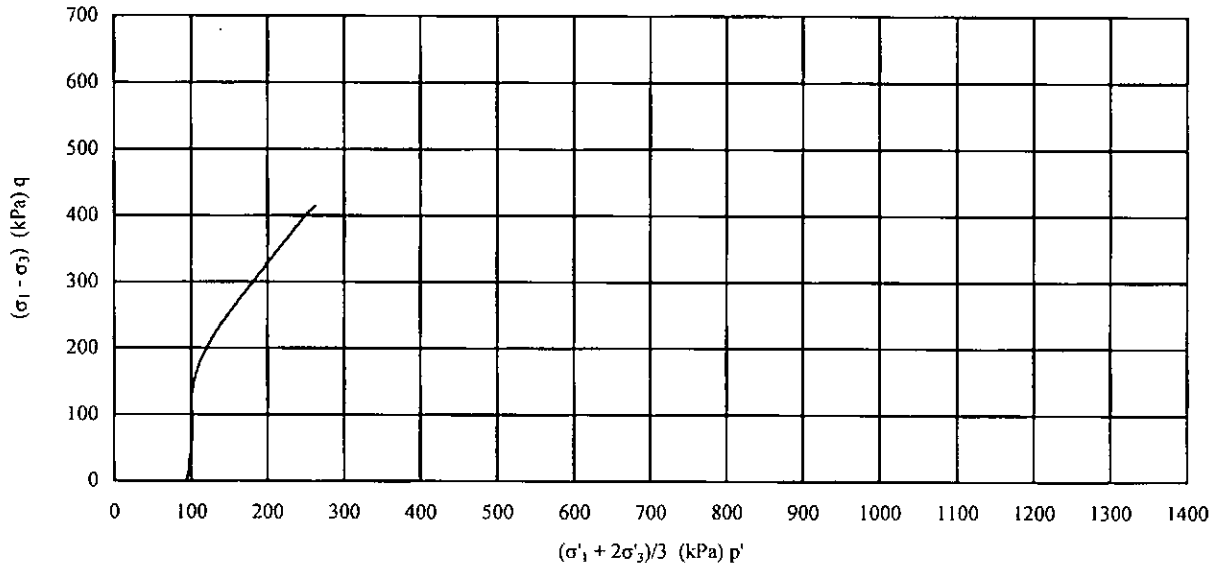
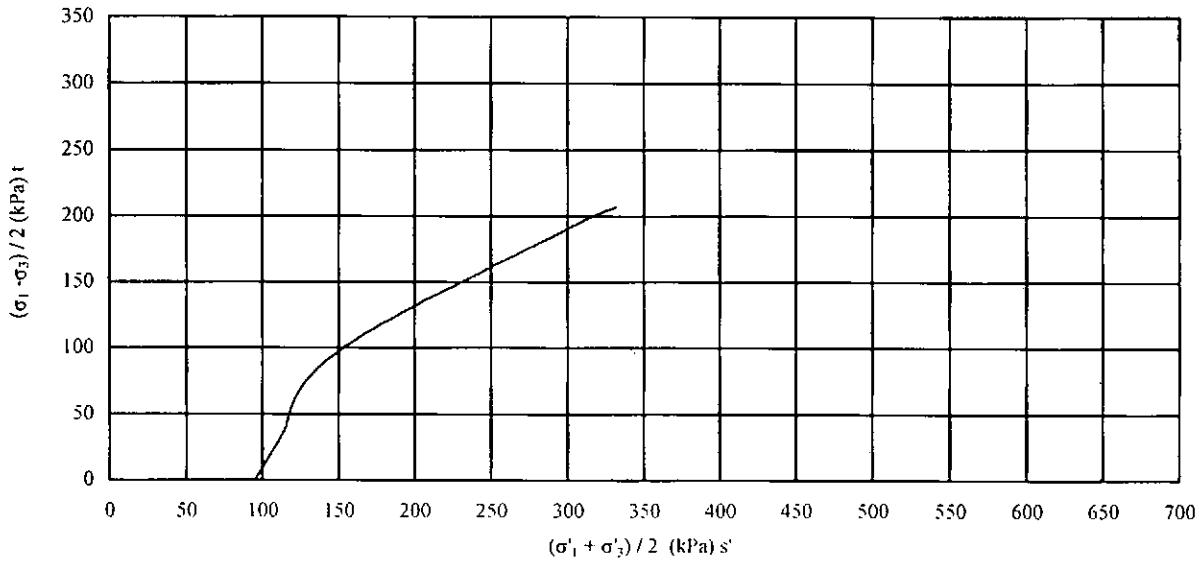
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. : WCH-BH10		**Sample Depth m:-** 9.00 - 10.00
Sample No. : 13		**Specimen Depth m:-** 9.60 - 9.80
Customer : Mass Transit Railway Corporation		Compiled by W S Wat
Project : Ground Investigation for South Island Line		
	Contract No.: Contract 1024	Checked by H W Chung
Job No.: J2999	**Works Order No.:** 059	

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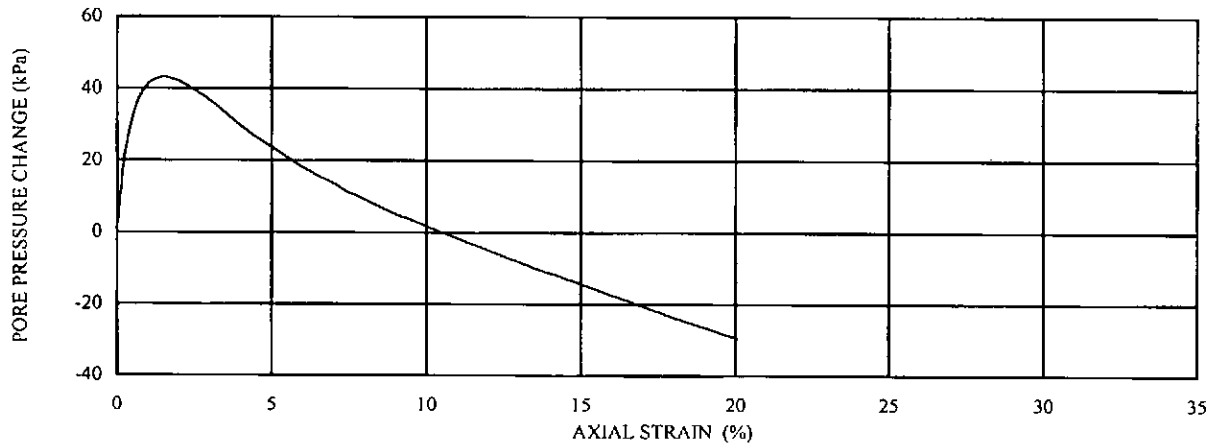
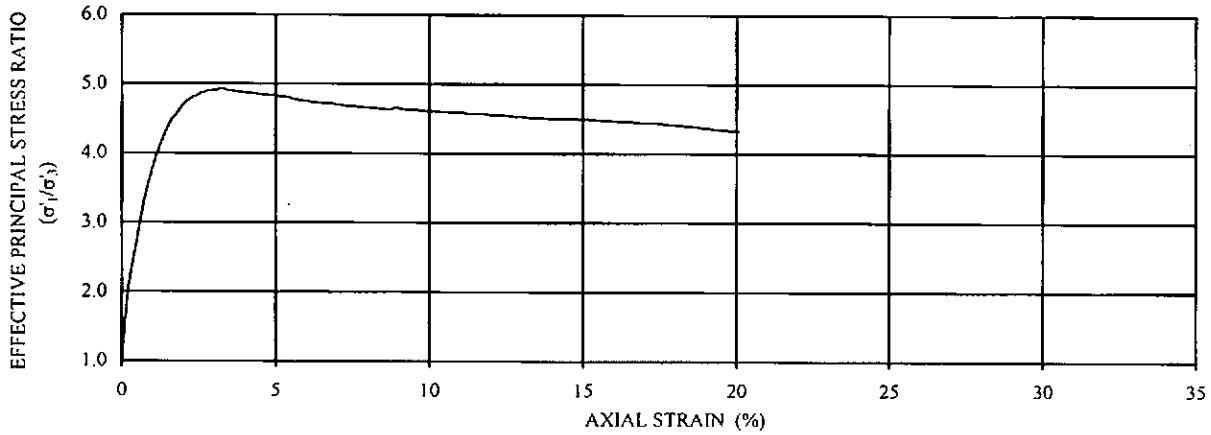
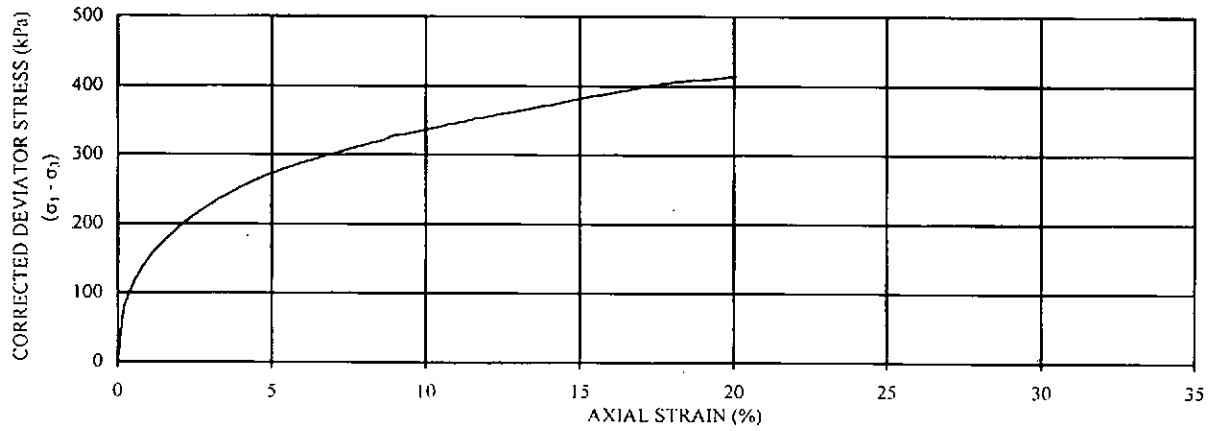
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**9.00 - 10.00**
Sample No. :	**13**	**Specimen Depth m:-**	**9.60 - 9.80**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

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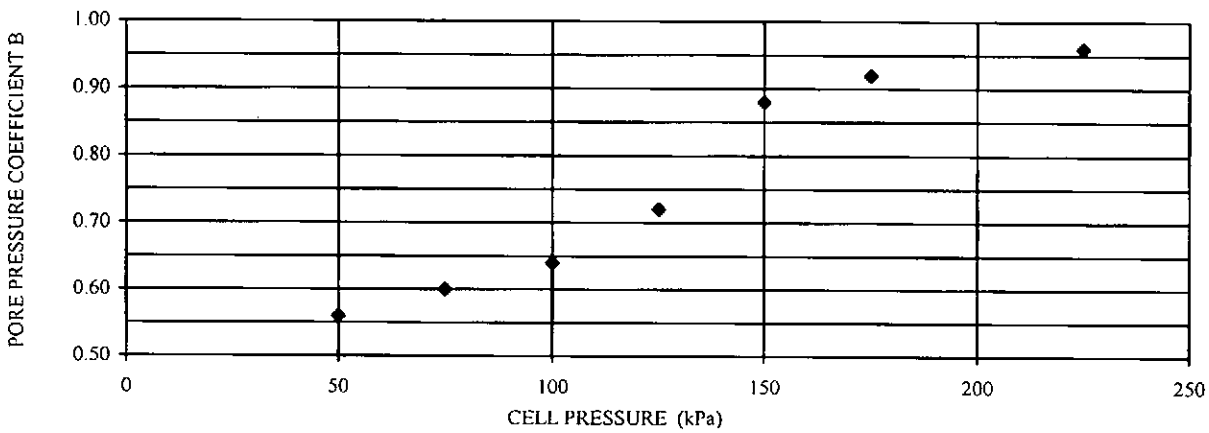
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
17/12/2008	08:45	0	0	-	0.0	
	08:51	25	-	22		-
	09:23	25	20	20	-1.8	
	09:30	50	-	34		0.56
	10:02	50	45	45	0.0	
	10:08	75	-	60		0.60
	10:48	75	70	70	3.0	
	10:52	100	-	86		0.64
	11:11	100	95	95	6.0	
	11:17	125	-	113		0.72
	11:50	125	120	120	8.5	
	12:00	150	-	142		0.88
	13:10	150	145	145	10.1	
	13:20	175	-	168		0.92
	14:10	175	170	170	11.6	
	14:18	225	-	218		0.96
18/12/2008	13:40	225	220	220	13.8	

Borehole No. WCH-BH10 — **Sample Depth m:-** 9.00 - 10.00
Sample No. : 13 — **Specimen Depth m:-** 9.60 - 9.80
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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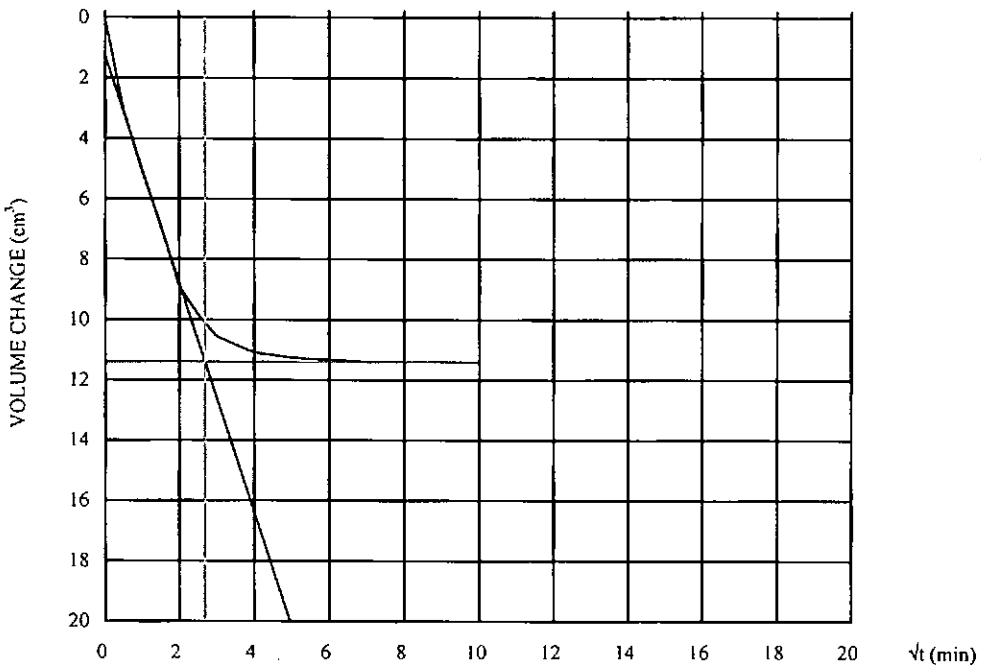
Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

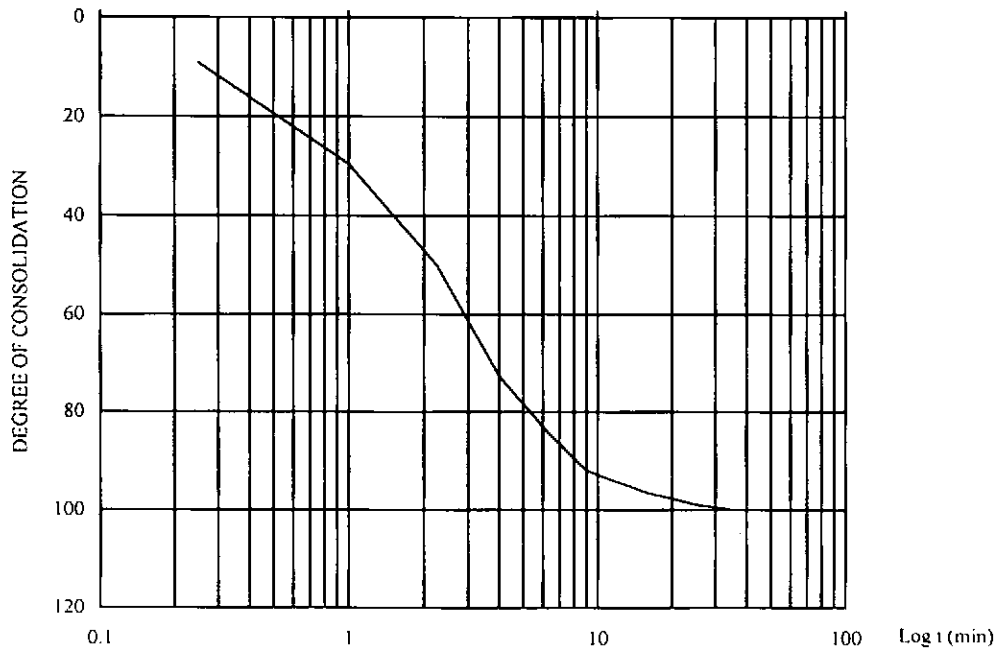


√t100 2.69 min

t100 7.214 min

tf 3.824 min

Calc. strain rate
2.638 mm/min



Borehole No. : WCH-BH10 **Sample Depth m:-** 9.00 - 10.00

Sample No. : 13 **Specimen Depth m:-** 9.60 - 9.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage		P.W.P,B.P		Effective Pressure	95 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress ☒	Max. Stress ratio ☐	Axial Strain % ☐
Stage : 1	Applied Pressure (kPa) - Cell : 315	Back : 220
P.R. factor 3.0820 kN/mm		

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 36 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
19/12	08:35	0.00	0.00	0.049	220	0.000	0.0	95.0	95.0	95.0	0.0	95.0	1.00
	08:40	0.28	0.19	0.152	238	0.055	74.2	151.4	77.2	114.3	37.1	101.9	1.96
	08:45	0.48	0.33	0.180	245	0.095	94.2	163.8	69.6	116.7	47.1	101.0	2.35
	08:50	0.67	0.47	0.201	251	0.134	109.1	173.4	64.3	118.8	54.5	100.7	2.70
	08:55	0.91	0.63	0.221	256	0.179	123.2	182.7	59.5	121.1	61.6	100.6	3.07
	09:00	1.14	0.79	0.240	259	0.224	136.6	192.9	56.3	124.6	68.3	101.8	3.43
	09:05	1.39	0.97	0.256	261	0.273	147.7	201.8	54.1	128.0	73.9	103.3	3.73
	09:10	1.62	1.12	0.269	262	0.314	156.7	209.6	52.9	131.3	78.4	105.1	3.96
	09:15	1.83	1.27	0.280	263	0.355	164.3	216.6	52.3	134.4	82.1	107.1	4.14
	09:20	2.08	1.44	0.291	263	0.400	171.8	223.6	51.8	137.7	85.9	109.1	4.32
	09:25	2.33	1.62	0.303	263	0.448	180.0	231.8	51.8	141.8	90.0	111.8	4.47
	09:30	2.61	1.81	0.314	263	0.498	187.3	239.6	52.3	146.0	93.7	114.7	4.58
	09:35	2.83	1.97	0.324	262	0.539	194.1	246.8	52.7	149.7	97.0	117.4	4.68
	09:40	3.08	2.13	0.334	262	0.580	200.8	254.3	53.5	153.9	100.4	120.4	4.75
	09:45	3.25	2.26	0.340	261	0.613	204.7	258.7	54.0	156.4	102.4	122.2	4.79
	09:50	3.48	2.42	0.348	260	0.654	210.0	264.9	54.9	159.9	105.0	124.9	4.82
	09:55	3.71	2.58	0.356	259	0.694	215.2	270.9	55.7	163.3	107.6	127.4	4.86
	10:00	3.99	2.77	0.365	258	0.741	221.1	277.9	56.8	167.3	110.5	130.5	4.89
	10:05	4.22	2.93	0.372	257	0.780	225.6	283.3	57.7	170.5	112.8	132.9	4.91
	10:10	4.52	3.14	0.381	256	0.831	231.3	290.4	59.1	174.8	115.7	136.2	4.91
	10:15	4.68	3.25	0.387	255	0.857	235.2	295.0	59.8	177.4	117.6	138.2	4.93
	10:20	4.99	3.46	0.394	254	0.907	239.5	300.8	61.3	181.1	119.8	141.1	4.91
	10:25	5.21	3.61	0.400	253	0.943	243.3	305.7	62.4	184.0	121.6	143.5	4.90
	10:30	5.43	3.77	0.406	252	0.980	247.0	310.5	63.5	187.0	123.5	145.8	4.89
	10:35	5.67	3.93	0.413	250	1.017	251.4	316.2	64.8	190.5	125.7	148.6	4.88
	10:40	5.91	4.10	0.419	249	1.056	255.1	321.0	65.9	193.4	127.5	150.9	4.87
	10:45	6.26	4.34	0.428	248	1.110	260.6	328.1	67.5	197.8	130.3	154.4	4.86
	10:50	6.40	4.44	0.431	247	1.132	262.4	330.5	68.1	199.3	131.2	155.6	4.85
	10:55	6.75	4.69	0.439	246	1.188	267.2	336.7	69.5	203.1	133.6	158.6	4.84
	11:00	6.92	4.80	0.443	245	1.212	269.6	339.8	70.2	205.0	134.8	160.1	4.84
	11:05	7.14	4.96	0.448	244	1.247	272.5	343.5	71.0	207.3	136.3	161.8	4.84
	11:10	7.39	5.13	0.452	243	1.284	274.7	346.6	71.9	209.3	137.4	163.5	4.82
	11:15	7.66	5.32	0.459	242	1.324	278.9	351.9	73.0	212.5	139.5	166.0	4.82
	11:20	7.87	5.46	0.462	241	1.354	280.5	354.3	73.8	214.1	140.3	167.3	4.80
	11:25	8.12	5.64	0.466	240	1.392	282.7	357.5	74.8	216.1	141.3	169.0	4.78
	11:30	8.36	5.80	0.471	239	1.425	285.6	361.4	75.8	218.6	142.8	171.0	4.77
	11:35	8.57	5.94	0.475	239	1.454	287.8	364.3	76.5	220.4	143.9	172.4	4.76
	11:40	8.81	6.11	0.479	238	1.488	290.0	367.4	77.4	222.4	145.0	174.1	4.75
	11:45	9.06	6.29	0.483	237	1.525	292.1	370.3	78.2	224.2	146.0	175.6	4.74

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 9.00 - 10.00**	
Sample No. :	**13**	**Specimen Depth m:- 9.60 - 9.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 17 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 36	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
19/12	11:50	9.32	6.47	0.488	236	1.561	294.9	374.0	79.1	226.5	147.4	177.4	4.73
	11:55	9.54	6.62	0.491	235	1.591	296.4	376.2	79.8	228.0	148.2	178.6	4.71
	12:00	9.79	6.79	0.496	235	1.624	299.1	379.5	80.4	230.0	149.6	180.1	4.72
	12:05	10.06	6.98	0.500	234	1.661	301.2	382.5	81.3	231.9	150.6	181.7	4.70
	12:10	10.28	7.14	0.504	233	1.692	303.3	385.4	82.1	233.8	151.7	183.2	4.69
	12:15	10.56	7.33	0.509	232	1.728	306.0	389.1	83.1	236.1	153.0	185.1	4.68
	12:20	10.84	7.52	0.514	231	1.764	308.7	392.6	83.9	238.2	154.3	186.8	4.68
	12:25	11.04	7.66	0.517	231	1.791	310.2	394.6	84.4	239.5	155.1	187.8	4.68
	12:30	11.29	7.84	0.521	230	1.824	312.2	397.3	85.1	241.2	156.1	189.2	4.67
	12:35	11.50	7.98	0.524	229	1.850	313.7	399.4	85.7	242.5	156.8	190.3	4.66
	12:40	11.77	8.17	0.529	229	1.885	316.3	402.8	86.5	244.7	158.2	191.9	4.66
	12:45	11.98	8.32	0.532	228	1.912	317.8	404.9	87.1	246.0	158.9	193.0	4.65
	12:50	12.23	8.49	0.536	227	1.943	319.8	407.6	87.8	247.7	159.9	194.4	4.64
	12:55	12.52	8.69	0.541	226	1.978	322.3	411.0	88.7	249.9	161.2	196.1	4.63
	13:00	12.65	8.78	0.544	226	1.994	324.0	413.0	89.0	251.0	162.0	197.0	4.64
	13:05	12.81	8.89	0.550	226	2.014	327.5	417.0	89.5	253.3	163.8	198.7	4.66
	13:10	13.12	9.11	0.553	225	2.052	328.6	418.9	90.3	254.6	164.3	199.8	4.64
	13:15	13.42	9.32	0.556	224	2.089	329.8	420.7	90.9	255.8	164.9	200.8	4.63
	13:20	13.70	9.51	0.560	224	2.121	331.7	423.2	91.5	257.3	165.8	202.1	4.62
	13:25	13.91	9.65	0.563	223	2.145	333.1	425.1	92.0	258.6	166.6	203.0	4.62
	13:30	14.19	9.85	0.567	222	2.179	335.0	427.7	92.7	260.2	167.5	204.4	4.61
	13:35	14.45	10.03	0.571	222	2.209	336.8	430.2	93.4	261.8	168.4	205.7	4.61
	13:40	14.67	10.18	0.575	221	2.234	338.8	432.7	93.9	263.3	169.4	206.8	4.61
	13:45	14.92	10.36	0.578	221	2.264	340.1	434.6	94.5	264.5	170.0	207.9	4.60
	13:50	15.13	10.50	0.581	220	2.287	341.4	436.4	95.0	265.7	170.7	208.8	4.59
	13:55	15.48	10.74	0.587	219	2.326	344.3	440.1	95.8	268.0	172.2	210.6	4.59
	14:00	15.67	10.87	0.589	219	2.347	345.1	441.3	96.2	268.7	172.5	211.2	4.59
	14:05	15.98	11.09	0.594	218	2.382	347.4	444.3	96.9	270.6	173.7	212.7	4.59
	14:10	16.21	11.25	0.597	218	2.408	348.7	446.2	97.5	271.9	174.4	213.7	4.58
	14:15	16.50	11.45	0.602	217	2.439	351.1	449.2	98.1	273.6	175.5	215.1	4.58
	14:20	16.74	11.62	0.606	216	2.466	352.9	451.6	98.7	275.2	176.5	216.3	4.58
	14:25	16.98	11.78	0.609	216	2.491	354.1	453.4	99.3	276.4	177.1	217.3	4.57
	14:30	17.25	11.97	0.612	215	2.520	355.3	455.2	99.9	277.5	177.6	218.3	4.56
	14:35	17.50	12.15	0.616	215	2.548	357.1	457.6	100.5	279.0	178.5	219.5	4.55
	14:40	17.69	12.28	0.619	214	2.568	358.4	459.3	100.9	280.1	179.2	220.4	4.55
	14:45	17.94	12.45	0.623	214	2.594	360.2	461.7	101.5	281.6	180.1	221.6	4.55
	14:50	18.21	12.64	0.626	213	2.622	361.3	463.4	102.1	282.7	180.6	222.5	4.54
	14:55	18.44	12.80	0.629	212	2.647	362.5	465.1	102.6	283.8	181.2	223.4	4.53
	15:00	18.67	12.96	0.633	212	2.671	364.3	467.4	103.1	285.2	182.1	224.5	4.53
	15:05	18.90	13.12	0.636	211	2.694	365.5	469.2	103.7	286.4	182.7	225.5	4.52
	15:10	19.14	13.28	0.639	211	2.718	366.6	470.8	104.2	287.5	183.3	226.4	4.52

Borehole No. : WCH-BH10 — **Sample Depth m:- 9.00 - 10.00**

Sample No. : 13 — **Specimen Depth m:- 9.60 - 9.80**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Job No.: J2999 — **Contract No.: Contract 1024** — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	I	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 36	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
19/12	15:15	19.40	13.46	0.643	210	2.745	368.3	473.1	104.8	289.0	184.2	227.6	4.51
	15:20	19.70	13.67	0.648	210	2.776	370.5	475.9	105.4	290.7	185.3	228.9	4.52
	15:25	19.86	13.78	0.650	209	2.792	371.3	477.1	105.8	291.4	185.6	229.6	4.51
	15:30	20.20	14.02	0.654	209	2.827	372.7	479.1	106.4	292.8	186.4	230.6	4.50
	15:35	20.36	14.13	0.656	208	2.843	373.4	480.1	106.7	293.4	186.7	231.2	4.50
	15:40	20.65	14.33	0.661	208	2.871	375.6	482.9	107.3	295.1	187.8	232.5	4.50
	15:45	20.91	14.51	0.665	207	2.897	377.3	485.2	107.9	296.5	188.6	233.7	4.50
	15:50	21.19	14.70	0.670	207	2.925	379.5	487.9	108.4	298.1	189.7	234.9	4.50
	15:55	21.38	14.84	0.673	206	2.945	380.7	489.5	108.8	299.1	190.3	235.7	4.50
	16:00	21.61	15.00	0.676	206	2.967	381.8	491.1	109.3	300.2	190.9	236.6	4.49
	16:05	21.81	15.14	0.680	205	2.987	383.6	493.3	109.7	301.5	191.8	237.6	4.50
	16:10	22.09	15.33	0.684	205	3.014	385.1	495.5	110.4	303.0	192.6	238.8	4.49
	16:15	22.36	15.52	0.688	204	3.041	386.7	497.6	110.9	304.2	193.3	239.8	4.49
	16:20	22.55	15.65	0.690	204	3.059	387.3	498.7	111.4	305.0	193.6	240.5	4.48
	16:25	22.75	15.79	0.693	203	3.079	388.4	500.2	111.8	306.0	194.2	241.3	4.47
	16:30	23.00	15.97	0.697	203	3.104	390.0	502.4	112.4	307.4	195.0	242.4	4.47
	16:35	23.29	16.17	0.701	202	3.132	391.5	504.4	112.9	308.6	195.7	243.4	4.47
	16:40	23.54	16.34	0.705	202	3.156	393.1	506.6	113.5	310.0	196.5	244.5	4.46
	16:45	23.75	16.49	0.708	201	3.177	394.1	508.0	113.9	311.0	197.1	245.3	4.46
	16:50	24.00	16.66	0.712	201	3.201	395.7	510.2	114.5	312.4	197.9	246.4	4.46
	16:55	24.24	16.82	0.716	200	3.223	397.3	512.3	115.0	313.6	198.6	247.4	4.45
	17:00	24.46	16.98	0.719	200	3.245	398.3	513.8	115.5	314.7	199.2	248.3	4.45
	17:05	24.72	17.16	0.723	199	3.270	399.8	515.8	116.0	315.9	199.9	249.3	4.45
	17:10	24.96	17.32	0.727	199	3.292	401.4	517.9	116.5	317.2	200.7	250.3	4.45
	17:15	25.21	17.49	0.730	198	3.316	402.3	519.4	117.1	318.2	201.1	251.2	4.44
	17:20	25.48	17.68	0.734	197	3.342	403.7	521.4	117.7	319.6	201.9	252.3	4.43
	17:25	25.70	17.84	0.736	197	3.365	404.1	522.3	118.2	320.3	202.1	252.9	4.42
	17:30	25.98	18.03	0.740	196	3.391	405.5	524.3	118.8	321.5	202.7	254.0	4.41
	17:35	26.19	18.18	0.742	196	3.412	405.9	525.1	119.2	322.2	203.0	254.5	4.41
	17:40	26.47	18.37	0.746	195	3.438	407.3	527.1	119.8	323.4	203.6	255.6	4.40
	17:45	26.68	18.52	0.749	195	3.459	408.3	528.5	120.2	324.3	204.1	256.3	4.40
	17:50	26.96	18.71	0.752	194	3.486	409.1	529.8	120.7	325.2	204.5	257.1	4.39
	17:55	27.20	18.88	0.753	194	3.509	408.8	530.0	121.2	325.6	204.4	257.5	4.37
	18:00	27.43	19.04	0.756	193	3.532	409.7	531.3	121.6	326.4	204.8	258.2	4.37
	18:05	27.72	19.24	0.759	193	3.560	410.4	532.6	122.2	327.4	205.2	259.0	4.36
	18:10	28.06	19.48	0.763	192	3.594	411.5	534.4	122.9	328.6	205.7	260.1	4.35
	18:15	28.15	19.54	0.765	192	3.602	412.3	535.4	123.1	329.2	206.1	260.5	4.35
	18:20	28.51	19.79	0.769	191	3.637	413.3	537.1	123.8	330.4	206.6	261.6	4.34
	18:25	28.62	19.87	0.771	191	3.649	414.0	538.0	124.0	331.0	207.0	262.0	4.34
	18:30	**28.91**	**20.06**	**0.774**	**191**	**3.675**	**414.7**	**539.2**	**124.5**	**331.8**	**207.3**	**262.7**	**4.33**

Borehole No. : WCH-BH10 — **Sample Depth m:- 9.00 - 10.00**
Sample No. : 13 — **Specimen Depth m:- 9.60 - 9.80**

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Job No.: J2999
Contract No.: Contract 1024
Works Order No.: 059

Compiled by W S Wat
Checked by H W Chung

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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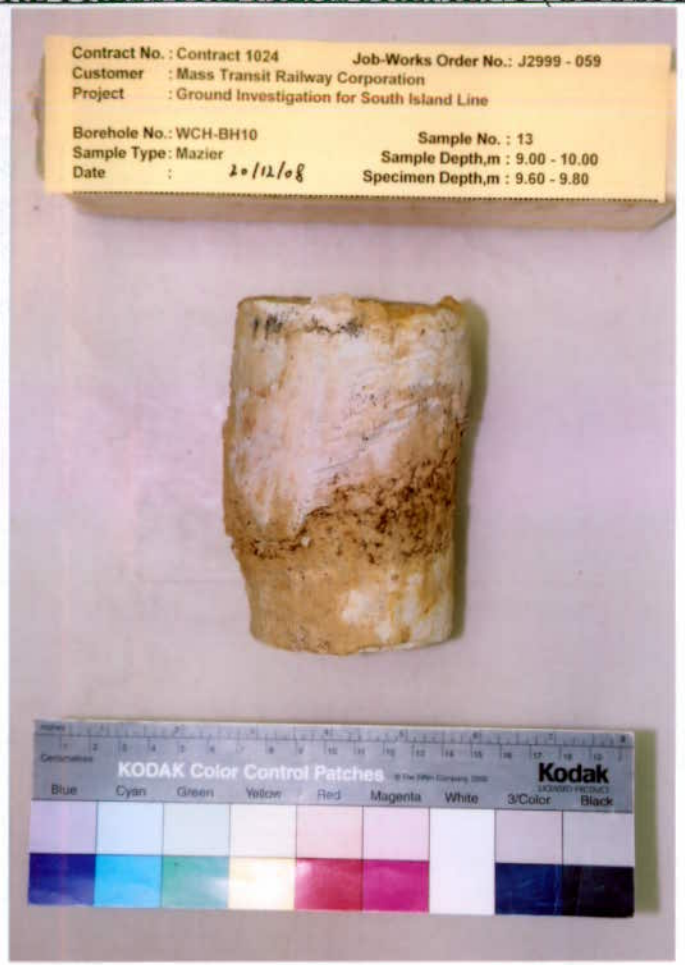
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Dark brown, slightly clayey, very silty, very sandy GRAVEL **Sample Origin : CDT‡** ‡ Information provided by customer

Borehole No. : **WCH-BH10**	**Sample No. : 13**	**Sample Depth m:- 9.00 - 10.00**	**Specimen Depth m:- 9.60 - 9.80**
Customer : Mass Transit Railway Corporation		**Contract No. : Contract 1024**	Compiled by W S Wat
Project : Ground Investigation for South Island Line		**Job No. : J2999**	
		Works Order No.: 059	Checked by H W Chung

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TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10	WCH-BH10	WCH-BH10
Sample		no	13	13	13
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	9.00 - 10.00	9.00 - 10.00	9.00 - 10.00
Specimen Depth		m	9.80 - 10.00	9.80 - 10.00	9.80 - 10.00
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.2	74.6	75.1
Height	(H_o)	mm	145.0	141.5	138.5
Moisture Content	(W_o)	%	13	14	13
Bulk density	(ρ_o)	Mg/m^3	2.17	2.21	2.22
Dry density	(ρ_d)	Mg/m^3	1.92	1.95	1.96
Particle density	(ρ_s)		2.65	2.65	2.65
Voids Ratio	(e_o)		0.38	0.36	0.35
Degree of Saturation	(S_r)	%	90.3	100.1	100.1
DRAINAGE CONDITIONS				ONE END	
SATURATION					
Final Pore Pressure Coefficient B			1.00		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	275	320	365
Back Pressure	(u_b)	kPa	230	230	230
Effective Pressure	(σ'_3)	kPa	45	90	135
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	3222.10	4321.31	4129.51
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.29	0.14	0.08
Coefficient of Permeability (k)		m/s	2.91E-07	1.88E-07	1.07E-07
COMPRESSION TERMINATION CRITERION			MAXIMUM STRESS RATIO		MAX ($\sigma'1$ - $\sigma'3$)
COMPRESSION - INITIAL					
Moisture Content	(w)	%	14	13	13
Pore Pressure at the End of Consolidation		kPa	230	230	230
Effective Stress at the End of Consolidation		kPa	45	90	135
Bulk density	(ρ_o)	Mg/m^3	2.21	2.22	2.23
Dry density	(ρ_d)	Mg/m^3	1.95	1.96	1.98
Voids Ratio	(e)		0.36	0.35	0.34
Degree of Saturation	(S_r)	%	100.1	100.1	100.1

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat Checked By : Name : H W Chung Approved By : Signatory : **Lau Wai Cheong**

Tested Date: 15/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH10	WCH-BH10	WCH-BH10
Sample		no	13	13	13
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	9.00 - 10.00	9.00 - 10.00	9.00 - 10.00
Specimen Depth		m	9.80 - 10.00	9.80 - 10.00	9.80 - 10.00
COMPRESSION - FAILURE					
Cell Pressure		kPa	275	320	365
Rate of Strain		mm/min	0.048	0.047	0.046
CONDITIONS AT MAXIMUM STRESS RATIO					
Major Effective Principal Stress (σ'_1)		kPa	243	472	736
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	220	415	632
Minor Effective Principal Stress (σ'_3)		kPa	23	58	104
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	133	265	420
$t = (\sigma_1 - \sigma_3)/2$		kPa	110	207	316
Expanded Uncertainty of s' ^		kPa	-	-	-
Expanded Uncertainty of t ^		kPa	-	-	-
Pore pressure parameter A_f			0.10	0.08	0.05
Strain at Failure	(εf)	%	1.9	3.9	5.9
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	14	13	13
Bulk density	(ρ_o)	Mg/m^3	2.21	2.22	2.23
Dry density	(ρ_d)	Mg/m^3	1.95	1.96	1.98
Voids Ratio	(e_f)		0.36	0.35	0.34
Degree of Saturation	(S_f)	%	100.1	100.1	100.1

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :-
   Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**

Compiled by W S Wat
Checked by H W Chung

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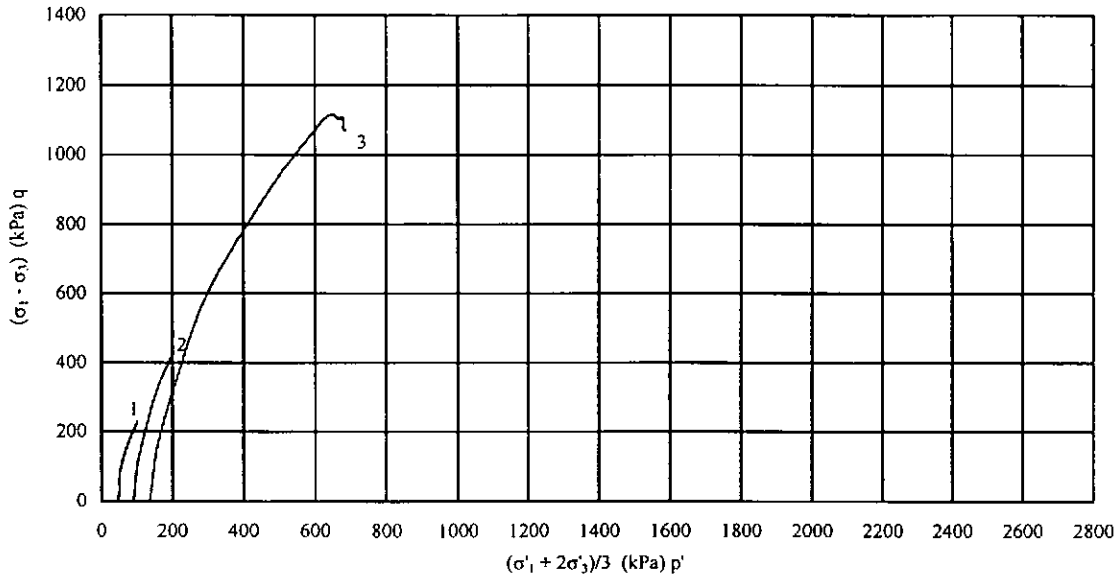
Form : GESR009.7 / Nov.10.06 / Issue 1 / Rev 1

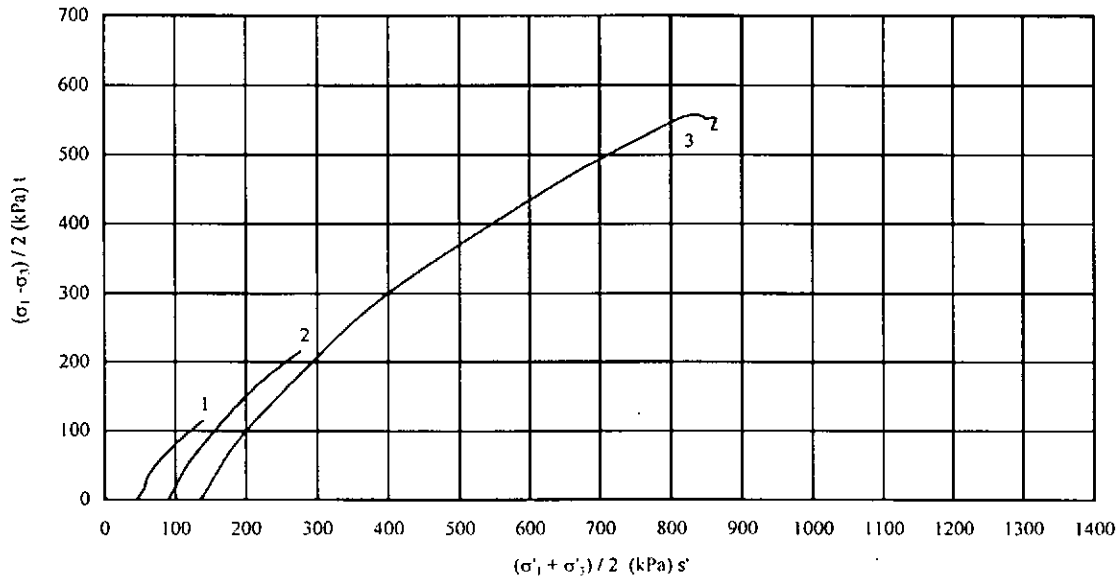
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH10**	**Sample Depth m:- 9.00 - 10.00**	
Sample No. :	**13**	**Specimen Depth m:- 9.80 - 10.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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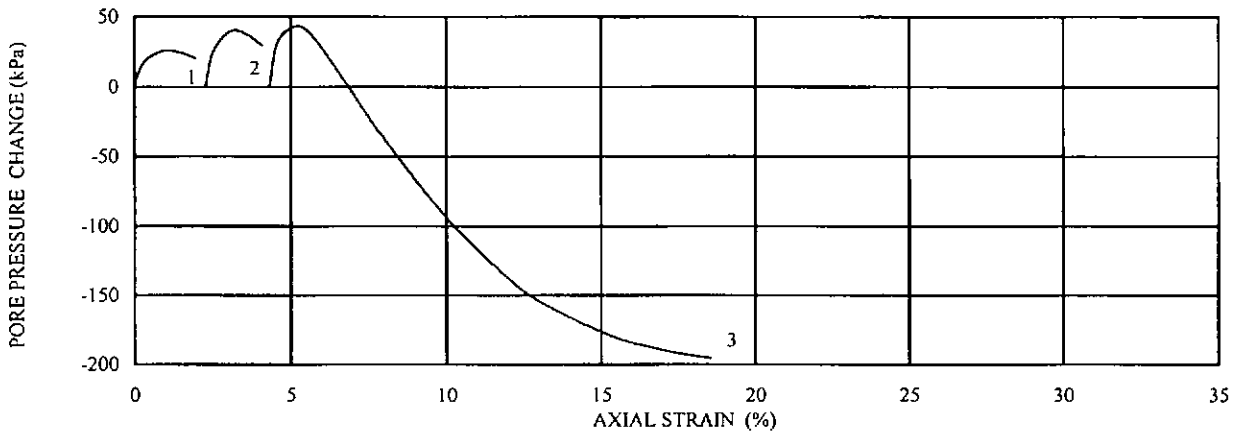
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

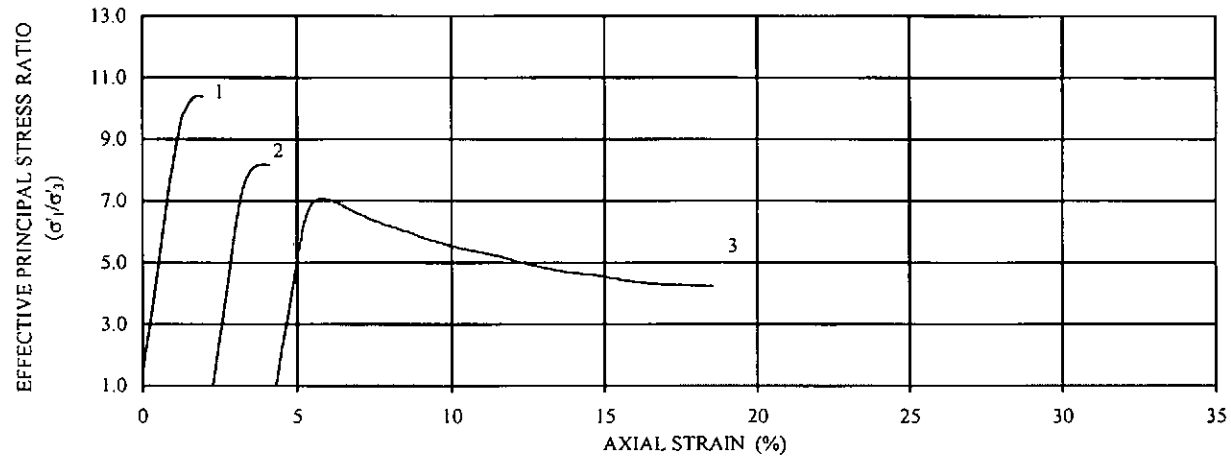
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

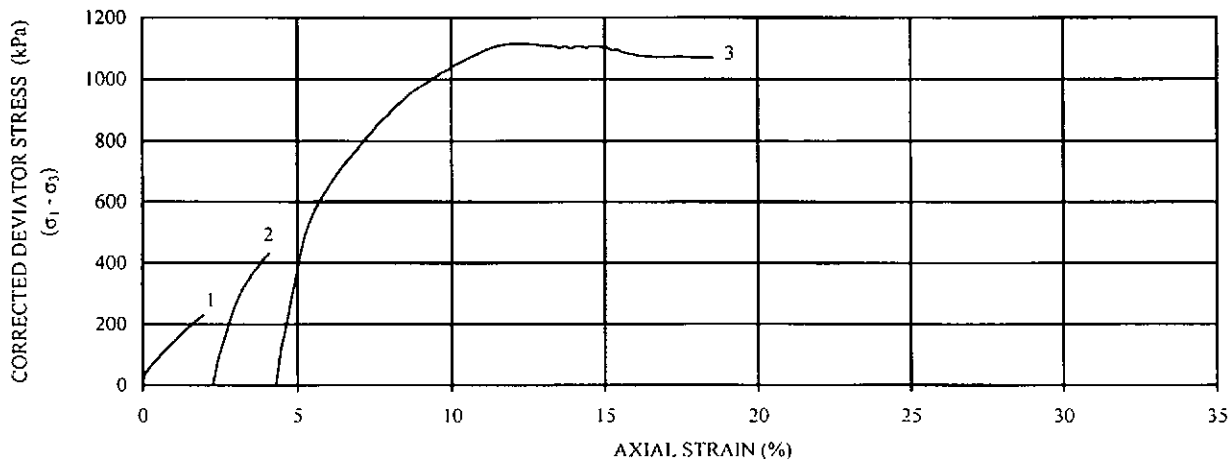
Gammon

HKAS HOKLAS 055

COMPRESSION







Borehole No. :	**WCH-BH10**	**Sample Depth m:-**	**9.00 - 10.00**
Sample No. :	**13**	**Specimen Depth m:-**	**9.80 - 10.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

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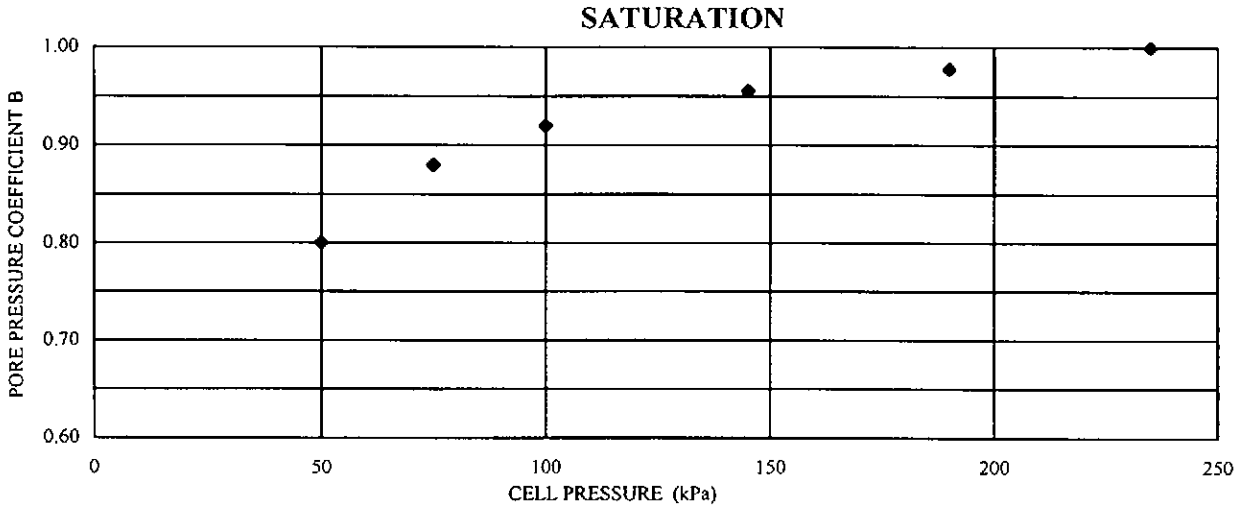
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Parameter B
17/12/2008	09:06	0	0	-	0.0	
	09:14	25	-	21		-
	09:43	25	20	20	-0.8	
	09:50	50	-	40		0.80
	10:20	50	45	45	2.9	
	10:30	75	-	67		0.88
	10:49	75	70	70	5.2	
	10:57	100	-	93		0.92
	11:40	100	95	95	9.2	
	11:49	145	-	138		0.96
	12:40	145	140	140	10.6	
	12:50	190	-	184		0.98
	13:20	190	185	185	14.1	
	13:28	235	-	230		1.00
19/12/2008	08:45	235	230	230	16.8	

Borehole No. : WCH-BH10 — **Sample Depth m:-** 9.00 - 10.00
Sample No. : 13 — **Specimen Depth m:-** 9.80 - 10.00
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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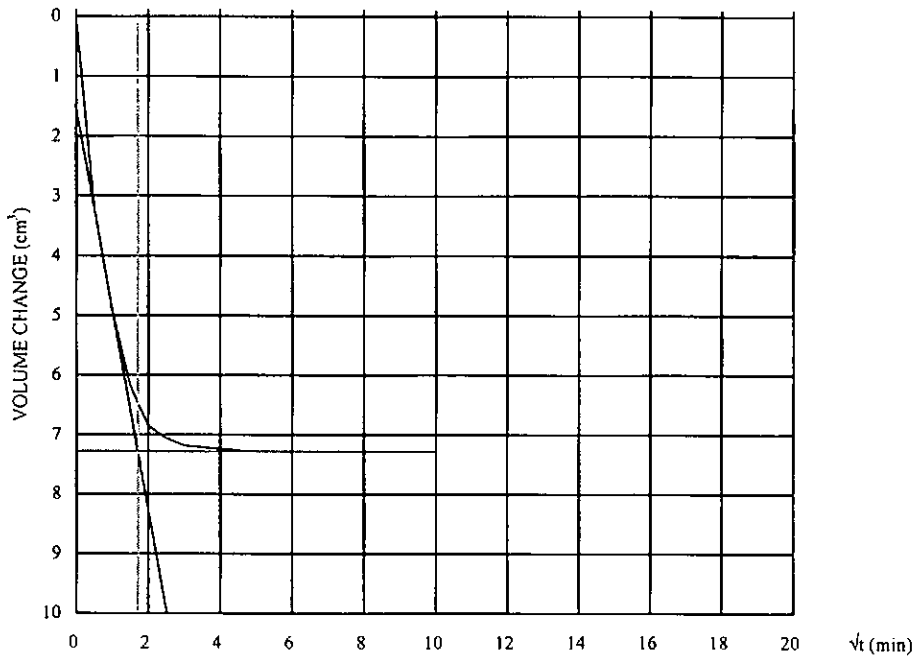
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

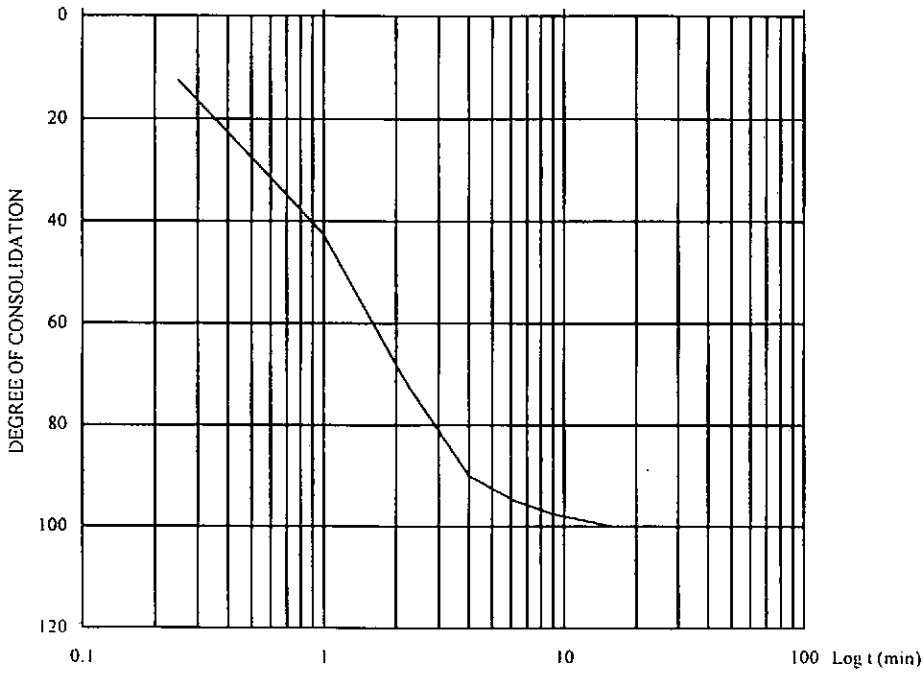


√t100 1.71 min

t100 2.94 min

tf 1.56 min

Calc. strain rate
6.494 mm/min



Borehole No. : WCH-BH10 — **Sample Depth m:-** 9.00 - 10.00

Sample No. : 13 — **Specimen Depth m:-** 9.80 - 10.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
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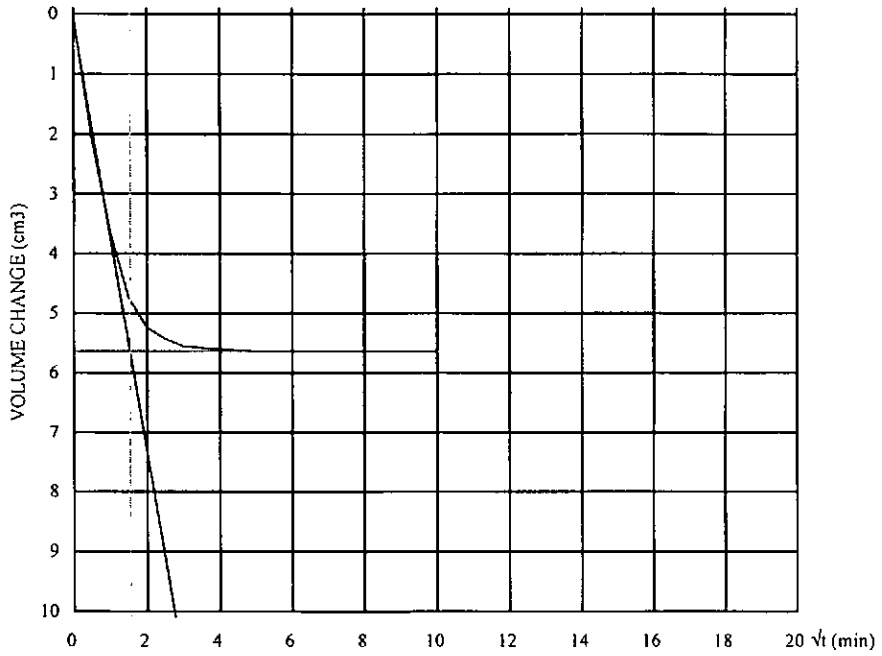
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 2

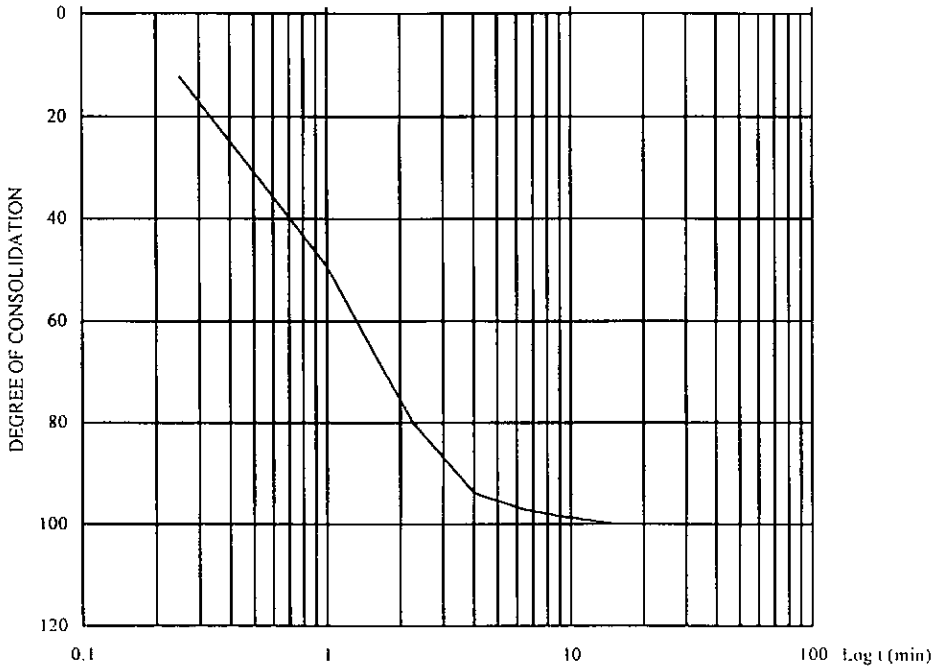


√t100 1.53 min

t100 2.36 min

tf 1.25 min

Calc. strain rate
7.911 mm/min



Borehole No. :	**WCH-BH10**	**Sample Depth m:- 9.00 - 10.00**	
Sample No. :	**13**	**Specimen Depth m:- 9.80 - 10.00**	
Customer :	**Mass Transit Railway Corporation**		Complied by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

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TEST REPORT
DETERMINATION OF
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WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

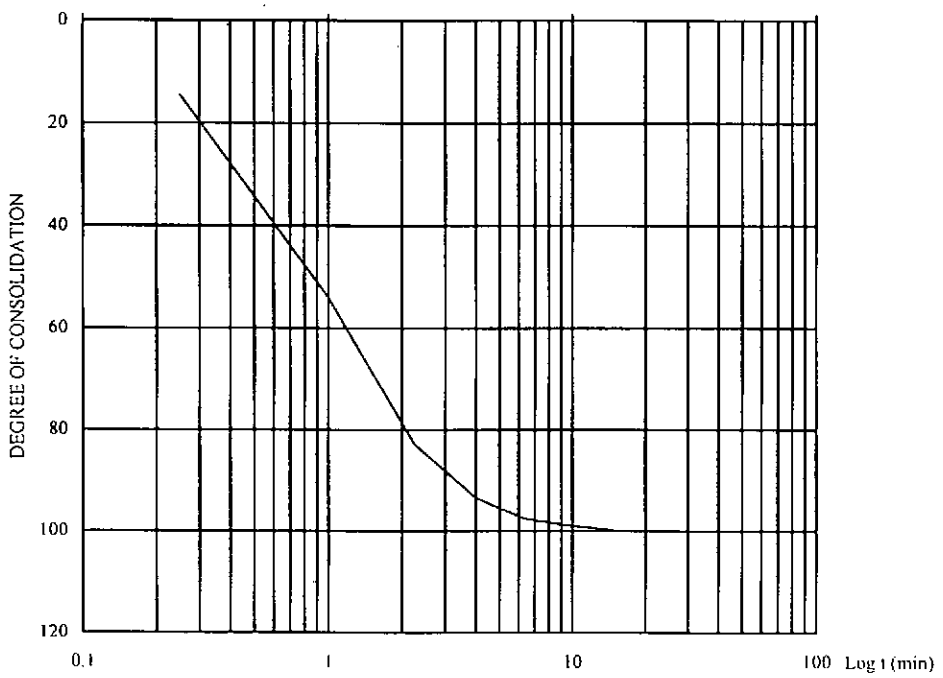
CONSOLIDATION (DRAINED PHASE) - Stage 3

√t100 1.63 min

t100 2.64 min

tf 1.40 min

Calc. strain rate
6.904 mm/min



Borehole No. : WCH-BH10 — **Sample Depth m:-** 9.00 - 10.00

Sample No. : 13 — **Specimen Depth m:-** 9.80 - 10.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

Technology Centre
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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P.B.P		Effective Pressure	45 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	1.99 % per hr
FAILURE CRITERION					
Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 1	Applied Pressure (kPa) - Cell :	275	Back : 230	P.R. factor	1.6835 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 39 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
19/12	10:10	0.00	0.00	0.076	230	0.000	0.0	45.0	45.0	45.0	0.0	45.0	1.00
	10:15	0.07	0.05	0.158	235	0.014	32.2	72.1	39.9	56.0	16.1	50.6	1.81
	10:20	0.27	0.19	0.212	243	0.055	53.3	85.3	32.0	58.6	26.6	49.8	2.66
	10:25	0.45	0.31	0.251	247	0.089	68.4	96.0	27.6	61.8	34.2	50.4	3.48
	10:30	0.63	0.44	0.287	250	0.126	82.4	107.0	24.6	65.8	41.2	52.1	4.35
	10:35	0.81	0.56	0.323	252	0.160	96.3	119.0	22.7	70.9	48.2	54.8	5.24
	10:40	1.01	0.70	0.360	254	0.199	110.6	131.8	21.2	76.5	55.3	58.1	6.22
	10:45	1.28	0.88	0.408	255	0.249	129.0	148.8	19.8	84.3	64.5	62.8	7.52
	10:50	1.42	0.99	0.436	256	0.279	139.7	159.2	19.5	89.4	69.9	66.1	8.17
	10:55	1.64	1.14	0.476	256	0.320	155.0	174.4	19.4	96.9	77.5	71.1	8.99
	11:00	1.86	1.29	0.516	255	0.360	170.2	189.8	19.6	104.7	85.1	76.3	9.69
	11:05	2.04	1.41	0.545	255	0.392	181.2	201.4	20.2	110.8	90.6	80.6	9.97
	11:10	2.27	1.57	0.582	254	0.435	195.2	216.3	21.1	118.7	97.6	86.2	10.25
	11:15	2.49	1.72	0.620	253	0.474	209.5	231.8	22.3	127.1	104.8	92.1	10.40
	11:20	**2.67**	**1.85**	**0.648**	**252**	**0.508**	**220.0**	**243.4**	**23.4**	**133.4**	**110.0**	**96.7**	**10.40**
	11:25	2.86	1.98	0.677	250	0.542	230.9	255.5	24.6	140.0	115.4	101.6	10.38

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 9.00 - 10.00**	
Sample No. :	**13**	**Specimen Depth m:- 9.80 - 10.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	90 kPa
Side drains	No	Selected Machine Speed	0.047 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 2	Applied Pressure (kPa) - Cell :	320	Back : 230	P.R. factor	1.6835 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 39 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
19/12	14:10	3.29	2.28	0.080	230	0.000	0.0	90.0	90.0	90.0	0.0	90.0	1.00
	14:15	3.43	2.38	0.220	243	0.644	53.5	130.9	77.4	104.2	26.8	95.2	1.69
	14:20	3.57	2.47	0.313	251	0.666	89.4	158.2	68.8	113.5	44.7	98.6	2.30
	14:25	3.70	2.56	0.398	256	0.689	122.1	185.7	63.6	124.7	61.1	104.3	2.92
	14:30	3.86	2.68	0.500	261	0.719	161.3	220.6	59.3	140.0	80.7	113.1	3.72
	14:35	4.01	2.78	0.584	264	0.743	193.5	250.0	56.5	153.3	96.8	121.0	4.42
	14:40	4.12	2.86	0.655	266	0.763	220.7	274.9	54.2	164.5	110.3	127.8	5.07
	14:45	4.27	2.96	0.729	268	0.788	248.9	301.1	52.2	176.6	124.4	135.2	5.77
	14:50	4.43	3.07	0.804	270	0.814	277.4	327.8	50.4	189.1	138.7	142.9	6.50
	14:55	4.60	3.19	0.872	270	0.843	303.1	352.7	49.6	201.2	151.6	150.6	7.11
	15:00	4.76	3.30	0.928	270	0.869	324.2	373.8	49.6	211.7	162.1	157.7	7.54
	15:05	4.94	3.42	0.979	270	0.898	343.3	393.6	50.3	221.9	171.6	164.7	7.82
	15:10	5.12	3.54	1.030	268	0.926	362.3	413.9	51.6	232.8	181.2	172.4	8.02
	15:15	5.34	3.70	1.086	266	0.964	383.1	436.7	53.6	245.1	191.5	181.3	8.15
	15:20	5.54	3.84	1.135	264	0.996	401.2	457.1	55.9	256.5	200.6	189.6	8.18
	15:25	**5.70**	**3.94**	**1.172**	**262**	**1.019**	**414.8**	**472.5**	**57.7**	**265.1**	**207.4**	**196.0**	**8.19**
	15:30	5.91	4.10	1.221	260	1.056	432.7	493.2	60.5	276.9	216.4	204.7	8.15

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 9.00 - 10.00**	
Sample No. :	**13**	**Specimen Depth m:- 9.80 - 10.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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Form : GESR009.14 / Dec. 13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	135 kPa
Side drains	No	Selected Machine Speed	0.046 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 3	Applied Pressure (kPa) - Cell :	365	Back : 230	P.R. factor	3.0328 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 25 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
22/12	08:40	6.21	4.30	0.067	230	0.000	0.0	135.0	135.0	135.0	0.0	135.0	1.00
	08:45	6.29	4.35	0.100	233	1.113	21.6	153.5	131.9	142.7	10.8	139.1	1.16
	08:50	6.46	4.47	0.232	252	1.139	112.1	224.8	112.7	168.8	56.1	150.1	2.00
	08:55	6.60	4.57	0.303	261	1.162	160.7	265.2	104.5	184.8	80.3	158.1	2.54
	09:00	6.78	4.70	0.393	266	1.190	222.1	321.0	98.9	210.0	111.1	172.9	3.25
	09:05	6.98	4.83	0.493	269	1.219	290.2	386.0	95.8	240.9	145.1	192.5	4.03
	09:10	7.10	4.92	0.562	271	1.239	337.0	431.4	94.4	262.9	168.5	206.7	4.57
	09:15	7.26	5.03	0.647	272	1.262	394.6	487.7	93.1	290.4	197.3	224.6	5.24
	09:20	7.39	5.12	0.708	273	1.282	435.8	527.9	92.1	310.0	217.9	237.4	5.73
	09:25	7.52	5.20	0.765	273	1.299	474.2	565.8	91.6	328.7	237.1	249.7	6.18
	09:30	7.70	5.34	0.830	273	1.329	517.8	609.8	92.0	350.9	258.9	264.6	6.63
	09:35	7.90	5.47	0.883	271	1.356	553.0	646.8	93.8	370.3	276.5	278.1	6.90
	09:40	8.09	5.60	0.923	269	1.384	579.4	675.7	96.3	386.0	289.7	289.4	7.02
	09:45	8.27	5.73	0.960	265	1.411	603.6	703.2	99.6	401.4	301.8	300.8	7.06
	09:50	**8.51**	**5.90**	**1.003**	**261**	**1.446**	**631.6**	**735.8**	**104.2**	**420.0**	**315.8**	**314.7**	**7.06**
	09:55	8.69	6.02	1.034	257	1.470	651.7	759.5	107.8	433.6	325.8	325.0	7.05
	10:00	8.88	6.15	1.063	253	1.497	670.3	782.2	111.9	447.1	335.2	335.3	6.99
	10:05	9.09	6.29	1.097	249	1.525	692.2	808.7	116.5	462.6	346.1	347.2	6.94
	10:10	9.34	6.47	1.134	243	1.561	715.7	838.1	122.4	480.2	357.8	361.0	6.85
	10:15	9.56	6.62	1.165	238	1.591	735.3	862.8	127.5	495.1	367.6	372.6	6.77
	10:20	9.78	6.78	1.196	232	1.623	754.8	887.4	132.6	510.0	377.4	384.2	6.69
	10:25	9.93	6.88	1.215	229	1.642	766.7	902.8	136.1	519.4	383.3	391.7	6.63
	10:30	10.18	7.05	1.250	223	1.675	788.6	930.6	142.0	536.3	394.3	404.9	6.55
	10:35	10.43	7.22	1.282	217	1.708	808.5	956.1	147.6	551.8	404.2	417.1	6.48
	10:40	10.63	7.36	1.308	213	1.735	824.5	977.0	152.5	564.8	412.3	427.3	6.41
	10:45	10.89	7.54	1.344	207	1.769	846.8	1005.1	158.3	581.7	423.4	440.6	6.35
	10:50	11.09	7.68	1.369	202	1.795	862.1	1024.9	162.8	593.8	431.0	450.2	6.30
	10:55	11.27	7.80	1.388	198	1.817	873.5	1040.2	166.7	603.5	436.8	457.9	6.24
	11:00	11.45	7.93	1.407	195	1.841	884.9	1055.1	170.2	612.6	442.4	465.2	6.20
	11:05	11.63	8.06	1.431	191	1.865	899.5	1073.6	174.1	623.8	449.7	473.9	6.17
	11:10	11.88	8.23	1.459	186	1.896	916.2	1095.4	179.2	637.3	458.1	484.6	6.11
	11:15	12.09	8.37	1.479	181	1.922	927.9	1111.5	183.6	647.6	464.0	492.9	6.05
	11:20	12.31	8.53	1.504	177	1.950	942.8	1130.9	188.1	659.5	471.4	502.4	6.01
	11:25	12.51	8.66	1.525	173	1.974	955.1	1147.1	192.0	669.6	477.6	510.4	5.97
	11:30	12.72	8.81	1.544	169	2.000	966.0	1162.4	196.4	679.4	483.0	518.4	5.92
	11:35	12.96	8.98	1.563	164	2.030	976.7	1178.2	201.5	689.8	488.3	527.1	5.85
	11:40	13.16	9.12	1.576	160	2.055	983.6	1188.7	205.1	696.9	491.8	533.0	5.80
	11:45	13.41	9.28	1.597	155	2.082	995.4	1205.2	209.8	707.5	497.7	541.6	5.74
	11:50	13.64	9.44	1.618	151	2.110	1007.3	1221.6	214.3	718.0	503.7	550.1	5.70

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 9.00 - 10.00**	
Sample No. :	**13**	**Specimen Depth m:- 9.80 - 10.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

Gammon

FAILURE CRITERION

Max. deviator Stress ☐ | Max. Stress ratio ☒ | Axial Strain % ☐

Stage :	3	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 25	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
22/12	11:55	13.82	9.57	1.633	147	2.132	1015.7	1233.4	217.7	725.5	507.8	556.3	5.67
	12:00	13.98	9.68	1.646	144	2.151	1022.8	1243.4	220.6	732.0	511.4	561.5	5.64
	12:05	14.28	9.89	1.666	139	2.186	1033.4	1259.7	226.3	743.0	516.7	570.8	5.57
	12:10	14.49	10.03	1.682	135	2.210	1042.1	1271.9	229.8	750.8	521.0	577.2	5.53
	12:15	14.71	10.19	1.698	131	2.236	1050.6	1284.4	233.8	759.1	525.3	584.0	5.49
	12:20	14.94	10.35	1.714	127	2.263	1058.9	1296.6	237.7	767.2	529.5	590.7	5.45
	12:25	15.16	10.50	1.729	124	2.287	1066.8	1307.7	240.9	774.3	533.4	596.5	5.43
	12:30	15.36	10.64	1.741	121	2.310	1072.8	1316.8	244.0	780.4	536.4	601.6	5.40
	12:35	15.60	10.81	1.758	117	2.338	1081.7	1329.4	247.7	788.5	540.8	608.3	5.37
	12:40	15.88	11.00	1.777	113	2.368	1091.5	1343.5	252.0	797.7	545.7	615.8	5.33
	12:45	16.10	11.15	1.790	110	2.392	1097.9	1353.4	255.5	804.4	548.9	621.5	5.30
	12:50	16.32	11.30	1.802	106	2.416	1103.6	1362.4	258.8	810.6	551.8	626.7	5.26
	12:55	16.56	11.47	1.812	103	2.443	1107.9	1369.9	262.0	816.0	554.0	631.3	5.23
	13:00	16.72	11.58	1.818	101	2.460	1110.3	1374.1	263.8	819.0	555.2	633.9	5.21
	13:05	17.00	11.77	1.827	97	2.490	1113.5	1382.0	268.5	825.3	556.8	639.7	5.15
	13:10	17.27	11.96	1.835	93	2.519	1116.2	1388.4	272.2	830.3	558.1	644.3	5.10
	13:15	17.49	12.11	1.836	90	2.542	1114.9	1390.0	275.1	832.5	557.4	646.7	5.05
	13:20	17.94	12.42	1.844	84	2.590	1115.9	1396.7	280.8	838.7	557.9	652.8	4.97
	13:25	18.04	12.49	1.844	83	2.600	1115.0	1397.0	282.0	839.5	557.5	653.7	4.95
	13:30	18.19	12.60	1.844	81	2.617	1113.6	1397.5	283.9	840.7	556.8	655.1	4.92
	13:35	18.39	12.74	1.846	79	2.638	1113.1	1398.9	285.8	842.3	556.5	656.8	4.89
	13:40	18.68	12.93	1.845	76	2.667	1109.9	1398.8	288.9	843.9	555.0	658.9	4.84
	13:45	18.91	13.09	1.849	74	2.691	1110.3	1400.9	290.6	845.8	555.2	660.7	4.82
	13:50	19.24	13.32	1.849	72	2.725	1107.4	1400.8	293.4	847.1	553.7	662.5	4.77
	13:55	19.37	13.42	1.846	70	2.740	1104.3	1398.9	294.6	846.8	552.2	662.7	4.75
	14:00	19.59	13.57	1.849	69	2.762	1104.2	1400.6	296.4	848.5	552.1	664.5	4.73
	14:05	19.79	13.71	1.856	67	2.782	1106.8	1404.6	297.8	851.2	553.4	666.7	4.72
	14:10	20.07	13.90	1.852	65	2.810	1101.8	1402.0	300.2	851.1	550.9	667.5	4.67
	14:15	20.31	14.06	1.865	63	2.833	1107.7	1409.4	301.7	855.5	553.8	670.9	4.67
	14:20	20.58	14.25	1.866	61	2.861	1105.8	1409.8	304.0	856.9	552.9	672.6	4.64
	14:25	20.79	14.40	1.866	60	2.882	1103.9	1409.3	305.4	857.3	551.9	673.4	4.61
	14:30	21.02	14.56	1.876	58	2.905	1107.9	1414.7	306.8	860.8	554.0	676.1	4.61
	14:35	21.30	14.75	1.878	56	2.933	1106.7	1415.6	308.9	862.2	553.3	677.8	4.58
	14:40	21.48	14.88	1.878	55	2.951	1105.0	1415.2	310.2	862.7	552.5	678.5	4.56
	14:45	21.75	15.06	1.882	53	2.977	1105.0	1416.6	311.6	864.1	552.5	679.9	4.55
	14:50	21.98	15.22	1.870	51	2.999	1095.6	1409.2	313.6	861.4	547.8	678.8	4.49
	14:55	22.25	15.41	1.877	50	3.026	1097.4	1412.3	314.9	863.6	548.7	680.7	4.48
	15:00	22.45	15.54	1.868	49	3.045	1090.1	1406.3	316.2	861.3	545.1	679.6	4.45
	15:15	23.18	16.05	1.860	45	3.116	1078.7	1398.3	319.6	858.9	539.3	679.2	4.38
	15:30	23.86	16.52	1.861	43	3.182	1073.1	1395.0	321.9	858.5	536.6	679.6	4.33
	15:45	24.58	17.02	1.870	40	3.252	1072.0	1396.7	324.7	860.7	536.0	682.0	4.30

Borehole No. : WCH-BH10 — **Sample Depth m:- 9.00 - 10.00**

Sample No. : 13 — **Specimen Depth m:- 9.80 - 10.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

Gammon HKAS

FAILURE CRITERION													
Max. deviator Stress ☐					Max. Stress ratio ☒				Axial Strain % ☐				
Stage :	3	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 25	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
22/12	16:00	25.28	17.51	1.883	38	3.320	1073.4	1400.3	326.9	863.6	536.7	684.7	4.28
	16:15	26.01	18.01	1.891	36	3.389	1071.4	1400.3	328.9	864.6	535.7	686.0	4.26
	16:30	26.75	18.53	1.900	35	3.462	1069.9	1400.4	330.5	865.4	534.9	687.1	4.24

Borehole No. :	**WCH-BH10**	**Sample Depth m:- 9.00 - 10.00**	
Sample No. :	**13**	**Specimen Depth m:- 9.80 - 10.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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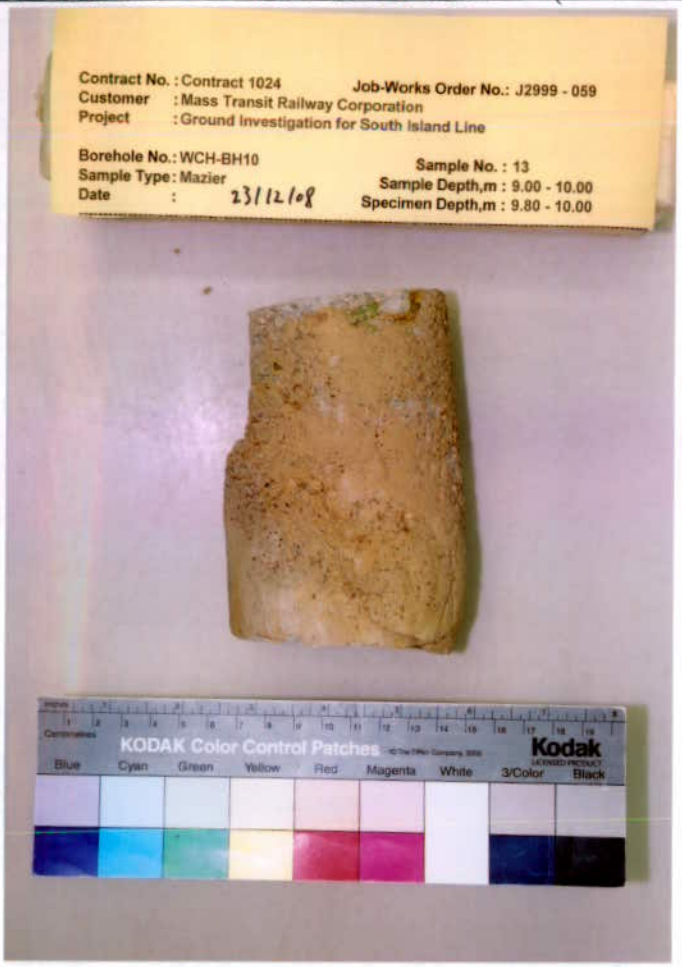
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Dark brown, slightly clayey, very silty, very sandy GRAVEL

Sample Origin : CDT ‡

‡ Information provided by customer

Borehole No. :	**WCH-BH10**	**Sample No. : 13**	**Sample Depth m:- 9.00 - 10.00**
			Specimen Depth m:- 9.80 - 10.00

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No.: Contract 1024
Job No.: J2999
Works Order No.: 059

Compiled by W S Wat

Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH11		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.60 - 3.80		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.0		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	33		
Bulk density	(ρ_o)	Mg/m^3	1.87		
Dry density	(ρ_d)	Mg/m^3	1.41		
Particle density	(ρ_s)		2.65		
Voids Ratio	(e_o)		0.88		
Degree of Saturation	(S_r)	%	97.8		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.97		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	255		
Back Pressure	(u_b)	kPa	220		
Effective Pressure	(σ'_3)	kPa	35		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	80.09		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.59		
Coefficient of Permeability (k)		m/s	1.47E-08		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	31		
Pore Pressure at the End of Consolidation		kPa	220		
Effective Stress at the End of Consolidation		kPa	35		
Bulk density	(ρ_o)	Mg/m^3	1.88		
Dry density	(ρ_d)	Mg/m^3	1.43		
Voids Ratio	(c)		0.85		
Degree of Saturation	(S_r)	%	96.4		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat
Checked By : Name : H W Chung Date : 19/12/2008
Approved By : Signatory : **Lau Wai Cheong** Date : 19/12/2008
Tested Date: 01/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH11		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.60 - 3.80		
COMPRESSION - FAILURE					
Cell Pressure		kPa	255		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	239		
Corrected Deviator Stress (σ'_1 - σ'_3)		kPa	179		
Minor Effective Principal Stress (σ'_3)		kPa	61		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	150		
$t = (\sigma_1 - \sigma_3)/2$		kPa	89		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.14		
Strain at Failure	(εf)	%	18.7		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	31		
Bulk density	(ρ_o)	Mg/m^3	1.88		
Dry density	(ρ_d)	Mg/m^3	1.43		
Voids Ratio	(e_f)		0.85		
Degree of Saturation	(S_f)	%	96.4		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

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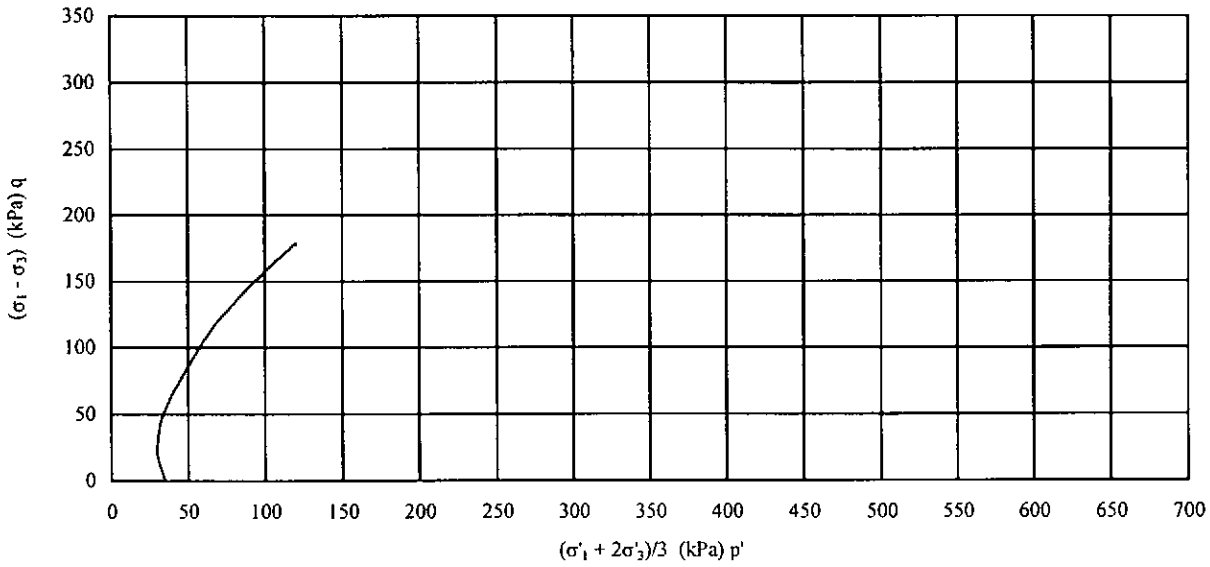
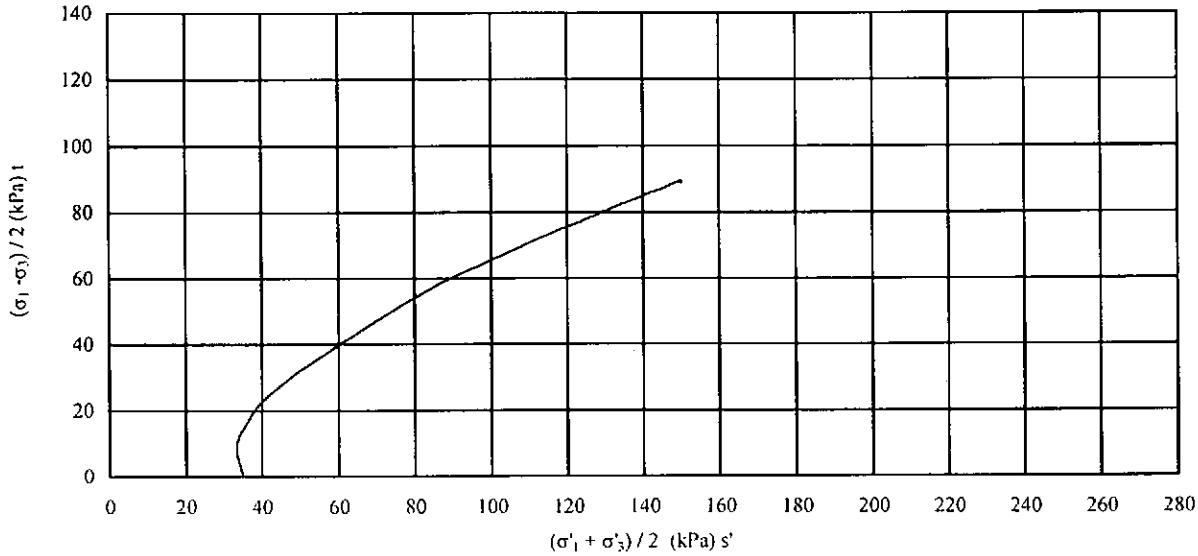
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH11**	**Sample Depth m:-**	**3.00 - 4.00**
Sample No. :	**1**	**Specimen Depth m:-**	**3.60 - 3.80**
Customer :	**Mass Transit Railway Corporation**	Compiled by	W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.:	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
		Checked by	H W Chung

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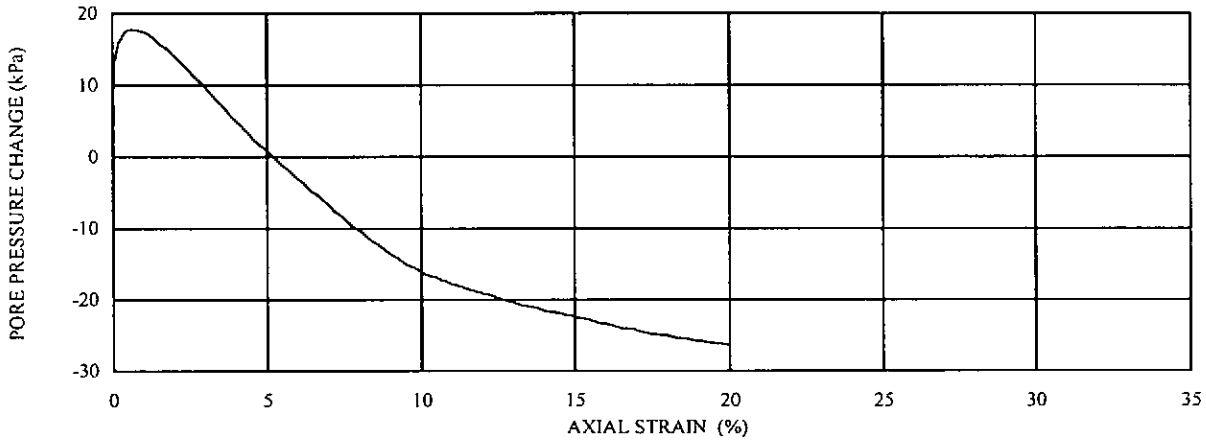
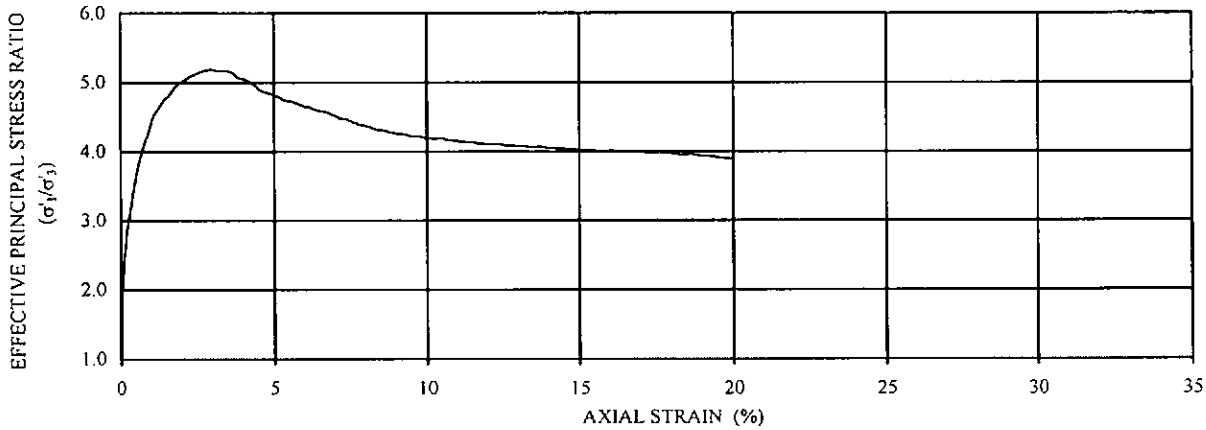
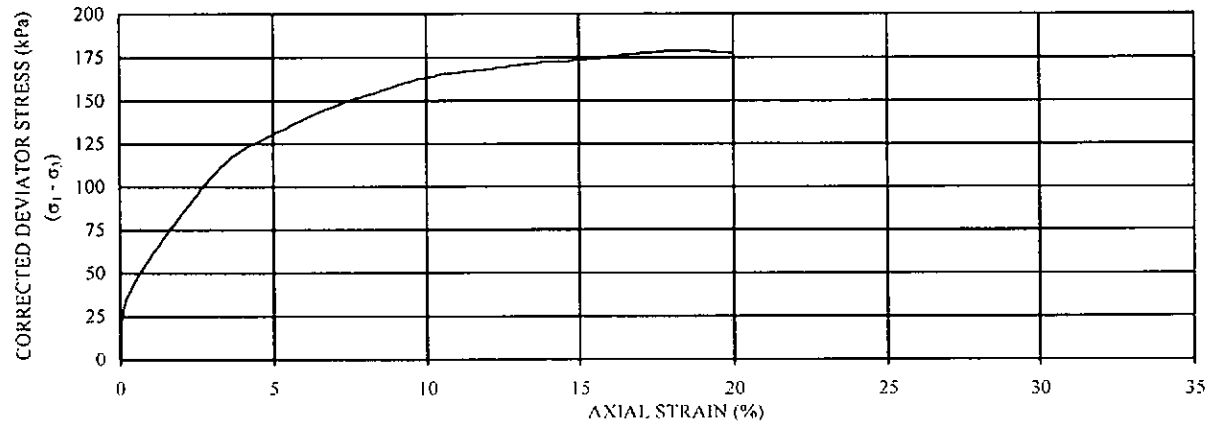
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH11**	**Sample Depth m:-**	**3.00 - 4.00**
Sample No. :	**1**	**Specimen Depth m:-**	**3.60 - 3.80**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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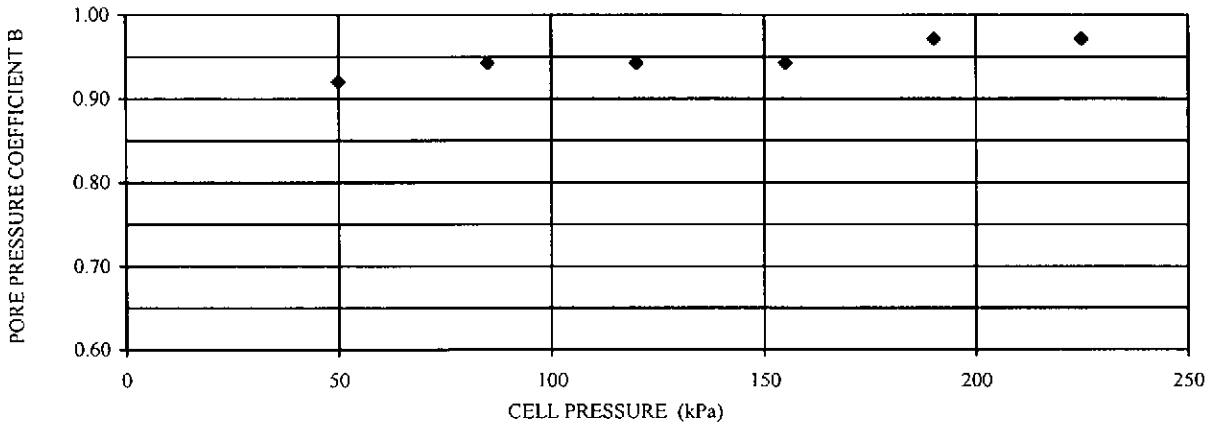
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
02/12/2008	08:30	0	0	-	0.0	
	08:37	25	-	24		-
	08:53	25	20	20	-6.7	
	09:00	50	-	43		0.92
	09:20	50	45	45	-6.2	
	09:27	85	-	78		0.94
	09:48	85	80	80	-5.8	
	09:54	120	-	113		0.94
	10:17	120	115	115	-5.4	
	10:23	155	-	148		0.94
	11:02	155	150	150	-4.7	
	11:10	190	-	184		0.97
	14:04	190	185	185	-4.5	
	14:15	225	-	219		0.97
03/12/2008	09:30	225	220	220	-3.5	

Borehole No. WCH-BH11 — **Sample Depth m:-** 3.00 - 4.00
Sample No. : 1 — **Specimen Depth m:-** 3.60 - 3.80
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

Form : GESR009.11 / Jun.02 03 / Issue 1 / Rev 0

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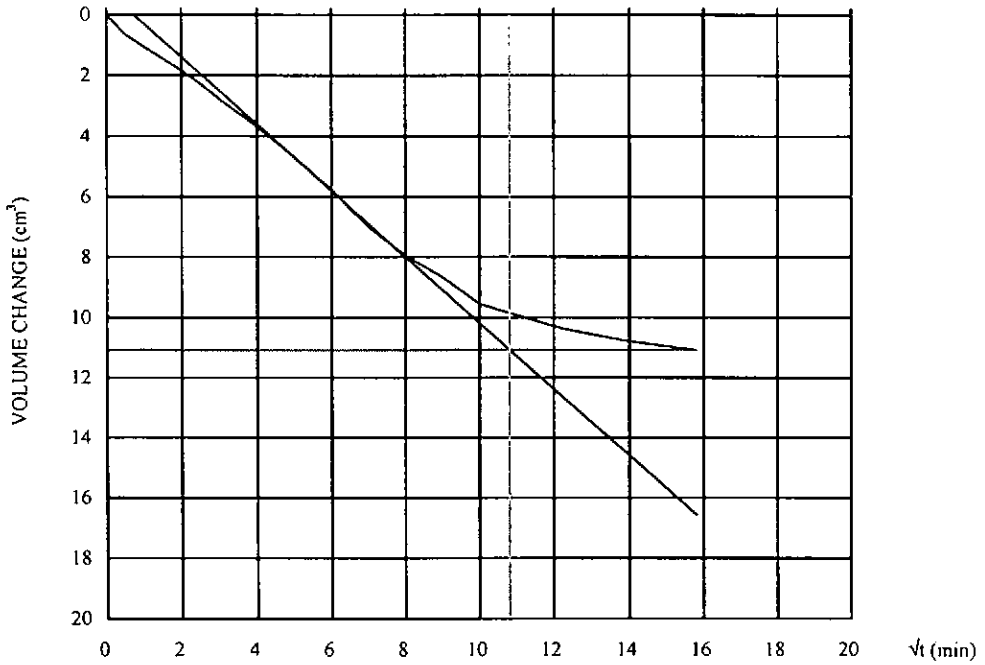
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

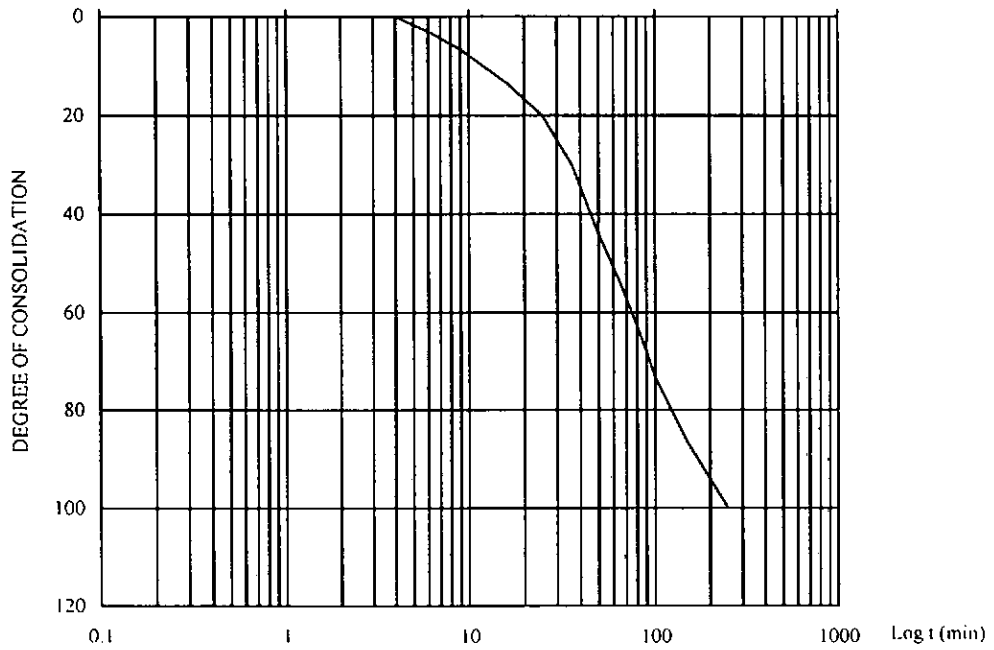


√t100 10.80 min

t100 116.732 min

tf 61.868 min

Calc. strain rate
0.163 mm/min



Borehole No. : WCH-BH11		**Sample Depth m:-** 3.00 - 4.00
Sample No. : 1		**Specimen Depth m:-** 3.60 - 3.80
Customer : Mass Transit Railway Corporation		Complied by
Project : Ground Investigation for South Island Line		W S Wat
	Contract No.: Contract 1024	Checked by
Job No.: J2999	**Works Order No.:** 059	H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage		P.W.P,B.P		Effective Pressure	35 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress ☒	Max. Stress ratio ☐	Axial Strain % ☐
Stage : 1	Applied Pressure (kPa) - Cell : 255	Back : 220
P.R. factor 1.6949 kN/mm		

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 11 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
04/12	08:40	0.00	0.00	0.058	220	0.000	0.0	35.0	35.0	35.0	0.0	35.0	1.00
	08:45	0.05	0.03	0.106	231	0.009	19.1	42.8	23.7	33.3	9.6	30.1	1.81
	08:50	0.26	0.18	0.143	236	0.052	33.8	53.3	19.5	36.4	16.9	30.8	2.73
	08:55	0.46	0.32	0.157	237	0.092	39.3	57.5	18.2	37.8	19.6	31.3	3.16
	09:00	0.68	0.47	0.170	238	0.135	44.3	61.7	17.4	39.6	22.2	32.2	3.55
	09:05	0.91	0.63	0.183	238	0.180	49.4	66.6	17.2	41.9	24.7	33.7	3.87
	09:10	1.15	0.80	0.195	238	0.227	54.0	71.3	17.3	44.3	27.0	35.3	4.12
	09:15	1.35	0.93	0.204	238	0.263	57.5	75.0	17.5	46.2	28.7	36.7	4.28
	09:20	1.56	1.08	0.215	237	0.304	61.7	79.3	17.6	48.4	30.8	38.2	4.50
	09:25	1.80	1.25	0.225	237	0.350	65.5	83.6	18.1	50.8	32.7	39.9	4.62
	09:30	2.07	1.44	0.238	236	0.401	70.4	89.2	18.8	54.0	35.2	42.3	4.74
	09:35	2.28	1.58	0.247	236	0.439	73.8	93.2	19.4	56.3	36.9	44.0	4.80
	09:40	2.55	1.77	0.258	235	0.489	77.9	97.8	19.9	58.9	39.0	45.9	4.91
	09:45	2.72	1.88	0.265	235	0.517	80.5	100.8	20.3	60.6	40.3	47.1	4.97
	09:50	2.99	2.08	0.278	234	0.569	85.4	106.6	21.2	63.9	42.7	49.7	5.03
	09:55	3.22	2.23	0.287	233	0.607	88.7	110.5	21.8	66.2	44.4	51.4	5.07
	10:00	3.46	2.40	0.297	233	0.650	92.4	114.9	22.5	68.7	46.2	53.3	5.11
	10:05	3.70	2.57	0.308	232	0.693	96.5	119.8	23.3	71.6	48.3	55.5	5.14
	10:10	3.96	2.75	0.319	231	0.738	100.6	124.7	24.1	74.4	50.3	57.6	5.17
	10:15	4.20	2.91	0.328	230	0.777	103.8	128.6	24.8	76.7	51.9	59.4	5.19
	10:20	4.36	3.03	0.334	230	0.806	106.0	131.3	25.3	78.3	53.0	60.6	5.19
	10:25	4.60	3.19	0.343	229	0.845	109.3	135.5	26.2	80.8	54.6	62.6	5.17
	10:30	4.83	3.35	0.351	228	0.884	112.1	139.0	26.9	83.0	56.1	64.3	5.17
	10:35	5.04	3.50	0.358	228	0.919	114.6	142.1	27.5	84.8	57.3	65.7	5.17
	10:40	5.33	3.70	0.367	227	0.966	117.8	146.3	28.5	87.4	58.9	67.8	5.13
	10:45	5.52	3.83	0.371	226	0.996	119.1	148.3	29.2	88.8	59.6	68.9	5.08
	10:50	5.75	3.99	0.377	225	1.033	121.2	151.1	29.9	90.5	60.6	70.3	5.05
	10:55	6.00	4.16	0.383	224	1.072	123.2	153.8	30.6	92.2	61.6	71.7	5.03
	11:00	6.14	4.26	0.386	224	1.095	124.2	155.3	31.1	93.2	62.1	72.5	4.99
	11:05	6.34	4.40	0.390	223	1.127	125.5	157.2	31.7	94.5	62.8	73.5	4.96
	11:10	6.59	4.57	0.394	222	1.165	126.8	159.4	32.6	96.0	63.4	74.9	4.89
	11:15	6.86	4.76	0.399	222	1.207	128.4	161.7	33.3	97.5	64.2	76.1	4.86
	11:20	7.14	4.96	0.404	221	1.250	130.0	163.9	33.9	98.9	65.0	77.2	4.83
	11:25	7.30	5.06	0.408	221	1.272	131.3	165.7	34.4	100.1	65.7	78.2	4.82
	11:30	7.54	5.23	0.412	220	1.309	132.6	167.7	35.1	101.4	66.3	79.3	4.78
	11:35	7.75	5.38	0.415	219	1.341	133.5	169.2	35.7	102.4	66.7	80.2	4.74
	11:40	8.00	5.55	0.421	219	1.376	135.4	171.7	36.3	104.0	67.7	81.4	4.73
	11:45	8.26	5.73	0.426	218	1.414	137.0	174.0	37.0	105.5	68.5	82.7	4.70
	11:50	8.49	5.89	0.430	217	1.447	138.3	175.9	37.6	106.7	69.1	83.7	4.68

Borehole No. : WCH-BH11 **Sample Depth m:- 3.00 - 4.00**
Sample No. : 1 **Specimen Depth m:- 3.60 - 3.80**

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage : 1		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 11	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
04/12	11:55	8.68	6.03	0.434	217	1.476	139.5	177.7	38.2	108.0	69.8	84.7	4.65
	12:00	8.85	6.14	0.437	217	1.499	140.5	179.0	38.5	108.7	70.2	85.3	4.65
	12:05	9.18	6.37	0.443	216	1.545	142.3	181.8	39.5	110.7	71.2	86.9	4.60
	12:10	9.40	6.52	0.447	215	1.575	143.5	183.5	40.0	111.8	71.8	87.8	4.59
	12:15	9.68	6.72	0.452	214	1.615	145.0	185.6	40.6	113.1	72.5	88.9	4.57
	12:20	9.90	6.87	0.455	214	1.644	145.9	187.1	41.2	114.1	72.9	89.8	4.54
	12:25	10.14	7.04	0.459	213	1.677	147.1	189.0	41.9	115.4	73.5	90.9	4.51
	12:30	10.37	7.20	0.463	212	1.708	148.3	190.9	42.6	116.7	74.1	92.0	4.48
	12:35	10.57	7.34	0.467	212	1.735	149.5	192.5	43.0	117.7	74.7	92.8	4.48
	12:40	10.74	7.45	0.469	212	1.756	150.0	193.4	43.4	118.4	75.0	93.4	4.46
	12:45	11.09	7.69	0.474	211	1.801	151.4	195.8	44.4	120.1	75.7	94.9	4.41
	12:50	11.28	7.83	0.476	210	1.827	151.9	196.8	44.9	120.9	76.0	95.5	4.38
	12:55	11.48	7.96	0.479	210	1.851	152.8	198.0	45.2	121.6	76.4	96.1	4.38
	13:00	11.68	8.11	0.482	209	1.879	153.6	199.3	45.7	122.5	76.8	96.9	4.36
	13:05	12.03	8.35	0.486	208	1.923	154.6	201.2	46.6	123.9	77.3	98.1	4.32
	13:10	12.26	8.50	0.490	208	1.950	155.8	202.8	47.0	124.9	77.9	98.9	4.31
	13:15	12.52	8.69	0.494	207	1.984	156.9	204.5	47.6	126.0	78.4	99.9	4.30
	13:20	12.70	8.81	0.496	207	2.005	157.4	205.4	48.0	126.7	78.7	100.5	4.28
	13:25	13.02	9.03	0.501	206	2.044	158.8	207.5	48.7	128.1	79.4	101.6	4.26
	13:30	13.26	9.20	0.505	206	2.074	159.9	209.0	49.1	129.0	79.9	102.4	4.26
	13:35	13.45	9.33	0.508	206	2.096	160.7	210.2	49.5	129.9	80.4	103.1	4.25
	13:40	13.66	9.48	0.510	205	2.122	161.1	211.1	50.0	130.6	80.6	103.7	4.22
	13:45	13.99	9.70	0.515	205	2.159	162.5	212.9	50.4	131.7	81.3	104.6	4.22
	13:50	14.20	9.85	0.516	204	2.185	162.6	213.3	50.7	132.0	81.3	104.9	4.21
	13:55	14.40	9.99	0.519	204	2.208	163.4	214.5	51.1	132.8	81.7	105.6	4.20
	14:00	14.64	10.16	0.521	204	2.237	163.7	215.2	51.5	133.4	81.9	106.1	4.18
	14:05	14.80	10.27	0.523	203	2.255	164.2	215.9	51.7	133.8	82.1	106.4	4.18
	14:10	15.06	10.45	0.527	203	2.285	165.3	217.1	51.8	134.5	82.7	106.9	4.19
	14:15	15.37	10.66	0.529	203	2.319	165.6	217.9	52.3	135.1	82.8	107.5	4.17
	14:20	15.52	10.77	0.530	203	2.337	165.7	218.1	52.4	135.3	82.9	107.6	4.16
	14:25	15.74	10.92	0.532	202	2.361	166.1	218.8	52.7	135.8	83.1	108.1	4.15
	14:30	16.00	11.10	0.534	202	2.390	166.5	219.4	52.9	136.1	83.2	108.4	4.15
	14:35	16.22	11.25	0.536	202	2.414	166.9	220.0	53.1	136.5	83.4	108.7	4.14
	14:40	16.47	11.43	0.538	202	2.443	167.2	220.6	53.4	137.0	83.6	109.1	4.13
	14:45	16.71	11.59	0.540	201	2.468	167.6	221.2	53.6	137.4	83.8	109.5	4.13
	14:50	16.94	11.75	0.541	201	2.493	167.6	221.4	53.8	137.6	83.8	109.7	4.12
	14:55	17.15	11.90	0.543	201	2.516	168.0	222.0	54.0	138.0	84.0	110.0	4.11
	15:00	17.41	12.08	0.545	201	2.544	168.3	222.5	54.2	138.4	84.2	110.3	4.11
	15:05	17.72	12.30	0.548	201	2.578	168.9	223.3	54.4	138.9	84.5	110.7	4.10
	15:10	17.87	12.40	0.550	200	2.593	169.4	224.0	54.6	139.3	84.7	111.1	4.10
	15:15	18.15	12.59	0.551	200	2.622	169.3	224.2	54.9	139.6	84.7	111.3	4.08

Borehole No. : WCH-BH11 — **Sample Depth m:-** 3.00 - 4.00

Sample No. : 1 — **Specimen Depth m:-** 3.60 - 3.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by: W S Wat

Checked by: H W Chung

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Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 11	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
04/12	15:20	18.35	12.73	0.554	200	2.643	170.1	225.2	55.1	140.1	85.0	111.8	4.09
	15:25	18.58	12.89	0.556	200	2.667	170.4	225.6	55.2	140.4	85.2	112.0	4.09
	15:30	18.85	13.08	0.558	200	2.696	170.7	226.2	55.5	140.9	85.4	112.4	4.08
	15:35	19.09	13.24	0.560	199	2.720	171.1	226.8	55.7	141.2	85.5	112.7	4.07
	15:40	19.31	13.40	0.561	199	2.743	171.1	227.0	55.9	141.4	85.5	112.9	4.06
	15:45	19.55	13.56	0.563	199	2.767	171.4	227.4	56.0	141.7	85.7	113.1	4.06
	15:50	19.78	13.73	0.566	199	2.792	172.1	228.2	56.1	142.1	86.0	113.5	4.07
	15:55	20.01	13.89	0.568	199	2.815	172.4	228.8	56.4	142.6	86.2	113.9	4.06
	16:00	20.25	14.05	0.569	198	2.839	172.4	229.0	56.6	142.8	86.2	114.1	4.05
	16:05	20.51	14.23	0.571	198	2.865	172.7	229.4	56.7	143.1	86.4	114.3	4.05
	16:10	20.73	14.38	0.572	198	2.886	172.7	229.5	56.8	143.2	86.4	114.4	4.04
	16:15	20.97	14.55	0.573	198	2.911	172.7	229.6	56.9	143.2	86.3	114.5	4.04
	16:20	21.20	14.71	0.575	198	2.934	173.0	230.1	57.1	143.6	86.5	114.8	4.03
	16:25	21.45	14.88	0.577	198	2.958	173.3	230.5	57.2	143.9	86.7	115.0	4.03
	16:30	21.68	15.04	0.578	198	2.981	173.3	230.8	57.5	144.2	86.7	115.3	4.01
	16:35	21.97	15.25	0.581	197	3.011	173.9	231.5	57.6	144.5	86.9	115.6	4.02
	16:40	22.16	15.38	0.583	197	3.029	174.2	231.9	57.7	144.8	87.1	115.8	4.02
	16:45	22.38	15.53	0.584	197	3.051	174.3	232.2	57.9	145.0	87.1	116.0	4.01
	16:50	22.64	15.71	0.586	197	3.076	174.5	232.7	58.2	145.5	87.3	116.4	4.00
	16:55	22.89	15.89	0.589	197	3.101	175.1	233.5	58.4	146.0	87.6	116.8	4.00
	17:00	23.09	16.02	0.592	197	3.120	175.8	234.2	58.4	146.3	87.9	117.0	4.01
	17:05	23.36	16.21	0.593	196	3.146	175.7	234.3	58.6	146.5	87.9	117.2	4.00
	17:10	23.58	16.36	0.596	196	3.167	176.4	235.2	58.8	147.0	88.2	117.6	4.00
	17:15	23.82	16.53	0.598	196	3.191	176.7	235.7	59.0	147.3	88.3	117.9	3.99
	17:20	24.07	16.70	0.600	196	3.215	176.9	235.9	59.0	147.5	88.5	118.0	4.00
	17:25	24.33	16.88	0.602	196	3.240	177.2	236.3	59.1	147.7	88.6	118.2	4.00
	17:30	24.59	17.06	0.604	196	3.265	177.4	236.8	59.4	148.1	88.7	118.5	3.99
	17:35	24.85	17.24	0.605	195	3.290	177.3	236.9	59.6	148.3	88.7	118.7	3.98
	17:40	25.13	17.43	0.608	195	3.317	177.9	237.7	59.8	148.7	88.9	119.1	3.97
	17:45	25.36	17.60	0.610	195	3.340	178.2	238.0	59.8	148.9	89.1	119.2	3.98
	17:50	25.62	17.78	0.612	195	3.365	178.4	238.4	60.0	149.2	89.2	119.5	3.97
	17:55	25.89	17.97	0.614	195	3.392	178.6	238.6	60.0	149.3	89.3	119.5	3.98
	18:00	26.14	18.14	0.615	195	3.416	178.5	238.7	60.2	149.5	89.3	119.7	3.97
	18:05	26.42	18.33	0.616	195	3.442	178.4	238.8	60.4	149.6	89.2	119.9	3.95
	18:10	26.67	18.51	0.618	195	3.467	178.6	239.0	60.4	149.7	89.3	119.9	3.96
	18:15	**26.95**	**18.70**	**0.620**	**195**	**3.494**	**178.8**	**239.3**	**60.5**	**149.9**	**89.4**	**120.1**	**3.96**
	18:20	27.19	18.87	0.621	194	3.518	178.8	239.5	60.7	150.1	89.4	120.3	3.94
	18:25	27.53	19.10	0.622	194	3.550	178.5	239.3	60.8	150.1	89.3	120.3	3.94
	18:30	27.86	19.33	0.623	194	3.582	178.3	239.3	61.0	150.1	89.1	120.4	3.92
	18:35	28.15	19.54	0.623	194	3.612	177.8	238.9	61.1	150.0	88.9	120.4	3.91
	18:40	28.45	19.74	0.624	194	3.640	177.6	238.8	61.2	150.0	88.8	120.4	3.90

Borehole No. : WCH-BH11 — **Sample Depth m:- 3.00 - 4.00**

Sample No. : 1 — **Specimen Depth m:- 3.60 - 3.80**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress	☒	Max. Stress ratio	☐	Axial Strain %	☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 11	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
04/12	18:45	28.83	20.01	0.625	194	3.678	177.3	238.7	61.4	150.1	88.7	120.5	3.89

Borehole No. : WCH-BH11 **Sample Depth m:-** 3.00 - 4.00
Sample No. : 1 **Specimen Depth m:-** 3.60 - 3.80

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 **Works Order No.:** 059

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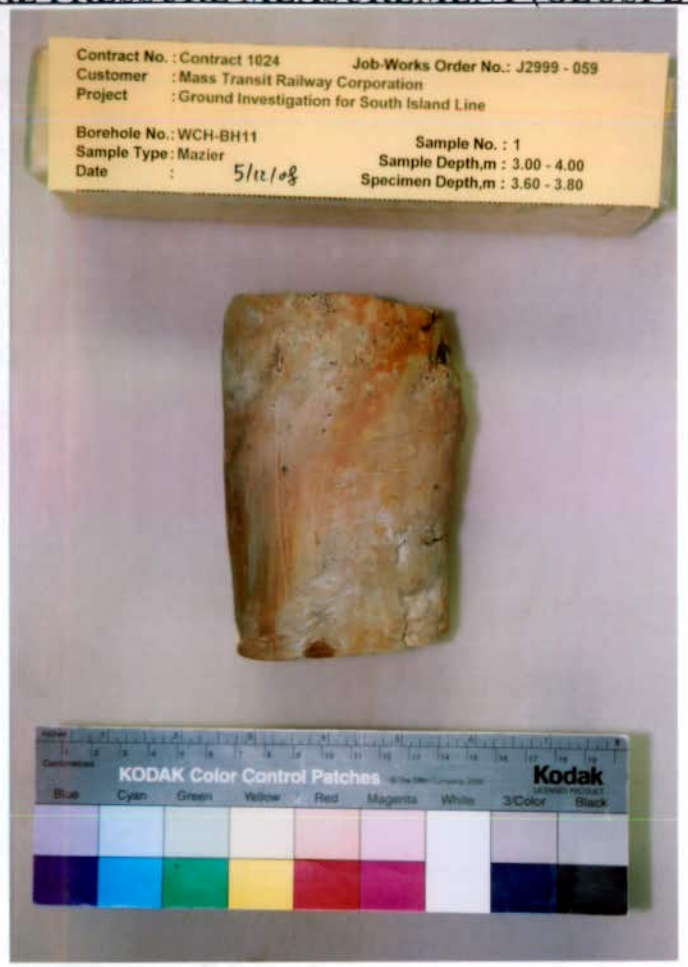
Form : GESR009.15 / Dec.13.04 / Issue 17 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Orangish brown, slightly gravelly, sandy SILT/CLAY **Sample Origin : CDT‡** ‡ Information provided by customer

Borehole No. : WCH-BH11 **Sample No. : 1** **Sample Depth m:- 3.00 - 4.00** **Specimen Depth m:- 3.60 - 3.80**

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024
Job No. : J2999
Works Order No.: 059

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH11		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.80 - 4.00		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.0		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	28		
Bulk density	(ρ_o)	Mg/m^3	1.91		
Dry density	(ρ_d)	Mg/m^3	1.49		
Particle density	(ρ_s)		2.65		
Voids Ratio	(e_o)		0.78		
Degree of Saturation	(S_r)	%	95.5		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			1.00		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	245		
Back Pressure	(u_b)	kPa	205		
Effective Pressure	(σ'_3)	kPa	40		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	913.39		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.47		
Coefficient of Permeability (k)		m/s	1.33E-07		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	27		
Pore Pressure at the End of Consolidation		kPa	205		
Effective Stress at the End of Consolidation		kPa	40		
Bulk density	(ρ_o)	Mg/m^3	1.92		
Dry density	(ρ_d)	Mg/m^3	1.52		
Voids Ratio	(e)		0.75		
Degree of Saturation	(S_r)	%	95.1		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**

Report No. : J2999-059.11

Technician : W S Wat Checked By : Name : H W Chung Approved By : Signatory : **Lau Wai Cheong**

Tested Date: 01/12/2008 Date : 19/12/2008 Date : 19/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH11		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.80 - 4.00		
COMPRESSION - FAILURE					
Cell Pressure		kPa	245		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	135		
Corrected Deviator Stress (σ'_1 - σ'_3)		kPa	104		
Minor Effective Principal Stress (σ'_3)		kPa	32		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	84		
$t = (\sigma_1 - \sigma_3)/2$		kPa	52		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			0.08		
Strain at Failure	(εf)	%	6.6		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	27		
Bulk density	(ρ_o)	Mg/m^3	1.92		
Dry density	(ρ_d)	Mg/m^3	1.52		
Voids Ratio	(e_f)		0.75		
Degree of Saturation	(S_f)	%	95.1		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

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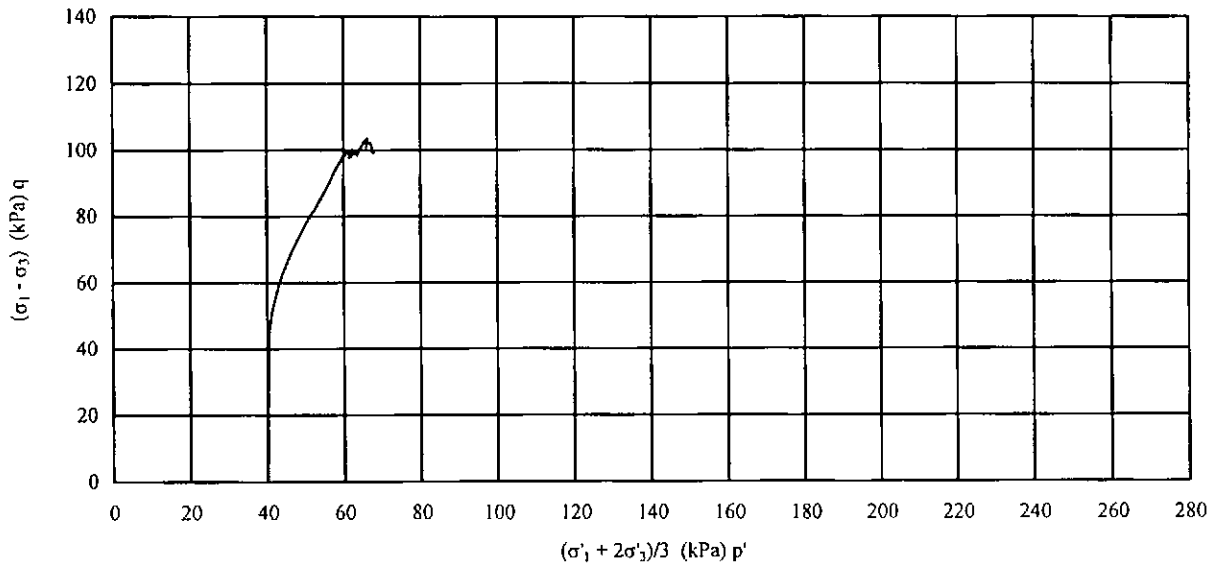
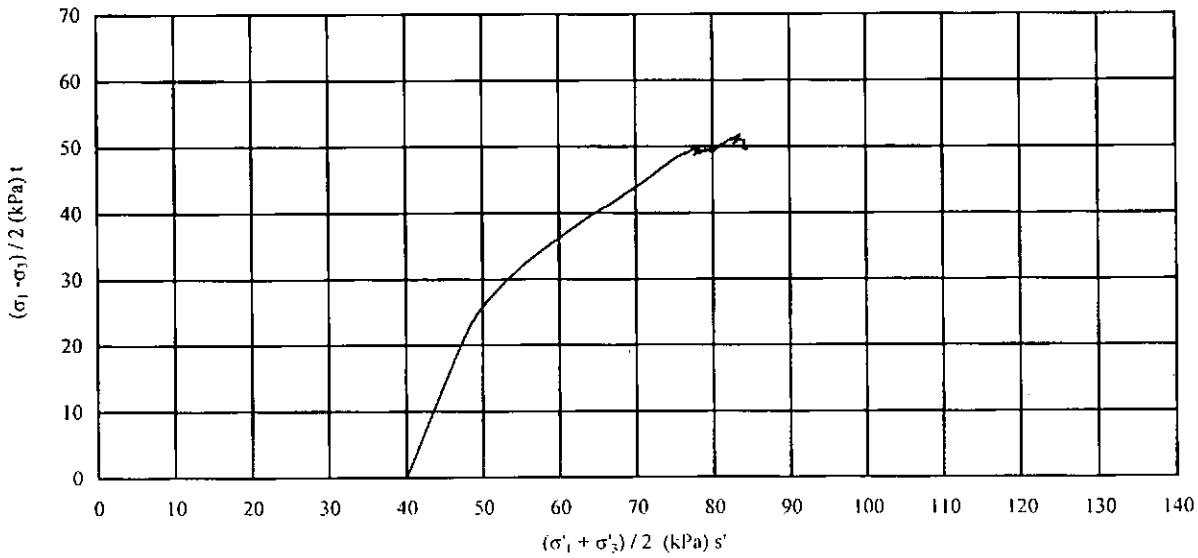
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH11**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.80 - 4.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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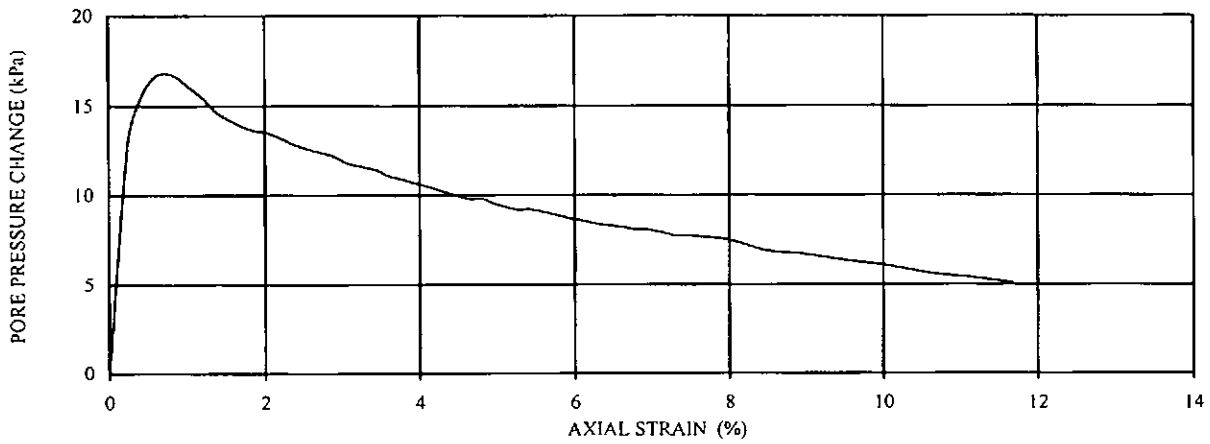
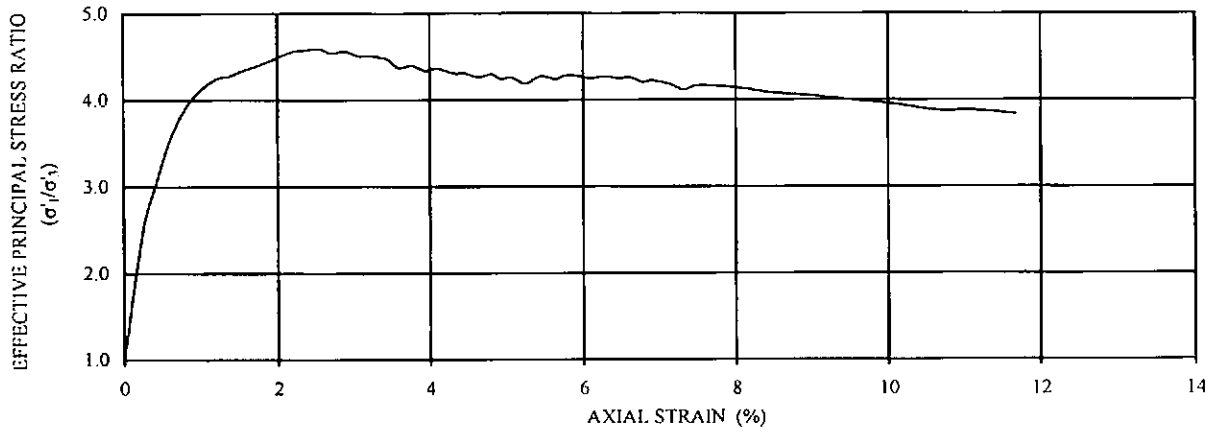
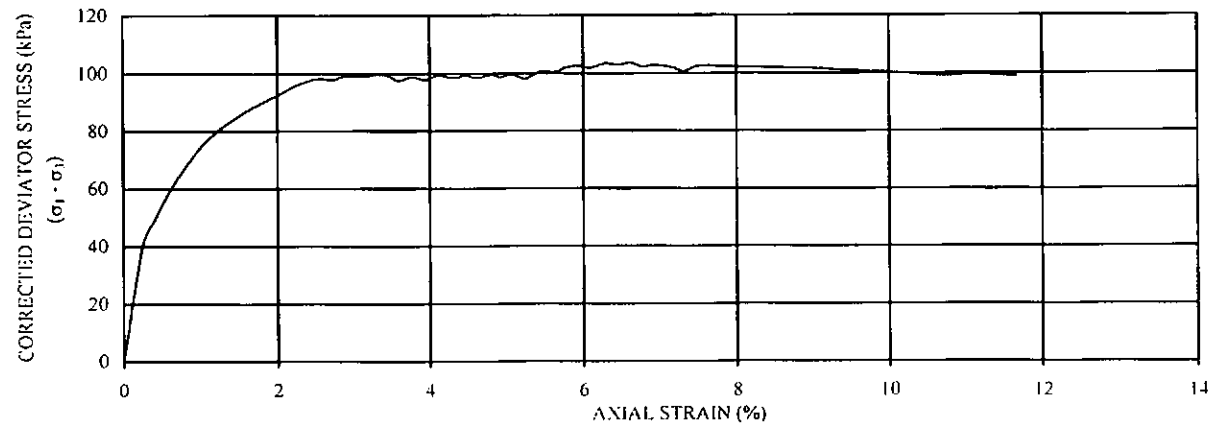
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH11**	**Sample Depth m:-**	**3.00 - 4.00**
Sample No. :	**1**	**Specimen Depth m:-**	**3.80 - 4.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.:**	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
			Checked by H W Chung

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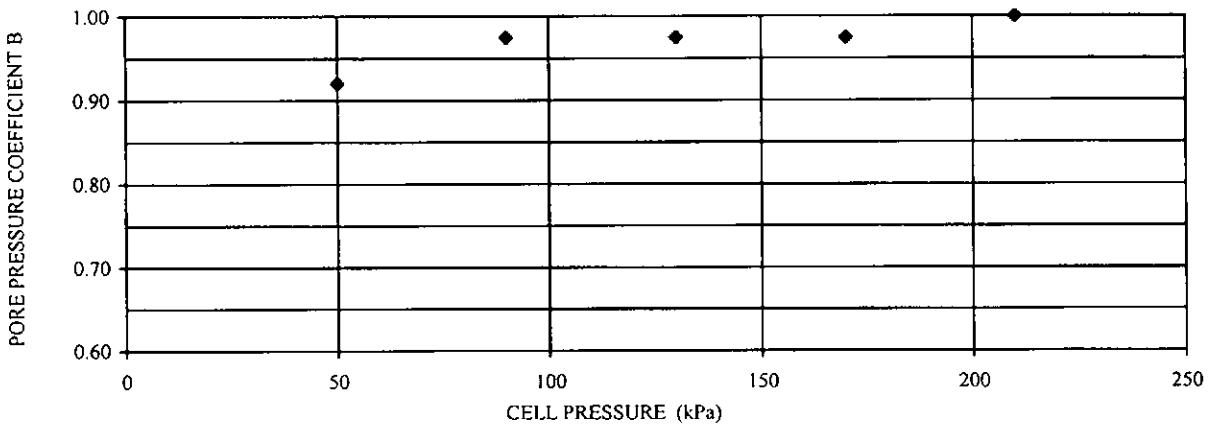
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
01/12/2008	16:26	0	0	-	0.0	
	16:38	25	-	24		-
02/12/2008	08:36	25	20	20	-3.9	
	08:42	50	-	43		0.92
	09:03	50	45	45	-3.2	
	09:11	90	-	84		0.98
	09:27	90	85	85	-2.9	
	09:33	130	-	124		0.98
	10:04	130	125	125	-2.1	
	10:12	170	-	164		0.98
	11:40	170	165	165	-1.3	
	11:49	210	-	205		1.00
03/12/2008	11:19	210	205	205	-0.5	

Borehole No. WCH-BH11 — **Sample Depth m:-** 3.00 - 4.00
Sample No. : 1 — **Specimen Depth m:-** 3.80 - 4.00
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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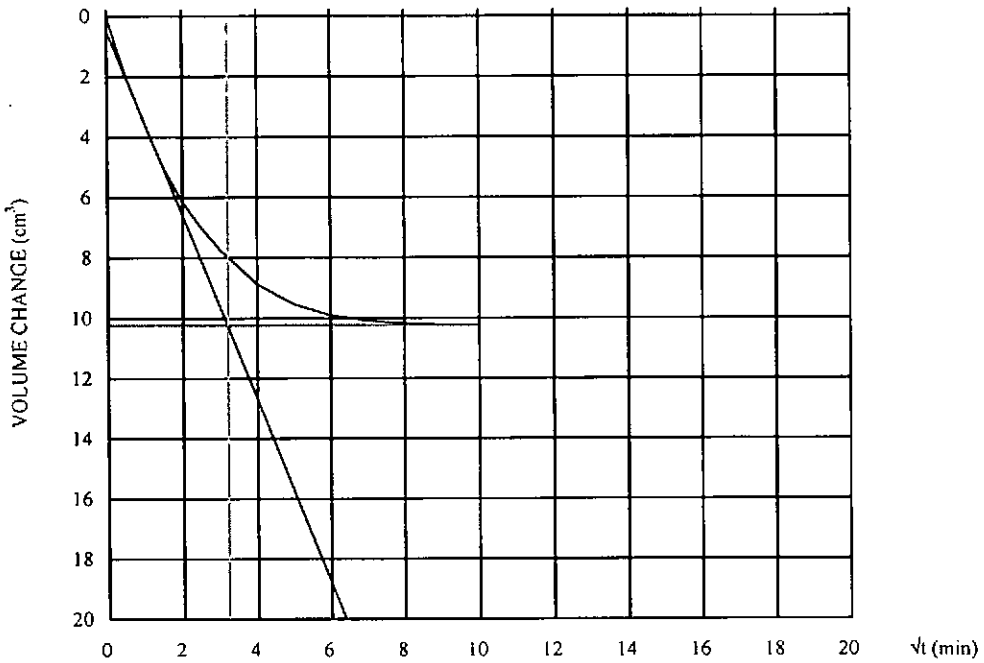
Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

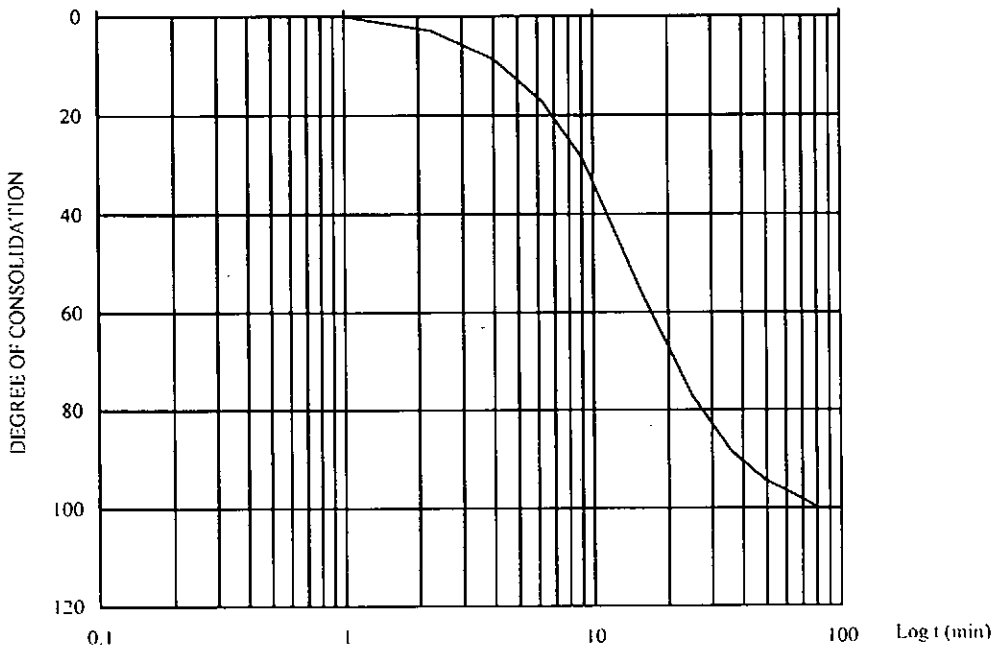


√t100 3.20 min

t100 10.230 min

tf 5.422 min

Calc. strain rate
1.862 mm/min



Borehole No. :	**WCH-BH11**	**Sample Depth m:-**	**3.00 - 4.00**
Sample No. :	**1**	**Specimen Depth m:-**	**3.80 - 4.00**
Customer :	**Mass Transit Railway Corporation**		Complied by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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GEOSPEC 3 : 2001 Test Method 15.2

Single Stage		P.W.P,B.P		Effective Pressure	40 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress	☒	Max. Stress ratio	☐	Axial Strain %	☐
Stage : 1	Applied Pressure (kPa) - Cell :	245	Back : 205	P.R. factor	1.7999 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 13 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
04/12	08:35	0.00	0.00	0.059	205	0.000	0.0	40.0	40.0	40.0	0.0	40.0	1.00
	08:40	0.37	0.25	0.155	218	0.072	40.5	67.5	27.0	47.2	20.2	40.5	2.50
	08:45	0.59	0.41	0.176	220	0.118	49.2	73.8	24.6	49.2	24.6	41.0	3.00
	08:50	0.83	0.57	0.196	222	0.163	57.5	81.0	23.5	52.3	28.8	42.7	3.45
	08:55	1.03	0.71	0.211	222	0.202	63.7	86.9	23.2	55.1	31.9	44.4	3.75
	09:00	1.26	0.87	0.226	222	0.247	69.9	93.3	23.4	58.3	34.9	46.7	3.99
	09:05	1.50	1.04	0.240	221	0.293	75.6	99.6	24.0	61.8	37.8	49.2	4.15
	09:10	1.76	1.22	0.251	220	0.342	80.0	104.6	24.6	64.6	40.0	51.3	4.25
	09:15	1.95	1.36	0.258	220	0.380	82.8	108.1	25.3	66.7	41.4	52.9	4.27
	09:20	2.18	1.51	0.265	219	0.420	85.5	111.2	25.7	68.5	42.8	54.2	4.33
	09:25	2.43	1.68	0.272	219	0.465	88.2	114.3	26.1	70.2	44.1	55.5	4.38
	09:30	2.71	1.88	0.279	219	0.517	90.9	117.3	26.4	71.9	45.5	56.7	4.44
	09:35	2.93	2.03	0.284	219	0.556	92.8	119.3	26.5	72.9	46.4	57.4	4.50
	09:40	3.18	2.21	0.291	218	0.602	95.5	122.3	26.8	74.6	47.8	58.6	4.56
	09:45	3.39	2.35	0.295	218	0.638	97.0	124.1	27.1	75.6	48.5	59.4	4.58
	09:50	3.68	2.55	0.299	218	0.688	98.4	125.8	27.4	76.6	49.2	60.2	4.59
	09:55	3.92	2.72	0.298	217	0.731	97.8	125.4	27.6	76.5	48.9	60.2	4.54
	10:00	4.17	2.89	0.302	217	0.773	99.2	127.0	27.8	77.4	49.6	60.9	4.57
	10:05	4.43	3.08	0.302	217	0.819	99.0	127.2	28.2	77.7	49.5	61.2	4.51
	10:10	4.71	3.27	0.304	217	0.865	99.5	127.9	28.4	78.2	49.8	61.6	4.50
	10:15	4.99	3.46	0.304	216	0.910	99.3	127.9	28.6	78.2	49.6	61.7	4.47
	10:20	5.17	3.59	0.300	216	0.941	97.5	126.4	28.9	77.6	48.7	61.4	4.37
	10:25	5.44	3.77	0.304	216	0.983	98.9	128.0	29.1	78.5	49.4	62.1	4.40
	10:30	5.68	3.94	0.302	216	1.022	97.9	127.2	29.3	78.2	48.9	61.9	4.34
	10:35	5.91	4.10	0.306	216	1.059	99.3	128.8	29.5	79.1	49.6	62.6	4.37
	10:40	6.22	4.31	0.305	215	1.107	98.6	128.4	29.8	79.1	49.3	62.7	4.31
	10:45	6.43	4.46	0.307	215	1.140	99.2	129.2	30.0	79.6	49.6	63.1	4.31
	10:50	6.67	4.63	0.306	215	1.178	98.6	128.8	30.2	79.5	49.3	63.1	4.27
	10:55	6.94	4.81	0.309	215	1.218	99.6	129.8	30.2	80.0	49.8	63.4	4.30
	11:00	7.09	4.92	0.307	215	1.242	98.6	129.0	30.4	79.7	49.3	63.3	4.24
	11:05	7.31	5.07	0.310	214	1.274	99.7	130.3	30.6	80.4	49.8	63.8	4.26
	11:10	7.57	5.25	0.307	214	1.313	98.2	129.0	30.8	79.9	49.1	63.5	4.19
	11:15	7.84	5.44	0.314	214	1.354	100.8	131.6	30.8	81.2	50.4	64.4	4.27
	11:20	8.15	5.65	0.314	214	1.398	100.5	131.5	31.0	81.3	50.3	64.5	4.24
	11:25	8.31	5.76	0.318	214	1.421	102.0	133.1	31.1	82.1	51.0	65.1	4.28
	11:30	8.55	5.93	0.320	214	1.456	102.5	133.8	31.3	82.6	51.3	65.5	4.28
	11:35	8.78	6.09	0.319	214	1.489	101.9	133.3	31.4	82.4	51.0	65.4	4.25
	11:40	9.03	6.27	0.323	213	1.525	103.3	134.9	31.6	83.3	51.7	66.0	4.27
	11:45	9.32	6.46	0.323	213	1.564	103.0	134.7	31.7	83.2	51.5	66.0	4.25

Borehole No. :	**WCH-BH11**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.80 - 4.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	I	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 13	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
04/12	**11:50**	**9.55**	**6.62**	**0.325**	**213**	**1.595**	**103.6**	**135.4**	**31.8**	**83.6**	**51.8**	**66.3**	**4.26**
	11:55	9.77	6.77	0.322	213	1.625	102.2	134.1	31.9	83.0	51.1	66.0	4.20
	12:00	9.95	6.90	0.324	213	1.651	102.9	134.8	31.9	83.3	51.4	66.2	4.22
	12:05	10.29	7.14	0.323	213	1.697	102.2	134.3	32.1	83.2	51.1	66.2	4.18
	12:10	10.54	7.31	0.320	213	1.730	100.8	133.1	32.3	82.7	50.4	65.9	4.12
	12:15	10.83	7.51	0.325	213	1.768	102.4	134.7	32.3	83.5	51.2	66.4	4.17
	12:30	11.51	7.98	0.326	213	1.856	102.2	134.7	32.5	83.6	51.1	66.6	4.15
	12:45	12.23	8.48	0.327	212	1.947	102.0	135.1	33.1	84.1	51.0	67.1	4.08
	13:00	12.94	8.97	0.328	212	2.034	101.7	135.0	33.3	84.1	50.8	67.2	4.05
	13:15	13.81	9.58	0.328	211	2.140	100.9	134.6	33.7	84.1	50.4	67.3	3.99
	13:30	14.61	10.13	0.328	211	2.232	100.2	134.2	34.0	84.1	50.1	67.4	3.95
	13:45	15.37	10.66	0.327	211	2.320	99.1	133.5	34.4	84.0	49.6	67.4	3.88
	14:00	16.06	11.14	0.330	210	2.397	99.6	134.2	34.6	84.4	49.8	67.8	3.88
	14:15	16.83	11.67	0.330	210	2.481	98.9	133.8	34.9	84.4	49.5	67.9	3.83

Borehole No. : WCH-BH11 — **Sample Depth m:- 3.00 - 4.00**

Sample No. : 1 — **Specimen Depth m:- 3.80 - 4.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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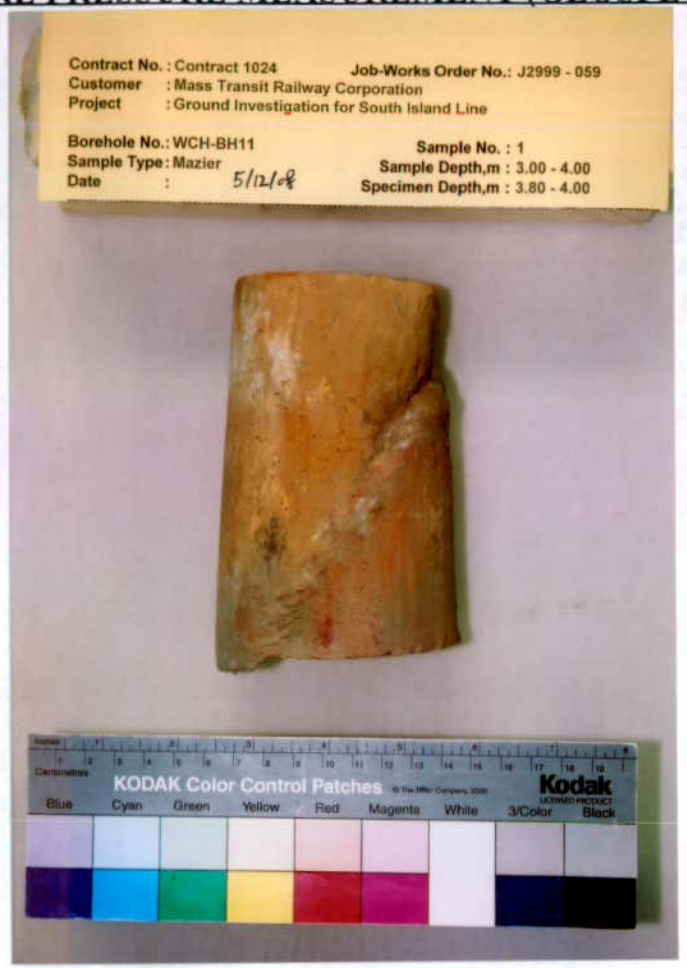
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Orangish brown, slightly gravelly, sandy SILT/CLAY

Sample Origin : CDT‡

‡ Information provided by customer

Borehole No. : WCH-BH11	Sample No. : 1	Sample Depth m:- 3.00 - 4.00	Specimen Depth m:- 3.80 - 4.00

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024
Job No. : J2999
Works Order No.: 059

Compiled by W S Wat

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH11		
Sample		no	5		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	5.00 - 6.00		
Specimen Depth		m	5.60 - 5.80		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	73.9		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	30		
Bulk density	(ρ_o)	Mg/m^3	1.88		
Dry density	(ρ_d)	Mg/m^3	1.44		
Particle density	(ρ_s)		2.65		
Voids Ratio	(e_o)		0.83		
Degree of Saturation	(S_r)	%	95.7		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.98		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	275		
Back Pressure	(u_b)	kPa	220		
Effective Pressure	(σ'_3)	kPa	55		
Coefficient of Consolidation (t100)	(C_{vi})	m^2/Year	1239.13		
Coefficient of Volume Compressibility	(m_{vi})	m^2/MN	0.34		
Coefficient of Permeability (k)		m/s	1.33E-07		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	29		
Pore Pressure at the End of Consolidation		kPa	220		
Effective Stress at the End of Consolidation		kPa	55		
Bulk density	(ρ_o)	Mg/m^3	1.89		
Dry density	(ρ_d)	Mg/m^3	1.47		
Voids Ratio	(e)		0.80		
Degree of Saturation	(S_r)	%	95.0		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: **Contract 1024**
Job No.: **J2999**
Works Order No.: **059**
Report No. : J2999-059.11

Technician : W S Wat
Checked By : Name : H W Chung
Approved By : Signatory : **Lau Wai Cheong**
Tested Date: 28/11/2008
Date : 19/12/2008
Date : 19/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH11		
Sample		no	5		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	5.00 - 6.00		
Specimen Depth		m	5.60 - 5.80		
COMPRESSION - FAILURE					
Cell Pressure		kPa	275		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	281		
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	220		
Minor Effective Principal Stress (σ'_3)		kPa	61		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	171		
$t = (\sigma_1 - \sigma_3)/2$		kPa	110		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.03		
Strain at Failure	(εf)	%	15.7		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	29		
Bulk density	(ρ_o)	Mg/m^3	1.89		
Dry density	(ρ_d)	Mg/m^3	1.47		
Voids Ratio	(e_f)		0.80		
Degree of Saturation	(S_f)	%	95.0		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

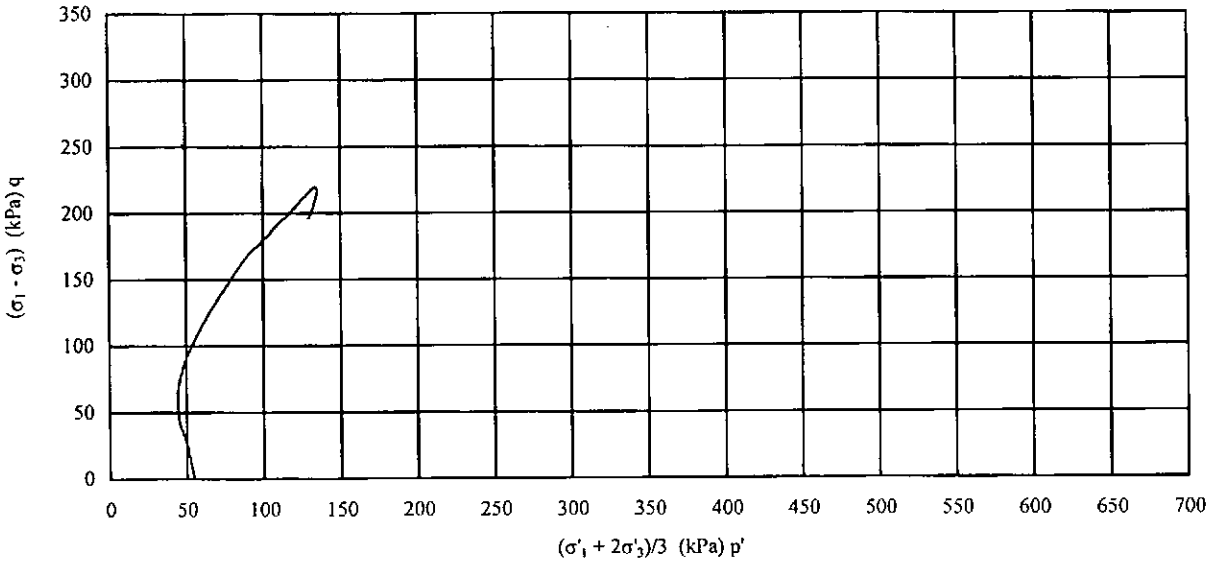
Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

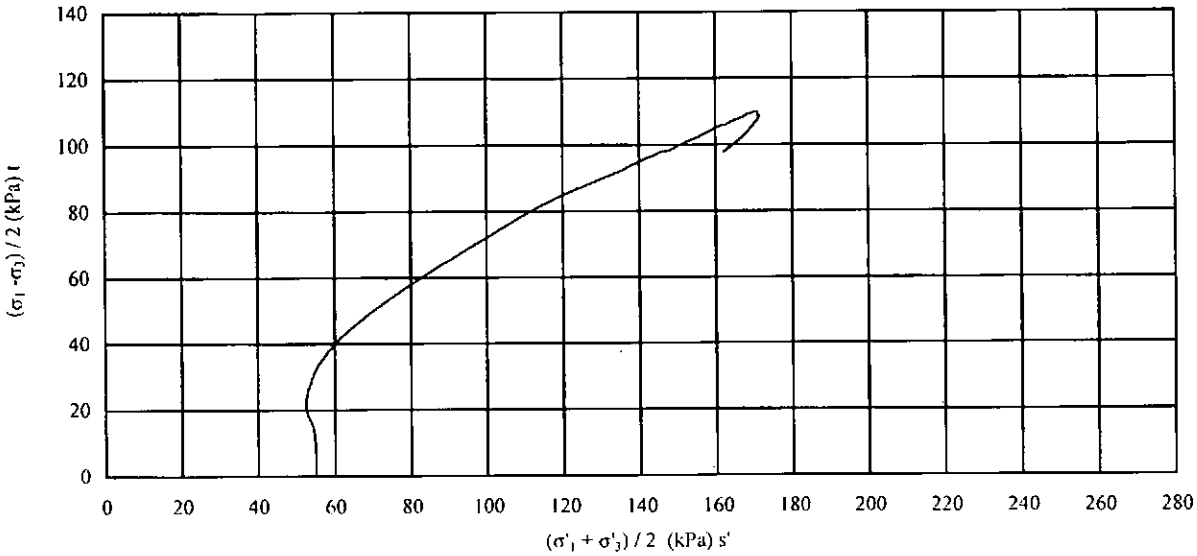
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH11**	**Sample Depth m:-**	**5.00 - 6.00**
Sample No. :	**5**	**Specimen Depth m:-**	**5.60 - 5.80**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

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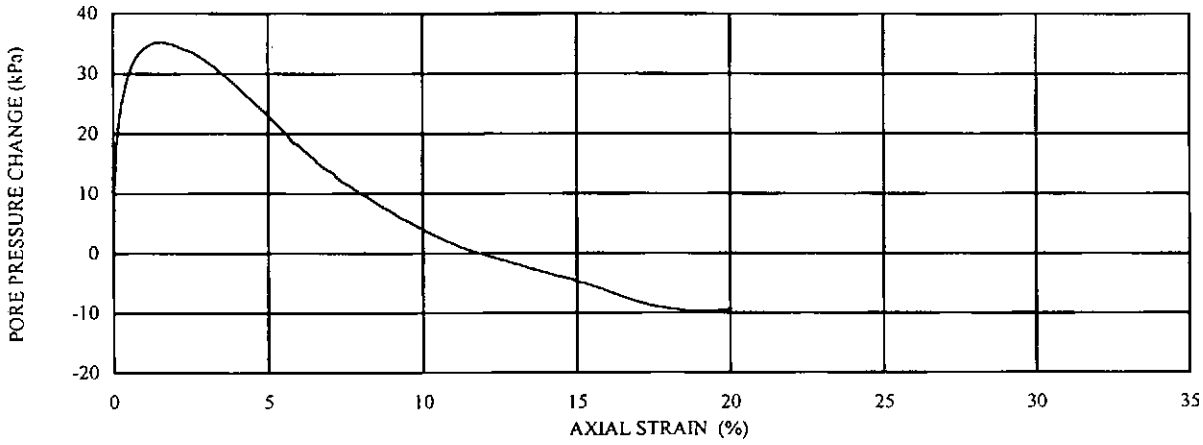
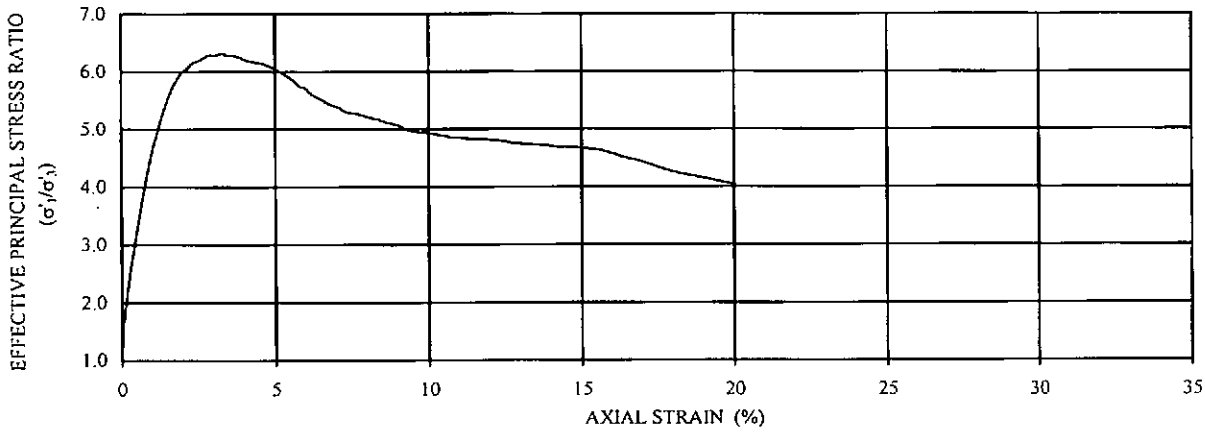
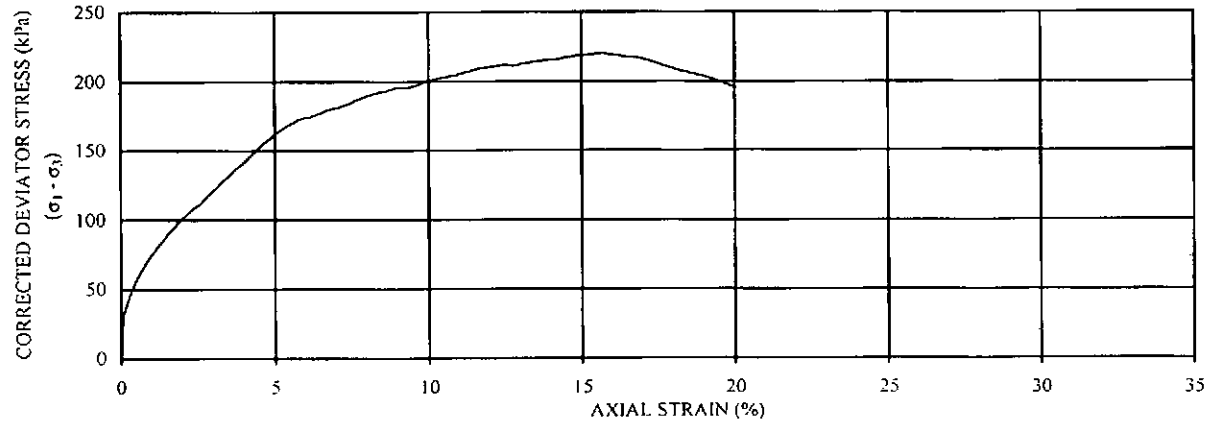
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH11**	**Sample Depth m:-**	**5.00 - 6.00**
Sample No. :	**5**	**Specimen Depth m:-**	**5.60 - 5.80**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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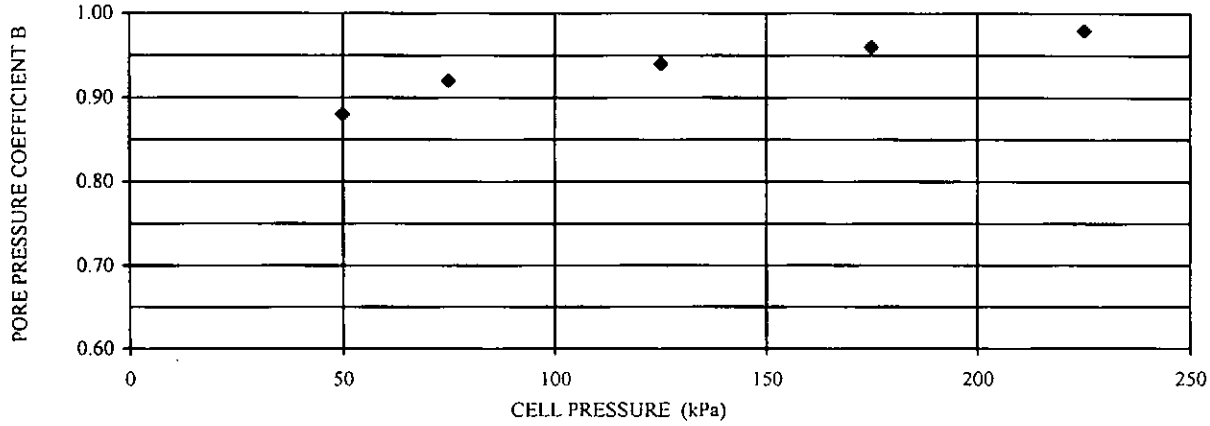
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
01/12/2008	08:36	0	0	-	0.0	
	08:45	25	-	22		-
	09:04	25	20	20	-1.9	
	09:12	50	-	42		0.88
	09:29	50	45	45	-1.9	
	09:35	75	-	68		0.92
	09:53	75	70	70	-1.8	
	10:01	125	-	117		0.94
	10:30	125	120	120	-1.7	
	10:39	175	-	168		0.96
	11:10	175	170	170	-1.6	
	11:20	225	-	219		0.98
02/12/2008	11:26	225	220	220	-1.4	

Borehole No. WCH-BH11 — **Sample Depth m:-** 5.00 - 6.00
Sample No. : 5 — **Specimen Depth m:-** 5.60 - 5.80
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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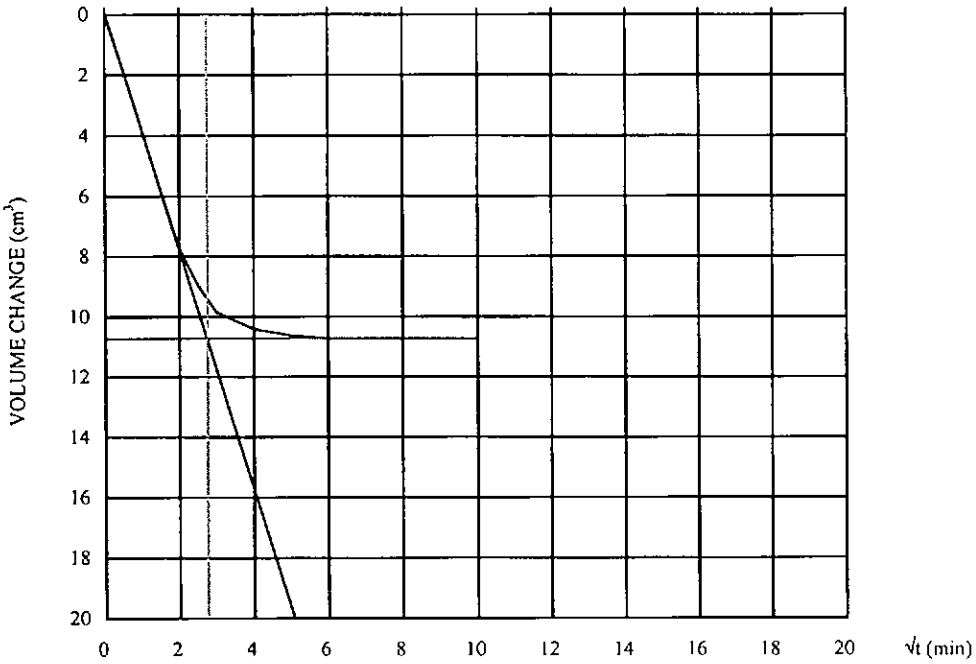
Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

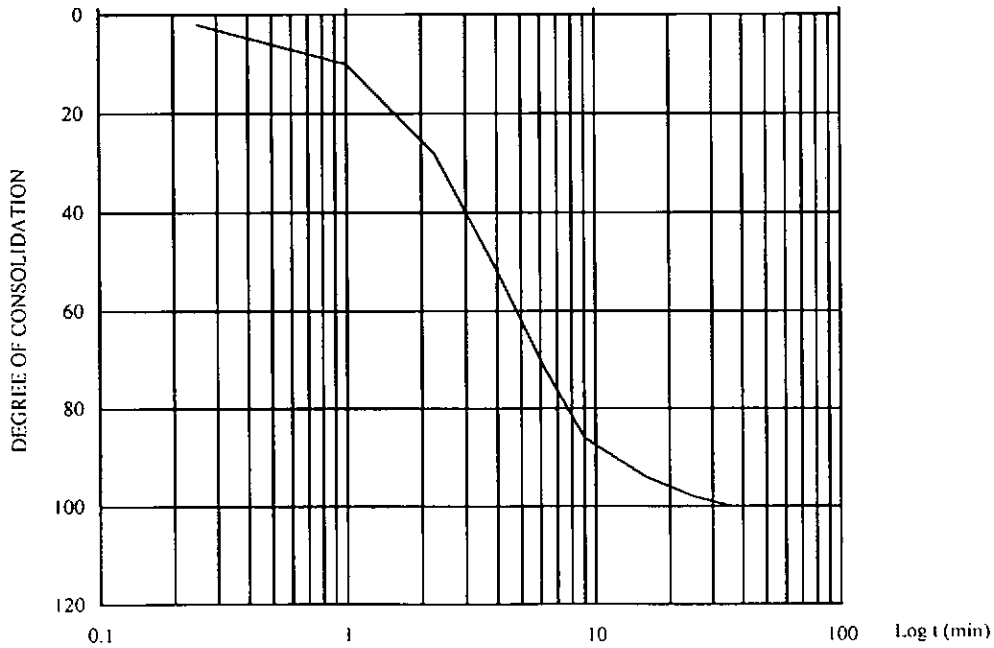


√t100 2.74 min

t100 7.510 min

tf 3.980 min

Calc. strain rate
2.536 mm/min



Borehole No. : WCH-BH11 — **Sample Depth m:-** 5.00 - 6.00

Sample No. : 5 — **Specimen Depth m:-** 5.60 - 5.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage		P.W.P,B.P		Effective Pressure	55 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress	☒	Max. Stress ratio	☐	Axial Strain %	☐

Stage : 1	Applied Pressure (kPa) - Cell :	275	Back : 220	P.R. factor	1.7305 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 10 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
03/12	08:35	0.00	0.00	0.083	220	0.000	0.0	55.0	55.0	55.0	0.0	55.0	1.00
	08:40	0.09	0.06	0.148	234	0.017	26.5	67.9	41.4	54.6	13.2	50.2	1.64
	08:45	0.28	0.19	0.180	242	0.055	39.5	72.5	33.0	52.7	19.7	46.2	2.20
	08:50	0.49	0.34	0.203	247	0.098	48.7	77.1	28.4	52.8	24.4	44.6	2.72
	08:55	0.72	0.50	0.224	250	0.143	57.1	82.4	25.3	53.9	28.6	44.3	3.26
	09:00	0.95	0.66	0.240	252	0.188	63.5	86.7	23.2	54.9	31.7	44.4	3.74
	09:05	1.17	0.81	0.254	253	0.230	69.0	90.9	21.9	56.4	34.5	44.9	4.15
	09:10	1.42	0.98	0.268	254	0.277	74.5	95.4	20.9	58.1	37.2	45.7	4.56
	09:15	1.68	1.16	0.282	255	0.326	80.0	100.3	20.3	60.3	40.0	47.0	4.94
	09:20	1.90	1.32	0.292	255	0.370	83.8	103.7	19.9	61.8	41.9	47.8	5.21
	09:25	2.13	1.48	0.304	255	0.412	88.5	108.3	19.8	64.0	44.2	49.3	5.47
	09:30	2.39	1.65	0.316	255	0.458	93.1	112.9	19.8	66.3	46.5	50.8	5.70
	09:35	2.65	1.84	0.328	255	0.507	97.7	117.7	20.0	68.8	48.8	52.6	5.88
	09:40	2.84	1.97	0.336	255	0.541	100.7	120.9	20.2	70.5	50.3	53.8	5.98
	09:45	3.07	2.13	0.345	254	0.582	104.1	124.7	20.6	72.6	52.0	55.3	6.05
	09:50	3.35	2.32	0.356	254	0.631	108.2	129.2	21.0	75.1	54.1	57.1	6.15
	09:55	3.66	2.54	0.364	254	0.686	111.1	132.5	21.4	76.9	55.5	58.4	6.19
	10:00	3.84	2.66	0.372	253	0.716	114.1	135.9	21.8	78.9	57.1	59.8	6.23
	10:05	4.08	2.83	0.382	253	0.758	117.8	140.1	22.3	81.2	58.9	61.6	6.28
	10:10	4.35	3.01	0.392	252	0.802	121.5	144.5	23.0	83.8	60.8	63.5	6.28
	10:15	4.54	3.15	0.400	252	0.836	124.5	148.0	23.5	85.7	62.2	65.0	6.30
	10:20	4.78	3.32	0.410	251	0.877	128.2	152.3	24.1	88.2	64.1	66.8	6.32
	10:25	4.98	3.45	0.417	250	0.908	130.7	155.5	24.8	90.2	65.4	68.4	6.27
	10:30	5.27	3.65	0.429	249	0.956	135.1	160.7	25.6	93.2	67.6	70.6	6.28
	10:35	5.53	3.84	0.439	249	1.000	138.7	165.1	26.4	95.8	69.4	72.6	6.25
	10:40	5.71	3.96	0.445	248	1.028	140.9	167.9	27.0	97.4	70.4	74.0	6.22
	10:45	6.04	4.19	0.458	247	1.080	145.6	173.7	28.1	100.9	72.8	76.6	6.18
	10:50	6.19	4.29	0.464	246	1.103	147.7	176.3	28.6	102.5	73.9	77.8	6.17
	10:55	6.38	4.42	0.472	246	1.132	150.6	179.8	29.2	104.5	75.3	79.4	6.16
	11:00	6.59	4.57	0.481	245	1.166	153.9	183.8	29.9	106.8	76.9	81.2	6.15
	11:05	6.86	4.76	0.491	244	1.208	157.4	188.2	30.8	109.5	78.7	83.3	6.11
	11:10	7.12	4.94	0.500	243	1.247	160.6	192.3	31.7	112.0	80.3	85.2	6.06
	11:15	7.35	5.09	0.508	243	1.280	163.3	195.8	32.5	114.2	81.7	86.9	6.03
	11:20	7.62	5.28	0.516	242	1.321	166.1	199.6	33.5	116.5	83.0	88.9	5.96
	11:25	7.82	5.43	0.522	241	1.353	168.1	202.3	34.2	118.3	84.1	90.2	5.92
	11:30	8.09	5.61	0.528	240	1.391	170.1	205.2	35.1	120.1	85.0	91.8	5.84
	11:35	8.34	5.78	0.535	239	1.426	172.4	208.7	36.3	122.5	86.2	93.8	5.75
	11:40	8.64	5.99	0.540	238	1.469	173.8	210.7	36.9	123.8	86.9	94.8	5.71
	11:45	8.83	6.12	0.542	237	1.496	174.4	212.0	37.6	124.8	87.2	95.7	5.64

Borehole No. :	**WCH-BH11**	**Sample Depth m:- 5.00 - 6.00**	
Sample No. :	**5**	**Specimen Depth m:- 5.60 - 5.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	I	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 10	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
03/12	11:50	9.09	6.30	0.547	237	1.533	175.9	214.3	38.4	126.4	88.0	97.0	5.58
	11:55	9.31	6.46	0.551	236	1.565	177.1	216.2	39.1	127.7	88.6	98.1	5.53
	12:00	9.49	6.58	0.555	235	1.589	178.4	218.1	39.7	128.9	89.2	99.2	5.49
	12:05	9.81	6.80	0.561	234	1.632	180.2	220.9	40.7	130.8	90.1	100.8	5.43
	12:10	10.26	7.11	0.567	233	1.693	181.8	223.4	41.6	132.5	90.9	102.2	5.37
	12:15	10.37	7.19	0.570	233	1.708	182.8	225.0	42.2	133.6	91.4	103.1	5.33
	12:20	10.61	7.36	0.574	232	1.741	183.9	226.8	42.9	134.9	92.0	104.2	5.29
	12:25	10.85	7.52	0.579	232	1.771	185.4	228.8	43.4	136.1	92.7	105.2	5.27
	12:30	11.02	7.64	0.583	231	1.794	186.7	230.4	43.7	137.0	93.3	105.9	5.27
	12:35	11.27	7.81	0.588	231	1.826	188.2	232.5	44.3	138.4	94.1	107.0	5.25
	12:40	11.56	8.01	0.593	230	1.863	189.6	234.6	45.0	139.8	94.8	108.2	5.21
	12:45	11.78	8.17	0.597	230	1.892	190.8	236.3	45.5	140.9	95.4	109.1	5.19
	12:50	12.07	8.37	0.602	229	1.928	192.2	238.3	46.1	142.2	96.1	110.2	5.17
	12:55	12.24	8.49	0.604	229	1.950	192.7	239.2	46.5	142.8	96.3	110.7	5.14
	13:00	12.44	8.63	0.607	228	1.975	193.4	240.4	47.0	143.7	96.7	111.5	5.12
	13:05	12.79	8.87	0.613	227	2.018	195.1	242.8	47.7	145.3	97.6	112.7	5.09
	13:10	13.04	9.04	0.616	227	2.048	195.8	244.0	48.2	146.1	97.9	113.5	5.06
	13:15	13.27	9.20	0.617	226	2.076	195.8	244.6	48.8	146.7	97.9	114.1	5.01
	13:20	13.51	9.37	0.619	226	2.105	196.2	245.5	49.3	147.4	98.1	114.7	4.98
	13:25	13.75	9.54	0.622	225	2.135	196.9	246.6	49.7	148.1	98.4	115.3	4.96
	13:30	14.02	9.73	0.627	225	2.167	198.3	248.6	50.3	149.4	99.1	116.4	4.94
	13:35	14.26	9.89	0.633	224	2.194	200.1	250.8	50.7	150.7	100.0	117.4	4.95
	13:40	14.51	10.06	0.636	224	2.223	200.8	252.0	51.2	151.6	100.4	118.1	4.92
	13:45	14.73	10.22	0.640	223	2.249	201.9	253.5	51.6	152.5	100.9	118.9	4.91
	13:50	14.96	10.38	0.643	223	2.276	202.6	254.6	52.0	153.3	101.3	119.5	4.90
	13:55	15.20	10.54	0.646	223	2.302	203.3	255.7	52.4	154.0	101.6	120.2	4.88
	14:00	15.41	10.69	0.649	222	2.327	204.0	256.8	52.8	154.8	102.0	120.8	4.86
	14:05	15.70	10.89	0.652	222	2.359	204.6	257.8	53.2	155.5	102.3	121.4	4.85
	14:10	15.94	11.06	0.657	221	2.386	206.0	259.6	53.6	156.6	103.0	122.3	4.84
	14:15	16.22	11.25	0.661	221	2.417	207.0	261.0	54.0	157.5	103.5	123.0	4.83
	14:20	16.52	11.46	0.666	221	2.450	208.2	262.6	54.4	158.5	104.1	123.8	4.83
	14:25	16.70	11.58	0.669	220	2.469	209.0	263.6	54.6	159.1	104.5	124.3	4.83
	14:30	16.96	11.76	0.672	220	2.497	209.6	264.5	54.9	159.7	104.8	124.8	4.82
	14:35	17.19	11.92	0.675	220	2.522	210.3	265.4	55.1	160.3	105.2	125.2	4.82
	14:40	17.41	12.07	0.677	220	2.545	210.6	266.0	55.4	160.7	105.3	125.6	4.80
	14:45	17.64	12.23	0.680	219	2.570	211.3	266.9	55.6	161.2	105.6	126.0	4.80
	14:50	17.92	12.43	0.683	219	2.600	211.9	267.8	55.9	161.8	105.9	126.5	4.79
	14:55	18.22	12.64	0.684	219	2.632	211.7	267.9	56.2	162.0	105.8	126.8	4.77
	15:00	18.40	12.76	0.684	219	2.651	211.4	267.8	56.4	162.1	105.7	126.9	4.75
	15:05	18.67	12.95	0.688	218	2.679	212.3	269.0	56.7	162.8	106.1	127.5	4.74
	15:10	18.88	13.09	0.691	218	2.700	213.0	269.9	56.9	163.4	106.5	127.9	4.74

Borehole No. : WCH-BH11 — **Sample Depth m:- 5.00 - 6.00**

Sample No. : 5 — **Specimen Depth m:- 5.60 - 5.80**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by: W S Wat

Checked by: H W Chung

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Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 10	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
03/12	15:15	19.18	13.30	0.695	218	2.731	213.8	271.0	57.2	164.1	106.9	128.5	4.74
	15:20	19.39	13.45	0.698	218	2.754	214.5	272.0	57.5	164.8	107.3	129.0	4.73
	15:25	19.62	13.61	0.700	217	2.777	214.8	272.5	57.7	165.1	107.4	129.3	4.72
	15:30	19.94	13.83	0.703	217	2.810	215.3	273.3	58.0	165.6	107.6	129.8	4.71
	15:35	20.17	13.99	0.706	217	2.833	215.9	274.1	58.2	166.1	107.9	130.2	4.71
	15:40	20.43	14.17	0.708	217	2.859	216.1	274.6	58.5	166.5	108.0	130.5	4.69
	15:45	20.70	14.35	0.711	216	2.885	216.6	275.4	58.8	167.1	108.3	131.0	4.68
	15:50	20.87	14.48	0.714	216	2.904	217.4	276.3	58.9	167.6	108.7	131.4	4.69
	15:55	21.09	14.63	0.716	216	2.926	217.7	276.8	59.1	167.9	108.8	131.7	4.68
	16:00	21.34	14.80	0.720	216	2.950	218.6	277.9	59.3	168.6	109.3	132.2	4.69
	16:05	21.59	14.97	0.722	215	2.974	218.8	278.4	59.6	169.0	109.4	132.5	4.67
	16:10	21.83	15.14	0.724	215	2.999	219.0	278.9	59.9	169.4	109.5	132.9	4.66
	16:15	22.10	15.32	0.727	215	3.024	219.5	279.6	60.1	169.9	109.8	133.3	4.65
	16:20	22.42	15.55	0.730	215	3.057	220.0	280.5	60.5	170.5	110.0	133.8	4.64
	16:25	**22.58**	**15.66**	**0.731**	**214**	**3.072**	**220.0**	**280.7**	**60.7**	**170.7**	**110.0**	**134.0**	**4.62**
	16:30	22.83	15.83	0.732	214	3.096	219.9	280.9	61.0	170.9	109.9	134.3	4.60
	16:35	23.12	16.03	0.732	214	3.124	219.3	280.7	61.4	171.1	109.7	134.5	4.57
	16:40	23.32	16.18	0.732	213	3.146	218.9	280.6	61.7	171.1	109.4	134.7	4.55
	16:45	23.59	16.36	0.731	213	3.171	218.1	280.1	62.0	171.0	109.0	134.7	4.52
	17:00	24.38	16.91	0.732	212	3.248	216.9	279.9	63.0	171.4	108.4	135.3	4.44
	17:15	25.24	17.51	0.725	211	3.331	212.8	276.6	63.8	170.2	106.4	134.7	4.34
	17:30	26.01	18.04	0.718	211	3.405	209.0	273.2	64.2	168.7	104.5	133.9	4.26
	17:45	26.66	18.49	0.714	211	3.468	206.5	271.0	64.5	167.7	103.2	133.3	4.20
	18:00	27.50	19.07	0.709	210	3.549	203.2	267.8	64.6	166.2	101.6	132.3	4.15
	18:15	28.17	19.54	0.702	210	3.616	199.7	264.3	64.6	164.4	99.8	131.2	4.09
	18:30	28.91	20.05	0.694	211	3.688	195.7	260.0	64.3	162.1	97.8	129.5	4.04

Borehole No. : WCH-BH11 — **Sample Depth m:- 5.00 - 6.00**

Sample No. : 5 — **Specimen Depth m:- 5.60 - 5.80**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

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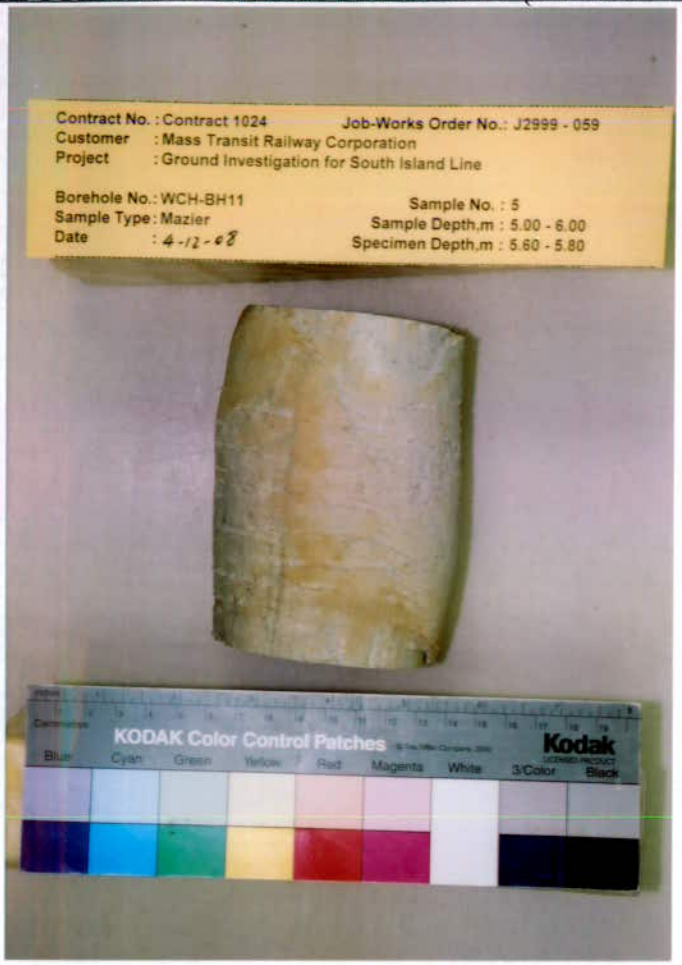
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Light grey, slightly sandy SILT | **Sample Origin : CDT‡** | ‡ Information provided by customer

Borehole No. : WCH-BH11	**Sample No. : 5**	**Sample Depth m:- 5.00 - 6.00**	**Specimen Depth m:- 5.60 - 5.80**
Customer : Mass Transit Railway Corporation		**Contract No. : Contract 1024**	Compiled by W S Wat
Project : Ground Investigation for South Island Line		**Job No. : J2999**	
		Works Order No.: 059	Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH11	WCH-BH11	WCH-BH11
Sample		no	5	5	5
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	5.00 - 6.00	5.00 - 6.00	5.00 - 6.00
Specimen Depth		m	5.80 - 6.00	5.80 - 6.00	5.80 - 6.00
INITIAL CONDITIONS					
Diameter	(D_o)	mm	73.9	74.6	75.1
Height	(H_o)	mm	145.0	141.2	137.7
Moisture Content	(W_o)	%	27	27	26
Bulk density	(ρ_o)	Mg/m^3	1.91	1.92	1.93
Dry density	(ρ_d)	Mg/m^3	1.50	1.51	1.53
Particle density	(ρ_s)		2.65	2.65	2.65
Voids Ratio	(e_o)		0.76	0.75	0.73
Degree of Saturation	(S_r)	%	93.2	95.2	95.1
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			1.00		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	245	270	295
Back Pressure	(u_b)	kPa	220	220	220
Effective Pressure	(σ'_3)	kPa	25	50	75
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	1936.54	2044.81	2341.61
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.43	0.26	0.15
Coefficient of Permeability (k)		m/s	2.56E-07	1.65E-07	1.12E-07
COMPRESSION TERMINATION CRITERION			MAXIMUM STRESS RATIO		MAX ($\sigma'1$ - $\sigma'3$)
COMPRESSION - INITIAL					
Moisture Content	(w)	%	27	26	26
Pore Pressure at the End of Consolidation		kPa	220	220	220
Effective Stress at the End of Consolidation		kPa	25	50	75
Bulk density	(ρ_o)	Mg/m^3	1.92	1.93	1.94
Dry density	(ρ_d)	Mg/m^3	1.51	1.53	1.54
Voids Ratio	(e)		0.75	0.73	0.72
Degree of Saturation	(S_r)	%	95.2	95.1	95.0

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat Checked By : Name : H W Chung Approved By : Signatory : **Lau Wai Cheong**

Tested Date: 28/11/2008 Date : 19/12/2008 Date : 19/12/2008

Technology Centre
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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH11	WCH-BH11	WCH-BH11
Sample		no	5	5	5
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	5.00 - 6.00	5.00 - 6.00	5.00 - 6.00
Specimen Depth		m	5.80 - 6.00	5.80 - 6.00	5.80 - 6.00
COMPRESSION - FAILURE					
Cell Pressure		kPa	245	270	295
Rate of Strain		mm/min	0.048	0.047	0.045
CONDITIONS AT MAXIMUM STRESS RATIO					
Major Effective Principal Stress (σ'_1)		kPa	106	173	258
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	89	137	201
Minor Effective Principal Stress (σ'_3)		kPa	17	36	57
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	61	104	157
$t = (\sigma_1 - \sigma_3)/2$		kPa	44	68	101
Expanded Uncertainty of s' ^		kPa	-	-	-
Expanded Uncertainty of t ^		kPa	-	-	-
Pore pressure parameter A_f			0.09	0.10	0.09
Strain at Failure	(εf)	%	2.2	4.6	8.8
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	27	26	26
Bulk density	(ρ_o)	Mg/m^3	1.92	1.93	1.94
Dry density	(ρ_d)	Mg/m^3	1.51	1.53	1.54
Voids Ratio	(e_f)		0.75	0.73	0.72
Degree of Saturation	(S_f)	%	95.2	95.1	95.0

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :-
   Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

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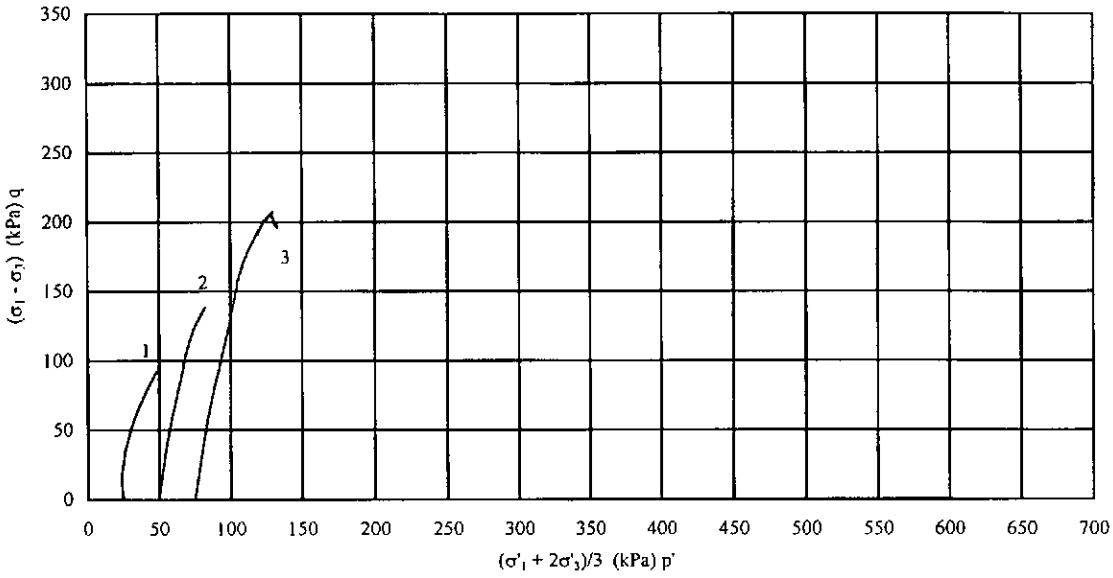
Form : GESR009.7 / Nov.10.06 / Issue 1 / Rev 1

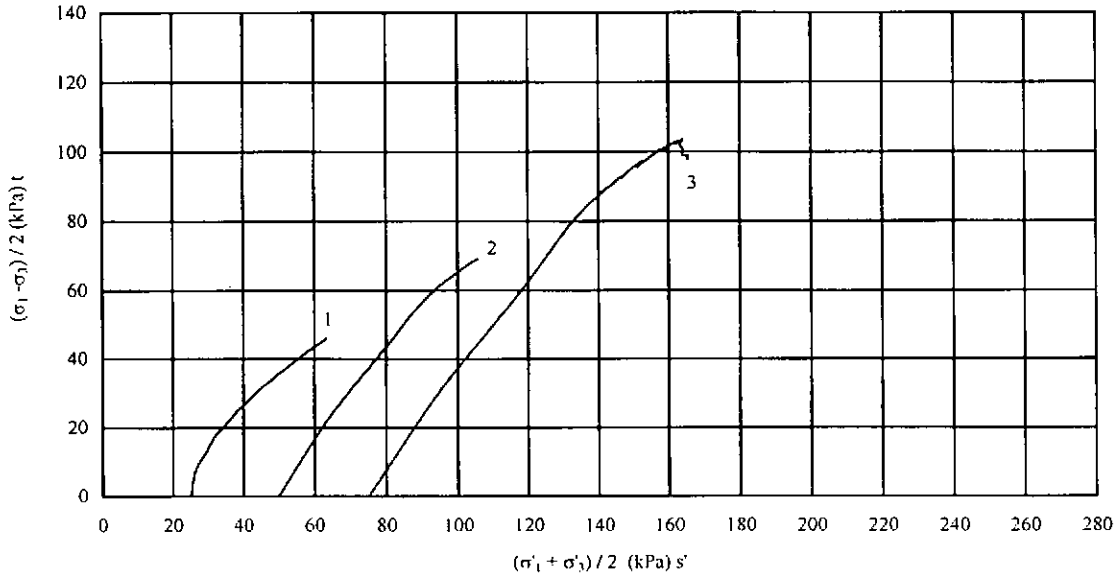
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. : WCH-BH11	**Sample Depth m:-** 5.00 - 6.00	
Sample No. : 5	**Specimen Depth m:-** 5.80 - 6.00	
Customer : Mass Transit Railway Corporation		Compiled by
Project : Ground Investigation for South Island Line		W S Wat
	Contract No.: Contract 1024	Checked by
Job No.: J2999	**Works Order No.:** 059	H W Chung

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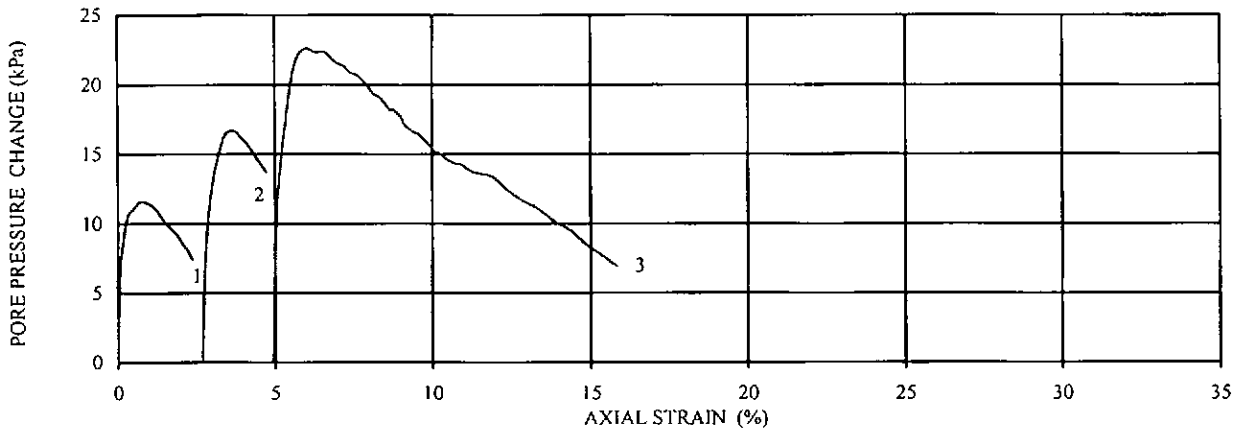
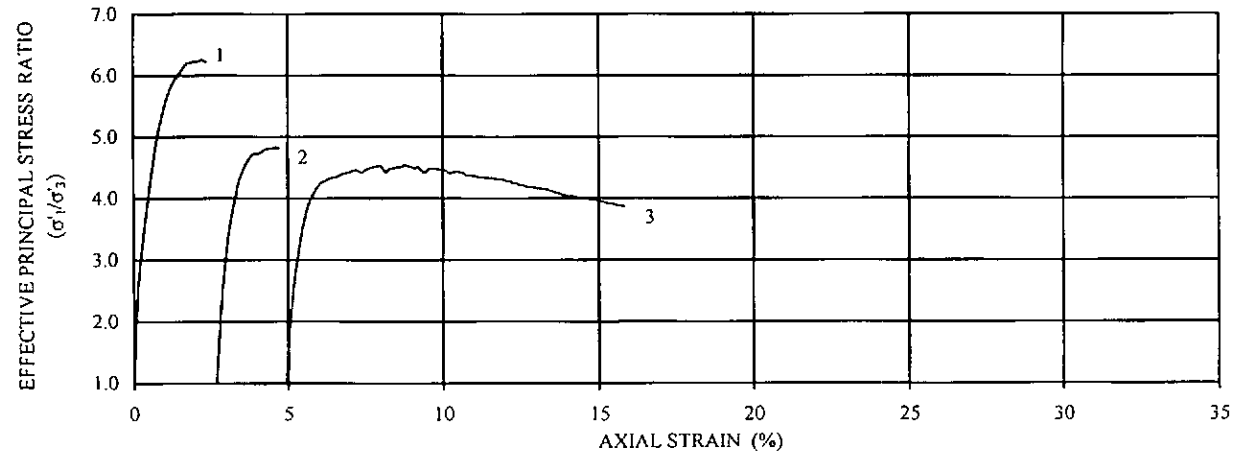
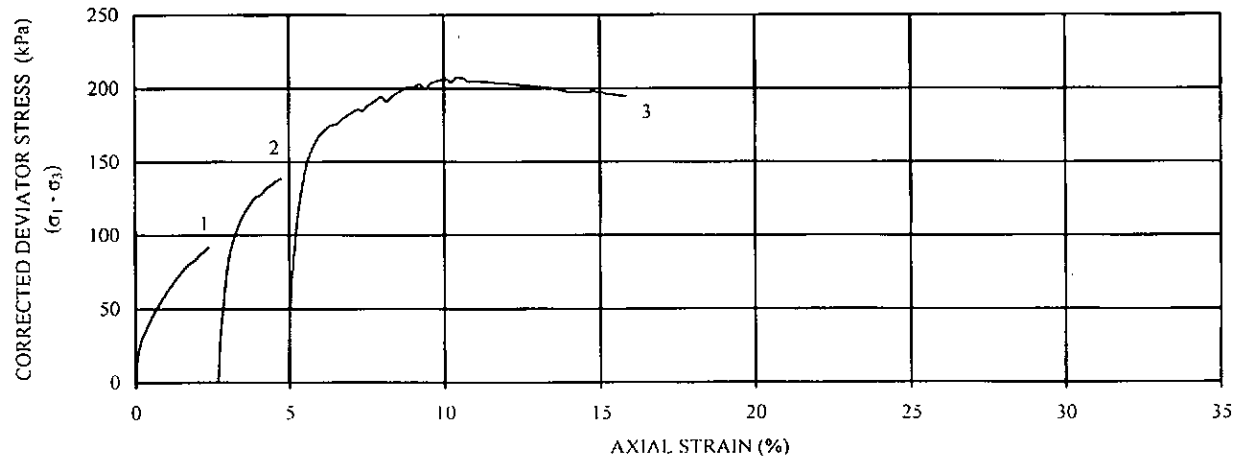
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH11**	**Sample Depth m:-**	**5.00 - 6.00**
Sample No. :	**5**	**Specimen Depth m:-**	**5.80 - 6.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.:	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
			Checked by H W Chung

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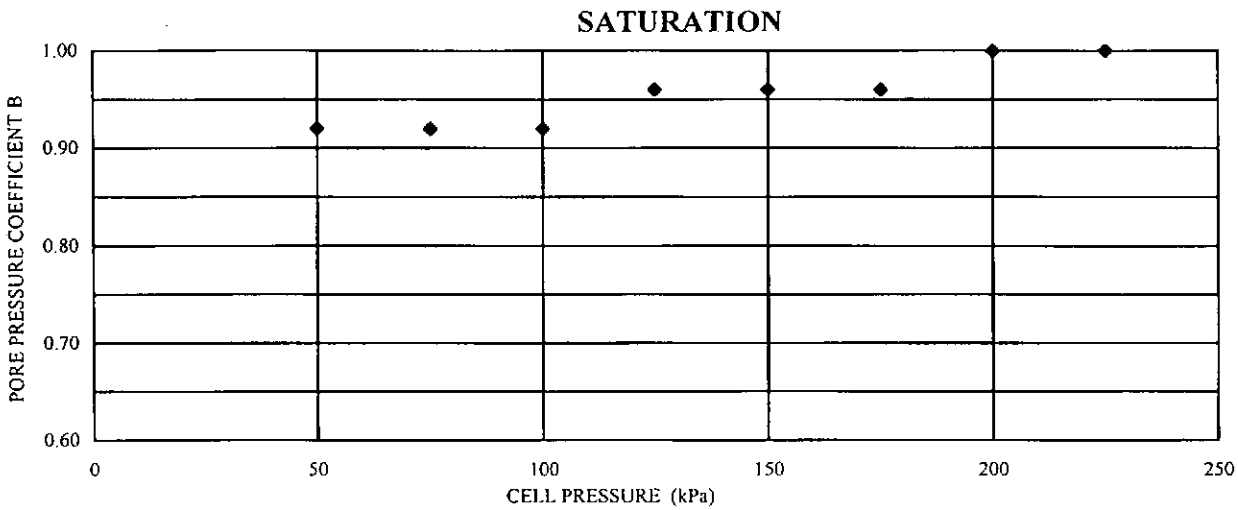
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Parameter B
28/11/2008	16:10	0	0	-	0.0	
	16:20	25	-	24		-
	16:52	25	20	20	-2.9	
	17:00	50	-	43		0.92
01/12/2008	08:33	50	45	45	1.1	
	08:39	75	-	68		0.92
	09:02	75	70	70	1.9	
	09:08	100	-	93		0.92
	09:24	100	95	95	2.4	
	09:34	125	-	119		0.96
	09:52	125	120	120	3.7	
	09:58	150	-	144		0.96
	10:15	150	145	145	4.4	
	10:21	175	-	169		0.96
	10:42	175	170	170	4.7	
	10:49	200	-	195		1.00
	11:10	200	195	195	4.8	
	11:15	225	-	220		1.00
02/12/2008	08:39	225	220	220	5.7	

Borehole No. : WCH-BH11 — **Sample Depth m:-** 5.00 - 6.00
Sample No. : 5 — **Specimen Depth m:-** 5.80 - 6.00
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

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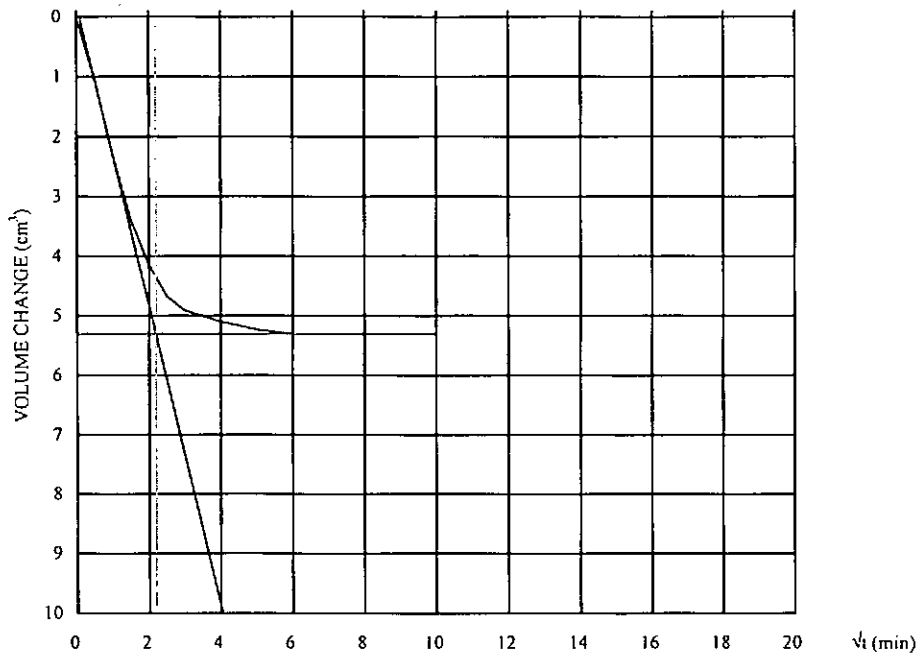
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

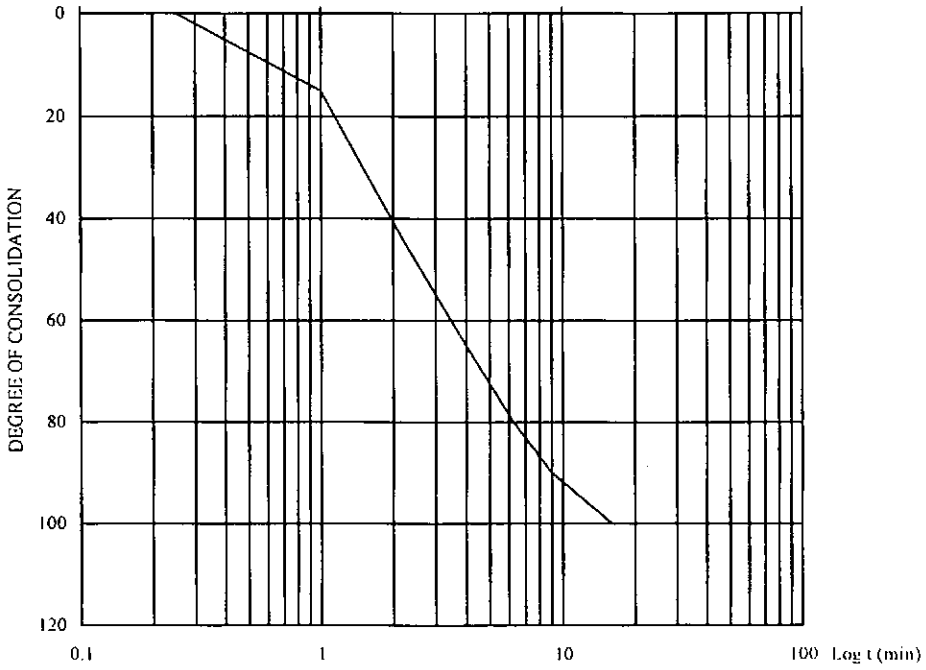


√t100 2.19 min

t100 4.82 min

tf 2.55 min

Calc. strain rate
3.966 mm/min



Borehole No. :	**WCH-BH11**	**Sample Depth m:-**	**5.00 - 6.00**
Sample No. :	**5**	**Specimen Depth m:-**	**5.80 - 6.00**
Customer :	**Mass Transit Railway Corporation**		Complied by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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TEST REPORT
DETERMINATION OF
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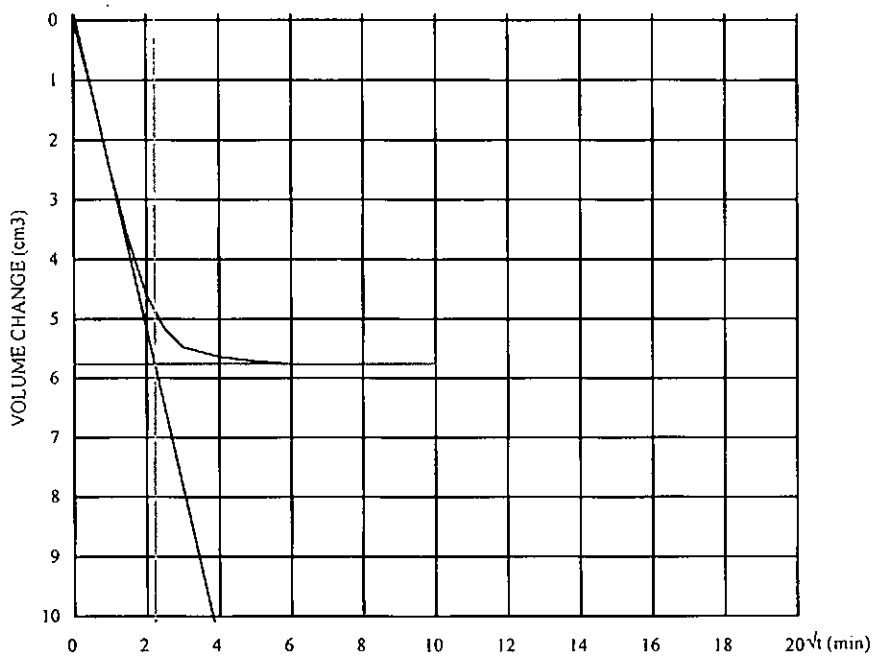
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 2

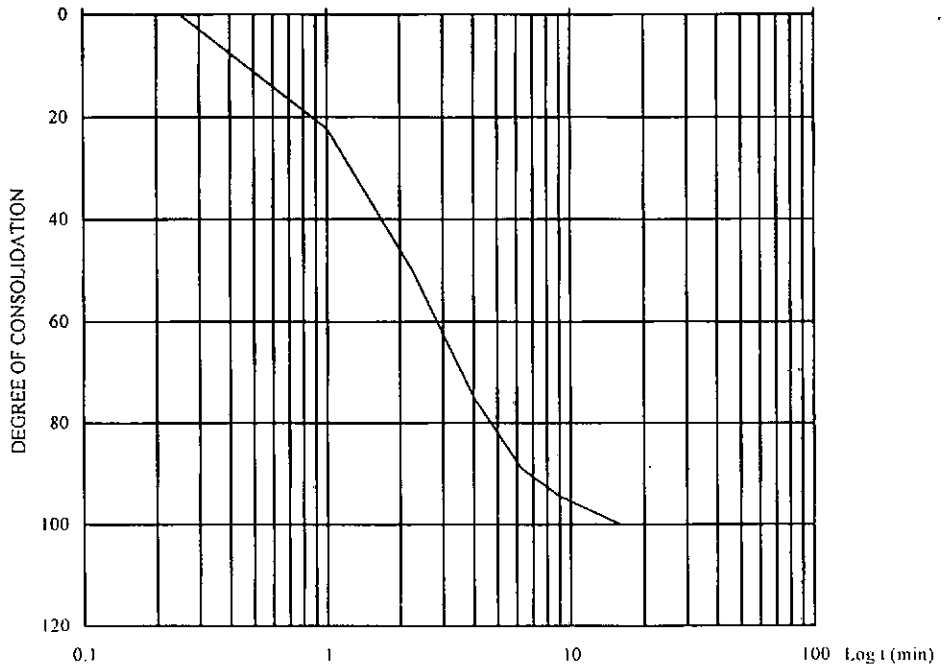


√t100 2.23 min

t100 4.99 min

tf 2.64 min

Calc. strain rate
3.725 mm/min



Borehole No. : WCH-BH11 **Sample Depth m:-** 5.00 - 6.00

Sample No. : 5 **Specimen Depth m:-** 5.80 - 6.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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Technology Centre
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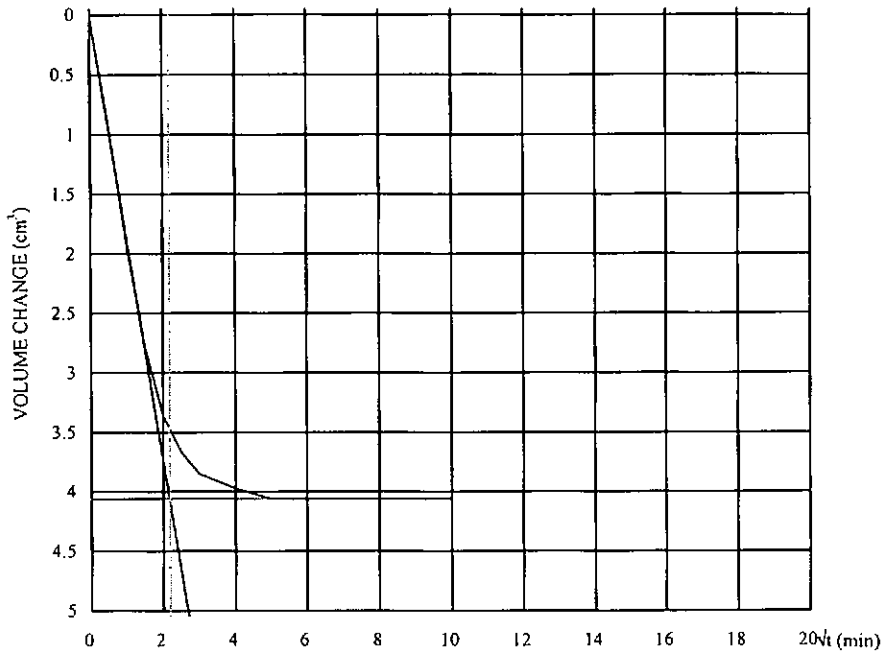
Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 3

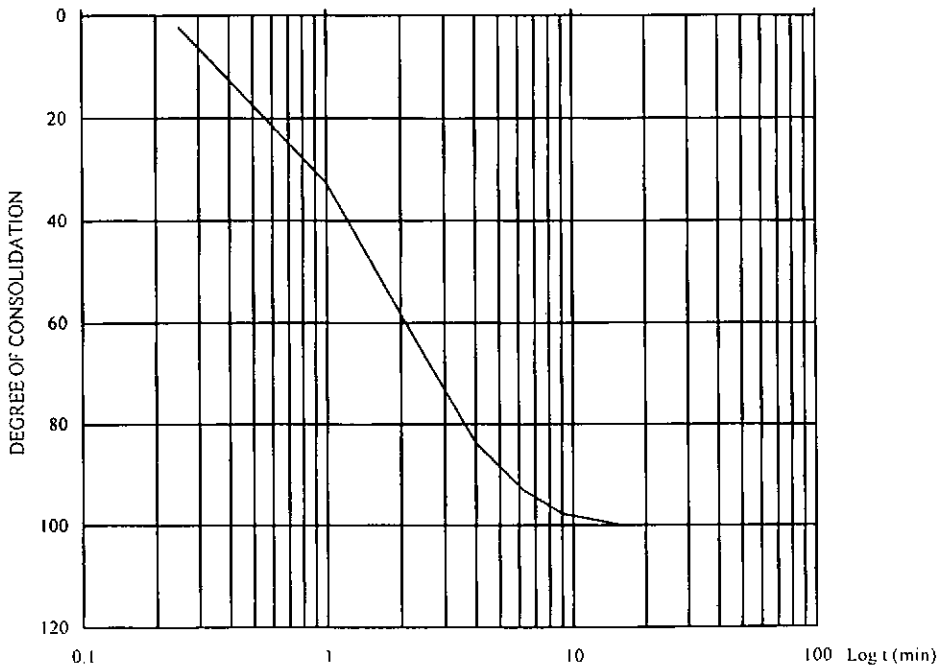


√t100 2.17 min

t100 4.72 min

tf 2.50 min

Calc. strain rate
3.846 mm/min



Borehole No. : WCH-BH11 **Sample Depth m:-** 5.00 - 6.00

Sample No. : 5 **Specimen Depth m:-** 5.80 - 6.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 **Works Order No.:** 059

Complied by: W S Wat

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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	25 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	1.99 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐

Stage : 1	Applied Pressure (kPa) - Cell : 245	Back : 220	P.R. factor 1.7257	kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 35 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
02/12	09:45	0.00	0.00	0.069	220	0.000	0.0	25.0	25.0	25.0	0.0	25.0	1.00
	09:50	0.09	0.06	0.106	226	0.017	15.0	33.8	18.8	26.3	7.5	23.8	1.80
	09:55	0.26	0.18	0.137	229	0.052	27.4	43.5	16.1	29.8	13.7	25.2	2.70
	10:00	0.47	0.32	0.155	231	0.092	34.6	49.1	14.5	31.8	17.3	26.0	3.39
	10:05	0.74	0.51	0.177	231	0.146	43.4	57.3	13.9	35.6	21.7	28.4	4.12
	10:10	0.95	0.66	0.192	232	0.188	49.3	62.8	13.5	38.1	24.6	29.9	4.65
	10:15	1.14	0.79	0.204	232	0.225	54.0	67.4	13.4	40.4	27.0	31.4	5.03
	10:20	1.35	0.93	0.216	232	0.263	58.7	72.2	13.5	42.8	29.3	33.1	5.35
	10:25	1.59	1.10	0.229	231	0.310	63.8	77.5	13.7	45.6	31.9	35.0	5.65
	10:30	1.81	1.25	0.241	231	0.351	68.4	82.5	14.1	48.3	34.2	36.9	5.85
	10:35	2.05	1.41	0.252	230	0.394	72.6	87.2	14.6	50.9	36.3	38.8	5.98
	10:40	2.28	1.57	0.263	230	0.436	76.9	92.0	15.1	53.5	38.4	40.7	6.09
	10:45	2.49	1.72	0.271	230	0.476	79.9	95.3	15.4	55.3	39.9	42.0	6.19
	10:50	2.74	1.89	0.278	229	0.521	82.5	98.3	15.8	57.0	41.2	43.3	6.22
	10:55	2.99	2.07	0.288	229	0.567	86.3	102.8	16.5	59.6	43.1	45.3	6.23
	11:00	**3.19**	**2.21**	**0.295**	**228**	**0.603**	**88.9**	**105.8**	**16.9**	**61.3**	**44.4**	**46.5**	**6.26**
	11:05	3.43	2.37	0.303	227	0.644	91.8	109.4	17.6	63.5	45.9	48.2	6.22

Borehole No. :	**WCH-BH11**	**Sample Depth m:- 5.00 - 6.00**	
Sample No. :	**5**	**Specimen Depth m:- 5.80 - 6.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon HKAS HOKLAS 055

Multi Stage		P.W.P.B.P		Effective Pressure	50 kPa
Side drains	No	Selected Machine Speed	0.047 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐
Stage : 2	Applied Pressure (kPa) - Cell : 270	Back : 220
P.R. factor 1.7257 kN/mm		

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 35 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
02/12	12:50	3.87	2.67	0.104	220	0.000	0.0	50.0	50.0	50.0	0.0	50.0	1.00
	12:55	3.98	2.75	0.186	226	0.739	31.9	75.6	43.7	59.6	15.9	54.3	1.73
	13:00	4.09	2.83	0.235	230	0.759	51.3	91.8	40.5	66.1	25.6	57.6	2.27
	13:05	4.33	2.99	0.304	233	0.798	78.5	115.9	37.4	76.6	39.2	63.6	3.10
	13:10	4.53	3.13	0.342	234	0.832	93.4	129.1	35.7	82.4	46.7	66.8	3.62
	13:15	4.75	3.29	0.367	236	0.870	103.1	137.4	34.3	85.8	51.5	68.7	4.01
	13:20	4.94	3.41	0.385	236	0.899	110.0	143.6	33.6	88.6	55.0	70.3	4.27
	13:25	5.17	3.58	0.402	237	0.939	116.5	149.8	33.3	91.5	58.2	72.1	4.50
	13:30	5.43	3.76	0.417	237	0.982	122.1	155.5	33.4	94.5	61.1	74.1	4.66
	13:35	5.61	3.88	0.426	236	1.009	125.5	159.2	33.7	96.4	62.7	75.5	4.72
	13:40	5.86	4.05	0.431	236	1.049	127.2	161.3	34.1	97.7	63.6	76.5	4.73
	13:45	6.14	4.25	0.443	235	1.094	131.6	166.3	34.7	100.5	65.8	78.6	4.79
	13:50	6.39	4.42	0.451	235	1.133	134.4	169.7	35.3	102.5	67.2	80.1	4.81
	13:55	**6.62**	**4.58**	**0.458**	**234**	**1.168**	**136.9**	**172.7**	**35.8**	**104.2**	**68.4**	**81.4**	**4.82**
	14:00	6.84	4.73	0.463	234	1.202	138.6	174.9	36.3	105.6	69.3	82.5	4.82

Borehole No. : WCH-BH11 **Sample Depth m:- 5.00 - 6.00**

Sample No. : 5 **Specimen Depth m:- 5.80 - 6.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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Form : GESR009.14 / Dec. 13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	75 kPa
Side drains	No	Selected Machine Speed	0.045 mm/min	Rate of Strain	1.96 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐

Stage : 3	Applied Pressure (kPa) - Cell : 295	Back : 220	P.R. factor 1.7257 kN/mm		

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 35 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
03/12	08:35	7.14	4.94	0.141	220	0.000	0.0	75.0	75.0	75.0	0.0	75.0	1.00
	08:40	7.30	5.05	0.292	230	1.272	57.7	122.5	64.8	93.7	28.9	84.0	1.89
	08:45	7.55	5.22	0.406	235	1.308	102.0	161.9	59.9	110.9	51.0	93.9	2.70
	08:50	7.72	5.34	0.457	237	1.334	121.7	179.4	57.7	118.6	60.9	98.3	3.11
	08:55	7.90	5.46	0.497	239	1.359	137.1	192.8	55.7	124.3	68.6	101.4	3.46
	09:00	8.10	5.60	0.530	241	1.389	149.7	203.6	53.9	128.7	74.8	103.8	3.78
	09:05	8.30	5.74	0.552	242	1.418	158.0	210.9	52.9	131.9	79.0	105.6	3.99
	09:10	8.53	5.90	0.570	243	1.451	164.6	217.1	52.5	134.8	82.3	107.4	4.14
	09:15	8.78	6.07	0.585	243	1.486	170.1	222.5	52.4	137.4	85.0	109.1	4.25
	09:20	9.01	6.23	0.593	242	1.519	172.9	225.5	52.6	139.0	86.4	110.2	4.29
	09:25	9.22	6.37	0.600	242	1.547	175.3	228.0	52.7	140.3	87.6	111.1	4.33
	09:30	9.48	6.56	0.603	242	1.585	176.0	228.6	52.6	140.6	88.0	111.3	4.35
	09:35	9.72	6.72	0.612	242	1.617	179.1	232.0	52.9	142.5	89.6	112.6	4.39
	09:40	9.90	6.85	0.618	242	1.643	181.2	234.4	53.2	143.8	90.6	113.6	4.41
	09:45	10.19	7.05	0.626	242	1.682	183.8	237.3	53.5	145.4	91.9	114.8	4.44
	09:50	10.45	7.23	0.632	241	1.716	185.7	239.4	53.7	146.5	92.8	115.6	4.46
	09:55	10.68	7.39	0.631	241	1.747	185.0	239.1	54.1	146.6	92.5	115.8	4.42
	10:00	10.87	7.52	0.639	241	1.772	187.7	241.9	54.2	148.1	93.9	116.8	4.46
	10:05	11.08	7.67	0.646	241	1.800	190.0	244.4	54.4	149.4	95.0	117.7	4.49
	10:10	11.35	7.85	0.654	240	1.834	192.6	247.4	54.8	151.1	96.3	119.0	4.52
	10:15	11.57	8.00	0.660	240	1.861	194.6	249.8	55.2	152.5	97.3	120.1	4.52
	10:20	11.79	8.16	0.651	239	1.891	190.8	246.5	55.7	151.1	95.4	119.3	4.43
	10:25	11.98	8.29	0.660	239	1.914	193.9	249.7	55.8	152.8	97.0	120.4	4.48
	10:30	12.29	8.50	0.670	239	1.952	197.2	253.5	56.3	154.9	98.6	122.0	4.50
	10:35	12.52	8.66	0.676	238	1.981	199.1	255.9	56.8	156.3	99.5	123.2	4.50
	10:40	**12.69**	**8.77**	**0.682**	**238**	**2.001**	**201.0**	**257.8**	**56.8**	**157.3**	**100.5**	**123.8**	**4.54**
	10:45	13.03	9.01	0.683	238	2.043	200.8	258.1	57.3	157.7	100.4	124.2	4.51
	10:50	13.17	9.11	0.686	237	2.061	201.7	259.5	57.8	158.7	100.9	125.0	4.49
	10:55	13.35	9.23	0.691	237	2.082	203.3	261.4	58.1	159.8	101.7	125.9	4.50
	11:00	13.61	9.41	0.682	237	2.113	199.5	257.9	58.4	158.2	99.8	124.9	4.42
	11:05	13.82	9.56	0.693	237	2.139	203.3	261.8	58.5	160.1	101.6	126.3	4.47
	11:10	14.06	9.73	0.699	236	2.168	205.1	264.0	58.9	161.4	102.5	127.3	4.48
	11:15	14.57	10.08	0.705	235	2.226	206.4	266.2	59.8	163.0	103.2	128.6	4.45
	11:20	14.77	10.21	0.700	235	2.248	204.2	264.1	59.9	162.0	102.1	128.0	4.41
	11:25	15.05	10.41	0.710	235	2.281	207.5	267.8	60.3	164.0	103.7	129.5	4.44
	11:30	15.25	10.55	0.710	235	2.304	207.1	267.6	60.5	164.0	103.5	129.5	4.42
	11:35	15.40	10.65	0.710	234	2.321	206.8	267.4	60.6	164.0	103.4	129.5	4.41
	11:40	15.54	10.75	0.705	234	2.337	204.8	265.5	60.7	163.1	102.4	129.0	4.37
	11:45	15.75	10.89	0.706	234	2.360	204.8	265.5	60.7	163.1	102.4	129.0	4.37

Borehole No. :	**WCH-BH11**	**Sample Depth m:- 5.00 - 6.00**	
Sample No. :	5	**Specimen Depth m:- 5.80 - 6.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐

Stage :	3	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 35	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
03/12	12:00	16.35	11.31	0.708	234	2.427	204.5	265.8	61.3	163.5	102.2	129.5	4.34
	12:15	17.16	11.87	0.709	233	2.515	203.4	265.0	61.6	163.3	101.7	129.4	4.30
	12:30	17.95	12.42	0.710	232	2.600	202.4	265.1	62.7	163.9	101.2	130.2	4.23
	12:45	18.63	12.88	0.710	232	2.669	201.3	264.7	63.4	164.0	100.6	130.5	4.17
	13:00	19.24	13.31	0.712	231	2.734	200.9	264.8	63.9	164.4	100.5	130.9	4.14
	13:15	20.06	13.88	0.708	230	2.818	198.1	263.0	64.9	163.9	99.0	130.9	4.05
	13:30	20.77	14.37	0.710	230	2.889	197.6	263.1	65.5	164.3	98.8	131.4	4.02
	13:45	21.47	14.85	0.715	229	2.958	198.1	264.6	66.5	165.6	99.1	132.5	3.98
	14:00	22.13	15.31	0.713	228	3.024	196.3	263.5	67.2	165.3	98.1	132.6	3.92
	14:15	22.91	15.85	0.714	227	3.100	195.3	263.4	68.1	165.7	97.6	133.2	3.87

Borehole No. :	**WCH-BH11**	**Sample Depth m:- 5.00 - 6.00**	
Sample No. :	**5**	**Specimen Depth m:- 5.80 - 6.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

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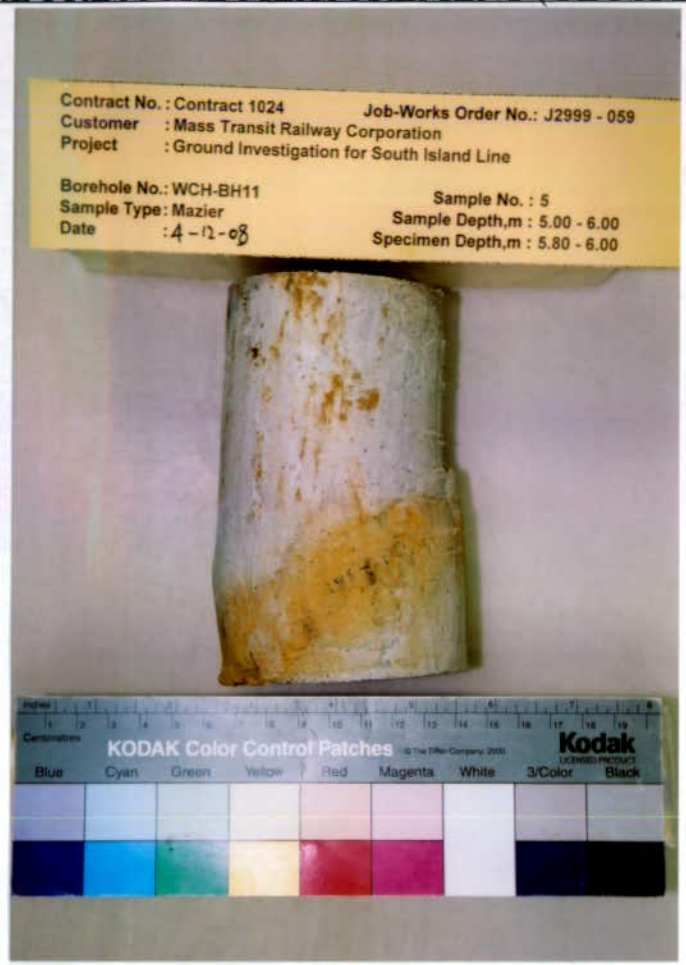
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Light grey, slightly sandy SILT

Sample Origin : CDT ‡

‡ Information provided by customer

Borehole No. : WCH-BH11	**Sample No. :** 5	**Sample Depth m:-** 5.00 - 6.00	**Specimen Depth m:-** 5.80 - 6.00

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No.: Contract 1024
Job No.: J2999
Works Order No.: 059

Compiled by W S Wat

Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.60 - 3.80		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.3		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	20		
Bulk density	(ρ_o)	Mg/m^3	2.09		
Dry density	(ρ_d)	Mg/m^3	1.74		
Particle density	(ρ_s)		2.65		
Voids Ratio	(e_o)		0.52		
Degree of Saturation	(S_r)	%	102.8		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			1.00		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	245		
Back Pressure	(u_b)	kPa	220		
Effective Pressure	(σ'_3)	kPa	25		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	96.05		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.93		
Coefficient of Permeability (k)		m/s	2.76E-08		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	19		
Pore Pressure at the End of Consolidation		kPa	220		
Effective Stress at the End of Consolidation		kPa	25		
Bulk density	(ρ_o)	Mg/m^3	2.11		
Dry density	(ρ_d)	Mg/m^3	1.77		
Voids Ratio	(e)		0.49		
Degree of Saturation	(S_r)	%	100.9		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat
Checked By : Name : H W Chung Date : 19/12/2008
Approved By : Signatory : **Lau Wai Cheong** Date : 19/12/2008
Tested Date: 10/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.60 - 3.80		
COMPRESSION - FAILURE					
Cell Pressure		kPa	245		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	183		
Corrected Deviator Stress (σ'_1 - σ'_3)		kPa	136		
Minor Effective Principal Stress (σ'_3)		kPa	47		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	115		
$t = (\sigma_1 - \sigma_3)/2$		kPa	68		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.16		
Strain at Failure	(εf)	%	11.4		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	19		
Bulk density	(ρ_o)	Mg/m^3	2.11		
Dry density	(ρ_d)	Mg/m^3	1.77		
Voids Ratio	(e_f)		0.49		
Degree of Saturation	(S_f)	%	100.9		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

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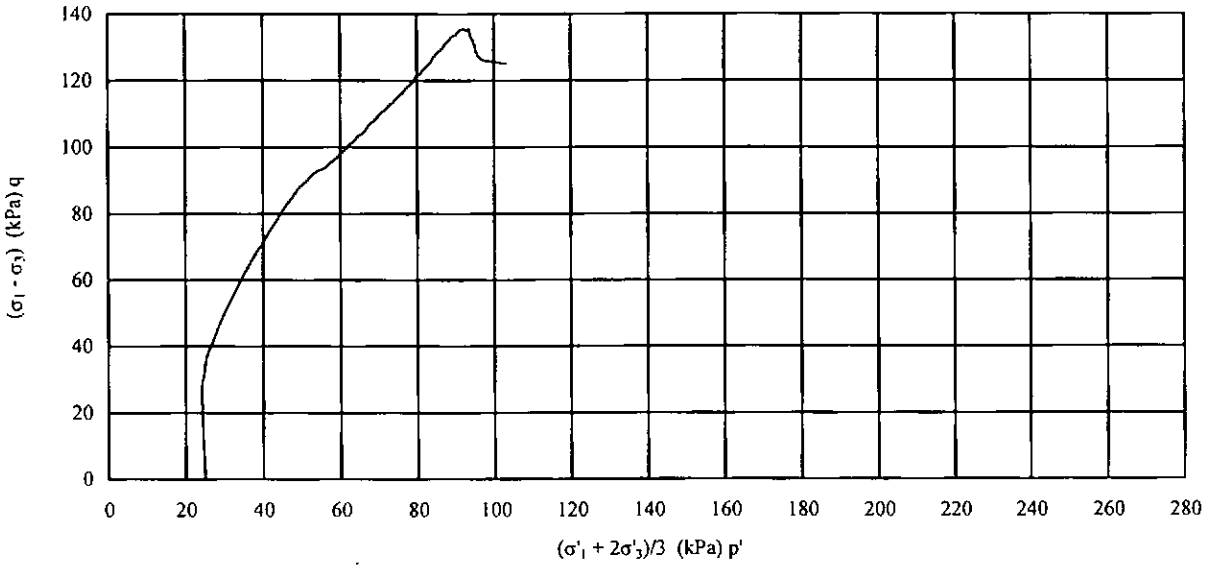
Form : GESR009.7 / Nov.10.06 / Issue 1 / Rev 1

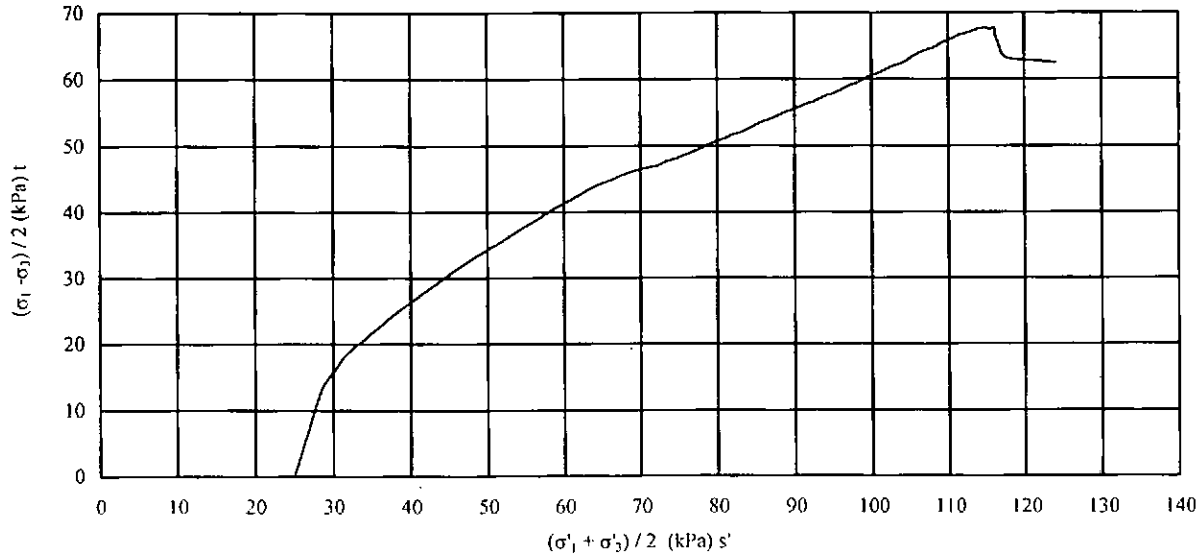
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. : WCH-BH12		Sample Depth m:- 3.00 - 4.00	
Sample No. : 1		Specimen Depth m:- 3.60 - 3.80	
Customer :	Mass Transit Railway Corporation		Compiled by W S Wat
Project :	Ground Investigation for South Island Line		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	J2999	Works Order No.: 059	

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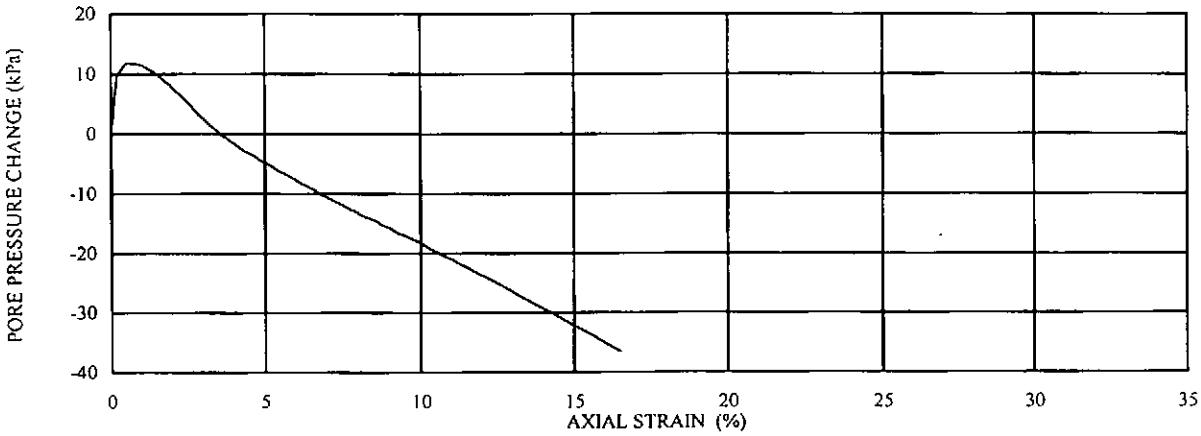
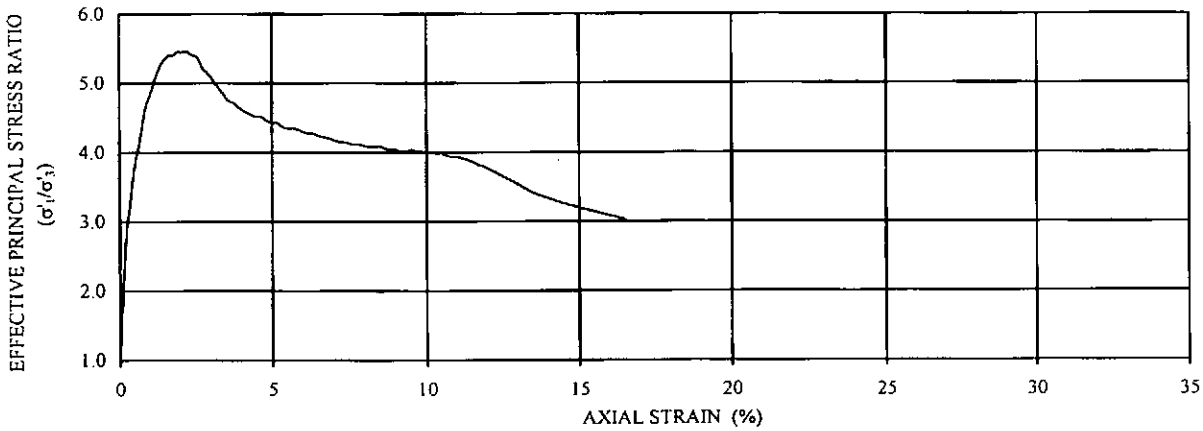
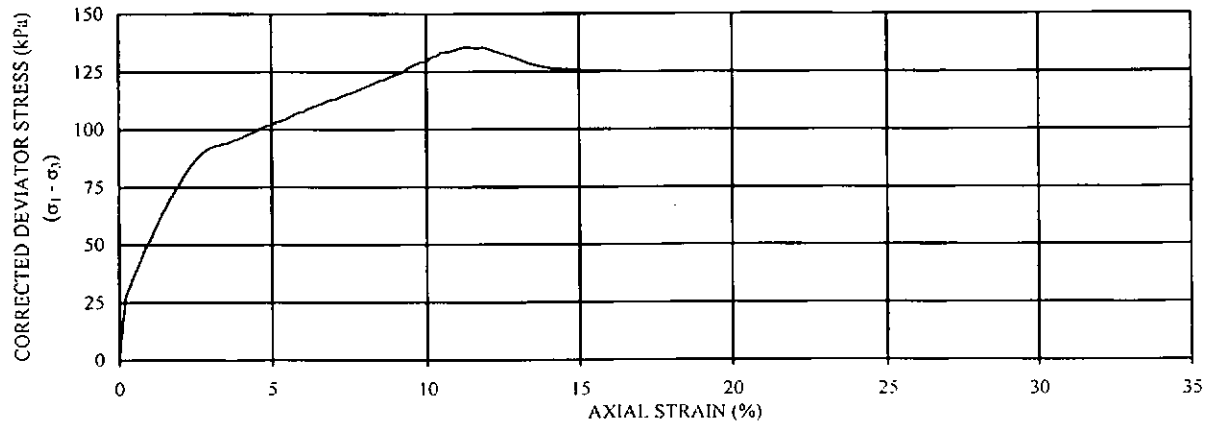
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH12**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.60 - 3.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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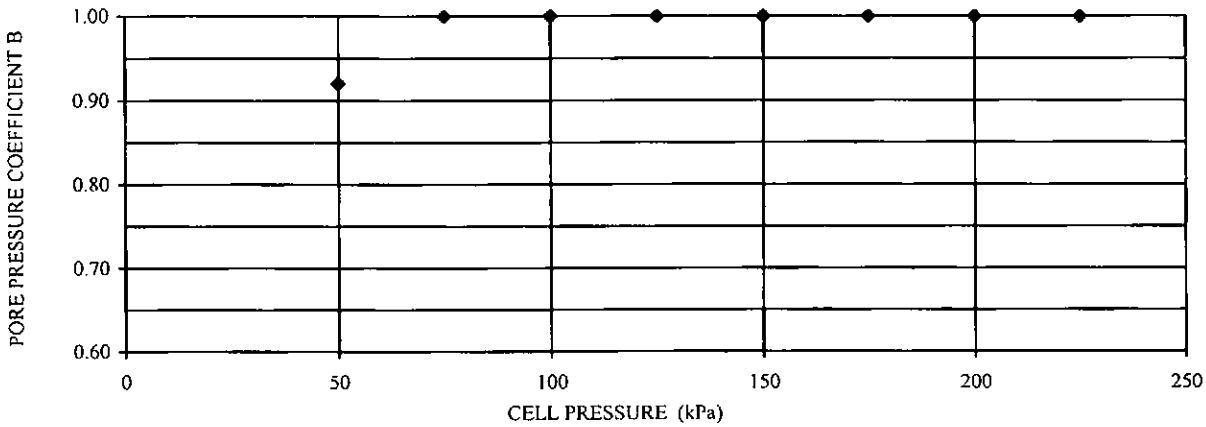
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
11/12/2008	10:11	0	0	-	0.0	
	10:18	25	-	24		-
	10:49	25	20	20	-12.5	
	10:55	50	-	43		0.92
	11:42	50	45	45	-6.8	
	11:51	75	-	70		1.00
	13:12	75	70	70	-6.7	
	13:19	100	-	95		1.00
	14:10	100	95	95	-6.3	
	14:19	125	-	120		1.00
12/12/2008	08:42	125	120	120	-5.5	
	08:50	150	-	145		1.00
	09:42	150	145	145	-5.1	
	09:50	175	-	170		1.00
	10:19	175	170	170	-4.9	
	10:30	200	-	195		1.00
	11:19	200	195	195	-4.8	
	11:30	225	-	220		1.00
16/12/2008	13:30	225	220	220	-4.2	

Borehole No. WCH-BH12 — **Sample Depth m:-** 3.00 - 4.00
Sample No. : 1 — **Specimen Depth m:-** 3.60 - 3.80

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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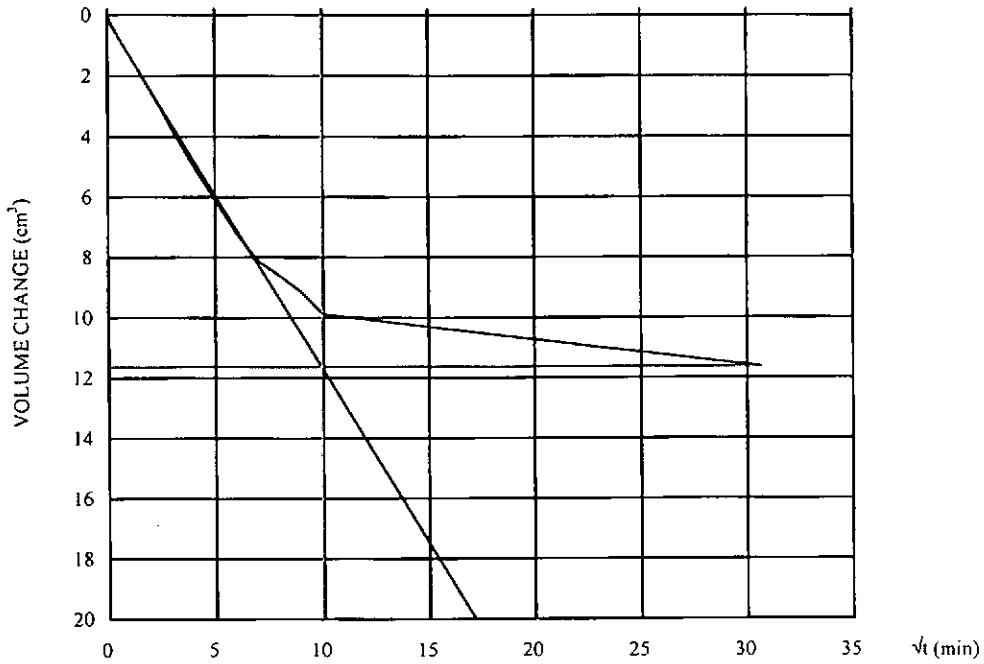
Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

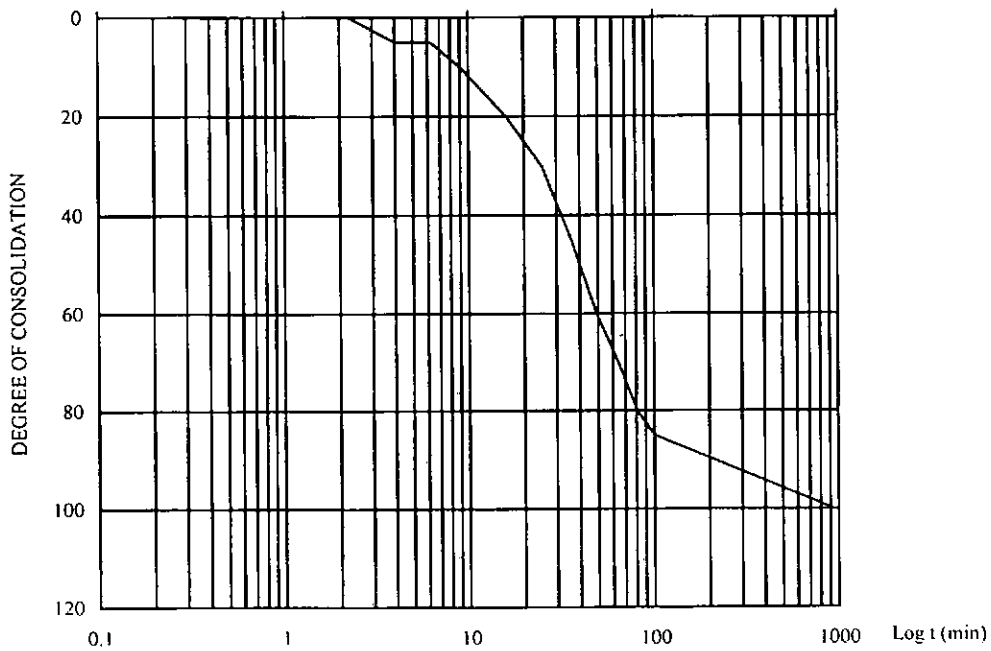


√t100 9.94 min

t100 98.900 min

tf 52.417 min

Calc. strain rate
0.192 mm/min



Borehole No. : WCH-BH12 — **Sample Depth m:-** 3.00 - 4.00

Sample No. : 1 — **Specimen Depth m:-** 3.60 - 3.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage		P.W.P,B.P		Effective Pressure	25 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress	☒	Max. Stress ratio	☐	Axial Strain %	☐
Stage : 1	Applied Pressure (kPa) - Cell : 245	Back : 220		P.R. factor	3.1283 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 7 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
17/12	08:45	0.00	0.00	0.041	220	0.000	0.0	25.0	25.0	25.0	0.0	25.0	1.00
	08:50	0.28	0.20	0.077	230	0.058	26.2	41.6	15.4	28.5	13.1	24.1	2.70
	08:55	0.51	0.35	0.085	231	0.100	31.9	46.1	14.2	30.2	16.0	24.8	3.25
	09:00	0.73	0.50	0.092	232	0.143	36.9	50.1	13.2	31.7	18.5	25.5	3.80
	09:05	0.99	0.69	0.100	232	0.196	42.6	55.9	13.3	34.6	21.3	27.5	4.21
	09:10	1.24	0.86	0.108	232	0.243	48.3	61.6	13.3	37.5	24.2	29.4	4.63
	09:15	1.53	1.06	0.115	231	0.297	53.2	66.9	13.7	40.3	26.6	31.4	4.88
	09:20	1.73	1.20	0.121	231	0.335	57.4	71.5	14.1	42.8	28.7	33.2	5.07
	09:25	2.00	1.38	0.128	230	0.384	62.3	76.9	14.6	45.8	31.2	35.4	5.27
	09:30	2.37	1.65	0.138	229	0.455	69.3	85.0	15.7	50.3	34.6	38.8	5.41
	09:35	2.48	1.72	0.140	229	0.474	70.6	86.7	16.1	51.4	35.3	39.6	5.39
	09:40	2.75	1.91	0.146	228	0.523	74.8	91.6	16.8	54.2	37.4	41.7	5.45
	09:45	2.96	2.06	0.151	227	0.562	78.2	95.8	17.6	56.7	39.1	43.7	5.44
	09:50	3.21	2.23	0.156	227	0.605	81.6	99.9	18.3	59.1	40.8	45.5	5.46
	09:55	3.47	2.41	0.161	226	0.650	85.0	104.3	19.3	61.8	42.5	47.6	5.40
	10:00	3.70	2.57	0.165	225	0.690	87.6	107.6	20.0	63.8	43.8	49.2	5.38
	10:05	3.95	2.74	0.168	224	0.732	89.6	110.8	21.2	66.0	44.8	51.1	5.22
	10:10	4.22	2.93	0.171	223	0.779	91.5	113.6	22.1	67.8	45.7	52.6	5.14
	10:15	4.48	3.11	0.173	222	0.823	92.7	115.7	23.0	69.3	46.3	53.9	5.03
	10:20	4.72	3.27	0.174	221	0.861	93.2	116.9	23.7	70.3	46.6	54.8	4.93
	10:25	4.95	3.43	0.175	221	0.899	93.7	118.1	24.4	71.2	46.8	55.6	4.84
	10:30	5.20	3.61	0.176	220	0.941	94.2	119.4	25.2	72.3	47.1	56.6	4.74
	10:35	5.45	3.78	0.178	219	0.981	95.4	121.1	25.7	73.4	47.7	57.5	4.71
	10:40	5.65	3.92	0.179	219	1.013	95.9	122.2	26.3	74.3	48.0	58.3	4.65
	10:45	5.92	4.11	0.181	218	1.057	97.1	124.1	27.0	75.5	48.5	59.4	4.60
	10:50	6.20	4.30	0.183	217	1.100	98.2	125.9	27.7	76.8	49.1	60.4	4.55
	10:55	6.50	4.51	0.185	217	1.147	99.4	127.7	28.3	78.0	49.7	61.4	4.51
	11:00	6.67	4.63	0.187	216	1.173	100.6	129.2	28.6	78.9	50.3	62.1	4.52
	11:05	6.99	4.85	0.189	216	1.221	101.7	131.1	29.4	80.3	50.9	63.3	4.46
	11:10	7.23	5.02	0.190	215	1.258	102.2	132.0	29.8	80.9	51.1	63.9	4.43
	11:15	7.47	5.18	0.192	215	1.293	103.4	133.6	30.2	81.9	51.7	64.7	4.42
	11:20	7.69	5.34	0.193	214	1.327	103.8	134.6	30.8	82.7	51.9	65.4	4.37
	11:25	7.98	5.54	0.195	214	1.369	105.0	136.4	31.4	83.9	52.5	66.4	4.34
	11:30	8.19	5.68	0.197	213	1.398	106.2	137.9	31.7	84.8	53.1	67.1	4.35
	11:35	8.41	5.84	0.199	213	1.431	107.3	139.5	32.2	85.9	53.7	68.0	4.33
	11:40	8.66	6.01	0.200	212	1.466	107.8	140.5	32.7	86.6	53.9	68.6	4.30
	11:45	8.88	6.16	0.202	212	1.497	108.9	142.1	33.2	87.7	54.5	69.5	4.28
	11:50	9.15	6.35	0.204	211	1.535	110.0	143.6	33.6	88.6	55.0	70.3	4.28
	11:55	9.36	6.50	0.205	211	1.565	110.5	144.6	34.1	89.4	55.3	70.9	4.24

Borehole No. :	**WCH-BH12**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.60 - 3.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage : 1		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 7	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
17/12	12:00	9.64	6.69	0.207	210	1.602	111.6	146.3	34.7	90.5	55.8	71.9	4.22
	12:05	9.88	6.85	0.209	210	1.634	112.8	148.0	35.2	91.6	56.4	72.8	4.20
	12:10	10.16	7.05	0.210	209	1.672	113.1	148.8	35.7	92.3	56.6	73.4	4.17
	12:15	10.42	7.23	0.212	209	1.707	114.2	150.4	36.2	93.3	57.1	74.3	4.16
	12:20	10.70	7.42	0.214	208	1.743	115.3	152.0	36.7	94.4	57.7	75.1	4.14
	12:25	10.89	7.56	0.215	208	1.770	115.8	152.9	37.1	95.0	57.9	75.7	4.12
	12:30	11.17	7.75	0.217	207	1.805	116.9	154.5	37.6	96.0	58.4	76.6	4.11
	12:35	11.41	7.92	0.219	207	1.837	118.0	156.0	38.0	97.0	59.0	77.3	4.10
	12:40	11.71	8.13	0.221	206	1.875	119.0	157.7	38.7	98.2	59.5	78.4	4.08
	12:45	11.96	8.30	0.223	206	1.906	120.1	159.1	39.0	99.0	60.0	79.0	4.08
	12:50	12.20	8.47	0.225	206	1.937	121.2	160.5	39.3	99.9	60.6	79.7	4.08
	12:55	12.40	8.61	0.226	205	1.962	121.6	161.3	39.7	100.5	60.8	80.2	4.06
	13:00	12.56	8.72	0.227	205	1.981	122.1	162.2	40.1	101.2	61.1	80.8	4.05
	13:05	12.94	8.98	0.230	204	2.027	123.7	164.4	40.7	102.6	61.9	81.9	4.04
	13:10	13.11	9.10	0.231	204	2.048	124.2	165.3	41.1	103.2	62.1	82.5	4.02
	13:15	13.37	9.28	0.233	203	2.079	125.2	166.8	41.6	104.2	62.6	83.3	4.01
	13:20	13.61	9.45	0.236	203	2.108	127.0	168.9	41.9	105.4	63.5	84.2	4.03
	13:25	13.84	9.60	0.238	203	2.134	128.0	170.3	42.3	106.3	64.0	85.0	4.03
	13:30	14.11	9.79	0.240	202	2.166	129.0	171.8	42.8	107.3	64.5	85.8	4.02
	13:35	14.41	10.00	0.241	202	2.201	129.4	172.6	43.2	107.9	64.7	86.3	3.99
	13:40	14.61	10.14	0.244	201	2.224	131.1	174.8	43.7	109.3	65.6	87.4	4.00
	13:45	14.89	10.34	0.246	201	2.257	132.1	176.4	44.3	110.3	66.0	88.3	3.98
	13:50	15.07	10.46	0.248	200	2.277	133.2	177.8	44.6	111.2	66.6	89.0	3.99
	13:55	15.36	10.66	0.249	200	2.310	133.5	178.7	45.2	112.0	66.8	89.7	3.95
	14:00	15.58	10.82	0.250	199	2.336	133.9	179.5	45.6	112.6	67.0	90.2	3.94
	14:05	15.86	11.01	0.252	199	2.366	134.9	180.9	46.0	113.4	67.4	91.0	3.93
	14:10	16.07	11.15	0.253	199	2.388	135.3	181.7	46.4	114.0	67.6	91.5	3.92
	14:15	**16.37**	**11.36**	**0.254**	**198**	**2.422**	**135.6**	**182.6**	**47.0**	**114.8**	**67.8**	**92.2**	**3.88**
	14:20	16.55	11.48	0.254	198	2.441	135.4	182.7	47.3	115.0	67.7	92.4	3.86
	14:25	16.82	11.68	0.254	197	2.472	135.0	182.9	47.9	115.4	67.5	92.9	3.82
	14:30	17.06	11.84	0.255	197	2.497	135.4	183.8	48.4	116.1	67.7	93.5	3.80
	14:45	17.79	12.35	0.253	195	2.575	133.3	182.9	49.6	116.2	66.6	94.0	3.69
	15:00	18.54	12.87	0.251	194	2.653	131.1	182.2	51.1	116.6	65.5	94.8	3.57
	15:15	19.29	13.39	0.248	192	2.731	128.3	181.0	52.7	116.9	64.2	95.5	3.43
	15:30	20.00	13.88	0.247	191	2.802	126.9	180.9	54.0	117.4	63.4	96.3	3.35
	15:45	20.72	14.38	0.247	190	2.875	126.1	181.5	55.4	118.4	63.0	97.4	3.28
	16:00	21.47	14.90	0.248	188	2.949	125.8	182.7	56.9	119.8	62.9	98.8	3.21
	16:15	22.28	15.46	0.249	187	3.028	125.5	183.9	58.4	121.2	62.8	100.2	3.15
	16:30	22.94	15.92	0.250	185	3.093	125.4	185.2	59.8	122.5	62.7	101.6	3.10
	16:45	23.79	16.51	0.251	183	3.175	125.0	186.6	61.6	124.1	62.5	103.3	3.03

Borehole No. : WCH-BH12 — **Sample Depth m:- 3.00 - 4.00**

Sample No. : 1 — **Specimen Depth m:- 3.60 - 3.80**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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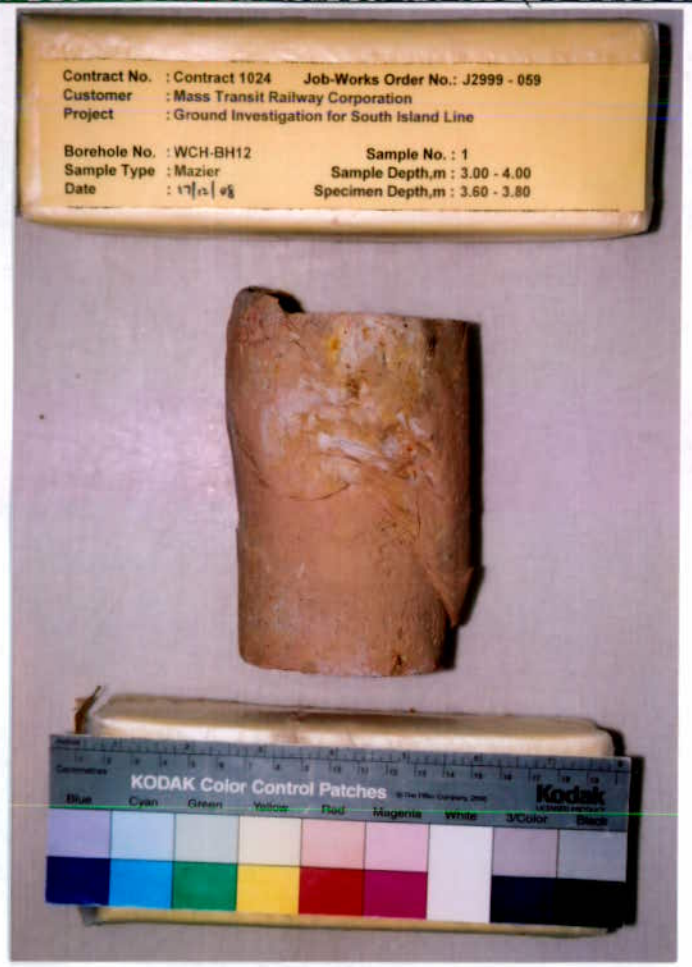
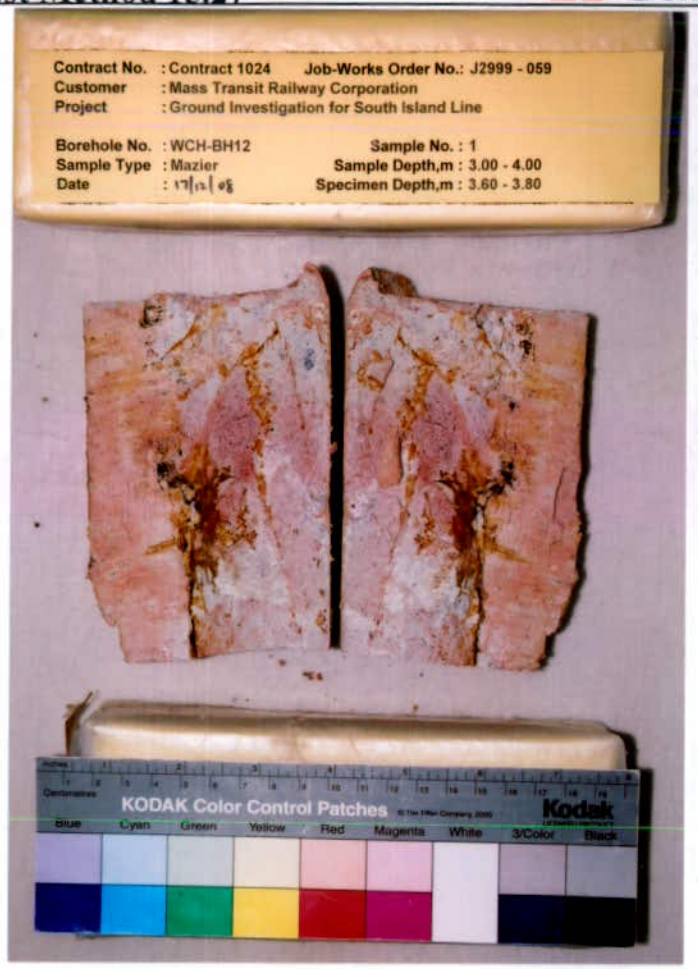
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)





Description : Greyish brown, sandy SILT/CLAY

Sample Origin : CDT‡

‡ Information provided by customer

Borehole No. : WCH-BH12	Sample No. : 1	Sample Depth m:- 3.00 - 4.00	Specimen Depth m:- 3.60 - 3.80
Customer : Mass Transit Railway Corporation Project : Ground Investigation for South Island Line		Contract No. : Contract 1024 Job No. : J2999 Works Order No.: 059	Compiled by W S Wat Checked by H W Chung

Technology Centre
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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.80 - 4.00		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.3		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	17		
Bulk density	(ρ_o)	Mg/m^3	2.15		
Dry density	(ρ_d)	Mg/m^3	1.83		
Particle density	(ρ_s)		2.65		
Voids Ratio	(e_o)		0.45		
Degree of Saturation	(S_r)	%	102.4		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			1.00		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	250		
Back Pressure	(u_b)	kPa	220		
Effective Pressure	(σ'_3)	kPa	30		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	212.54		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.57		
Coefficient of Permeability (k)		m/s	3.73E-08		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	16		
Pore Pressure at the End of Consolidation		kPa	220		
Effective Stress at the End of Consolidation		kPa	30		
Bulk density	(ρ_o)	Mg/m^3	2.16		
Dry density	(ρ_d)	Mg/m^3	1.85		
Voids Ratio	(e)		0.43		
Degree of Saturation	(S_r)	%	101.5		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat
Checked By : Name : H W Chung Date : 19/12/2008
Approved By : Signatory : **Lau Wai Cheong** Date : 19/12/2008
Tested Date: 10/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12		
Sample		no	1		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	3.00 - 4.00		
Specimen Depth		m	3.80 - 4.00		
COMPRESSION - FAILURE					
Cell Pressure		kPa	250		
Rate of Strain		mm/min	0.048		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	331		
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	235		
Minor Effective Principal Stress (σ'_3)		kPa	95		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	213		
$t = (\sigma_1 - \sigma_3)/2$		kPa	118		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.28		
Strain at Failure	(εf)	%	20.1		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	16		
Bulk density	(ρ_o)	Mg/m^3	2.16		
Dry density	(ρ_d)	Mg/m^3	1.85		
Voids Ratio	(e_f)		0.43		
Degree of Saturation	(S_f)	%	101.5		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

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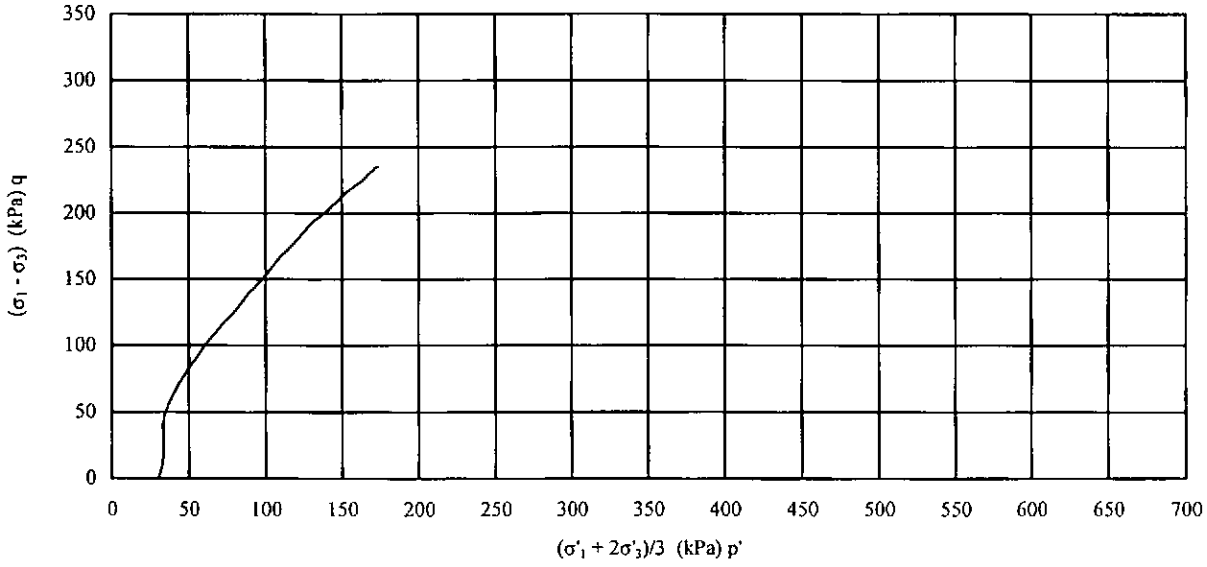
Form : GESR009.7 / Nov.10.06 / Issue 1 / Rev 1

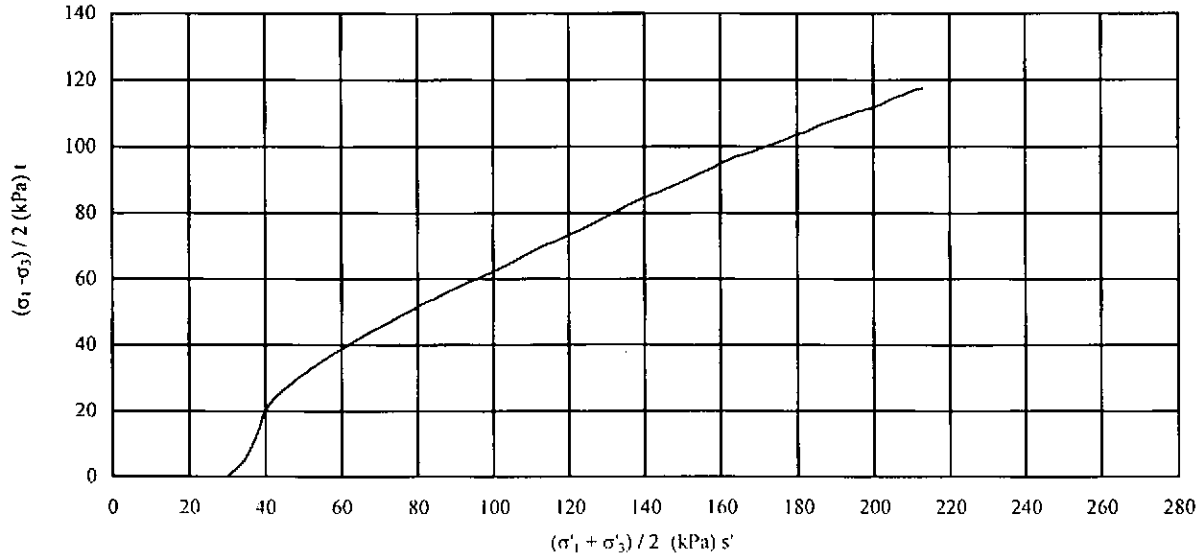
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH12**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.80 - 4.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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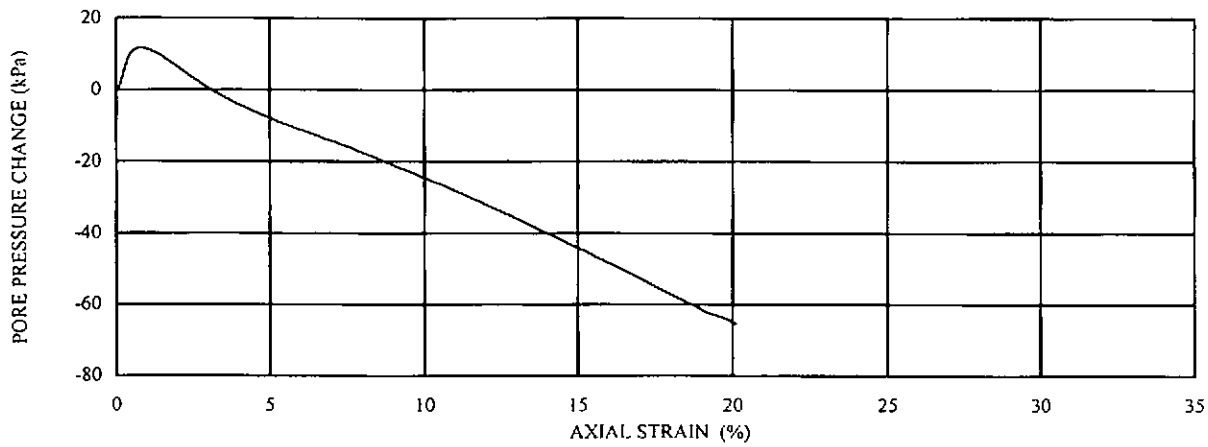
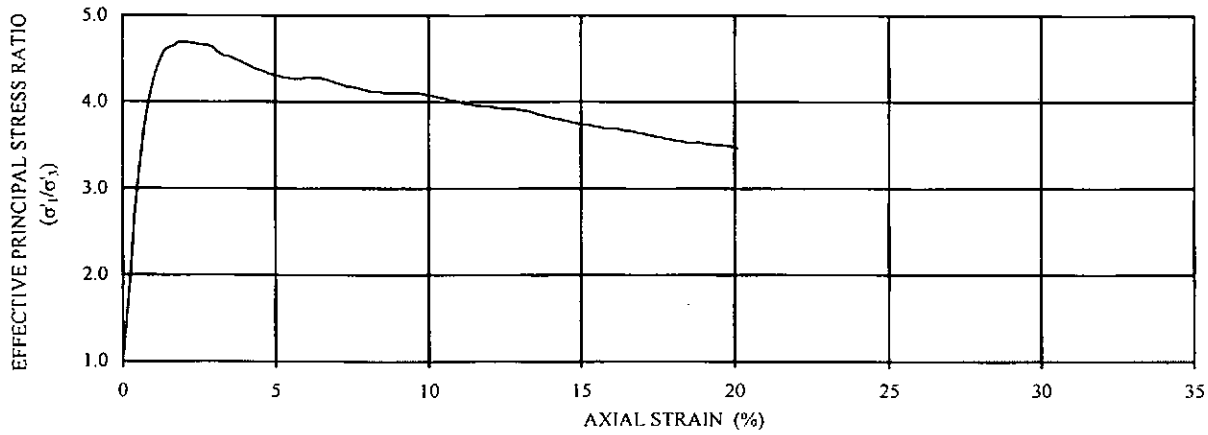
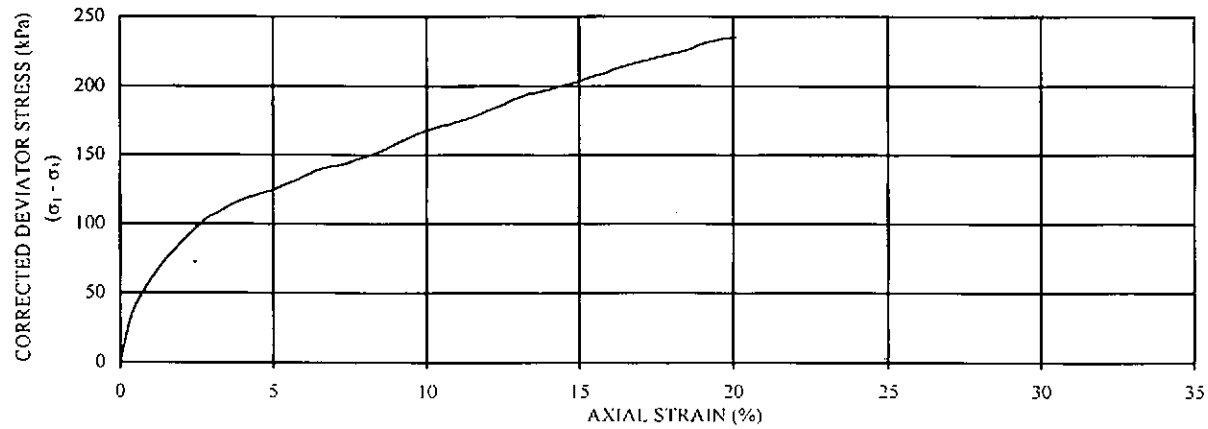
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH12**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.80 - 4.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

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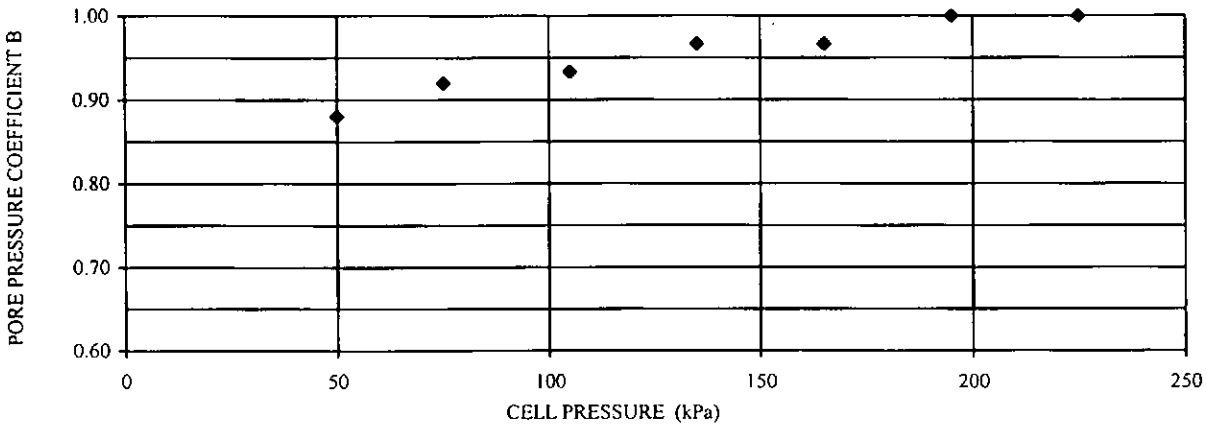
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
11/12/2008	08:33	0	0	-	0.0	
	08:41	25	-	24		-
	09:00	25	20	20	-4.0	
	09:10	50	-	42		0.88
	09:43	50	45	45	-3.2	
	09:51	75	-	68		0.92
	10:19	75	70	70	-2.9	
	10:30	105	-	98		0.93
	11:19	105	100	100	-2.7	
	11:25	135	-	129		0.97
	12:11	135	130	130	-2.7	
	12:18	165	-	159		0.97
	13:25	165	160	160	-2.6	
	13:36	195	-	190		1.00
	14:20	195	190	190	-2.3	
	14:29	225	-	220		1.00
12/12/2008	08:50	225	220	220	-1.8	

Borehole No. WCH-BH12 — **Sample Depth m:-** 3.00 - 4.00
Sample No. : 1 — **Specimen Depth m:-** 3.80 - 4.00
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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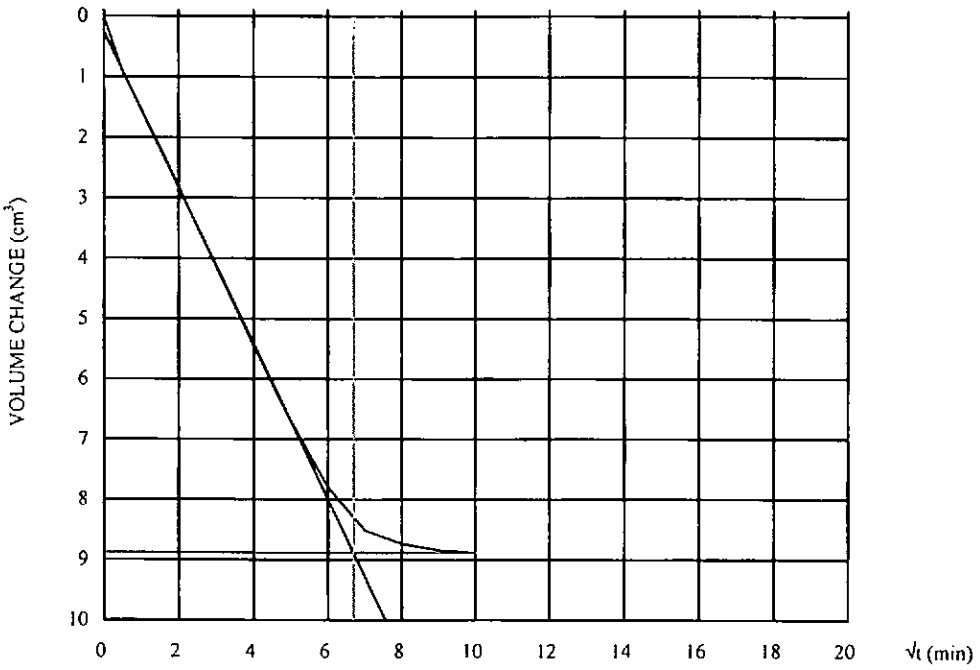
Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

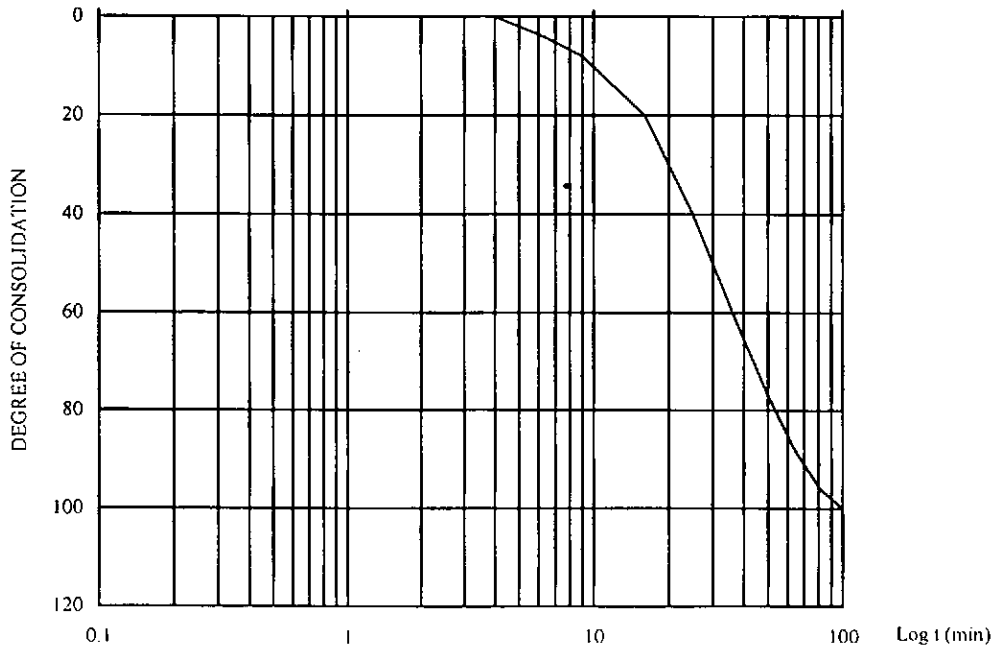


√t100 6.69 min

t100 44.762 min

tf 23.724 min

Calc. strain rate
0.426 mm/min



Borehole No. : WCH-BH12 **Sample Depth m:-** 3.00 - 4.00

Sample No. : 1 **Specimen Depth m:-** 3.80 - 4.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Single Stage		P.W.P,B.P		Effective Pressure	30 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress ☒	Max. Stress ratio ☐	Axial Strain % ☐

Stage : 1	Applied Pressure (kPa) - Cell : 250	Back : 220	P.R. factor 1.6995	kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 40 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
15/12	08:35	0.00	0.00	0.056	220	0.000	0.0	30.0	30.0	30.0	0.0	30.0	1.00
	08:40	0.15	0.10	0.084	221	0.029	11.0	40.2	29.2	34.7	5.5	32.9	1.38
	08:45	0.41	0.28	0.127	226	0.080	28.0	52.1	24.1	38.1	14.0	33.4	2.16
	08:50	0.62	0.43	0.152	229	0.123	37.7	58.3	20.6	39.5	18.9	33.2	2.83
	08:55	0.86	0.60	0.171	231	0.171	45.1	64.0	18.9	41.4	22.5	33.9	3.39
	09:00	1.03	0.71	0.183	232	0.201	49.7	68.1	18.4	43.3	24.9	35.0	3.70
	09:05	1.26	0.87	0.198	232	0.246	55.5	73.8	18.3	46.0	27.7	36.8	4.03
	09:10	1.56	1.08	0.216	231	0.303	62.4	81.1	18.7	49.9	31.2	39.5	4.33
	09:15	1.76	1.22	0.227	231	0.341	66.5	85.7	19.2	52.5	33.3	41.4	4.47
	09:20	1.99	1.38	0.240	230	0.384	71.5	91.4	19.9	55.6	35.7	43.7	4.59
	09:25	2.21	1.53	0.250	229	0.424	75.2	95.9	20.7	58.3	37.6	45.8	4.63
	09:30	2.45	1.70	0.261	228	0.468	79.3	101.0	21.7	61.4	39.7	48.1	4.66
	09:35	2.66	1.85	0.271	228	0.507	83.0	105.5	22.5	64.0	41.5	50.2	4.69
	09:40	2.90	2.01	0.281	227	0.549	86.7	110.2	23.5	66.9	43.4	52.4	4.69
	09:45	3.12	2.16	0.290	226	0.587	90.1	114.5	24.4	69.4	45.0	54.4	4.69
	09:50	3.36	2.33	0.300	225	0.630	93.7	119.2	25.5	72.4	46.9	56.7	4.68
	09:55	3.61	2.50	0.310	224	0.673	97.4	123.9	26.5	75.2	48.7	59.0	4.67
	10:00	3.88	2.69	0.320	222	0.720	101.0	128.6	27.6	78.1	50.5	61.3	4.66
	10:05	4.08	2.82	0.328	222	0.752	103.9	132.3	28.4	80.3	51.9	63.0	4.66
	10:10	4.31	2.99	0.335	221	0.794	106.4	135.7	29.3	82.5	53.2	64.8	4.63
	10:15	4.52	3.14	0.339	220	0.830	107.7	137.8	30.1	84.0	53.9	66.0	4.58
	10:20	4.78	3.32	0.345	219	0.873	109.8	140.8	31.0	85.9	54.9	67.6	4.54
	10:25	5.03	3.49	0.352	218	0.913	112.2	144.0	31.8	87.9	56.1	69.2	4.53
	10:30	5.28	3.66	0.358	217	0.953	114.2	146.8	32.6	89.7	57.1	70.7	4.50
	10:35	5.50	3.81	0.363	217	0.988	115.9	149.2	33.3	91.3	58.0	71.9	4.48
	10:40	5.72	3.96	0.367	216	1.022	117.2	151.1	33.9	92.5	58.6	73.0	4.46
	10:45	6.07	4.21	0.373	215	1.079	119.2	154.1	34.9	94.5	59.6	74.6	4.41
	10:50	6.30	4.37	0.376	215	1.115	120.0	155.5	35.5	95.5	60.0	75.5	4.38
	10:55	6.50	4.51	0.380	214	1.147	121.4	157.4	36.0	96.7	60.7	76.5	4.37
	11:00	6.74	4.67	0.384	213	1.182	122.6	159.2	36.6	97.9	61.3	77.5	4.35
	11:05	7.01	4.86	0.388	213	1.224	123.8	161.1	37.3	99.2	61.9	78.6	4.32
	11:10	7.24	5.02	0.392	212	1.258	125.1	162.9	37.8	100.3	62.5	79.5	4.31
	11:15	7.49	5.19	0.397	212	1.295	126.7	165.2	38.5	101.9	63.4	80.7	4.29
	11:20	7.74	5.36	0.402	211	1.331	128.3	167.4	39.1	103.3	64.2	81.9	4.28
	11:25	7.96	5.52	0.406	210	1.365	129.6	169.2	39.6	104.4	64.8	82.8	4.27
	11:30	8.25	5.71	0.412	210	1.404	131.5	171.7	40.2	105.9	65.7	84.0	4.27
	11:35	8.47	5.87	0.417	209	1.437	133.1	173.8	40.7	107.2	66.5	85.1	4.27
	11:40	8.71	6.03	0.423	209	1.470	135.1	176.3	41.2	108.7	67.5	86.2	4.28
	11:45	8.96	6.21	0.428	208	1.507	136.6	178.3	41.7	110.0	68.3	87.2	4.28

Borehole No. :	**WCH-BH12**	**Sample Depth m:- 3.00 - 4.00**	
Sample No. :	**1**	**Specimen Depth m:- 3.80 - 4.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

Technology Centre
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Form : GESR009.14 / Dec.13.04 / Issue 17 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 40	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
15/12	11:50	9.18	6.36	0.433	208	1.537	138.2	180.4	42.2	111.3	69.1	88.3	4.28
	11:55	9.38	6.50	0.437	207	1.565	139.5	182.1	42.6	112.3	69.7	89.1	4.27
	12:00	9.61	6.66	0.441	207	1.596	140.7	183.9	43.2	113.5	70.3	90.1	4.26
	12:05	9.92	6.87	0.445	206	1.638	141.8	185.6	43.8	114.7	70.9	91.1	4.24
	12:10	10.13	7.02	0.447	206	1.667	142.3	186.5	44.2	115.3	71.1	91.6	4.22
	12:15	10.36	7.18	0.450	205	1.697	143.1	187.8	44.7	116.2	71.5	92.4	4.20
	12:20	10.65	7.38	0.454	205	1.736	144.2	189.6	45.4	117.5	72.1	93.5	4.18
	12:25	10.88	7.54	0.458	204	1.766	145.4	191.2	45.8	118.5	72.7	94.3	4.17
	12:30	11.12	7.71	0.462	204	1.798	146.6	193.0	46.4	119.7	73.3	95.3	4.16
	12:35	11.43	7.92	0.467	203	1.837	148.0	195.2	47.2	121.2	74.0	96.5	4.14
	12:40	11.60	8.04	0.470	202	1.859	148.9	196.5	47.6	122.0	74.4	97.2	4.13
	12:45	11.91	8.25	0.476	202	1.897	150.7	199.0	48.3	123.6	75.3	98.5	4.12
	12:50	12.10	8.38	0.480	201	1.920	151.9	200.6	48.7	124.6	75.9	99.3	4.12
	12:55	12.36	8.56	0.485	201	1.953	153.4	202.8	49.4	126.1	76.7	100.5	4.10
	13:00	12.51	8.67	0.489	200	1.972	154.6	204.4	49.8	127.1	77.3	101.3	4.10
	13:05	12.83	8.89	0.497	199	2.011	157.1	207.7	50.6	129.1	78.5	103.0	4.10
	13:10	13.06	9.05	0.503	199	2.039	158.9	210.1	51.2	130.7	79.5	104.2	4.10
	13:15	13.30	9.22	0.508	198	2.069	160.4	212.1	51.7	131.9	80.2	105.2	4.10
	13:20	13.55	9.39	0.514	198	2.098	162.2	214.5	52.3	133.4	81.1	106.4	4.10
	13:25	13.78	9.55	0.520	197	2.125	164.0	216.9	52.9	134.9	82.0	107.6	4.10
	13:30	14.03	9.73	0.526	197	2.156	165.8	219.3	53.5	136.4	82.9	108.8	4.10
	13:35	14.29	9.90	0.531	196	2.184	167.3	221.5	54.2	137.8	83.6	110.0	4.09
	13:40	14.50	10.05	0.535	195	2.210	168.4	223.1	54.7	138.9	84.2	110.8	4.08
	13:45	14.80	10.26	0.540	195	2.244	169.7	225.2	55.5	140.4	84.9	112.1	4.06
	13:50	14.99	10.39	0.543	194	2.266	170.5	226.4	55.9	141.2	85.3	112.7	4.05
	13:55	15.23	10.55	0.547	194	2.292	171.6	228.0	56.4	142.2	85.8	113.6	4.04
	14:00	15.52	10.75	0.550	193	2.324	172.2	229.4	57.2	143.3	86.1	114.6	4.01
	14:05	15.72	10.89	0.555	192	2.347	173.7	231.4	57.7	144.5	86.8	115.6	4.01
	14:10	15.98	11.08	0.559	192	2.377	174.7	233.1	58.4	145.8	87.4	116.6	3.99
	14:15	16.30	11.29	0.565	191	2.411	176.4	235.6	59.2	147.4	88.2	118.0	3.98
	14:20	16.48	11.42	0.568	190	2.431	177.1	236.8	59.7	148.3	88.6	118.7	3.97
	14:25	16.77	11.62	0.575	190	2.463	179.1	239.6	60.5	150.1	89.6	120.2	3.96
	14:30	17.00	11.78	0.580	189	2.487	180.5	241.6	61.1	151.4	90.3	121.3	3.95
	14:35	17.20	11.92	0.585	188	2.509	182.0	243.7	61.7	152.7	91.0	122.4	3.95
	14:40	17.46	12.10	0.591	188	2.537	183.6	246.0	62.4	154.2	91.8	123.6	3.94
	14:45	17.82	12.35	0.598	187	2.575	185.5	248.9	63.4	156.2	92.8	125.2	3.93
	14:50	18.00	12.47	0.602	186	2.593	186.6	250.5	63.9	157.2	93.3	126.1	3.92
	14:55	18.19	12.61	0.607	186	2.614	188.0	252.4	64.4	158.4	94.0	127.1	3.92
	15:00	18.43	12.78	0.614	185	2.640	190.1	255.1	65.0	160.0	95.0	128.4	3.92
	15:05	18.61	12.90	0.618	184	2.658	191.1	256.7	65.6	161.2	95.6	129.3	3.91
	15:10	18.92	13.11	0.624	184	2.689	192.7	259.1	66.4	162.8	96.4	130.6	3.90

Borehole No. : WCH-BH12 — **Sample Depth m:- 3.00 - 4.00**

Sample No. : 1 — **Specimen Depth m:- 3.80 - 4.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by: W S Wat

Checked by: H W Chung

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Form : GESK009.15 / Dec.15.04 / Issue 17 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Porc	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 40	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
15/12	15:15	19.23	13.32	0.631	183	2.720	194.6	261.9	67.3	164.6	97.3	132.2	3.89
	15:20	19.38	13.43	0.632	182	2.737	194.7	262.4	67.7	165.0	97.3	132.6	3.88
	15:25	19.65	13.62	0.636	182	2.765	195.6	264.1	68.5	166.3	97.8	133.7	3.86
	15:30	19.90	13.79	0.640	181	2.789	196.5	265.7	69.2	167.5	98.3	134.7	3.84
	15:35	20.12	13.94	0.643	180	2.811	197.2	267.0	69.8	168.4	98.6	135.5	3.83
	15:40	20.39	14.13	0.648	179	2.839	198.4	269.0	70.6	169.8	99.2	136.7	3.81
	15:45	20.69	14.34	0.653	179	2.869	199.6	271.0	71.4	171.2	99.8	137.9	3.80
	15:50	20.86	14.46	0.656	178	2.886	200.3	272.2	71.9	172.1	100.2	138.7	3.79
	15:55	21.11	14.63	0.661	177	2.911	201.6	274.3	72.7	173.5	100.8	139.9	3.77
	16:00	21.39	14.82	0.665	177	2.938	202.4	275.9	73.5	174.7	101.2	141.0	3.75
	16:05	21.56	14.94	0.668	176	2.955	203.1	277.0	73.9	175.5	101.6	141.6	3.75
	16:10	21.81	15.12	0.673	175	2.980	204.4	279.0	74.6	176.8	102.2	142.7	3.74
	16:15	22.13	15.34	0.680	175	3.012	206.1	281.6	75.5	178.6	103.1	144.2	3.73
	16:20	22.34	15.48	0.684	174	3.031	207.1	283.3	76.2	179.8	103.6	145.2	3.72
	16:25	22.54	15.62	0.688	173	3.051	208.1	284.9	76.8	180.8	104.0	146.2	3.71
	16:30	22.82	15.81	0.692	172	3.078	208.9	286.5	77.6	182.1	104.5	147.2	3.69
	16:35	23.09	16.00	0.700	172	3.104	211.1	289.5	78.4	183.9	105.5	148.8	3.69
	16:40	23.33	16.17	0.706	171	3.128	212.6	291.6	79.0	185.3	106.3	149.9	3.69
	16:45	23.56	16.32	0.710	170	3.149	213.5	293.2	79.7	186.5	106.8	150.9	3.68
	16:50	23.79	16.49	0.714	170	3.173	214.4	294.8	80.4	187.6	107.2	151.9	3.67
	16:55	24.00	16.63	0.719	169	3.192	215.6	296.6	81.0	188.8	107.8	152.9	3.66
	17:00	24.36	16.88	0.725	168	3.227	216.9	299.0	82.1	190.6	108.5	154.4	3.64
	17:05	24.56	17.02	0.729	167	3.246	217.9	300.6	82.7	191.6	108.9	155.3	3.63
	17:10	24.74	17.15	0.732	167	3.264	218.5	301.8	83.3	192.5	109.2	156.1	3.62
	17:15	25.02	17.34	0.737	166	3.291	219.6	303.8	84.2	194.0	109.8	157.4	3.61
	17:20	25.33	17.56	0.743	165	3.321	220.9	306.1	85.2	195.7	110.5	158.8	3.59
	17:25	25.59	17.74	0.747	164	3.346	221.7	307.7	86.0	196.9	110.9	159.9	3.58
	17:30	25.82	17.90	0.751	163	3.369	222.6	309.3	86.7	198.0	111.3	160.9	3.57
	17:35	26.06	18.06	0.755	163	3.391	223.4	310.8	87.4	199.1	111.7	161.9	3.56
	17:40	26.30	18.22	0.759	162	3.413	224.2	312.3	88.1	200.2	112.1	162.8	3.54
	17:45	26.54	18.39	0.763	161	3.437	225.0	313.8	88.8	201.3	112.5	163.8	3.53
	17:50	26.73	18.53	0.767	161	3.456	225.9	315.4	89.5	202.4	112.9	164.8	3.52
	17:55	26.97	18.69	0.773	160	3.478	227.3	317.3	90.0	203.7	113.7	165.8	3.53
	18:00	27.22	18.86	0.781	159	3.502	229.4	320.1	90.7	205.4	114.7	167.2	3.53
	18:05	27.47	19.04	0.787	158	3.527	230.8	322.5	91.7	207.1	115.4	168.6	3.52
	18:10	27.75	19.23	0.792	158	3.554	231.8	324.2	92.4	208.3	115.9	169.7	3.51
	18:15	27.99	19.40	0.796	157	3.577	232.6	325.5	92.9	209.2	116.3	170.4	3.50
	18:20	28.25	19.58	0.801	157	3.603	233.6	327.0	93.4	210.2	116.8	171.3	3.50
	18:25	28.51	19.76	0.805	156	3.628	234.3	328.2	93.9	211.1	117.2	172.0	3.50
	18:30	28.76	19.93	0.808	155	3.652	234.7	329.3	94.6	212.0	117.4	172.8	3.48
	18:35	**29.01**	**20.10**	**0.811**	**155**	**3.676**	**235.2**	**330.6**	**95.4**	**213.0**	**117.6**	**173.8**	**3.46**

Borehole No. : WCH-BH12 — **Sample Depth m:- 3.00 - 4.00**

Sample No. : 1 — **Specimen Depth m:- 3.80 - 4.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

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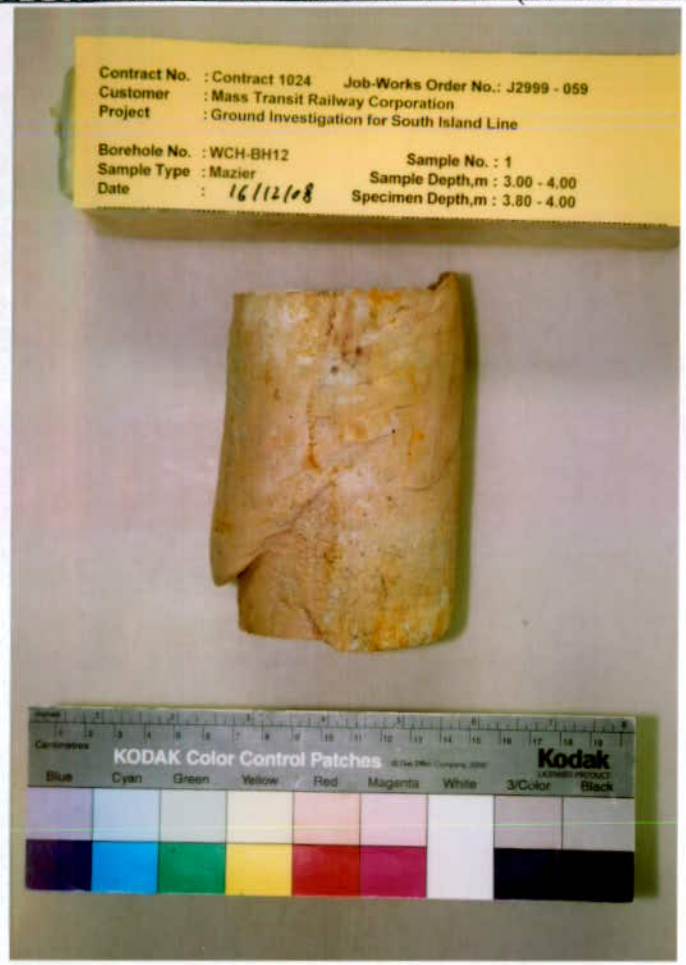
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Greyish brown, sandy SILT/CLAY **Sample Origin : CDT‡** ‡ Information provided by customer

Borehole No. : WCH-BH12	**Sample No. : 1**	**Sample Depth m:- 3.00 - 4.00**	**Specimen Depth m:- 3.80 - 4.00**
Customer : Mass Transit Railway Corporation **Project : Ground Investigation for South Island Line**		**Contract No. : Contract 1024** **Job No. : J2999** **Works Order No.: 059**	Compiled by W S Wat Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12		
Sample		no	9		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	7.00 - 8.00		
Specimen Depth		m	7.80 - 8.00		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	73.9		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	31		
Bulk density	(ρ_o)	Mg/m^3	1.88		
Dry density	(ρ_d)	Mg/m^3	1.43		
Particle density	(ρ_s)		2.66		
Voids Ratio	(e_o)		0.86		
Degree of Saturation	(S_r)	%	97.7		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.98		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	295		
Back Pressure	(u_b)	kPa	220		
Effective Pressure	(σ'_3)	kPa	75		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	332.90		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.63		
Coefficient of Permeability (k)		m/s	6.45E-08		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	28		
Pore Pressure at the End of Consolidation		kPa	220		
Effective Stress at the End of Consolidation		kPa	75		
Bulk density	(ρ_o)	Mg/m^3	1.92		
Dry density	(ρ_d)	Mg/m^3	1.50		
Voids Ratio	(e)		0.78		
Degree of Saturation	(S_r)	%	96.6		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Job No.: **J2999**
Contract No.: Contract 1024
Works Order No.: 059
Report No. : J2999-059.11

Technician : W S Wat
Tested Date: 15/12/2008

Checked By :
Name : H W Chung
Date : 09/01/2009

Approved By :
Signatory : **Lau Wai Cheong**
Date : 09/01/2009

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12		
Sample		no	9		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	7.00 - 8.00		
Specimen Depth		m	7.80 - 8.00		
COMPRESSION - FAILURE					
Cell Pressure		kPa	295		
Rate of Strain		mm/min	0.035		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	247		
Corrected Deviator Stress (σ'_1 - σ'_3)		kPa	184		
Minor Effective Principal Stress (σ'_3)		kPa	63		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	155		
$t = (\sigma_1 - \sigma_3)/2$		kPa	92		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			0.07		
Strain at Failure	(εf)	%	10.3		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	28		
Bulk density	(ρ_o)	Mg/m^3	1.92		
Dry density	(ρ_d)	Mg/m^3	1.50		
Voids Ratio	(e_f)		0.78		
Degree of Saturation	(S_f)	%	96.6		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.66 (Determuned)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**		
	Contract No.: Contract 1024	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

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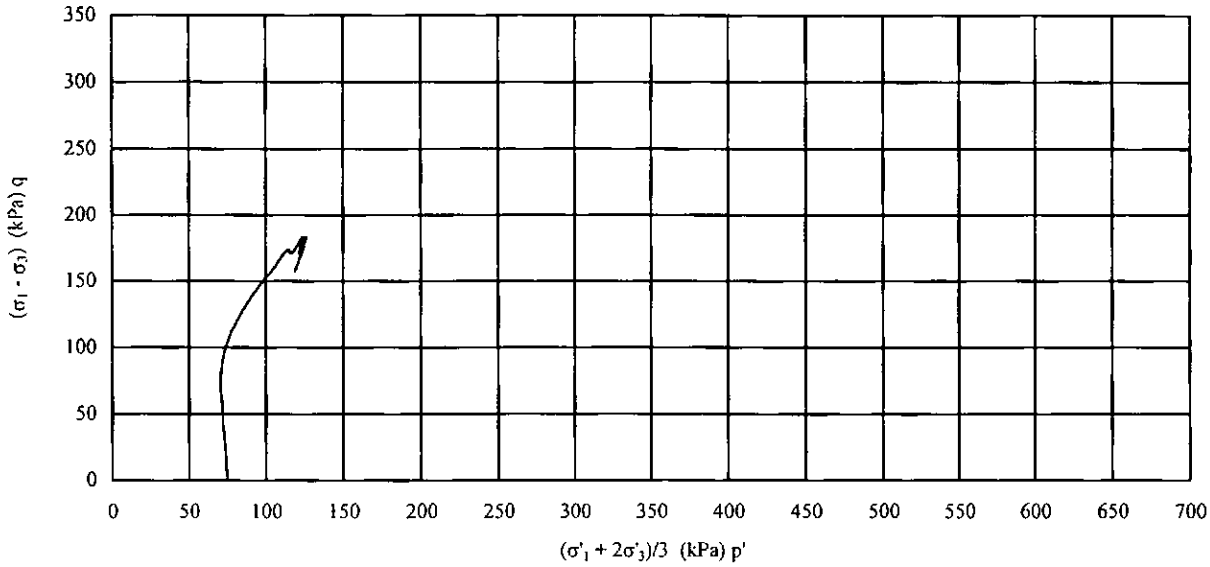
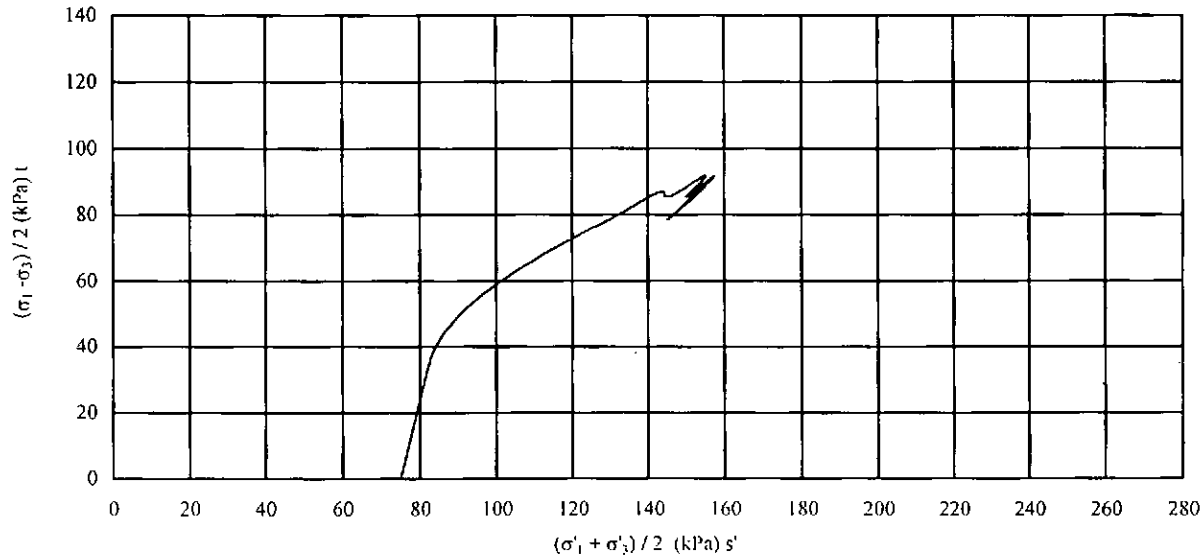
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH12**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.80 - 8.00**
Customer :	**Mass Transit Railway Corporation**	Compiled by	W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.:	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
		Checked by	H W Chung

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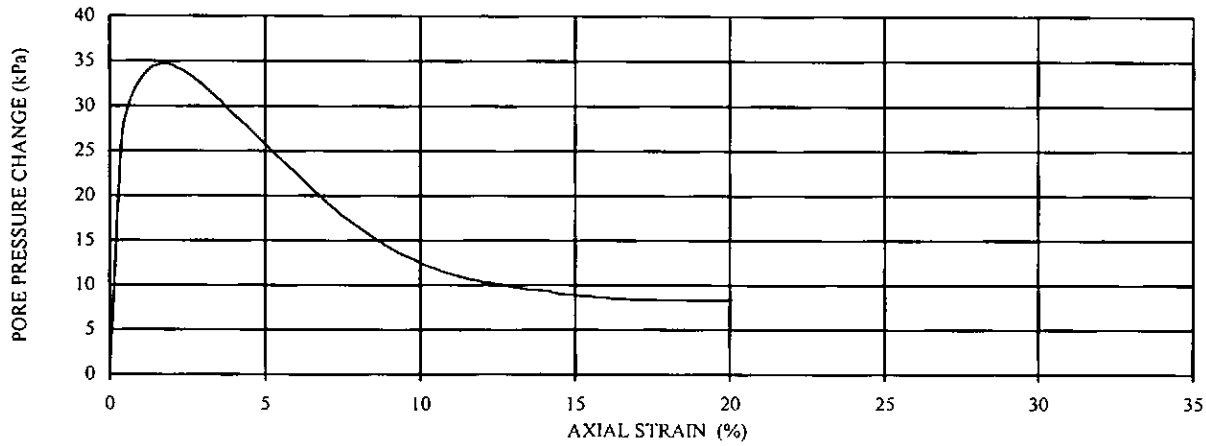
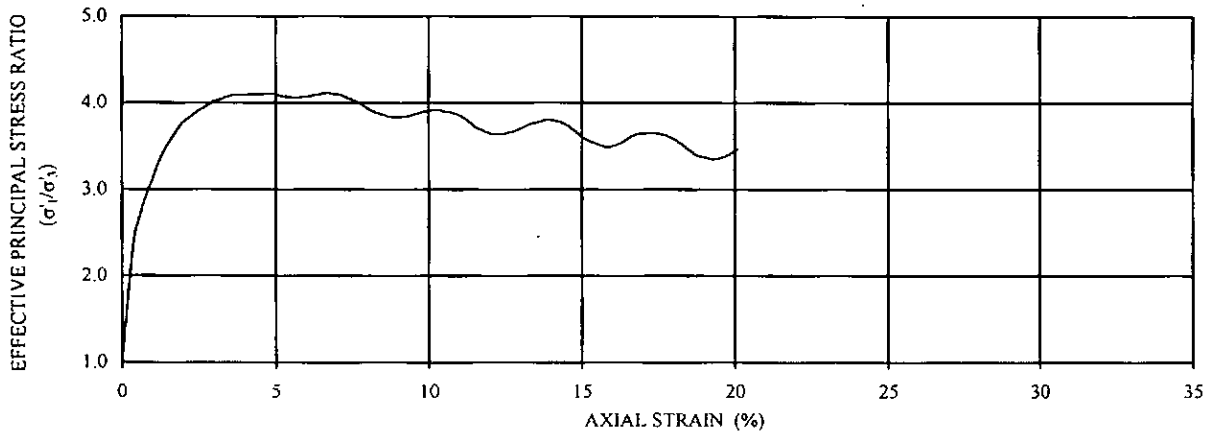
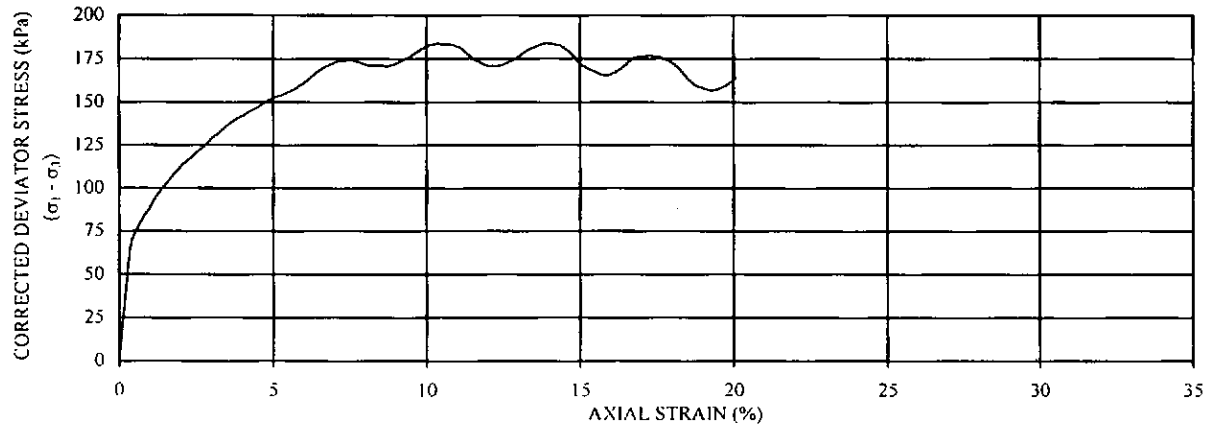
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH12**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.80 - 8.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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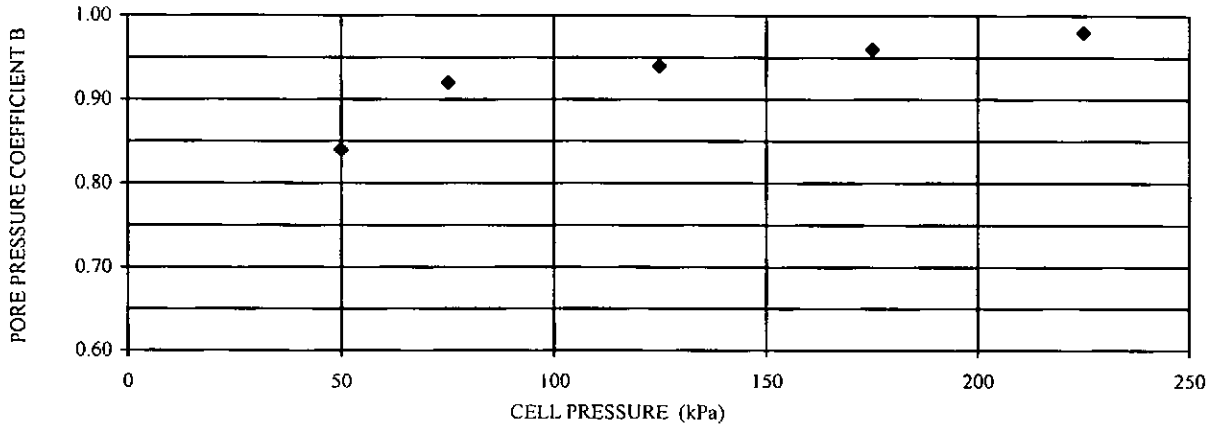
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
17/12/2008	08:42	0	0	-	0.0	
	08:51	25	-	24		-
	09:13	25	20	20	-4.5	
	09:21	50	-	41		0.84
	10:13	50	45	45	-3.5	
	10:25	75	-	68		0.92
	11:03	75	70	70	-3.3	
	11:10	125	-	117		0.94
	11:41	125	120	120	-2.9	
	11:49	175	-	168		0.96
	12:36	175	170	170	-2.3	
	12:45	225	-	219		0.98
19/12/2008	08:45	225	220	220	-2.1	

Borehole No. WCH-BH12 — **Sample Depth m:-** 7.00 - 8.00
Sample No. : 9 — **Specimen Depth m:-** 7.80 - 8.00
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

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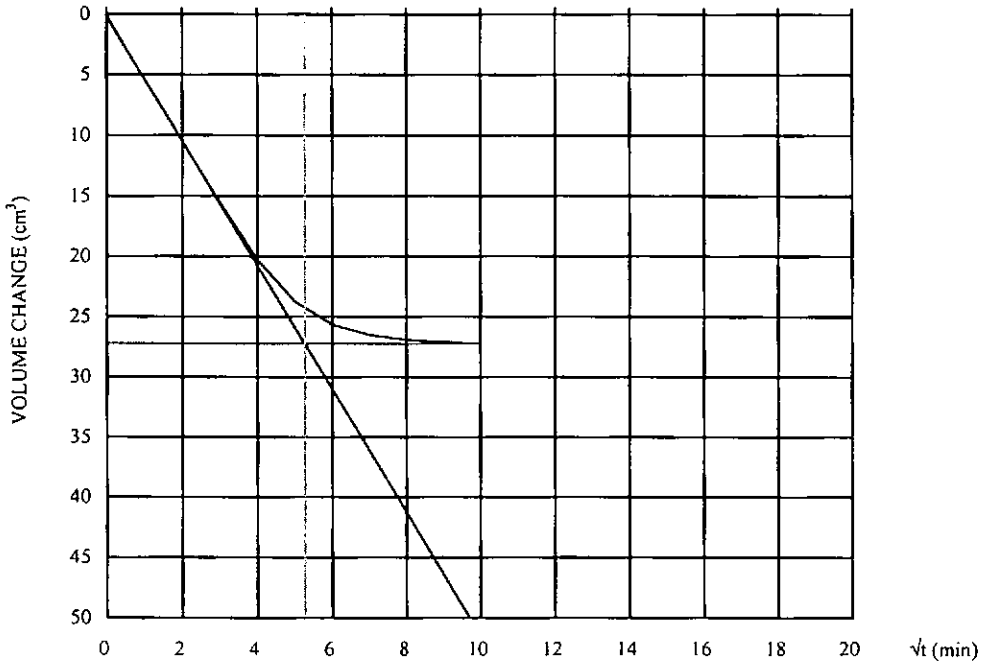
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

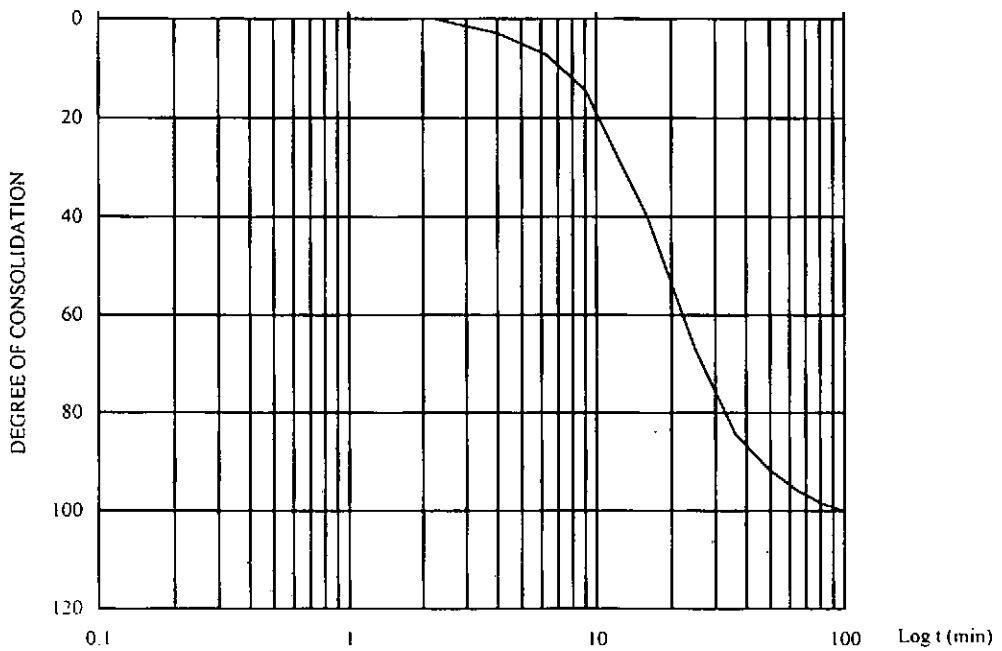


√t100 5.27 min

t100 27.747 min

tf 14.706 min

Calc. strain rate
0.680 mm/min



Borehole No. : WCH-BH12 **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 **Specimen Depth m:-** 7.80 - 8.00

Customer : Mass Transit Railway Corporation		Complied by
Project : Ground Investigation for South Island Line		W S Wat
	Contract No.: Contract 1024	Checked by
Job No.: J2999	**Works Order No.: 059**	H W Chung

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Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage				P.W.P,B.P					Effective Pressure		75		kPa
Side drains		No		Selected Machine Speed			0.035	mm/min	Rate of Strain		1.47		% per hr
FAILURE CRITERION													
Max. deviator Stress					☒	Max. Stress ratio			☐	Axial Strain %			☐
Stage :	1	Applied Pressure (kPa) - Cell :				295	Back :	220		P.R. factor		3.0328	kN/mm
Date	Time	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
		Dial		P.R.No. 25	Pressure	Corr.	q $\sigma_1-\sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
19/12	15:00	0.00	0.00	0.041	220	0.000	0.0	75.0	75.0	75.0	0.0	75.0	1.00
	15:25	0.54	0.38	0.133	246	0.109	66.6	115.3	48.7	82.0	33.3	70.9	2.37
	15:36	0.83	0.58	0.146	250	0.166	75.8	121.1	45.3	83.2	37.9	70.6	2.67
	15:46	1.12	0.78	0.156	252	0.222	82.9	126.3	43.4	84.8	41.4	71.0	2.91
	15:57	1.41	0.99	0.164	253	0.280	88.4	130.5	42.1	86.3	44.2	71.6	3.10
	16:07	1.70	1.19	0.173	254	0.334	94.6	135.8	41.2	88.5	47.3	72.7	3.30
	16:17	1.99	1.39	0.180	254	0.388	99.4	140.0	40.6	90.3	49.7	73.7	3.45
	16:27	2.28	1.60	0.187	255	0.444	104.2	144.6	40.4	92.5	52.1	75.1	3.58
	16:37	2.57	1.80	0.193	255	0.497	108.2	148.5	40.3	94.4	54.1	76.4	3.68
	16:47	2.86	2.00	0.199	255	0.549	112.2	152.6	40.4	96.5	56.1	77.8	3.78
	16:57	3.15	2.20	0.204	254	0.600	115.5	156.3	40.8	98.5	57.7	79.3	3.83
	17:07	3.44	2.41	0.209	254	0.654	118.7	159.8	41.1	100.5	59.4	80.7	3.89
	17:18	3.73	2.61	0.214	253	0.704	122.0	163.6	41.6	102.6	61.0	82.3	3.93
	17:29	4.02	2.82	0.219	253	0.756	125.2	167.3	42.1	104.7	62.6	83.8	3.97
	17:40	4.31	3.02	0.225	252	0.805	129.1	171.8	42.7	107.3	64.6	85.7	4.02
	17:52	4.60	3.22	0.229	252	0.853	131.6	174.9	43.3	109.1	65.8	87.2	4.04
	18:03	4.89	3.42	0.234	251	0.901	134.8	178.7	43.9	111.3	67.4	88.8	4.07
	18:14	5.18	3.63	0.239	250	0.951	138.0	182.6	44.6	113.6	69.0	90.6	4.09
	18:24	5.47	3.83	0.243	250	0.997	140.4	185.8	45.4	115.6	70.2	92.2	4.09
	18:35	5.76	4.03	0.246	249	1.043	142.2	188.2	46.0	117.1	71.1	93.4	4.09
	18:45	6.05	4.24	0.250	248	1.091	144.6	191.3	46.7	119.0	72.3	94.9	4.10
	18:55	6.34	4.44	0.253	248	1.136	146.4	193.7	47.3	120.5	73.2	96.1	4.09
	19:05	6.63	4.64	0.257	247	1.181	148.8	196.8	48.0	122.4	74.4	97.6	4.10
	19:15	6.92	4.85	0.261	246	1.227	151.2	199.9	48.7	124.3	75.6	99.1	4.10
	19:25	7.21	5.05	0.264	246	1.271	152.9	202.3	49.4	125.8	76.4	100.4	4.10
	19:34	7.50	5.25	0.266	245	1.314	153.9	204.0	50.1	127.1	77.0	101.4	4.07
	19:44	7.79	5.45	0.269	244	1.356	155.6	206.3	50.7	128.5	77.8	102.6	4.07
	19:55	8.08	5.66	0.272	244	1.401	157.3	208.7	51.4	130.0	78.6	103.8	4.06
	20:05	8.37	5.86	0.276	243	1.442	159.6	211.6	52.0	131.8	79.8	105.2	4.07
	20:16	8.66	6.06	0.280	242	1.483	162.0	214.7	52.7	133.7	81.0	106.7	4.07
	20:26	8.95	6.27	0.285	242	1.526	165.0	218.4	53.4	135.9	82.5	108.4	4.09
	20:38	9.24	6.47	0.290	241	1.566	168.0	222.1	54.1	138.1	84.0	110.1	4.11
	20:48	9.53	6.67	0.294	240	1.606	170.3	225.0	54.7	139.9	85.2	111.5	4.11
	21:00	9.82	6.88	0.297	240	1.647	171.9	227.3	55.4	141.4	86.0	112.7	4.10
	21:10	10.11	7.08	0.300	239	1.686	173.5	229.5	56.0	142.8	86.8	113.8	4.10
	21:21	10.40	7.28	0.301	238	1.725	173.8	230.4	56.6	143.5	86.9	114.5	4.07
	21:31	10.69	7.48	0.302	238	1.763	174.0	231.2	57.2	144.2	87.0	115.2	4.04
	21:41	10.98	7.69	0.302	237	1.803	173.6	231.3	57.7	144.5	86.8	115.6	4.01
	21:51	11.27	7.89	0.301	237	1.840	172.5	230.7	58.2	144.5	86.3	115.7	3.96

Borehole No. : WCH-BH12 **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 **Specimen Depth m:-** 7.80 - 8.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 25	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
19/12	22:01	11.56	8.09	0.300	236	1.877	171.4	230.1	58.7	144.4	85.7	115.8	3.92
	22:11	11.85	8.30	0.300	236	1.915	171.0	230.2	59.2	144.7	85.5	116.2	3.89
	22:21	12.14	8.50	0.301	235	1.951	171.3	231.0	59.7	145.3	85.6	116.8	3.87
	22:30	12.43	8.70	0.301	235	1.987	170.8	230.9	60.1	145.5	85.4	117.0	3.84
	22:40	12.72	8.91	0.303	234	2.024	171.7	232.3	60.6	146.5	85.9	117.8	3.83
	22:51	13.01	9.11	0.306	234	2.060	173.3	234.3	61.0	147.7	86.7	118.8	3.84
	23:01	13.30	9.31	0.309	234	2.094	174.9	236.3	61.4	148.8	87.4	119.7	3.85
	23:12	13.59	9.52	0.313	233	2.131	177.1	238.8	61.7	150.2	88.5	120.7	3.87
	23:22	13.88	9.72	0.317	233	2.165	179.3	241.3	62.0	151.6	89.6	121.8	3.89
	23:33	14.17	9.92	0.321	233	2.198	181.4	243.8	62.4	153.1	90.7	122.9	3.91
	23:44	14.46	10.12	0.324	232	2.232	183.0	245.7	62.7	154.2	91.5	123.7	3.92
	23:55	**14.75**	**10.33**	**0.326**	**232**	**2.267**	**183.8**	**246.8**	**63.0**	**154.9**	**91.9**	**124.3**	**3.92**
20/12	00:05	15.04	10.53	0.326	232	2.300	183.4	246.6	63.2	154.9	91.7	124.3	3.90
	00:16	15.33	10.73	0.327	232	2.332	183.6	247.1	63.5	155.3	91.8	124.7	3.89
	00:26	15.62	10.94	0.326	231	2.366	182.4	246.1	63.7	154.9	91.2	124.5	3.86
	00:36	15.91	11.14	0.324	231	2.398	180.7	244.6	63.9	154.2	90.3	124.1	3.83
	00:46	16.20	11.34	0.320	231	2.430	177.7	241.8	64.1	152.9	88.8	123.3	3.77
	00:55	16.49	11.55	0.316	231	2.464	174.6	238.9	64.3	151.6	87.3	122.5	3.72
	01:05	16.78	11.75	0.314	231	2.495	172.9	237.3	64.4	150.9	86.5	122.0	3.69
	01:15	17.07	11.95	0.312	230	2.526	171.2	235.8	64.6	150.2	85.6	121.7	3.65
	01:24	17.36	12.15	0.312	230	2.557	170.8	235.5	64.7	150.1	85.4	121.6	3.64
	01:34	17.65	12.36	0.313	230	2.589	171.0	235.8	64.8	150.3	85.5	121.8	3.64
	01:44	17.94	12.56	0.316	230	2.620	172.5	237.4	64.9	151.1	86.2	122.4	3.66
	01:55	18.23	12.76	0.319	230	2.650	173.9	239.0	65.1	152.1	87.0	123.1	3.67
	02:05	18.52	12.97	0.323	230	2.681	176.0	241.2	65.2	153.2	88.0	123.9	3.70
	02:16	18.81	13.17	0.328	230	2.711	178.7	244.0	65.3	154.7	89.4	124.9	3.74
	02:27	19.10	13.37	0.332	230	2.741	180.8	246.2	65.4	155.8	90.4	125.7	3.76
	02:37	19.39	13.58	0.335	230	2.772	182.2	247.7	65.5	156.6	91.1	126.2	3.78
	02:48	19.68	13.78	0.338	230	2.801	183.6	249.1	65.5	157.3	91.8	126.7	3.80
	02:59	19.97	13.98	0.339	229	2.831	183.8	249.4	65.6	157.5	91.9	126.9	3.80
	03:09	20.26	14.19	0.339	229	2.861	183.3	249.0	65.7	157.4	91.7	126.8	3.79
	03:20	20.55	14.39	0.338	229	2.890	182.2	248.1	65.9	157.0	91.1	126.6	3.77
	03:30	20.84	14.59	0.335	229	2.919	179.9	245.9	66.0	156.0	90.0	126.0	3.73
	03:39	21.13	14.79	0.330	229	2.948	176.3	242.3	66.0	154.2	88.2	124.8	3.67
	03:49	21.42	15.00	0.324	229	2.978	172.2	238.3	66.1	152.2	86.1	123.5	3.60
	03:59	21.71	15.20	0.321	229	3.006	169.9	236.1	66.2	151.1	84.9	122.8	3.57
	04:08	22.00	15.40	0.319	229	3.035	168.2	234.4	66.2	150.3	84.1	122.3	3.54
	04:17	22.29	15.61	0.317	229	3.064	166.5	232.8	66.3	149.6	83.3	121.8	3.51
	04:27	22.58	15.81	0.316	229	3.093	165.5	231.9	66.4	149.1	82.7	121.6	3.49
	04:37	22.87	16.01	0.318	229	3.121	166.3	232.7	66.4	149.5	83.1	121.8	3.50
	04:48	23.16	16.22	0.322	229	3.150	168.3	234.8	66.5	150.6	84.1	122.6	3.53

Borehole No. : WCH-BH12 — **Sample Depth m:- 7.00 - 8.00**

Sample No. : 9 — **Specimen Depth m:- 7.80 - 8.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

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Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 25	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
20/12	04:58	23.45	16.42	0.327	229	3.178	170.9	237.4	66.5	151.9	85.4	123.5	3.57
	05:09	23.74	16.62	0.333	229	3.206	174.1	240.6	66.5	153.5	87.0	124.5	3.62
	05:19	24.03	16.82	0.337	228	3.234	176.0	242.6	66.6	154.6	88.0	125.3	3.64
	05:30	24.32	17.03	0.338	228	3.264	176.2	242.8	66.6	154.7	88.1	125.3	3.65
	05:41	24.61	17.23	0.340	228	3.292	176.9	243.5	66.6	155.0	88.4	125.6	3.66
	05:52	24.90	17.43	0.340	228	3.319	176.4	243.0	66.6	154.8	88.2	125.4	3.65
	06:02	25.19	17.64	0.340	228	3.349	176.0	242.6	66.6	154.6	88.0	125.3	3.64
	06:12	25.48	17.84	0.338	228	3.377	174.3	241.0	66.7	153.8	87.1	124.8	3.61
	06:23	25.77	18.04	0.335	228	3.404	172.0	238.7	66.7	152.7	86.0	124.0	3.58
	06:32	26.06	18.25	0.330	228	3.434	168.6	235.3	66.7	151.0	84.3	122.9	3.53
	06:42	26.35	18.45	0.324	228	3.462	164.6	231.3	66.7	149.0	82.3	121.6	3.47
	06:52	26.64	18.65	0.319	228	3.490	161.2	227.9	66.7	147.3	80.6	120.4	3.42
	07:01	26.93	18.85	0.316	228	3.518	159.0	225.7	66.7	146.2	79.5	119.7	3.38
	07:10	27.22	19.06	0.315	228	3.547	157.9	224.6	66.7	145.7	79.0	119.3	3.37
	07:20	27.51	19.26	0.314	228	3.575	156.9	223.6	66.7	145.2	78.5	119.0	3.35
	07:30	27.80	19.46	0.316	228	3.603	157.7	224.4	66.7	145.5	78.8	119.3	3.36
	07:41	28.09	19.67	0.319	228	3.633	159.0	225.7	66.7	146.2	79.5	119.7	3.38
	07:51	28.38	19.87	0.324	228	3.661	161.4	228.1	66.7	147.4	80.7	120.5	3.42
	08:01	28.67	20.07	0.330	228	3.690	164.5	231.1	66.6	148.8	82.2	121.4	3.47

Borehole No. : WCH-BH12 — **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 — **Specimen Depth m:-** 7.80 - 8.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

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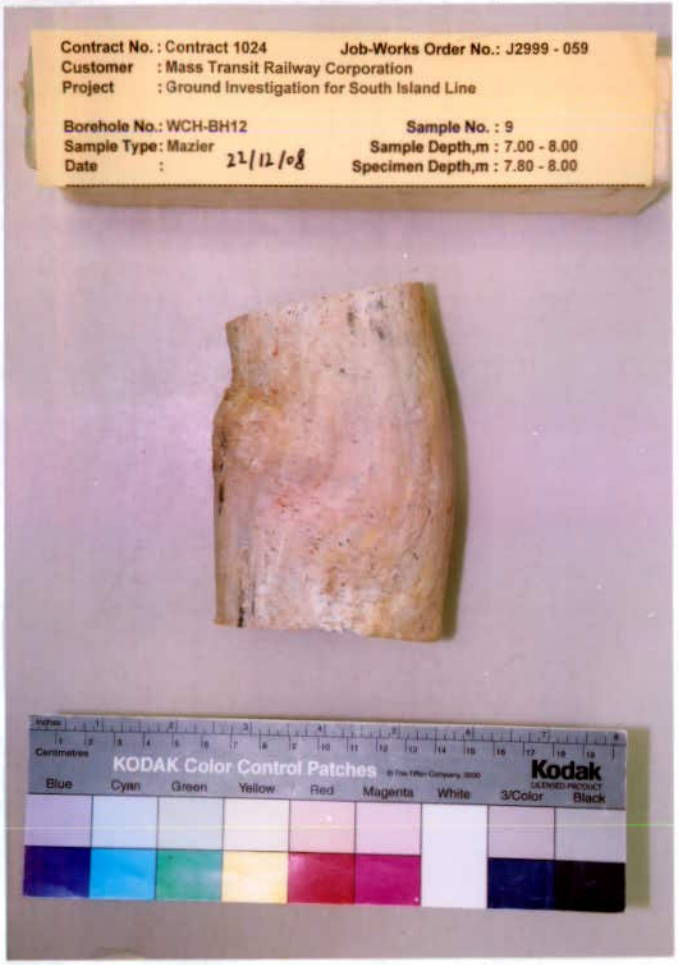
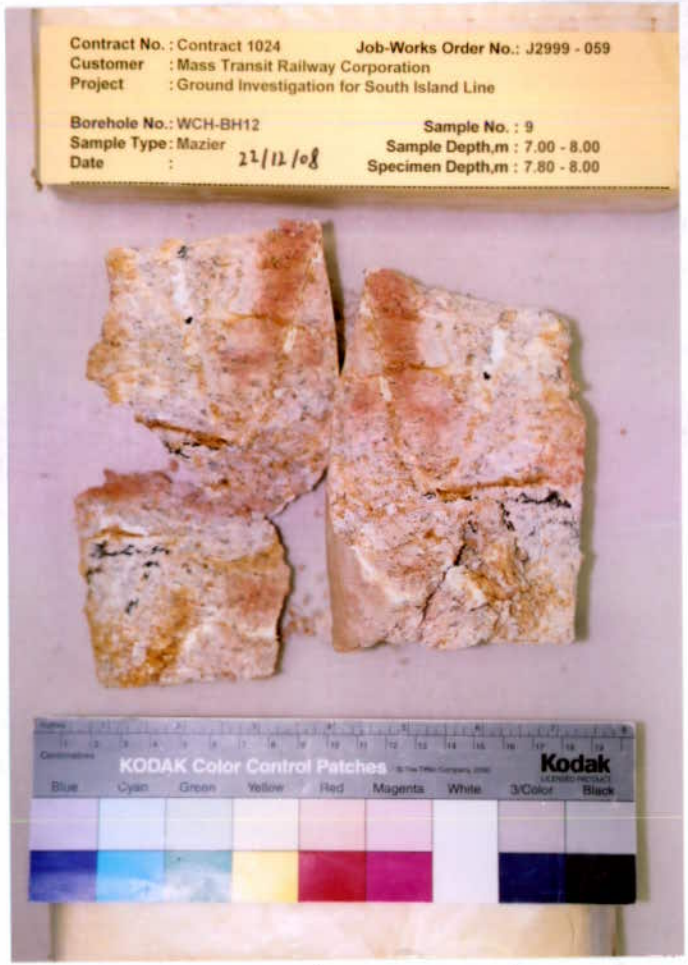
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)





Description : Reddish brown, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin : CDT‡

‡ Information provided by customer

Borehole No. : WCH-BH12	**Sample No. :** 9	**Sample Depth m:-** 7.00 - 8.00	**Specimen Depth m:-** 7.80 - 8.00

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024
Job No. : J2999
Works Order No.: 059

Compiled by W S Wat
Checked by H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12	WCH-BH12	WCH-BH12
Sample		no	9	9	9
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	7.00 - 8.00	7.00 - 8.00	7.00 - 8.00
Specimen Depth		m	7.60 - 7.80	7.60 - 7.80	7.60 - 7.80
INITIAL CONDITIONS					
Diameter	(D_o)	mm	73.9	74.7	75.7
Height	(H_o)	mm	145.0	138.5	132.6
Moisture Content	(W_o)	%	31	29	28
Bulk density	(ρ_o)	Mg/m^3	1.90	1.91	1.93
Dry density	(ρ_d)	Mg/m^3	1.45	1.49	1.51
Particle density	(ρ_s)		2.66	2.66	2.66
Voids Ratio	(e_o)		0.83	0.79	0.76
Degree of Saturation	(S_r)	%	98.9	97.0	96.9
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			1.00		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	235	270	305
Back Pressure	(u_b)	kPa	200	200	200
Effective Pressure	(σ'_3)	kPa	35	70	105
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	347.35	1056.06	1099.38
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.82	0.30	0.20
Coefficient of Permeability (k)		m/s	8.87E-08	9.94E-08	6.71E-08
COMPRESSION TERMINATION CRITERION			MAXIMUM STRESS RATIO		MAX ($\sigma'1$ - $\sigma'3$)
COMPRESSION - INITIAL					
Moisture Content	(w)	%	29	28	27
Pore Pressure at the End of Consolidation		kPa	200	200	200
Effective Stress at the End of Consolidation		kPa	35	70	105
Bulk density	(ρ_o)	Mg/m^3	1.91	1.93	1.94
Dry density	(ρ_d)	Mg/m^3	1.49	1.51	1.53
Voids Ratio	(e)		0.79	0.76	0.74
Degree of Saturation	(S_r)	%	97.0	96.9	96.8

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat Checked By : Approved By :
Name : H W Chung Signatory : **Lau Wai Cheong**
Tested Date: 15/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12	WCH-BH12	WCH-BH12
Sample		no	9	9	9
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	7.00 - 8.00	7.00 - 8.00	7.00 - 8.00
Specimen Depth		m	7.60 - 7.80	7.60 - 7.80	7.60 - 7.80
COMPRESSION - FAILURE					
Cell Pressure		kPa	235	270	305
Rate of Strain		mm/min	0.048	0.046	0.023
CONDITIONS AT MAXIMUM STRESS RATIO					
Major Effective Principal Stress (σ'_1)		kPa	111	214	279
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	88	164	210
Minor Effective Principal Stress (σ'_3)		kPa	23	49	70
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	67	131	174
$t = (\sigma_1 - \sigma_3)/2$		kPa	44	82	105
Expanded Uncertainty of s' ^		kPa	-	-	-
Expanded Uncertainty of t ^		kPa	-	-	-
Pore pressure parameter A_f			0.13	0.13	0.17
Strain at Failure	(εf)	%	3.5	7.5	10.2
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	29	28	27
Bulk density	(ρ_o)	Mg/m^3	1.91	1.93	1.94
Dry density	(ρ_d)	Mg/m^3	1.49	1.51	1.53
Voids Ratio	(e_f)		0.79	0.76	0.74
Degree of Saturation	(S_f)	%	97.0	96.9	96.8

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :-
   Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.66 (Determuned)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by
Project : **Ground Investigation for South Island Line**		W S Wat
	Contract No.: Contract 1024	Checked by
Job No.: **J2999**	**Works Order No.: 059**	H W Chung

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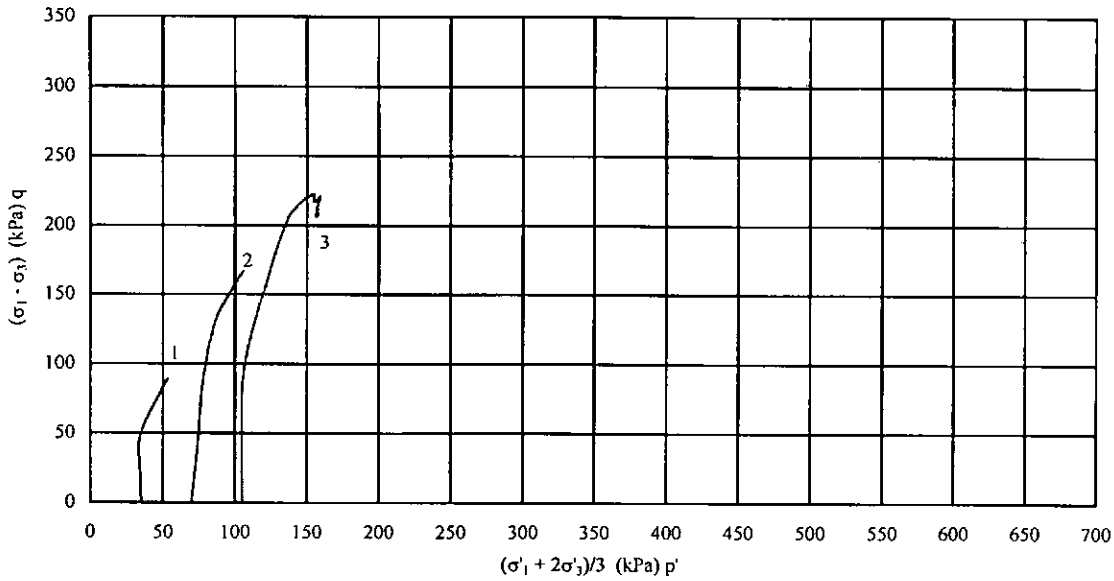
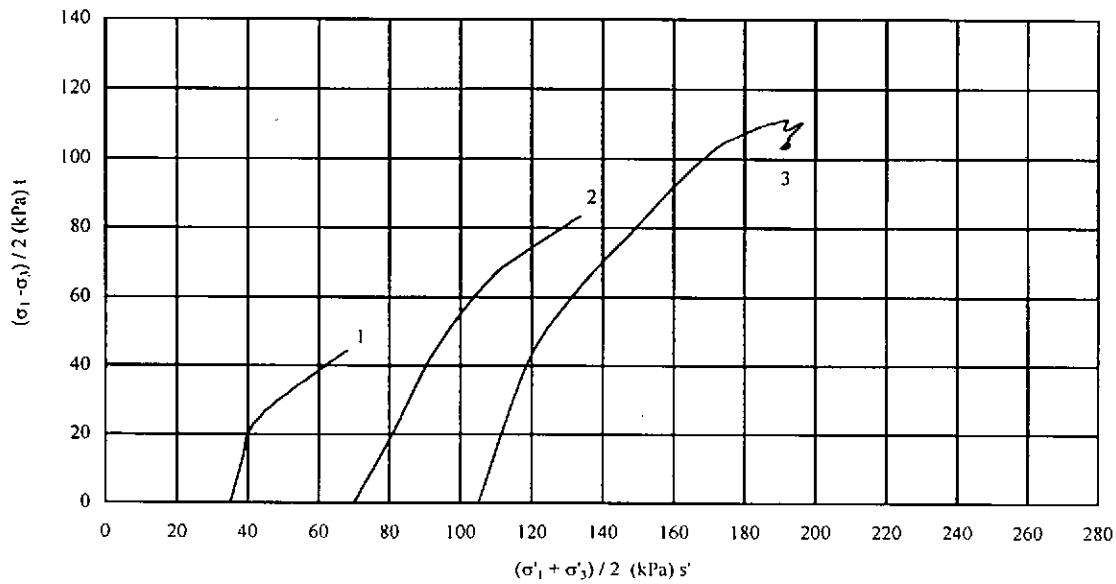
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. : WCH-BH12	**Sample Depth m:-** 7.00 - 8.00	
Sample No. : 9	**Specimen Depth m:-** 7.60 - 7.80	
Customer : Mass Transit Railway Corporation		Compiled by W S Wat
Project : Ground Investigation for South Island Line		
	Contract No.: Contract 1024	Checked by H W Chung
Job No.: J2999	**Works Order No.:** 059	

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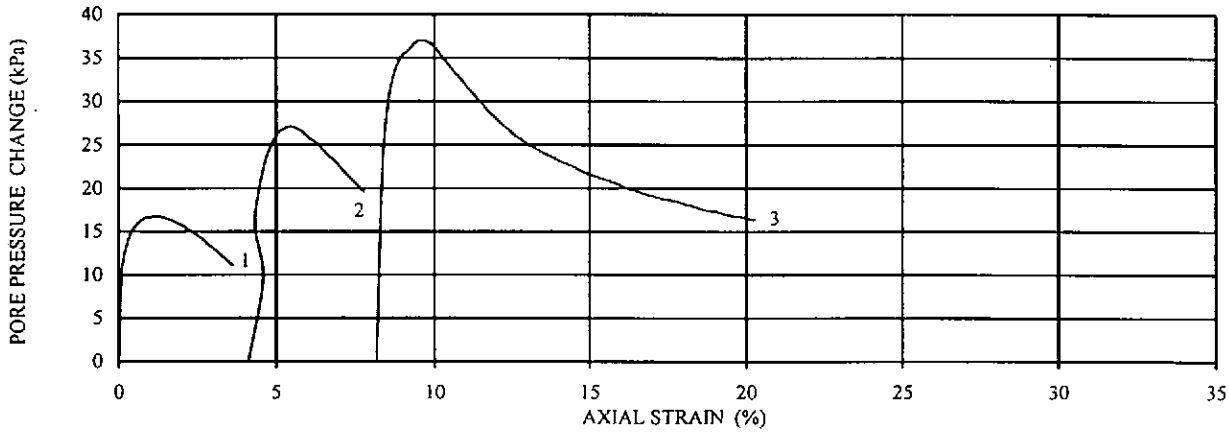
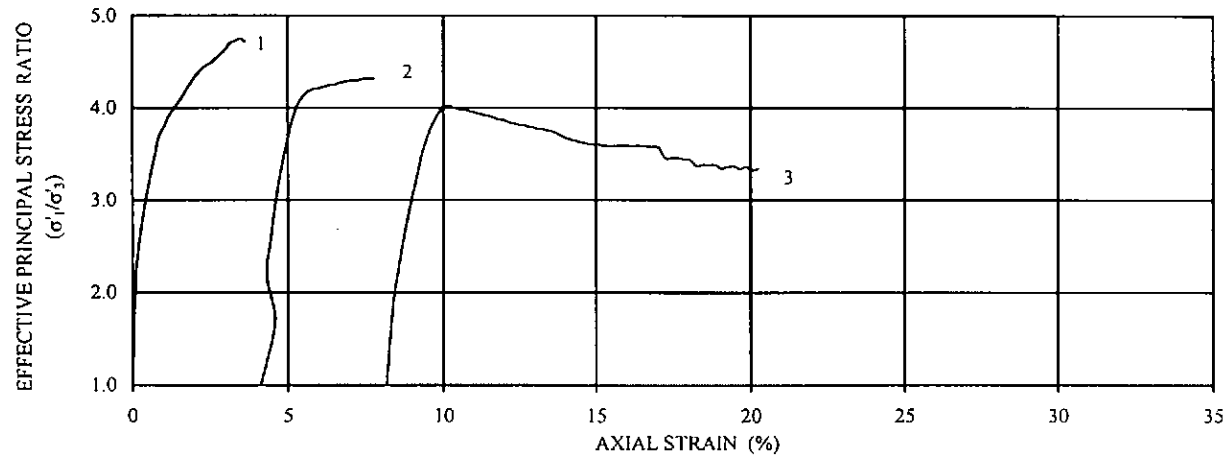
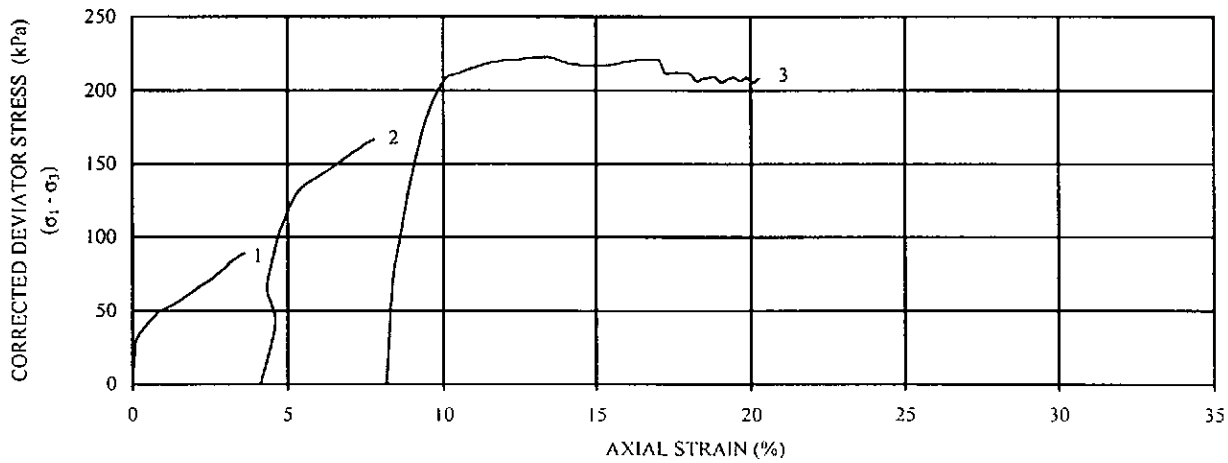
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. : WCH-BH12 — **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 — **Specimen Depth m:-** 7.60 - 7.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

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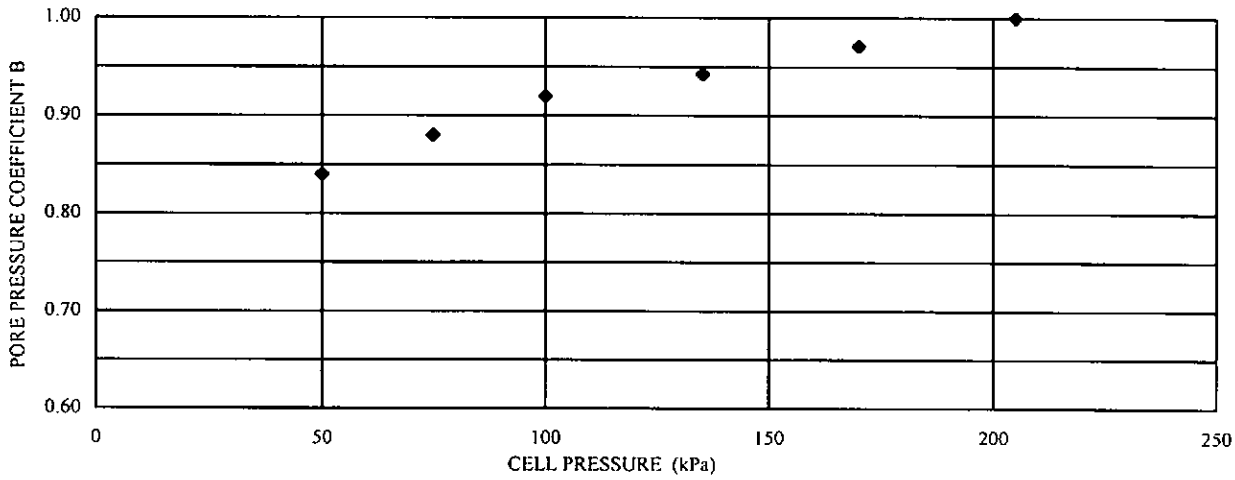
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Parameter B
17/12/2008	08:41	0	0	-	0.0	
	08:50	25	-	24		-
	09:07	25	20	20	-6.6	
	09:13	50	-	41		0.84
	09:40	50	45	45	-6.2	
	09:48	75	-	67		0.88
	10:06	75	70	70	-6.0	
	10:13	100	-	93		0.92
	10:50	100	95	95	-5.8	
	11:00	135	-	128		0.94
	11:53	135	130	130	-5.2	
	12:06	170	-	164		0.97
	12:50	170	165	165	-5.2	
	12:58	205	-	200		1.00
19/12/2008	08:55	205	200	200	-4.9	

Borehole No. : WCH-BH12 — **Sample Depth m:-** 7.00 - 8.00
Sample No. : 9 — **Specimen Depth m:-** 7.60 - 7.80
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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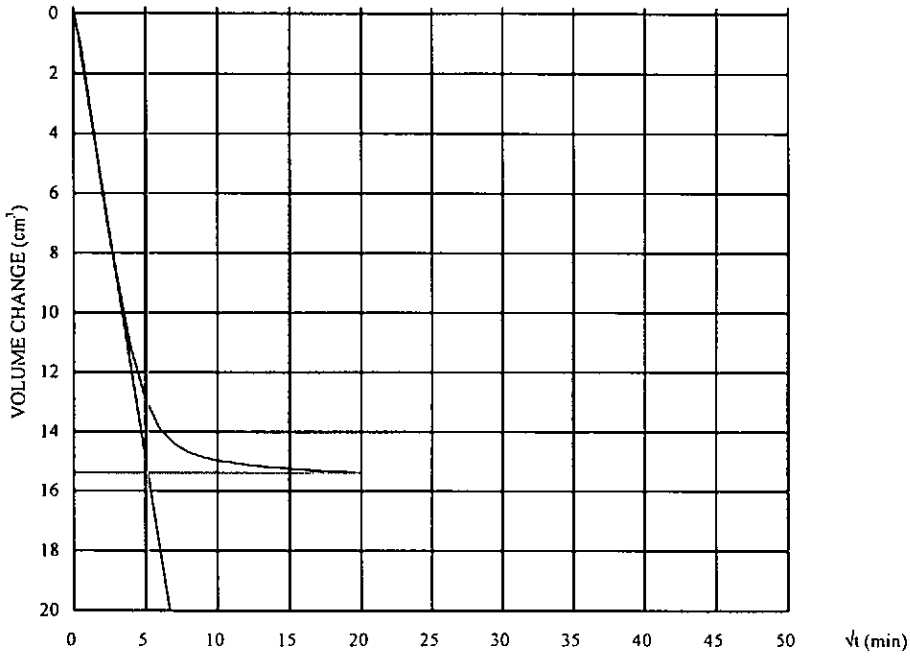
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

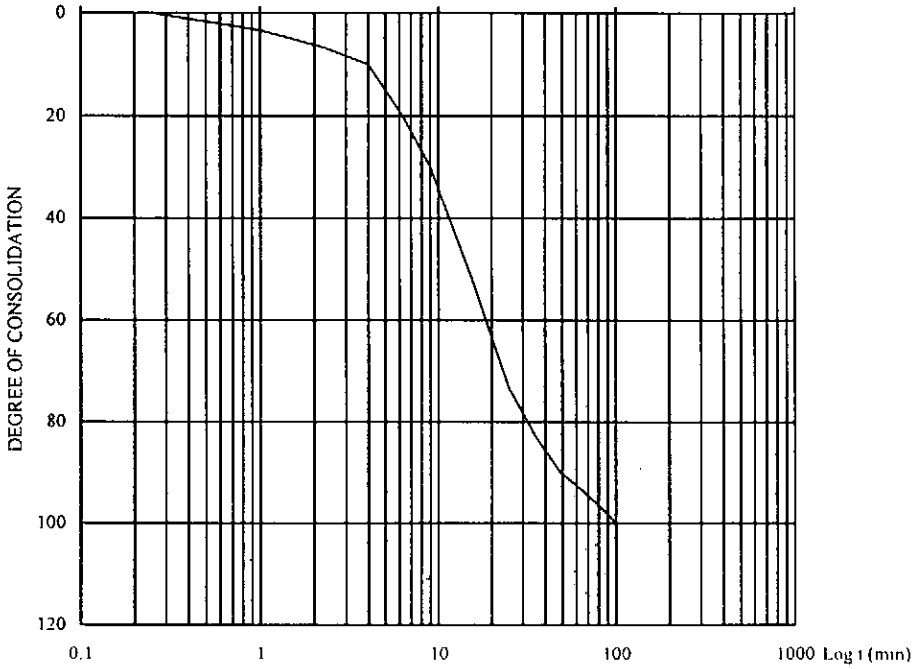


√t100 5.17 min

t100 26.77 min

tf 14.19 min

Calc. strain rate
0.709 mm/min



Borehole No. :	**WCH-BH12**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.60 - 7.80**
Customer :	**Mass Transit Railway Corporation**		Complied by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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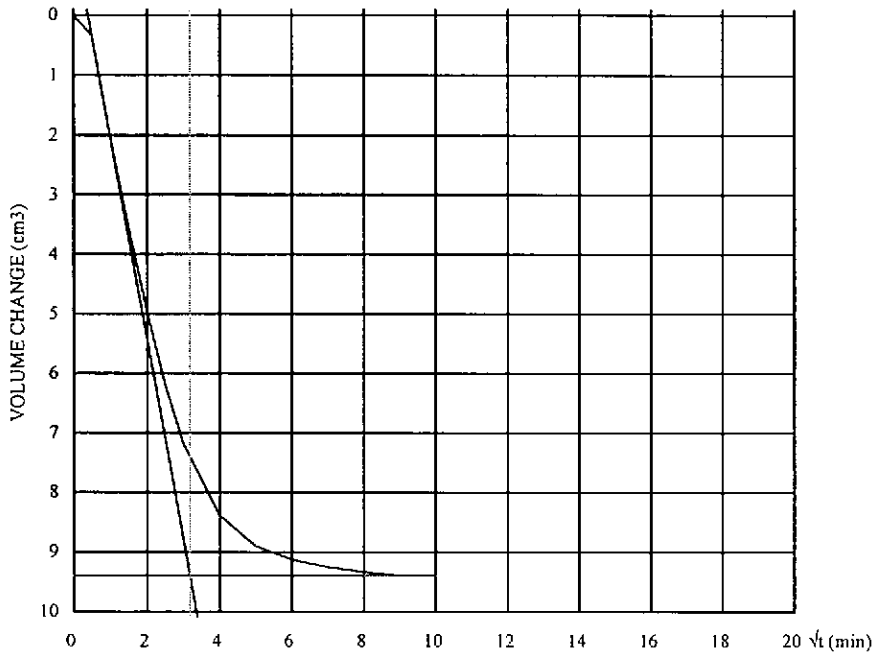
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 2

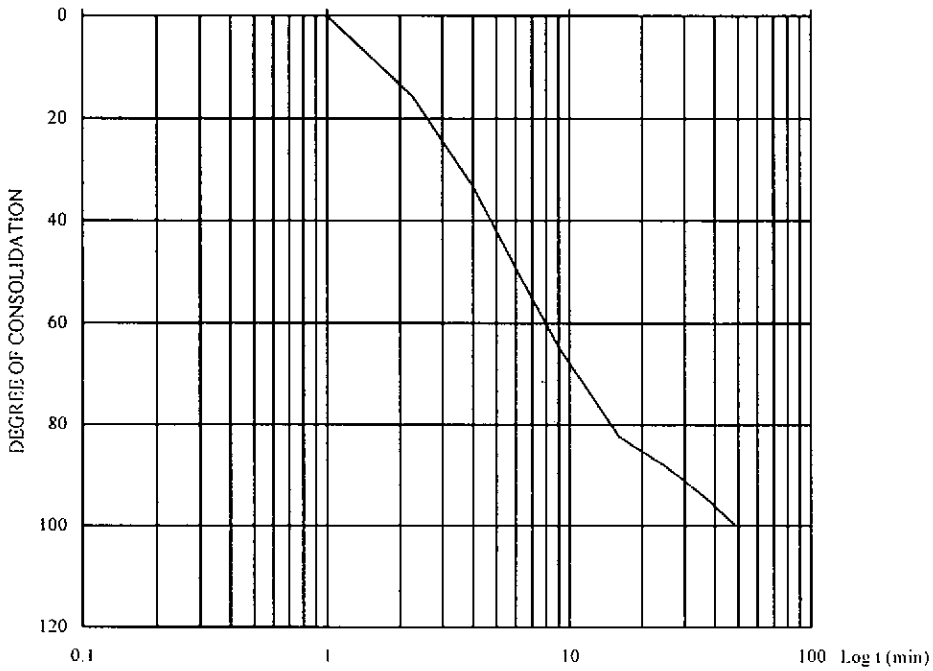


√t100 3.17 min

t100 10.07 min

tf 5.34 min

Calc. strain rate
1.807 mm/min



Borehole No. :	**WCH-BH12**	**Sample Depth m:-**	**7.00 - 8.00**
Sample No. :	**9**	**Specimen Depth m:-**	**7.60 - 7.80**
Customer :	**Mass Transit Railway Corporation**	Complied by	W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.:	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
		Checked by	H W Chung

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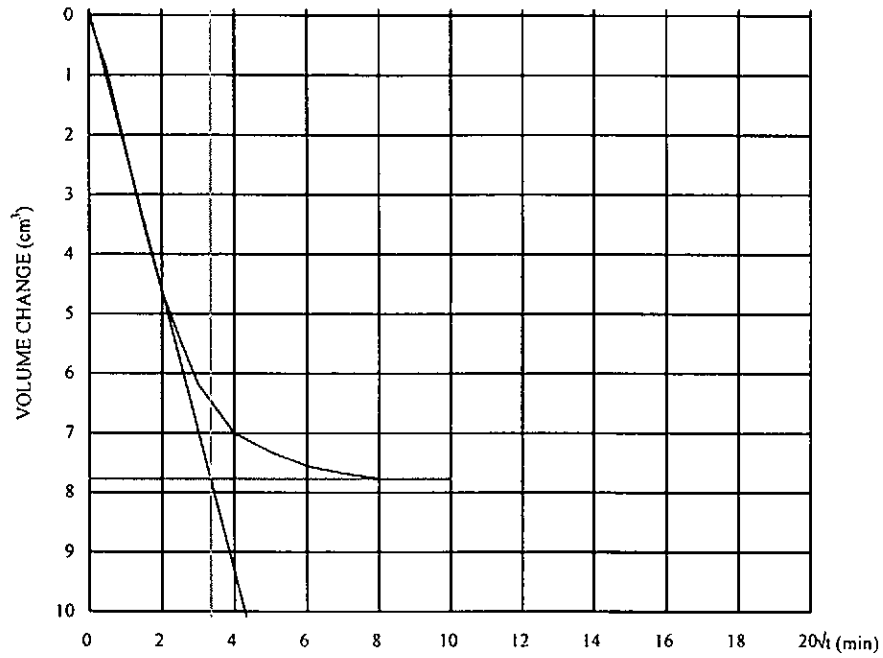
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 3

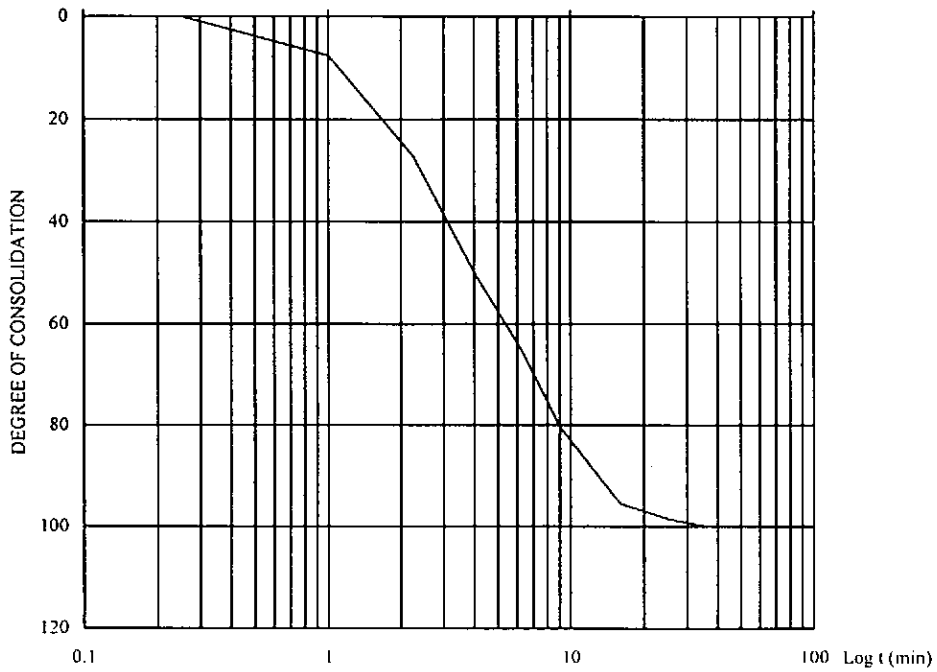


√t100 3.35 min

t100 11.19 min

tf 5.93 min

Calc. strain rate
1.558 mm/min



Borehole No. : WCH-BH12 — **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 — **Specimen Depth m:-** 7.60 - 7.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	35 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr
FAILURE CRITERION					
Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 1	Applied Pressure (kPa) - Cell :	235	Back : 200	P.R. factor	1.7257 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 35 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
23/12	09:55	0.00	0.00	0.074	200	0.000	0.0	35.0	35.0	35.0	0.0	35.0	1.00
	10:00	0.15	0.10	0.143	210	0.029	28.2	52.9	24.7	38.8	14.1	34.1	2.14
	10:05	0.36	0.25	0.160	213	0.072	35.0	56.7	21.7	39.2	17.5	33.4	2.61
	10:10	0.60	0.42	0.172	215	0.121	39.8	59.8	20.0	39.9	19.9	33.3	2.99
	10:15	0.81	0.56	0.180	216	0.160	42.9	62.2	19.3	40.8	21.5	33.6	3.22
	10:20	1.02	0.71	0.188	216	0.202	46.1	64.8	18.7	41.7	23.0	34.1	3.46
	10:25	1.25	0.87	0.197	217	0.247	49.6	68.0	18.4	43.2	24.8	34.9	3.70
	10:30	1.48	1.03	0.201	217	0.291	51.1	69.4	18.3	43.9	25.6	35.3	3.79
	10:35	1.70	1.18	0.206	217	0.332	53.0	71.2	18.2	44.7	26.5	35.9	3.91
	10:40	2.02	1.40	0.212	217	0.391	55.2	73.5	18.3	45.9	27.6	36.7	4.02
	10:45	2.22	1.55	0.217	217	0.431	57.1	75.6	18.5	47.1	28.6	37.5	4.09
	10:50	2.46	1.71	0.223	216	0.473	59.4	78.1	18.7	48.4	29.7	38.5	4.18
	10:55	2.70	1.88	0.230	216	0.518	62.1	81.1	19.0	50.0	31.0	39.7	4.27
	11:00	2.95	2.05	0.237	216	0.562	64.7	84.0	19.3	51.7	32.4	40.9	4.35
	11:05	3.24	2.25	0.245	215	0.613	67.7	87.5	19.8	53.7	33.9	42.4	4.42
	11:10	3.44	2.39	0.250	215	0.648	69.6	89.7	20.1	54.9	34.8	43.3	4.46
	11:15	3.65	2.54	0.255	215	0.686	71.4	91.9	20.5	56.2	35.7	44.3	4.49
	11:20	3.90	2.72	0.263	214	0.731	74.4	95.4	21.0	58.2	37.2	45.8	4.55
	11:25	4.11	2.86	0.270	214	0.766	77.1	98.6	21.5	60.0	38.5	47.2	4.59
	11:30	4.32	3.01	0.277	213	0.802	79.7	101.6	21.9	61.8	39.9	48.5	4.64
	11:35	4.56	3.17	0.286	213	0.841	83.1	105.5	22.4	63.9	41.5	50.1	4.71
	11:40	4.77	3.32	0.292	212	0.877	85.3	108.2	22.9	65.5	42.6	51.3	4.72
	11:45	**5.01**	**3.48**	**0.299**	**212**	**0.915**	**87.9**	**111.3**	**23.4**	**67.3**	**43.9**	**52.7**	**4.76**
	11:50	5.22	3.63	0.302	211	0.951	88.9	112.8	23.9	68.3	44.4	53.5	4.72

Borehole No. :	**WCH-BH12**	**Sample Depth m:- 7.00 - 8.00**	
Sample No. :	**9**	**Specimen Depth m:- 7.60 - 7.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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Form : GFSR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	70 kPa
Side drains	No	Selected Machine Speed	0.046 mm/min	Rate of Strain	2.00 % per hr
FAILURE CRITERION					
Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 2	Applied Pressure (kPa) - Cell :	270	Back : 200	P.R. factor	1.7257 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 35 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
29/12	09:40	5.94	4.13	0.070	200	0.000	0.0	70.0	70.0	70.0	0.0	70.0	1.00
	09:45	6.60	4.59	0.177	210	1.170	41.2	101.7	60.5	81.1	20.6	74.2	1.68
	09:50	6.23	4.33	0.234	216	1.112	64.0	118.4	54.4	86.4	32.0	75.7	2.18
	09:55	6.43	4.47	0.277	220	1.143	81.0	131.1	50.1	90.6	40.5	77.1	2.62
	10:00	6.61	4.60	0.307	222	1.172	92.7	140.4	47.7	94.1	46.4	78.6	2.94
	10:05	6.79	4.72	0.331	224	1.199	102.1	148.2	46.1	97.1	51.0	80.1	3.21
	10:10	6.99	4.87	0.353	225	1.232	110.6	155.4	44.8	100.1	55.3	81.7	3.47
	10:15	7.24	5.04	0.376	226	1.269	119.4	163.1	43.7	103.4	59.7	83.5	3.73
	10:20	7.43	5.17	0.391	227	1.297	125.1	168.4	43.3	105.9	62.6	85.0	3.89
	10:25	7.63	5.30	0.404	227	1.325	130.0	173.0	43.0	108.0	65.0	86.3	4.02
	10:30	7.88	5.48	0.415	227	1.363	134.1	177.0	42.9	109.9	67.0	87.6	4.13
	10:35	8.10	5.64	0.423	227	1.396	136.9	180.0	43.1	111.6	68.5	88.7	4.18
	10:40	8.34	5.80	0.429	227	1.430	139.0	182.4	43.4	112.9	69.5	89.7	4.20
	10:45	8.53	5.93	0.434	226	1.457	140.7	184.5	43.8	114.2	70.4	90.7	4.21
	10:50	8.76	6.09	0.440	226	1.490	142.8	187.1	44.3	115.7	71.4	91.9	4.22
	10:55	8.99	6.25	0.446	225	1.522	144.9	189.6	44.7	117.1	72.4	93.0	4.24
	11:00	9.22	6.41	0.453	225	1.554	147.3	192.6	45.3	119.0	73.7	94.4	4.25
	11:05	9.45	6.57	0.460	224	1.586	149.7	195.6	45.9	120.8	74.9	95.8	4.26
	11:10	9.69	6.74	0.468	224	1.620	152.5	199.0	46.5	122.8	76.3	97.3	4.28
	11:15	9.90	6.89	0.474	223	1.649	154.6	201.6	47.0	124.3	77.3	98.5	4.29
	11:20	10.12	7.04	0.481	222	1.679	157.0	204.6	47.6	126.1	78.5	99.9	4.30
	11:25	10.37	7.21	0.488	222	1.712	159.4	207.7	48.3	128.0	79.7	101.4	4.30
	11:30	10.56	7.35	0.494	221	1.738	161.4	210.2	48.8	129.5	80.7	102.6	4.31
	11:35	**10.80**	**7.51**	**0.502**	**221**	**1.769**	**164.2**	**213.6**	**49.4**	**131.5**	**82.1**	**104.1**	**4.32**
	11:40	11.00	7.65	0.507	220	1.795	165.8	215.7	49.9	132.8	82.9	105.2	4.32
	11:45	11.17	7.77	0.511	220	1.818	167.1	217.5	50.4	133.9	83.5	106.1	4.32

Borehole No. :	**WCH-BH12**	**Sample Depth m:- 7.00 - 8.00**	
Sample No. :	**9**	**Specimen Depth m:- 7.60 - 7.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	105 kPa
Side drains	No	Selected Machine Speed	0.023 mm/min	Rate of Strain	1.05 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐
Stage : 3	Applied Pressure (kPa) - Cell : 305 Back : 200	P.R. factor 1.7257 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 35 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
29/12	16:00	11.75	8.17	0.078	200	0.000	0.0	105.0	105.0	105.0	0.0	105.0	1.00
	16:21	12.01	8.36	0.258	223	1.926	67.5	149.8	82.3	116.0	33.7	104.8	1.82
	16:37	12.30	8.56	0.330	230	1.962	95.0	169.7	74.7	122.2	47.5	106.4	2.27
	16:52	12.59	8.76	0.391	234	1.998	118.2	189.6	71.4	130.5	59.1	110.8	2.66
	17:08	12.88	8.96	0.448	235	2.033	139.7	209.5	69.8	139.7	69.9	116.4	3.00
	17:23	13.17	9.16	0.499	236	2.068	158.9	228.1	69.2	148.6	79.4	122.2	3.30
	17:39	13.46	9.36	0.543	237	2.103	175.2	243.5	68.3	155.9	87.6	126.7	3.57
	17:54	13.75	9.57	0.578	237	2.139	188.1	256.1	68.0	162.1	94.1	130.7	3.77
	18:08	14.04	9.77	0.605	237	2.173	197.9	266.0	68.1	167.1	99.0	134.1	3.91
	18:22	14.33	9.97	0.626	236	2.207	205.4	274.0	68.6	171.3	102.7	137.1	3.99
	18:35	**14.62**	**10.17**	**0.639**	**236**	**2.240**	**209.8**	**279.3**	**69.5**	**174.4**	**104.9**	**139.4**	**4.02**
	18:48	14.91	10.37	0.644	235	2.273	211.2	281.6	70.4	176.0	105.6	140.8	4.00
	19:01	15.20	10.57	0.649	234	2.306	212.6	283.9	71.3	177.6	106.3	142.2	3.98
	19:13	15.49	10.78	0.655	233	2.341	214.3	286.4	72.1	179.2	107.1	143.5	3.97
	19:26	15.78	10.98	0.660	232	2.373	215.6	288.6	73.0	180.8	107.8	144.9	3.95
	19:39	16.07	11.18	0.665	231	2.405	217.0	290.9	73.9	182.4	108.5	146.2	3.94
	19:51	16.36	11.38	0.670	230	2.437	218.3	293.0	74.7	183.9	109.2	147.5	3.92
	20:04	16.65	11.58	0.674	230	2.468	219.3	294.8	75.5	185.1	109.6	148.6	3.90
	20:17	16.94	11.78	0.677	229	2.500	219.8	296.1	76.3	186.2	109.9	149.6	3.88
	20:29	17.23	11.99	0.681	228	2.532	220.8	297.8	77.0	187.4	110.4	150.6	3.87
	20:42	17.52	12.19	0.682	227	2.563	220.6	298.3	77.7	188.0	110.3	151.2	3.84
	20:56	17.81	12.39	0.685	227	2.594	221.2	299.5	78.3	188.9	110.6	152.0	3.82
	21:09	18.10	12.59	0.688	226	2.624	221.7	300.6	78.9	189.8	110.9	152.8	3.81
	21:22	18.39	12.79	0.691	226	2.654	222.3	301.7	79.4	190.5	111.1	153.5	3.80
	21:36	18.68	12.99	0.693	225	2.684	222.5	302.4	79.9	191.1	111.2	154.1	3.78
	21:49	18.97	13.20	0.695	225	2.716	222.6	302.9	80.3	191.6	111.3	154.5	3.77
	22:02	19.26	13.40	0.697	224	2.745	222.8	303.5	80.7	192.1	111.4	155.0	3.76
	22:15	19.55	13.60	0.697	224	2.775	222.3	303.4	81.1	192.2	111.1	155.2	3.74
	22:27	19.84	13.80	0.694	224	2.804	220.6	302.0	81.4	191.7	110.3	154.9	3.71
	22:40	20.13	14.00	0.691	223	2.834	219.0	300.8	81.8	191.3	109.5	154.8	3.68
	22:52	20.42	14.21	0.690	223	2.864	218.1	300.2	82.1	191.1	109.0	154.8	3.66
	23:04	20.71	14.41	0.690	223	2.893	217.5	299.9	82.4	191.2	108.8	154.9	3.64
	23:17	21.00	14.61	0.690	222	2.922	217.0	299.8	82.8	191.3	108.5	155.1	3.62
	23:29	21.29	14.81	0.691	222	2.951	216.8	299.9	83.1	191.5	108.4	155.4	3.61
	23:42	21.58	15.01	0.693	222	2.979	217.0	300.4	83.4	191.9	108.5	155.7	3.60
	23:54	21.87	15.21	0.695	221	3.008	217.1	300.7	83.6	192.2	108.6	156.0	3.60
30/12	00:07	22.16	15.42	0.697	221	3.038	217.3	301.2	83.9	192.5	108.6	156.3	3.59
	00:20	22.45	15.62	0.700	221	3.066	217.8	301.9	84.1	193.0	108.9	156.7	3.59
	00:33	22.74	15.82	0.705	221	3.094	219.0	303.4	84.4	193.9	109.5	157.4	3.59

Borehole No. :	**WCH-BH12**	**Sample Depth m:- 7.00 - 8.00**	
Sample No. :	**9**	**Specimen Depth m:- 7.60 - 7.80**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

Gammon

FAILURE CRITERION

Max. deviator Stress ☐ | Max. Stress ratio ☒ | Axial Strain % ☐

Stage : 3		Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 35	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
30/12	00:46	23.03	16.02	0.709	220	3.122	219.9	304.6	84.7	194.6	109.9	158.0	3.60
	00:59	23.32	16.22	0.712	220	3.150	220.3	305.3	85.0	195.2	110.2	158.4	3.59
	01:13	23.61	16.42	0.716	220	3.178	221.2	306.4	85.2	195.8	110.6	158.9	3.60
	01:26	23.90	16.63	0.717	220	3.208	221.0	306.5	85.5	196.0	110.5	159.2	3.58
	01:39	24.19	16.83	0.719	219	3.236	221.1	306.8	85.7	196.2	110.5	159.4	3.58
	01:52	24.48	17.03	0.720	219	3.264	220.9	306.8	85.9	196.3	110.4	159.5	3.57
	02:03	24.77	17.23	0.696	219	3.292	211.9	298.0	86.1	192.1	106.0	156.7	3.46
	02:16	25.06	17.43	0.698	219	3.319	212.1	298.4	86.3	192.3	106.0	157.0	3.46
	02:28	25.35	17.63	0.700	219	3.347	212.2	298.6	86.4	192.5	106.1	157.1	3.46
	02:41	25.64	17.84	0.701	218	3.377	212.0	298.6	86.6	192.6	106.0	157.3	3.45
	02:53	25.93	18.04	0.701	218	3.404	211.5	298.3	86.8	192.5	105.7	157.3	3.44
	03:04	26.23	18.24	0.688	218	3.432	206.4	293.4	87.0	190.2	103.2	155.8	3.37
	03:17	26.52	18.44	0.695	218	3.460	208.3	295.5	87.2	191.3	104.1	156.6	3.39
	03:30	26.81	18.65	0.698	218	3.490	208.7	296.2	87.5	191.9	104.4	157.1	3.39
	03:43	27.10	18.85	0.700	217	3.518	208.9	296.5	87.6	192.0	104.4	157.2	3.38
	03:55	27.39	19.05	0.693	217	3.546	205.9	293.6	87.7	190.7	103.0	156.3	3.35
	04:08	27.68	19.25	0.700	217	3.574	207.8	295.7	87.9	191.8	103.9	157.2	3.36
	04:21	27.97	19.45	0.705	217	3.602	208.9	297.0	88.1	192.6	104.5	157.7	3.37
	04:34	28.26	19.65	0.700	217	3.630	206.7	294.9	88.2	191.5	103.3	157.1	3.34
	04:47	28.55	19.86	0.708	217	3.660	208.8	297.1	88.3	192.7	104.4	157.9	3.36
	05:00	28.84	20.06	0.701	217	3.688	205.9	294.4	88.5	191.4	102.9	157.1	3.33
	05:14	29.13	20.26	0.710	216	3.717	208.3	296.9	88.6	192.8	104.2	158.0	3.35

Borehole No. : WCH-BH12 — **Sample Depth m:-** 7.00 - 8.00

Sample No. : 9 — **Specimen Depth m:-** 7.60 - 7.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

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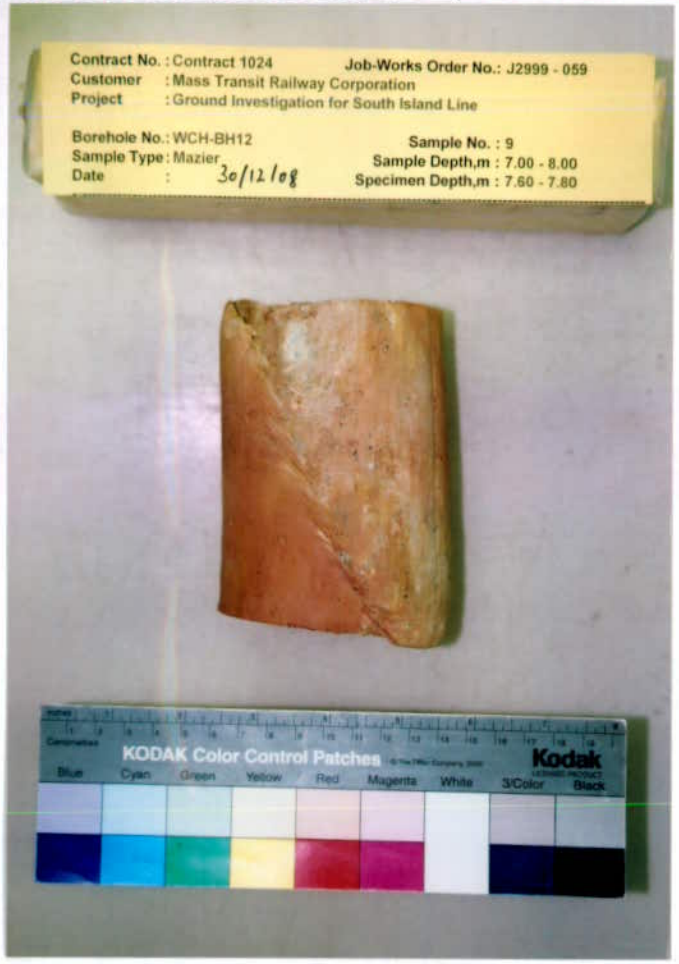
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)



Description : Reddish brown, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin : CDT ‡

‡ Information provided by customer

Borehole No. :	**WCH-BH12**	**Sample No. : 9**	**Sample Depth m:- 7.00 - 8.00**	**Specimen Depth m:- 7.60 - 7.80**

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No.: Contract 1024
Job No.: J2999
Works Order No.: 059

Compiled by W S Wat

Checked by H W Chung

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12		
Sample		no	17		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	11.00 - 12.00		
Specimen Depth		m	11.60 - 11.80		
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.0		
Height	(H_o)	mm	145.0		
Moisture Content	(W_o)	%	24		
Bulk density	(ρ_o)	Mg/m^3	1.96		
Dry density	(ρ_d)	Mg/m^3	1.58		
Particle density	(ρ_s)		2.65		
Voids Ratio	(e_o)		0.68		
Degree of Saturation	(S_r)	%	94.8		
DRAINAGE CONDITIONS			ONE END		
SATURATION					
Final Pore Pressure Coefficient B			0.98		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	335		
Back Pressure	(u_b)	kPa	220		
Effective Pressure	(σ'_3)	kPa	115		
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	888.21		
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.38		
Coefficient of Permeability (k)		m/s	1.05E-07		
COMPRESSION TERMINATION CRITERION			MAXIMUM DEVIATOR STRESS		
COMPRESSION - INITIAL					
Moisture Content	(w)	%	22		
Pore Pressure at the End of Consolidation		kPa	220		
Effective Stress at the End of Consolidation		kPa	115		
Bulk density	(ρ_o)	Mg/m^3	2.00		
Dry density	(ρ_d)	Mg/m^3	1.65		
Voids Ratio	(e)		0.61		
Degree of Saturation	(S_r)	%	94.8		

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat
Tested Date: 09/12/2008

Checked By : Name : H W Chung Date : 19/12/2008

Approved By : Signatory : **Lau Wai Cheong** Date : 19/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12		
Sample		no	17		
Sample Type			Mazier		
Stage		no	1		
Sample Depth		m	11.00 - 12.00		
Specimen Depth		m	11.60 - 11.80		
COMPRESSION - FAILURE					
Cell Pressure		kPa	335		
Rate of Strain		mm/min	0.047		
CONDITIONS MAXIMUM DEVIATOR STRESS					
Major Effective Principal Stress (σ'_1)		kPa	479		
Corrected Deviator Stress (σ'_1 - σ'_3)		kPa	353		
Minor Effective Principal Stress (σ'_3)		kPa	127		
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	303		
$t = (\sigma_1 - \sigma_3)/2$		kPa	176		
Expanded Uncertainty of s' ^		kPa	-		
Expanded Uncertainty of t ^		kPa	-		
Pore pressure parameter A_f			-0.03		
Strain at Failure	(εf)	%	15.7		
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	22		
Bulk density	(ρ_o)	Mg/m^3	2.00		
Dry density	(ρ_d)	Mg/m^3	1.65		
Voids Ratio	(e_f)		0.61		
Degree of Saturation	(S_f)	%	94.8		

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :- Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

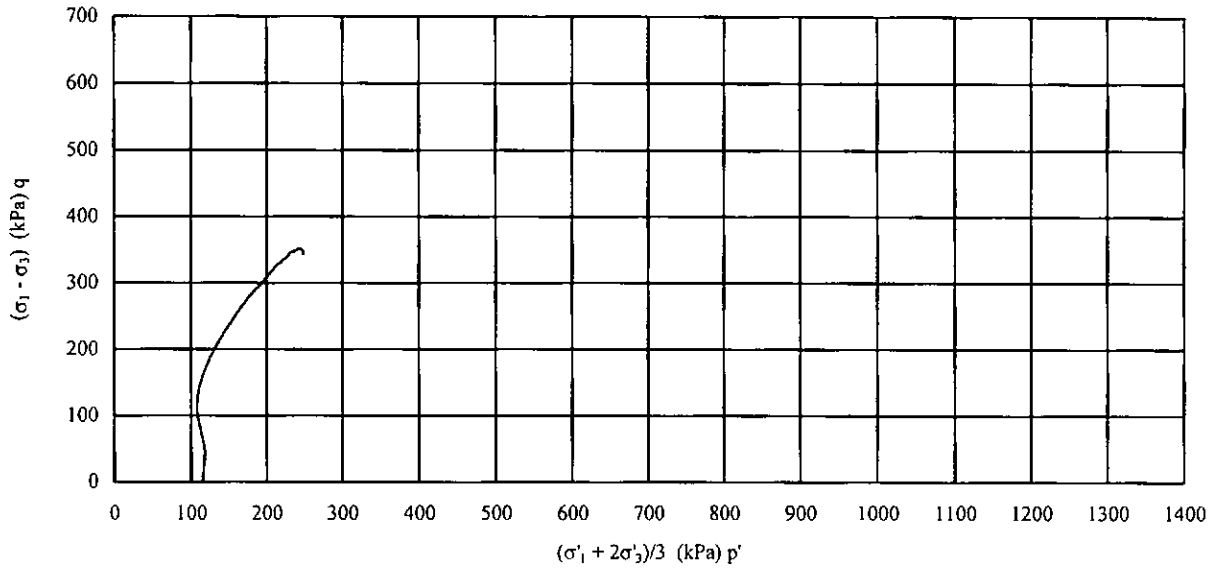
* Delete as appropriate ^ Upon request

Customer : **Mass Transit Railway Corporation**		Compiled by W S Wat
Project : **Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.: **J2999**	**Works Order No.: 059**	

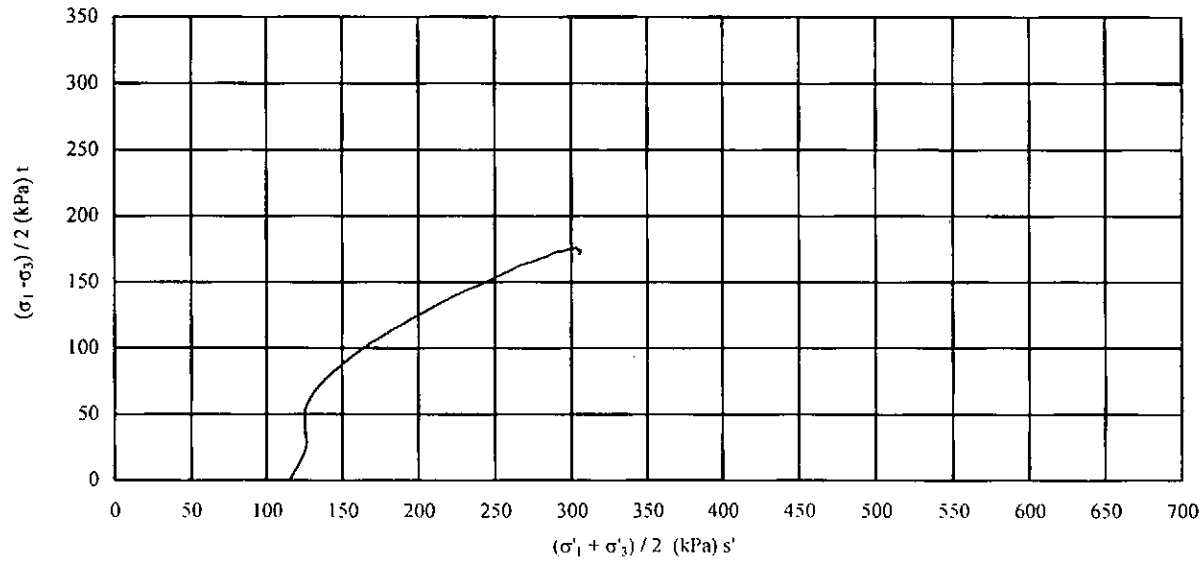
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. :	**WCH-BH12**	**Sample Depth m:-**	**11.00 - 12.00**
Sample No. :	**17**	**Specimen Depth m:-**	**11.60 - 11.80**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.:	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
			Checked by H W Chung

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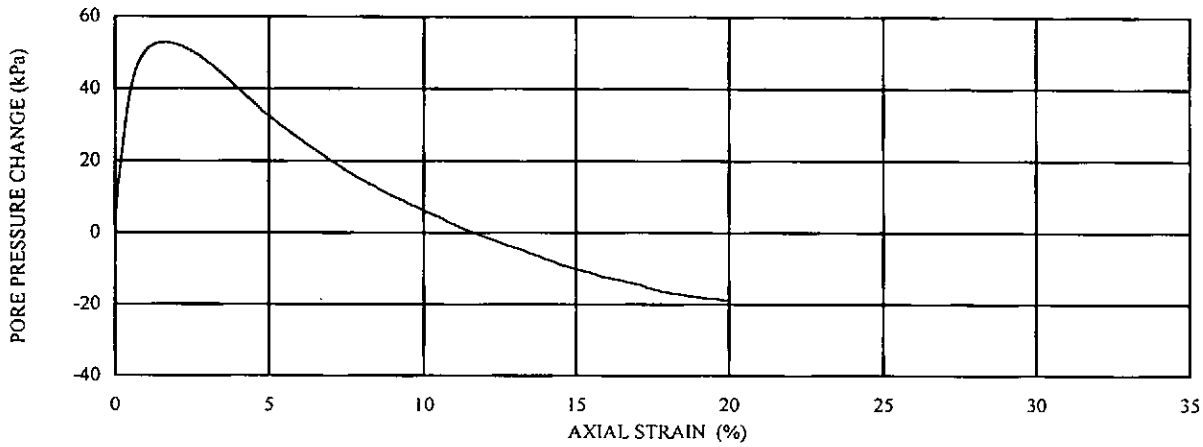
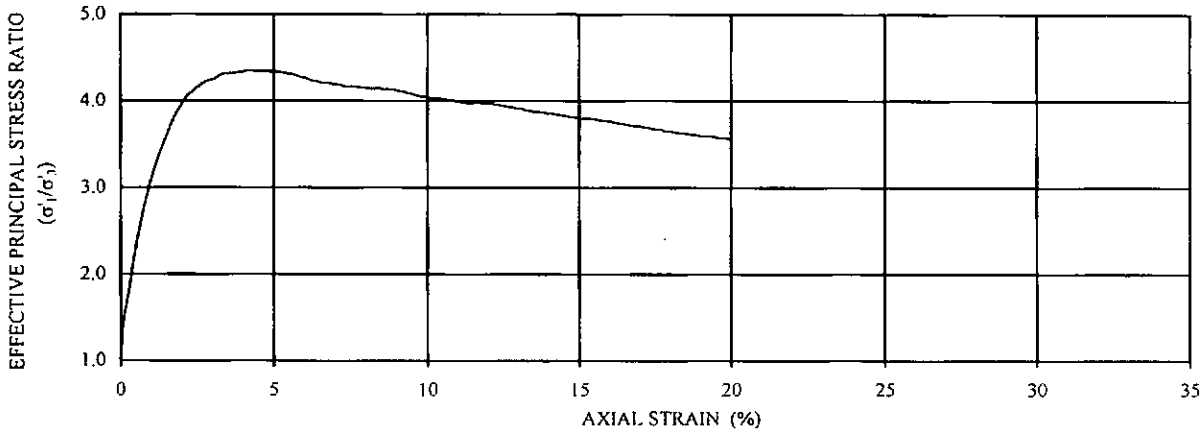
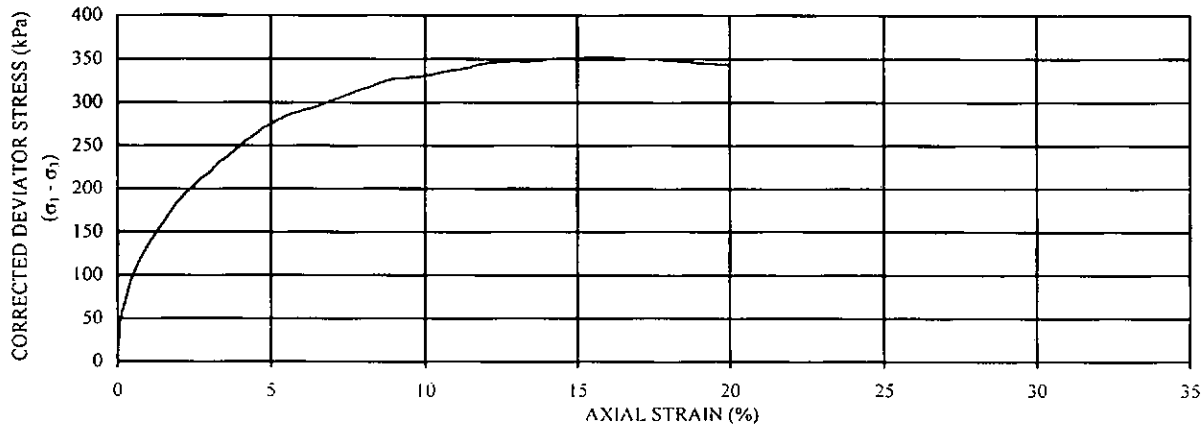
Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. : WCH-BH12		**Sample Depth m:-** 11.00 - 12.00
Sample No. : 17		**Specimen Depth m:-** 11.60 - 11.80
Customer : Mass Transit Railway Corporation		Compiled by
Project : Ground Investigation for South Island Line		W S Wat
	Contract No.: Contract 1024	Checked by
Job No.: J2999	**Works Order No.:** 059	H W Chung

Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

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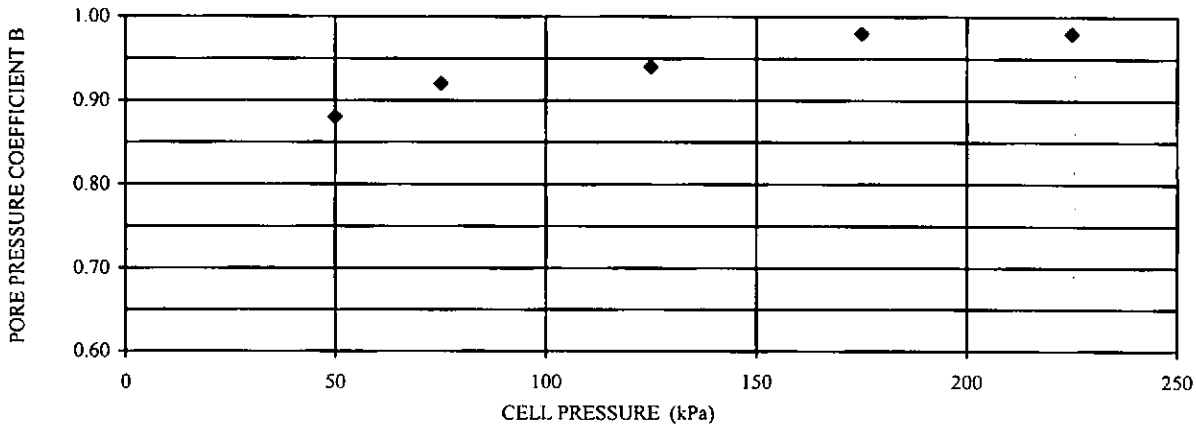
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

SATURATION



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Coefficient B
10/12/2008	15:15	0	0	-	0.0	
	15:30	25	-	24		-
11/12/2008	08:37	25	20	20	-2.5	
	08:45	50	-	42		0.88
	09:10	50	45	45	-1.8	
	09:17	75	-	68		0.92
	09:52	75	70	70	-1.1	
	09:59	125	-	117		0.94
	10:40	125	120	120	0.6	
	10:45	175	-	169		0.98
	12:00	175	170	170	1.3	
	12:10	225	-	219		0.98
12/12/2008	09:00	225	220	220	1.5	

Borehole No. :WCH-BH12 — **Sample Depth m:- 11.00 - 12.00**
Sample No. : 17 — **Specimen Depth m:- 11.60 - 11.80**

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Compiled by W S Wat

Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.: 059**

Checked by H W Chung

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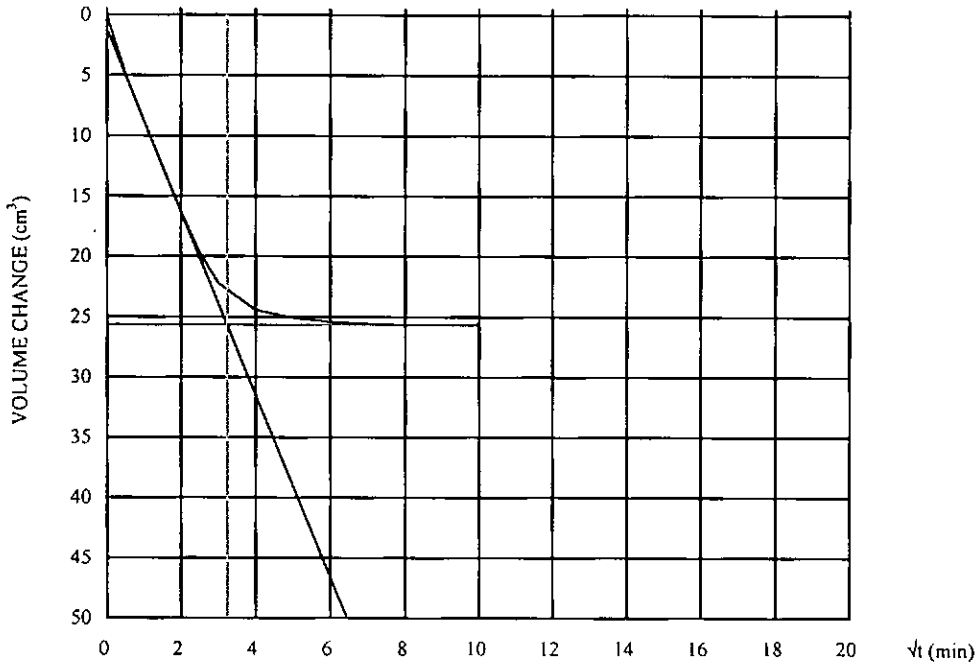
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

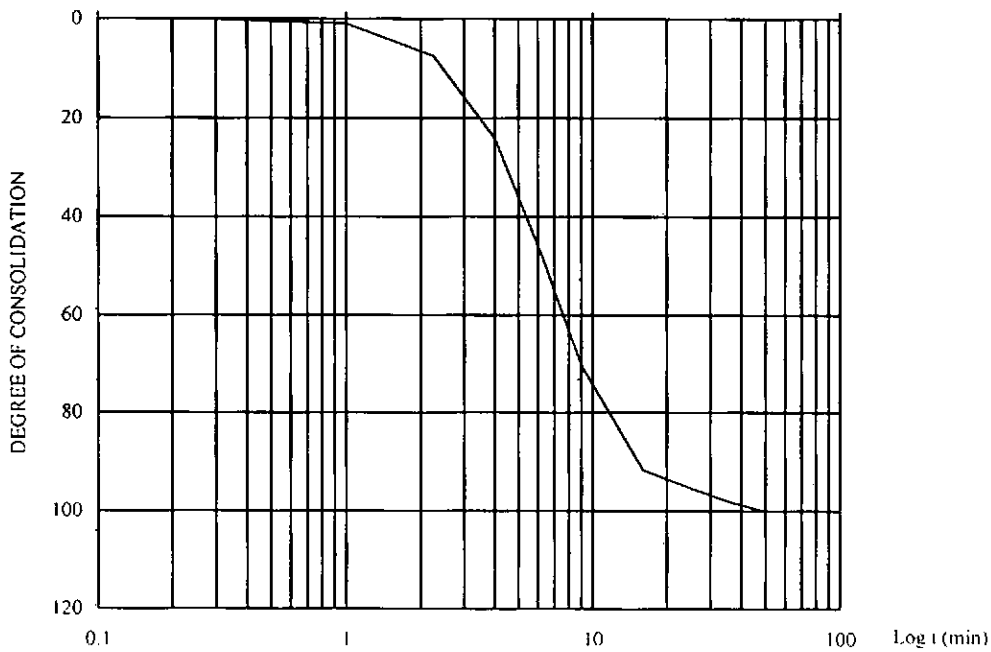


√t100 3.23 min

t100 10.445 min

tf 5.536 min

Calc. strain rate
1.807 mm/min



Borehole No. : WCH-BH12 — **Sample Depth m:-** 11.00 - 12.00

Sample No. : 17 — **Specimen Depth m:-** 11.60 - 11.80

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Complied by: W S Wat

Checked by: H W Chung

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Single Stage				P.W.P,B.P					Effective Pressure	115			kPa
Side drains	No			Selected Machine Speed		0.047		mm/min	Rate of Strain	1.97			% per hr
FAILURE CRITERION													
Max. deviator Stress				☒	Max. Stress ratio			☐	Axial Strain %				☐
Stage :	1	Applied Pressure (kPa) - Cell :				335	Back :	220	P.R. factor		3.1659		kN/mm
Date	Time	Strain Dial		Load P.R.No. 37	Pore Pressure	Dev. stress Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
15/12	08:35	0.00	0.00	0.044	220	0.000	0.0	115.0	115.0	115.0	0.0	115.0	1.00
	08:40	0.13	0.09	0.106	233	0.026	46.9	149.3	102.4	125.8	23.4	118.0	1.46
	08:45	0.39	0.28	0.142	246	0.081	73.9	162.5	88.6	125.6	37.0	113.2	1.83
	08:50	0.60	0.42	0.166	256	0.121	91.9	171.3	79.4	125.3	45.9	110.0	2.16
	08:55	0.82	0.58	0.185	262	0.166	106.0	178.7	72.7	125.7	53.0	108.0	2.46
	09:00	0.98	0.69	0.197	266	0.197	114.9	184.4	69.5	126.9	57.4	107.8	2.65
	09:05	1.20	0.84	0.211	268	0.238	125.2	191.8	66.6	129.2	62.6	108.3	2.88
	09:10	1.49	1.04	0.228	271	0.293	137.6	201.7	64.1	132.9	68.8	110.0	3.15
	09:15	1.70	1.19	0.239	272	0.334	145.6	208.7	63.1	135.9	72.8	111.6	3.31
	09:20	1.92	1.34	0.250	273	0.375	153.6	216.1	62.5	139.3	76.8	113.7	3.46
	09:25	2.14	1.50	0.261	273	0.417	161.5	223.7	62.2	142.9	80.7	116.0	3.60
	09:30	2.38	1.67	0.274	273	0.462	170.8	233.0	62.2	147.6	85.4	119.1	3.75
	09:35	2.59	1.81	0.284	273	0.499	178.0	240.3	62.3	151.3	89.0	121.6	3.86
	09:40	2.84	1.98	0.294	272	0.543	185.1	247.8	62.7	155.2	92.5	124.4	3.95
	09:45	3.05	2.14	0.304	272	0.584	192.1	255.2	63.1	159.2	96.1	127.1	4.05
	09:50	3.33	2.33	0.313	271	0.633	198.4	262.3	63.9	163.1	99.2	130.0	4.10
	09:55	3.58	2.50	0.321	270	0.676	203.9	268.5	64.6	166.5	101.9	132.6	4.16
	10:00	3.86	2.70	0.331	269	0.725	210.8	276.5	65.7	171.1	105.4	136.0	4.21
	10:05	4.06	2.84	0.337	269	0.760	214.9	281.4	66.5	173.9	107.4	138.1	4.23
	10:10	4.30	3.01	0.344	267	0.802	219.6	287.2	67.6	177.4	109.8	140.8	4.25
	10:15	4.52	3.16	0.351	267	0.838	224.3	292.8	68.5	180.7	112.2	143.3	4.28
	10:20	4.78	3.34	0.361	265	0.881	231.2	301.0	69.8	185.4	115.6	146.9	4.31
	10:25	5.01	3.51	0.368	264	0.922	235.9	307.0	71.1	189.0	117.9	149.7	4.32
	10:30	5.24	3.67	0.374	263	0.959	239.8	312.1	72.3	192.2	119.9	152.2	4.32
	10:35	5.45	3.82	0.381	262	0.994	244.5	317.9	73.4	195.7	122.3	154.9	4.33
	10:40	5.66	3.96	0.387	260	1.027	248.5	323.1	74.6	198.8	124.2	157.4	4.33
	10:45	5.96	4.17	0.397	259	1.075	255.2	331.4	76.2	203.8	127.6	161.3	4.35
	10:50	6.22	4.35	0.404	257	1.115	259.7	337.3	77.6	207.4	129.8	164.2	4.35
	10:55	6.42	4.49	0.409	256	1.147	262.9	341.5	78.6	210.0	131.4	166.2	4.34
	11:00	6.66	4.66	0.416	255	1.185	267.5	347.4	79.9	213.6	133.7	169.1	4.35
	11:05	6.85	4.79	0.422	254	1.213	271.4	352.6	81.2	216.9	135.7	171.7	4.34
	11:10	7.15	5.00	0.428	253	1.259	275.1	357.5	82.4	219.9	137.5	174.1	4.34
	11:15	7.39	5.17	0.434	252	1.296	278.8	362.3	83.5	222.9	139.4	176.4	4.34
	11:20	7.64	5.34	0.439	250	1.332	281.9	366.7	84.8	225.7	140.9	178.8	4.32
	11:25	7.89	5.52	0.444	249	1.370	284.9	370.8	85.9	228.3	142.4	180.9	4.32
	11:30	8.19	5.73	0.449	248	1.414	287.8	375.0	87.2	231.1	143.9	183.1	4.30
	11:35	8.43	5.90	0.452	247	1.449	289.4	377.7	88.3	233.0	144.7	184.8	4.28
	11:40	8.68	6.07	0.456	246	1.484	291.6	381.0	89.4	235.2	145.8	186.6	4.26
	11:45	8.93	6.24	0.458	245	1.519	292.5	382.9	90.4	236.6	146.2	187.9	4.24

Borehole No. : WCH-BH12 — **Sample Depth m:- 11.00 - 12.00**

Sample No. : 17 — **Specimen Depth m:- 11.60 - 11.80**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 37	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
15/12	11:50	9.17	6.42	0.462	244	1.555	294.7	386.1	91.4	238.8	147.4	189.6	4.22
	11:55	9.38	6.56	0.465	243	1.583	296.4	388.6	92.2	240.4	148.2	191.0	4.21
	12:00	9.60	6.72	0.469	242	1.615	298.7	391.8	93.1	242.4	149.3	192.7	4.21
	12:05	9.91	6.94	0.475	241	1.658	302.2	396.6	94.4	245.5	151.1	195.1	4.20
	12:10	10.12	7.08	0.478	240	1.685	303.8	399.0	95.2	247.1	151.9	196.5	4.19
	12:15	10.32	7.22	0.481	239	1.712	305.4	401.4	96.0	248.7	152.7	197.8	4.18
	12:20	10.60	7.41	0.486	238	1.748	308.2	405.4	97.2	251.3	154.1	199.9	4.17
	12:25	10.82	7.57	0.490	237	1.779	310.5	408.5	98.0	253.2	155.2	201.5	4.17
	12:30	11.04	7.72	0.494	236	1.807	312.7	411.6	98.9	255.3	156.4	203.1	4.16
	12:35	11.37	7.95	0.499	235	1.850	315.4	415.4	100.0	257.7	157.7	205.1	4.15
	12:40	11.54	8.07	0.501	235	1.872	316.3	416.8	100.5	258.7	158.2	205.9	4.15
	12:45	11.83	8.28	0.506	234	1.910	319.1	420.6	101.5	261.0	159.5	207.9	4.14
	12:50	12.03	8.42	0.510	233	1.935	321.3	423.4	102.1	262.8	160.7	209.2	4.15
	12:55	12.29	8.60	0.514	232	1.968	323.4	426.5	103.1	264.8	161.7	210.9	4.14
	13:00	12.44	8.70	0.517	232	1.986	325.1	428.6	103.5	266.0	162.5	211.9	4.14
	13:05	12.77	8.93	0.521	231	2.026	327.0	431.5	104.5	268.0	163.5	213.5	4.13
	13:10	13.03	9.11	0.523	230	2.058	327.7	432.9	105.2	269.0	163.8	214.4	4.11
	13:15	13.29	9.30	0.525	229	2.091	328.4	434.3	105.9	270.1	164.2	215.4	4.10
	13:20	13.54	9.47	0.527	228	2.120	329.1	435.8	106.7	271.2	164.5	216.4	4.08
	13:25	13.80	9.65	0.528	228	2.151	329.1	436.5	107.4	271.9	164.5	217.1	4.06
	13:30	14.06	9.83	0.530	227	2.182	329.7	437.7	108.0	272.9	164.9	217.9	4.05
	13:35	14.32	10.02	0.533	226	2.213	331.1	440.0	108.9	274.4	165.5	219.3	4.04
	13:40	14.54	10.17	0.535	226	2.238	331.8	441.3	109.5	275.4	165.9	220.1	4.03
	13:45	14.83	10.37	0.539	225	2.272	333.8	444.0	110.2	277.1	166.9	221.5	4.03
	13:50	15.02	10.51	0.541	224	2.295	334.6	445.3	110.7	278.0	167.3	222.2	4.02
	13:55	15.25	10.67	0.544	224	2.321	336.0	447.5	111.5	279.5	168.0	223.5	4.01
	14:00	15.51	10.85	0.547	223	2.350	337.3	449.6	112.3	280.9	168.6	224.7	4.00
	14:05	15.72	11.00	0.548	222	2.374	337.4	450.2	112.8	281.5	168.7	225.3	3.99
	14:10	15.97	11.17	0.551	222	2.401	338.7	452.2	113.5	282.9	169.4	226.4	3.98
	14:15	16.27	11.38	0.554	221	2.435	339.9	454.1	114.2	284.1	169.9	227.5	3.98
	14:20	16.46	11.51	0.557	220	2.455	341.4	456.0	114.6	285.3	170.7	228.4	3.98
	14:25	16.77	11.73	0.562	220	2.490	343.8	459.2	115.4	287.3	171.9	230.0	3.98
	14:30	17.00	11.89	0.564	219	2.515	344.5	460.4	115.9	288.2	172.3	230.7	3.97
	14:35	17.20	12.04	0.567	219	2.538	345.9	462.3	116.4	289.4	173.0	231.7	3.97
	14:40	17.48	12.23	0.569	218	2.567	346.5	463.5	117.0	290.2	173.2	232.5	3.96
	14:45	17.84	12.48	0.571	217	2.605	346.7	464.4	117.7	291.1	173.4	233.3	3.95
	14:50	18.04	12.62	0.572	217	2.627	346.8	465.0	118.2	291.6	173.4	233.8	3.93
	14:55	18.25	12.77	0.574	216	2.649	347.5	466.2	118.7	292.5	173.8	234.5	3.93
	15:00	18.51	12.95	0.575	216	2.676	347.4	466.5	119.1	292.8	173.7	234.9	3.92
	15:05	18.71	13.09	0.576	216	2.697	347.5	467.0	119.5	293.3	173.8	235.3	3.91
	15:10	19.01	13.30	0.576	215	2.728	346.6	466.7	120.1	293.4	173.3	235.6	3.89

Borehole No. : WCH-BH12 — **Sample Depth m:- 11.00 - 12.00**

Sample No. : 17 — **Specimen Depth m:- 11.60 - 11.80**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by W S Wat

Checked by H W Chung

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21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

FAILURE CRITERION

Max. deviator Stress ☒ | Max. Stress ratio ☐ | Axial Strain % ☐

Stage :	1	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 37	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
15/12	15:15	19.33	13.52	0.580	214	2.761	348.3	469.2	120.9	295.1	174.2	237.0	3.88
	15:20	19.50	13.64	0.581	214	2.779	348.5	469.7	121.2	295.4	174.2	237.4	3.88
	15:25	19.76	13.83	0.583	213	2.807	349.0	470.7	121.7	296.2	174.5	238.0	3.87
	15:30	19.99	13.98	0.585	213	2.828	349.6	471.9	122.3	297.1	174.8	238.8	3.86
	15:35	20.21	14.14	0.587	212	2.852	350.3	473.1	122.8	297.9	175.1	239.6	3.85
	15:40	20.48	14.33	0.588	212	2.879	350.1	473.4	123.3	298.4	175.1	240.0	3.84
	15:45	20.70	14.48	0.590	211	2.901	350.8	474.7	123.9	299.3	175.4	240.8	3.83
	15:50	20.93	14.64	0.591	211	2.924	350.7	475.0	124.3	299.7	175.4	241.2	3.82
	15:55	21.18	14.81	0.592	210	2.948	350.6	475.3	124.7	300.0	175.3	241.6	3.81
	16:00	21.46	15.01	0.593	210	2.977	350.4	475.5	125.1	300.3	175.2	241.9	3.80
	16:05	21.63	15.13	0.595	210	2.994	351.2	476.6	125.4	301.0	175.6	242.5	3.80
	16:10	21.89	15.31	0.598	209	3.019	352.4	478.2	125.8	302.0	176.2	243.3	3.80
	16:15	22.24	15.56	0.600	209	3.055	352.6	479.0	126.4	302.7	176.3	243.9	3.79
	16:20	**22.43**	**15.69**	**0.601**	**208**	**3.073**	**352.6**	**479.4**	**126.8**	**303.1**	**176.3**	**244.3**	**3.78**
	16:25	22.64	15.84	0.602	208	3.094	352.6	479.8	127.2	303.5	176.3	244.7	3.77
	16:30	22.90	16.02	0.603	208	3.120	352.4	479.9	127.5	303.7	176.2	245.0	3.76
	16:35	23.23	16.25	0.603	207	3.152	351.4	479.3	127.9	303.6	175.7	245.0	3.75
	16:40	23.51	16.45	0.603	207	3.180	350.6	478.8	128.2	303.5	175.3	245.1	3.73
	16:45	23.71	16.59	0.604	207	3.200	350.6	479.1	128.5	303.8	175.3	245.4	3.73
	16:50	23.92	16.73	0.604	206	3.219	350.0	478.9	128.9	303.9	175.0	245.6	3.72
	16:55	24.17	16.91	0.606	206	3.244	350.4	479.6	129.2	304.4	175.2	246.0	3.71
	17:00	24.54	17.16	0.607	205	3.279	350.0	479.7	129.7	304.7	175.0	246.4	3.70
	17:05	24.75	17.31	0.608	205	3.300	349.9	480.1	130.2	305.2	175.0	246.8	3.69
	17:10	24.92	17.43	0.608	205	3.317	349.4	479.9	130.5	305.2	174.7	247.0	3.68
	17:15	25.18	17.61	0.610	204	3.342	349.9	480.7	130.8	305.7	174.9	247.4	3.67
	17:20	25.48	17.82	0.610	204	3.371	348.9	480.3	131.4	305.9	174.5	247.7	3.66
	17:25	25.72	17.99	0.611	203	3.395	348.8	480.4	131.6	306.0	174.4	247.9	3.65
	17:30	25.95	18.16	0.611	203	3.418	348.1	480.0	131.9	305.9	174.0	247.9	3.64
	17:35	26.20	18.33	0.611	203	3.442	347.3	479.4	132.1	305.8	173.7	247.9	3.63
	17:40	26.43	18.49	0.612	203	3.464	347.2	479.5	132.3	305.9	173.6	248.0	3.62
	17:45	26.62	18.63	0.612	203	3.484	346.6	479.1	132.5	305.8	173.3	248.0	3.62
	17:50	26.87	18.80	0.613	202	3.508	346.5	479.2	132.7	305.9	173.2	248.2	3.61
	17:55	27.10	18.96	0.613	202	3.530	345.7	478.6	132.9	305.8	172.9	248.1	3.60
	18:00	27.35	19.13	0.614	202	3.554	345.6	478.7	133.1	305.9	172.8	248.3	3.60
	18:05	27.60	19.31	0.615	202	3.579	345.4	478.6	133.2	305.9	172.7	248.3	3.59
	18:10	27.86	19.49	0.615	202	3.605	344.6	477.9	133.3	305.6	172.3	248.2	3.59
	18:15	28.11	19.67	0.615	202	3.630	343.8	477.3	133.5	305.4	171.9	248.1	3.58
	18:20	28.37	19.85	0.616	201	3.656	343.6	477.3	133.7	305.5	171.8	248.2	3.57
	18:25	28.62	20.02	0.616	201	3.680	342.8	476.6	133.8	305.2	171.4	248.1	3.56

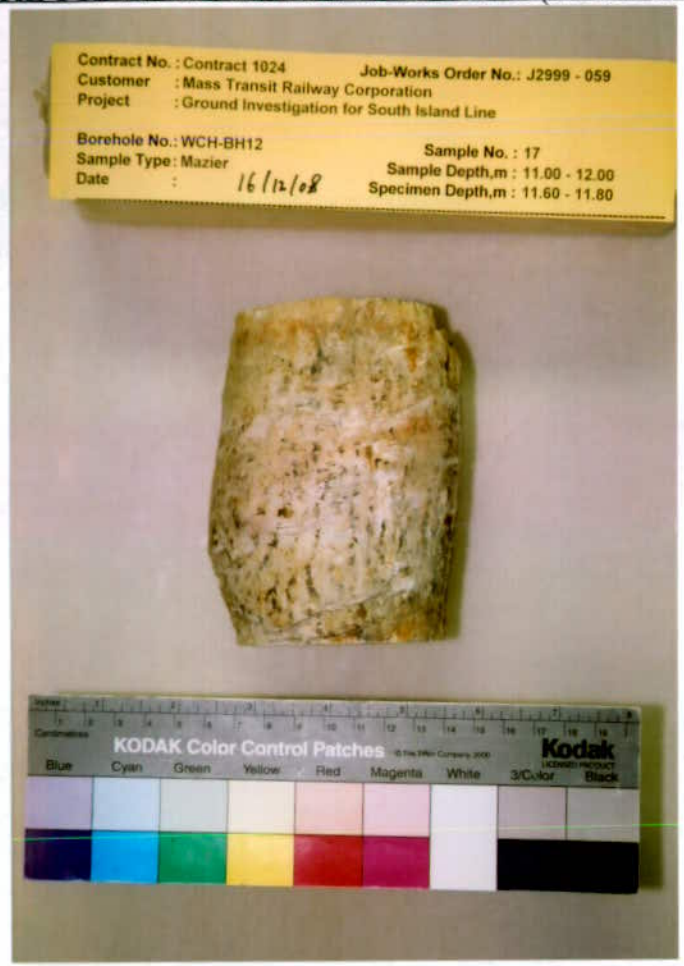
Borehole No. : WCH-BH12 — **Sample Depth m:- 11.00 - 12.00**
Sample No. : 17 — **Specimen Depth m:- 11.60 - 11.80**

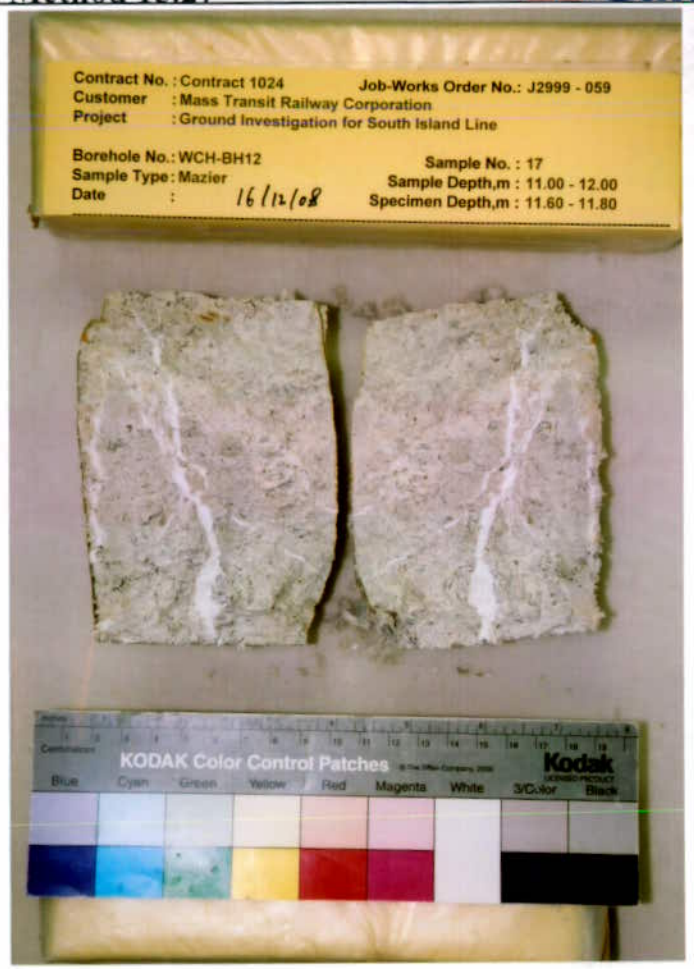
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)





Description : Light grey, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin : CDT‡ ‡ Information provided by customer

Borehole No. :	**WCH-BH12**	**Sample No. : 17**	**Sample Depth m:- 11.00 - 12.00**
Specimen Depth m:-	**11.60 - 11.80**		

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024
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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12	WCH-BH12	WCH-BH12
Sample		no	17	17	17
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	11.00 - 12.00	11.00 - 12.00	11.00 - 12.00
Specimen Depth		m	11.80 - 12.00	11.80 - 12.00	11.80 - 12.00
INITIAL CONDITIONS					
Diameter	(D_o)	mm	74.0	74.4	74.8
Height	(H_o)	mm	145.0	141.0	138.7
Moisture Content	(W_o)	%	20	20	19
Bulk density	(ρ_o)	Mg/m^3	2.02	2.05	2.05
Dry density	(ρ_d)	Mg/m^3	1.68	1.71	1.72
Particle density	(ρ_s)		2.65	2.65	2.65
Voids Ratio	(e_o)		0.58	0.55	0.54
Degree of Saturation	(S_r)	%	91.8	95.2	95.1
DRAINAGE CONDITIONS				ONE END	
SATURATION					
Final Pore Pressure Coefficient B			1.00		
CONSOLIDATION					
Cell Pressure	(σ_3)	kPa	300	355	410
Back Pressure	(u_b)	kPa	245	245	245
Effective Pressure	(σ'_3)	kPa	55	110	165
Coefficient of Consolidation (t100) (C_{vi})		m^2/Year	1328.74	2749.18	3466.71
Coefficient of Volume Compressibility (m_{vi})		m^2/MN	0.30	0.11	0.07
Coefficient of Permeability (k)		m/s	1.24E-07	9.41E-08	7.27E-08
COMPRESSION TERMINATION CRITERION			MAXIMUM STRESS RATIO		MAX ($\sigma'1$ - $\sigma'3$)
COMPRESSION - INITIAL					
Moisture Content	(w)	%	20	19	19
Pore Pressure at the End of Consolidation		kPa	245	245	245
Effective Stress at the End of Consolidation		kPa	55	110	165
Bulk density	(ρ_o)	Mg/m^3	2.05	2.05	2.06
Dry density	(ρ_d)	Mg/m^3	1.71	1.72	1.73
Voids Ratio	(e)		0.55	0.54	0.53
Degree of Saturation	(S_r)	%	95.2	95.1	95.0

Customer : **Mass Transit Railway Corporation**
Project : **Ground Investigation for South Island Line**
Contract No.: Contract 1024
Job No.: **J2999** **Works Order No.: 059**
Report No. : J2999-059.11

Technician : W S Wat Checked By : Name : H W Chung Approved By : Signatory : **Lau Wai Cheong**

Tested Date: 09/12/2008 Date : 19/12/2008 Date : 19/12/2008

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Form : GESR009.6 / Nov.10.06 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Borehole		no	WCH-BH12	WCH-BH12	WCH-BH12
Sample		no	17	17	17
Sample Type			Mazier	Mazier	Mazier
Stage		no	1	2	3
Sample Depth		m	11.00 - 12.00	11.00 - 12.00	11.00 - 12.00
Specimen Depth		m	11.80 - 12.00	11.80 - 12.00	11.80 - 12.00
COMPRESSION - FAILURE					
Cell Pressure		kPa	300	355	410
Rate of Strain		mm/min	0.048	0.047	0.046
CONDITIONS AT MAXIMUM STRESS RATIO					
Major Effective Principal Stress (σ'_1)		kPa	151	259	371
Corrected Deviator Stress ($\sigma'_1 - \sigma'_3$)		kPa	121	201	283
Minor Effective Principal Stress (σ'_3)		kPa	29	58	88
$s' = (\sigma'_1 + \sigma'_3)/2$		kPa	90	159	230
$t = (\sigma_1 - \sigma_3)/2$		kPa	61	101	142
Expanded Uncertainty of s' ^		kPa	-	-	-
Expanded Uncertainty of t ^		kPa	-	-	-
Pore pressure parameter A_f			0.21	0.26	0.27
Strain at Failure	(εf)	%	1.7	3.6	5.5
COMPRESSION - FINAL					
Moisture Content	(W_f)	%	20	19	19
Bulk density	(ρ_o)	Mg/m^3	2.05	2.05	2.06
Dry density	(ρ_d)	Mg/m^3	1.71	1.72	1.73
Voids Ratio	(e_f)		0.55	0.54	0.53
Degree of Saturation	(S_f)	%	95.2	95.1	95.0

Notes -
1. The method of specimen preparation was in accordance with GEOSPEC 3 : 2001 :-
   Test method 13.3 : test specimen from undisturbed soil samples.
2. Sample received date :29/09/2008
3. The determination of moisture content was in accordance with test method 5.1 of GEOSPEC 3 : 2001.
4. Particle density : 2.65 (Assumed)
5. Maximum and minimum temperature recorded over the period of testing 19.9 - 20.7 °C.
6. Unavoidable variations from specified procedure : none
7. Comment on observed or inferred sample disturbance : none
8. Percentage by mass of soil particles larger than 1/5 of the diameter of specimen (%) : Nil
9. The specimen was selected by the laboratory.
   Name : W S Wat Designation : Senior Laboratory Technician
10. Sampling History : As Received

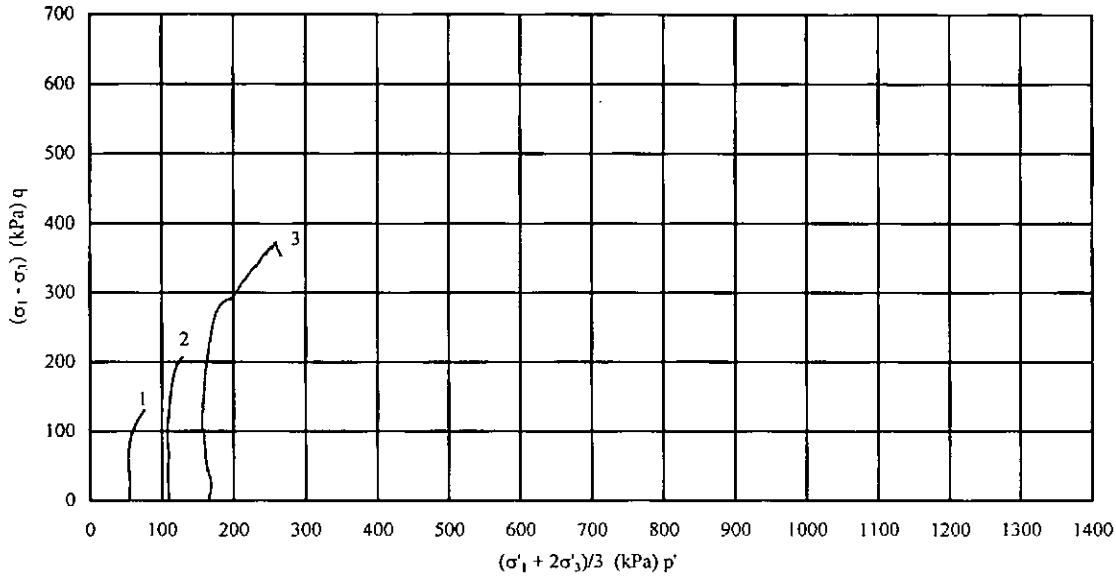
* Delete as appropriate ^ Upon request

Customer :	**Mass Transit Railway Corporation**	Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	
	Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999** **Works Order No.: 059**	

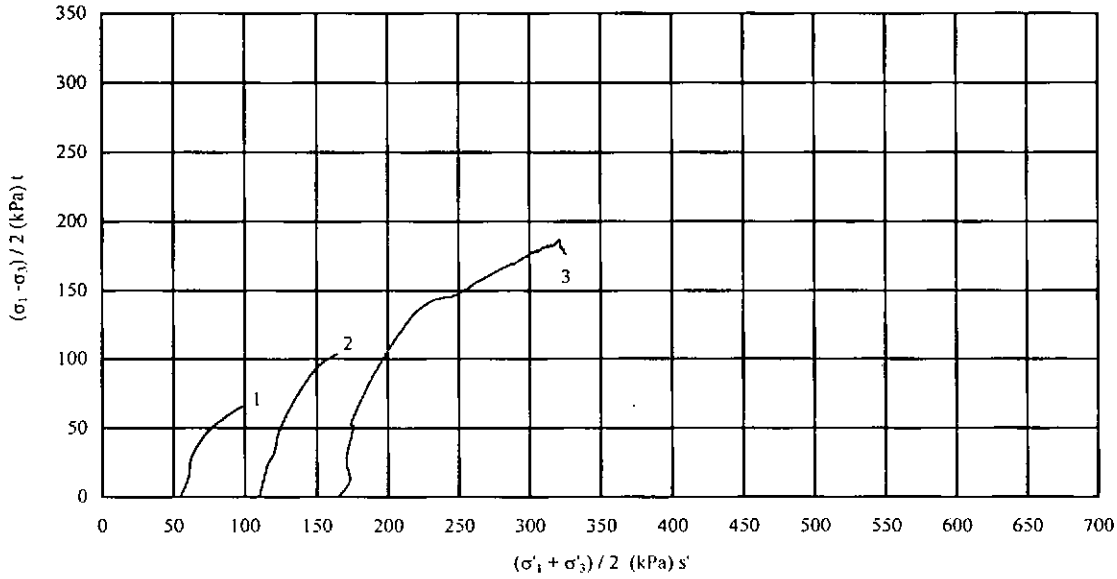
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

STRESS PATH PARAMETERS FOR EFFECTIVE STRESS

p' - q PLOT



s' - t PLOT



Borehole No. : WCH-BH12 — **Sample Depth m:-** 11.00 - 12.00

Sample No. : 17 — **Specimen Depth m:-** 11.80 - 12.00

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat

Checked by H W Chung

Form : GESR009.8 / Jun.02.03 / Issue 1 / Rev 0

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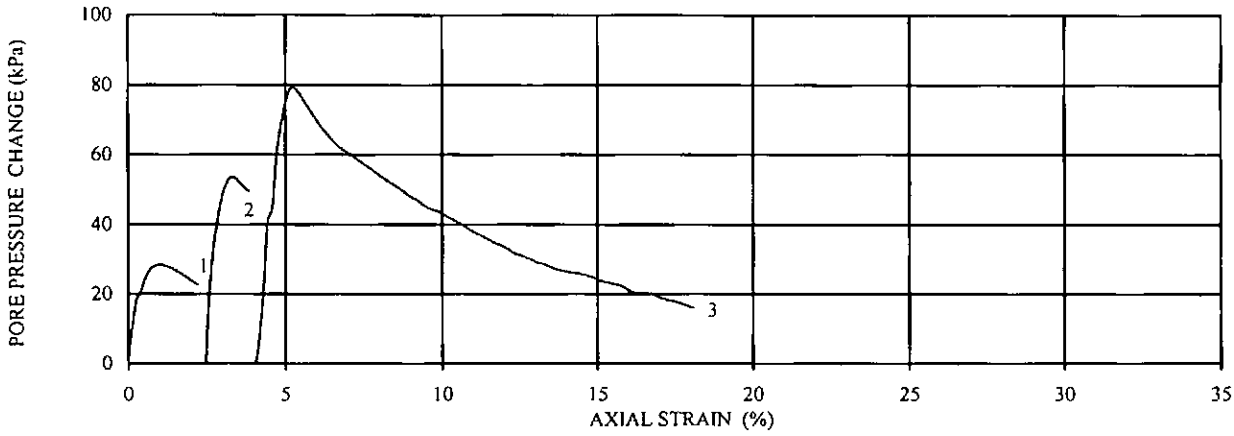
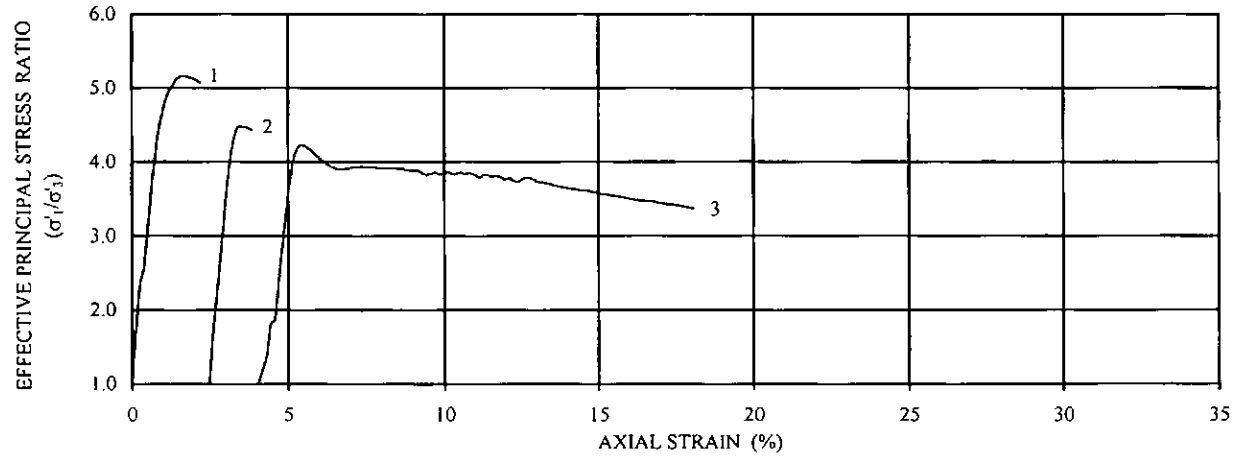
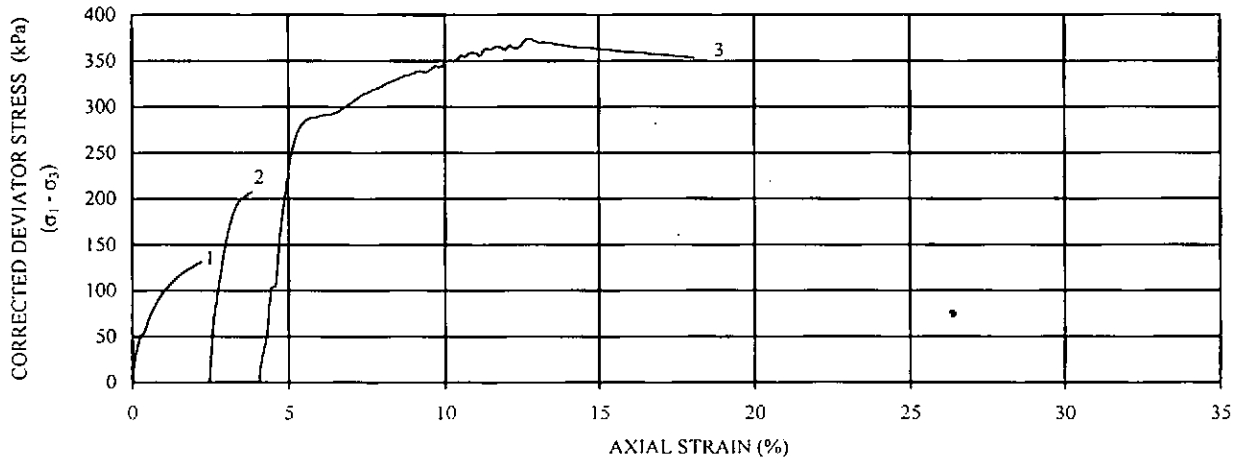
TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

COMPRESSION







Borehole No. :	**WCH-BH12**	**Sample Depth m:-**	**11.00 - 12.00**
Sample No. :	**17**	**Specimen Depth m:-**	**11.80 - 12.00**
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.:**	**Contract 1024**
Job No.:	**J2999**	**Works Order No.:**	**059**
			Checked by H W Chung

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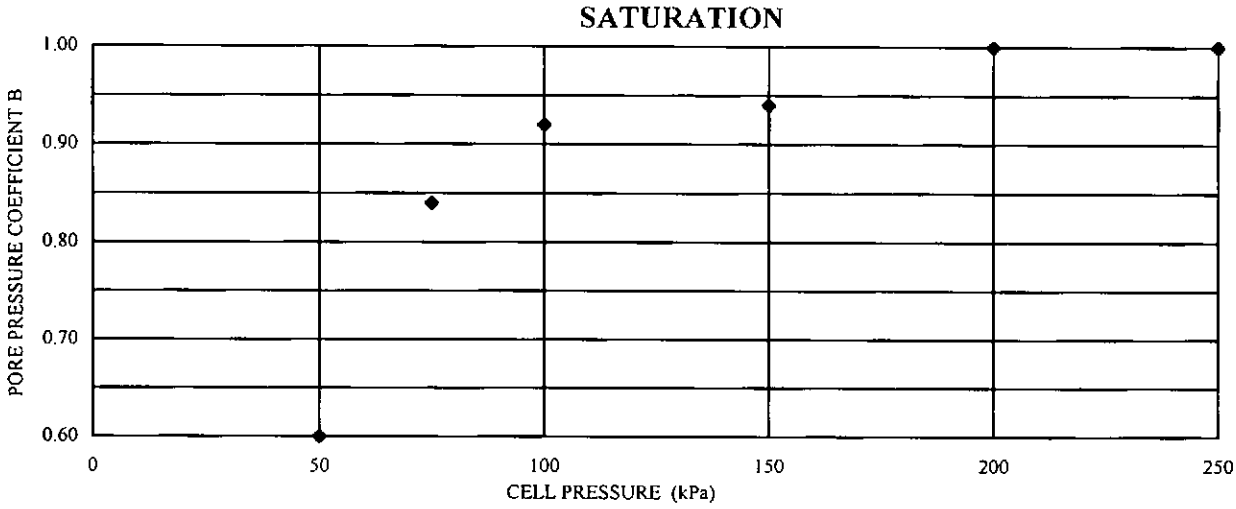
Form : GESR009.9 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2



Date	Time	Cell Pressure kPa	Back Pressure kPa	Pore Pressure kPa	Cumulative Volume of Water cm^3	Pore Pressure Parameter B
10/12/2008	14:46	0	0	-	0.0	
	14:57	25	-	23		-
11/12/2008	08:40	25	20	20	-2.9	
	08:49	50	-	35		0.60
	09:20	50	45	45	0.7	
	09:27	75	-	66		0.84
	09:53	75	70	70	3.0	
	10:00	100	-	93		0.92
	10:23	100	95	95	4.3	
	10:30	150	-	142		0.94
	11:22	150	145	145	6.5	
	11:30	200	-	195		1.00
	13:30	200	195	195	6.8	
	13:45	250	-	245		1.00
12/12/2008	08:40	250	245	245	8.3	

Borehole No. : WCH-BH12 — **Sample Depth m:-** 11.00 - 12.00
Sample No. : 17 — **Specimen Depth m:-** 11.80 - 12.00
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line
Contract No.: Contract 1024
Job No.: J2999 — **Works Order No.:** 059

Compiled by W S Wat
Checked by H W Chung

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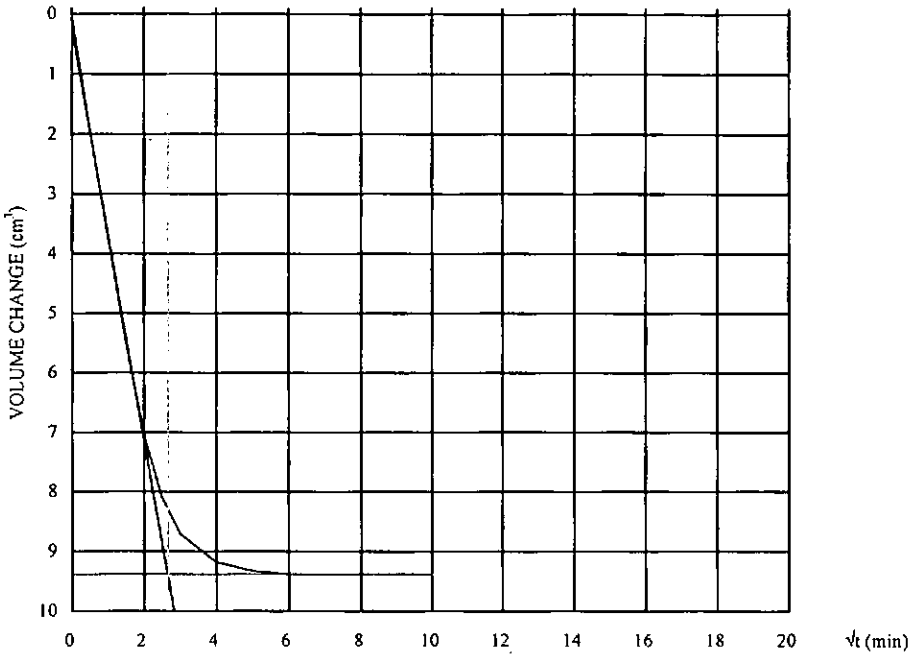
Form : GESR009.11 / Jun.02.03 / Issue 1 / Rev 0

TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 1

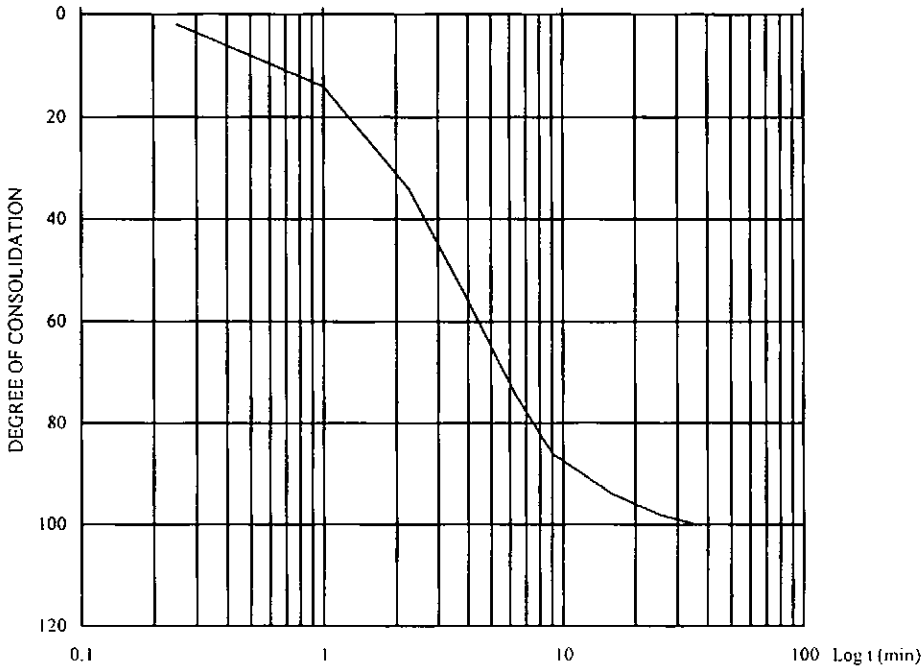


√t100 2.65 min

t100 7.04 min

tf 3.73 min

Calc. strain rate
2.705 mm/min



Borehole No. :	**WCH-BH12**	**Sample Depth m:-**	**11.00 - 12.00**
Sample No. :	**17**	**Specimen Depth m:-**	**11.80 - 12.00**
Customer :	**Mass Transit Railway Corporation**	Complied by	W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

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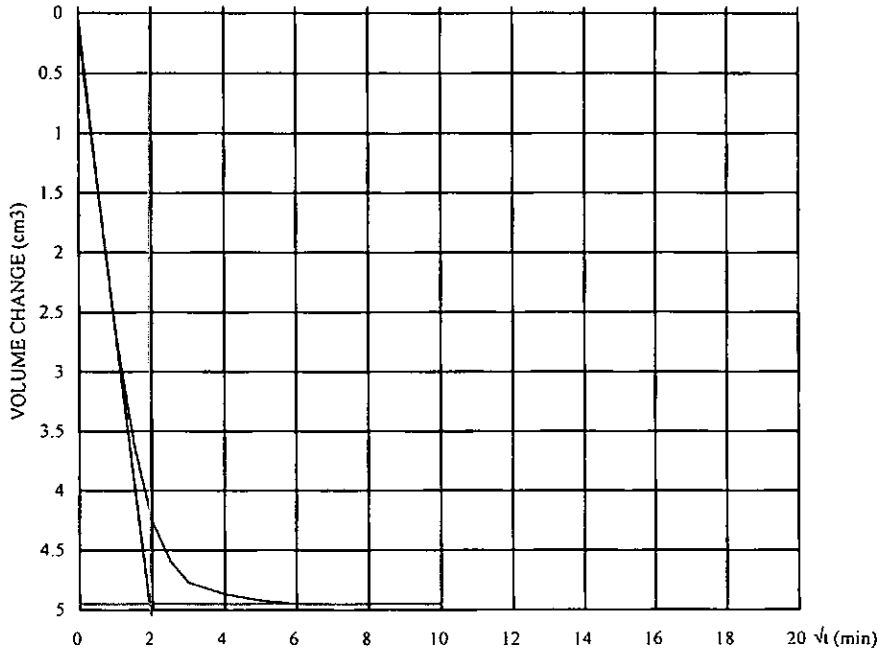
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 2

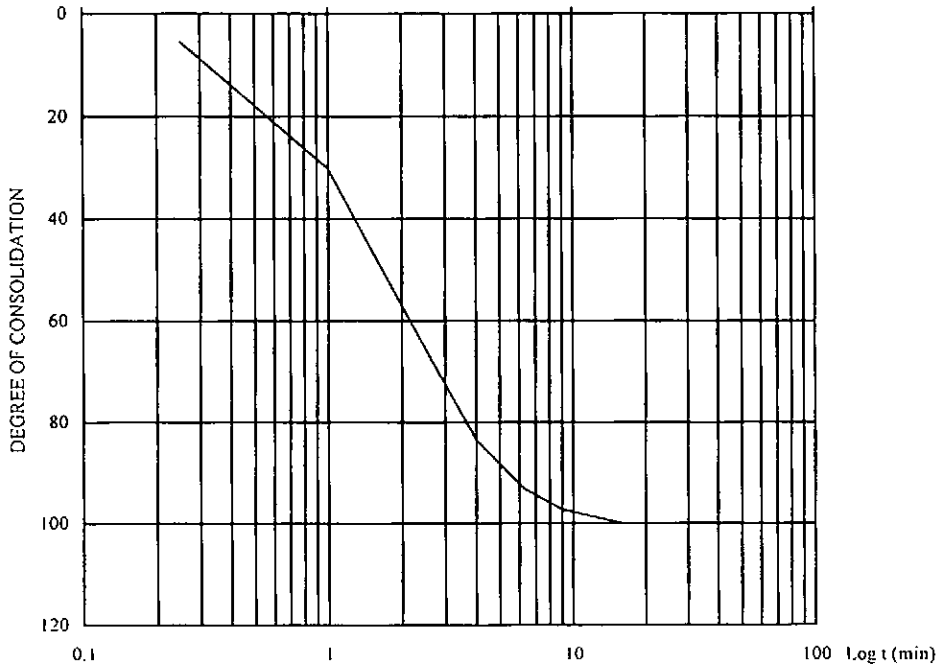


√t100 1.92 min

t100 3.69 min

tf 1.96 min

Calc. strain rate
5.028 mm/min



Borehole No. :	**WCH-BH12**	**Sample Depth m:-**	**11.00 - 12.00**
Sample No. :	**17**	**Specimen Depth m:-**	**11.80 - 12.00**
Customer :	**Mass Transit Railway Corporation**		Complied by W S Wat
Project :	**Ground Investigation for South Island Line**		
		Contract No.: Contract 1024	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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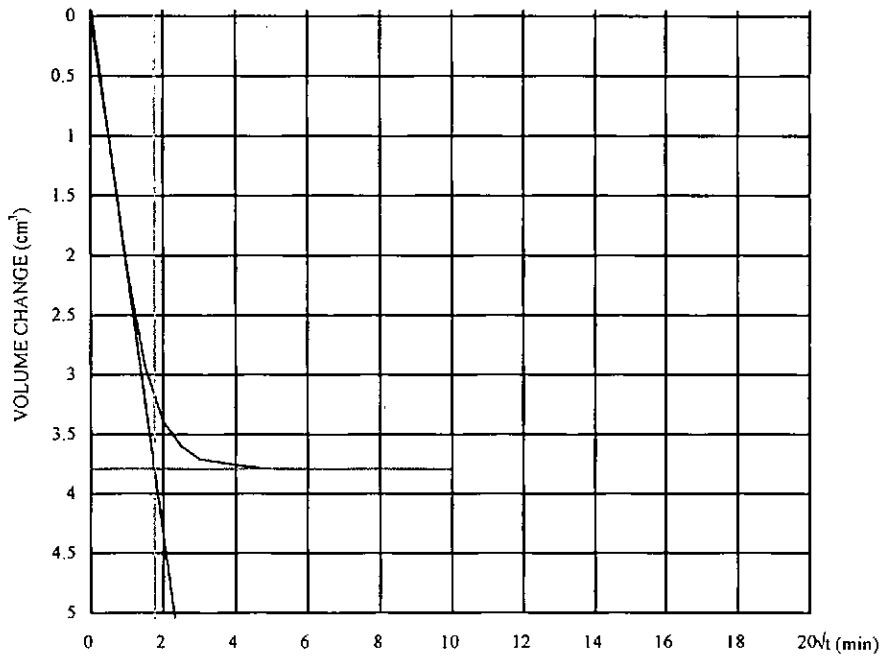
TEST REPORT
DETERMINATION OF
THE ISOTROPICALLY CONSOLIDATED
UNDRAINED TRIAXIAL COMPRESSION TEST
WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

CONSOLIDATION (DRAINED PHASE) - Stage 3

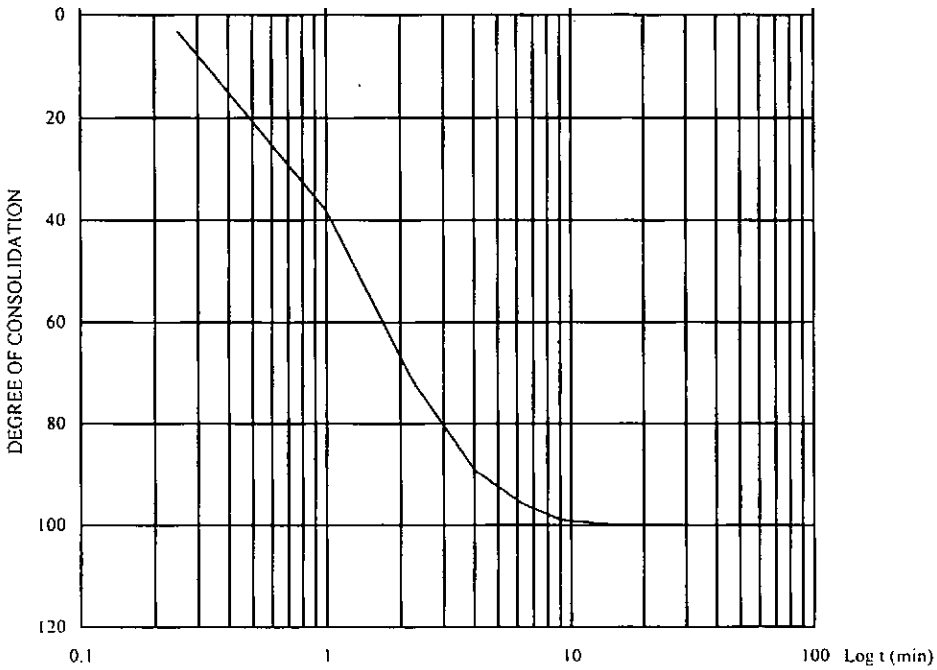


√t100 1.76 min

t100 3.09 min

tf 1.64 min

Calc. strain rate
5.925 mm/min



Borehole No. :	**WCH-BH12**	**Sample Depth m:-**	**11.00 - 12.00**
Sample No. :	**17**	**Specimen Depth m:-**	**11.80 - 12.00**
Customer :	**Mass Transit Railway Corporation**		Complied by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

Form : GESR009.13 / Jun.02.03 / Issue 1 / Rev 0

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	55 kPa
Side drains	No	Selected Machine Speed	0.048 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐
Stage : 1	Applied Pressure (kPa) - Cell : 300 Back : 245	P.R. factor 3.1043 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 3 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
12/12	09:35	0.00	0.00	0.023	245	0.000	0.0	55.0	55.0	55.0	0.0	55.0	1.00
	09:40	0.12	0.09	0.061	253	0.026	27.7	74.3	46.6	60.4	13.8	55.8	1.59
	09:45	0.37	0.26	0.091	263	0.075	49.4	86.2	36.8	61.5	24.7	53.3	2.34
	09:50	0.57	0.39	0.099	266	0.112	55.1	89.6	34.5	62.1	27.6	52.9	2.60
	09:55	0.78	0.54	0.118	269	0.155	68.8	99.5	30.7	65.1	34.4	53.6	3.24
	10:00	1.00	0.69	0.135	272	0.197	80.9	109.0	28.1	68.6	40.5	55.1	3.88
	10:05	1.22	0.85	0.149	273	0.241	90.9	117.7	26.8	72.2	45.4	57.1	4.39
	10:10	1.43	0.99	0.159	273	0.280	98.0	124.6	26.6	75.6	49.0	59.3	4.68
	10:15	1.63	1.13	0.167	273	0.318	103.5	130.1	26.6	78.4	51.8	61.1	4.89
	10:20	1.86	1.29	0.175	273	0.361	109.1	136.2	27.1	81.6	54.5	63.5	5.03
	10:25	2.09	1.45	0.183	272	0.404	114.6	142.4	27.8	85.1	57.3	66.0	5.12
	10:30	2.27	1.57	0.188	272	0.436	118.0	146.4	28.4	87.4	59.0	67.7	5.16
	10:35	**2.48**	**1.72**	**0.193**	**271**	**0.475**	**121.4**	**150.6**	**29.2**	**89.9**	**60.7**	**69.7**	**5.16**
	10:40	2.76	1.91	0.199	270	0.525	125.4	155.7	30.3	93.0	62.7	72.1	5.14
	10:45	2.97	2.06	0.204	269	0.564	128.8	160.1	31.3	95.7	64.4	74.2	5.11
	10:50	3.20	2.22	0.208	268	0.605	131.4	163.7	32.3	98.0	65.7	76.1	5.07

Borehole No. :	**WCH-BH12**	**Sample Depth m:- 11.00 - 12.00**	
Sample No. :	**17**	**Specimen Depth m:- 11.80 - 12.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by
Project :	**Ground Investigation for South Island Line**		W S Wat
		Contract No.: Contract 1024	Checked by
Job No.:	**J2999**	**Works Order No.: 059**	H W Chung

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Form : GESR009.14 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	110 kPa
Side drains	No	Selected Machine Speed	0.047 mm/min	Rate of Strain	2.00 % per hr

FAILURE CRITERION

Max. deviator Stress	☐	Max. Stress ratio	☒	Axial Strain %	☐
Stage : 2	Applied Pressure (kPa) - Cell :	355	Back : 245	P.R. factor	3.1043 kN/mm

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 3 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)/2$	t $(\sigma_1-\sigma_3)/2$	p' $(\sigma'_1+2\sigma'_3)/3$	Stress Ratio σ'_1/σ'_3
12/12	13:15	3.58	2.48	0.031	245	0.000	0.0	110.0	110.0	110.0	0.0	110.0	1.00
	13:20	3.69	2.56	0.096	262	0.691	45.9	138.7	92.8	115.7	22.9	108.1	1.49
	13:25	3.76	2.61	0.123	267	0.703	65.2	153.3	88.1	120.7	32.6	109.8	1.74
	13:30	3.92	2.72	0.161	278	0.730	92.3	169.5	77.2	123.3	46.1	108.0	2.20
	13:35	4.11	2.85	0.202	286	0.762	121.4	190.3	68.9	129.6	60.7	109.4	2.76
	13:40	4.31	2.99	0.243	293	0.797	150.5	212.7	62.2	137.4	75.2	112.4	3.42
	13:45	4.51	3.13	0.273	297	0.831	171.6	229.9	58.3	144.1	85.8	115.5	3.94
	13:50	4.69	3.25	0.292	299	0.860	184.9	241.4	56.5	148.9	92.4	118.1	4.27
	13:55	4.92	3.41	0.309	298	0.898	196.6	253.3	56.7	155.0	98.3	122.2	4.47
	14:00	**5.13**	**3.56**	**0.316**	**297**	**0.933**	**201.2**	**259.2**	**58.0**	**158.6**	**100.6**	**125.1**	**4.47**
	14:05	5.35	3.71	0.322	296	0.969	205.1	264.4	59.3	161.9	102.6	127.7	4.46
	14:10	5.55	3.85	0.326	294	1.001	207.6	268.2	60.6	164.4	103.8	129.8	4.43

Borehole No. :	**WCH-BH12**	**Sample Depth m:- 11.00 - 12.00**	
Sample No. :	**17**	**Specimen Depth m:- 11.80 - 12.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2

Gammon

Multi Stage		P.W.P,B.P		Effective Pressure	165 kPa
Side drains	No	Selected Machine Speed	0.046 mm/min	Rate of Strain	1.99 % per hr

FAILURE CRITERION

Max. deviator Stress ☐	Max. Stress ratio ☒	Axial Strain % ☐

Stage : 3	Applied Pressure (kPa) - Cell : 410	Back : 245	P.R. factor 3.1043 kN/mm	

Date	Time	Strain Dial mm	Strain %	Load P.R.No. 3 mm	Pore Pressure kPa	Dev. stress Corr. kPa	Dev. stress q $\sigma_1 - \sigma_3$ kPa	Effective Stress σ'_1	Effective Stress σ'_3	s' $(\sigma'_1+\sigma'_3)$ 2	t $(\sigma_1-\sigma_3)$ 2	p' $(\sigma'_1+2\sigma'_3)$ 3	Stress Ratio σ'_1/σ'_3
15/12	08:35	5.84	4.05	0.039	245	0.000	0.0	165.0	165.0	165.0	0.0	165.0	1.00
	08:40	5.98	4.14	0.074	249	1.068	23.8	184.7	160.9	172.8	11.9	168.8	1.15
	08:45	6.22	4.31	0.118	267	1.106	54.8	198.0	143.2	170.6	27.4	161.5	1.38
	08:50	6.40	4.44	0.185	285	1.136	102.1	226.7	124.6	175.7	51.1	158.6	1.82
	08:55	6.60	4.58	0.190	289	1.167	105.5	226.3	120.8	173.5	52.7	156.0	1.87
	09:00	6.73	4.67	0.240	299	1.187	140.6	251.4	110.8	181.1	70.3	157.7	2.27
	09:05	6.90	4.78	0.291	309	1.211	176.4	277.8	101.4	189.6	88.2	160.2	2.74
	09:10	7.14	4.95	0.352	318	1.248	218.9	311.4	92.5	202.0	109.5	165.5	3.37
	09:15	7.30	5.06	0.386	321	1.272	242.5	331.1	88.6	209.9	121.3	169.4	3.74
	09:20	7.49	5.19	0.415	324	1.300	262.5	348.4	85.9	217.2	131.3	173.4	4.06
	09:25	7.69	5.33	0.434	324	1.330	275.4	361.5	86.1	223.8	137.7	177.9	4.20
	09:30	**7.91**	**5.49**	**0.446**	**322**	**1.364**	**283.3**	**371.2**	**87.9**	**229.6**	**141.7**	**182.3**	**4.22**
	09:35	8.12	5.63	0.452	320	1.393	287.0	377.0	90.0	233.5	143.5	185.7	4.19
	09:40	8.36	5.80	0.455	318	1.429	288.6	381.0	92.4	236.7	144.3	188.6	4.12
	09:45	8.57	5.94	0.457	316	1.458	289.5	383.8	94.3	239.1	144.8	190.8	4.07
	09:50	8.82	6.11	0.460	313	1.492	291.0	387.6	96.6	242.1	145.5	193.6	4.01
	09:55	9.05	6.27	0.461	312	1.525	291.2	389.6	98.4	244.0	145.6	195.5	3.96
	10:00	9.33	6.47	0.465	310	1.565	293.3	393.8	100.5	247.2	146.7	198.3	3.92
	10:05	9.52	6.60	0.468	308	1.591	294.9	396.7	101.8	249.3	147.5	200.1	3.90
	10:10	9.75	6.76	0.474	307	1.623	298.5	401.5	103.0	252.3	149.3	202.5	3.90
	10:15	9.96	6.91	0.480	306	1.652	302.2	406.1	103.9	255.0	151.1	204.6	3.91
	10:20	10.21	7.08	0.487	305	1.685	306.4	411.3	104.9	258.1	153.2	207.0	3.92
	10:25	10.45	7.25	0.494	304	1.718	310.6	416.6	106.0	261.3	155.3	209.5	3.93
	10:30	10.69	7.41	0.500	303	1.748	314.1	421.1	107.0	264.1	157.1	211.7	3.94
	10:35	10.91	7.56	0.503	302	1.777	315.6	423.5	107.9	265.7	157.8	213.1	3.93
	10:40	11.12	7.71	0.508	301	1.805	318.5	427.3	108.8	268.1	159.3	215.0	3.93
	10:45	11.43	7.92	0.513	300	1.844	321.2	431.5	110.3	270.9	160.6	217.4	3.91
	10:50	11.69	8.10	0.519	299	1.877	324.6	436.1	111.5	273.8	162.3	219.7	3.91
	10:55	11.88	8.23	0.523	298	1.901	326.8	439.0	112.2	275.6	163.4	221.1	3.91
	11:00	12.11	8.39	0.527	297	1.930	328.9	442.0	113.1	277.6	164.5	222.7	3.91
	11:05	12.36	8.57	0.532	296	1.962	331.6	445.8	114.2	280.0	165.8	224.7	3.90
	11:10	12.57	8.71	0.536	295	1.987	333.8	448.9	115.1	282.0	166.9	226.4	3.90
	11:15	12.81	8.88	0.539	294	2.018	335.2	451.4	116.2	283.8	167.6	227.9	3.88
	11:20	13.04	9.04	0.543	293	2.046	337.2	454.4	117.2	285.8	168.6	229.6	3.88
	11:25	13.27	9.20	0.547	292	2.074	339.3	457.3	118.0	287.6	169.6	231.1	3.88
	11:30	13.54	9.38	0.545	291	2.105	337.2	456.5	119.3	287.9	168.6	231.7	3.83
	11:35	13.77	9.54	0.551	290	2.132	340.6	460.8	120.2	290.5	170.3	233.7	3.83
	11:40	13.99	9.70	0.558	289	2.159	344.7	465.4	120.7	293.0	172.3	235.6	3.86
	11:45	14.22	9.86	0.557	289	2.187	343.4	464.7	121.3	293.0	171.7	235.8	3.83

Borehole No. :	**WCH-BH12**	**Sample Depth m:- 11.00 - 12.00**	
Sample No. :	**17**	**Specimen Depth m:- 11.80 - 12.00**	
Customer :	**Mass Transit Railway Corporation**		Compiled by W S Wat
Project :	**Ground Investigation for South Island Line**	**Contract No.: Contract 1024**	Checked by H W Chung
Job No.:	**J2999**	**Works Order No.: 059**	

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TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT
GEOSPEC 3 : 2001 Test Method 15.2
Shearing Continuation

Gammon

FAILURE CRITERION

Max. deviator Stress ☐ | Max. Stress ratio ☒ | Axial Strain % ☐

Stage :	3	Strain		Load	Pore	Dev. stress		Effective Stress Parameters					
Date	Time	Dial		P.R.No. 3	Pressure	Corr.	q $\sigma_1 - \sigma_3$	Effective Stress		s' $(\sigma'_1+\sigma'_3)$	t $(\sigma_1-\sigma_3)$	p' $(\sigma'_1+2\sigma'_3)$	Stress Ratio
		mm	%	mm	kPa	kPa		σ'_1	σ'_3	2	2	3	σ'_1/σ'_3
15/12	11:50	14.46	10.02	0.566	288	2.213	348.7	470.7	122.0	296.4	174.4	238.2	3.86
	11:55	14.65	10.15	0.570	287	2.235	350.8	473.5	122.7	298.1	175.4	239.6	3.86
	12:00	14.87	10.31	0.569	287	2.262	349.5	472.9	123.4	298.2	174.8	239.9	3.83
	12:05	15.16	10.51	0.580	286	2.295	356.0	480.5	124.5	302.5	178.0	243.2	3.86
	12:10	15.36	10.65	0.579	285	2.317	354.8	479.9	125.1	302.5	177.4	243.4	3.84
	12:15	15.56	10.79	0.586	284	2.340	358.8	484.7	125.9	305.3	179.4	245.5	3.85
	12:20	15.84	10.98	0.587	283	2.371	358.6	485.5	126.9	306.2	179.3	246.4	3.83
	12:25	16.06	11.13	0.583	282	2.395	355.4	483.1	127.7	305.4	177.7	246.2	3.78
	12:30	16.27	11.28	0.596	282	2.419	363.3	491.6	128.3	309.9	181.6	249.4	3.83
	12:35	16.59	11.50	0.596	281	2.454	362.4	491.7	129.3	310.5	181.2	250.1	3.80
	12:40	16.74	11.61	0.601	280	2.471	365.2	495.1	129.9	312.5	182.6	251.6	3.81
	12:45	17.03	11.80	0.602	279	2.501	365.0	495.6	130.6	313.1	182.5	252.3	3.79
	12:50	17.22	11.94	0.598	279	2.522	361.8	493.0	131.2	312.1	180.9	251.8	3.76
	12:55	17.46	12.11	0.607	278	2.549	366.9	499.0	132.1	315.6	183.5	254.4	3.78
	13:00	17.60	12.20	0.603	277	2.562	363.9	496.5	132.6	314.5	181.9	253.9	3.74
	13:05	17.91	12.41	0.606	276	2.595	364.9	498.5	133.6	316.1	182.5	255.2	3.73
	13:10	18.13	12.57	0.618	276	2.619	372.0	506.0	134.0	320.0	186.0	258.0	3.78
	13:15	18.37	12.73	0.622	276	2.643	373.9	508.4	134.5	321.4	186.9	259.1	3.78
	13:20	18.60	12.89	0.621	275	2.667	372.5	507.6	135.1	321.4	186.3	259.3	3.76
	13:25	18.83	13.06	0.618	274	2.693	369.9	506.0	136.1	321.0	184.9	259.4	3.72
	13:30	19.07	13.22	0.620	274	2.717	370.4	506.6	136.2	321.4	185.2	259.7	3.72
	13:45	19.78	13.71	0.619	272	2.789	367.6	505.5	137.9	321.7	183.8	260.4	3.67
	14:00	20.47	14.19	0.618	271	2.859	364.8	503.5	138.7	321.1	182.4	260.3	3.63
	14:15	21.21	14.70	0.620	270	2.932	363.8	503.5	139.7	321.6	181.9	261.0	3.60
	14:30	21.90	15.18	0.621	269	3.001	362.3	503.6	141.3	322.5	181.2	262.1	3.56
	14:45	22.67	15.72	0.622	268	3.077	360.6	503.1	142.5	322.8	180.3	262.7	3.53
	15:00	23.29	16.15	0.623	266	3.138	359.3	503.7	144.4	324.0	179.6	264.2	3.49
	15:15	24.04	16.66	0.624	265	3.209	357.6	502.4	144.8	323.6	178.8	264.0	3.47
	15:30	24.67	17.11	0.625	264	3.272	356.2	502.5	146.3	324.4	178.1	265.0	3.43
	15:45	25.43	17.63	0.626	263	3.345	354.5	501.9	147.4	324.6	177.2	265.6	3.40
	16:00	26.07	18.07	0.627	261	3.406	353.1	502.1	149.0	325.6	176.6	266.7	3.37

Borehole No. : WCH-BH12 — **Sample Depth m:- 11.00 - 12.00**

Sample No. : 17 — **Specimen Depth m:- 11.80 - 12.00**

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Job No.: J2999 — **Works Order No.: 059**

Compiled by: W S Wat

Checked by: H W Chung

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Technology Centre
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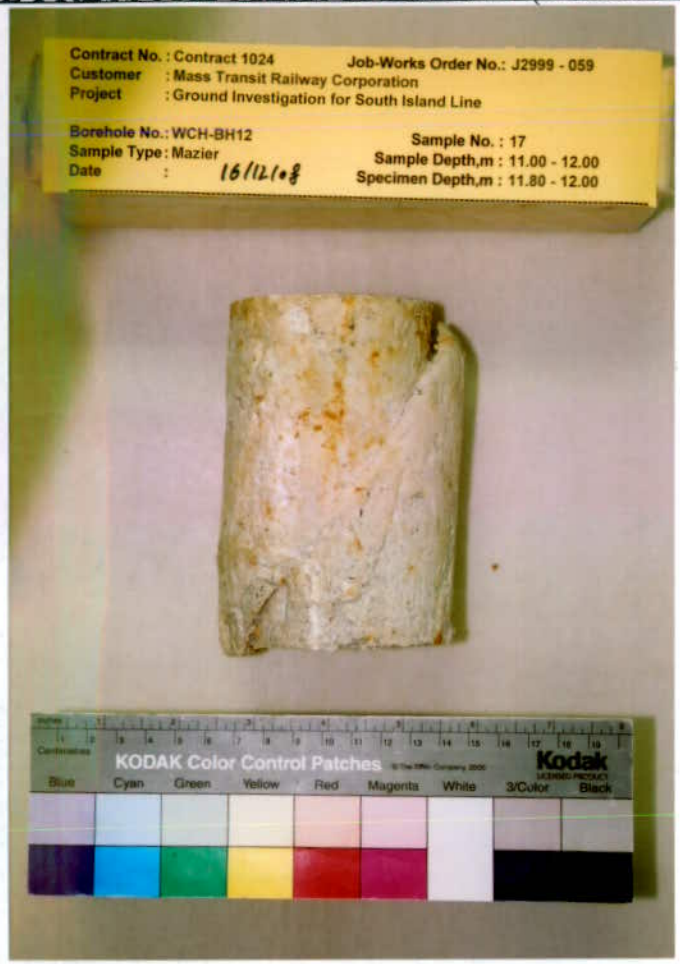
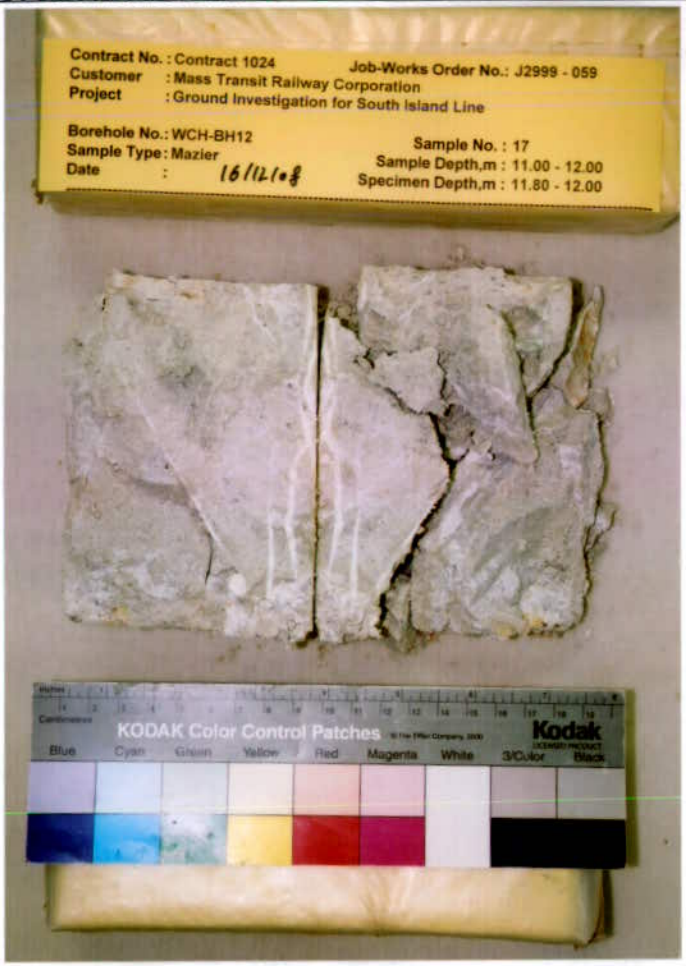
Form : GESR009.15 / Dec.13.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST WITH PORE PRESSURE MEASUREMENT (GEOSPEC 3 : 2001 Test Method 15.2)





Description : Light grey, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin : CDT ‡

‡ Information provided by customer

Borehole No. : WCH-BH12	Sample No. : 17	Sample Depth m:- 11.00 - 12.00	Specimen Depth m:- 11.80 - 12.00
Customer : Mass Transit Railway Corporation Project : Ground Investigation for South Island Line		Contract No.: Contract 1024 Job No.: J2999 Works Order No.: 059	Compiled by W S Wat Checked by H W Chung

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Gammon

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CONTRACT NO. CONTRACT NEX 1024
GROUND INVESTIGATION FOR SOUTH ISLAND LINE
LABORATORY ORDER NO. 1
COMPILATION OF FINAL LABORATORY TESTING REPORT
VOLUME 4 OF 4

CONTRACTOR
GAMMON CONSTRUCTION LIMITED
28th Floor Devon House
Taikoo Place
979 King's Road
Hong Kong

CUSTOMER
MASS TRANSIT RAILWAY CORPORATION

Report No : J2999-059.11 Rev 0

29/01/2009

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INTRODUCTION

This document contains a compilation of reports of tests for which the laboratory was accredited by HOKLAS at the date of testing and reports of tests for which it was not. The two individual series of reports are separated by a yellow divider sheet and presented in sequential order following the original works instruction. The document comprises of four volumes of test reports where volume 1 to volume 3 contain HOKLAS reports and volume 4 contains HOKLAS & NON-HOKLAS reports.

The laboratory did not know the sampling history of the samples prior to receipt at the laboratory. The results presented relate only to the samples in the condition as received.

Readers should note the conditions of use of the HOKLAS endorsed certificates/reports.

In order to avoid the possibility of misrepresented results being used, reproduction of test certificates/reports in part shall not be permitted.

Reliance should only be given to test reports given in the original or certified true copy of test certificates/reports.

For the determination of Moisture Content, Bulk Density, Atterberg Limits, Particle Density, Particle Size Distribution & Triaxial Compression Tests. Some of these tests were subcontracted to FT Laboratories Limited. These results are clearly annoted as being conducted by this testing house, within this document.

CUSTOMER
MASS TRANSIT RAILWAY CORPORATION

Gammon

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CONTENTS

Volume 4 of 4

Approved Signatory : ~~J Fowler~~ / W C Lau
(~~Laboratory Quality Manager~~ /Deputy Laboratory Manager)

Gammon

Section 1
HOKLAS Endorsed Test Certificates

Section 1.1
Summary of Soil Classification Tests

TEST CERTIFICATE
SUMMARY OF SOIL CLASSIFICATION TEST RESULT
GEOSPEC 3 : 2001

Gammon HKAS HOKLAS

Report No : J2999-059.11

Customer : Mass Transit Railway Corporation

Job No. : J2999

Works Order No. : 059

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	Δ Moisture Content (%)	Test 6.1 Liquid Limit (%)	Test 6.1 Plastic Limit (%)	Test 6.1 Plasticity Index (%)	Test 6.2 Liquidity Index	Passing 425μm Test Sieve (%)	Preparation Method	Particle Size Distribution # Test Method	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Description	Sample Origin
D003	1	M	7.00 - 8.00	12A		N.P.			13	W.S.	1,5,7	51	45	2	2	Dark brown, slightly clayey/silty, very sandy GRAVEL	CDG‡
D003	5	M	9.55 - 10.55	9.9A		N.P.			13	W.S.	1,5,7	56	42	2	0	Dark brown, slightly silty, very sandy GRAVEL	HDG‡
D008	1	M	3.00 - 4.00	23B	44	23	21	0.39	76	W.S.	1,5,7	9	33	38	20	Brown, slightly gravelly, slightly sandy SILT/CLAY	FILL‡
D011	1	M	3.00 - 4.00	24B	35	22	13	0.99	63	W.S.	1,5,7	18	26	38	18	Brown, slightly gravelly, slightly sandy SILT/CLAY	FILL‡
D019	1	M	3.00 - 4.00	29B	44	24	20	1.05	60	W.S.	1,5,7	14	36	29	11	Brown, slightly gravelly, sandy SILT/CLAY	FILL‡
D019	5	M	6.70 - 7.70	23B		N.P.			55	W.S.	1,5,7	19	35	40	6	Brown, slightly gravelly, sandy SILT/CLAY	COL‡
D019	9	M	14.40 - 15.40	22A		N.P.			49	W.S.	1,5,7	18	57	16	9	Dark brown, clayey, silty, gravelly SAND	CDT‡
D021	5	M	5.50 - 6.50	28A		N.P.			51	W.S.	1,5,7	17	60	17	6	Dark brown, clayey, gravelly, very silty SAND	CDM‡
D022A	1	M	3.00 - 4.00	31A		N.P.			60	W.S.	1,5,7	15	52	22	11	Dark brown, clayey, gravelly, very silty SAND	CDG‡
D022A	21	M	15.50 - 16.50	24A		N.P.			50	W.S.	1,5,7	12	64	18	6	Dark brown, clayey, gravelly, very silty SAND	CDG‡

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C± 5°C (C)
= Test Method in accordance with GEOSPEC3 : 2001 Test 8.1 (1), 8.2 (2), 8.3 (3), 8.4 (4), 8.5 (5), 8.6 (6), 8.7 (7).

Symbols :
U - Undisturbed Sample;
LB - Large Disturbed Sample;
BLK - Block Sample;
SPTL - SPT Split-Barrel Sample;
P - Piston Sample;
M - Mazier Sample;
D - Small Disturbed Sample;
PT - Portable triple tube Sample;
N.P. - Non Plastic;
A.R. - As Received;
H.P. - Hand Picked;
* - Moisture Content for A.L. Test.
A.D. - Air Dried;
O.D. - Oven Dried;
W.S. - Wet Sieved;
Sampling History - Refer the Individual Test Report;
Estimated Uncertainty - Refer the Individual Test Report.
‡ - Information provided by customer.

Notes: IS - Insufficient Sample; Tf - To Follow on supplementary Report.

Checked by : H W Chung

Approved By : Lau Wai Cheong

Date : 08/01/2009

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TEST CERTIFICATE
SUMMARY OF SOIL CLASSIFICATION TEST RESULT
GEOSPEC 3 : 2001

Gammon HKAS HOKLAS

Report No : J2999-059.11

Customer : Mass Transit Railway Corporation

Job No. : J2999

Works Order No. : 059

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	Δ Moisture Content (%)	Test 6.1 Liquid Limit (%)	Test 6.1 Plastic Limit (%)	Test 6.1 Plasticity Index (%)	Test 6.2 Liquidity Index	Passing 425μm Test Sieve (%)	Preparation Method	Particle Size Distribution # Test Method	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Description	Sample Origin
D024	5	M	7.50 - 8.50	□29B		□N.P.			61	W.S.	□1,5,7	8	55	32	5	Brown, slightly gravelly, sandy SILT/CLAY	CDM‡
D025	5	M	7.00 - 8.00	□30B		□N.P.			58	W.S.	□1,5,7	15	48	31	6	Brown, slightly gravelly, sandy SILT/CLAY	CDM‡
D033	1	M	3.00 - 4.00	22A	40	24	16	0.15	86	W.S.	1,5,7	2	35	37	26	Dark brown, slightly gravelly, sandy SILT/CLAY	COL‡
D033	5	M	5.60 - 6.60	13A		N.P.			94	W.S.	1,5,7	0	12	85	3	Orangish brown, slightly sandy, SILT/CLAY	CDT‡
D034	1	M	7.50 - 8.50	□15B		□N.P.			50	W.S.	□1,5,7	21	49	24	6	Brown, clayey,very silty, very gravelly SAND	CDM‡
D040	1	M	3.00 - 4.00	23A		N.P.			47	W.S.	1,5,7	45	22	26	7	Dark brown, clayey, very sandy, very silty GRAVEL	CDT‡
D041	1	M	5.00 - 6.00	39A		N.P.			71	W.S.	1,5,7	8	47	24	21	Brown, slightly gravelly, sandy SILT/CLAY	CDS‡
D042	1	M	5.00 - 6.00	18B		N.P.			42	W.S.	1,5,7	21	71	6	2	Dark grey, slightly clayey, silty, very gravelly SAND with shell fragments	MD‡
D042	7	M	9.00 - 10.00	28A	46	30	16	2.51	46	W.S.	1,5,7	14	48	19	19	Brown, slightly gravelly, sandy SILT/CLAY	CDG‡

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C± 5°C (C)
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‡ - Information provided by customer.

□Tests conducted by FT Laboratories Ltd

Notes: IS - Insufficient Sample; Tf - To Follow on supplementary Report.

Checked by : H W Chung

Approved By : Lau Wai Cheong

Date : 08/01/2009

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TEST CERTIFICATE
SUMMARY OF SOIL CLASSIFICATION TEST RESULT
GEOSPEC 3 : 2001

Gammon

Report No : J2999-059.11

Customer : Mass Transit Railway Corporation

Job No. : J2999

Works Order No. : 059

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	Δ Moisture Content (%)	Test 6.1 Liquid Limit (%)	Test 6.1 Plastic Limit (%)	Test 6.1 Plasticity Index (%)	Test 6.2 Liquidity Index	Passing 425μm Test Sieve (%)	Preparation Method	Particle Size Distribution # Test Method	Percentage Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Description	Sample Origin
D046	1	M	8.00 - 9.00	17B		N.P.			90	W.S.	1,5,7	1	20	75	4	Light grey, slightly gravelly, slightly sandy SILT/CLAY	FILL‡
D051	1	M	3.00 - 4.00	29A		N.P.			36	W.S.	1,5,7	25	23	45	7	Brown, slightly sandy, slightly gravelly SILT/CLAY	HDV‡
D054	1	M	3.00 - 4.00	26A		N.P.			98	W.S.	1,5,7	0	18	79	3	Greyish brown, slightly sandy SILT/CLAY	CDT‡
D055	1	M	3.00 - 4.00	24A		N.P.			74	W.S.	1,5,7	7	38	49	6	Brown, slightly gravelly, sandy SILT/CLAY	CDT‡
D059	1	M	3.50 - 4.50	28A		N.P.			81	W.S.	1,5,7	19	36	38	7	Dark brown, slightly gravelly, sandy SILT/CLAY	CDT‡
D060	3	M	5.20 - 6.20	19A		Oversize material, delete AL & PSD test										Grey, silty, gravelly SAND	ALL‡
D060	7	M	7.70 - 8.70			Oversize material, delete M.C, ,AL & PSD test											HDT‡
D065	8	M	4.50 - 5.50	22A		N.P.			70	W.S.	1,5,7	36	26	31	7	Brown, slightly sandy, gravelly SILT/CLAY	HDT‡
D071	9	M	8.00 - 9.00	34A		N.P.			95	W.S.	1,5,7	0	13	79	8	Dark brown, slightly sandy SILT/CLAY	CDT‡
D090	2	M	4.00 - 5.00	15A		N.P.			43	W.S.	1,5,7	39	13	45	3	Dark brown, slightly sandy, gravelly, SILT/CLAY	CDT‡

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C± 5°C (C)
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TEST CERTIFICATE
SUMMARY OF SOIL CLASSIFICATION TEST RESULT
GEOSPEC 3 : 2001

Gammon

Report No : J2999-059.11

Customer : Mass Transit Railway Corporation

Job No. : J2999

Works Order No. : 059

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	Δ Moisture Content (%)	Test 6.1 Liquid Limit (%)	Test 6.1 Plastic Limit (%)	Test 6.1 Plasticity Index (%)	Test 6.2 Liquidity Index	Passing 425μm Test Sieve (%)	Preparation Method	Particle Size Distribution # Test Method	Percentage Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Description	Sample Origin
D091	1	M	3.00 - 4.00	Oversize material, delete M.C, ,AL & PSD test													HDT‡
D092	1	M	13.00 - 14.00	13A		N.P.			68	W.S.	1,5,7	9	47	40	4	Brown, slightly gravelly, sandy SILT/CLAY	CDT‡

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C± 5°C (C)
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Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	Δ Moisture Content (%)	Test 6.1 Liquid Limit (%)	Test 6.1 Plastic Limit (%)	Test 6.1 Plasticity Index (%)	Test 6.2 Liquidity Index	Passing 425μm Test Sieve (%)	Preparation Method	Particle Size Distribution # Test Method	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Description	Sample Origin
WCH-BH01	5	M	7.00 - 8.00	37A		N.P.			84	W.S.	1,5,7	1	35	48	16	Brown, slightly gravelly, sandy SILT/CLAY	CDM‡
WCH-BH02	1	M	4.00 - 5.00	19A		N.P.			42	W.S.	1,5,7	41	29	24	6	Dark brown, clayey, very silty, very sandy GRAVEL	FILL‡
WCH-BH02	5	M	6.50 - 7.50	27A		N.P.			82	W.S.	1,5,7	3	14	69	14	Dark grey, slightly gravelly, slightly sandy SILT/CLAY	ALL‡
WCH-BH09	1	M	3.00 - 4.00	22A		N.P.			86	W.S.	1,5,7	5	28	53	14	Orangish brown, slightly gravelly, slightly sandy SILT/CLAY	COL‡
WCH-BH10	1	M	3.00 - 4.00	23A		N.P.			87	W.S.	1,5,7	3	33	57	7	Orangish brown, slightly gravelly, slightly sandy SILT/CLAY	COL‡
WCH-BH10	5	M	5.00 - 6.00	16A		N.P.			56	W.S.	1,5,7	19	43	33	5	Light grey, slightly gravelly, sandy SILT/CLAY	CDT‡
WCH-BH10	13	M	9.00 - 10.00	13A		N.P.			48	W.S.	1,5,7	35	31	31	3	Dark brown, slightly clayey, very silty, very sandy GRAVEL	CDT‡
WCH-BH11	1	M	3.00 - 4.00	28A		N.P.			69	W.S.	1,5,7	18	24	47	11	Orangish brown, slightly gravelly, sandy SILT/CLAY	CDT‡
WCH-BH12	1	M	3.00 - 4.00	22A		N.P.			75	W.S.	1,5,7	0	34	64	2	Greyish brown, sandy SILT/CLAY	CDT‡
WCH-BH12	9	M	7.00 - 8.00	31A		N.P.			74	W.S.	1,5,7	3	32	54	11	Reddish brown, slightly gravelly, slightly sandy SILT/CLAY	CDT‡

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C± 5°C (C)
= Test Method in accordance with GEOSPEC3 : 2001 Test 8.1 (1), 8.2 (2), 8.3 (3), 8.4 (4), 8.5 (5), 8.6 (6), 8.7 (7).

Symbols :
U - Undisturbed Sample;
LB - Large Disturbed Sample;
BLK - Block Sample;
SPTL - SPT Split-Barrel Sample;
P - Piston Sample;
M - Mazier Sample;
D - Small Disturbed Sample;
PT - Portable triple tube Sample;
N.P. - Non Plastic;
A.R. - As Received;
H.P. - Hand Picked;
^ - Moisture Content for A.L. Test.
A.D. - Air Dried;
O.D. - Oven Dried;
W.S. - Wet Sieved;
Sampling History - Refer the Individual Test Report;
Estimated Uncertainty - Refer the Individual Test Report.
‡ - Information provided by customer.

Notes: IS - Insufficient Sample; Tf - To Follow on supplementary Report.

Checked by : H W Chung

Approved By : Lau Wai Cheong

Date : 08/01/2009

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST CERTIFICATE
SUMMARY OF SOIL CLASSIFICATION TEST RESULT
GEOSPEC 3 : 2001

Gammon

Report No : J2999-059.11

Customer : Mass Transit Railway Corporation

Job No. : J2999

Works Order No. : 059

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	Δ Moisture Content (%)	Test 6.1 Liquid Limit (%)	Test 6.1 Plastic Limit (%)	Test 6.1 Plasticity Index (%)	Test 6.2 Liquidity Index	Passing 425μm Test Sieve (%)	Preparation Method	Particle Size Distribution # Test Method	Percentage Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Description	Sample Origin
WCH-BH12	17	M	11.00 - 12.00	20A		N.P.			70	W.S.	1,5,7	8	33	55	4	Light grey, slightly gravelly, slightly sandy SILT/CLAY	CDT‡

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C± 5°C (C)
= Test Method in accordance with GEOSPEC3 : 2001 Test 8.1 (1), 8.2 (2), 8.3 (3), 8.4 (4), 8.5 (5), 8.6 (6), 8.7 (7).

Symbols :
U - Undisturbed Sample;
LB - Large Disturbed Sample;
BLK - Block Sample;
SPTL - SPT Split-Barrel Sample;
P - Piston Sample;
M - Mazier Sample;
D - Small Disturbed Sample;
PT - Portable triple tube Sample;
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A.R. - As Received;
H.P. - Hand Picked;
* - Moisture Content for A.L. Test.
A.D. - Air Dried;
O.D. - Oven Dried;
W.S. - Wet Sieved;
Sampling History - Refer the Individual Test Report;
Estimated Uncertainty - Refer the Individual Test Report.
‡ - Information provided by customer.

Notes: IS - Insufficient Sample; Tf - To Follow on supplementary Report.

Checked by : H W Chung

Approved By : Lau Wai Cheong

Date : 08/01/2009

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Section 1.2
Summary of Chemical Tests

TEST CERTIFICATE
SUMMARY OF CHEMICAL TESTS
GEOSPEC 3 : 2001

Gammon

Report No. : J2999-059.11

Customer : Mass Transit Railway Corporation

Job No. : J2999

Works Order No. : 059

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	Test Method 9.1 Organic Matter Content (%)	9.2 Mass Loss On Ignition (%)	9.3 Acid Soluble Sulphate Content (%)	9.3 Water Soluble Sulphate Content (%)	9.3 Ground Water Sulphate Content (g/L)	9.4 Water Soluble Chloride Content (%)	9.5 pH Value	Dry Mass Of Original Sample Passing 2mm Test Sieve (%)	Preparation Method	Description	Sample Origin
D003	1	M	7.00 - 8.00			0.04			<0.01	5.7	49	O.D.	Brown, slightly gravelly, sandy SILT/CLAY	CDG‡
D003	5	M	9.55 - 10.55							5.7	44	A.D.	Dark brown, slightly silty, very sandy GRAVEL	HDG‡
D008	1	M	3.00 - 4.00							4.6	91	A.D.	Brown, slightly gravelly, slightly sandy SILT/CLAY	FILL‡
D019	1	M	3.00 - 4.00			0.07			<0.01	5.7	86	O.D.	Brown, slightly gravelly, sandy SILT/CLAY	FILL‡
D019	5	M	6.70 - 7.70			0.05			<0.01	4.5	81	O.D.	Brown, slightly gravelly, sandy SILT/CLAY	COL‡
D019	9	M	14.40 - 15.40			0.04			<0.01	5.6	82	O.D.	Dark brown, clayey, silty, gravelly SAND	CDT‡
D021	5	M	5.50 - 6.50							5.2	83	A.D.	Dark brown, clayey, gravelly, very silty SAND	CDM‡
D022A	1	M	3.00 - 4.00							4.9	85	O.D.	Dark brown, clayey, gravelly, very silty SAND	CDG‡
D022A	21	M	15.50 - 16.50			0.03			<0.01	5.6	88	O.D.	Dark brown, clayey, gravelly, very silty SAND	CDG‡
D033	1	M	3.00 - 4.00			0.04			<0.01	5.8	98	O.D.	Dark brown, slightly gravelly, sandy SILT/CLAY	COL‡

Symbols :
U - Undisturbed Sample;
LB - Large Disturbed Sample;
BLK - Block Sample;
W - Water Sample;
P - Piston Sample;
M - Mazier Sample;
SPTL - SPT Split-Barrel Sample;
D - Small Disturbed Sample;
PT - Portable triple tube Sample;
A.R. - As Received;
H.P. - Hand Picked;
A.D. - Air Dried;
O.D. - Oven Dried;
W.S. - Wet Sieved;
Sampling History - Refer the Individual Test Report;
Estimated Uncertainty - Refer the Individual Test Report.
‡ - Information provided by customer

Notes: IS - Insufficient Sample; Tf - To Follow on supplementary Report.

Checked by : H W Chung

Approved By : Lau Wai Cheong

Date : 08/01/2009

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TEST CERTIFICATE
SUMMARY OF CHEMICAL TESTS
GEOSPEC 3 : 2001

Gammon HKAS HOKLAS 055

Report No. : J2999-059.11

Customer : Mass Transit Railway Corporation

Job No. : J2999

Works Order No. : 059

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	9.1 Organic Matter Content (%)	9.2 Mass Loss On Ignition (%)	9.3 Acid Soluble Sulphate Content (%)	9.3 Water Soluble Sulphate Content (%)	9.3 Ground Water Sulphate Content (g/L)	9.4 Water Soluble Chloride Content (%)	9.5 pH Value	Dry Mass Of Original Sample Passing 2mm Test Sieve (%)	Preparation Method	Description	Sample Origin
D033	5	M	5.60 - 6.60			0.03			<0.01	5.4	100	O.D.	Orangish brown, slightly sandy, SILT/CLAY	CDT‡
D040	1	M	3.00 - 4.00			0.04			<0.01	6.0	55	O.D.	Dark brown, clayey, very sandy, very silty GRAVEL	CDT‡
D041	1	M	5.00 - 6.00			0.06			0.03	5.8	92	O.D.	Brown, slightly gravelly, sandy SILT/CLAY	CDS‡
D042	1	M	5.00 - 6.00			0.07			0.03	7.0	79	O.D.	Dark grey, slightly clayey, silty, very gravelly SAND	MD‡

Symbols :
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SPTL - SPT Split-Barrel Sample;
D - Small Disturbed Sample;
PT - Portable triple tube Sample;
A.R. - As Received;
H.P. - Hand Picked;
A.D. - Air Dried;
O.D. - Oven Dried;
W.S. - Wet Sieved;
Sampling History - Refer the Individual Test Report;
Estimated Uncertainty - Refer the Individual Test Report.
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Approved By : Lau Wai Cheong

Date : 08/01/2009

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TEST CERTIFICATE
SUMMARY OF CHEMICAL TESTS
GEOSPEC 3 : 2001

Gammon

Report No. : J2999-059.11

Customer : Mass Transit Railway Corporation

Job No. : J2999

Works Order No. : 059

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	Test Method 9.1 Organic Matter Content (%)	9.2 Mass Loss On Ignition (%)	9.3 Acid Soluble Sulphate Content (%)	9.3 Water Soluble Sulphate Content (%)	9.3 Ground Water Sulphate Content (g/L)	9.4 Water Soluble Chloride Content (%)	9.5 pH Value	Dry Mass Of Original Sample Passing 2mm Test Sieve (%)	Preparation Method	Description	Sample Origin
D046	1	M	8.00 - 9.00			0.06			<0.01	5.8	99	O.D.	Light grey, slightly gravelly, slightly sandy SILT/CLAY	FILL‡
D054	1	M	3.00 - 4.00			0.05			<0.01	6.0	100	O.D.	Greyish brown, slightly sandy SILT/CLAY	CDT‡

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TEST CERTIFICATE
SUMMARY OF CHEMICAL TESTS
GEOSPEC 3 : 2001

Gammon HKAS HOKLAS

Report No. : J2999-059.11

Customer : Mass Transit Railway Corporation

Job No. : J2999

Works Order No. : 059

Project : Ground Investigation for South Island Line

Contract No.: Contract 1024

Date : 08/09/2008

Borehole No.	Sample No.	Sample Type	Sample Depth (m)	Test Method 9.1 Organic Matter Content (%)	9.2 Mass Loss On Ignition (%)	9.3 Acid Soluble Sulphate Content (%)	9.3 Water Soluble Sulphate Content (%)	9.3 Ground Water Sulphate Content (g/L)	9.4 Water Soluble Chloride Content (%)	9.5 pH Value	Dry Mass Of Original Sample Passing 2mm Test Sieve (%)	Preparation Method	Description	Sample Origin
WCH-BH01	5	M	7.00 - 8.00							6.2	99	A.D.	Brown, slightly gravelly, sandy SILT/CLAY	CDM‡
WCH-BH02	1	M	4.00 - 5.00			0.04			0.02	6.0	59	O.D.	Dark brown, clayey, very silty, very sandy GRAVEL	FILL‡
WCH-BH02	5	M	6.50 - 7.50			0.08			0.03	6.3	97	O.D.	Dark grey, slightly gravelly, slightly sandy SILT/CLAY	ALL‡
WCH-BH09	1	M	3.00 - 4.00							5.8	95	A.D.	Orangish brown, slightly gravelly, slightly sandy SILT/CLAY	COL‡
WCH-BH10	1	M	3.00 - 4.00			0.08			<0.01	6.1	97	O.D.	Orangish brown, slightly gravelly, slightly sandy SILT/CLAY	COL‡
WCH-BH10	5	M	5.00 - 6.00							5.3	81	A.D.	Light grey, slightly gravelly, sandy SILT/CLAY	CDT‡
WCH-BH12	1	M	3.00 - 4.00							4.9	100	A.D.	Greyish brown, sandy SILT/CLAY	CDT‡

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M - Mazier Sample;
SPTL - SPT Split-Barrel Sample;
D - Small Disturbed Sample;
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A.R. - As Received;
H.P. - Hand Picked;
A.D. - Air Dried;
O.D. - Oven Dried;
W.S. - Wet Sieved;
Sampling History - Refer the Individual Test Report;
Estimated Uncertainty - Refer the Individual Test Report.
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Notes: IS - Insufficient Sample; Tf - To Follow on supplementary Report.

Checked by : H W Chung

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Gammon

Section 2
HOKLAS Endorsed Test Reports

Section 2.1
Determination of Moisture Content – GEOSPEC 3 : 2001 Test Method 5.1/5.2

TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D003

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 7.00 - 8.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 7.00 - 7.60 m

Description: Dark brown, slightly clayey/silty, very sandy GRAVEL

Sample Origin: CDG‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z901		
Mass of Wet sample & Tray = (m_2)	g	703.5		
Mass of Tray = (m_1)	g	191.0		
Oven Used	no.	6		
Date in Oven		21/11		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(23/11) (m_3) @ Time (10:00)	g	648.7		
Mass of Dry sample & Tray Date(23/11) (m_3) @ Time (15:00)	g	648.7		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	54.8		
Mass of Dry Sample = (m_3-m_1)	g	457.7		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	12		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 21/11/2008 Date : 23/11/2008 Date : 23/11/2008

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report shall not be reproduced unless with prior written approval from this laboratory.

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D003

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 9.55 - 10.55 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 9.55 - 10.15 m

Description: Dark brown, slightly silty, very sandy GRAVEL

Sample Origin: HDG‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z106		
Mass of Wet sample & Tray = (m_2)	g	914.7		
Mass of Tray = (m_1)	g	192.2		
Oven Used	no.	6		
Date in Oven		18/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(20/12) (m_3) @ Time (10:00)	g	849.4		
Mass of Dry sample & Tray Date(20/12) (m_3) @ Time (15:00)	g	849.4		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	65.3		
Mass of Dry Sample = (m_3-m_1)	g	657.2		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**9.9**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 18/12/2008 Date : 20/12/2008 Date : 20/12/2008

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report shall not be reproduced unless with prior written approval from this laboratory.

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method ~~5.1~~ / 5.2 *
(Bulk Sample - Fine / ~~Medium / Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D008

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.20 - 3.60 m

Description: Brown, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin : FILL‡

Temperature range [ ] ~~45°C ± 5°C~~ [X] 105°C ± 5°C Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B4		
Tray	no.	FG126		
Mass of Wet sample & Tray = (m_2)	g	181.40		
Mass of Tray = (m_1)	g	68.08		
Oven Used	no.	6		
Date in Oven		25/11		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(27/11) (m_3) @ Time (10:00)	g	160.58		
Mass of Dry sample & Tray Date(27/11) (m_3) @ Time (15:00)	g	160.58		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B4		
Mass of Moisture = (m_2-m_3)	g	20.82		
Mass of Dry Sample = (m_3-m_1)	g	92.50		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**23**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

* Delete as appropriate ^ Upon request ‡Information provided by customer

Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 25/11/2008 Date : 27/11/2008 Date : 27/11/2008

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method ~~5.1~~ / 5.2 *
(Bulk Sample - Fine / ~~Medium / Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D011

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description: Brown, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin : FILL‡

Temperature range ~~[ ] 45°C ± 5°C~~ [X] 105°C ± 5°C Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B4		
Tray	no.	A89		
Mass of Wet sample & Tray = (m_2)	g	193.71		
Mass of Tray = (m_1)	g	86.32		
Oven Used	no.	6		
Date in Oven		19/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(21/12) (m_3) @ Time (10:00)	g	172.63		
Mass of Dry sample & Tray Date(21/12) (m_3) @ Time (15:00)	g	172.63		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B4		
Mass of Moisture = (m_2-m_3)	g	21.08		
Mass of Dry Sample = (m_3-m_1)	g	86.31		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	24		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 19/12/2008 Date : 21/12/2008 Date : 21/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method ~~5.1~~ / 5.2 *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D019

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description: Brown, slightly gravelly, sandy SILT/CLAY

Sample Origin: FILL‡

Temperature range ~~[ ] 45°C ± 5°C~~ [X] 105°C ± 5°C Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z28		
Mass of Wet sample & Tray = (m_2)	g	581.2		
Mass of Tray = (m_1)	g	187.4		
Oven Used	no.	6		
Date in Oven		08/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(10/12) (m_3) @ Time (10:00)	g	493.4		
Mass of Dry sample & Tray Date(10/12) (m_3) @ Time (15:00)	g	493.4		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	87.8		
Mass of Dry Sample = (m_3-m_1)	g	306.0		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	29		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 08/12/2008 Date : 10/12/2008 Date : 10/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method ~~5.1~~ / 5.2 *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D019

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 6.70 - 7.70 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 6.70 - 7.30 m

Description: Brown, slightly gravelly, sandy SILT/CLAY

Sample Origin: COL‡

Temperature range [ ] ~~45°C ± 5°C~~ [X] 105°C ± 5°C Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z54		
Mass of Wet sample & Tray = (m_2)	g	689.0		
Mass of Tray = (m_1)	g	193.5		
Oven Used	no.	6		
Date in Oven		08/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(10/12) (m_3) @ Time (10:00)	g	595.6		
Mass of Dry sample & Tray Date(10/12) (m_3) @ Time (15:00)	g	595.6		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	93.4		
Mass of Dry Sample = (m_3-m_1)	g	402.1		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	23		
AVERAGE %				
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 08/12/2008 Date : 10/12/2008 Date : 10/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D019

Customer : Mass Transit Railway Corporation Sample No. : 9

Project : Ground Investigation for South Island Line Sample Depth : 14.40 - 15.40 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 14.40 - 15.00 m

Description: Dark brown, clayey, silty, gravelly SAND

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z32		
Mass of Wet sample & Tray = (m_2)	g	911.4		
Mass of Tray = (m_1)	g	189.9		
Oven Used	no.	6		
Date in Oven		23/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(29/12) (m_3) @ Time (10:00)	g	780.0		
Mass of Dry sample & Tray Date(29/12) (m_3) @ Time (15:00)	g	780.0		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	140		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	131.4		
Mass of Dry Sample = (m_3-m_1)	g	590.1		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**22**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 23/12/2008 Date : 29/12/2008 Date : 29/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D021

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 5.50 - 6.50 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 5.50 - 6.10 m

Description: Dark brown, clayey, gravelly, very silty SAND

Sample Origin: CDM‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z115		
Mass of Wet sample & Tray = (m_2)	g	783.2		
Mass of Tray = (m_1)	g	189.2		
Oven Used	no.	6		
Date in Oven		10/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(12/12) (m_3) @ Time (10:00)	g	652.4		
Mass of Dry sample & Tray Date(12/12) (m_3) @ Time (15:00)	g	652.4		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	130.8		
Mass of Dry Sample = (m_3-m_1)	g	463.2		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**28**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 10/12/2008 Date : 12/12/2008 Date : 12/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D022A

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description: Dark brown, clayey, gravelly, very silty SAND

Sample Origin: CDG‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z520		
Mass of Wet sample & Tray = (m_2)	g	653.6		
Mass of Tray = (m_1)	g	192.1		
Oven Used	no.	6		
Date in Oven		19/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(21/12) (m_3) @ Time (10:00)	g	545.1		
Mass of Dry sample & Tray Date(21/12) (m_3) @ Time (15:00)	g	545.1		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	108.5		
Mass of Dry Sample = (m_3-m_1)	g	353.0		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**31**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 19/12/2008 Date : 21/12/2008 Date : 21/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D022A

Customer : Mass Transit Railway Corporation Sample No. : 21

Project : Ground Investigation for South Island Line Sample Depth : 15.50 - 16.50 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 15.50 - 16.10 m

Description: Dark brown, clayey, gravelly, very silty SAND

Sample Origin: CDG‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z11		
Mass of Wet sample & Tray = (m_2)	g	773.7		
Mass of Tray = (m_1)	g	191.5		
Oven Used	no.	6		
Date in Oven		17/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (10:00)	g	661.5		
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (15:00)	g	661.5		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	112.2		
Mass of Dry Sample = (m_3-m_1)	g	470.0		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**24**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Tested Date : 17/12/2008 Date : 19/12/2008 Date : 19/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D033

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description: Dark brown, slightly gravelly, sandy SILT/CLAY

Sample Origin: COL‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z607		
Mass of Wet sample & Tray = (m_2)	g	721.3		
Mass of Tray = (m_1)	g	184.0		
Oven Used	no.	6		
Date in Oven		17/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (10:00)	g	623.5		
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (15:00)	g	623.5		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	97.8		
Mass of Dry Sample = (m_3-m_1)	g	439.5		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**22**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 17/12/2008 Date : 19/12/2008 Date : 19/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - Fine / ~~Medium / Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D033

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 5.60 - 6.60 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 5.60 - 6.20 m

Description: Orangish brown, slightly sandy, SILT/CLAY

Sample Origin : CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B4		
Tray	no.	GA1		
Mass of Wet sample & Tray = (m_2)	g	185.62		
Mass of Tray = (m_1)	g	73.60		
Oven Used	no.	6		
Date in Oven		10/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(12/12) (m_3) @ Time (10:00)	g	172.76		
Mass of Dry sample & Tray Date(12/12) (m_3) @ Time (15:00)	g	172.76		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B4		
Mass of Moisture = (m_2-m_3)	g	12.86		
Mass of Dry Sample = (m_3-m_1)	g	99.16		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	13		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 10/12/2008 Date : 12/12/2008 Date : 12/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon HKAS HOKLAS 035

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D040

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.40 - 3.60 m

Description: Dark brown, clayey, very sandy, very silty GRAVEL

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z102		
Mass of Wet sample & Tray = (m_2)	g	628.3		
Mass of Tray = (m_1)	g	188.4		
Oven Used	no.	6		
Date in Oven		17/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (10:00)	g	547.1		
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (15:00)	g	547.1		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	81.2		
Mass of Dry Sample = (m_3-m_1)	g	358.7		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	23		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 17/12/2008 Date : 19/12/2008 Date : 19/12/2008

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D041

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 5.00 - 5.60 m

Description: Brown, slightly gravelly, sandy SILT/CLAY

Sample Origin: CDS‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z608		
Mass of Wet sample & Tray = (m_2)	g	732.2		
Mass of Tray = (m_1)	g	195.3		
Oven Used	no.	6		
Date in Oven		21/11		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(23/11) (m_3) @ Time (10:00)	g	582.2		
Mass of Dry sample & Tray Date(23/11) (m_3) @ Time (15:00)	g	582.2		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	150.0		
Mass of Dry Sample = (m_3-m_1)	g	386.9		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	39		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 21/11/2008 Date : 23/11/2008 Date : 23/11/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method ~~5.1~~ / 5.2 *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D042

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 5.40 - 5.60 m

Description: Dark grey, slightly clayey, silty, very gravelly SAND with shell fragments

Sample Origin: MD‡

Temperature range [ ] ~~45°C ± 5°C~~ [X] 105°C ± 5°C Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z520		
Mass of Wet sample & Tray = (m_2)	g	679.4		
Mass of Tray = (m_1)	g	192.2		
Oven Used	no.	6		
Date in Oven		03/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(05/12) (m_3) @ Time (10:00)	g	604.6		
Mass of Dry sample & Tray Date(05/12) (m_3) @ Time (15:00)	g	604.6		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	74.8		
Mass of Dry Sample = (m_3-m_1)	g	412.4		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**18**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 03/12/2008 Date : 05/12/2008 Date : 05/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - Fine / ~~Medium / Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D042

Customer : Mass Transit Railway Corporation Sample No. : 7

Project : Ground Investigation for South Island Line Sample Depth : 9.00 - 10.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 9.20 - 9.60 m

Description: Brown, slightly gravelly, sandy SILT/CLAY

Sample Origin : CDG‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B4		
Tray	no.	FG97		
Mass of Wet sample & Tray = (m_2)	g	159.50		
Mass of Tray = (m_1)	g	63.97		
Oven Used	no.	6		
Date in Oven		24/11		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(26/11) (m_3) @ Time (10:00)	g	138.89		
Mass of Dry sample & Tray Date(26/11) (m_3) @ Time (15:00)	g	138.89		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B4		
Mass of Moisture = (m_2-m_3)	g	20.61		
Mass of Dry Sample = (m_3-m_1)	g	74.92		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**28**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 24/11/2008 Date : 26/11/2008 Date : 26/11/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method ~~5.1~~ / 5.2 *
(Bulk Sample - Fine / ~~Medium / Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D046

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 8.00 - 9.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 8.00 - 8.60 m

Description: Light grey, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin : FILL‡

Temperature range ~~[ ] 45°C ± 5°C~~ [X] 105°C ± 5°C Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B4		
Tray	no.	FG50		
Mass of Wet sample & Tray = (m_2)	g	152.01		
Mass of Tray = (m_1)	g	61.38		
Oven Used	no.	6		
Date in Oven		25/11		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(27/11) (m_3) @ Time (10:00)	g	139.11		
Mass of Dry sample & Tray Date(27/11) (m_3) @ Time (15:00)	g	139.11		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B4		
Mass of Moisture = (m_2-m_3)	g	12.90		
Mass of Dry Sample = (m_3-m_1)	g	77.73		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	17		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 25/11/2008 Date : 27/11/2008 Date : 27/11/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D051

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.20 - 3.60 m

Description: Brown, slightly sandy, slightly gravelly SILT/CLAY

Sample Origin: HDV‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z353		
Mass of Wet sample & Tray = (m_2)	g	690.6		
Mass of Tray = (m_1)	g	189.1		
Oven Used	no.	6		
Date in Oven		03/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(05/12) (m_3) @ Time (10:00)	g	577.1		
Mass of Dry sample & Tray Date(05/12) (m_3) @ Time (15:00)	g	577.1		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	113.5		
Mass of Dry Sample = (m_3-m_1)	g	388.0		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**29**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 03/12/2008 Date : 05/12/2008 Date : 05/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - Fine / ~~Medium / Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D054

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description: Greyish brown, slightly sandy SILT/CLAY

Sample Origin : CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 200 g
Sampling history : As received

Balance used for Wet weighing	no.	B4		
Tray	no.	FG106		
Mass of Wet sample & Tray = (m_2)	g	146.80		
Mass of Tray = (m_1)	g	52.71		
Oven Used	no.	6		
Date in Oven		17/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (10:00)	g	127.31		
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (15:00)	g	127.31		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B4		
Mass of Moisture = (m_2-m_3)	g	19.49		
Mass of Dry Sample = (m_3-m_1)	g	74.60		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	26		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 17/12/2008 Date : 19/12/2008 Date : 19/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D055

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.40 - 3.80 m

Description: Brown, slightly gravelly, sandy SILT/CLAY

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z102A		
Mass of Wet sample & Tray = (m_2)	g	647.1		
Mass of Tray = (m_1)	g	187.6		
Oven Used	no.	6		
Date in Oven		12/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS **(To constant mass or 0.1% original mass at intervals of 4 hrs)**				
Date out of Oven				
Mass of Dry sample & Tray Date(14/12) (m_3) @ Time (10:00)	g	557.3		
Mass of Dry sample & Tray Date(14/12) (m_3) @ Time (15:00)	g	557.3		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	89.8		
Mass of Dry Sample = (m_3-m_1)	g	369.7		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**24**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Tested Date : 12/12/2008 Date : 14/12/2008 Date : 14/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D059

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.50 - 4.50 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.70 - 4.10 m

Description: Dark brown, slightly gravelly, sandy SILT/CLAY

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z884		
Mass of Wet sample & Tray = (m_2)	g	762.6		
Mass of Tray = (m_1)	g	197.6		
Oven Used	no.	6		
Date in Oven		24/11		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(26/11) (m_3) @ Time (10:00)	g	637.4		
Mass of Dry sample & Tray Date(26/11) (m_3) @ Time (15:00)	g	637.4		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	125.2		
Mass of Dry Sample = (m_3-m_1)	g	439.8		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**28**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 24/11/2008 Date : 26/11/2008 Date : 26/11/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D060

Customer : Mass Transit Railway Corporation Sample No. : 3

Project : Ground Investigation for South Island Line Sample Depth : 5.20 - 6.20 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 6.00 - 6.20 m

Description: Grey, silty, gravelly SAND

Sample Origin: ALL‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z15		
Mass of Wet sample & Tray = (m_2)	g	759.8		
Mass of Tray = (m_1)	g	194.2		
Oven Used	no.	6		
Date in Oven		17/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(18/12) (m_3) @ Time (10:00)	g	669.3		
Mass of Dry sample & Tray Date(18/12) (m_3) @ Time (15:00)	g	669.3		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	20		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	90.5		
Mass of Dry Sample = (m_3-m_1)	g	475.1		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	19		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

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Technician : C K Choy Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Tested Date : 17/12/2008 Date : 18/12/2008 Date : 18/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D065

Customer : Mass Transit Railway Corporation Sample No. : 8

Project : Ground Investigation for South Island Line Sample Depth : 4.50 - 5.50 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 4.50 - 5.10 m

Description: Brown, slightly sandy, gravelly SILT/CLAY

Sample Origin: HDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z112		
Mass of Wet sample & Tray = (m_2)	g	732.5		
Mass of Tray = (m_1)	g	193.5		
Oven Used	no.	6		
Date in Oven		22/11		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(24/11) (m_3) @ Time (10:00)	g	634.5		
Mass of Dry sample & Tray Date(24/11) (m_3) @ Time (15:00)	g	634.5		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	98.0		
Mass of Dry Sample = (m_3-m_1)	g	441.0		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**22**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Tested Date : 22/11/2008 Date : 24/11/2008 Date : 24/11/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - Fine / ~~Medium / Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D071

Customer : Mass Transit Railway Corporation Sample No. : 9

Project : Ground Investigation for South Island Line Sample Depth : 8.00 - 9.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 8.00 - 8.60 m

Description: Dark brown, slightly sandy SILT/CLAY

Sample Origin : CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B4		
Tray	no.	FG121		
Mass of Wet sample & Tray = (m_2)	g	163.53		
Mass of Tray = (m_1)	g	70.70		
Oven Used	no.	6		
Date in Oven		19/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(21/12) (m_3) @ Time (10:00)	g	139.72		
Mass of Dry sample & Tray Date(21/12) (m_3) @ Time (15:00)	g	139.72		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B4		
Mass of Moisture = (m_2-m_3)	g	23.81		
Mass of Dry Sample = (m_3-m_1)	g	69.02		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**34**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

* Delete as appropriate ^ Upon request ‡ Information provided by customer

Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 19/12/2008 Date : 21/12/2008 Date : 21/12/2008

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Form : GESR001.1 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D090

Customer : Mass Transit Railway Corporation Sample No. : 2

Project : Ground Investigation for South Island Line Sample Depth : 4.00 - 5.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 4.00 - 4.60 m

Description: Dark brown, slightly sandy, gravelly, SILT/CLAY

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z694		
Mass of Wet sample & Tray = (m_2)	g	734.0		
Mass of Tray = (m_1)	g	192.4		
Oven Used	no.	6		
Date in Oven		01/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(03/12) (m_3) @ Time (10:00)	g	663.9		
Mass of Dry sample & Tray Date(03/12) (m_3) @ Time (15:00)	g	663.9		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	70.1		
Mass of Dry Sample = (m_3-m_1)	g	471.5		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	15		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 01/12/2008 Date : 03/12/2008 Date : 03/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: D092

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 13.00 - 14.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 13.00 - 13.60 m

Description: Brown, slightly gravelly, sandy SILT/CLAY

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z164		
Mass of Wet sample & Tray = (m_2)	g	705.8		
Mass of Tray = (m_1)	g	186.3		
Oven Used	no.	6		
Date in Oven		16/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(18/12) (m_3) @ Time (10:00)	g	647.7		
Mass of Dry sample & Tray Date(18/12) (m_3) @ Time (15:00)	g	647.7		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	58.1		
Mass of Dry Sample = (m_3-m_1)	g	461.4		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	13		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 16/12/2008 Date : 18/12/2008 Date : 18/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH01

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 7.00 - 8.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 7.00 - 7.60 m

Description: Brown, slightly gravelly, sandy SILT/CLAY

Sample Origin: CDM‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z24		
Mass of Wet sample & Tray = (m_2)	g	842.9		
Mass of Tray = (m_1)	g	190.4		
Oven Used	no.	6		
Date in Oven		12/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(14/12) (m_3) @ Time (10:00)	g	667.1		
Mass of Dry sample & Tray Date(14/12) (m_3) @ Time (15:00)	g	667.1		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	175.8		
Mass of Dry Sample = (m_3-m_1)	g	476.7		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	37		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Tested Date : 12/12/2008 Date : 14/12/2008 Date : 14/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH02

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 4.00 - 5.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 4.00 - 4.60 m

Description: Dark brown, clayey, very silty, very sandy GRAVEL

Sample Origin: FILL‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z30		
Mass of Wet sample & Tray = (m_2)	g	653.6		
Mass of Tray = (m_1)	g	189.3		
Oven Used	no.	6		
Date in Oven		18/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (10:00)	g	578.7		
Mass of Dry sample & Tray Date(19/12) (m_3) @ Time (15:00)	g	578.7		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	20		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	74.9		
Mass of Dry Sample = (m_3-m_1)	g	389.4		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	19		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 18/12/2008 Date : 19/12/2008 Date : 19/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - Fine / ~~Medium / Coarse~~ Grained)*

Gammon HKAS HOKLAS

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH02

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 6.50 - 7.50 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 6.50 - 7.10 m

Description: Dark grey, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin : ALL‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B4		
Tray	no.	F7		
Mass of Wet sample & Tray = (m_2)	g	195.38		
Mass of Tray = (m_1)	g	79.92		
Oven Used	no.	6		
Date in Oven		05/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(07/12) (m_3) @ Time (10:00)	g	170.84		
Mass of Dry sample & Tray Date(07/12) (m_3) @ Time (15:00)	g	170.84		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B4		
Mass of Moisture = (m_2-m_3)	g	24.54		
Mass of Dry Sample = (m_3-m_1)	g	90.92		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	27		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 05/12/2008 Date : 07/12/2008 Date : 07/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH09

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description: Orangish brown, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin: COL‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z28		
Mass of Wet sample & Tray = (m_2)	g	647.8		
Mass of Tray = (m_1)	g	187.4		
Oven Used	no.	6		
Date in Oven		10/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(12/12) (m_3) @ Time (10:00)	g	565.2		
Mass of Dry sample & Tray Date(12/12) (m_3) @ Time (15:00)	g	565.2		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	82.6		
Mass of Dry Sample = (m_3-m_1)	g	377.8		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	22		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 10/12/2008 Date : 12/12/2008 Date : 12/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH10

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description: Orangish brown, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin: COL‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z62		
Mass of Wet sample & Tray = (m_2)	g	752.7		
Mass of Tray = (m_1)	g	188.3		
Oven Used	no.	6		
Date in Oven		02/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(04/12) (m_3) @ Time (10:00)	g	648.2		
Mass of Dry sample & Tray Date(04/12) (m_3) @ Time (15:00)	g	648.2		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	104.5		
Mass of Dry Sample = (m_3-m_1)	g	459.9		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	23		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 02/12/2008 Date : 04/12/2008 Date : 04/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - Fine / ~~Medium / Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH10

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 5.40 - 6.00 m

Description: Light grey, slightly gravelly, sandy SILT/CLAY

Sample Origin : CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1200 g
Sampling history : As received

Balance used for Wet weighing	no.	B4		
Tray	no.	FG96		
Mass of Wet sample & Tray = (m_2)	g	154.26		
Mass of Tray = (m_1)	g	62.05		
Oven Used	no.	6		
Date in Oven		28/11		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(30/11) (m_3) @ Time (10:00)	g	141.36		
Mass of Dry sample & Tray Date(30/11) (m_3) @ Time (15:00)	g	141.36		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B4		
Mass of Moisture = (m_2-m_3)	g	12.90		
Mass of Dry Sample = (m_3-m_1)	g	79.31		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	16		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 28/11/2008 Date : 30/11/2008 Date : 30/11/2008

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Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH10

Customer : Mass Transit Railway Corporation Sample No. : 13

Project : Ground Investigation for South Island Line Sample Depth : 9.00 - 10.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 9.00 - 9.60 m

Description: Dark brown, slightly clayey, very silty, very sandy GRAVEL

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z9		
Mass of Wet sample & Tray = (m_2)	g	870.2		
Mass of Tray = (m_1)	g	188.5		
Oven Used	no.	6		
Date in Oven		15/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(17/12) (m_3) @ Time (10:00)	g	790.6		
Mass of Dry sample & Tray Date(17/12) (m_3) @ Time (15:00)	g	790.6		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	79.6		
Mass of Dry Sample = (m_3-m_1)	g	602.1		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	13		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 15/12/2008 Date : 17/12/2008 Date : 17/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon HKAS HOKLAS 055

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH11

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description: Orangish brown, slightly gravelly, sandy SILT/CLAY

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z45		
Mass of Wet sample & Tray = (m_2)	g	717.7		
Mass of Tray = (m_1)	g	186.0		
Oven Used	no.	6		
Date in Oven		01/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(03/12) (m_3) @ Time (10:00)	g	601.2		
Mass of Dry sample & Tray Date(03/12) (m_3) @ Time (15:00)	g	601.2		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	116.5		
Mass of Dry Sample = (m_3-m_1)	g	415.2		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	28		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 01/12/2008 Date : 03/12/2008 Date : 03/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH12

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description: Greyish brown, sandy SILT/CLAY

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z62		
Mass of Wet sample & Tray = (m_2)	g	725.2		
Mass of Tray = (m_1)	g	188.3		
Oven Used	no.	6		
Date in Oven		10/12		
Time in Oven		17:00		

SUCCESSIVE WEIGHINGS
(To constant mass or 0.1% original mass at intervals of 4 hrs)

Date out of Oven				
Mass of Dry sample & Tray Date(12/12) (m_3) @ Time (10:00)	g	627.0		
Mass of Dry sample & Tray Date(12/12) (m_3) @ Time (15:00)	g	627.0		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	98.2		
Mass of Dry Sample = (m_3-m_1)	g	438.7		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	22		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Tested Date : 10/12/2008 Date : 12/12/2008 Date : 12/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH12

Customer : Mass Transit Railway Corporation Sample No. : 9

Project : Ground Investigation for South Island Line Sample Depth : 7.00 - 8.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 7.00 - 7.60 m

Description: Reddish brown, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z901A		
Mass of Wet sample & Tray = (m_2)	g	644.4		
Mass of Tray = (m_1)	g	184.6		
Oven Used	no.	6		
Date in Oven		15/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(17/12) (m_3) @ Time (10:00)	g	536.1		
Mass of Dry sample & Tray Date(17/12) (m_3) @ Time (15:00)	g	536.1		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	108.3		
Mass of Dry Sample = (m_3-m_1)	g	351.5		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	31		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 15/12/2008 Date : 17/12/2008 Date : 17/12/2008

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TEST REPORT
DETERMINATION OF MOISTURE CONTENT
GEOSPEC 3 : 2001 Test Method 5.1 / ~~5.2~~ *
(Bulk Sample - ~~Fine~~ / Medium / ~~Coarse~~ Grained)*

Gammon

Report No. : J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No.: WCH-BH12

Customer : Mass Transit Railway Corporation Sample No. : 17

Project : Ground Investigation for South Island Line Sample Depth : 11.00 - 12.00 m

Date Received: 29/09/2009 Sample Type : Mazier Specimen Depth : 11.20 - 11.60 m

Description: Light grey, slightly gravelly, slightly sandy SILT/CLAY

Sample Origin: CDT‡

Temperature range [X] 45°C ± 5°C ~~[ ] 105°C ± 5°C~~ Mass of sample used : 1000 g
Sampling history : As received

Balance used for Wet weighing	no.	B2		
Tray	no.	Z28		
Mass of Wet sample & Tray = (m_2)	g	639.0		
Mass of Tray = (m_1)	g	187.6		
Oven Used	no.	6		
Date in Oven		09/12		
Time in Oven		17:00		
SUCCESSIVE WEIGHINGS (To constant mass or 0.1% original mass at intervals of 4 hrs)				
Date out of Oven				
Mass of Dry sample & Tray Date(11/12) (m_3) @ Time (10:00)	g	565.1		
Mass of Dry sample & Tray Date(11/12) (m_3) @ Time (15:00)	g	565.1		
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Mass of Dry sample & Tray Date( ) (m_3) @ Time ( )	g			
Period sample in Oven	hrs	44		
Balance used for Dry weighing	no.	B2		
Mass of Moisture = (m_2-m_3)	g	73.9		
Mass of Dry Sample = (m_3-m_1)	g	377.5		
Moisture Content (MC) = (m_2-m_3)/(m_3-m_1) x 100	%	**20**		
	AVERAGE %			
Expanded Uncertainty (U) ^	%	-		

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Technician : C K Choy Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Tested Date : 09/12/2008 Date : 11/12/2008 Date : 11/12/2008

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Section 2.2

Determination of Liquid Limit, Plastic Limit, Plasticity Index and Liquidity Index

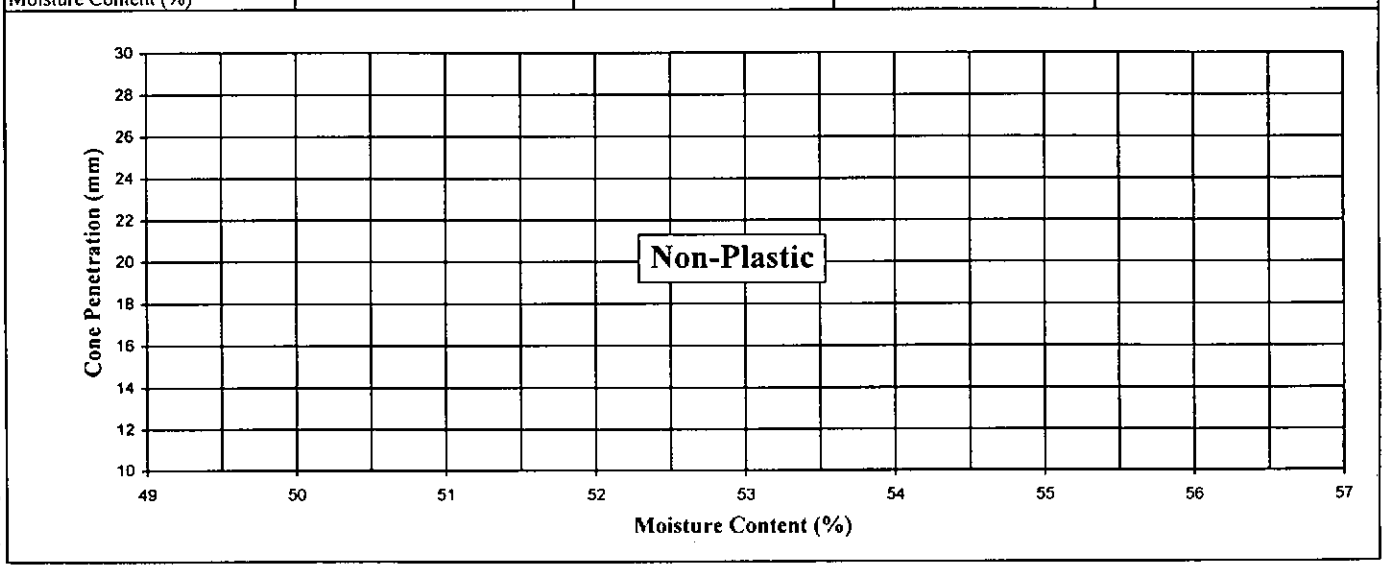
GEOSPEC 3 : 2001 Test Method 6.1/6.2

TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D003
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 7.00 - 8.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 7.00 - 7.60
Tested Date	: 21/11/2008	Sample Type	: Mazier
Description	: Dark brown, slightly clayey/silty, very sandy GRAVEL		
Sample Origin	: CDG ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 804.4		
Natural Moisture Content (%)	: 12	Dry Mass > 425mm (g)	: 625.6
Calculated Dry Mass (g)	: 718.2	Passing 425μm Sieve (%)	: 13
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 12
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician	: C M Yip	Checked By :	Approved By :
		Name : H W Chung	Signatory : Lau Wai Cheong
Date	: 21/11/2008	Date : 09/01/2009	Date : 09/01/2009

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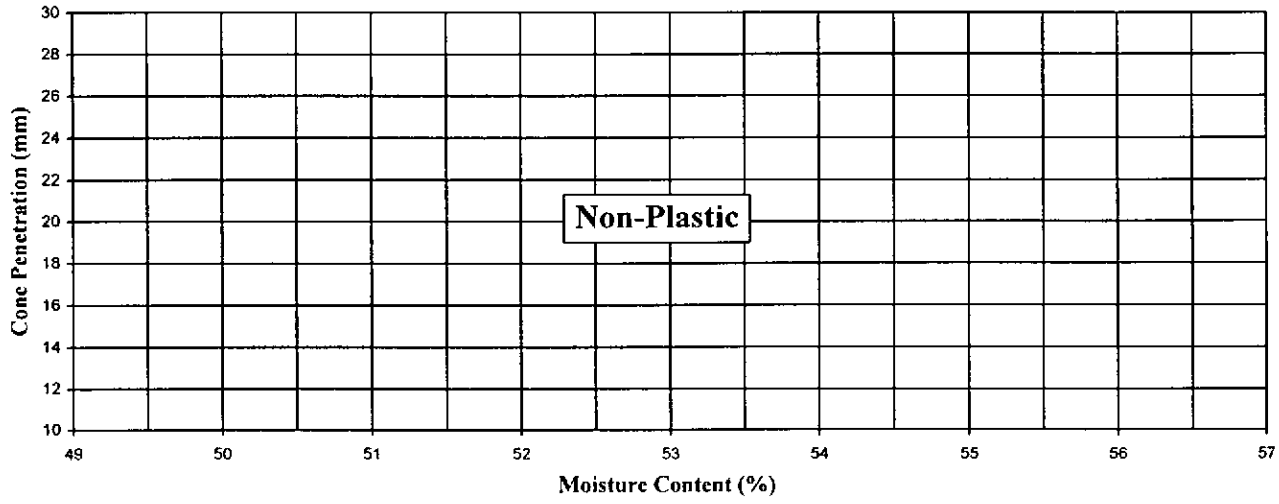
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D003
Project	: Ground Investigation for South Island Line	Sample No.	: 5
		Sample Depth (m)	: 9.55 - 10.55
Date Received	: 29/09/2008	Specimen Depth (m)	: 9.55 - 10.15
Tested Date	: 18/12/2008	Sample Type	: Mazier
Description	: Dark brown, slightly silty, very sandy GRAVEL		
Sample Origin	: HDG ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 848.4		
Natural Moisture Content (%)	: 10	Dry Mass > 425mm (g)	: 673.1
Calculated Dry Mass (g)	: 771.3	Passing 425μm Sieve (%)	: 13
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 10
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : **Lau Wai Cheong**

Date : 18/12/2008 Date : 09/01/2009 Date : **09/01/2009**

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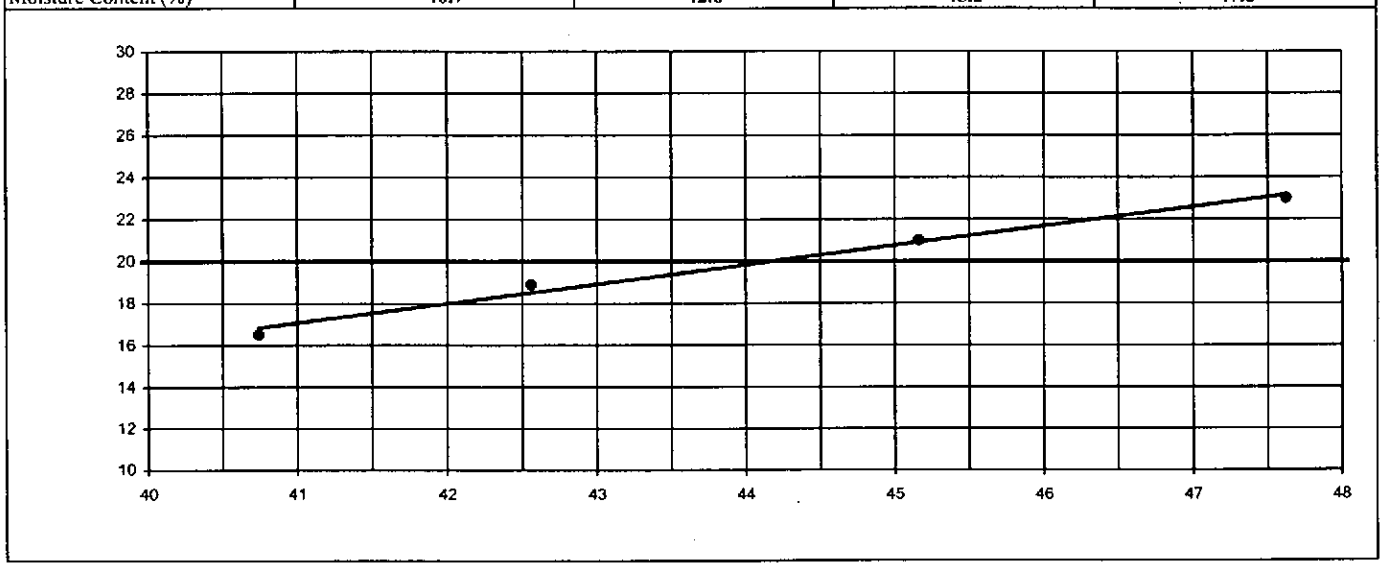
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D008
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.20 - 3.60
Tested Date	: 26/11/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, slightly sandy SILT/CLAY		
Sample Origin	: FILL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 112	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 756.0		
Natural Moisture Content (%)	: 24	Dry Mass > 425mm (g)	: 144.6
Calculated Dry Mass (g)	: 609.7	Passing 425μm Sieve (%)	: 76
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)	10			10			10			10		
Initial Reading (mm)	0.4	0.3		0.5	0.4		0.4	0.5		0.5	0.4	
Final Reading (mm)	16.7	17.0		19.2	19.5		21.4	21.5		23.3	23.6	
Penetration (mm)	16.3	16.7		18.7	19.1		21.0	21.0		22.8	23.2	
Mean Penetration (mm)	16.5			18.9			21.0			23.0		
Moisture Content (%)	40.7			42.6			45.2			47.6		



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Test Results

Liquid Limit (%)	: 44	Natural Moisture Content (%)	: 24
Plastic Limit (%)	: 23	Liquidity Index	: 0.39
Plasticity Index (%)	: 21		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By: Name : H W Chung

Approved By : Signatory : **Lau Wai Cheong**

Date : 26/11/2008 Date : 09/01/2009 Date : **09/01/2009**

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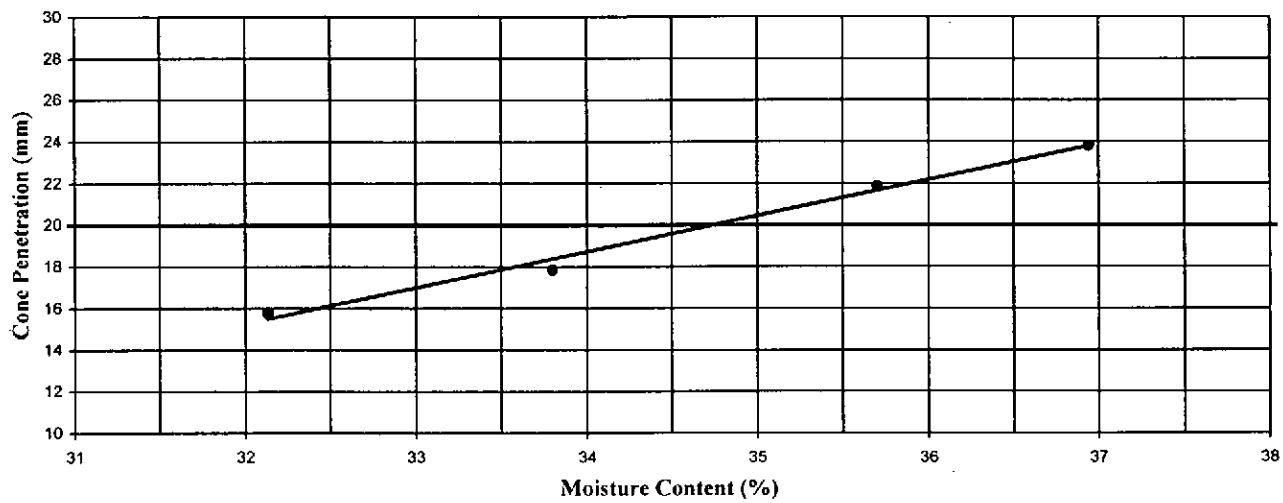
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKLAS 035

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D011
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.00 - 3.60
Tested Date	: 20/12/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, slightly sandy SILT/CLAY		
Sample Origin	: FILL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 1026.0		
Natural Moisture Content (%)	: 22	Dry Mass > 425mm (g)	: 308.4
Calculated Dry Mass (g)	: 841.0	Passing 425μm Sieve (%)	: 63
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)	10			10			10			10		
Initial Reading (mm)	0.3	0.2		0.2	0.1		0.2	0.3		0.2	0.2	
Final Reading (mm)	16.0	16.0		18.2	17.8		21.9	22.3		24.1	23.9	
Penetration (mm)	15.7	15.8		18.0	17.7		21.7	22.0		23.9	23.7	
Mean Penetration (mm)	15.8			17.9			21.9			23.8		
Moisture Content (%)	32.1			33.8			35.7			36.9		



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	: 35	Natural Moisture Content (%)	: 22
Plastic Limit (%)	: 22	Liquidity Index	: 0.99
Plasticity Index (%)	: 13		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician	: C M Yip	Checked By :	Approved By :
		Name : H W Chung	Signatory : **Lau Wai Cheong**
Date	: 20/12/2008	Date : 09/01/2009	Date : **09/01/2009**

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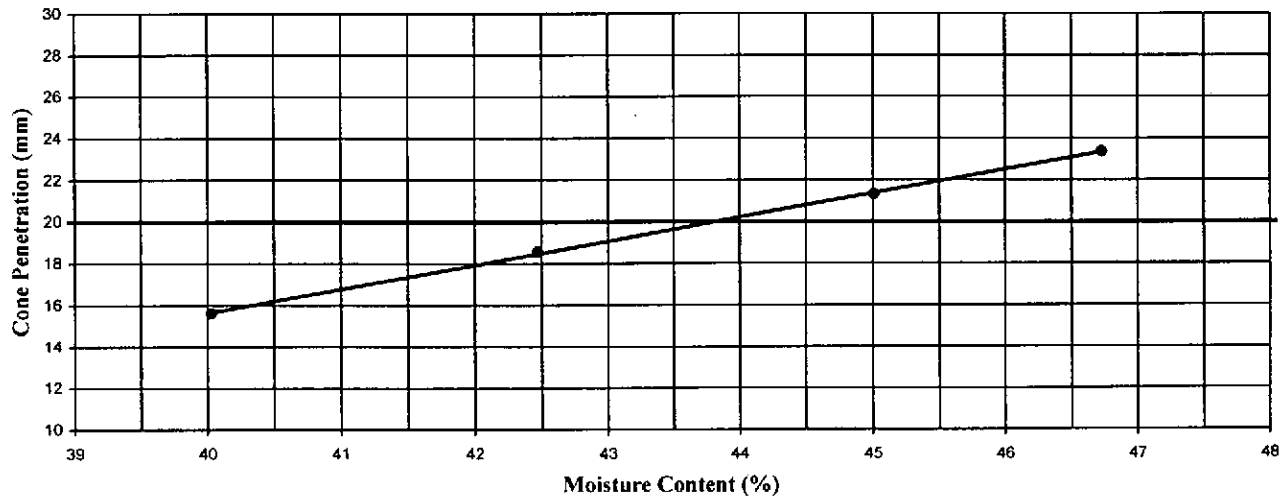
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKAS HOKLAS 055

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D019
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.00 - 3.60
Tested Date	: 17/12/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: FILL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 112	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 763.0		
Natural Moisture Content (%)	: 27	Dry Mass > 425mm (g)	: 243.0
Calculated Dry Mass (g)	: 600.8	Passing 425μm Sieve (%)	: 60
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)	10			10			10			10		
Initial Reading (mm)	0.5	0.4		0.4	0.5		0.5	0.5		0.5	0.4	
Final Reading (mm)	16.0	16.1		18.9	19.1		21.7	21.9		24.1	23.5	
Penetration (mm)	15.5	15.7		18.5	18.6		21.2	21.4		23.6	23.1	
Mean Penetration (mm)	15.6			18.6			21.3			23.4		
Moisture Content (%)	40.0			42.5			45.0			46.7		



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Test Results

Liquid Limit (%)	: 44	Natural Moisture Content (%)	: 27
Plastic Limit (%)	: 24	Liquidity Index	: 1.05
Plasticity Index (%)	: 20		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 17/12/2008 Date : 09/01/2009 Date : 09/01/2009

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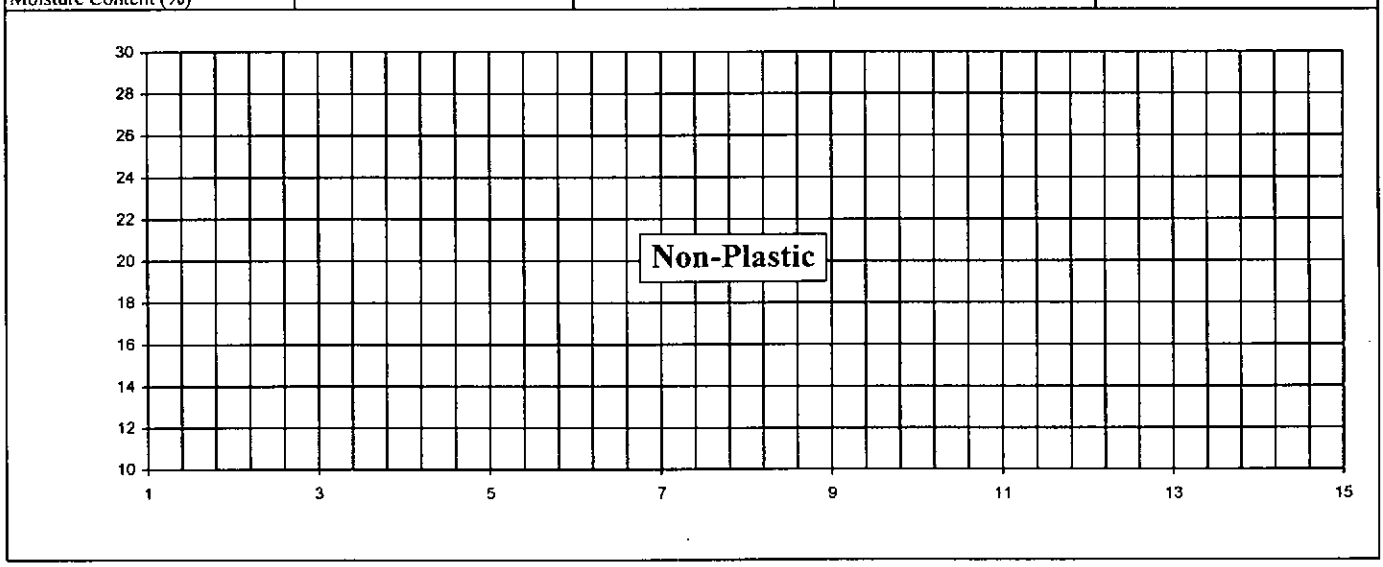
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKLAS 035

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D019
Project	: Ground Investigation for South Island Line	Sample No.	: 5
		Sample Depth (m)	: 6.70 - 7.70
Date Received	: 29/09/2008	Specimen Depth (m)	: 6.70 - 7.30
Tested Date	: 09/12/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: COL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 1002.0		
Natural Moisture Content (%)	: 19	Dry Mass > 425mm (g)	: 378.5
Calculated Dry Mass (g)	: 842.0	Passing 425μm Sieve (%)	: 55
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 19
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : **Lau Wai Cheong**

Date : 09/12/2008 Date : 09/01/2009 Date : **09/01/2009**

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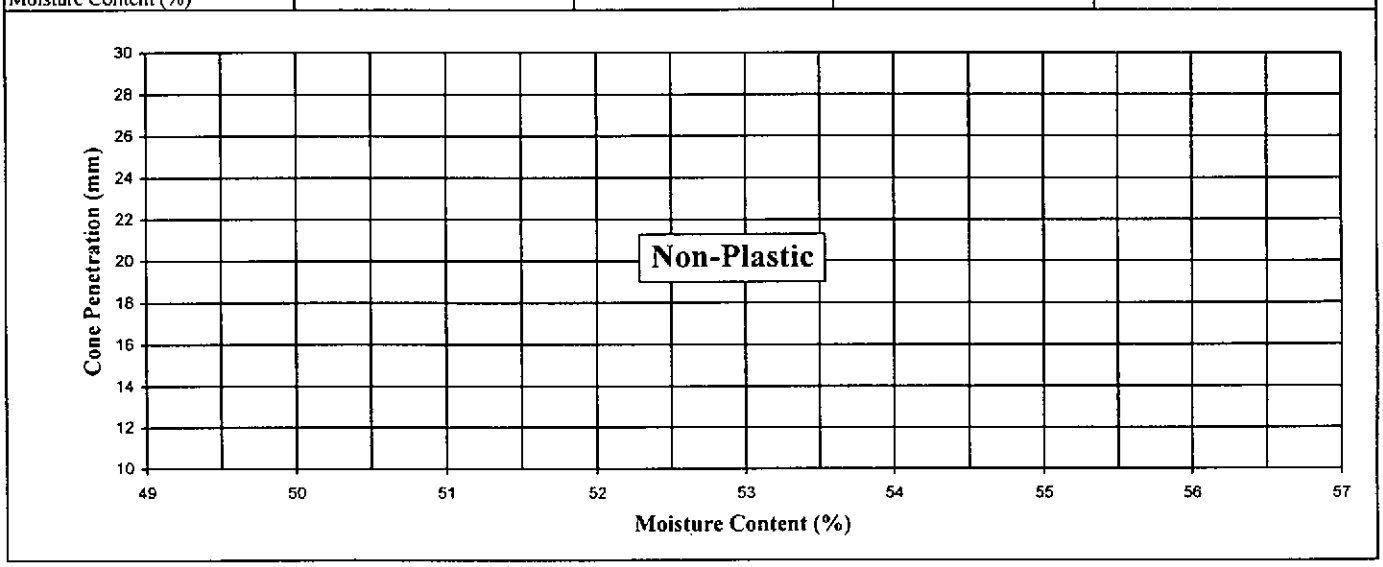
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D019
Project	: Ground Investigation for South Island Line	Sample No.	: 9
		Sample Depth (m)	: 14.40 - 15.40
Date Received	: 29/09/2008	Specimen Depth (m)	: 14.40 - 15.10
Tested Date	: 17/12/2008	Sample Type	: Mazier
Description	: Dark brown, clayey, silty, gravelly SAND		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 796.6		
Natural Moisture Content (%)	: 23	Dry Mass > 425mm (g)	: 327.4
Calculated Dry Mass (g)	: 647.6	Passing 425μm Sieve (%)	: 49
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 23
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : **Lau Wai Cheong**

Date : 17/12/2008 Date : 09/01/2009 Date : **09/01/2009**

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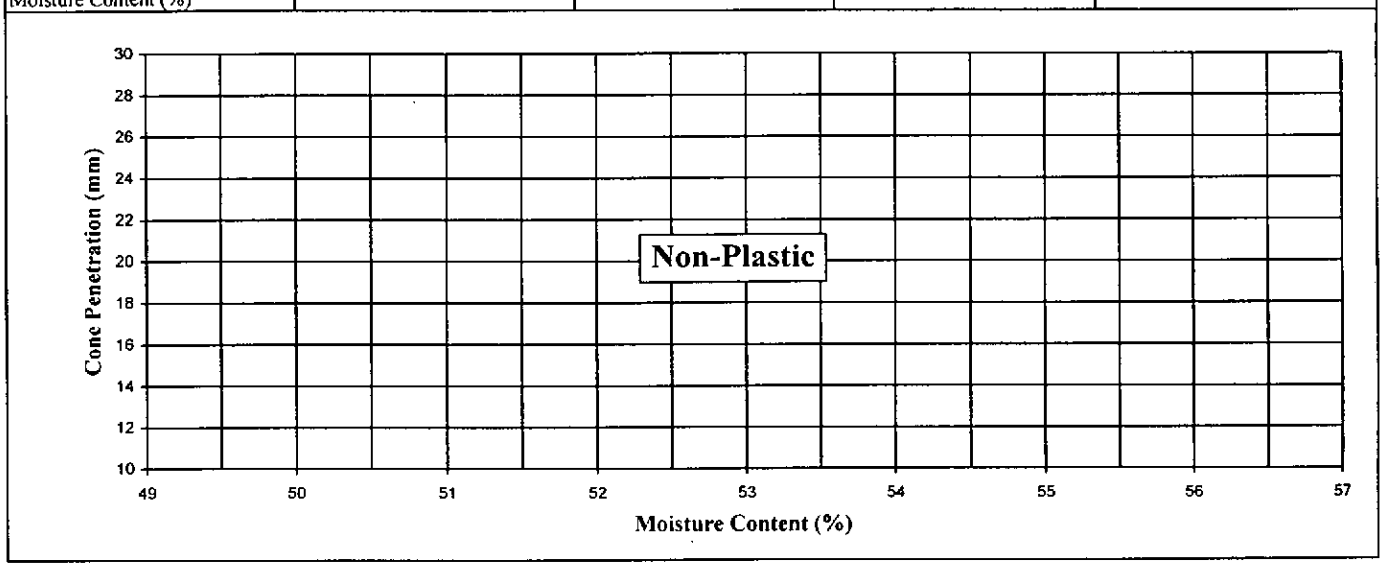
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D021
Project	: Ground Investigation for South Island Line	Sample No.	: 5
		Sample Depth (m)	: 5.50 - 6.50
Date Received	: 29/09/2008	Specimen Depth (m)	: 5.50 - 6.10
Tested Date	: 10/12/2008	Sample Type	: Mazier
Description	: Dark brown, clayey, gravelly, very silty SAND		
Sample Origin	: CDM ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 784.1		
Natural Moisture Content (%)	: 27	Dry Mass > 425mm (g)	: 300.7
Calculated Dry Mass (g)	: 617.4	Passing 425μm Sieve (%)	: 51
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 27
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit *	-	%	
Expanded Uncertainty of Plastic Limit *	-	%	
Expanded Uncertainty of Plasticity Index *	-	%	
Expanded Uncertainty of Liquidity Index *	-	%	

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : **Lau Wai Cheong**

Date : 10/12/2008 Date : 09/01/2009 Date : **09/01/2009**

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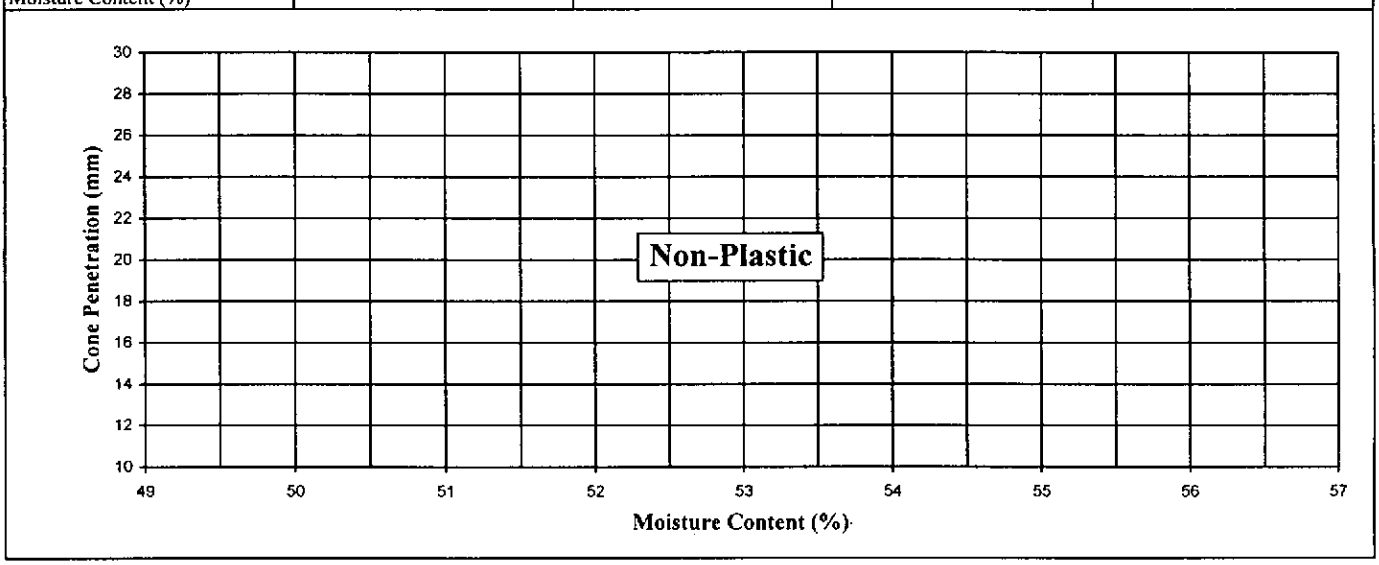
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D022A
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.00 - 3.60
Tested Date	: 19/12/2008	Sample Type	: Mazier
Description	: Dark brown, clayey, gravelly, very silty SAND		
Sample Origin	: CDG ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 806.6		
Natural Moisture Content (%)	: 30	Dry Mass > 425mm (g)	: 245.4
Calculated Dry Mass (g)	: 620.5	Passing 425μm Sieve (%)	: 60
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 30
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : **Lau Wai Cheong** Date : **09/01/2009**

Date : 19/12/2008

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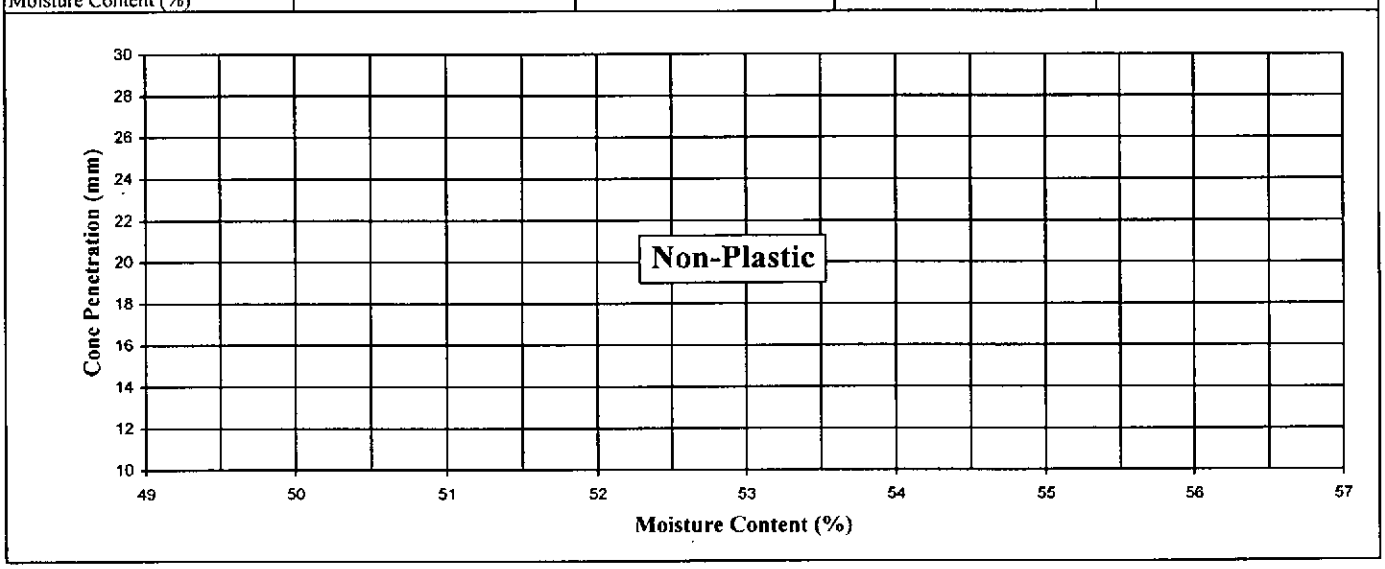
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKAS HOKLAS 055

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D022A
Project	: Ground Investigation for South Island Line	Sample No.	: 21
		Sample Depth (m)	: 15.50 - 16.50
Date Received	: 29/09/2008	Specimen Depth (m)	: 15.50 - 16.10
Tested Date	: 17/12/2008	Sample Type	: Mazier
Description	: Dark brown, clayey, gravelly, very silty SAND		
Sample Origin	: CDG ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 806.6		
Natural Moisture Content (%)	: 24	Dry Mass > 425mm (g)	: 325.4
Calculated Dry Mass (g)	: 650.5	Passing 425μm Sieve (%)	: 50
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 24
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 17/12/2008

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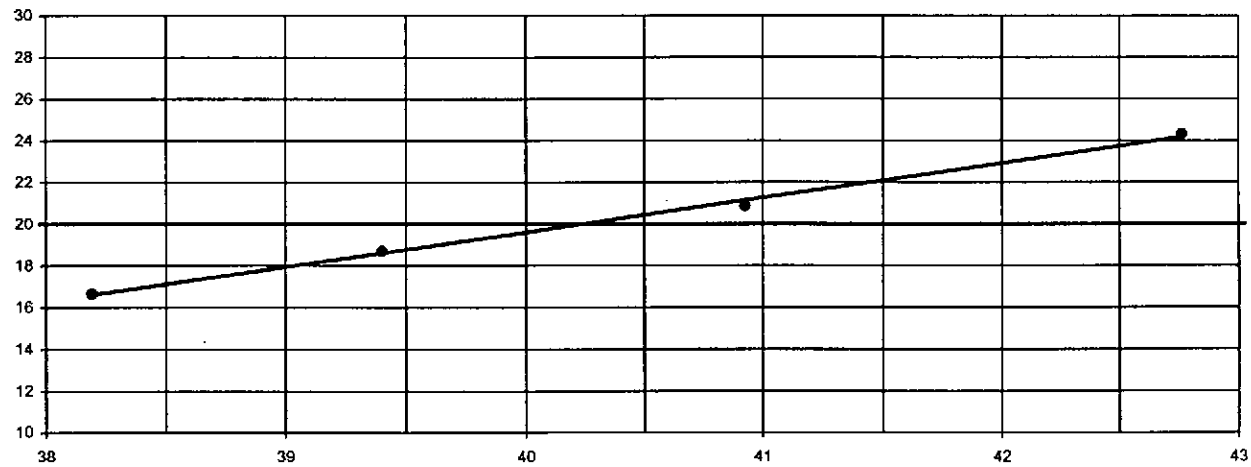
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D033
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.00 - 3.60
Tested Date	: 23/12/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, slightly sandy SILT/CLAY		
Sample Origin	: COL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 136	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 1012.0		
Natural Moisture Content (%)	: 23	Dry Mass > 425mm (g)	: 111.3
Calculated Dry Mass (g)	: 822.8	Passing 425μm Sieve (%)	: 86
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)	10			10			10			10		
Initial Reading (mm)	0.2	0.2		0.2	0.1		0.2	0.1		0.2	0.2	
Final Reading (mm)	16.7	17.0		18.9	18.8		21.0	21.0		24.7	24.3	
Penetration (mm)	16.5	16.8		18.7	18.7		20.8	20.9		24.5	24.1	
Mean Penetration (mm)	16.7			18.7			20.9			24.3		
Moisture Content (%)	38.2			39.4			40.9			42.8		



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	: 40	Natural Moisture Content (%)	: 23
Plastic Limit (%)	: 24	Liquidity Index	: 0.15
Plasticity Index (%)	: 16		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician	: C M Yip	Checked By :	Approved By :
		Name : H W Chung	Signatory : **Lau Wai Cheong**
Date	: 23/12/2008	Date : 09/01/2009	Date : **09/01/2009**

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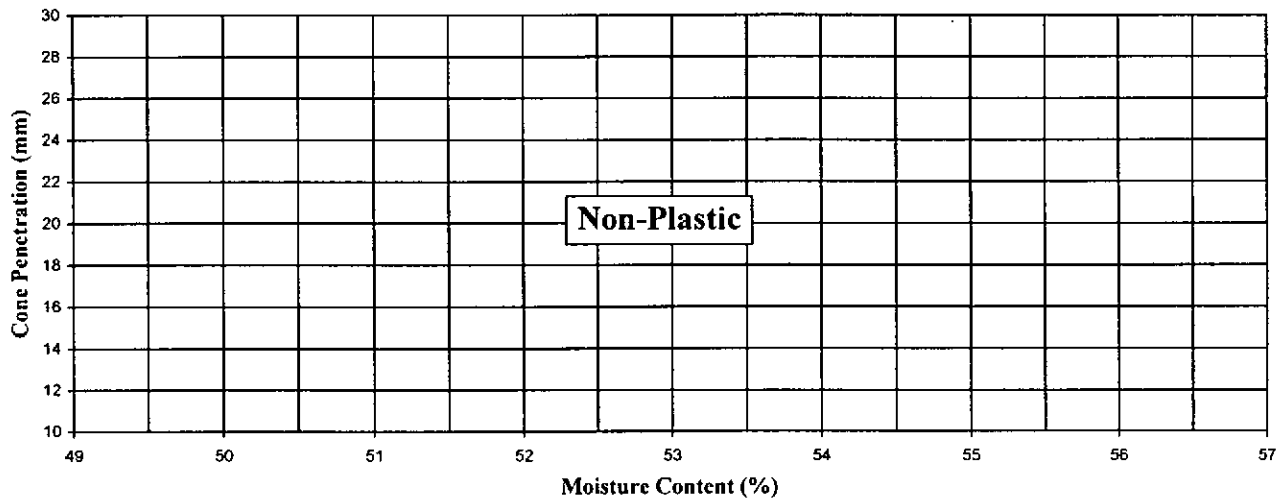
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKAS HOKLAS 055

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D033
Project	: Ground Investigation for South Island Line	Sample No.	: 5
		Sample Depth (m)	: 5.60 - 6.60
Date Received	: 29/09/2008	Specimen Depth (m)	: 5.60 - 6.20
Tested Date	: 16/12/2008	Sample Type	: Mazier
Description	: Orangish brown, slightly sandy, SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 1381.0		
Natural Moisture Content (%)	: 15	Dry Mass > 425mm (g)	: 70.2
Calculated Dry Mass (g)	: 1200.9	Passing 425μm Sieve (%)	: 94
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 15
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 16/12/2008 Date : 09/01/2009 Date : 09/01/2009

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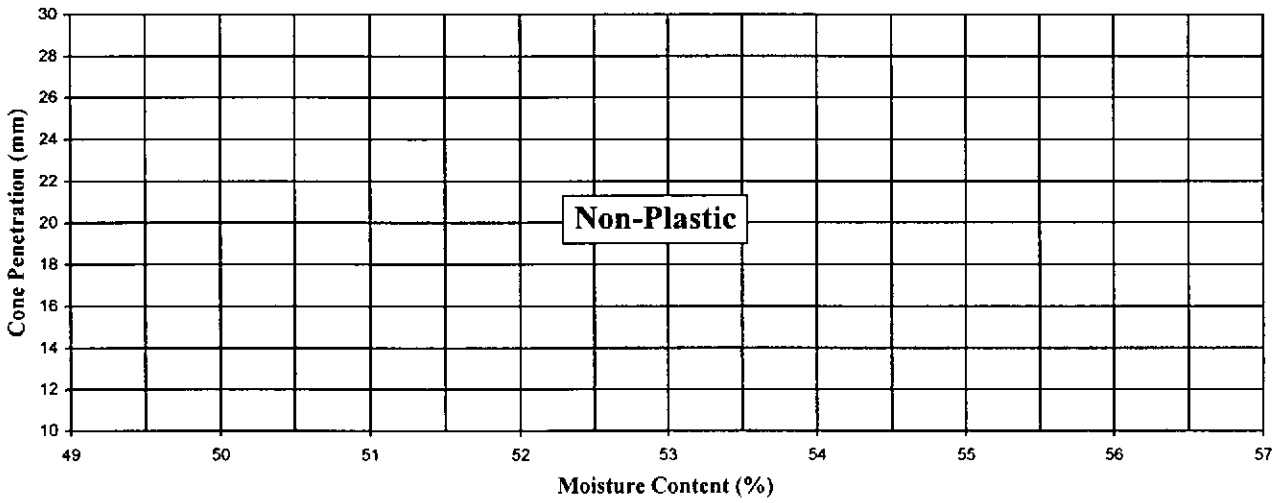
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKLAS 033

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D040
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.60 - 3.80
Tested Date	: 30/12/2008	Sample Type	: Mazier
Description	: Dark brown, clayey, very sandy, very silty GRAVEL		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 947.0		
Natural Moisture Content (%)	: 20	Dry Mass > 425mm (g)	: 420.5
Calculated Dry Mass (g)	: 789.2	Passing 425μm Sieve (%)	: 47
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 20
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 30/12/2008

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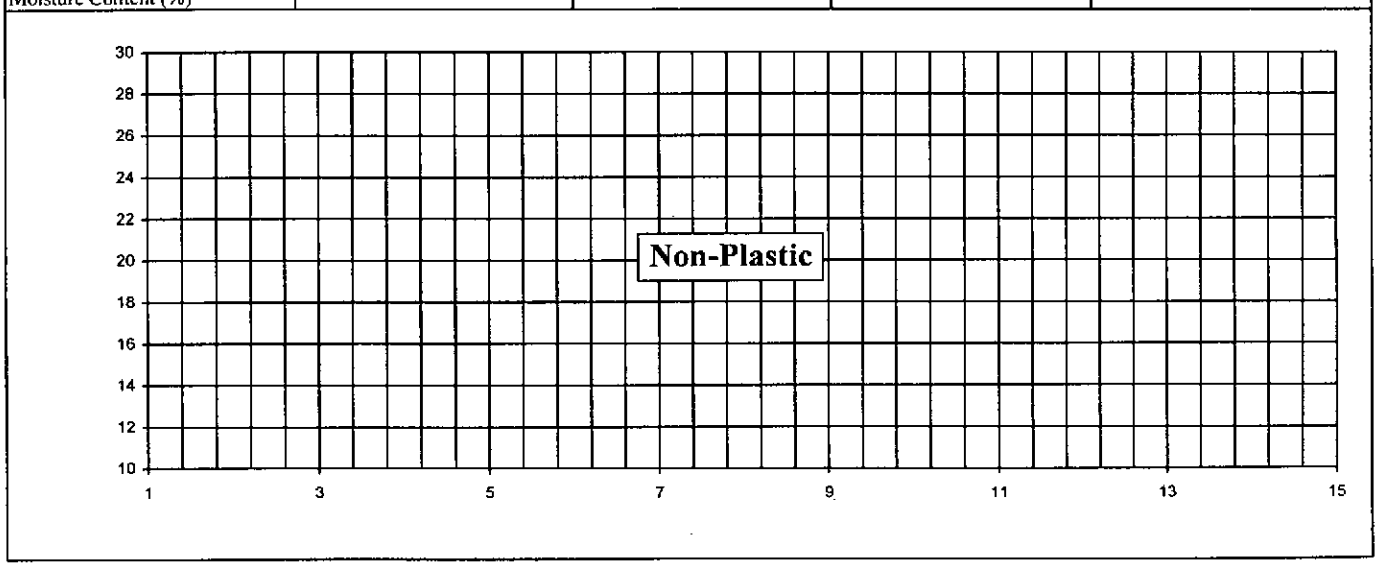
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D041
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 5.00 - 6.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 5.00 - 5.60
Tested Date	: 24/11/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: CDS ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 162	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 976.9		
Natural Moisture Content (%)	: 36	Dry Mass > 425mm (g)	: 211.4
Calculated Dry Mass (g)	: 718.3	Passing 425μm Sieve (%)	: 71
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 36
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 24/11/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

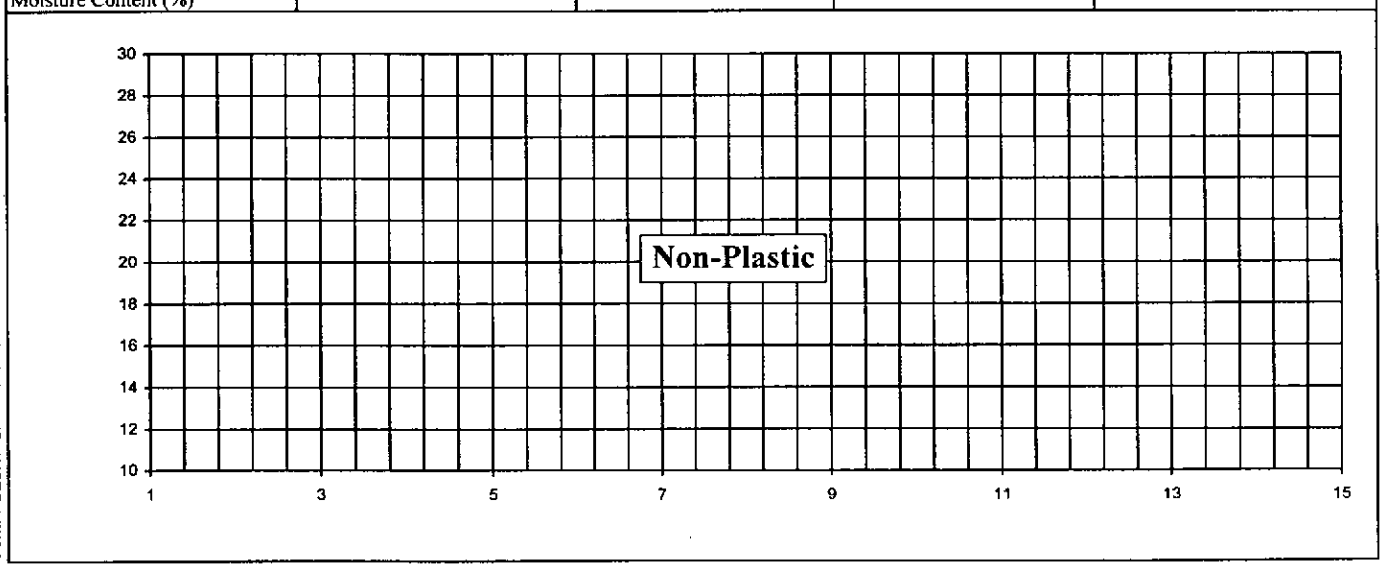
Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D042
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 5.00 - 6.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 5.40 - 5.60
Tested Date	: 03/12/2008	Sample Type	: Mazier

Description : Dark grey, slightly clayey, silty, very gravelly SAND with shell fragments
Sample Origin : MD ‡
Additional Information :

Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 1015.0		
Natural Moisture Content (%)	: 17	Dry Mass > 425mm (g)	: 503.1
Calculated Dry Mass (g)	: 867.5	Passing 425μm Sieve (%)	: 42
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 17
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip
Checked By : Name : H W Chung
Approved By : Signatory : Lau Wai Cheong

Date : 03/12/2008 Date : 09/01/2009 Date : 09/01/2009

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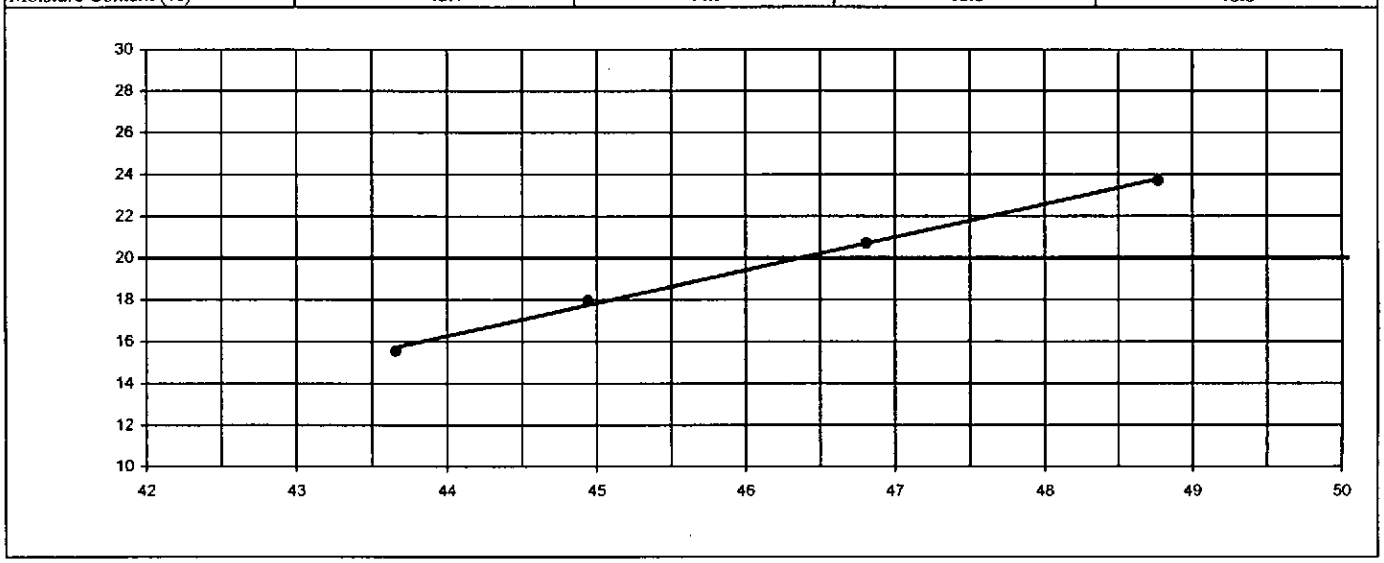
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D042
Project	: Ground Investigation for South Island Line	Sample No.	: 7
		Sample Depth (m)	: 9.00 - 10.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 9.20 - 9.60
Tested Date	: 24/11/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: CDG ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 162	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 989.5		
Natural Moisture Content (%)	: 32	Dry Mass > 425mm (g)	: 401.5
Calculated Dry Mass (g)	: 749.6	Passing 425μm Sieve (%)	: 46
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)	10			10			10			10		
Initial Reading (mm)	0.3	0.3		0.4	0.3		0.5	0.4		0.4	0.4	
Final Reading (mm)	15.8	15.9		18.3	18.3		21.0	21.3		24.0	24.2	
Penetration (mm)	15.5	15.6		17.9	18.0		20.5	20.9		23.6	23.8	
Mean Penetration (mm)	15.6			18.0			20.7			23.7		
Moisture Content (%)	43.7			44.9			46.8			48.8		



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Test Results

Liquid Limit (%)	: 46	Natural Moisture Content (%)	: 32
Plastic Limit (%)	: 30	Liquidity Index	: 2.51
Plasticity Index (%)	: 16		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : **Lau Wai Cheong**

Date : 24/11/2008 Date : 09/01/2009 Date : **09/01/2009**

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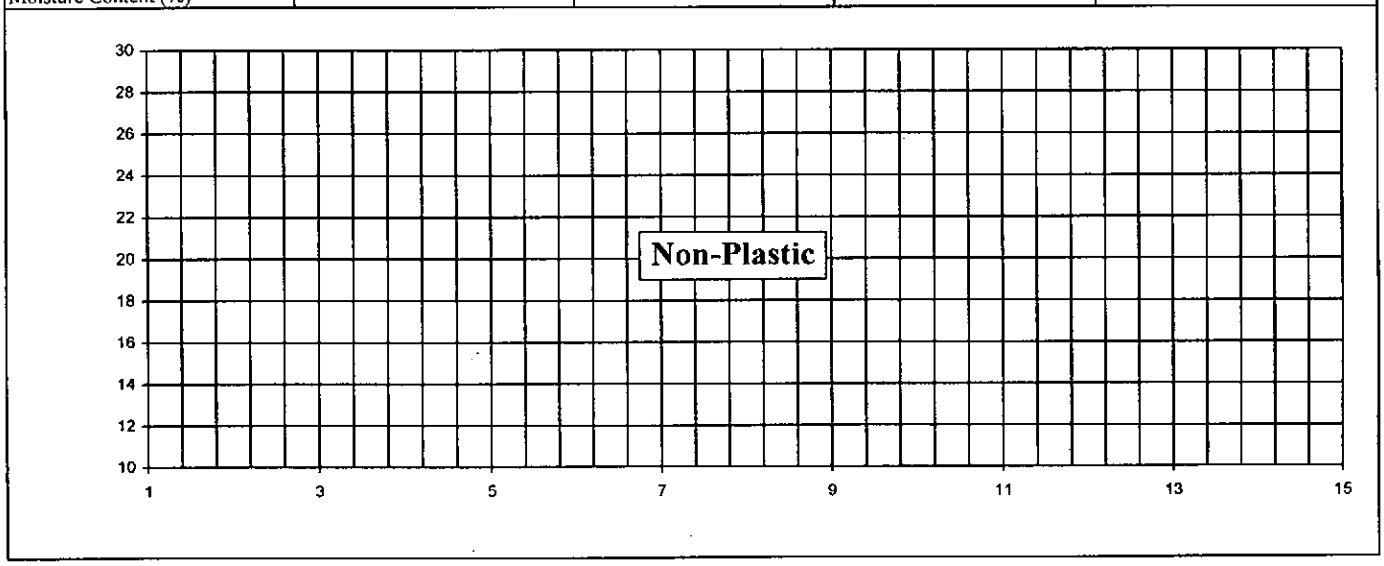
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / TP * No.	: D046
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 8.00 - 9.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 8.00 - 8.60
Tested Date	: 26/11/2008	Sample Type	: Mazier
Description	: Light grey, slightly gravelly, slightly sandy SILT/CLAY		
Sample Origin	: FILL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 162	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 1132.0		
Natural Moisture Content (%)	: 15	Dry Mass > 425mm (g)	: 102.8
Calculated Dry Mass (g)	: 984.3	Passing 425μm Sieve (%)	: 90
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 15
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : **Lau Wai Cheong**

Date : 26/11/2008 Date : 09/01/2009 Date : **09/01/2009**

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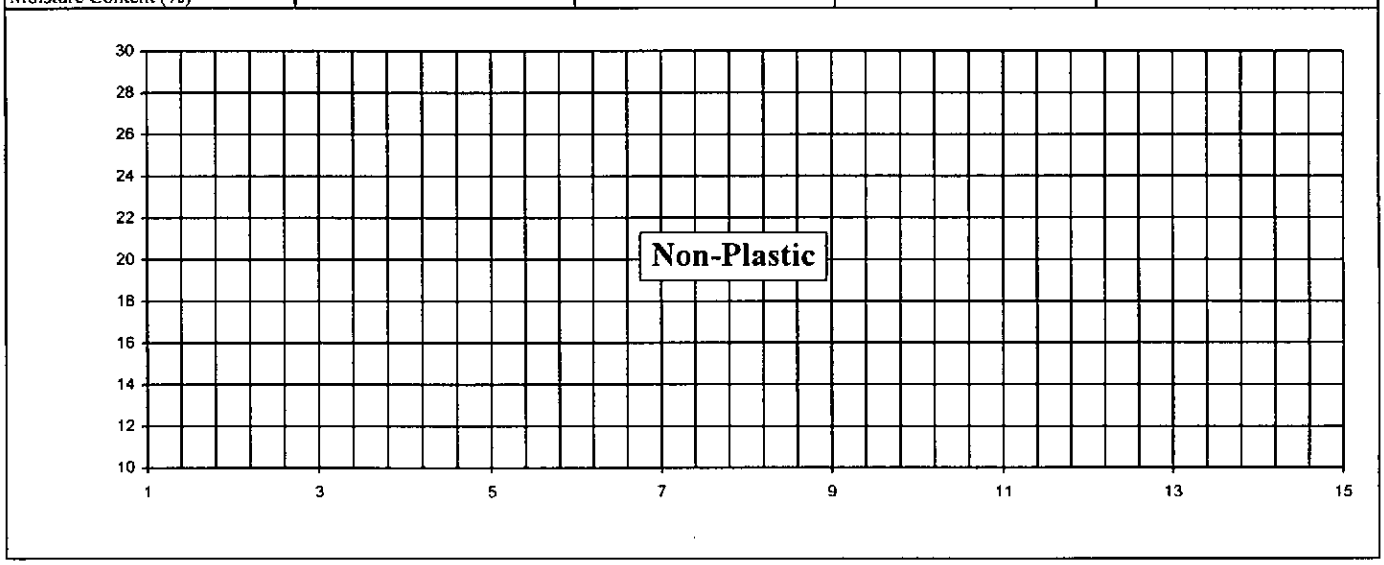
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D051
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.20 - 3.60
Tested Date	: 03/12/2008	Sample Type	: Mazier
Description	: Brown, slightly sandy, slightly gravelly SILT/CLAY		
Sample Origin	: HDV ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 840.0		
Natural Moisture Content (%)	: 29	Dry Mass > 425mm (g)	: 414.0
Calculated Dry Mass (g)	: 651.2	Passing 425μm Sieve (%)	: 36
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 29
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician	: C M Yip	Checked By :	Approved By :
		Name : H W Chung	Signatory : **Lau Wai Cheong**
Date	: 03/12/2008	Date : 09/01/2009	Date : **09/01/2009**

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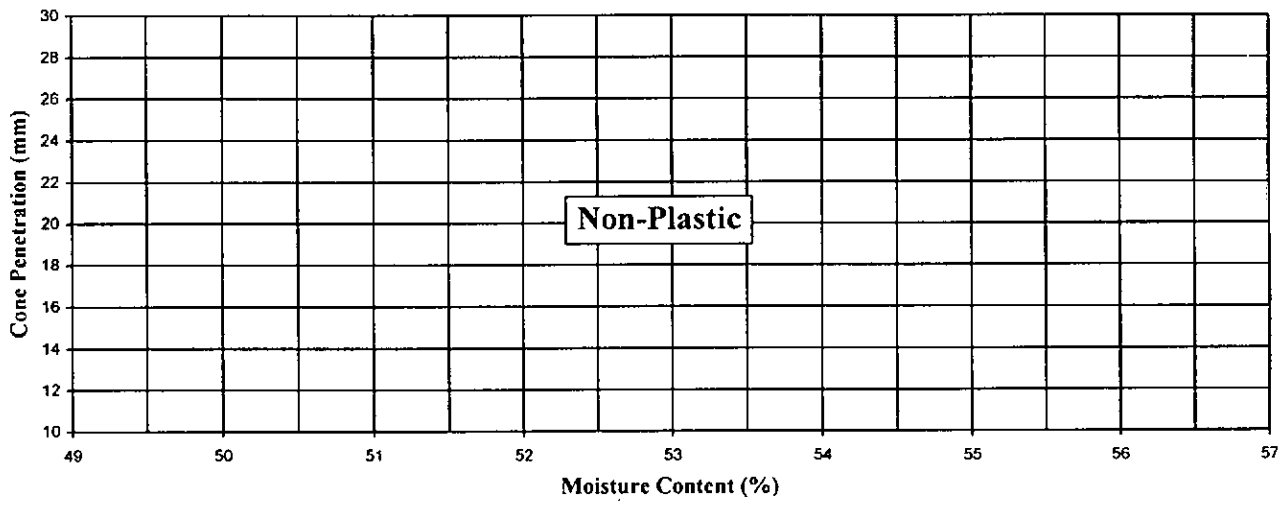
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / TP * No.	: D054
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.00 - 3.60
Tested Date	: 18/12/2008	Sample Type	: Mazier
Description	: Greyish brown, slightly sandy SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 800.8		
Natural Moisture Content (%)	: 21	Dry Mass > 425mm (g)	: 15.3
Calculated Dry Mass (g)	: 661.8	Passing 425μm Sieve (%)	: 98
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 21
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 18/12/2008 Date : 09/01/2009 Date : 09/01/2009

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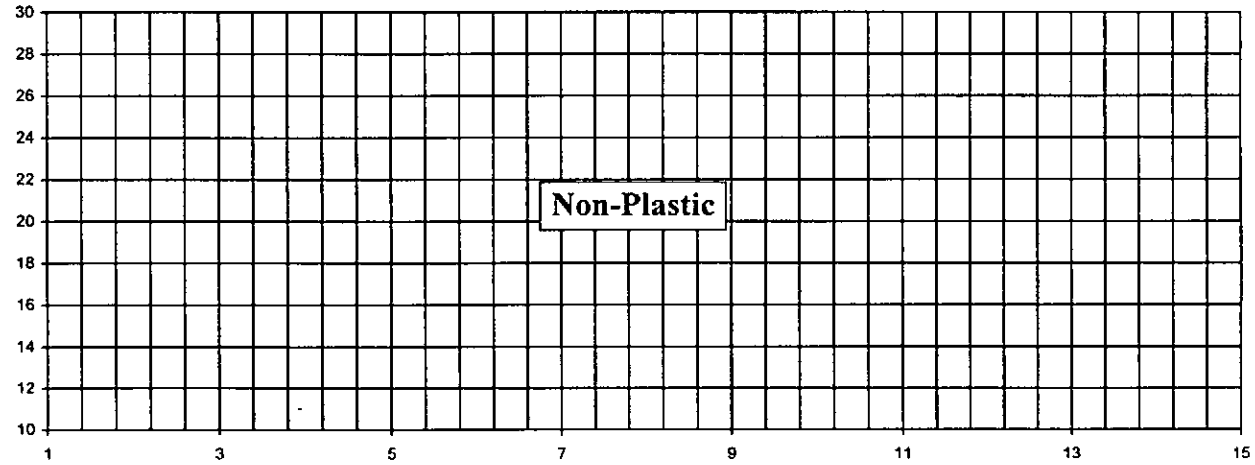
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKAS HOKLAS 055

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D055
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.20 - 3.60
Tested Date	: 03/12/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: CDT‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 811.2		
Natural Moisture Content (%)	: 23	Dry Mass > 425mm (g)	: 171.3
Calculated Dry Mass (g)	: 659.5	Passing 425μm Sieve (%)	: 74
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 23
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 03/12/2008 Date : 09/01/2009 Date : 09/01/2009

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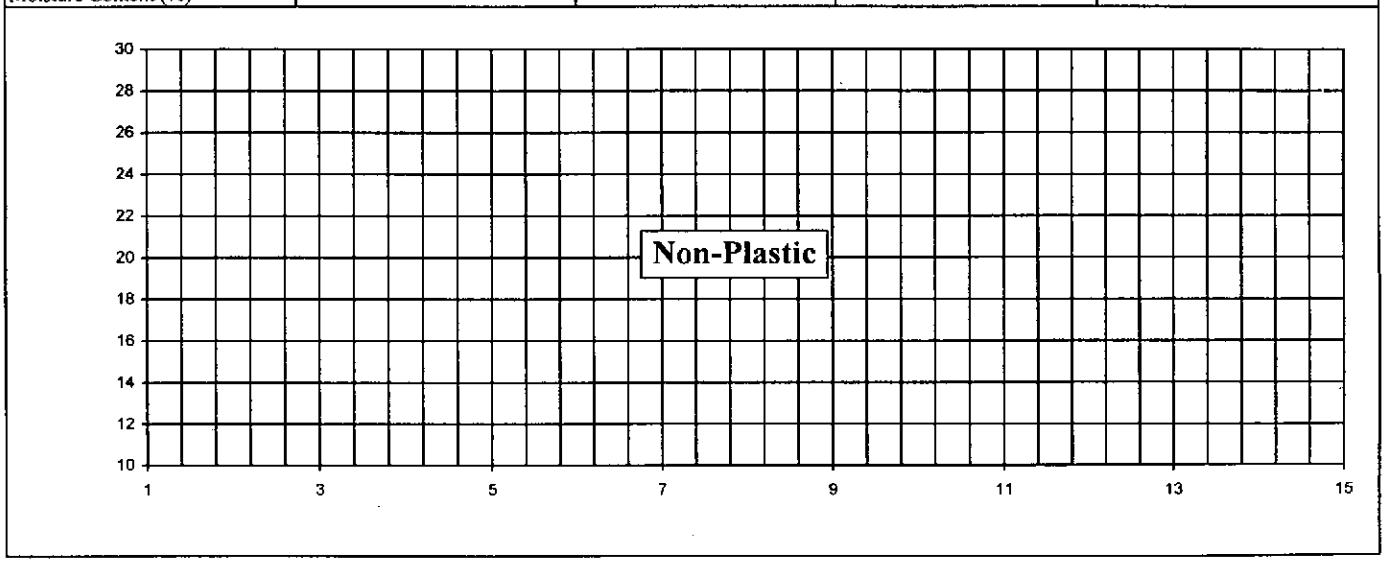
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKAS HOKLAS 055

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D059
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.50 - 4.50
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.70 - 4.10
Tested Date	: 24/11/2008	Sample Type	: Mazier
Description	: Dark brown, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 748.4		
Natural Moisture Content (%)	: 31	Dry Mass > 425mm (g)	: 109.3
Calculated Dry Mass (g)	: 571.3	Passing 425μm Sieve (%)	: 81
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 31
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : **Lau Wai Cheong** Date : **09/01/2009**

Date : 24/11/2008

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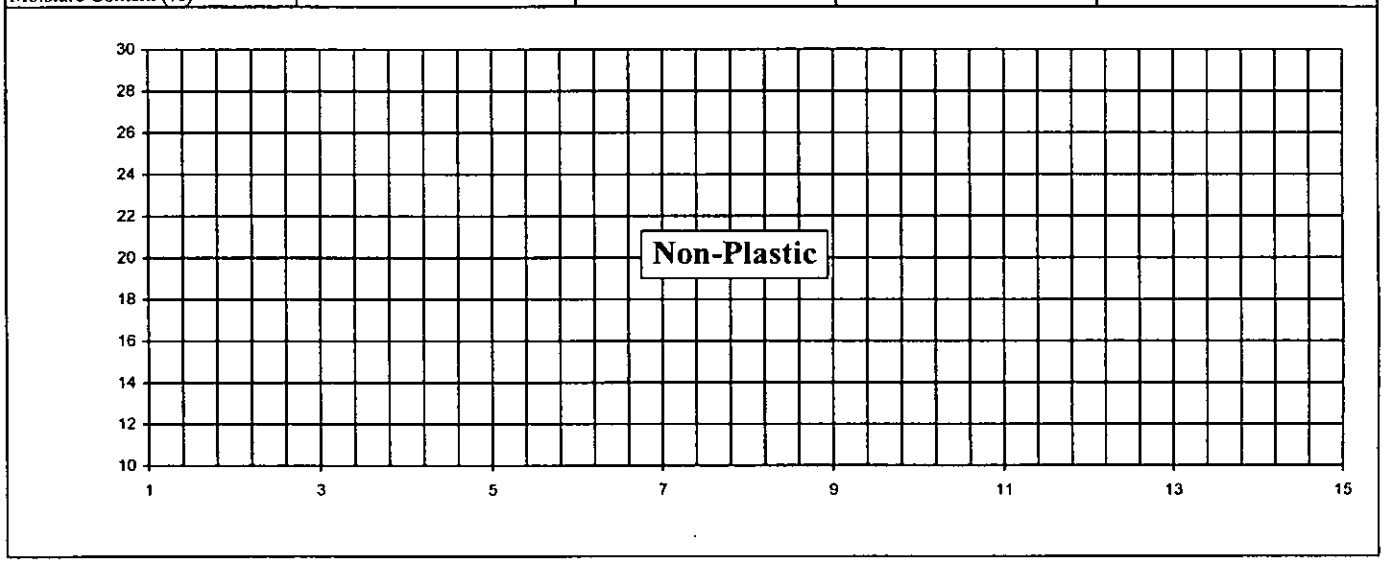
Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D065
Project	: Ground Investigation for South Island Line	Sample No.	: 8
		Sample Depth (m)	: 4.50 - 5.50
Date Received	: 29/09/2008	Specimen Depth (m)	: 4.50 - 5.10
Tested Date	: 26/11/2008	Sample Type	: Mazier
Description	: Brown, slightly sandy, gravelly SILT/CLAY		
Sample Origin	: HDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 112	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 1165.0		
Natural Moisture Content (%)	: 22	Dry Mass > 425mm (g)	: 289.1
Calculated Dry Mass (g)	: 954.9	Passing 425μm Sieve (%)	: 70
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 22
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 26/11/2008

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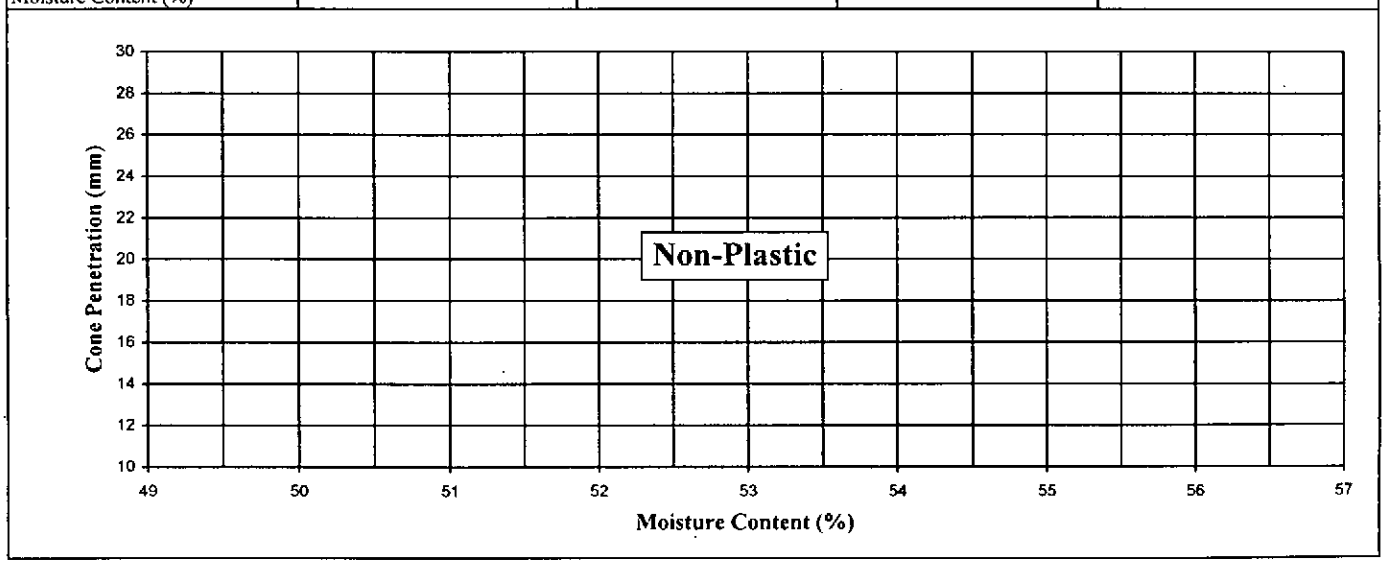
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D071
Project	: Ground Investigation for South Island Line	Sample No.	: 9
		Sample Depth (m)	: 8.00 - 9.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 8.00 - 8.60
Tested Date	: 17/12/2008	Sample Type	: Mazier
Description	: Dark brown, slightly sandy SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 838.8		
Natural Moisture Content (%)	: 35	Dry Mass > 425mm (g)	: 30.2
Calculated Dry Mass (g)	: 621.3	Passing 425μm Sieve (%)	: 95
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 35
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 17/12/2008

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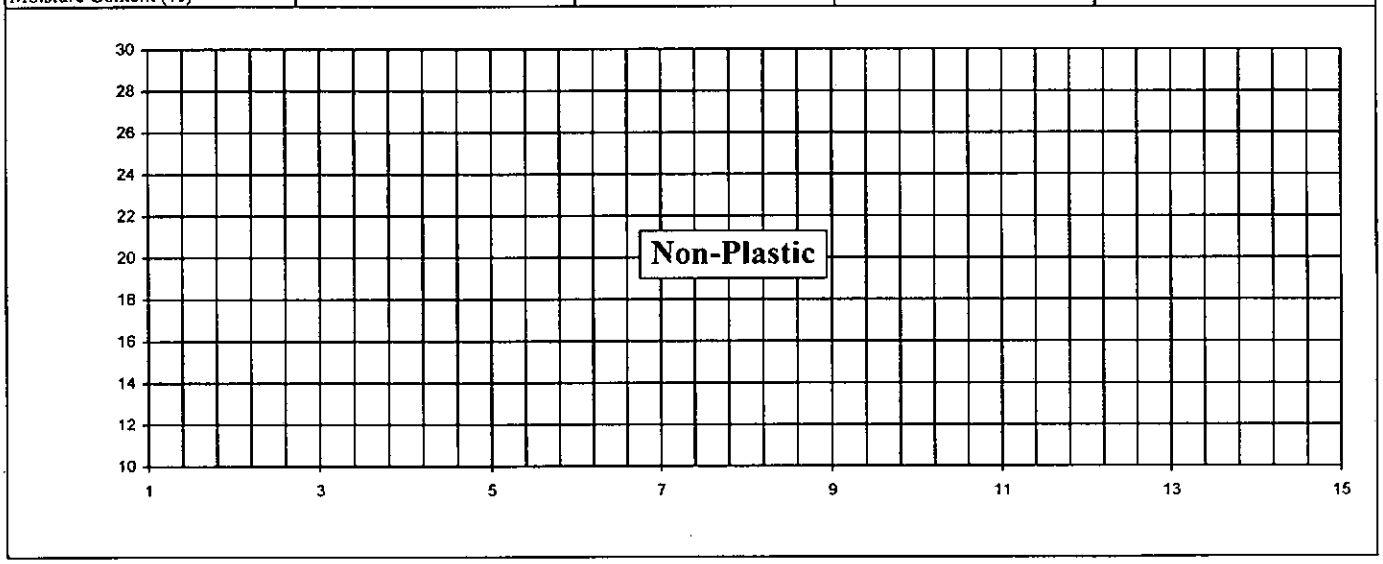
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D090
Project	: Ground Investigation for South Island Line	Sample No.	: 2
		Sample Depth (m)	: 4.00 - 5.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 4.00 - 4.60
Tested Date	: 02/12/2008	Sample Type	: Mazier
Description	: Dark brown, slightly sandy, gravelly, SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 1033.0		
Natural Moisture Content (%)	: 14	Dry Mass > 425mm (g)	: 512.4
Calculated Dry Mass (g)	: 906.1	Passing 425μm Sieve (%)	: 43
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 14
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 02/12/2008 Date : 09/01/2009 Date : 09/01/2009

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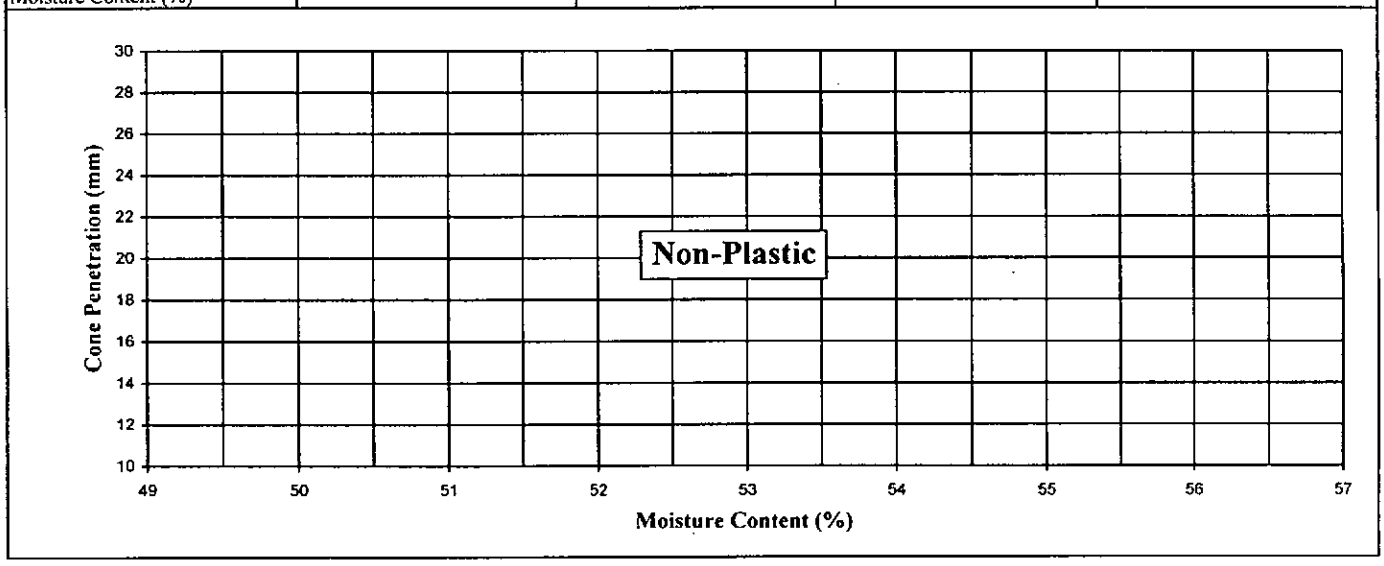
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKAS HOKLAS 033

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: D092
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 13.00 - 14.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 13.00 - 13.60
Tested Date	: 17/12/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 838.8		
Natural Moisture Content (%)	: 13	Dry Mass > 425mm (g)	: 239.3
Calculated Dry Mass (g)	: 742.3	Passing 425μm Sieve (%)	: 68
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 13
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 17/12/2008 Date : 09/01/2009 Date : 09/01/2009

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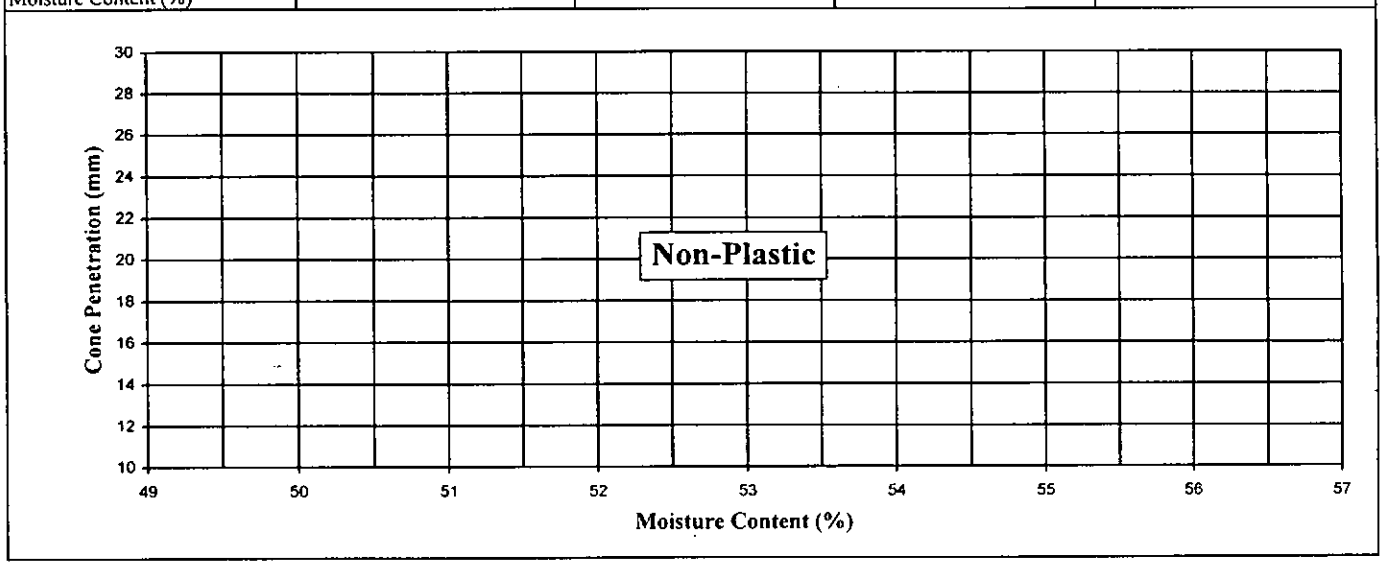
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: WCH-BH01
Project	: Ground Investigation for South Island Line	Sample No.	: 5
		Sample Depth (m)	: 7.00 - 8.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 7.00 - 7.60
Tested Date	: 16/12/2008	Sample Type	: Mazier
Description	: Brown, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: CDM ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 136	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 1098.0		
Natural Moisture Content (%)	: 41	Dry Mass > 425mm (g)	: 122.7
Calculated Dry Mass (g)	: 778.7	Passing 425μm Sieve (%)	: 84
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 41
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 16/12/2008

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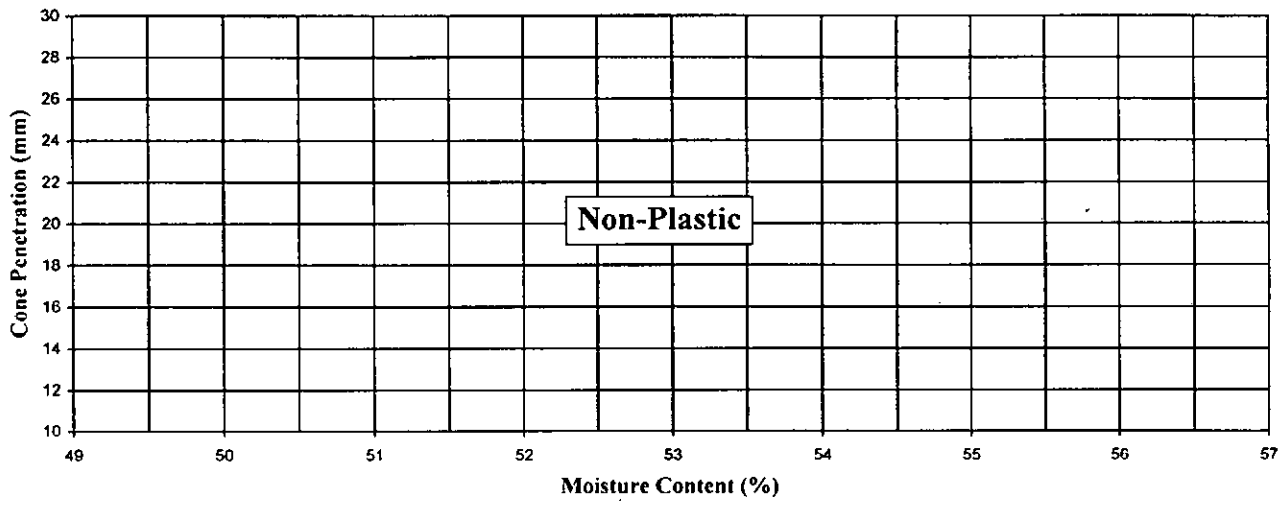
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: WCH-BH02
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 4.00 - 5.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 4.00 - 4.60
Tested Date	: 17/12/2008	Sample Type	: Mazier
Description	: Dark brown, clayey, very silty, very sandy GRAVEL		
Sample Origin	: FILL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 798.3		
Natural Moisture Content (%)	: 19	Dry Mass > 425mm (g)	: 390.8
Calculated Dry Mass (g)	: 670.8	Passing 425μm Sieve (%)	: 42
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 19
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 17/12/2008

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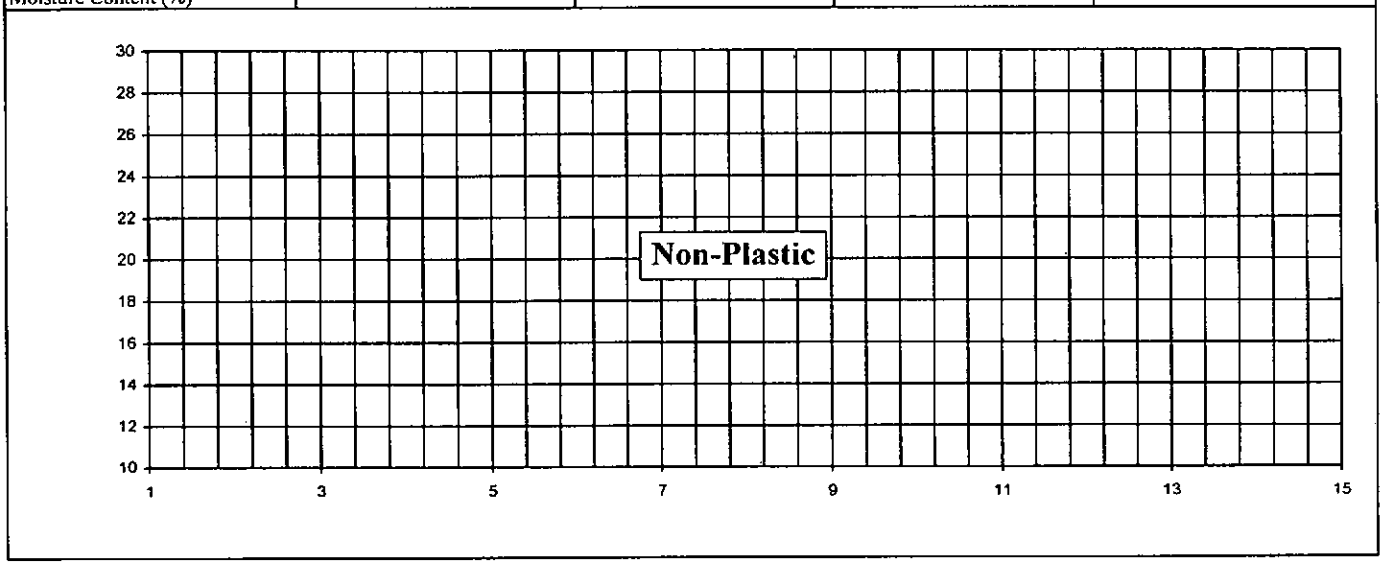
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKAS HOKLAS 055

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: WCH-BH02
Project	: Ground Investigation for South Island Line	Sample No.	: 5
		Sample Depth (m)	: 6.50 - 7.50
Date Received	: 29/09/2008	Specimen Depth (m)	: 6.50 - 7.10
Tested Date	: 09/12/2008	Sample Type	: Mazier
Description	: Dark grey, slightly gravelly, slightly sandy SILT/CLAY		
Sample Origin	: ALL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 136	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 1279.0		
Natural Moisture Content (%)	: 26	Dry Mass > 425mm (g)	: 184.2
Calculated Dry Mass (g)	: 1015.1	Passing 425μm Sieve (%)	: 82
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 26
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 09/12/2008

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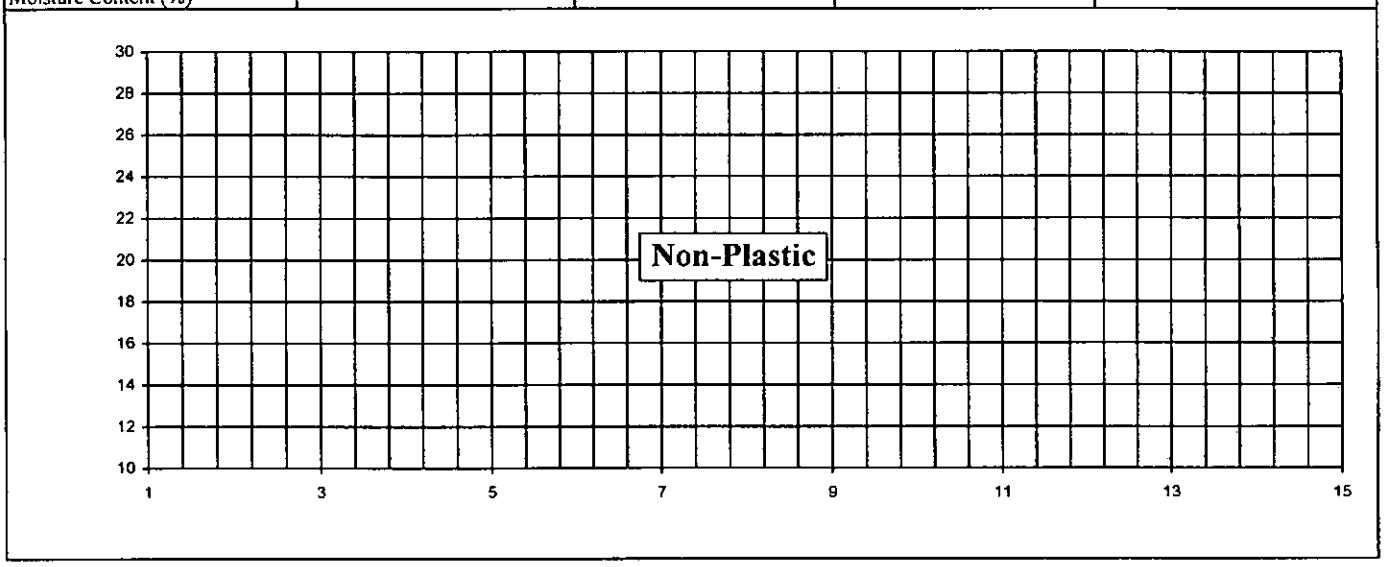
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: WCH-BH09
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.00 - 3.60
Tested Date	: 11/12/2008	Sample Type	: Mazier
Description	: Orangish brown, slightly gravelly, slightly sandy SILT/CLAY		
Sample Origin	: COL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 879.5		
Natural Moisture Content (%)	: 24	Dry Mass > 425mm (g)	: 99.8
Calculated Dry Mass (g)	: 709.3	Passing 425μm Sieve (%)	: 86
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



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Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 24
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 11/12/2008

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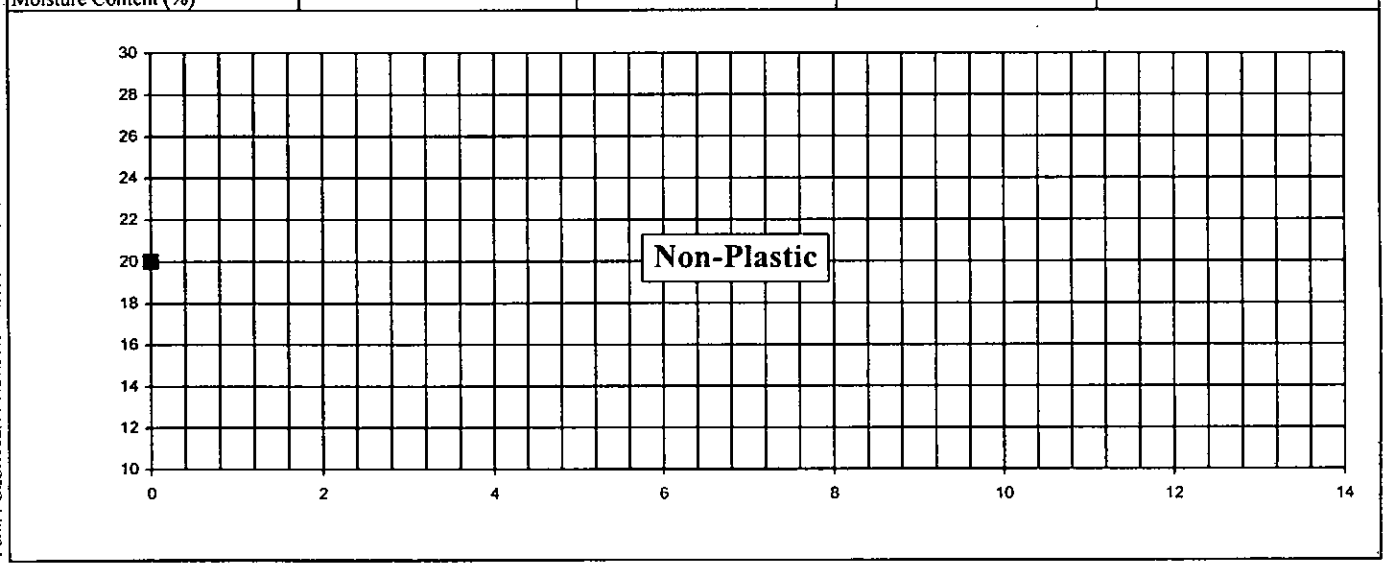
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKAS HOKLAS 055

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: WCH-BH10
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.00 - 3.60
Tested Date	: 02/12/2008	Sample Type	: Mazier
Description	: Orangish brown, slightly gravelly, slightly sandy SILT/CLAY		
Sample Origin	: COL ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 1001.1		
Natural Moisture Content (%)	: 26	Dry Mass > 425mm (g)	: 106.5
Calculated Dry Mass (g)	: 794.5	Passing 425μm Sieve (%)	: 87
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 26
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 02/12/2008

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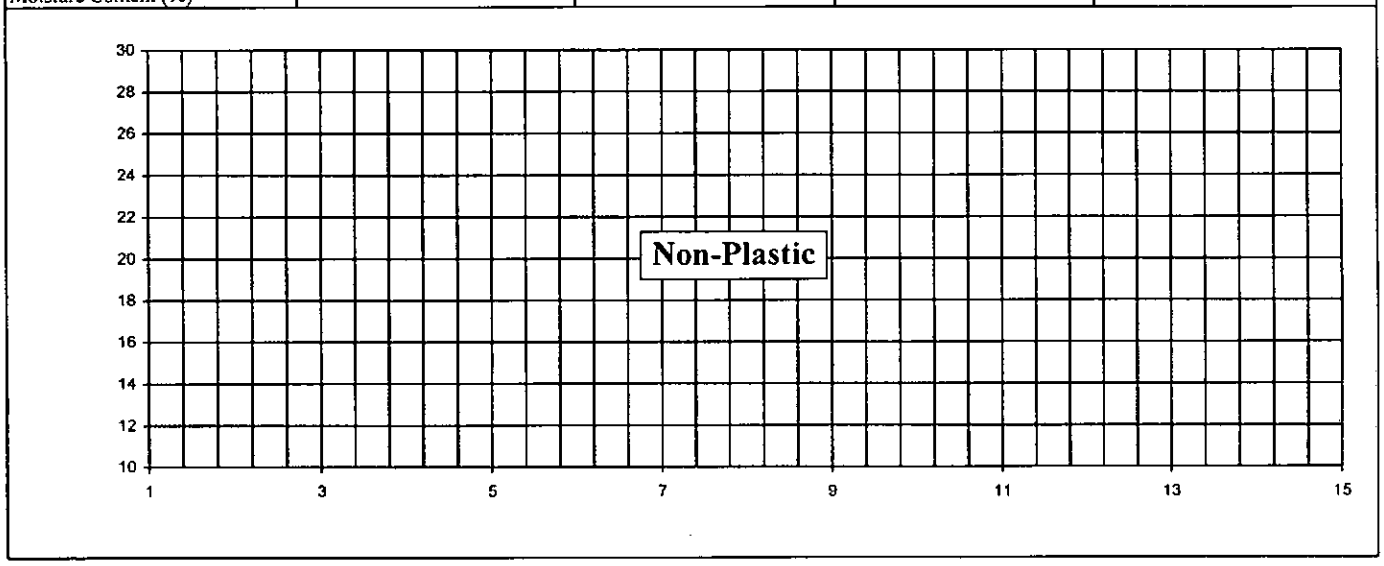
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: WCH-BH10
Project	: Ground Investigation for South Island Line	Sample No.	: 5
		Sample Depth (m)	: 5.00 - 6.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 5.00 - 5.60
Tested Date	: 01/12/2008	Sample Type	: Mazier
Description	: Light grey, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 1001.1		
Natural Moisture Content (%)	: 16	Dry Mass > 425mm (g)	: 379.2
Calculated Dry Mass (g)	: 863.0	Passing 425μm Sieve (%)	: 56
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 16
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 01/12/2008 Date : 09/01/2009 Date : 09/01/2009

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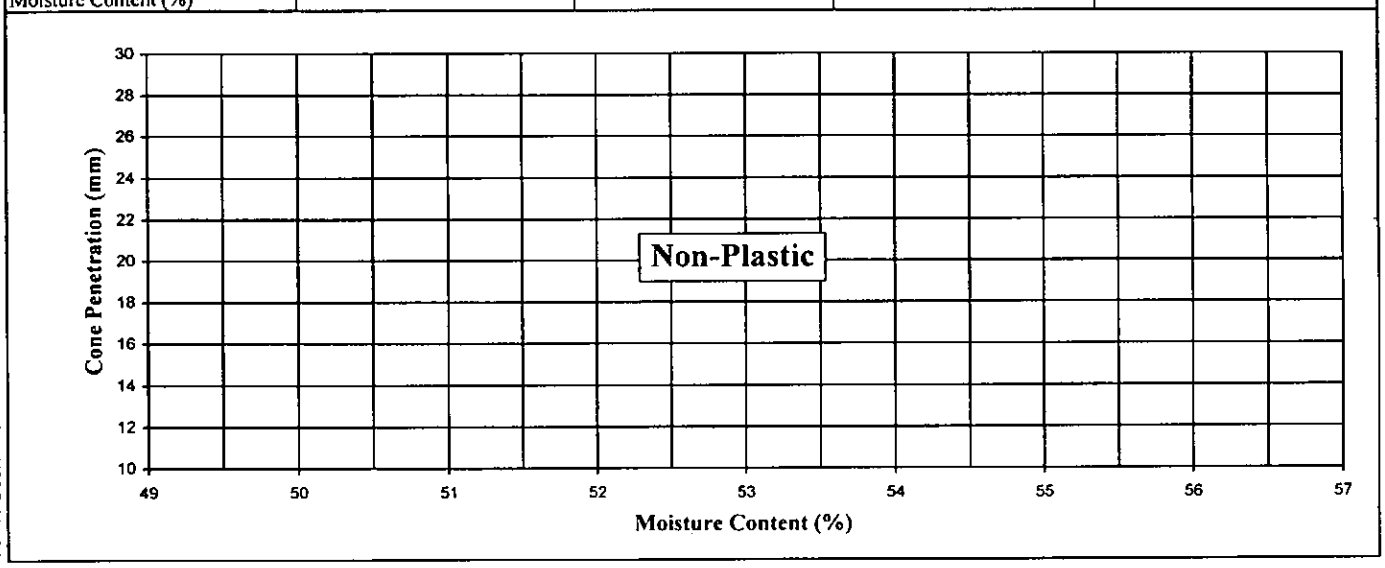
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / TP * No.	: WCH-BH10
Project	: Ground Investigation for South Island Line	Sample No.	: 13
		Sample Depth (m)	: 9.00 - 10.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 9.00 - 9.60
Tested Date	: 15/12/2008	Sample Type	: Mazier
Description	: Dark brown, slightly clayey, very silty, very sandy GRAVEL		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 64	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 851.1		
Natural Moisture Content (%)	: 13	Dry Mass > 425mm (g)	: 392.1
Calculated Dry Mass (g)	: 753.2	Passing 425μm Sieve (%)	: 48
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 13
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit *	-	%	
Expanded Uncertainty of Plastic Limit *	-	%	
Expanded Uncertainty of Plasticity Index *	-	%	
Expanded Uncertainty of Liquidity Index *	-	%	

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 15/12/2008 Date : 09/01/2009 Date : 09/01/2009

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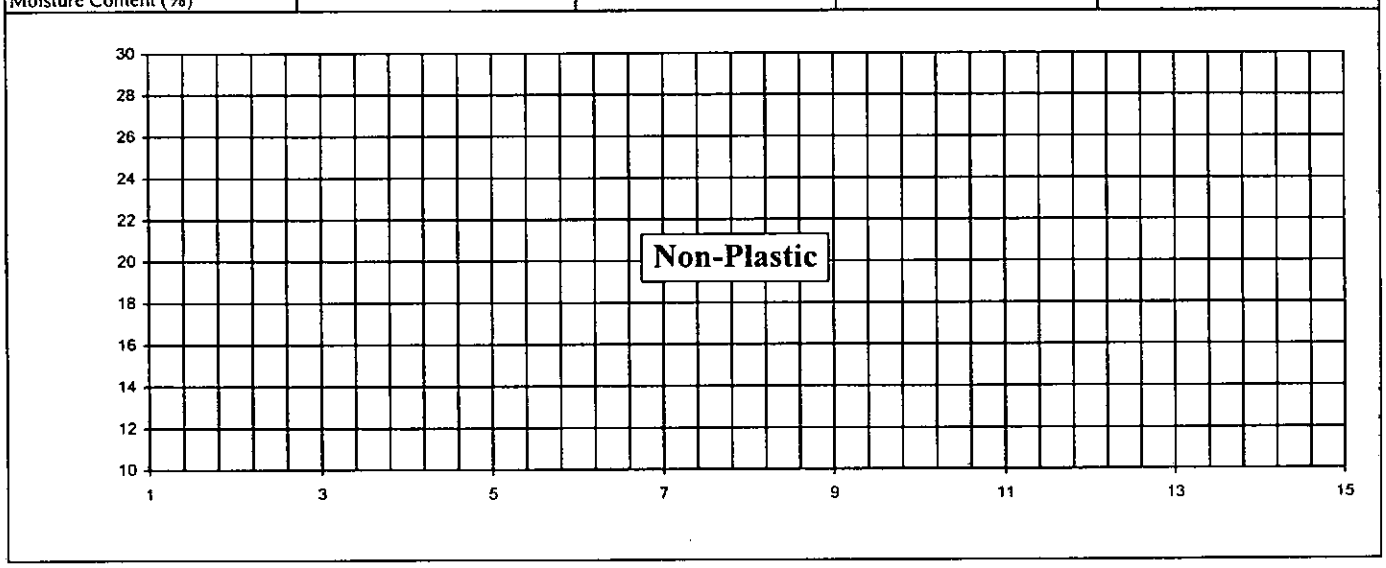
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon HKAS

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: WCH-BH11
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.30 - 3.60
Tested Date	: 01/12/2008	Sample Type	: Mazier
Description	: Orangish brown, slightly gravelly, sandy SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 136	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 882.6		
Natural Moisture Content (%)	: 26	Dry Mass > 425mm (g)	: 217.7
Calculated Dry Mass (g)	: 700.5	Passing 425μm Sieve (%)	: 69
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 26
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 01/12/2008 Date : 09/01/2009 Date : 09/01/2009

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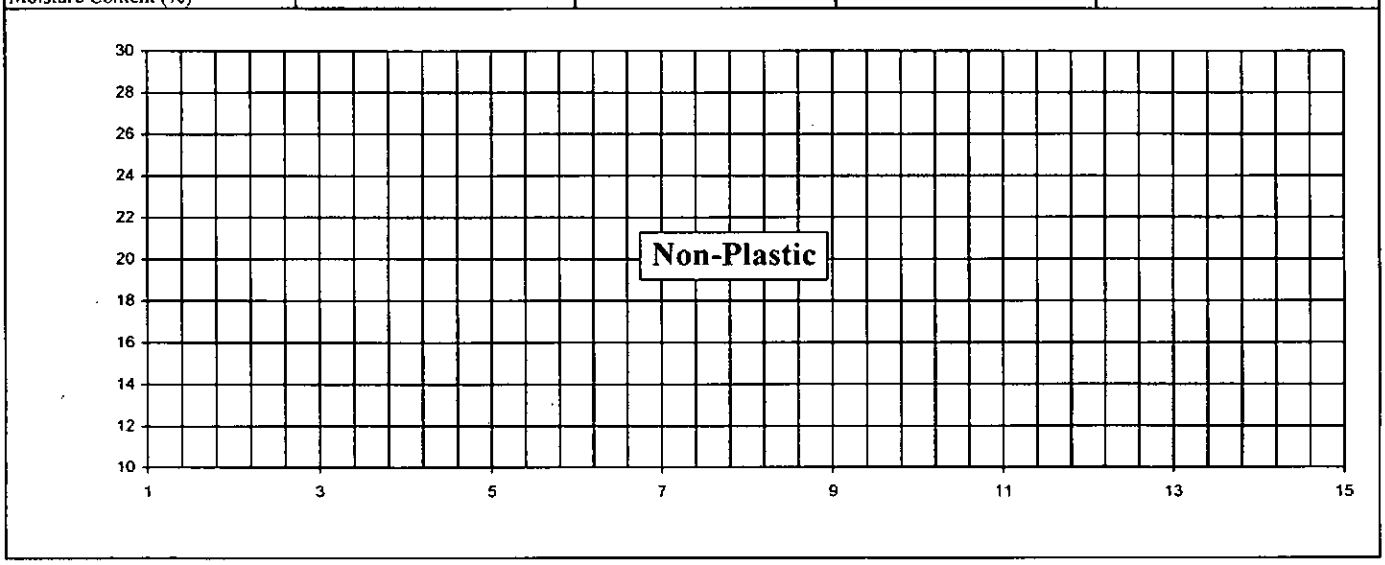
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / TP * No.	: WCH-BH12
Project	: Ground Investigation for South Island Line	Sample No.	: 1
		Sample Depth (m)	: 3.00 - 4.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 3.00 - 3.60
Tested Date	: 13/12/2008	Sample Type	: Mazier
Description	: Greyish brown, sandy SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 11		
Initial Wet Mass of Sample (g)	: 813.1		
Natural Moisture Content (%)	: 18	Dry Mass > 425mm (g)	: 173.8
Calculated Dry Mass (g)	: 689.1	Passing 425μm Sieve (%)	: 75
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 18
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician	: C M Yip	Checked By :	Approved By :
		Name : H W Chung	Signatory : Lau Wai Cheong
Date	: 13/12/2008	Date : 09/01/2009	Date : 09/01/2009

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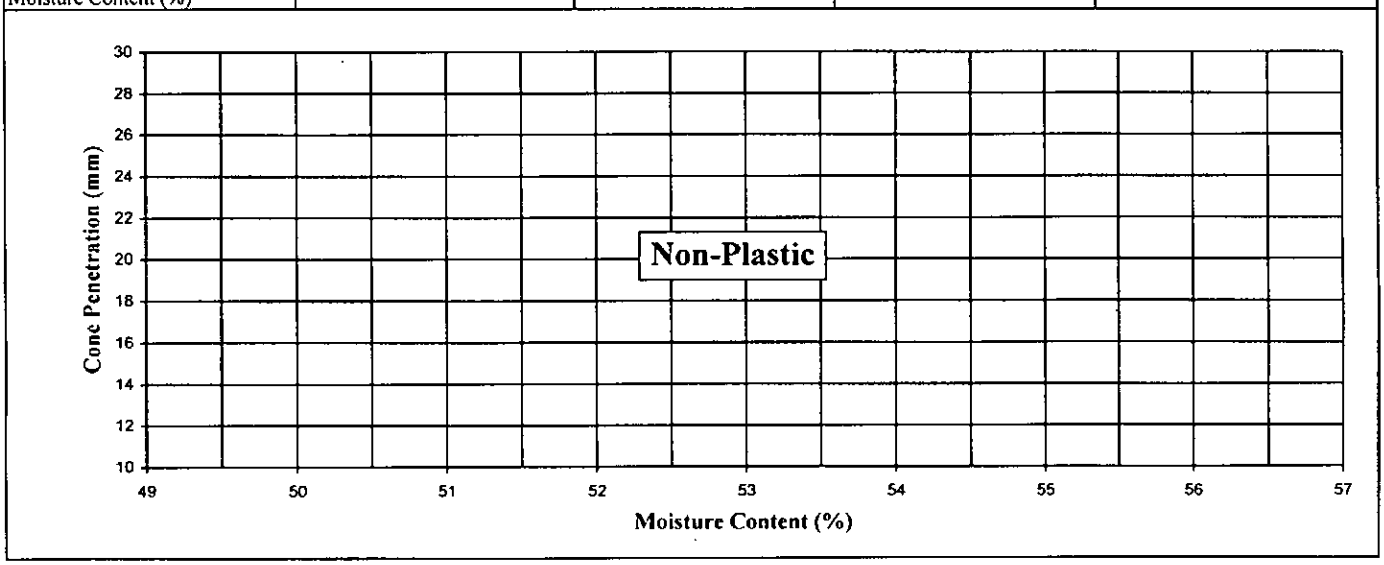
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT,
PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: WCH-BH12
Project	: Ground Investigation for South Island Line	Sample No.	: 9
		Sample Depth (m)	: 7.00 - 8.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 7.00 - 7.60
Tested Date	: 16/12/2008	Sample Type	: Mazier
Description	: Reddish brown, slightly gravelly, slightly sandy SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 88	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 1265.0		
Natural Moisture Content (%)	: 32	Dry Mass > 425mm (g)	: 247.0
Calculated Dry Mass (g)	: 958.3	Passing 425μm Sieve (%)	: 74
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 32
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	- %		
Expanded Uncertainty of Plastic Limit ^	- %		
Expanded Uncertainty of Plasticity Index ^	- %		
Expanded Uncertainty of Liquidity Index ^	- %		

Technician : C M Yip

Checked By : Name : H W Chung Date : 09/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 09/01/2009

Date : 16/12/2008

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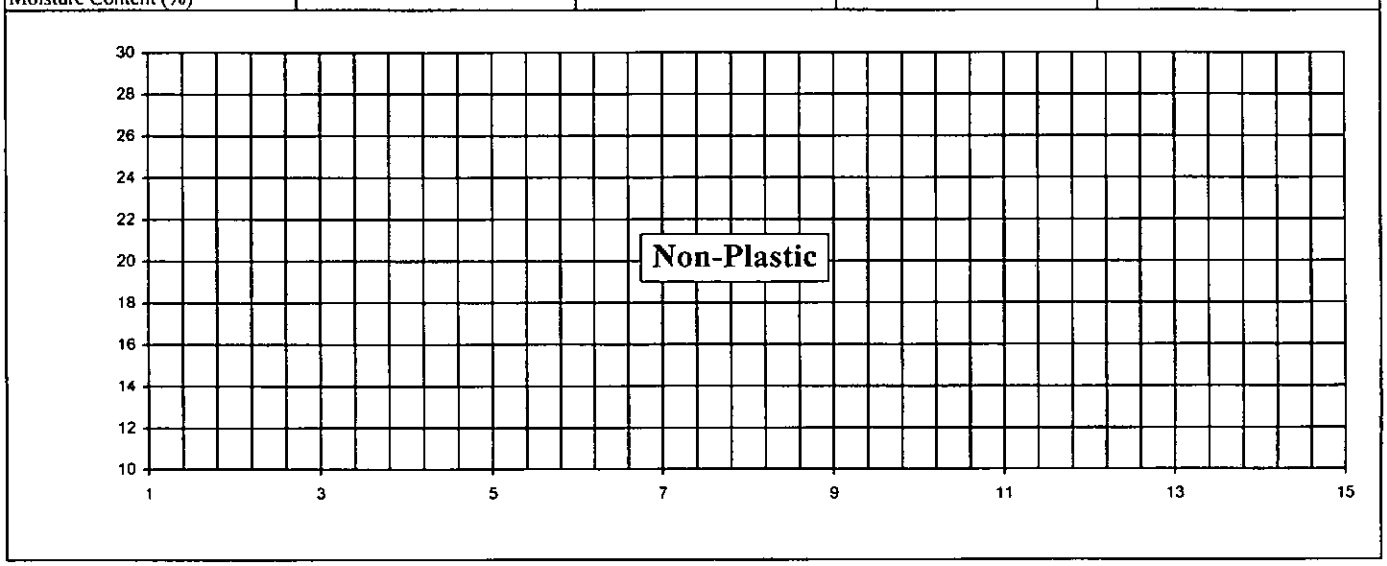
TEST REPORT
DETERMINATION OF
LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY & LIQUIDITY INDEX
GEOSPEC 3 : 2001 Test Method 6.1 and 6.2

Gammon

		Report No.	: J2999-059.11
Job No.	: J2999 Contract No. : Contract 1024	Works Order No.	: 059
Customer	: Mass Transit Railway Corporation	BH / ~~TP~~ * No.	: WCH-BH12
Project	: Ground Investigation for South Island Line	Sample No.	: 17
		Sample Depth (m)	: 11.00 - 12.00
Date Received	: 29/09/2008	Specimen Depth (m)	: 11.20 - 11.60
Tested Date	: 10/12/2008	Sample Type	: Mazier
Description	: Light grey, slightly gravelly, slightly sandy SILT/CLAY		
Sample Origin	: CDT ‡		
Additional Information	:		
Sample Preparation	: Wet Sieved		
Duration Of Drying (hrs)	: 112	Drying Temperature (°C)	: 45
Initial Mixing Time (min)	: 10		
Initial Wet Mass of Sample (g)	: 1505.0		
Natural Moisture Content (%)	: 20	Dry Mass > 425mm (g)	: 376.2
Calculated Dry Mass (g)	: 1254.2	Passing 425μm Sieve (%)	: 70
Sampling History	: As Received		

Determination No.	LL1			LL2			LL3			LL4		
Mixing Time (min)												
Initial Reading (mm)												
Final Reading (mm)												
Penetration (mm)												
Mean Penetration (mm)												
Moisture Content (%)												



Form : GESR002.1 / Nov.30.04 / Issue 1 / Rev 1

Test Results

Liquid Limit (%)	:	Natural Moisture Content (%)	: 20
Plastic Limit (%)	: Non - Plastic	Liquidity Index	: -
Plasticity Index (%)	:		
Expanded Uncertainty of Liquid Limit ^	-	%	
Expanded Uncertainty of Plastic Limit ^	-	%	
Expanded Uncertainty of Plasticity Index ^	-	%	
Expanded Uncertainty of Liquidity Index ^	-	%	

Technician : C M Yip

Checked By : Name : H W Chung

Approved By : Signatory : Lau Wai Cheong

Date : 10/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Section 2.3
Determination of Particle Size Distribution – GEOSPEC 3 : 2001 Test Method 8.1/8.5/8.7

TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 21/11/2008

Description : Dark brown, slightly clayey/silty, very sandy GRAVEL
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D003
Sample No. : 1
Sample Depth (m) : 7.00 - 8.00
Specimen Depth (m) : 7.00 - 7.60
Sample Type : Mazier
Sample Origin : CDG‡

^Upon request * Delete as appropriate ‡Information provided by customer

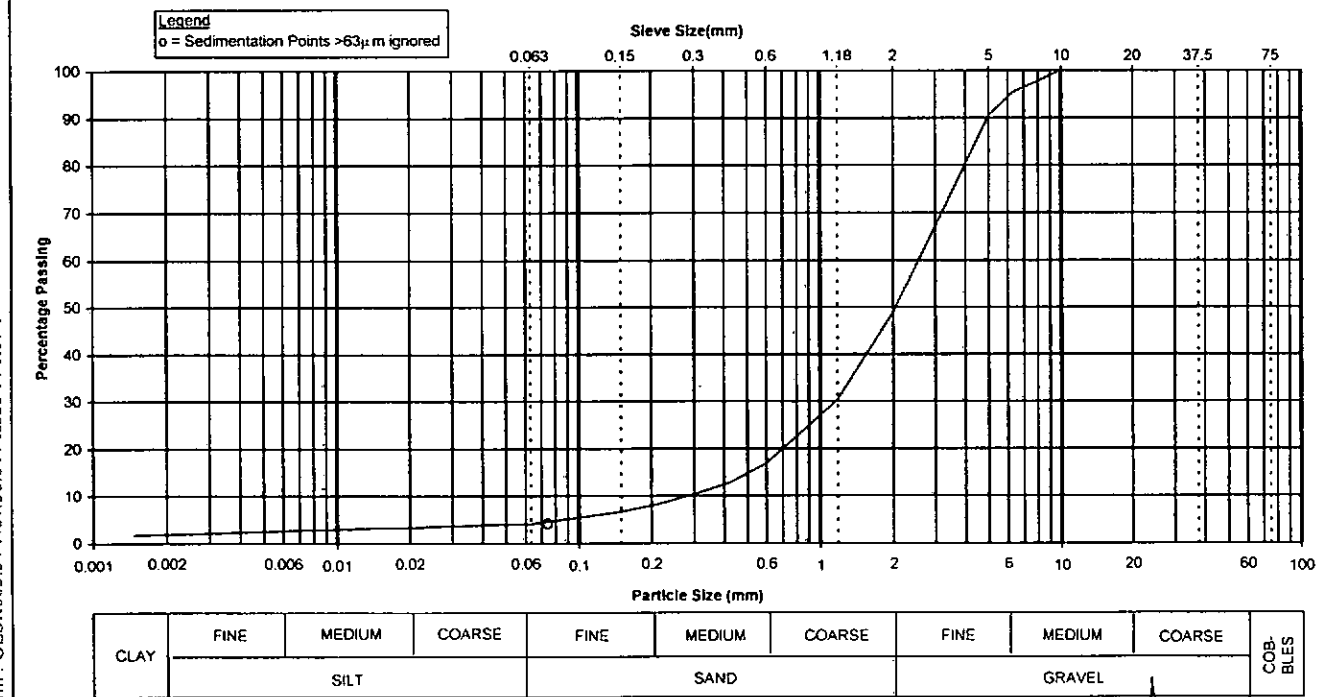
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	95	-	-
5.00 mm	90	-	-
3.35 mm	72	-	-
2.00 mm	49	-	-
1.18 mm	30	-	-
600 µm	17	-	-
425 µm	13	-	-
300 µm	10	-	-
212 µm	8	-	-
150 µm	7	-	-
63 µm	4	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0742	-	4	-
0.0527	-	4	-
0.0374	-	4	-
0.0267	-	4	-
0.0190	-	3	-
0.0099	-	3	-
0.0050	-	3	-
0.0025	-	2	-
0.0015	-	2	-

SUMMARY :

Gravel (%)	:	**51**
Sand (%)	:	**45**
Silt (%)	:	**2**
Clay (%)	:	**2**



Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : K Y Sun
Date : 21/11/2008

Checked By : H W Chung
Name : H W Chung
Date : 25/11/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 25/11/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 17/12/2008

Description : Dark brown, slightly silty, very sandy GRAVEL
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D003
Sample No. : 5
Sample Depth (m) : 9.55 - 10.55
Specimen Depth (m) : 9.55 - 10.15
Sample Type : Mazier
Sample Origin : HDG‡

^Upon request * Delete as appropriate ‡Information provided by customer

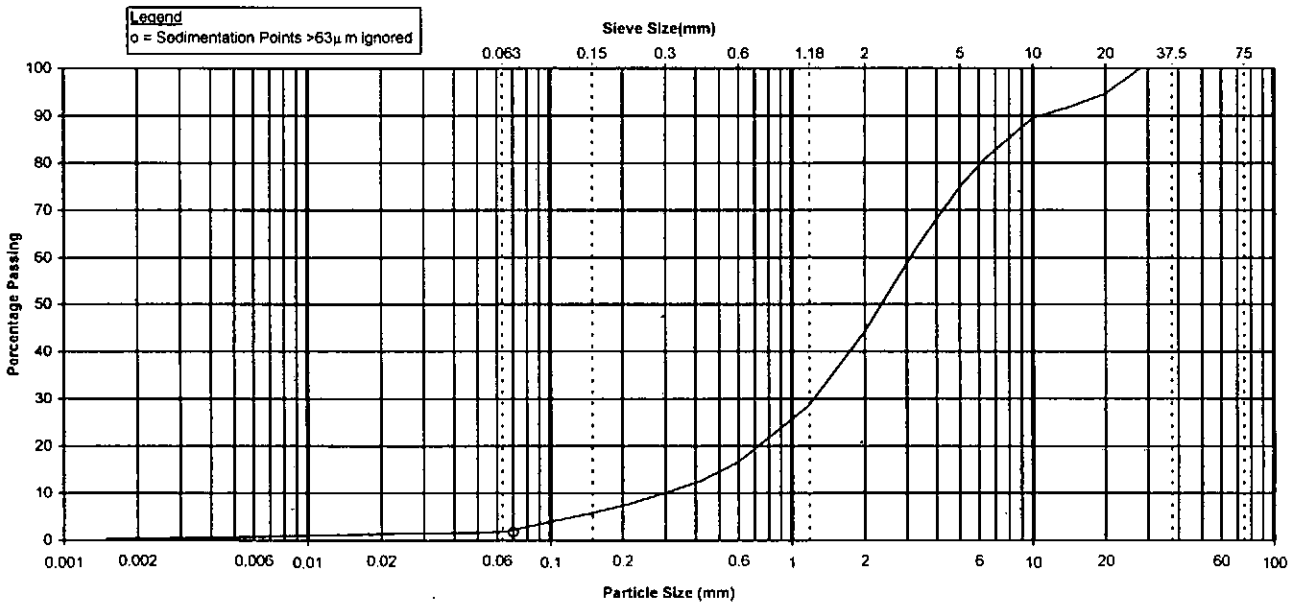
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	95	-	-
14.0 mm	92	-	-
10.0 mm	89	-	-
6.30 mm	81	-	-
5.00 mm	75	-	-
3.35 mm	62	-	-
2.00 mm	44	-	-
1.18 mm	29	-	-
600 µm	16	-	-
425 µm	13	-	-
300 µm	10	-	-
212 µm	8	-	-
150 µm	6	-	-
63 µm	2	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.67
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0702	-	2	-
0.0500	-	2	-
0.0356	-	2	-
0.0255	-	1	-
0.0183	-	1	-
0.0098	-	1	-
0.0050	-	1	-
0.0026	-	0	-
0.0015	-	0	-

SUMMARY :

Gravel (%)	:	**56**
Sand (%)	:	**42**
Silt (%)	:	**2**
Clay (%)	:	**0**



Technician : K Y Sun
Date : 17/12/2008

Checked By : H W Chung
Name : H W Chung
Date : 24/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 24/12/2008

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21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

Form : GESK003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 24/11/2008

Description : Brown, slightly gravelly, slightly sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D008
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.20 - 3.60
Sample Type : Mazier
Sample Origin : FILL‡

^Upon request * Delete as appropriate ‡Information provided by customer

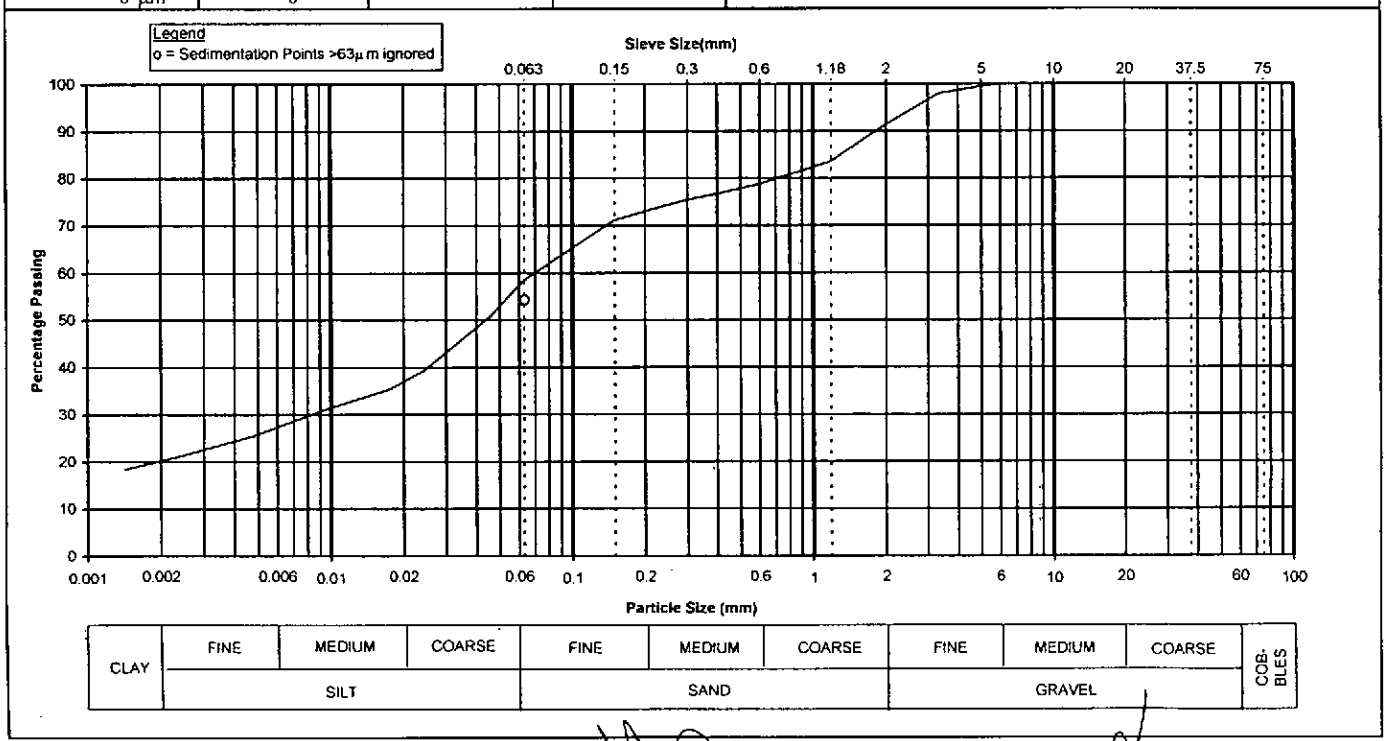
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	99	-	-
3.35 mm	98	-	-
2.00 mm	91	-	-
1.18 mm	84	-	-
600 µm	79	-	-
425 µm	77	-	-
300 µm	75	-	-
212 µm	73	-	-
150 µm	71	-	-
63 µm	58	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0636	-	54	-
0.0459	-	51	-
0.0336	-	45	-
0.0245	-	39	-
0.0177	-	35	-
0.0093	-	31	-
0.0048	-	25	-
0.0024	-	21	-
0.0014	-	18	-

SUMMARY :

Gravel (%)	:	**9**
Sand (%)	:	**33**
Silt (%)	:	**38**
Clay (%)	:	**20**



Technician : K Y Sun
Date : 24/11/2008

Checked By : H W Chung
Name : H W Chung
Date : 28/11/2008

Approved By : Lau Wai Cheong
Signatory : Lau Wai Cheong
Date : 28/11/2008

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Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 20/12/2008

Description : Brown, slightly gravelly, slightly sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D011
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.00 - 3.60
Sample Type : Mazier
Sample Origin : FILL‡

^Upon request * Delete as appropriate ‡Information provided by customer

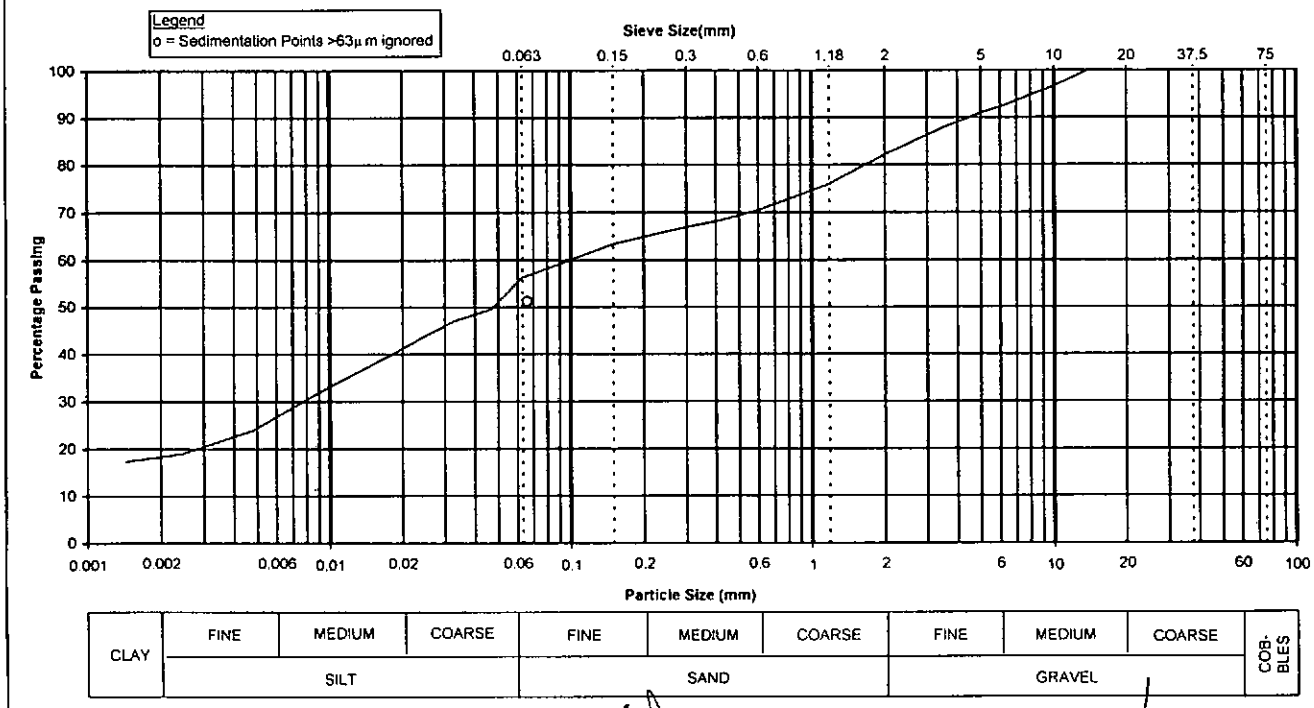
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	97	-	-
6.30 mm	93	-	-
5.00 mm	91	-	-
3.35 mm	87	-	-
2.00 mm	82	-	-
1.18 mm	76	-	-
600 µm	70	-	-
425 µm	68	-	-
300 µm	67	-	-
212 µm	65	-	-
150 µm	63	-	-
63 µm	56	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.68
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0659	-	51	-
0.0470	-	50	-
0.0336	-	47	-
0.0242	-	43	-
0.0175	-	39	-
0.0093	-	32	-
0.0048	-	24	-
0.0025	-	19	-
0.0014	-	17	-

SUMMARY :

Gravel (%)	:	**18**
Sand (%)	:	**26**
Silt (%)	:	**38**
Clay (%)	:	**18**



Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : K Y Sun
Date : 20/12/2008

Checked By : Name : H W Chung Date : 03/01/2009

Approved By : Signatory : Lau Wai Cheong Date : 03/01/2009

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 10/12/2008

Description : Brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D019
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.00 - 3.60
Sample Type : Mazier
Sample Origin : FILL‡

^Upon request * Delete as appropriate ‡Information provided by customer

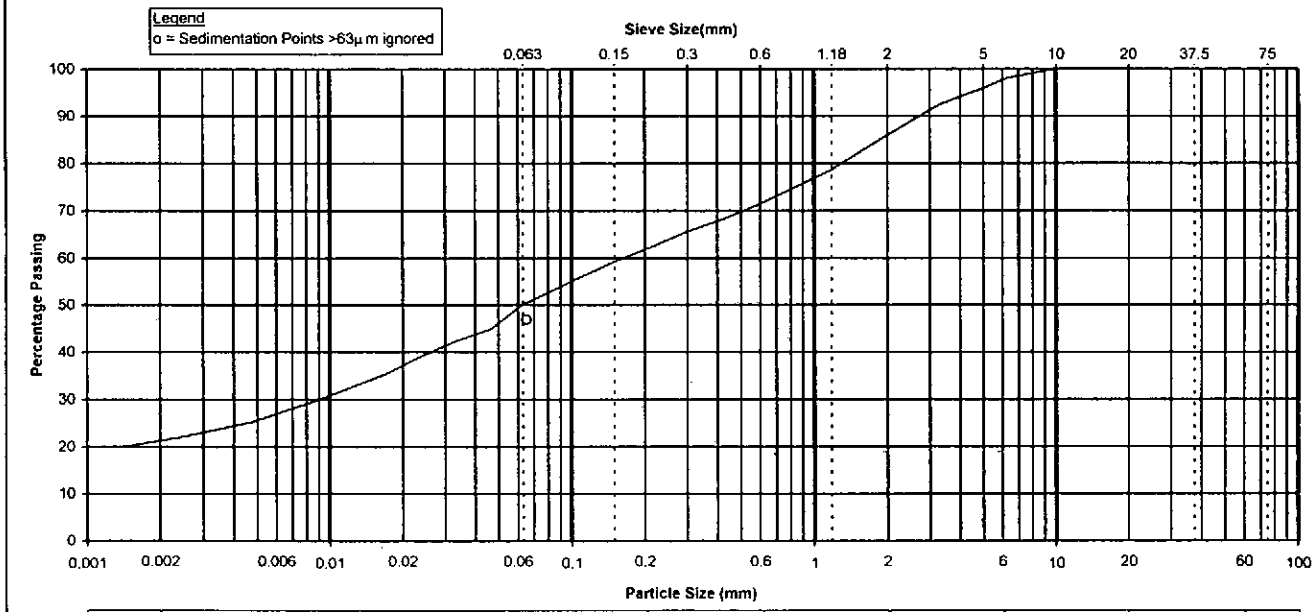
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	98	-	-
5.00 mm	96	-	-
3.35 mm	93	-	-
2.00 mm	86	-	-
1.18 mm	79	-	-
600 µm	71	-	-
425 µm	68	-	-
300 µm	66	-	-
212 µm	62	-	-
150 µm	59	-	-
63 µm	50	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0653	-	47	-
0.0468	-	45	-
0.0336	-	42	-
0.0242	-	39	-
0.0175	-	36	-
0.0093	-	30	-
0.0048	-	25	-
0.0024	-	22	-
0.0014	-	20	-

SUMMARY :

Gravel (%)	:	**14**
Sand (%)	:	**36**
Silt (%)	:	**29**
Clay (%)	:	**21**



Technician : K Y Sun
Date : 10/12/2008

Checked By :
Name : H W Chung
Date : 17/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 17/12/2008

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TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 10/12/2008

Description : Brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D019
Sample No. : 5
Sample Depth (m) : 6.70 - 7.70
Specimen Depth (m) : 6.70 - 7.30
Sample Type : Mazier
Sample Origin : COL‡

^Upon request * Delete as appropriate ‡Information provided by customer

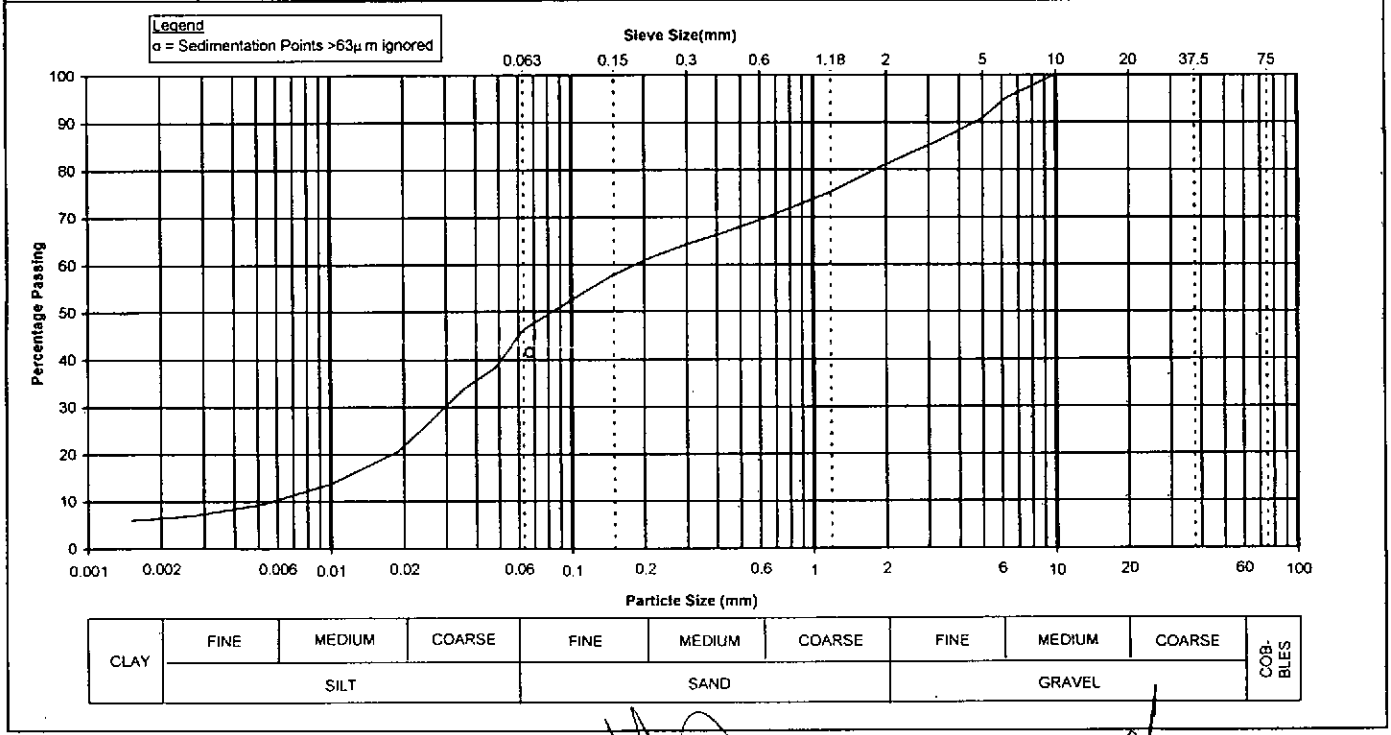
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	95	-	-
5.00 mm	91	-	-
3.35 mm	86	-	-
2.00 mm	81	-	-
1.18 mm	75	-	-
600 µm	69	-	-
425 µm	67	-	-
300 µm	64	-	-
212 µm	61	-	-
150 µm	58	-	-
63 µm	46	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.61
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0669	-	42	-
0.0483	-	38	-
0.0352	-	34	-
0.0259	-	27	-
0.0189	-	21	-
0.0101	-	14	-
0.0052	-	9	-
0.0026	-	7	-
0.0015	-	6	-

SUMMARY :

Gravel (%)	:	**19**
Sand (%)	:	**35**
Silt (%)	:	**40**
Clay (%)	:	**6**



Technician : K Y Sun
Date : 10/12/2008

Checked By :
Name : H W Chung
Date : 17/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 17/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 23/12/2008

Description : Dark brown, clayey, silty, gravelly SAND
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D019
Sample No. : 9
Sample Depth (m) : 14.40 - 15.40
Specimen Depth (m) : 14.40 - 15.00
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡Information provided by customer

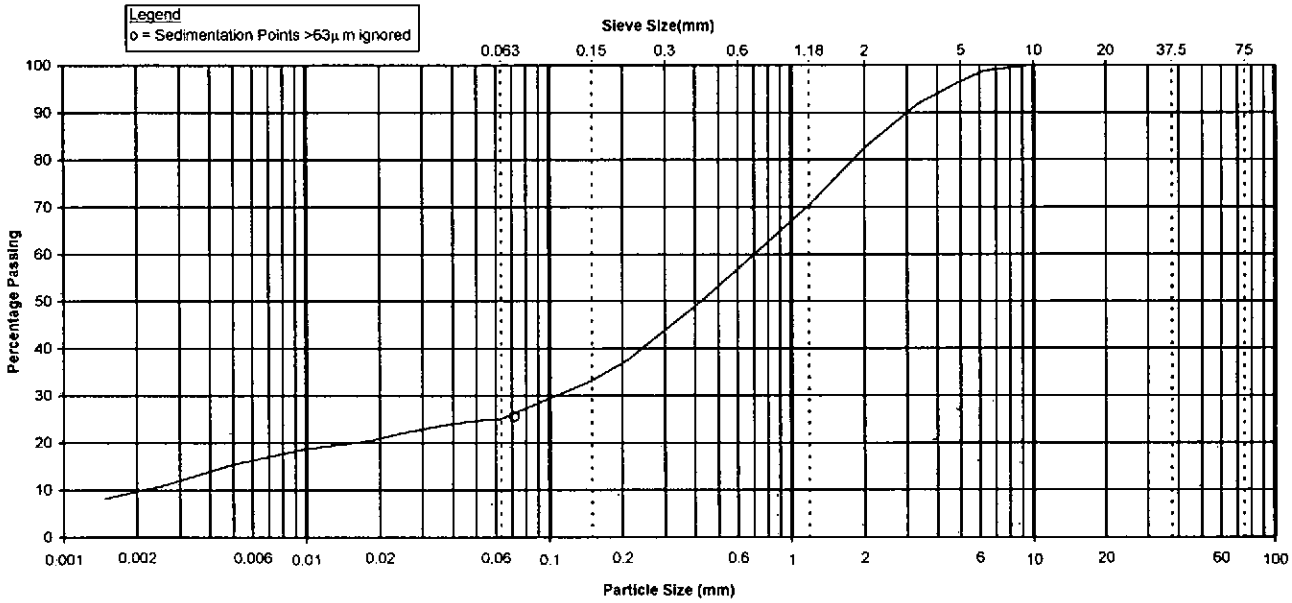
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	99	-	-
5.00 mm	96	-	-
3.35 mm	92	-	-
2.00 mm	82	-	-
1.18 mm	70	-	-
600 µm	57	-	-
425 µm	50	-	-
300 µm	44	-	-
212 µm	38	-	-
150 µm	33	-	-
63 µm	25	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0716	-	26	-
0.0509	-	25	-
0.0362	-	24	-
0.0258	-	22	-
0.0185	-	20	-
0.0097	-	19	-
0.0049	-	15	-
0.0025	-	11	-
0.0015	-	8	-

SUMMARY :

Gravel (%)	:	18
Sand (%)	:	57
Silt (%)	:	16
Clay (%)	:	9



Technician : K Y Sun
Date : 23/12/2008

Checked By :
Name : H W Chung
Date : 06/01/2009

Approved By :
Signatory : Lau Wai Cheong
Date : 06/01/2009

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

HK AS HKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 10/12/2008

Description : Dark brown, clayey, gravelly, very silty SAND
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D021
Sample No. : 5
Sample Depth (m) : 5.50 - 6.50
Specimen Depth (m) : 5.50 - 6.10
Sample Type : Mazier
Sample Origin : CDM‡

^Upon request * Delete as appropriate ‡Information provided by customer

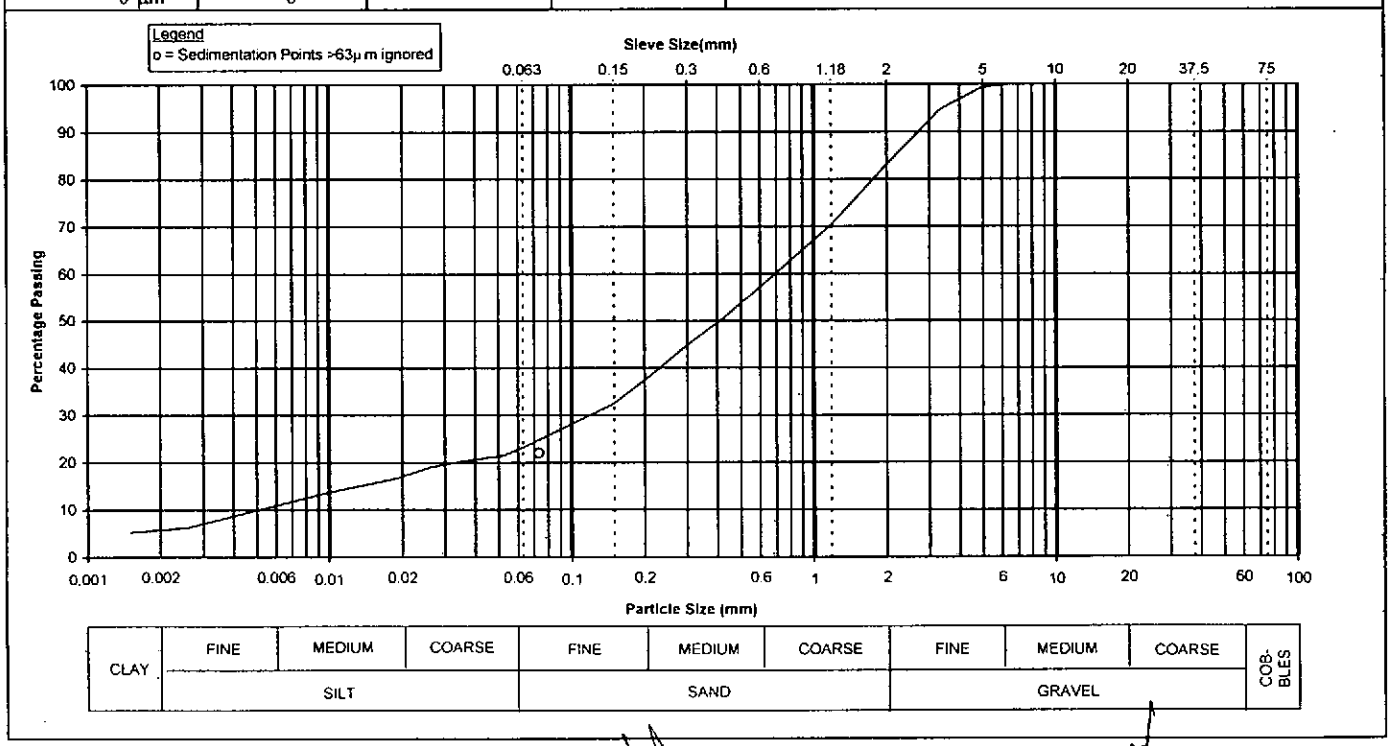
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	99	-	-
3.35 mm	95	-	-
2.00 mm	83	-	-
1.18 mm	70	-	-
600 µm	57	-	-
425 µm	51	-	-
300 µm	45	-	-
212 µm	38	-	-
150 µm	32	-	-
63 µm	23	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.63
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0734	-	22	-
0.0521	-	21	-
0.0371	-	20	-
0.0264	-	19	-
0.0190	-	17	-
0.0100	-	14	-
0.0051	-	10	-
0.0026	-	6	-
0.0015	-	5	-

SUMMARY :

Gravel (%)	:	**17**
Sand (%)	:	**60**
Silt (%)	:	**17**
Clay (%)	:	**6**



Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : K Y Sun
Date : 10/12/2008

Checked By : H W Chung
Name : H W Chung
Date : 17/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 17/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 20/12/2008

Description : Dark brown, clayey, gravelly, very silty SAND
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D022A
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.00 - 3.60
Sample Type : Mazier
Sample Origin : CDG‡

^Upon request * Delete as appropriate ‡Information provided by customer

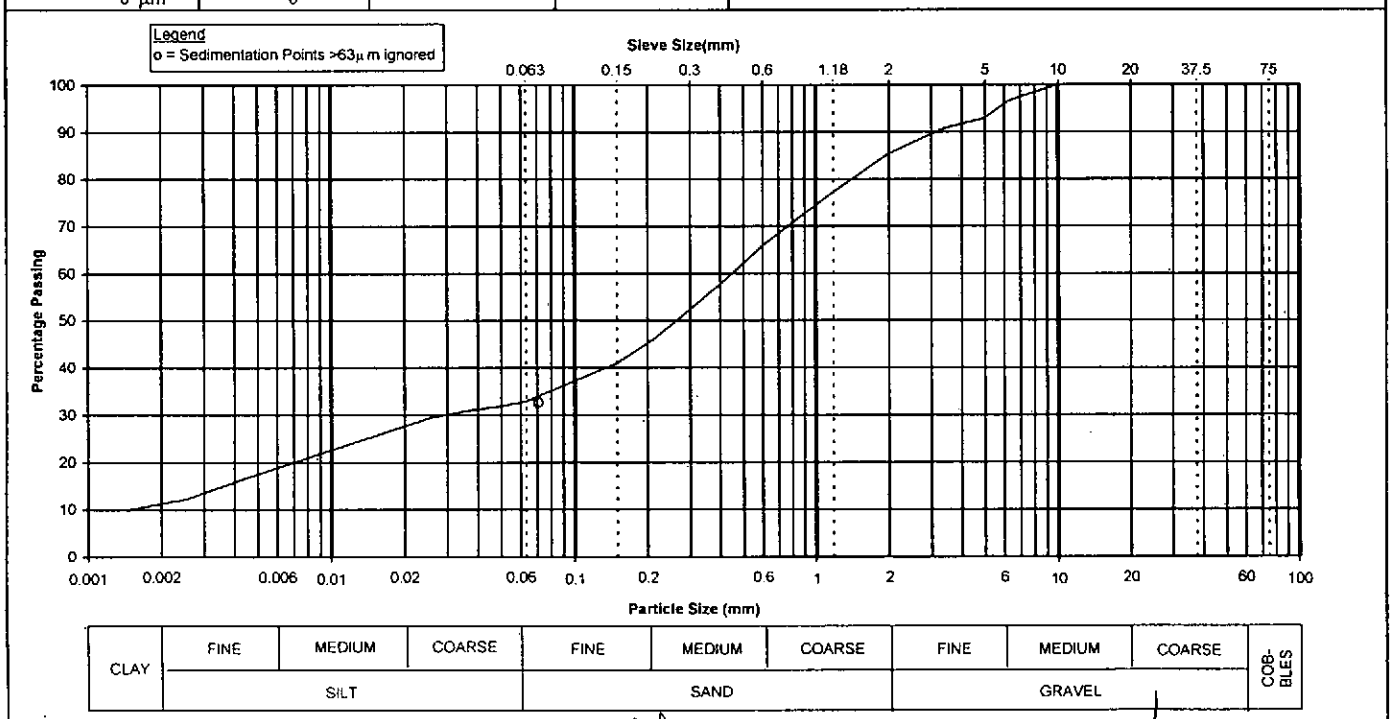
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	97	-	-
5.00 mm	93	-	-
3.35 mm	91	-	-
2.00 mm	85	-	-
1.18 mm	77	-	-
600 µm	66	-	-
425 µm	59	-	-
300 µm	52	-	-
212 µm	46	-	-
150 µm	41	-	-
63 µm	33	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.64
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0711	-	33	-
0.0505	-	32	-
0.0359	-	31	-
0.0256	-	29	-
0.0183	-	27	-
0.0097	-	22	-
0.0050	-	17	-
0.0025	-	12	-
0.0015	-	10	-

SUMMARY :

Gravel (%)	:	15
Sand (%)	:	52
Silt (%)	:	22
Clay (%)	:	11



Technician : K Y Sun
Date : 20/12/2008

Checked By : H W Chung
Name : H W Chung
Date : 03/01/2009

Approved By : Lau Wai Cheong
Signatory : Lau Wai Cheong
Date : 03/01/2009

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TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 16/12/2008

Description : Dark brown, clayey, gravelly, very silty SAND
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D022A
Sample No. : 21
Sample Depth (m) : 15.50 - 16.50
Specimen Depth (m) : 15.50 - 16.10
Sample Type : Mazier
Sample Origin : CDG‡

^Upon request * Delete as appropriate ‡Information provided by customer

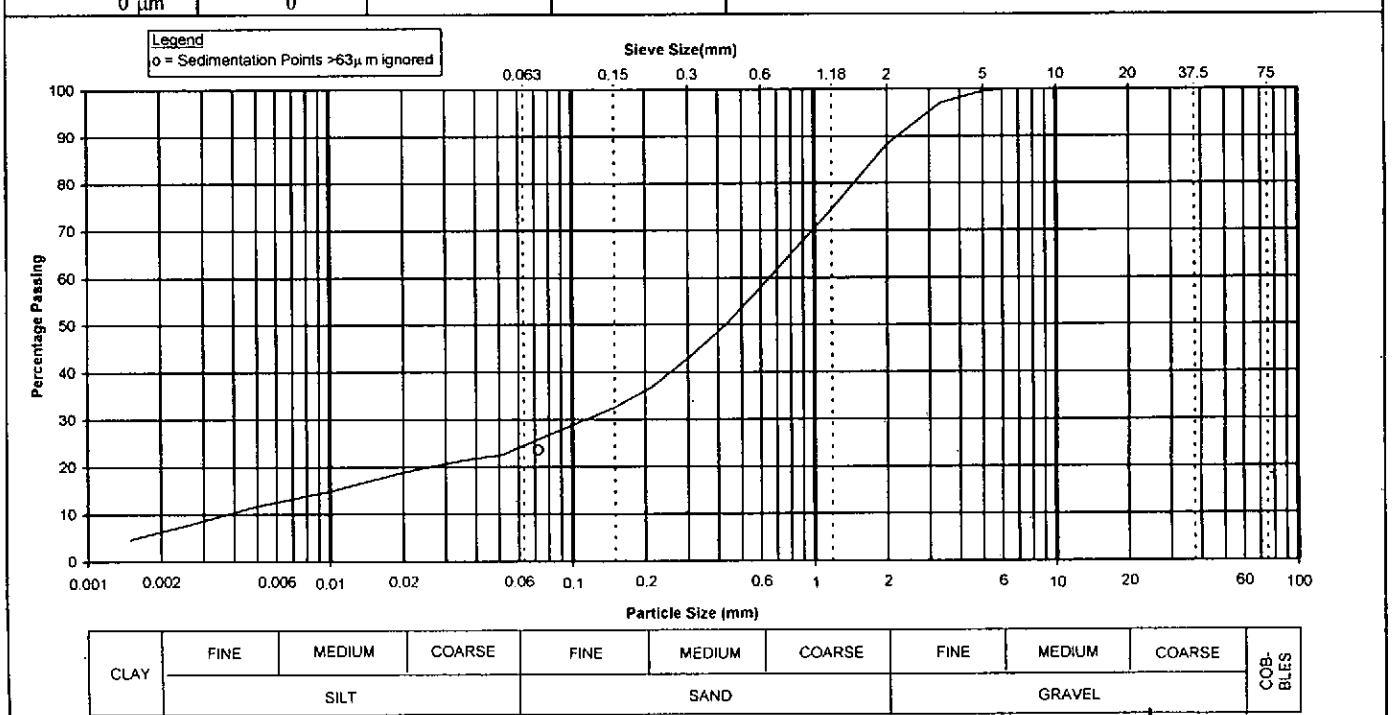
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	99	-	-
3.35 mm	97	-	-
2.00 mm	88	-	-
1.18 mm	74	-	-
600 µm	58	-	-
425 µm	50	-	-
300 µm	43	-	-
212 µm	37	-	-
150 µm	32	-	-
63 µm	24	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0725	-	24	-
0.0516	-	22	-
0.0367	-	21	-
0.0262	-	20	-
0.0187	-	18	-
0.0099	-	15	-
0.0050	-	12	-
0.0026	-	8	-
0.0015	-	5	-

SUMMARY :

Gravel (%)	:	**12**
Sand (%)	:	**64**
Silt (%)	:	**18**
Clay (%)	:	**6**



Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : K Y Sun
Date : 16/12/2008

Checked By :
Name : H W Chung
Date : 24/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 24/12/2008

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 16/12/2008

Description : Dark brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D033
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.00 - 3.60
Sample Type : Mazier
Sample Origin : COL‡

^Upon request * Delete as appropriate ‡Information provided by customer

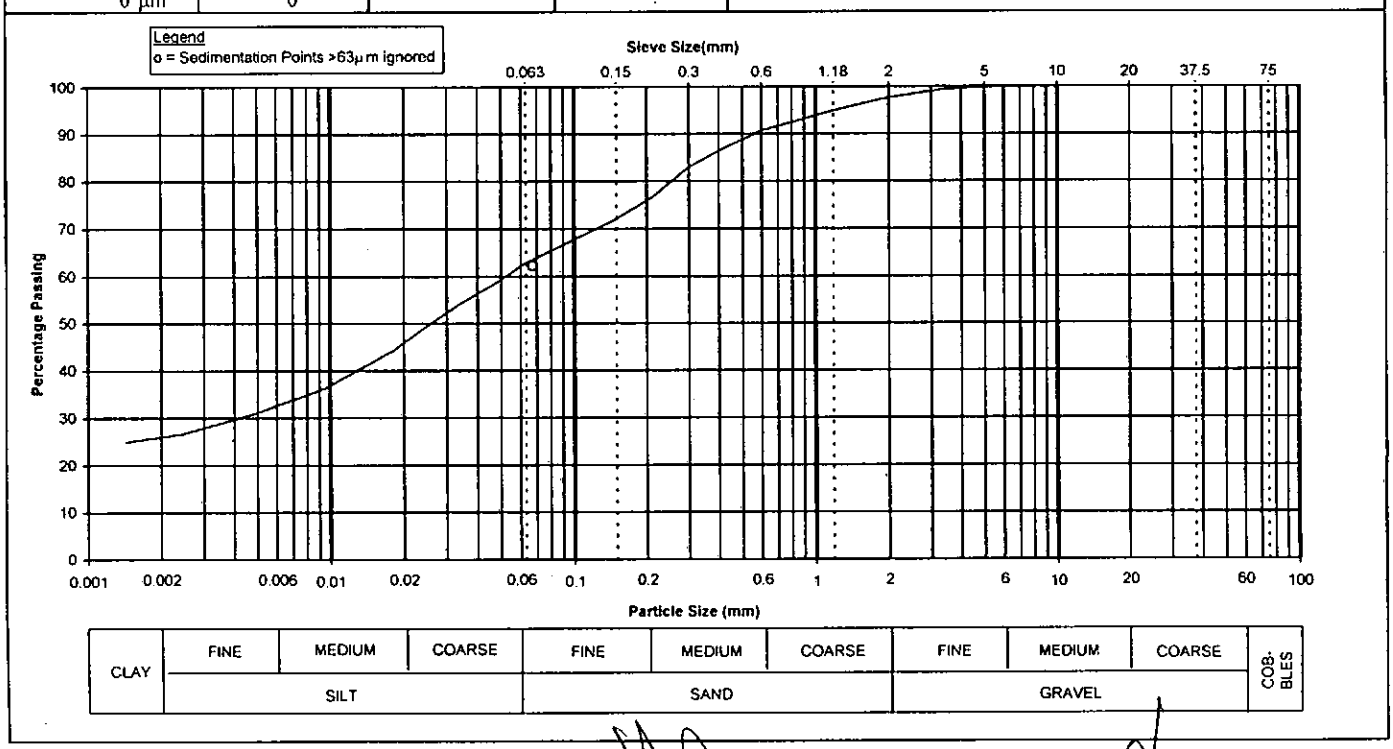
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	99	-	-
2.00 mm	98	-	-
1.18 mm	95	-	-
600 µm	91	-	-
425 µm	87	-	-
300 µm	83	-	-
212 µm	77	-	-
150 µm	72	-	-
63 µm	63	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.63
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0671	-	62	-
0.0482	-	59	-
0.0347	-	54	-
0.0250	-	49	-
0.0180	-	44	-
0.0096	-	36	-
0.0049	-	31	-
0.0025	-	27	-
0.0014	-	25	-

SUMMARY :

Gravel (%)	:	2
Sand (%)	:	35
Silt (%)	:	37
Clay (%)	:	26



Technician : K Y Sun
Date : 16/12/2008

Checked By : H W Chung
Name : H W Chung
Date : 24/12/2008

Approved By : Lau Wai Cheong
Signatory : Lau Wai Cheong
Date : 24/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 10/12/2008

Description : Orangish brown, slightly sandy, SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D033
Sample No. : 5
Sample Depth (m) : 5.60 - 6.60
Specimen Depth (m) : 5.60 - 6.20
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡ Information provided by customer

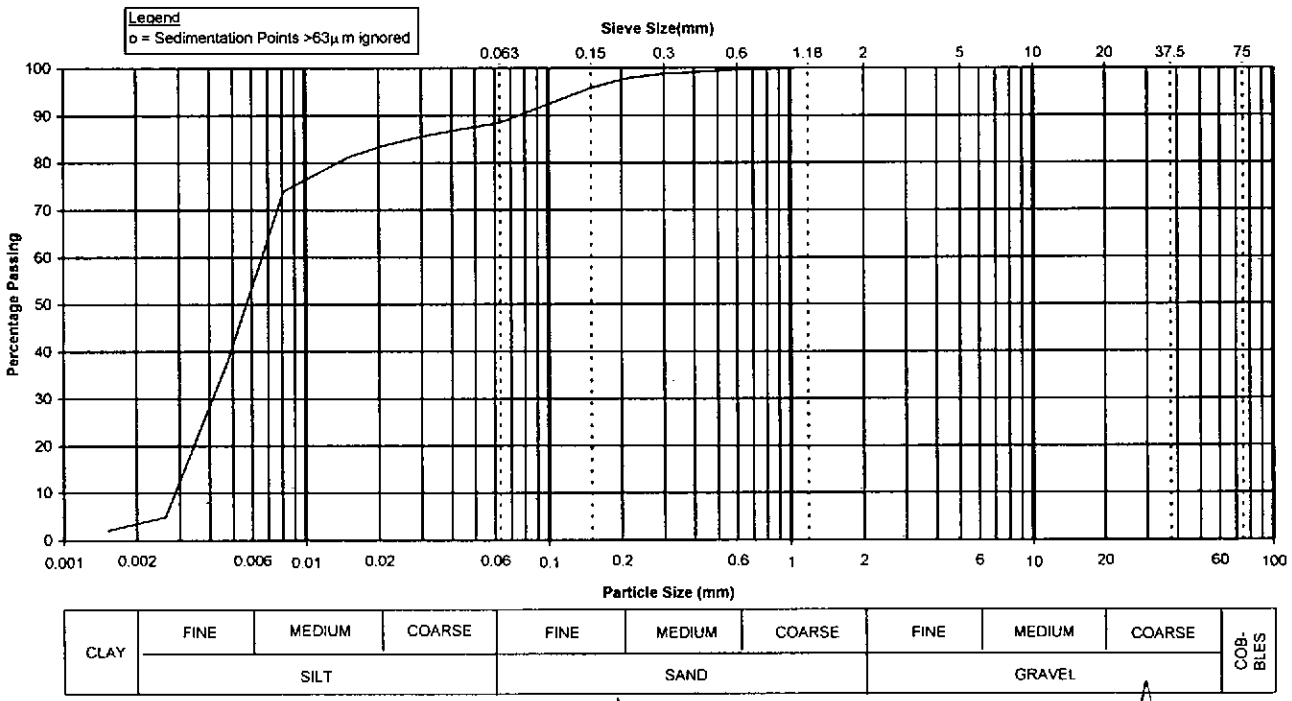
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	99	-	-
300 µm	99	-	-
212 µm	98	-	-
150 µm	96	-	-
63 µm	88	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0587	-	88	-
0.0418	-	87	-
0.0298	-	85	-
0.0213	-	84	-
0.0152	-	81	-
0.0082	-	74	-
0.0047	-	37	-
0.0026	-	5	-
0.0015	-	2	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**12**
Silt (%)	:	**85**
Clay (%)	:	**3**



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Technician : K Y Sun
Date : 10/12/2008

Checked By :
Name : H W Chung
Date : 17/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 17/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 16/12/2008

Description : Dark brown, clayey, very sandy, very silty GRAVEL
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D040
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.40 - 3.60
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡Information provided by customer

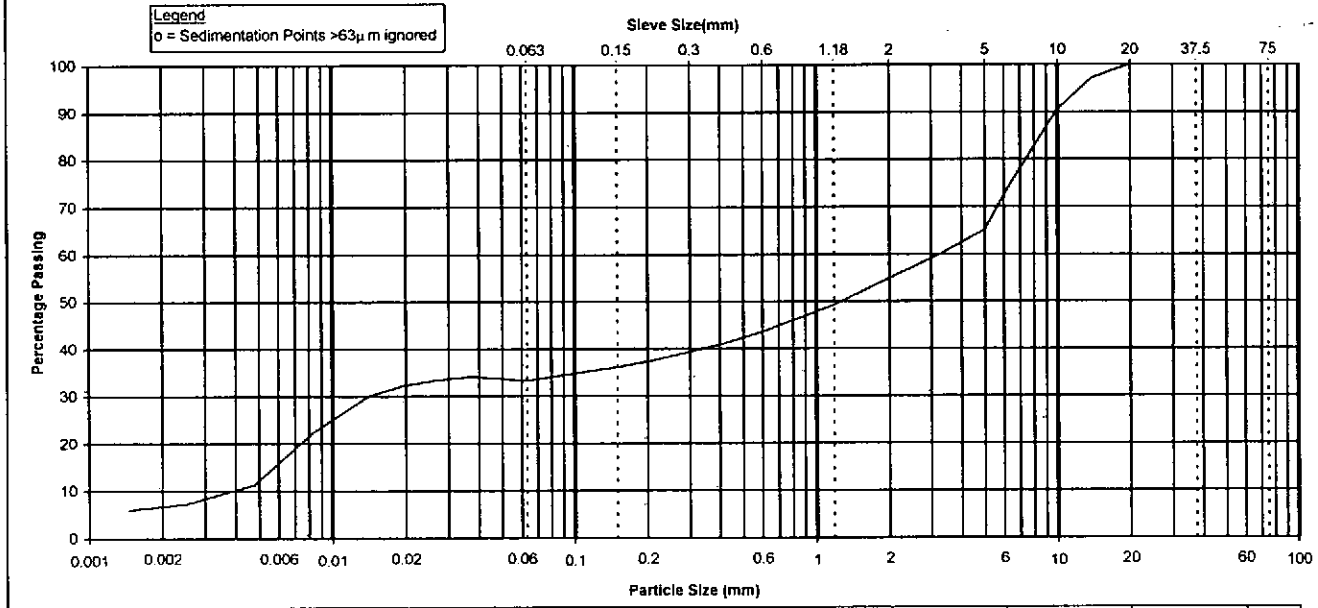
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	97	-	-
10.0 mm	90	-	-
6.30 mm	74	-	-
5.00 mm	65	-	-
3.35 mm	60	-	-
2.00 mm	55	-	-
1.18 mm	49	-	-
600 µm	44	-	-
425 µm	41	-	-
300 µm	39	-	-
212 µm	38	-	-
150 µm	36	-	-
63 µm	33	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0525	-	34	-
0.0374	-	34	-
0.0268	-	33	-
0.0195	-	32	-
0.0143	-	30	-
0.0084	-	22	-
0.0048	-	11	-
0.0025	-	7	-
0.0015	-	6	-

SUMMARY :

Gravel (%)	:	**45**
Sand (%)	:	**22**
Silt (%)	:	**26**
Clay (%)	:	**7**



Technician : K Y Sun
Date : 16/12/2008

Checked By : H W Chung
Name : H W Chung
Date : 24/12/2008

Approved By : Lau Wai Cheong
Signatory : Lau Wai Cheong
Date : 24/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 035

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 21/11/2008

Description : Brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D041
Sample No. : 1
Sample Depth (m) : 5.00 - 6.00
Specimen Depth (m) : 5.00 - 5.60
Sample Type : Mazier
Sample Origin : CDS‡

^ Upon request * Delete as appropriate ‡ Information provided by customer

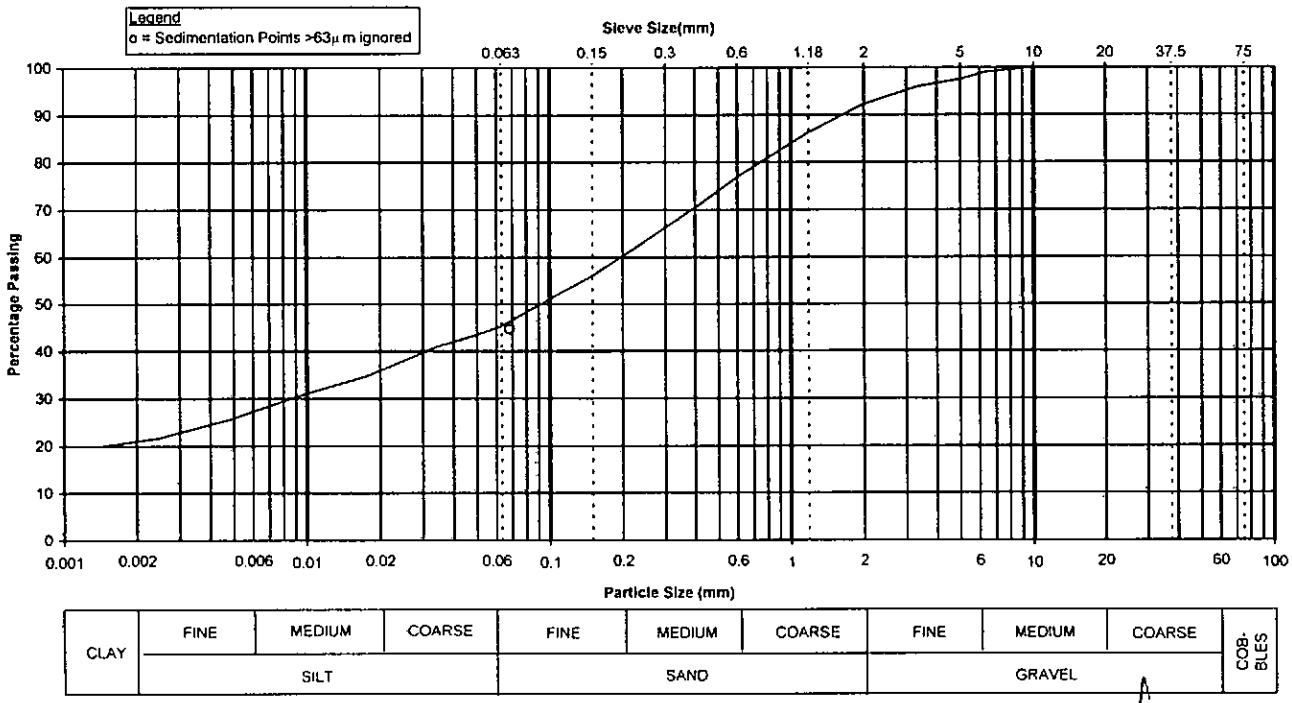
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	99	-	-
5.00 mm	97	-	-
3.35 mm	96	-	-
2.00 mm	92	-	-
1.18 mm	86	-	-
600 µm	77	-	-
425 µm	71	-	-
300 µm	66	-	-
212 µm	61	-	-
150 µm	56	-	-
63 µm	45	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0683	-	45	-
0.0487	-	43	-
0.0348	-	41	-
0.0250	-	38	-
0.0179	-	35	-
0.0094	-	31	-
0.0048	-	26	-
0.0025	-	22	-
0.0014	-	20	-

SUMMARY :

Gravel (%)	:	**8**
Sand (%)	:	**47**
Silt (%)	:	**24**
Clay (%)	:	**21**



Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : K Y Sun
Date : 21/11/2008

Checked By : Name : H W Chung
Date : 25/11/2008

Approved By : Signatory : Lau Wai Cheong
Date : 25/11/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKLAS 033

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 10/12/2008

Description : Dark grey, slightly clayey, silty, very gravelly SAND
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D042
Sample No. : 1
Sample Depth (m) : 5.00 - 6.00
Specimen Depth (m) : 5.80 - 6.00
Sample Type : Mazier
Sample Origin : MD‡

^Upon request * Delete as appropriate ‡Information provided by customer

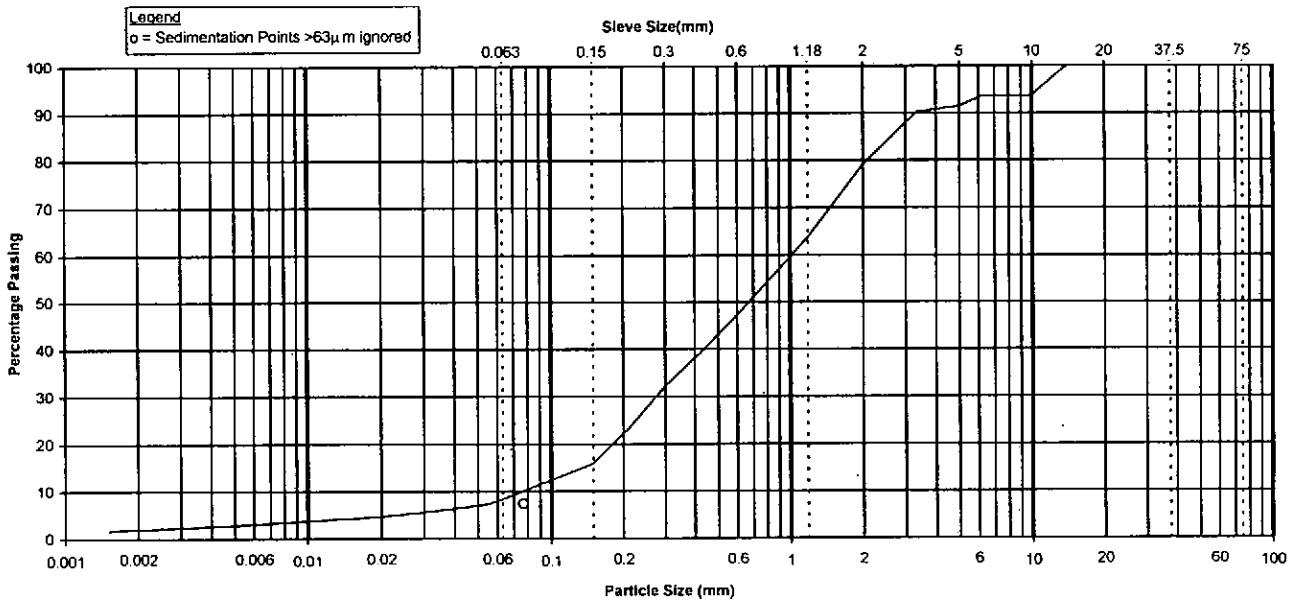
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	94	-	-
6.30 mm	94	-	-
5.00 mm	91	-	-
3.35 mm	90	-	-
2.00 mm	79	-	-
1.18 mm	64	-	-
600 µm	47	-	-
425 µm	39	-	-
300 µm	32	-	-
212 µm	23	-	-
150 µm	16	-	-
63 µm	8	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0768	-	7	-
0.0544	-	7	-
0.0388	-	6	-
0.0277	-	5	-
0.0197	-	5	-
0.0103	-	4	-
0.0052	-	3	-
0.0026	-	2	-
0.0015	-	2	-

SUMMARY :

Gravel (%)	:	**21**
Sand (%)	:	**71**
Silt (%)	:	**6**
Clay (%)	:	**2**



Technician : K Y Sun
Date : 10/12/2008

Checked By :
Name : H W Chung
Date : 17/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 17/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 035

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 27/11/2008

Description : Brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D042
Sample No. : 7
Sample Depth (m) : 9.00 - 10.00
Specimen Depth (m) : 9.80 - 10.00
Sample Type : Mazier
Sample Origin : CDG‡

^Upon request * Delete as appropriate ‡Information provided by customer

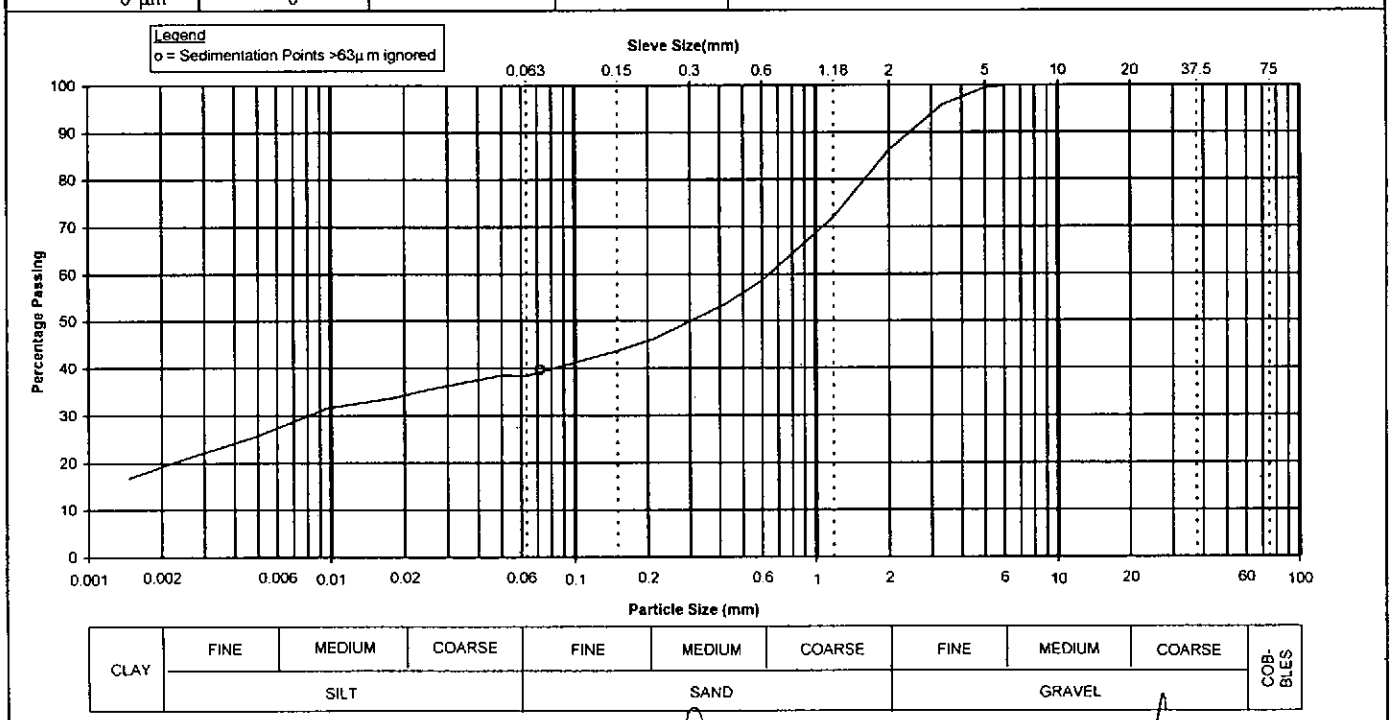
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	99	-	-
3.35 mm	96	-	-
2.00 mm	86	-	-
1.18 mm	72	-	-
600 µm	59	-	-
425 µm	54	-	-
300 µm	50	-	-
212 µm	46	-	-
150 µm	44	-	-
63 µm	38	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.60
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0718	-	40	-
0.0510	-	39	-
0.0363	-	37	-
0.0258	-	36	-
0.0184	-	34	-
0.0096	-	31	-
0.0049	-	26	-
0.0025	-	21	-
0.0015	-	17	-

SUMMARY :

Gravel (%)	:	**14**
Sand (%)	:	**48**
Silt (%)	:	**19**
Clay (%)	:	**19**



Technician : K Y Sun
Date : 27/11/2008

Checked By :
Name : H W Chung
Date : 02/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 02/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKLAS

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 24/11/2008

Description : Light grey, slightly gravelly, slightly sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D046
Sample No. : 1
Sample Depth (m) : 8.00 - 9.00
Specimen Depth (m) : 8.00 - 8.60
Sample Type : Mazier
Sample Origin : FILL‡

^Upon request * Delete as appropriate ‡Information provided by customer

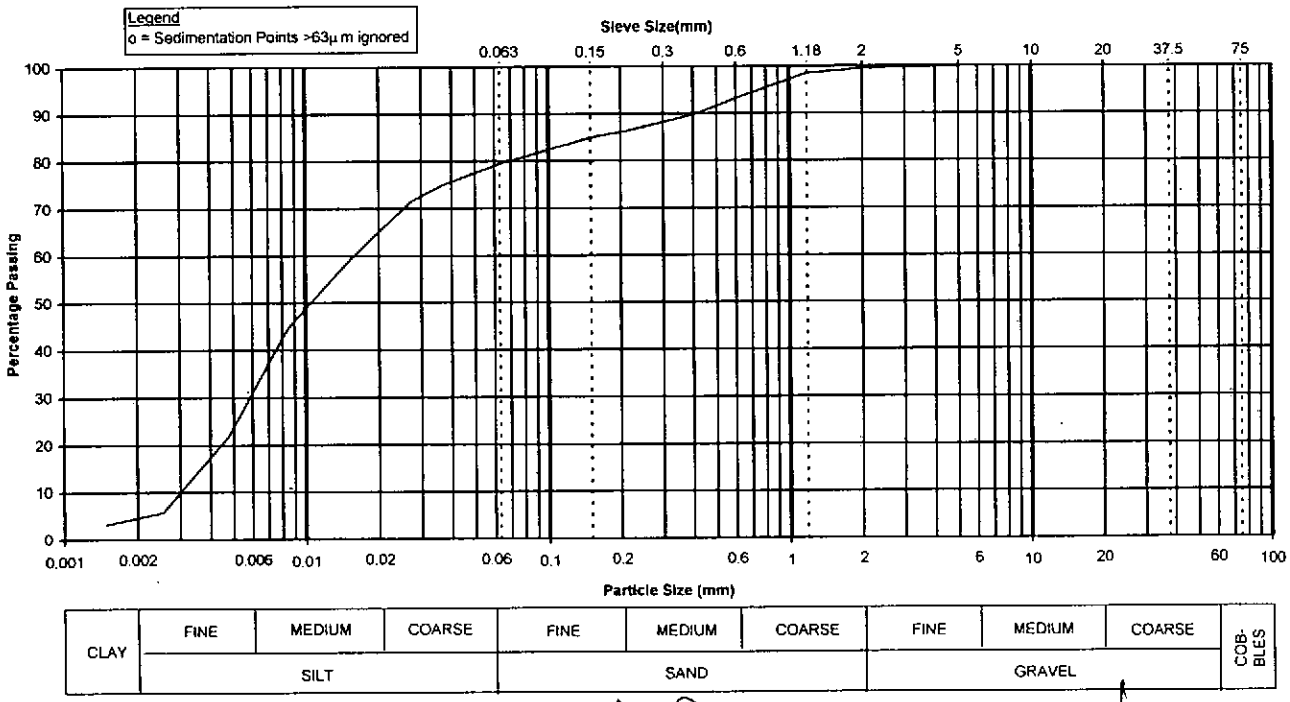
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	99	-	-
1.18 mm	98	-	-
600 µm	93	-	-
425 µm	90	-	-
300 µm	88	-	-
212 µm	86	-	-
150 µm	85	-	-
63 µm	79	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.71
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0521	-	78	-
0.0376	-	75	-
0.0274	-	72	-
0.0204	-	65	-
0.0151	-	59	-
0.0085	-	45	-
0.0048	-	22	-
0.0026	-	6	-
0.0015	-	3	-

SUMMARY :

Gravel (%)	:	**1**
Sand (%)	:	**20**
Silt (%)	:	**75**
Clay (%)	:	**4**



Technician : K Y Sun
Date : 24/11/2008

Checked By : H W Chung
Name : H W Chung
Date : 28/11/2008

Approved By : Lau Wai Cheong
Signatory : Lau Wai Cheong
Date : 28/11/2008

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 03/12/2008

Description : Brown, slightly sandy, slightly gravelly, SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D051
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.20 - 3.60
Sample Type : Mazier
Sample Origin : HDV‡

^ Upon request * Delete as appropriate ‡ Information provided by customer

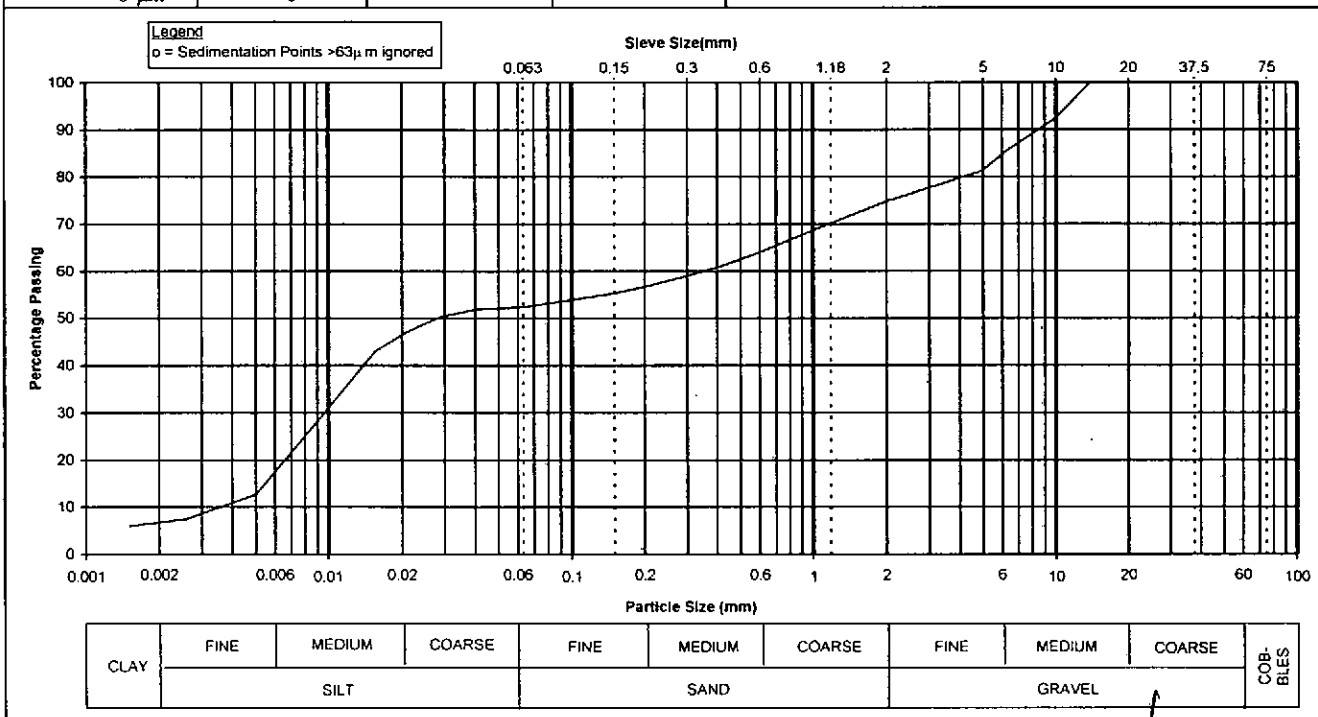
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	92	-	-
6.30 mm	85	-	-
5.00 mm	81	-	-
3.35 mm	78	-	-
2.00 mm	75	-	-
1.18 mm	70	-	-
600 µm	64	-	-
425 µm	61	-	-
300 µm	59	-	-
212 µm	57	-	-
150 µm	55	-	-
63 µm	52	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.61
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0563	-	53	-
0.0404	-	52	-
0.0290	-	50	-
0.0212	-	47	-
0.0156	-	43	-
0.0091	-	28	-
0.0050	-	13	-
0.0026	-	8	-
0.0015	-	6	-

SUMMARY :

Gravel (%)	:	**25**
Sand (%)	:	**23**
Silt (%)	:	**45**
Clay (%)	:	**7**



Technician : K Y Sun
Date : 03/12/2008

Checked By : H W Chung
Name : H W Chung
Date : 09/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 09/12/2008

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Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 17/12/2008

Description : Greyish brown, slightly sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D054
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.00 - 3.60
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡Information provided by customer

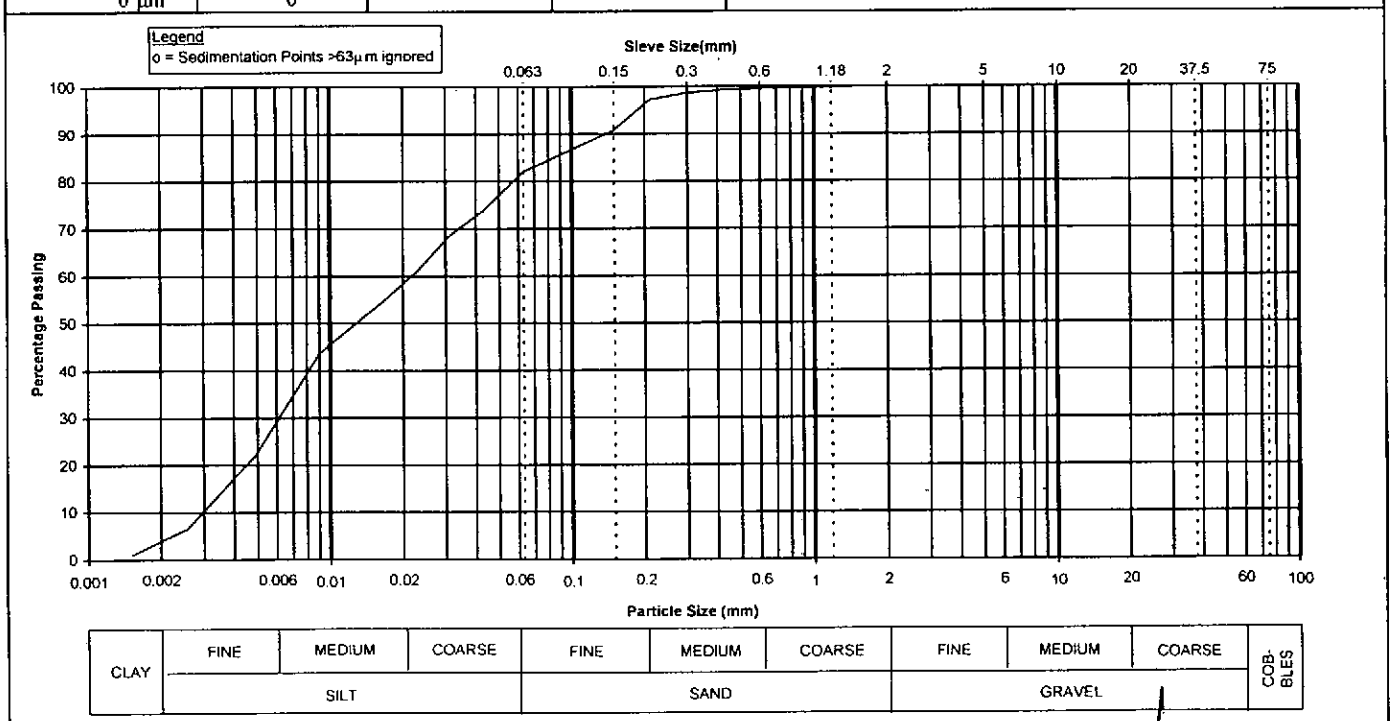
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	99	-	-
300 µm	99	-	-
212 µm	97	-	-
150 µm	91	-	-
63 µm	82	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.69
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0594	-	78	-
0.0429	-	74	-
0.0312	-	68	-
0.0229	-	61	-
0.0167	-	55	-
0.0090	-	44	-
0.0049	-	22	-
0.0026	-	7	-
0.0015	-	1	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**18**
Silt (%)	:	**79**
Clay (%)	:	**3**



Technician : K Y Sun
Date : 17/12/2008

Checked By :
Name : H W Chung
Date : 24/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 24/12/2008

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Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 13/12/2008

Description : Brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D055
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.40 - 3.80
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡Information provided by customer

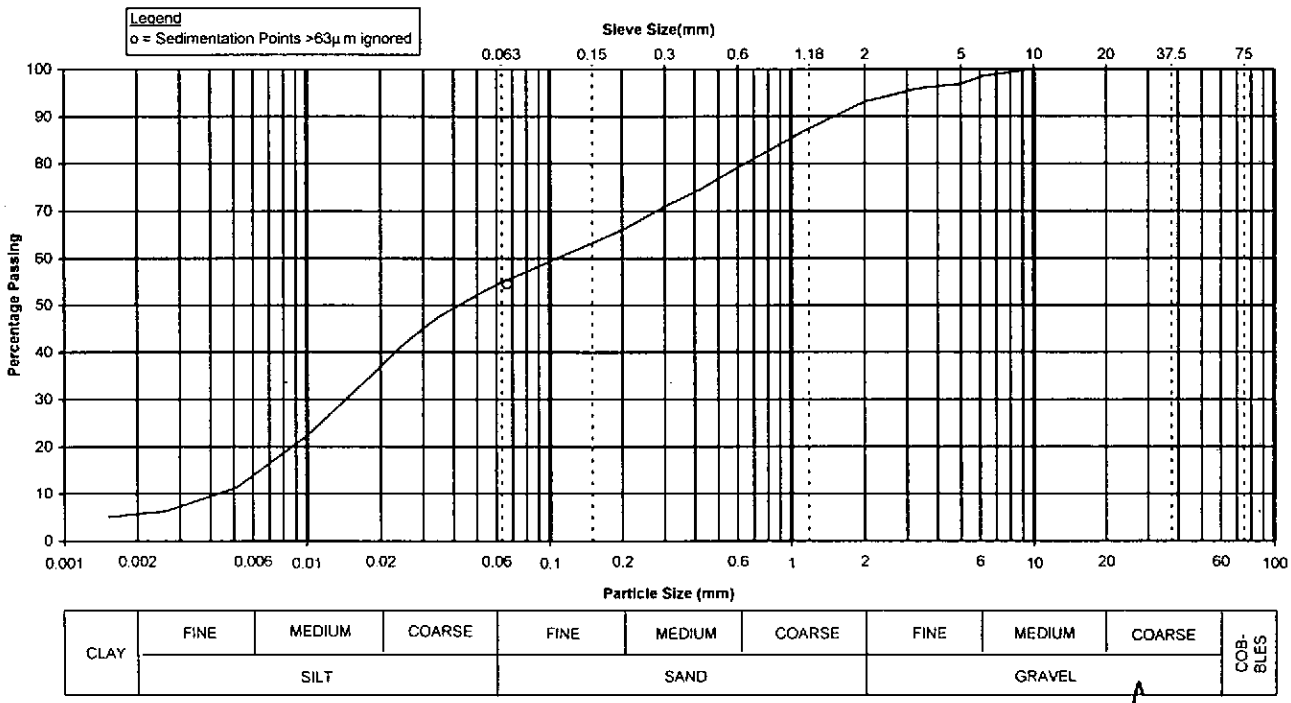
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	99	-	-
5.00 mm	97	-	-
3.35 mm	96	-	-
2.00 mm	93	-	-
1.18 mm	87	-	-
600 µm	79	-	-
425 µm	75	-	-
300 µm	71	-	-
212 µm	67	-	-
150 µm	63	-	-
63 µm	55	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.62
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0666	-	55	-
0.0478	-	52	-
0.0345	-	47	-
0.0251	-	42	-
0.0183	-	35	-
0.0099	-	22	-
0.0052	-	11	-
0.0026	-	6	-
0.0015	-	5	-

SUMMARY :

Gravel (%)	:	**7**
Sand (%)	:	**38**
Silt (%)	:	**49**
Clay (%)	:	**6**



Technician : K Y Sun
Date : 13/12/2008

Checked By : H W Chung
Name : H W Chung
Date : 19/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 19/12/2008

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Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 23/11/2008

Description : Dark brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D059
Sample No. : 1
Sample Depth (m) : 3.50 - 4.50
Specimen Depth (m) : 3.70 - 4.10
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡Information provided by customer

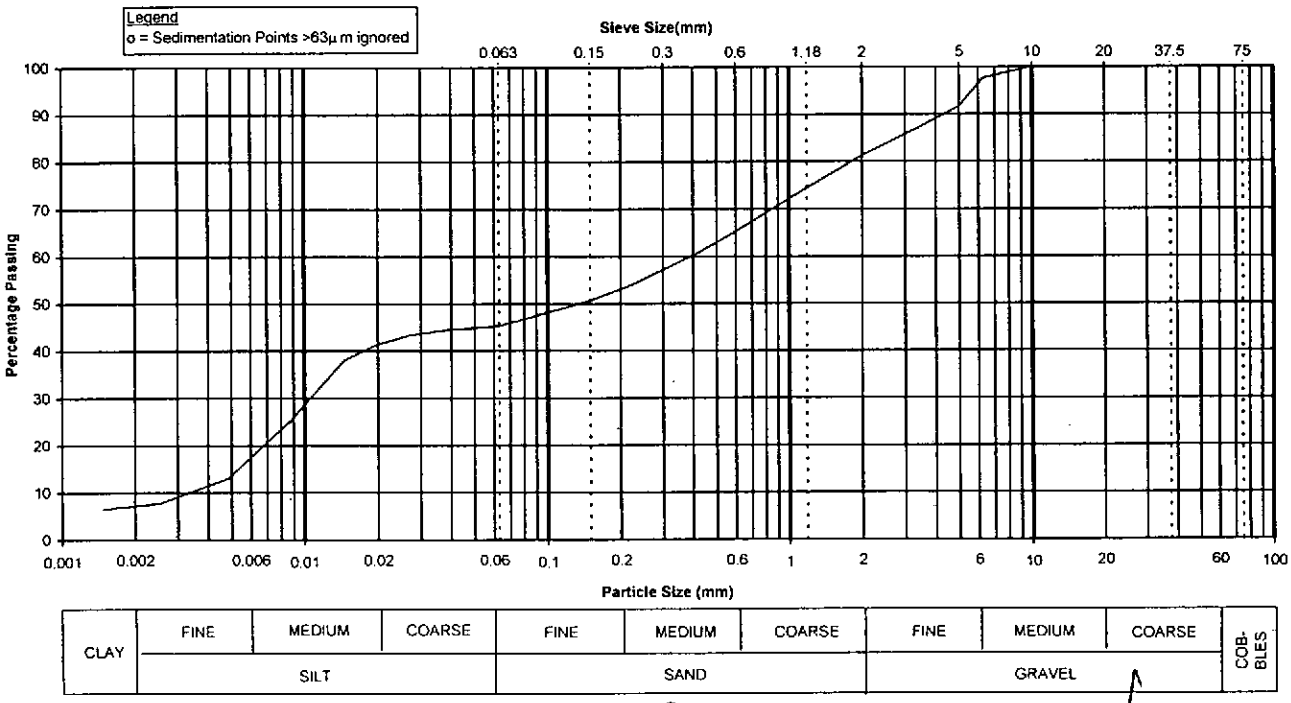
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	98	-	-
5.00 mm	91	-	-
3.35 mm	87	-	-
2.00 mm	81	-	-
1.18 mm	74	-	-
600 µm	65	-	-
425 µm	61	-	-
300 µm	57	-	-
212 µm	54	-	-
150 µm	51	-	-
63 µm	45	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.64
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0529	-	45	-
0.0379	-	44	-
0.0272	-	43	-
0.0198	-	41	-
0.0147	-	38	-
0.0088	-	25	-
0.0049	-	13	-
0.0025	-	8	-
0.0015	-	7	-

SUMMARY :

Gravel (%)	:	**19**
Sand (%)	:	**36**
Silt (%)	:	**38**
Clay (%)	:	**7**



Technician : K Y Sun
Date : 23/11/2008

Checked By : Name : H W Chung
Date : 27/11/2008

Approved By : Signatory : Lau Wai Cheong
Date : 27/11/2008

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Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 22/11/2008

Description : Brown, slightly sandy, gravelly, SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D065
Sample No. : 8
Sample Depth (m) : 4.50 - 5.50
Specimen Depth (m) : 4.50 - 5.10
Sample Type : Mazier
Sample Origin : HDT‡

*Upon request * Delete as appropriate ‡Information provided by customer

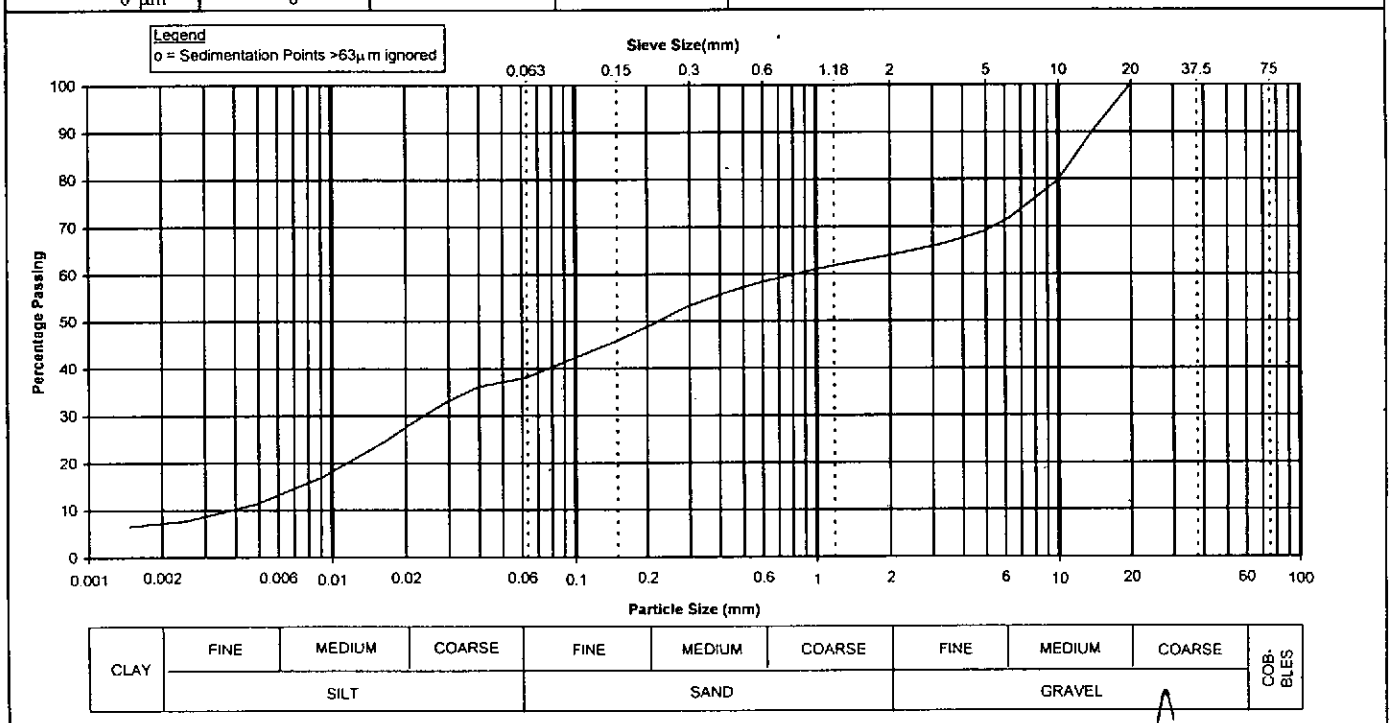
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	*Expanded Uncertainty of the Percent Passing (%)	*Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	90	-	-
10.0 mm	80	-	-
6.30 mm	72	-	-
5.00 mm	69	-	-
3.35 mm	66	-	-
2.00 mm	64	-	-
1.18 mm	62	-	-
600 µm	58	-	-
425 µm	56	-	-
300 µm	53	-	-
212 µm	49	-	-
150 µm	46	-	-
63 µm	38	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.63
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	*Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	*Expanded Uncertainty of % finer than D (%)
0.0544	-	38	-
0.0396	-	36	-
0.0294	-	33	-
0.0220	-	29	-
0.0165	-	25	-
0.0092	-	17	-
0.0049	-	11	-
0.0025	-	8	-
0.0015	-	7	-

SUMMARY :

Gravel (%)	:	**36**
Sand (%)	:	**26**
Silt (%)	:	**31**
Clay (%)	:	**7**



Technician : K Y Sun
Date : 22/11/2008

Checked By : H W Chung
Name : H W Chung
Date : 26/11/2008

Approved By : Lau Wai Cheong
Signatory : Lau Wai Cheong
Date : 26/11/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 20/12/2008

Description : Dark brown, slightly sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D071
Sample No. : 9
Sample Depth (m) : 8.00 - 9.00
Specimen Depth (m) : 8.00 - 8.60
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡Information provided by customer

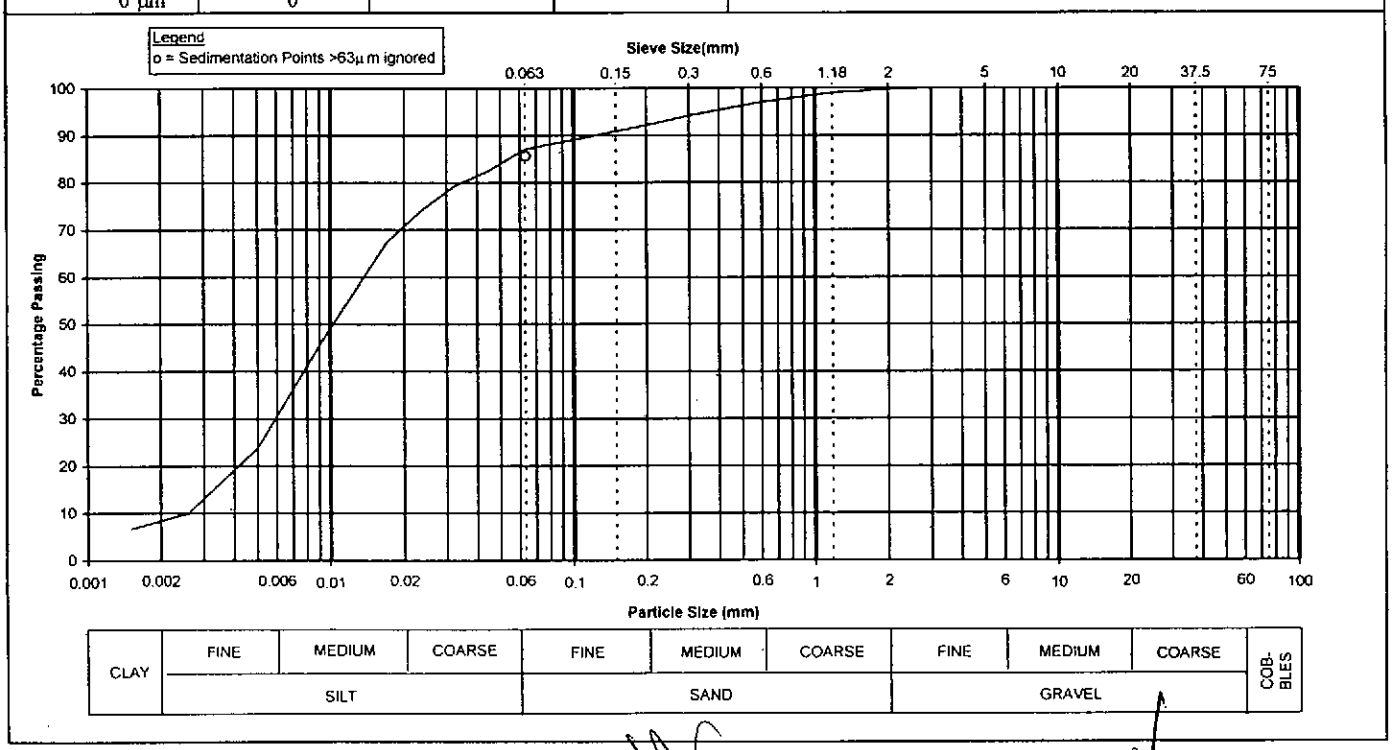
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	99	-	-
600 µm	97	-	-
425 µm	96	-	-
300 µm	94	-	-
212 µm	92	-	-
150 µm	91	-	-
63 µm	87	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0637	-	86	-
0.0455	-	83	-
0.0326	-	79	-
0.0235	-	74	-
0.0170	-	67	-
0.0094	-	47	-
0.0050	-	24	-
0.0026	-	10	-
0.0015	-	7	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**13**
Silt (%)	:	**79**
Clay (%)	:	**8**



Technician : K Y Sun
Date : 20/12/2008

Checked By :
Name : H W Chung
Date : 03/01/2009

Approved By :
Signatory : Lau Wai Cheong
Date : 03/01/2009

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 29/11/2008

Description : Dark brown, slightly sandy, gravelly, SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D090
Sample No. : 2
Sample Depth (m) : 4.00 - 5.00
Specimen Depth (m) : 4.00 - 4.60
Sample Type : Mazier
Sample Origin : CDT‡

^ Upon request * Delete as appropriate ‡ Information provided by customer

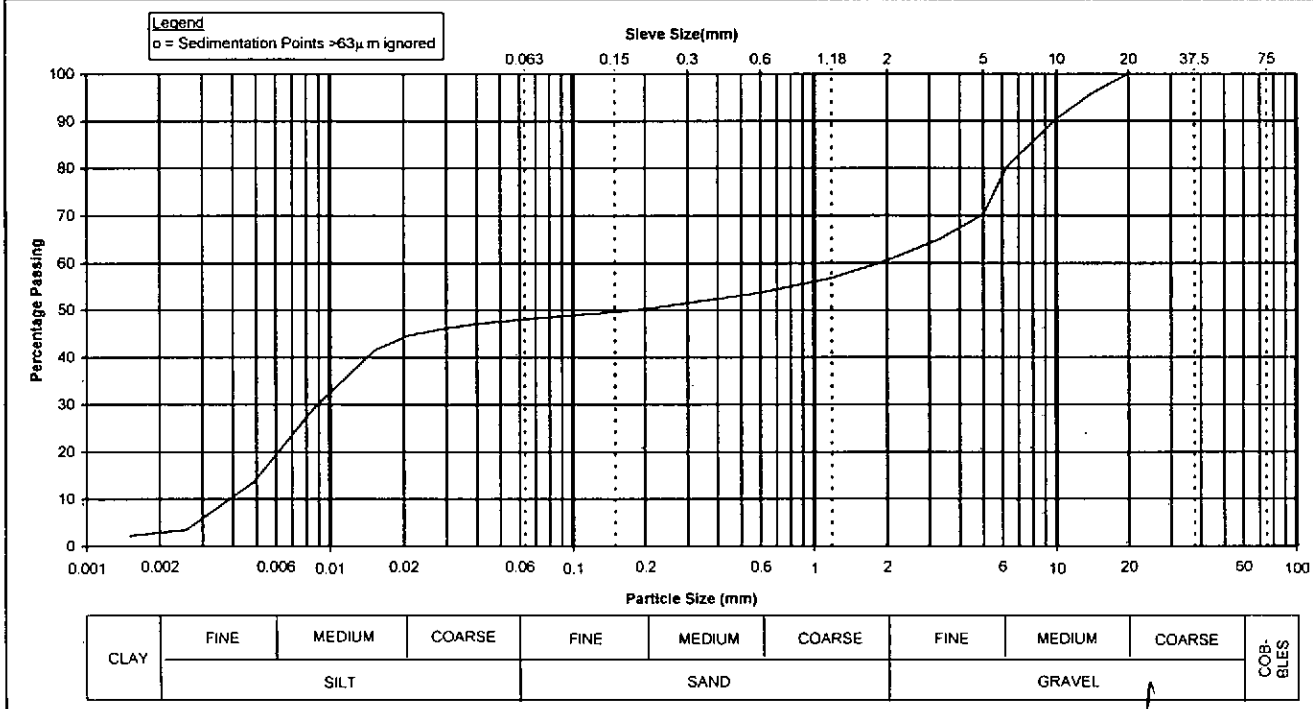
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	96	-	-
10.0 mm	90	-	-
6.30 mm	80	-	-
5.00 mm	70	-	-
3.35 mm	65	-	-
2.00 mm	61	-	-
1.18 mm	57	-	-
600 µm	54	-	-
425 µm	53	-	-
300 µm	52	-	-
212 µm	50	-	-
150 µm	50	-	-
63 µm	48	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.68
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0570	-	48	-
0.0406	-	47	-
0.0291	-	46	-
0.0209	-	45	-
0.0152	-	41	-
0.0087	-	29	-
0.0049	-	14	-
0.0026	-	3	-
0.0015	-	2	-

SUMMARY :

Gravel (%)	:	**39**
Sand (%)	:	**13**
Silt (%)	:	**45**
Clay (%)	:	**3**



Technician : K Y Sun
Date : 29/11/2008

Checked By : H W Chung
Name : H W Chung
Date : 04/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 04/12/2008

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 17/12/2008

Description : Brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : D092
Sample No. : 1
Sample Depth (m) : 13.00 - 14.00
Specimen Depth (m) : 13.00 - 13.60
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡ Information provided by customer

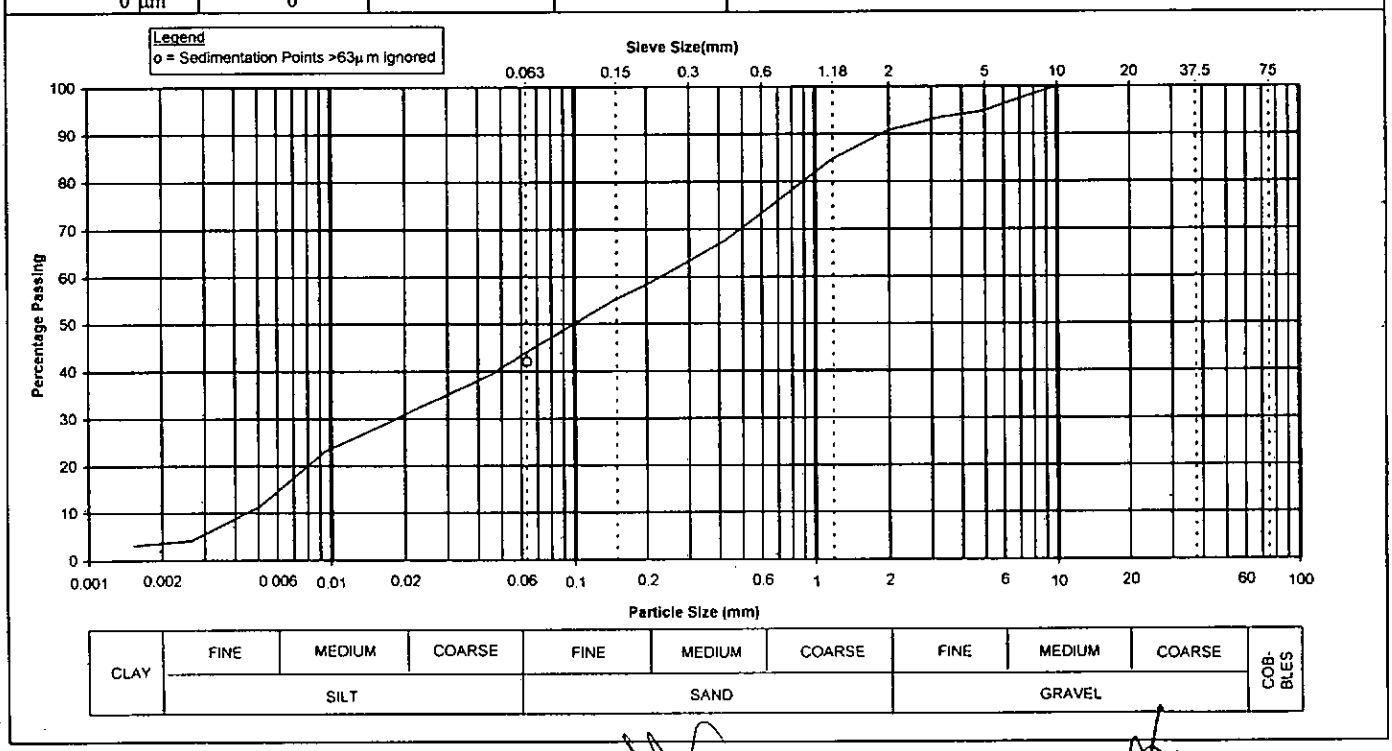
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	97	-	-
5.00 mm	95	-	-
3.35 mm	94	-	-
2.00 mm	91	-	-
1.18 mm	85	-	-
600 µm	73	-	-
425 µm	68	-	-
300 µm	63	-	-
212 µm	59	-	-
150 µm	55	-	-
63 µm	44	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.60
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0637	-	42	-
0.0460	-	39	-
0.0335	-	36	-
0.0242	-	33	-
0.0176	-	29	-
0.0095	-	23	-
0.0051	-	11	-
0.0026	-	4	-
0.0015	-	3	-

SUMMARY :

Gravel (%)	:	**9**
Sand (%)	:	**47**
Silt (%)	:	**40**
Clay (%)	:	**4**



Technician : K Y Sun
Date : 17/12/2008

Checked By :
Name : H W Chung
Date : 24/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 24/12/2008

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Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 13/12/2008

Description : Brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH01
Sample No. : 5
Sample Depth (m) : 7.00 - 8.00
Specimen Depth (m) : 7.00 - 7.60
Sample Type : Mazier
Sample Origin : CDM‡

^Upon request * Delete as appropriate ‡Information provided by customer

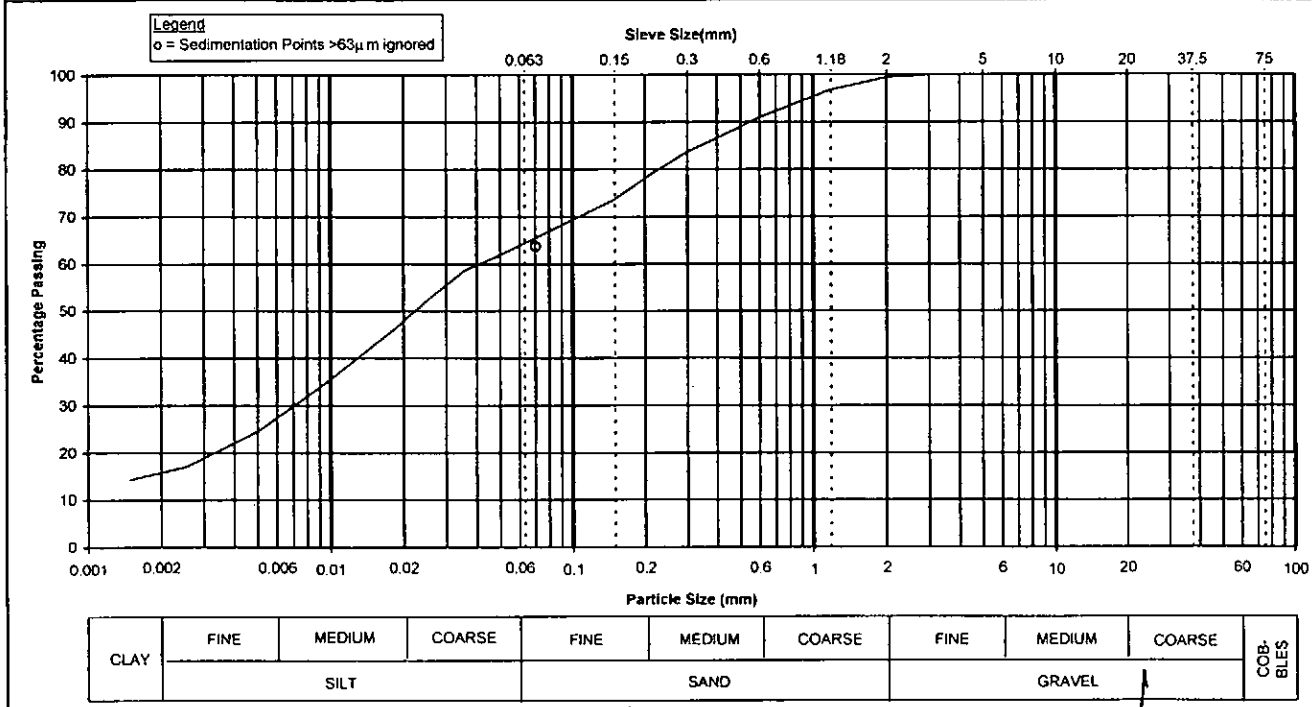
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	99	-	-
1.18 mm	97	-	-
600 µm	91	-	-
425 µm	87	-	-
300 µm	84	-	-
212 µm	79	-	-
150 µm	74	-	-
63 µm	64	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0704	-	64	-
0.0500	-	62	-
0.0357	-	59	-
0.0257	-	53	-
0.0185	-	46	-
0.0098	-	35	-
0.0050	-	24	-
0.0026	-	17	-
0.0015	-	14	-

SUMMARY :

Gravel (%)	:	**1**
Sand (%)	:	**35**
Silt (%)	:	**48**
Clay (%)	:	**16**



Technician : K Y Sun
Date : 13/12/2008

Checked By :
Name : H W Chung
Date : 19/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 19/12/2008

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Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 17/12/2008

Description : Dark brown, clayey, very silty, very sandy GRAVEL
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH02
Sample No. : 1
Sample Depth (m) : 4.00 - 5.00
Specimen Depth (m) : 4.00 - 4.60
Sample Type : Mazier
Sample Origin : FILL‡

^Upon request * Delete as appropriate ‡Information provided by customer

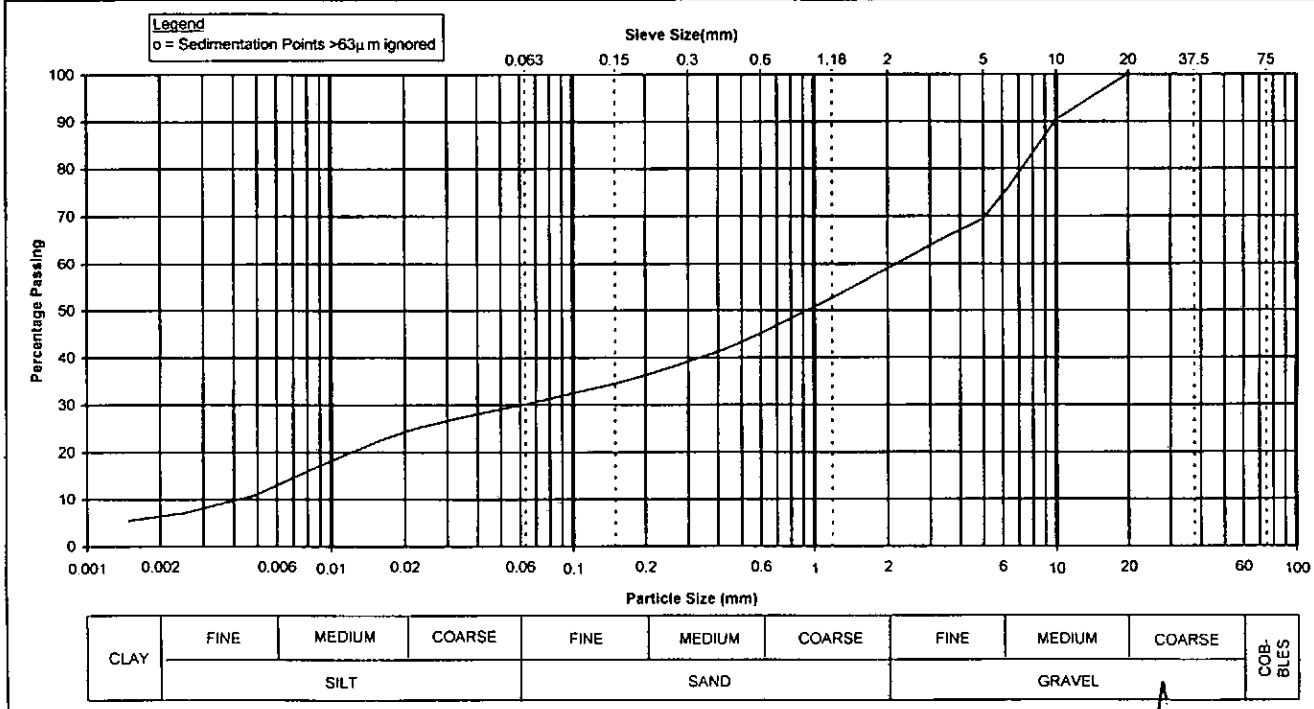
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	95	-	-
10.0 mm	90	-	-
6.30 mm	76	-	-
5.00 mm	69	-	-
3.35 mm	65	-	-
2.00 mm	59	-	-
1.18 mm	53	-	-
600 µm	45	-	-
425 µm	42	-	-
300 µm	39	-	-
212 µm	37	-	-
150 µm	34	-	-
63 µm	30	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.64
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0617	-	30	-
0.0443	-	29	-
0.0320	-	27	-
0.0231	-	25	-
0.0168	-	23	-
0.0092	-	17	-
0.0049	-	11	-
0.0025	-	7	-
0.0015	-	5	-

SUMMARY :

Gravel (%)	:	**41**
Sand (%)	:	**29**
Silt (%)	:	**24**
Clay (%)	:	**6**



Technician : K Y Sun
Date : 17/12/2008

Checked By :
Name : H W Chung
Date : 24/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 24/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH02
Sample No. : 5
Sample Depth (m) : 6.50 - 7.50
Specimen Depth (m) : 6.50 - 7.10
Sample Type : Mazier
Sample Origin : ALL‡

Date Received : 29/09/2008
Tested Date : 04/12/2008

Description : Dark grey, slightly gravelly, slightly sandy SILT/CLAY

Sieve Method : Method B ^Upon request * Delete as appropriate ‡Information provided by customer

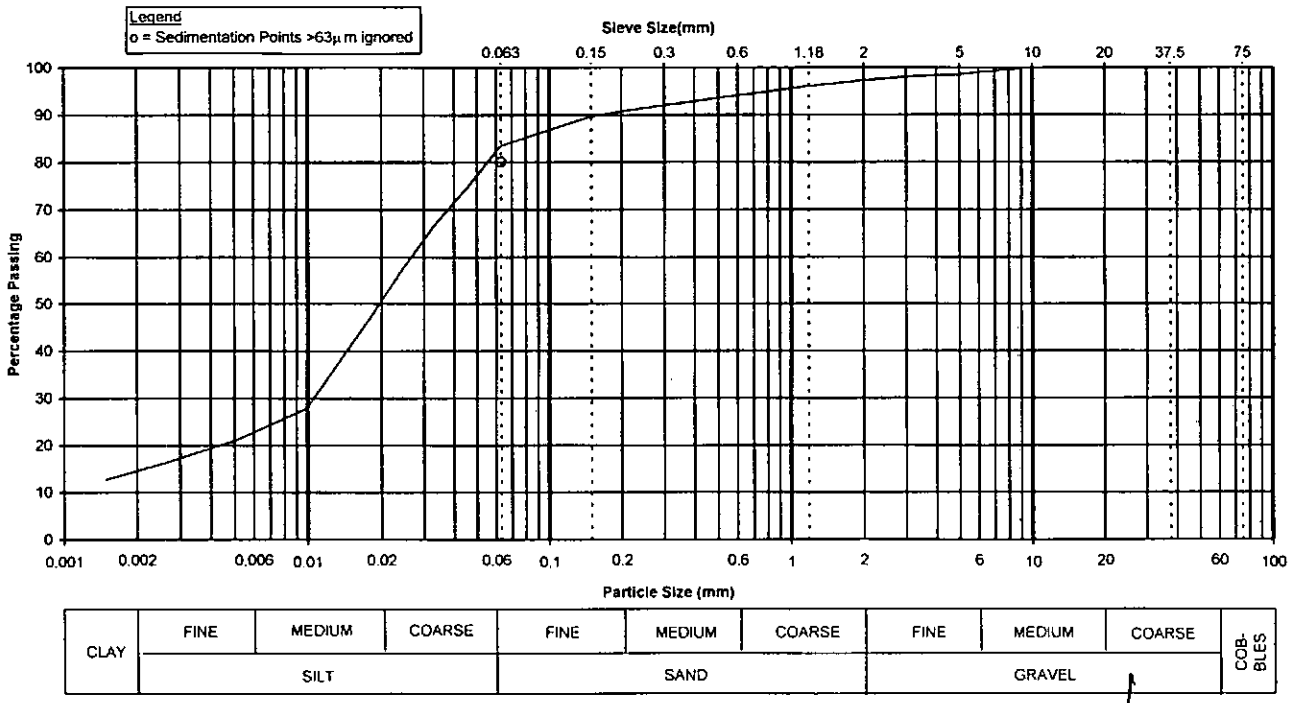
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	99	-	-
5.00 mm	98	-	-
3.35 mm	98	-	-
2.00 mm	97	-	-
1.18 mm	96	-	-
600 µm	94	-	-
425 µm	93	-	-
300 µm	92	-	-
212 µm	91	-	-
150 µm	90	-	-
63 µm	83	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.62
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0633	-	80	-
0.0458	-	75	-
0.0335	-	67	-
0.0246	-	58	-
0.0181	-	47	-
0.0099	-	28	-
0.0051	-	21	-
0.0026	-	16	-
0.0015	-	13	-

SUMMARY :

Gravel (%)	:	**3**
Sand (%)	:	**14**
Silt (%)	:	**69**
Clay (%)	:	**14**



Technician : K Y Sun
Date : 04/12/2008

Checked By : H W Chung
Name : H W Chung
Date : 10/12/2008

Approved By : Lau Wai Cheong
Signatory : Lau Wai Cheong
Date : 10/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 10/12/2008

Description : Orangish brown, slightly gravelly, slightly sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH09
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.00 - 3.60
Sample Type : Mazier
Sample Origin : COL‡

^Upon request * Delete as appropriate ‡Information provided by customer

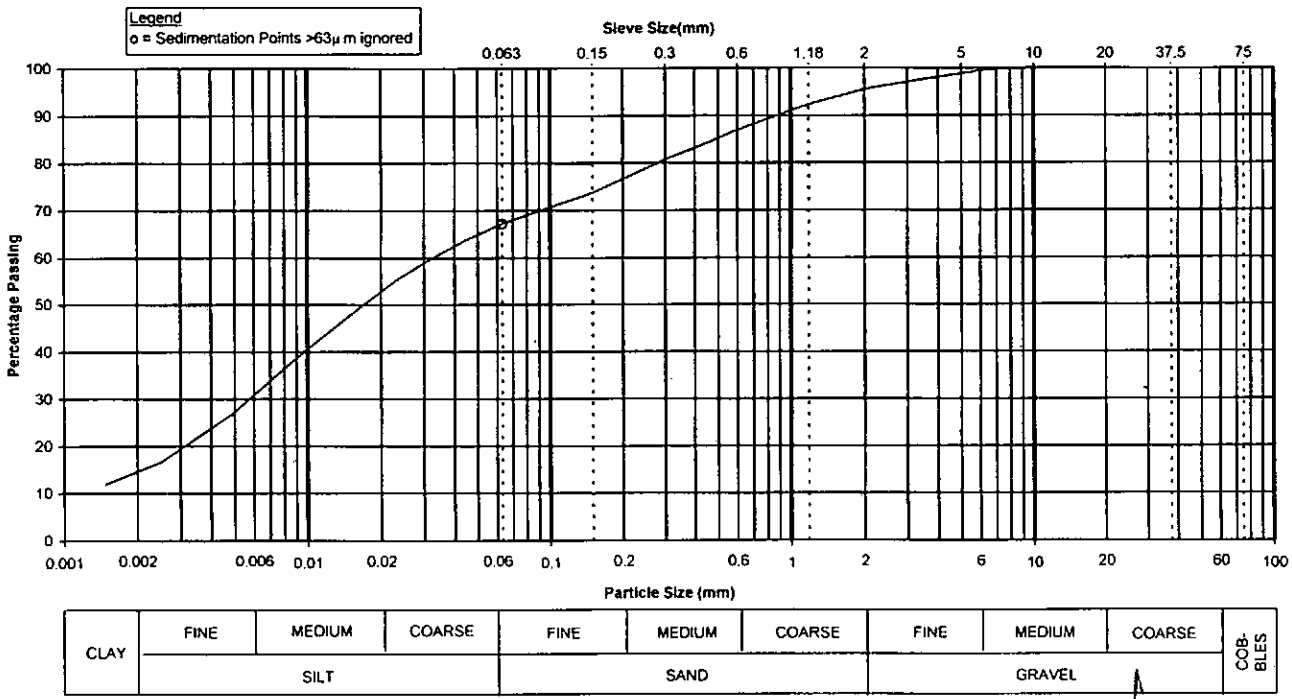
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	99	-	-
3.35 mm	97	-	-
2.00 mm	95	-	-
1.18 mm	92	-	-
600 µm	87	-	-
425 µm	84	-	-
300 µm	81	-	-
212 µm	77	-	-
150 µm	74	-	-
63 µm	67	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0633	-	67	-
0.0455	-	64	-
0.0328	-	60	-
0.0237	-	56	-
0.0172	-	50	-
0.0093	-	39	-
0.0049	-	27	-
0.0025	-	17	-
0.0015	-	12	-

SUMMARY :

Gravel (%)	:	**5**
Sand (%)	:	**28**
Silt (%)	:	**53**
Clay (%)	:	**14**



Technician : K Y Sun
Date : 10/12/2008

Checked By :
Name : H W Chung
Date : 17/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 17/12/2008

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 02/12/2008

Description : Orangish brown, slightly gravelly, slightly sandy SILT/CLAY
Sieve Method : Method B ^Upon request * Delete as appropriate ‡ Information provided by customer

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH10
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.00 - 3.60
Sample Type : Mazier
Sample Origin : COL‡

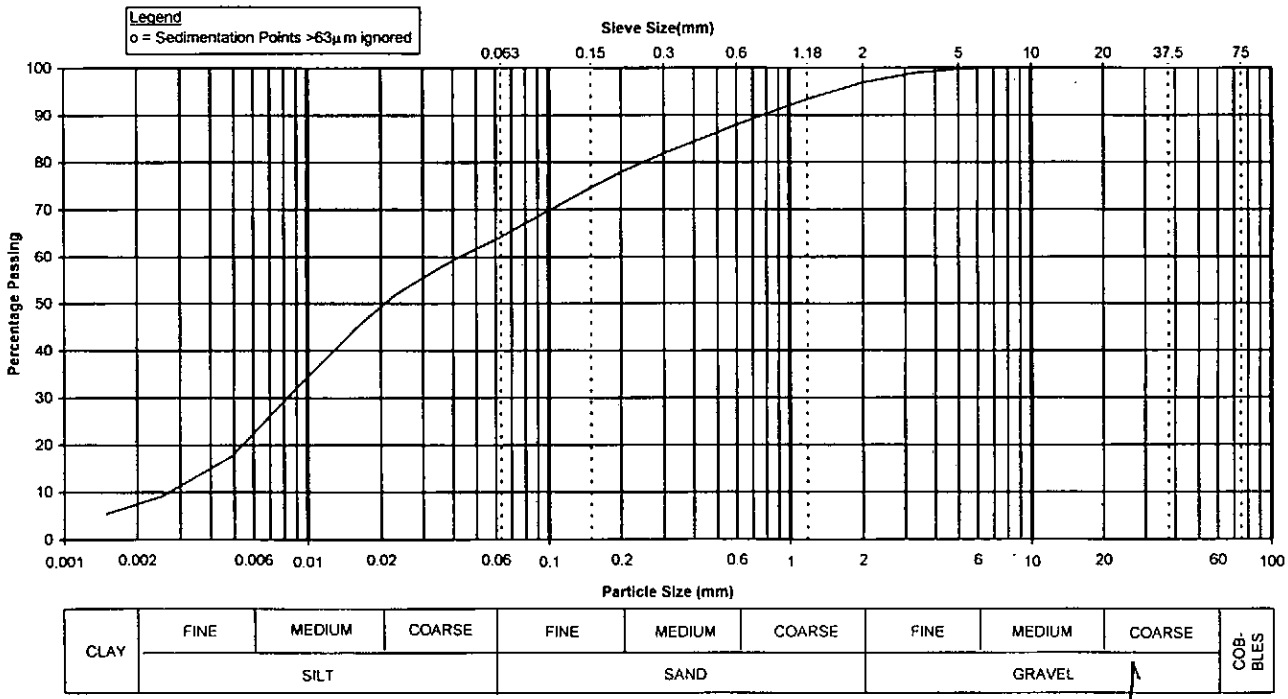
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	99	-	-
2.00 mm	97	-	-
1.18 mm	93	-	-
600 µm	88	-	-
425 µm	85	-	-
300 µm	82	-	-
212 µm	78	-	-
150 µm	75	-	-
63 µm	64	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.68
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0603	-	63	-
0.0434	-	60	-
0.0315	-	56	-
0.0228	-	52	-
0.0167	-	46	-
0.0092	-	33	-
0.0049	-	18	-
0.0025	-	9	-
0.0015	-	5	-

SUMMARY :

Gravel (%)	:	**3**
Sand (%)	:	**33**
Silt (%)	:	**57**
Clay (%)	:	**7**



Technician : K Y Sun
Date : 02/12/2008

Checked By :
Name : H W Chung
Date : 06/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 06/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 29/11/2008

Description : Light grey, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH10
Sample No. : 5
Sample Depth (m) : 5.00 - 6.00
Specimen Depth (m) : 5.00 - 5.60
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡Information provided by customer

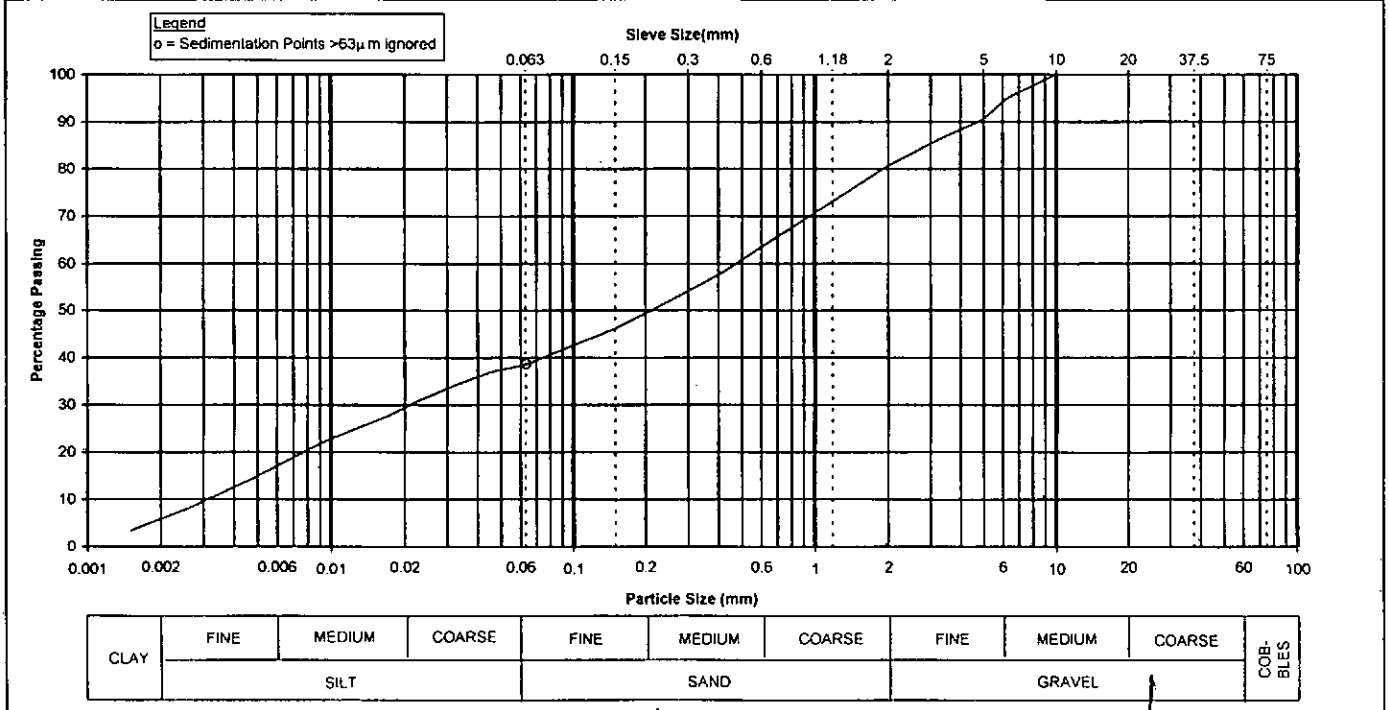
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	95	-	-
5.00 mm	90	-	-
3.35 mm	86	-	-
2.00 mm	81	-	-
1.18 mm	73	-	-
600 µm	63	-	-
425 µm	58	-	-
300 µm	54	-	-
212 µm	50	-	-
150 µm	46	-	-
63 µm	38	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0635	-	39	-
0.0456	-	37	-
0.0329	-	34	-
0.0239	-	31	-
0.0173	-	28	-
0.0093	-	22	-
0.0049	-	15	-
0.0026	-	8	-
0.0015	-	3	-

SUMMARY :

Gravel (%)	:	**19**
Sand (%)	:	**43**
Silt (%)	:	**33**
Clay (%)	:	**5**



Technician : K Y Sun
Date : 29/11/2008

Checked By : Name : H W Chung
Date : 03/12/2008

Approved By : Signatory : Lau Wai Cheong
Date : 03/12/2008

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 15/12/2008

Description : Dark brown, slightly clayey, very silty, very sandy GRAVEL
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH10
Sample No. : 13
Sample Depth (m) : 9.00 - 10.00
Specimen Depth (m) : 9.00 - 9.60
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡ Information provided by customer

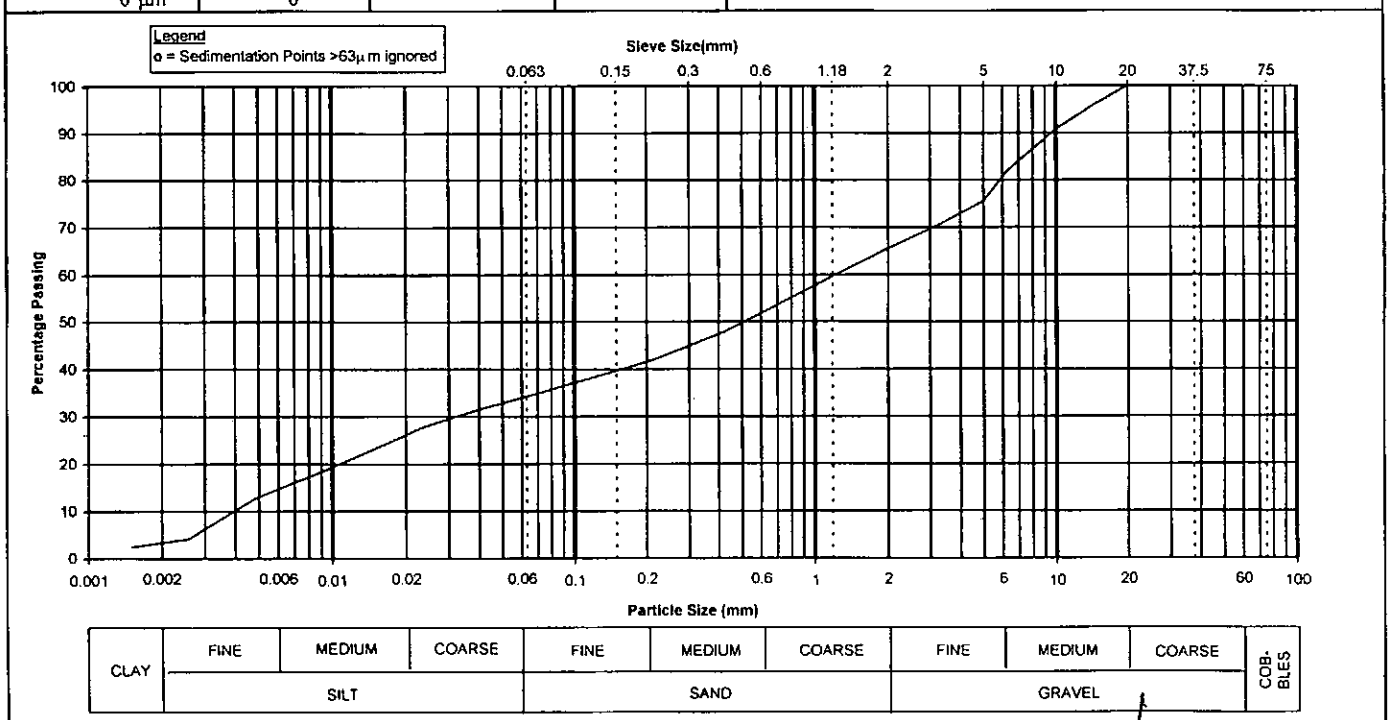
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	95	-	-
10.0 mm	91	-	-
6.30 mm	82	-	-
5.00 mm	75	-	-
3.35 mm	71	-	-
2.00 mm	65	-	-
1.18 mm	60	-	-
600 µm	52	-	-
425 µm	48	-	-
300 µm	45	-	-
212 µm	42	-	-
150 µm	40	-	-
63 µm	34	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0620	-	34	-
0.0447	-	32	-
0.0323	-	30	-
0.0234	-	28	-
0.0171	-	25	-
0.0093	-	19	-
0.0049	-	13	-
0.0026	-	4	-
0.0015	-	2	-

SUMMARY :

Gravel (%)	:	**35**
Sand (%)	:	**31**
Silt (%)	:	**31**
Clay (%)	:	**3**



Technician : K Y Sun
Date : 15/12/2008

Checked By :
Name : H W Chung
Date : 19/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 19/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 035

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 29/11/2008

Description : Orangish brown, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH11
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.30 - 3.60
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡ Information provided by customer

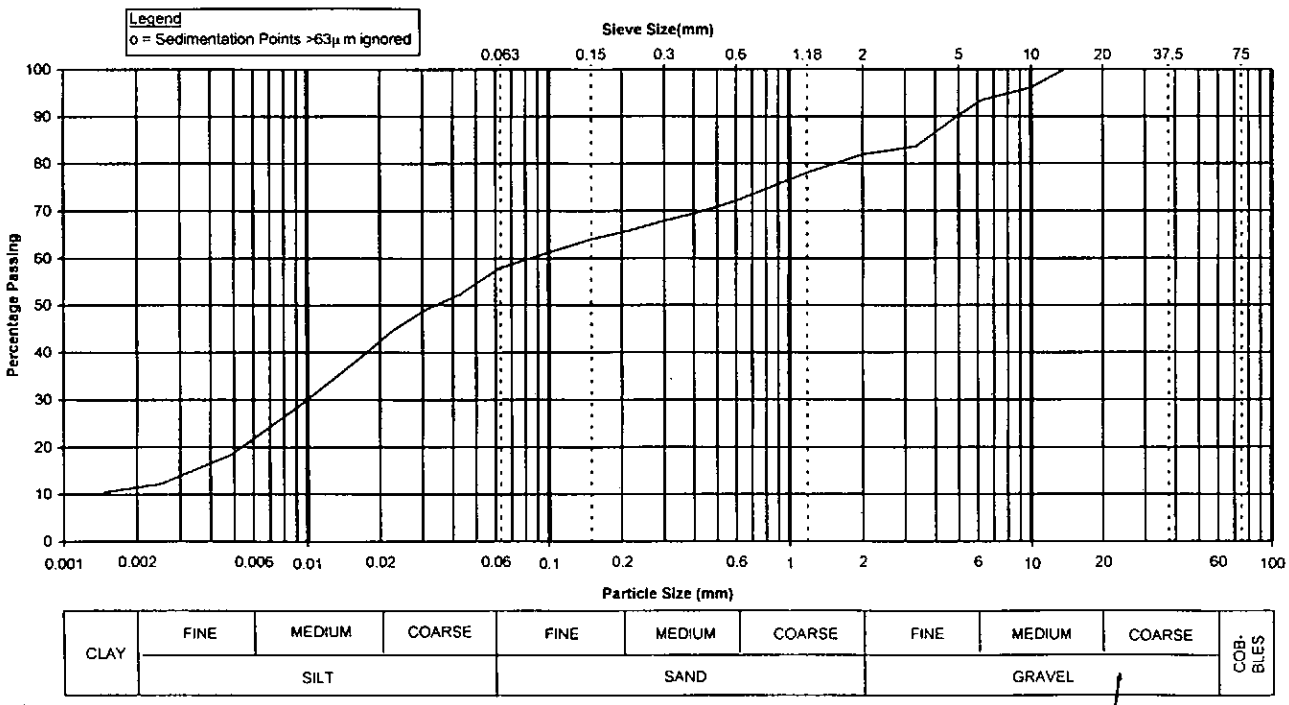
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	96	-	-
6.30 mm	93	-	-
5.00 mm	90	-	-
3.35 mm	84	-	-
2.00 mm	82	-	-
1.18 mm	78	-	-
600 μm	72	-	-
425 μm	70	-	-
300 μm	68	-	-
212 μm	66	-	-
150 μm	64	-	-
63 μm	58	-	-
0 μm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0598	-	55	-
0.0431	-	52	-
0.0312	-	49	-
0.0228	-	45	-
0.0168	-	39	-
0.0092	-	29	-
0.0049	-	18	-
0.0025	-	12	-
0.0015	-	10	-

SUMMARY :

Gravel (%)	:	**18**
Sand (%)	:	**24**
Silt (%)	:	**47**
Clay (%)	:	**11**



Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : K Y Sun
Date : 29/11/2008

Checked By :
Name : H W Chung
Date : 04/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 04/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 055

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 10/12/2008

Description : Greyish brown, sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH12
Sample No. : 1
Sample Depth (m) : 3.00 - 4.00
Specimen Depth (m) : 3.00 - 3.60
Sample Type : Mazier
Sample Origin : CDT‡

*Upon request * Delete as appropriate ‡Information provided by customer

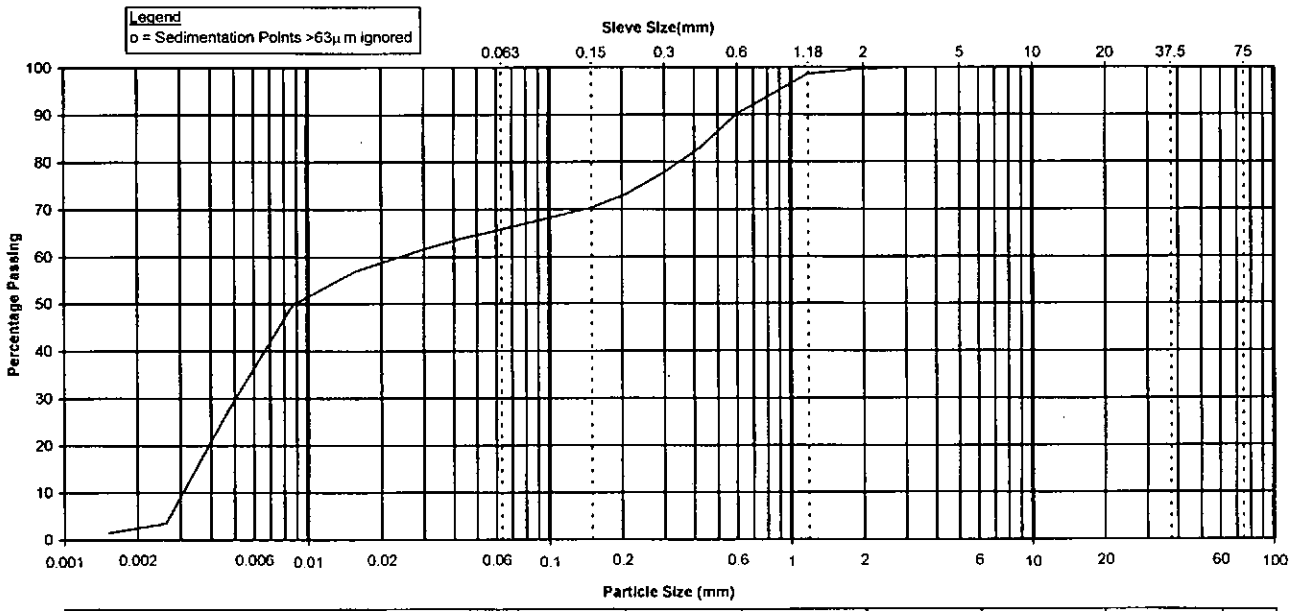
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	*Expanded Uncertainty of the Percent Passing (%)	*Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	99	-	-
600 µm	90	-	-
425 µm	83	-	-
300 µm	78	-	-
212 µm	73	-	-
150 µm	70	-	-
63 µm	66	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	*Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	*Expanded Uncertainty of % finer than D (%)
0.0615	-	66	-
0.0440	-	64	-
0.0315	-	62	-
0.0225	-	60	-
0.0161	-	57	-
0.0087	-	50	-
0.0048	-	28	-
0.0026	-	3	-
0.0015	-	1	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**34**
Silt (%)	:	**64**
Clay (%)	:	**2**



Technician : K Y Sun
Date : 10/12/2008

Checked By :
Name : H W Chung
Date : 17/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 17/12/2008

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TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon HKAS HOKLAS 035

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 15/12/2008

Description : Reddish brown, slightly gravelly, slightly sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH12
Sample No. : 9
Sample Depth (m) : 7.00 - 8.00
Specimen Depth (m) : 7.00 - 7.60
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡Information provided by customer

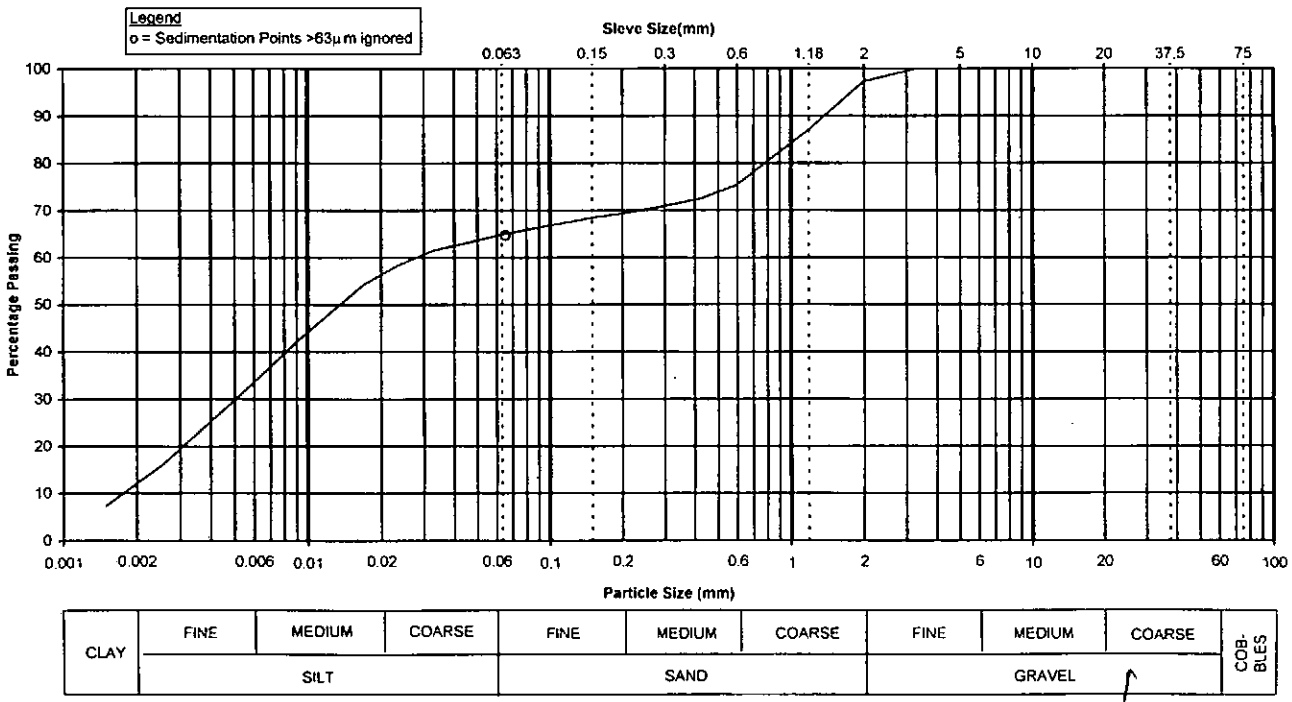
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	97	-	-
1.18 mm	87	-	-
600 µm	75	-	-
425 µm	72	-	-
300 µm	71	-	-
212 µm	70	-	-
150 µm	68	-	-
63 µm	65	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.66
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0654	-	65	-
0.0465	-	63	-
0.0332	-	62	-
0.0238	-	58	-
0.0171	-	54	-
0.0092	-	43	-
0.0048	-	29	-
0.0025	-	16	-
0.0015	-	7	-

SUMMARY :

Gravel (%)	:	**3**
Sand (%)	:	**32**
Silt (%)	:	**54**
Clay (%)	:	**11**



Technician : K Y Sun
Date : 15/12/2008

Checked By : Name : H W Chung Date : 19/12/2008

Approved By : Signatory : Lau Wai Cheong Date : 19/12/2008

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Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Gammon

Report No. : J2999-059.11

Job No. : Contract 1024 Contract No. : J2999-059
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Date Received : 29/09/2008
Tested Date : 10/12/2008

Description : Light grey, slightly gravelly, slightly sandy SILT/CLAY
Sieve Method : Method B

Works Order No. : 059
BH / ~~TP~~ * No. : WCH-BH12
Sample No. : 17
Sample Depth (m) : 11.00 - 12.00
Specimen Depth (m) : 11.20 - 11.60
Sample Type : Mazier
Sample Origin : CDT‡

^Upon request * Delete as appropriate ‡Information provided by customer

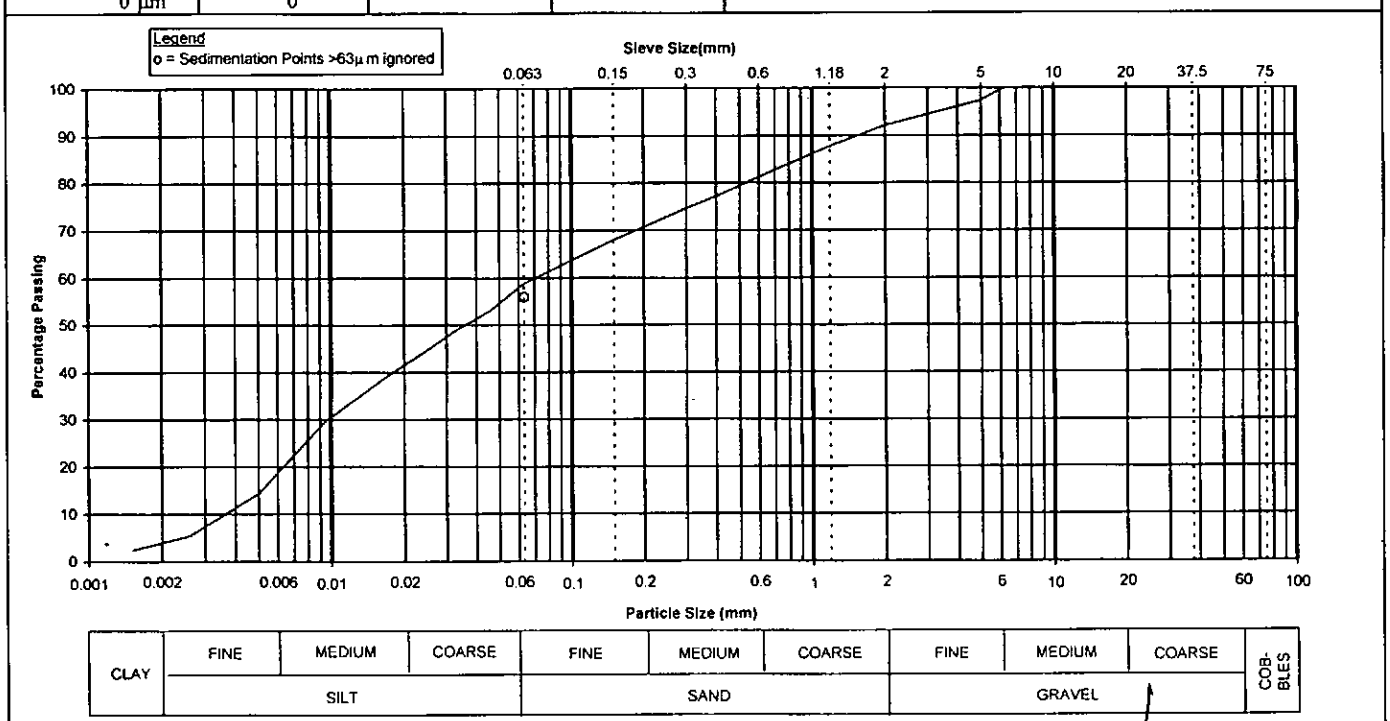
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	97	-	-
3.35 mm	95	-	-
2.00 mm	92	-	-
1.18 mm	88	-	-
600 µm	81	-	-
425 µm	78	-	-
300 µm	75	-	-
212 µm	71	-	-
150 µm	68	-	-
63 µm	59	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0636	-	56	-
0.0457	-	53	-
0.0331	-	49	-
0.0240	-	44	-
0.0174	-	39	-
0.0094	-	29	-
0.0050	-	14	-
0.0026	-	5	-
0.0015	-	2	-

SUMMARY :

Gravel (%)	:	**8**
Sand (%)	:	**33**
Silt (%)	:	**55**
Clay (%)	:	**4**



Technician : K Y Sun
Date : 10/12/2008

Checked By :
Name : H W Chung
Date : 17/12/2008

Approved By :
Signatory : Lau Wai Cheong
Date : 17/12/2008

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Form : GESR003.5 / Nov.30.04 / Issue 1 / Rev 1

Section 2.4
Determination of Acid / Water Soluble Sulphate Content of Soil – GEOSPEC 3 : 2001 Test Method 9.3

TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Gammon

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D003

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 7.00 - 8.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 7.00 - 7.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 31/12/2008

Sample Origin : CDG‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	49
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.04
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.3 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 31/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Gammon

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D019

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 12/12/2008

Sample Origin : FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	86
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.07
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.3 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 12/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Gammon

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D019

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 6.70 - 7.70 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 6.70 - 7.30 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 12/12/2008

Sample Origin : COL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	81
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.05
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.3 / Nov.30,04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 12/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Gammon

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D019

Customer : Mass Transit Railway Corporation Sample No. : 9

Project : Ground Investigation for South Island Line Sample Depth : 14.40 - 15.40 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 14.40 - 15.00 m

Description : Dark brown, clayey, silty, gravelly SAND Tested Date : 31/12/2008

Sample Origin : CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	82
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.04
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ▲		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ▲ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 31/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Gammon HKAS HOKLAS 033

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D022A

Customer : Mass Transit Railway Corporation Sample No. : 21

Project : Ground Investigation for South Island Line Sample Depth : 15.50 - 16.50 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 15.50 - 16.10 m

Description : Dark brown, clayey, gravelly, very silty SAND Tested Date : 31/12/2008

Sample Origin : CDG‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	88
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.03
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

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Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 31/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D033

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Dark brown, slightly gravelly, sandy SILT/CLAY Tested Date : 31/12/2008

Sample Origin : COL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	98
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.04
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 31/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D033

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 5.60 - 6.60 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 5.60 - 6.20 m

Description : Orangish brown, slightly sandy SILT/CLAY Tested Date : 16/12/2008

Sample Origin : CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	100
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.03
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.3 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Date : 16/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D040

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.80 - 4.00 m

Description : Dark brown, clayey, very sandy, very silty GRAVEL Tested Date : 31/12/2008

Sample Origin : CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	55
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.04
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ▲		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ▲ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 31/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Gammon

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D041

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 5.00 - 5.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 01/12/2008

Sample Origin : CDS‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	92
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.06
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

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Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 01/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Gammon

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D042

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 5.40 - 5.60 m

Description : Dark grey, slightly clayey, silty, very gravelly SAND Tested Date : 12/12/2008

Sample Origin : MD‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	79
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.07
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 12/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Gammon

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D046

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 8.00 - 9.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 8.00 - 8.60 m

Description : Light grey, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 01/12/2008

Sample Origin : FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	99
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.06
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 01/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : D054

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Greyish brown, slightly sandy SILT/CLAY Tested Date : 31/12/2008

Sample Origin : CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	100
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.05
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 31/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Gammon

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : WCH-BH02

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 4.00 - 5.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 4.00 - 4.60 m

Description : Dark brown, clayey, very silty, very sandy GRAVEL Tested Date : 31/12/2008

Sample Origin : FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	59
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.04
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.3 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 31/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : WCH-BH02

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 6.50 - 7.50 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 6.50 - 7.10 m

Description : Dark grey, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 12/12/2008

Sample Origin : ALL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	97
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.08
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.3 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 12/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
ACID - SOLUBLE SULPHATE CONTENT AND
WATER SOLUBLE SULPHATE CONTENT OF SOIL
GEOSPEC 3 : 2001 Test Method 9.3

Report No.: 2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~ * No. : WCH-BH10

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Orangish brown, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 11/12/2008

Sample Origin : COL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Gravimetric
Method of Preparation		Oven Dried, 75-80°C
Percentage of the original soil sample passing the 2mm test sieve	%	97
Soil sample : acid extract Average percentage of Total Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	0.08
Soil sample : water extract Average percentage of Water - Soluble Sulphates (as SO_3) in the fraction of the soil sample finer than 2mm	%	
Expanded uncertainty (U) ^		-

Note :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.3 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Date : 11/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Section 2.5
Determination of Water-Soluble Chloride Content – GEOSPEC 3 : 2001 Test Method 9.4

TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D003

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 7.00 - 8.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 7.00 - 7.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 05/01/2009

Sample Origin CDG‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 05/01/2009 Date : 09/01/2009 Date : 09/01/2009

Technology Centre
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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D019

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 17/12/2008

Sample Origin FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov 30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 17/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D019

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 6.70 - 7.70 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 6.70 - 7.30 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 17/12/2008

Sample Origin COL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ▲	%	-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ▲ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 17/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D019

Customer : Mass Transit Railway Corporation Sample No. : 9

Project : Ground Investigation for South Island Line Sample Depth : 14.40 - 15.40 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 14.40 - 15.00 m

Description : Dark brown, clayey, silty, gravelly SAND Tested Date : 05/01/2009

Sample Origin CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request

‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 05/01/2009 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D022A

Customer : Mass Transit Railway Corporation Sample No. : 21

Project : Ground Investigation for South Island Line Sample Depth : 15.50 - 16.50 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 15.50 - 16.10 m

Description : Dark brown, clayey, gravelly, very silty SAND Tested Date : 05/01/2009

Sample Origin CDG‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 05/01/2009 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon HKAS HOKLAS 055

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D033

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Dark brown, slightly gravelly, sandy SILT/CLAY Tested Date : 05/01/2009

Sample Origin COL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Date : 05/01/2009 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D033

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 5.60 - 6.60 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 5.60 - 6.20 m

Description : Orangish brown, slightly sandy SILT/CLAY Tested Date : 17/12/2008

Sample Origin CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 17/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D040

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 3.80 - 4.00 m

Description : Dark brown, clayey, very sandy, very silty GRAVEL Tested Date : 05/01/2009

Sample Origin CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ▲	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ▲ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Date : 05/01/2009 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D041

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 5.00 - 5.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 24/11/2008

Sample Origin CDS‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	0.03
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request

‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Date : 24/11/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D042

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 5.40 - 5.60 m

Description : Dark grey, slightly clayey, silty, very gravelly SAND Tested Date : 17/12/2008

Sample Origin MD‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	0.03
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request

‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 17/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D046

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 8.00 - 9.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 8.00 - 8.60 m

Description : Light grey, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 02/12/2008

Sample Origin FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request

‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 02/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : D054

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Greyish brown, slightly sandy SILT/CLAY Tested Date : 05/01/2009

Sample Origin CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Date : 05/01/2009 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : WCH-BH02

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 4.00 - 5.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 4.00 - 4.60 m

Description : Dark brown, clayey, very silty, very sandy GRAVEL Tested Date : 05/01/2009

Sample Origin FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	0.02
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 05/01/2009 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : WCH-BH02

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 6.50 - 7.50 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 6.50 - 7.10 m

Description : Dark grey, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 17/12/2008

Sample Origin ALL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	0.03
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request

‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 17/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF
WATER-SOLUBLE CHLORIDE CONTENT
GEOSPEC 3 : 2001 Test Method 9.4

Gammon

Report No.: J2999-059.11

Contract No.: Contract 1024 Job/W.O. No.: J2999-059 BH / ~~TP~~* No. : WCH-BH10

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Orangish brown, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 09/12/2008

Sample Origin COL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Titrimetric
Method of preparation		Oven Dried, 105-110°C
The water to soil ratio used for preparing the soluble extract		2 : 1
Water-soluble Chloride Content: Percentage of chloride ion in the fraction of the soil sample finer than 2mm	%	<0.01
Estimated Expanded Uncertainty of water-soluble chloride content (U) ^	%	-

Remark :

1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.5 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Name : H W Chung Approved By : Signatory : Lau Wai Cheong

Date : 09/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Section 2.6
Determination of pH Value - GEOSPEC 3 : 2001 Test Method 9.5

TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D003

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 7.00 - 8.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 7.00 - 7.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 30/12/2008

Sample Origin : CDG‡

Sampling History : As received	
Max.and Min.temperature recorded over the period of testing °C	19 - 21
Method of Test	Electrometric
Mass of sample used g	30.00
Method of preparation	Air Dried
Percentage of the original soil sample passing the 2mm test sieve %	49
Average pH Value	5.7
Temperature at which the pH value was taken °C	25
Estimated Expanded Uncertainty of pH value (U) ▲	-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ▲ Upon request
‡ Information provided by customer

Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 30/12/2008 Date : 09/01/2009 Date : 09/01/2009

Technology Centre
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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D003

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 9.55 - 10.55 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 9.55 - 10.15 m

Description : Dark brown, slightly silty, very sandy GRAVEL Tested Date : 23/12/2008

Sample Origin : HDG‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	44
Average pH Value		5.7
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 23/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D008

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.20 - 3.60 m

Description : Brown, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 27/11/2008

Sample Origin : FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	91
Average pH Value		4.6
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 27/11/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D019

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 11/12/2008

Sample Origin : FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	86
Average pH Value		5.7
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 11/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D019

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 6.70 - 7.70 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 6.70 - 7.30 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 11/12/2008

Sample Origin : COL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	81
Average pH Value		4.5
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 11/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D019

Customer : Mass Transit Railway Corporation Sample No. : 9

Project : Ground Investigation for South Island Line Sample Depth : 14.40 - 15.40 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 14.40 - 15.00 m

Description : Dark brown, clayey, silty, gravelly SAND Tested Date : 30/12/2008

Sample Origin : CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	82
Average pH Value		5.6
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang
Date : 30/12/2008

Checked By :
Name : H W Chung
Date : 09/01/2009

Approved By :
Signatory : Lau Wai Cheong
Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D021

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 5.50 - 6.50 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 5.50 - 6.10 m

Description : Dark brown, clayey, gravelly, very silty SAND Tested Date : 15/12/2008

Sample Origin : CDM‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	83
Average pH Value		5.2
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 15/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D022A

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Dark brown, clayey, gravelly, very silty SAND Tested Date : 23/12/2008

Sample Origin : CDG‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	85
Average pH Value		4.9
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 23/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH /~~TP~~ * No. : D022A

Customer : Mass Transit Railway Corporation Sample No. : 21

Project : Ground Investigation for South Island Line Sample Depth : 15.50 - 16.50 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 15.50 - 16.10 m

Description : Dark brown, clayey, gravelly, very silty SAND Tested Date : 30/12/2008

Sample Origin : CDG‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	88
Average pH Value		5.6
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 30/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D033

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Dark brown, slightly gravelly, sandy SILT/CLAY Tested Date : 30/12/2008

Sample Origin : COL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	98
Average pH Value		5.8
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang
Date : 30/12/2008

Checked By :
Name : H W Chung
Date : 09/01/2009

Approved By :
Signatory : Lau Wai Cheong
Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D033

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 5.60 - 6.60 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 5.60 - 6.20 m

Description : Orangish brown, slightly sandy SILT/CLAY Tested Date : 15/12/2008

Sample Origin : CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	100
Average pH Value		5.4
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang
Date : 15/12/2008

Checked By :
Name : H W Chung
Date : 09/01/2009

Approved By :
Signatory : Lau Wai Cheong
Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D040

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.80 - 4.00 m

Description : Dark brown, clayey, very sandy, very silty GRAVEL Tested Date : 30/12/2008

Sample Origin : HDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	55
Average pH Value		6.0
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ▲		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ▲ Upon request
‡ Information provided by customer

Technician : L L Wang
Date : 30/12/2008

Checked By :
Name : H W Chung
Date : 09/01/2009

Approved By :
Signatory : Lau Wai Cheong
Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH /~~TP~~ * No. : D041

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 5.00 - 5.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 27/11/2008

Sample Origin : CDS‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	92
Average pH Value		5.8
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ▲		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ▲ Upon request
‡ Information provided by customer

Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang
Date : 27/11/2008

Checked By :
Name : H W Chung
Date : 09/01/2009

Approved By :
Signatory : Lau Wai Cheong
Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH /~~TP~~ * No. : D042

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 5.40 - 5.60 m

Description : Dark grey, slightly clayey, silty, very gravelly SAND Tested Date : 11/12/2008

Sample Origin : MD‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	79
Average pH Value		7.0
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 11/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D046

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 8.00 - 9.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 8.00 - 8.60 m

Description : Light grey, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 27/11/2008

Sample Origin : FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	99
Average pH Value		5.8
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

Technician : L L Wang
Date : 27/11/2008

Checked By :
Name : H W Chung
Date : 09/01/2009

Approved By :
Signatory : Lau Wai Cheong
Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : D054

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Greyish brown, slightly sandy SILT/CLAY Tested Date : 30/12/2008

Sample Origin : CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	100
Average pH Value		6.0
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 30/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : WCH-BH01

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 7.00 - 8.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 7.00 - 7.60 m

Description : Brown, slightly gravelly, sandy SILT/CLAY Tested Date : 13/12/2008

Sample Origin : CDM‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	99
Average pH Value		6.2
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Date : 13/12/2008 Name : H W Chung Date : 09/01/2009 Signatory : Lau Wai Cheong Date : 09/01/2009

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : WCH-BH02

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 4.00 - 5.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 4.00 - 4.60 m

Description : Dark brown, clayey, very silty, very sandy GRAVEL Tested Date : 30/12/2008

Sample Origin : FILL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	59
Average pH Value		6.0
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang
Date : 30/12/2008

Checked By :
Name : H W Chung
Date : 09/01/2009

Approved By :
Signatory : Lau Wai Cheong
Date : 09/01/2009

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Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : WCH-BH02

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 6.50 - 7.50 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 6.50 - 7.10 m

Description : Dark grey, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 11/12/2008

Sample Origin : ALL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	97
Average pH Value		6.3
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 11/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : WCH-BH09

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Orangish brown, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 15/12/2008

Sample Origin : COL‡

Sampling History : As received	
Max.and Min.temperature recorded over the period of testing °C	19 - 21
Method of Test	Electrometric
Mass of sample used g	30.00
Method of preparation	Air Dried
Percentage of the original soil sample passing the 2mm test sieve %	95
Average pH Value	5.8
Temperature at which the pH value was taken °C	25
Estimated Expanded Uncertainty of pH value (U) ^	-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 15/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : WCH-BH10

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Orangish brown, slightly gravelly, slightly sandy SILT/CLAY Tested Date : 04/12/2008

Sample Origin : COL‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	97
Average pH Value		6.1
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 04/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : WCH-BH10

Customer : Mass Transit Railway Corporation Sample No. : 5

Project : Ground Investigation for South Island Line Sample Depth : 5.00 - 6.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 5.00 - 5.60 m

Description : Light grey, slightly gravelly, sandy SILT/CLAY Tested Date : 03/12/2008

Sample Origin : CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	81
Average pH Value		5.3
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 03/12/2008 Date : 09/01/2009 Date : 09/01/2009

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TEST REPORT
DETERMINATION OF THE pH VALUE
GEOSPEC 3 : 2001 Test Method 9.5

Gammon

Report No. : J2999-059.11

Contract No. : Contract 1024 Job/W.O. No. : J2999-059 BH / ~~TP~~ * No. : WCH-BH12

Customer : Mass Transit Railway Corporation Sample No. : 1

Project : Ground Investigation for South Island Line Sample Depth : 3.00 - 4.00 m

Date Received : 29/09/2008 Sample Type : Mazier Specimen Depth : 3.00 - 3.60 m

Description : Orangish brown, slightly gravelly, sandy SILT/CLAY Tested Date : 15/12/2008

Sample Origin : CDT‡

Sampling History : As received		
Max.and Min.temperature recorded over the period of testing	°C	19 - 21
Method of Test		Electrometric
Mass of sample used	g	30.00
Method of preparation		Air Dried
Percentage of the original soil sample passing the 2mm test sieve	%	100
Average pH Value		4.9
Temperature at which the pH value was taken	°C	25
Estimated Expanded Uncertainty of pH value (U) ^		-

Remark :
1. Observed or inferred sample disturbance - none.
2. Unavoidable variations from specified procedure - none.

* Delete as appropriate ^ Upon request
‡ Information provided by customer

Technician : L L Wang Checked By : Approved By :

Name : H W Chung Signatory : Lau Wai Cheong

Date : 15/12/2008 Date : 09/01/2009 Date : 09/01/2009

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Form : GESR004.6 / Nov.30.04 / Issue 1 / Rev 1

Section 2.7

Determination of Moisture Content, Bulk Density, Atterberg Limits, Particle Density, Particle Size Distribution & Triaxial Compression Tests (Test Conducted by FT Laboratories Ltd)

Moisture Content Test

FT Laboratories Ltd.
科達測檢試驗所有限公司

HKAS HOKLAS 071

Test Report on the Determination of Moisture Content

Job Reference No. : **65127070-K02J17-MC**

Test Method : GEOSPEC 3: 2001: Test 5.2

Client Supplied Infor

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : Contract 1024

Works order No. : Nil

Borehole No. : D024

Customer sample No. : 5

Depth (m) From / To : 7.5 - 8.5

Sample type : M

Sample origin : CD Monzonite

Laboratory Information

Date of sample received : 2-Oct-08

Date of test started : 11-Oct-08

Date of test completed : 13-Oct-08

Soil description (Visual) : Moist, brown, silty/clayey, gravelly SAND.

Laboratory Reference No. : K02J17004-MC

Specimen depth (m) From/To : 7.5 - 8.1

Test result

Mass of wet specimen & container	g	490.83
Mass of dry specimen & container	g	413.62
Mass of container	g	145.10
Duration of drying	hours	47
Moisture content	%	29

Note : * Delete whichever is not applicable

Remarks:

HOKLAS Approved Signatory : _____
*YUE Wai Chun / VONG Hong Ian

Date: 23 DEC 2008

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on the Determination of Moisture Content

Job Reference No. : **65127070-K02J17-MC**

Test Method : GEOSPEC 3: 2001: Test 5.2

Client Supplied Infor

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

		Borehole No.	: D025
Contract No.	: Contract 1024	Customer sample No.	: 5
		Depth (m) From / To	: 7.0 - 8.0
Works order No.	: Nil	Sample type	: M
		Sample origin	: CD Monzonite

Laboratory Information

Date of sample received	: 2-Oct-08	Laboratory Reference No.	: K02J17005-MC
Date of test started	: 11-Oct-08	Specimen depth (m) From/To	: 7.0 - 7.6
Date of test completed	: 13-Oct-08		
Soil description (Visual)	: Moist, brown, silty/clayey, gravelly SAND.		

Test result

Mass of wet specimen & container	g	474.77
Mass of dry specimen & container	g	396.23
Mass of container	g	131.10
Duration of drying	hours	47
Moisture content	%	**30**

Note :

Remarks:

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on the Determination of Moisture Content

Job Reference No. : **65127070-K02J17-MC**

Test Method : GEOSPEC 3: 2001: Test 5.2

Client Supplied Infor

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : Contract 1024

Works order No. : Nil

Borehole No. : D034

Customer sample No. : 1

Depth (m) From / To : 7.5 - 8.5

Sample type : M

Sample origin : CD Monzonite

Laboratory Information

Date of sample received : 2-Oct-08

Date of test started : 11-Oct-08

Date of test completed : 13-Oct-08

Soil description (Visual) : Moist, brown, silty/clayey, gravelly SAND.

Laboratory Reference No. : K02J17010-MC

Specimen depth (m) From/To : 7.5 - 8.1

Test result

Mass of wet specimen & container	g	510.11
Mass of dry specimen & container	g	460.67
Mass of container	g	137.85
Duration of drying	hours	47
Moisture content	%	**15**

Note :

Remarks:

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

Bulk Density Test

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on the Determination of Density By Linear Measurement Method

Job Reference No. : 65127070-K02J17-BLD

Test Method Used : BS 1377: Part 2: 1990: Clause 7

Customer Supplied Information

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : Contract 1024

Works order No. : Nil

Borehole No. : D024

Customer sample No. : 5

Depth (m) From / To : 7.5 - 8.5

Sample type : Mazier'

Sample origin : CD Monzonite

Laboratory Information

Date of sample received : 2-Oct-08

Date of test started : 3-Oct-08

Date of test completed : 6-Oct-08

Soil description (Visual) : Moist, brown, silty/clayey, gravelly SAND.

Laboratory Reference No. : K02J17004-BD

Specimen depth (m) From/To : 8.10 - 8.30

Method of sample preparation : Specimen direct from sample tube

Bulk density of specimen	=	1.93	Mg/m^3
Dry density of specimen	=	1.48	Mg/m^3
Moisture content	=	30.8	%

Note : * Delete whichever is not applicable

Remarks:

Certified By: * YUE Wai Chun / VONG Hong Ian

Date: 23 DEC 2008

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on the Determination of Density By Linear Measurement Method

Job Reference No. : 65127070-K02J17-BLD

Test Method Used : BS 1377: Part 2: 1990: Clause 7

Customer Supplied Information

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No.	: Contract 1024	Borehole No.	: D025
		Customer sample No.	: 5
Works order No.	: Nil	Depth (m) From / To	: 7.0 - 8.0
		Sample type	: Mazier
		Sample origin	: CD Monzonite

Laboratory Information

Date of sample received	: 2-Oct-08	Laboratory Reference No.	: K02J17005-BD
Date of test started	: 3-Oct-08	Specimen depth (m) From/To	: 7.60 - 7.80
Date of test completed	: 6-Oct-08	Method of sample preparation	: Specimen direct from sample tube
Soil description (Visual)	: Moist, brown, silty/clayey, gravelly SAND.		

Bulk density of specimen	=	1.90	Mg/m^3
Dry density of specimen	=	1.47	Mg/m^3
Moisture content	=	29.8	%

Note :

Remarks:

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on the Determination of Density By Linear Measurement Method

Job Reference No. : 65127070-K02J17-BLD

Test Method Used : BS 1377: Part 2: 1990: Clause 7

Customer Supplied Information

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : Contract 1024

Works order No. : Nil

Borehole No. : D034

Customer sample No. : 1

Depth (m) From / To : 7.5 - 8.5

Sample type : Mazier

Sample origin : CD Monzonite

Laboratory Information

Date of sample received : 2-Oct-08

Date of test started : 8-Oct-08

Date of test completed : 13-Oct-08

Soil description (Visual) : Moist, brown, silty/clayey, gravelly SAND.

Laboratory Reference No. : K02J17010-BD

Specimen depth (m) From/To : 8.10 - 8.30

Method of sample preparation : Specimen direct from sample tube

Bulk density of specimen	=	2.17	Mg/m^3
Dry density of specimen	=	1.89	Mg/m^3
Moisture content	=	14.5	%

Note :

Remarks:

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

Atterberg Limits Test

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on Determination of the Atterberg Limits

Job Reference No. : **65127070-K02J17-AL**

Test Method : GEOSPEC 3: 2001 Test 6.1 & 6.2

Client Supplied Information

Customer : Mass Transit Railway Corporation

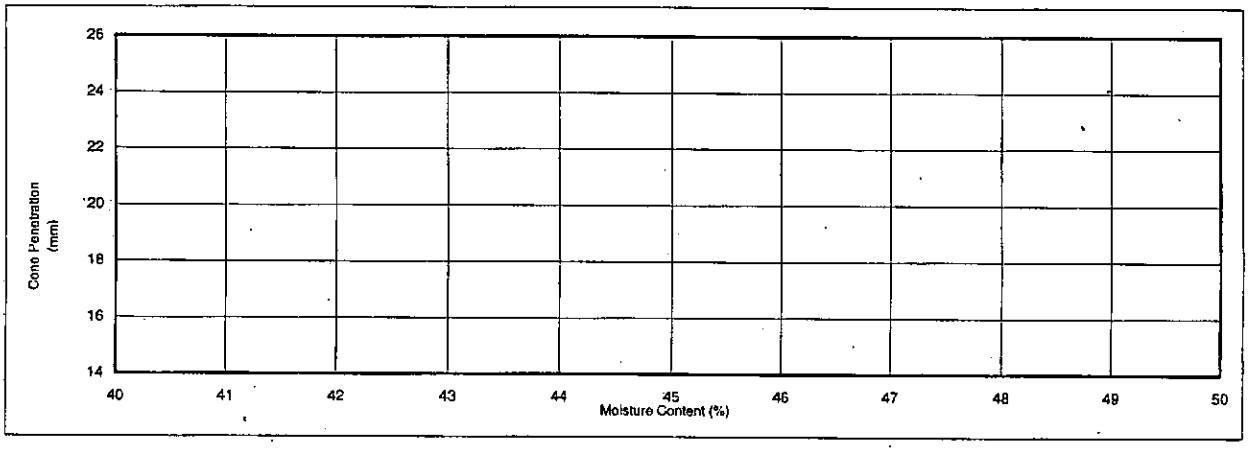
Project : Ground Investigation for South Island Line

		Borehole No.	: D024
Contract No.	: Contract 1024	Customer sample No.	: 5
		Depth (m) From / To	: 7.5 - 8.5
Works order No.	: Nil	Sample type	: M
		Sample origin	: CD Monzonite

Laboratory Information

Date of sample received	: 2-Oct-08	Laboratory Reference No.	: K02J17004-AL
Date of test started	: 11-Oct-08	Specimen depth (m) From/To	: 7.5 - 8.1
Date of test completed	: 14-Oct-08		
Soil description (Visual)	: Moist, brown, silty/clayey, gravelly SAND.		
Material passing 425 µm (%)	: 61		
Sample history	: Sample has been subjected to sieved specimen. (Oven drying at <50 °C)	Duration (hr)	: 25

Test Result



Moisture content of fraction passing 425 µm w_a (%) : **44**

Liquid Limit (%) : -

Plastic Limit (%) : **Non-Plastic**

Plasticity Index (%) : -

Liquidity Index : -

Notes : * Delete whichever is not applicable

Remarks:

HOKLAS Approved Signatory : *YUE Wai Chun / VONG Hong Ian

Date : 23 DEC 2008

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on Determination of the Atterberg Limits

Job Reference No. : **65127070-K02J17-AL**

Test Method : GEOSPEC 3: 2001 Test 6.1 & 6.2

Client Supplied Information

Customer : Mass Transit Railway Corporation

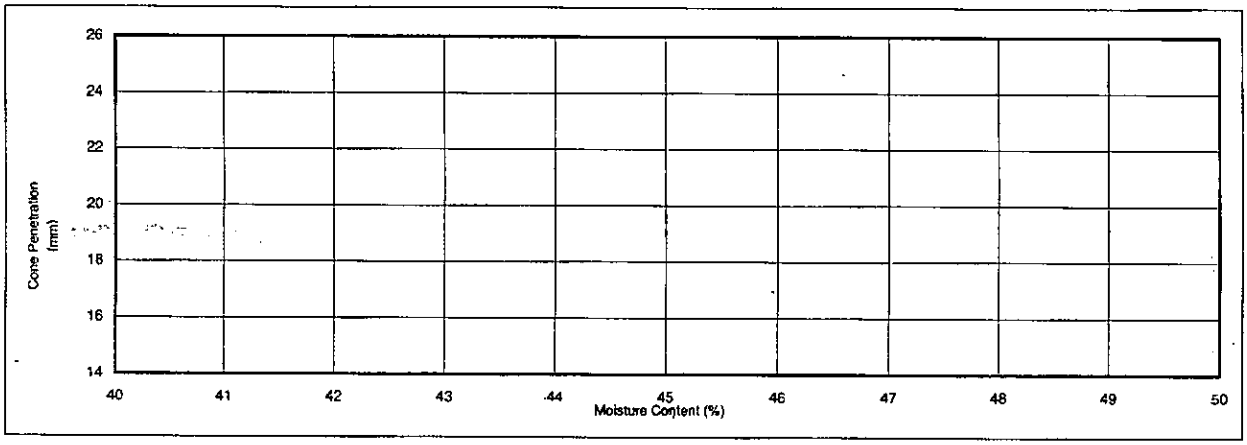
Project : Ground Investigation for South Island Line

		Borehole No.	: D025
Contract No.	: Contract 1024	Customer sample No.	: 5
		Depth (m) From / To	: 7.0 - 8.0
Works order No.	: Nil	Sample type	: M
		Sample origin	: CD Monzonite

Laboratory Information

Date of sample received	: 2-Oct-08	Laboratory Reference No.	: K02J17005-AL
Date of test started	: 11-Oct-08	Specimen depth (m) From/To	: 7.0 - 7.6
Date of test completed	: 14-Oct-08		
Soil description (Visual)	: Moist, brown, silty/clayey, gravelly SAND.		
Material passing 425 μm (%)	: 58		
Sample history	: Sample has been subjected to sieved specimen. (Oven drying at <50 °C)	Duration (hr)	: 25

Test Result



Moisture content of fraction passing 425 μm w_a (%) : **42**

Liquid Limit (%) : -
Plastic Limit (%) : **Non-Plastic**
Plasticity Index (%) : -
Liquidity Index : -

Notes :

Remarks:

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

HKAS 071

Test Report on Determination of the Atterberg Limits

Job Reference No. : **65127070-K02J17-AL**

Test Method : GEOSPEC 3: 2001 Test 6.1 & 6.2

Client Supplied Information

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

		Borehole No.	: D034
Contract No.	: Contract 1024	Customer sample No.	: 1
		Depth (m) From / To	: 7.5 - 8.5
Works order No.	: Nil	Sample type	: M
		Sample origin	: CD Monzonite

Laboratory Information

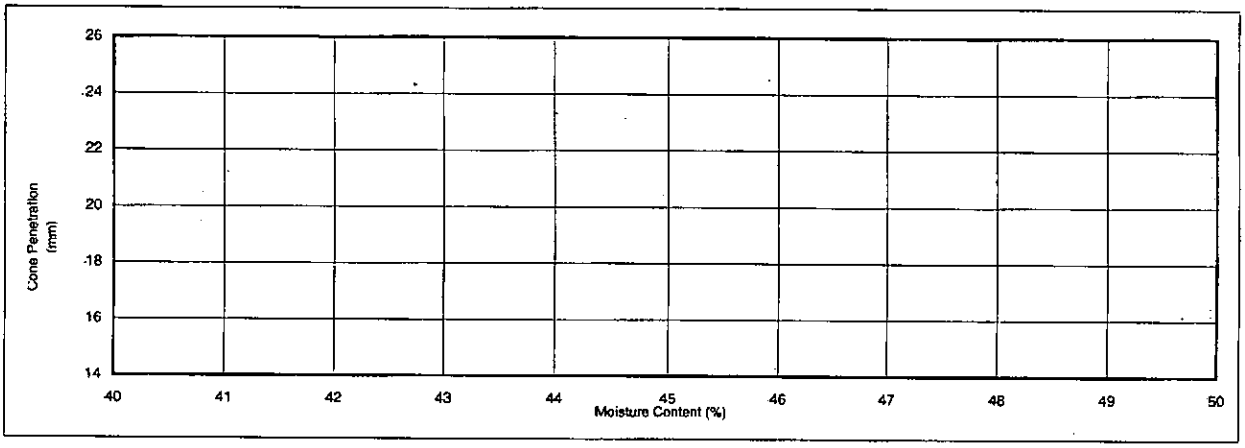
Date of sample received	: 2-Oct-08	Laboratory Reference No.	: K02J17010-AL
Date of test started	: 11-Oct-08	Specimen depth (m) From/To	: 7.5 - 8.1
Date of test completed	: 14-Oct-08		

Soil description (Visual) : Moist, brown, silty/clayey, gravelly SAND.

Material passing 425 μm (%) : 50

Sample history : Sample has been subjected to sieved specimen.
(Oven drying at <50 °C) Duration (hr) : 25

Test Result



Moisture content of fraction passing 425 μm w_a (%) : **29**

Liquid Limit (%) : -
Plastic Limit (%) : **Non-Plastic**
Plasticity Index (%) : -
Liquidity Index : -

Notes :

Remarks:

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

Particle Density Test

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on Determination of Particle Density of Soil

Job Reference No. : **65127070-K02J17-PDT**

Test Method : GEOSPEC 3: 2001: Test 7.2

Customer Supplied Information

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : Contract 1024

Works order No. : Nil

Borehole No. : D024

Customer sample No. : 5

Depth (m) From / To : 7.5 - 8.5

Sample type : M

Sample origin : CD Monzonite

Laboratory Information

Date of sample received : 2-Oct-08

Date of test started : 11-Oct-08

Date of test completed : 15-Oct-08

Soil description (Visual) : Moist, brown, silty/clayey, gravelly SAND.

Laboratory Reference No. : K02J17004-PDT

Specimen depth (m) From/To : 7.5 - 8.1

Oven dried method : 105 ± 5 °C

Test Result

Particle density of soil: 2.68 Mg/m^3

Remarks:

Note : * Delete whichever is not applicable

HOKLAS Approved Signatory : *YUE Wai Chun / VONG Hong Ian

Date : 23 DEC 2008

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on Determination of Particle Density of Soil

Job Reference No. : **65127070-K02J17-PDT**

Test Method : GEOSPEC 3: 2001: Test 7.2

Customer Supplied Information

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

		Borehole No.	: D025
Contract No.	: Contract 1024	Customer sample No.	: 5
		Depth (m) From / To	: 7.0 - 8.0
Works order No.	: Nil	Sample type	: M
		Sample origin	: CD Monzonite

Laboratory Information

Date of sample received	: 2-Oct-08	Laboratory Reference No.	: K02J17005-PDT
Date of test started	: 11-Oct-08	Specimen depth (m) From/To	: 7.0 - 7.6
Date of test completed	: 15-Oct-08	Oven dried method	: 105 ± 5 °C
Soil description (Visual)	: Moist, brown, silty/clayey, gravelly SAND.		

Test Result

Particle density of soil: 2.67 Mg/m^3

Remarks:

Note :

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

Particle Size Distribution Test

FT Laboratories Ltd.
科達測檢試驗所有限公司

HOKLAS 071

Test Report on the Particle Size Distribution of Soil

Job Reference No. : **65127070-K02J17-PSD**
Test Method : GEOSPEC 3: 2001: Test 8.1; 8.5 & 8.7

Customer Supplied Information

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024

Works order No. : Nil

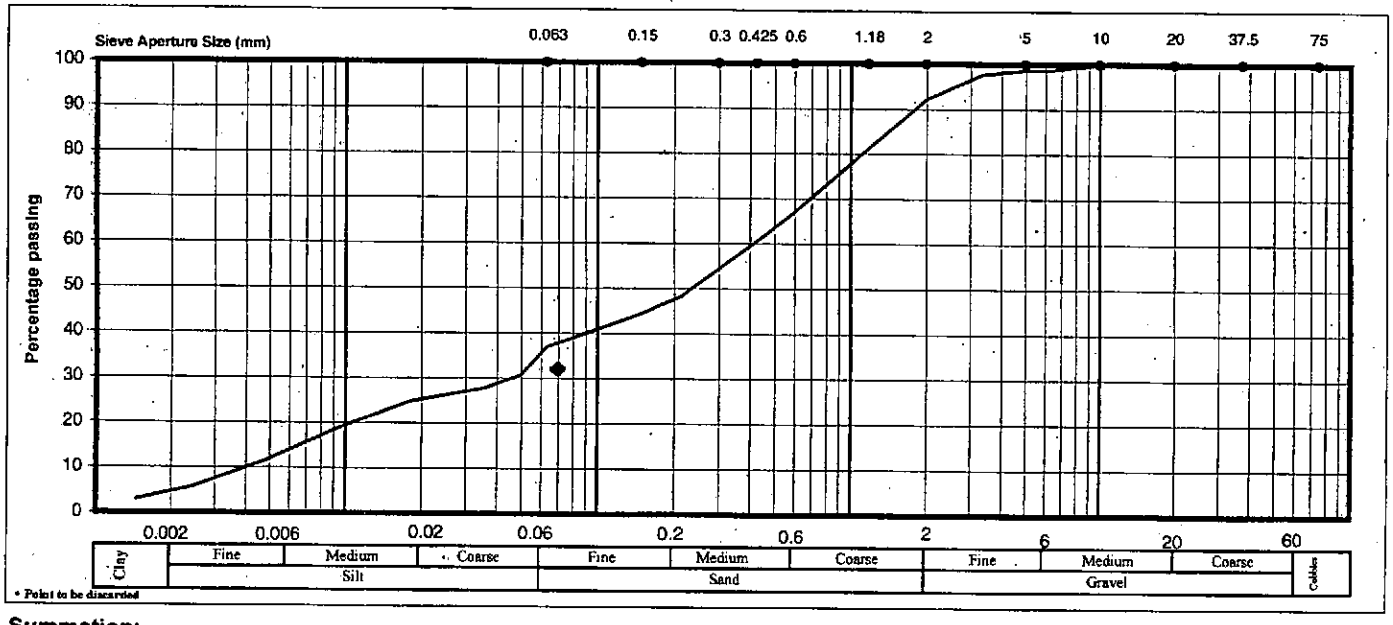
Borehole No. : D024
Customer sample No. : 5
Depth (m) From / To : 7.5 - 8.5
Sample type : M
Sample origin : CD Monzonite

Laboratory Information

Date of sample received : 2-Oct-08
Date of test started : 11-Oct-08
Date of test completed : 15-Oct-08

Laboratory Reference No. : K02J17004-PSD
Specimen depth (m) From/To : 7.5 - 8.1
Particle density (Mg/m^3) : 2.68

Test Result



Summation:
Soil Description : Moist, brown, slightly gravelly, sandy SILT/CLAY.

Gravel % : 8
Sand % : 55
Silt % : 32
Clay % : 5

Note : * Delete whichever is not applicable
No visible organic matters in the soil

Remarks:

HOKLAS Approved Signatory: *YUE Wai Chun / VONG Hong Ian

Date: 23 DEC 2008

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on the Particle Size Distribution of Soil

Job Reference No. : **65127070-K02J17-PSD**
Test Method : GEOSPEC 3: 2001: Test 8.1, 8.5 & 8.7

Customer Supplied Information

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024
Works order No. : Nil

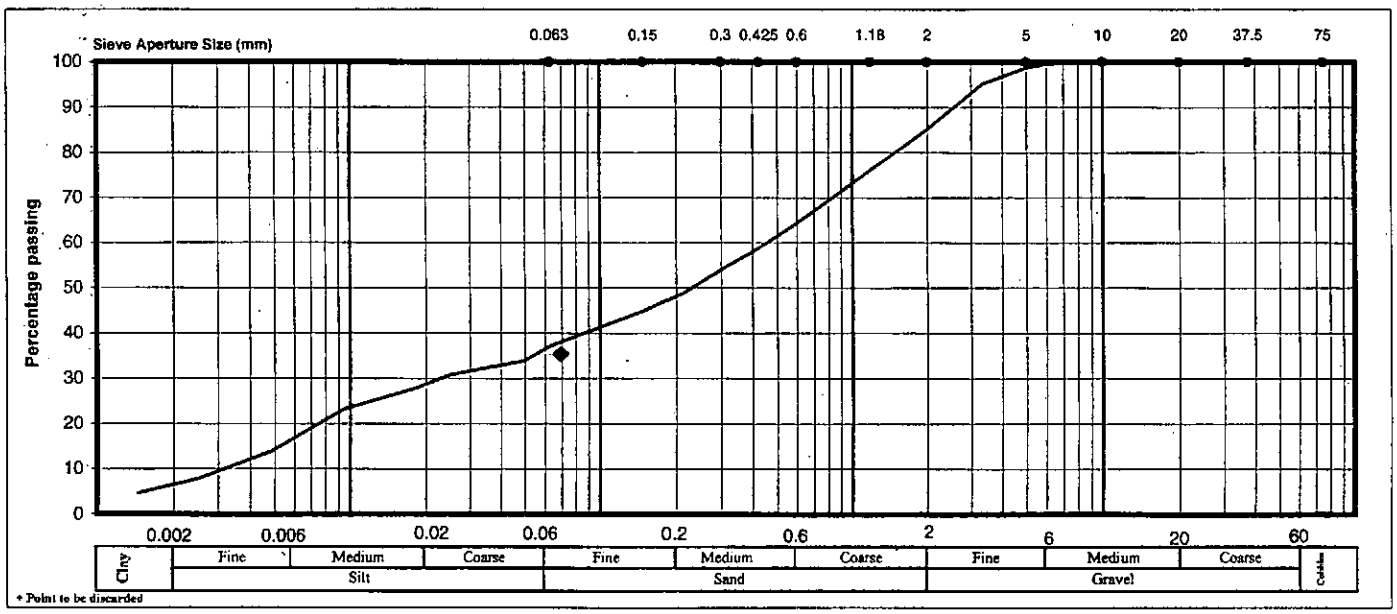
Borehole No. : D025
Customer sample No. : 5
Depth (m) From / To : 7.0 - 8.0
Sample type : M
Sample origin : CD Monzonite

Laboratory Information

Date of sample received : 2-Oct-08
Date of test started : 11-Oct-08
Date of test completed : 15-Oct-08

Laboratory Reference No. : K02J17005-PSD
Specimen depth (m) From/To : 7.0 - 7.6
Particle density (Mg/m^3) : 2.67

Test Result



Summation:
Soil Description : Moist, brown, slightly gravelly, sandy SILT/CLAY.

Gravel % : 15
Sand % : 48
Silt % : 31
Clay % : 6

Note : No visible organic matters in the soil

Remarks:

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Test Report on the Particle Size Distribution of Soil

Job Reference No. : **65127070-K02J17-PSD**
Test Method : GEOSPEC 3: 2001: Test 8.1, 8.5 & 8.7

Customer Supplied Information

Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : Contract 1024
Works order No. : Nil

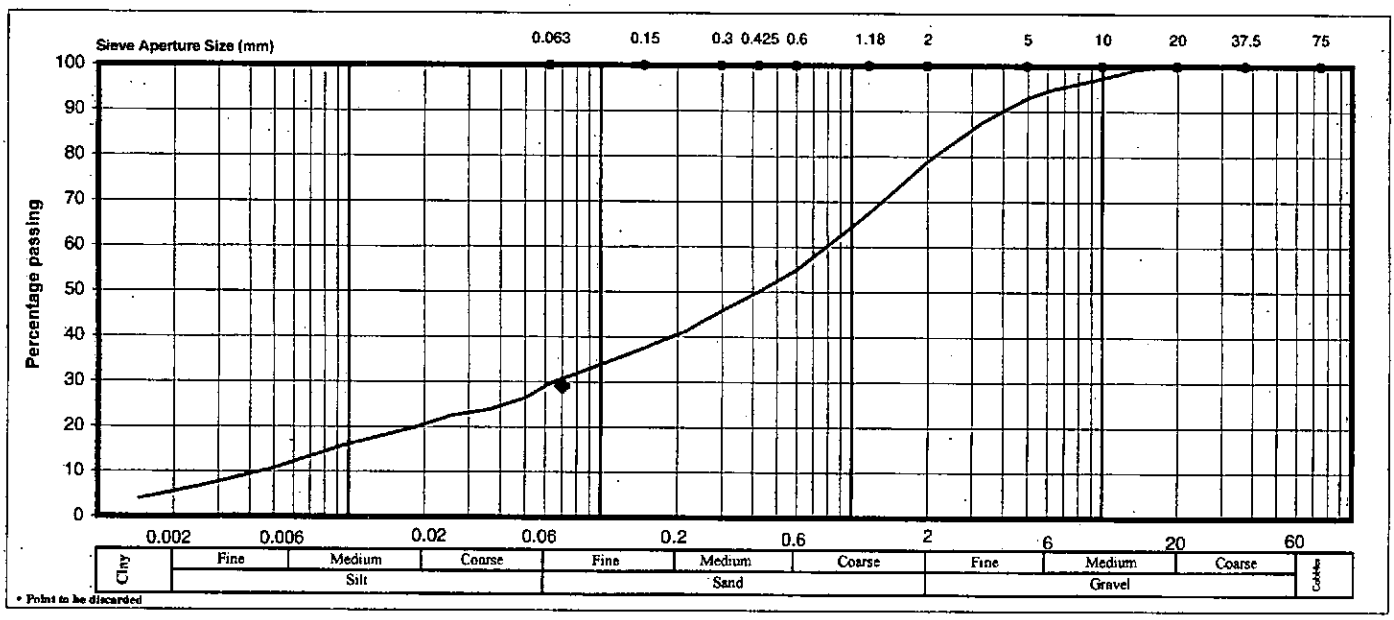
Borehole No. : D034
Customer sample No. : 1
Depth (m) From / To : 7.5 - 8.5
Sample type : M
Sample origin : CD Monzonite

Laboratory Information

Date of sample received : 2-Oct-08
Date of test started : 11-Oct-08
Date of test completed : 15-Oct-08

Laboratory Reference No. : K02J17010-PSD
Specimen depth (m) From/To : 7.5 - 8.1
Particle density (Mg/m^3) : 2.65 (assumed)

Test Result



Summation:
Soil Description : Moist, brown, clayey, very silty, very gravelly SAND .

Gravel % : 21
Sand % : 49
Silt % : 24
Clay % : 6

Note : No visible organic matters in the soil

Remarks:

Address: Lot No. DD 77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

Triaxial Comprsssion Test

FT Laboratories Ltd.
科達測檢試驗所有限公司

HOKLAS 071

Laboratory Report on Triaxial Compression Test

Summary of specimen data - Consolidated Undrained with Pore Water Pressure Measurement

Job Reference No. : 65127070-K02J17001B1

Information supplied by customer

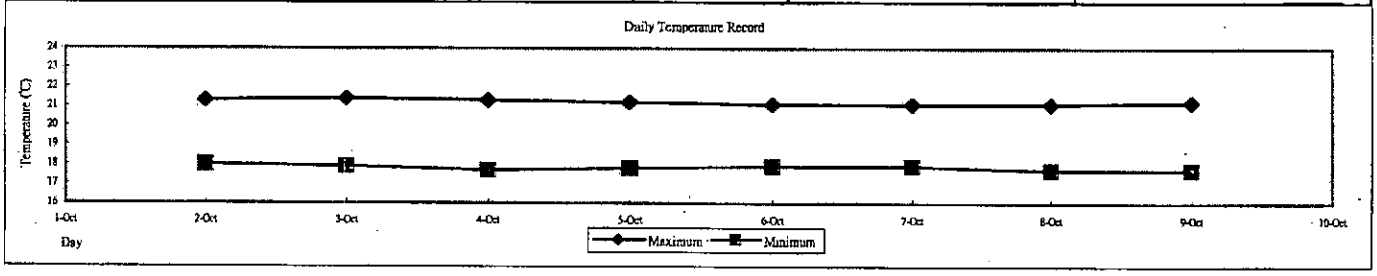
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Works Order No.	: Nil	Borehole No.	: D019
Customer Sample No.	: 13	Depth (m)	: 17.40 - 18.40
Sample Origin	: CDT	Sample type	: Mazier
Contract No.	: 1024		

Laboratory information

Lab. Reference No.	: K02J17001B1	Date test started	: 2-Oct-08
Specimen Depth (m)	: 18.00 - 18.20	Date test completed	: 9-Oct-08
		Date sample received	: 2-Oct-08
Method of preparation	: Undisturbed (direct extrusion from tube sample)	Selected specimen by	: M.T. Kwok (FT Lab. Ltd)
% > 1/5 of specimen diameter	: -	Room temperature range(°C)	: 17.7-21.4
Method of moisture content	: GEOSPEC 3 : 2001: Test 5.1	Particle density (assumed)	: 2.65 Mg/m^3
Test method used	: GEOSPEC 3 : 2001: Test 15.2		
Soil description (Visual)	: Moist, brown, silty/clayey gravelly SAND.		

Stage		Saturation		Compression	
				Single	After
Effective cell pressure	(kPa)	5		180	
		Before	After	Before	
Diameter of specimen	(mm)	73.4 *	-	-	-
Height of specimen	(mm)	147.8 *	-	-	-
Volume of specimen	(cm^3)	625.4	625.4	597.0	597.0
Wet mass of specimen	(g)	1220.3 *	1265.6	1237.2	1234.0 *
Dry mass of specimen	(g)	1037.1 *	-	-	1037.1 *
Moisture content	(%)	17.7	22.1	19.4	19.0
Bulk density	(Mg/m^3)	1.951	2.024	2.072	2.067
Dry density	(Mg/m^3)	1.658	1.658	1.737	1.737
Void ratio		0.598	0.598	0.526	0.526
Degree of saturation	(%)	78.4	97.9	97.7	95.7
Coefficient of volume compressibility	(m^2/MN)	-	-	0.27	-
Coefficient of consolidation by t_{100}	($m^2/Year$)	-	-	13682.43	-
Coefficient of consolidation by t_{50}	($m^2/Year$)	-	-	-	-



Remarks : *Measured primary data

HOKLAS Approved Signatory: YUE Wai Chun / VONG Hong Ian

Date: 23 DEC 2008

Address: Lot No.DD77 Section 1552 S.A. ss1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

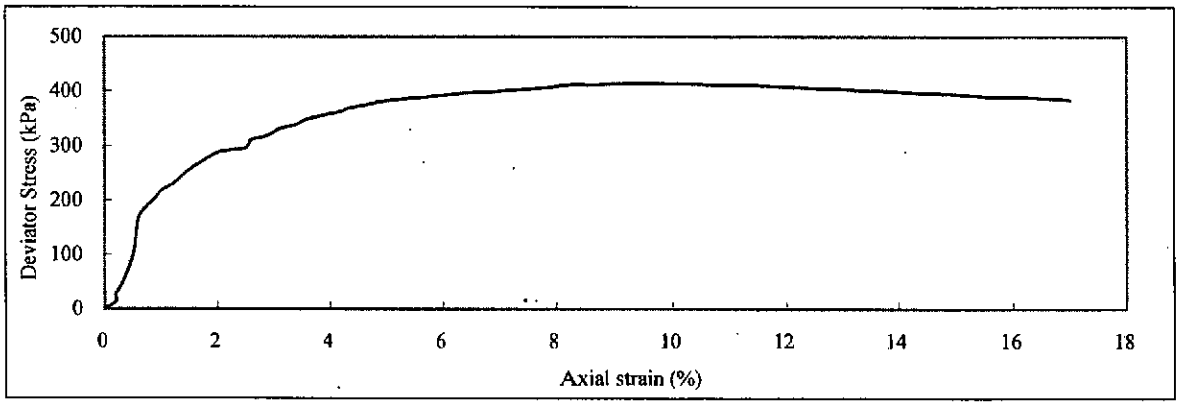
Single Stage - Consolidated Undrained with Pore Water Pressure Measurement

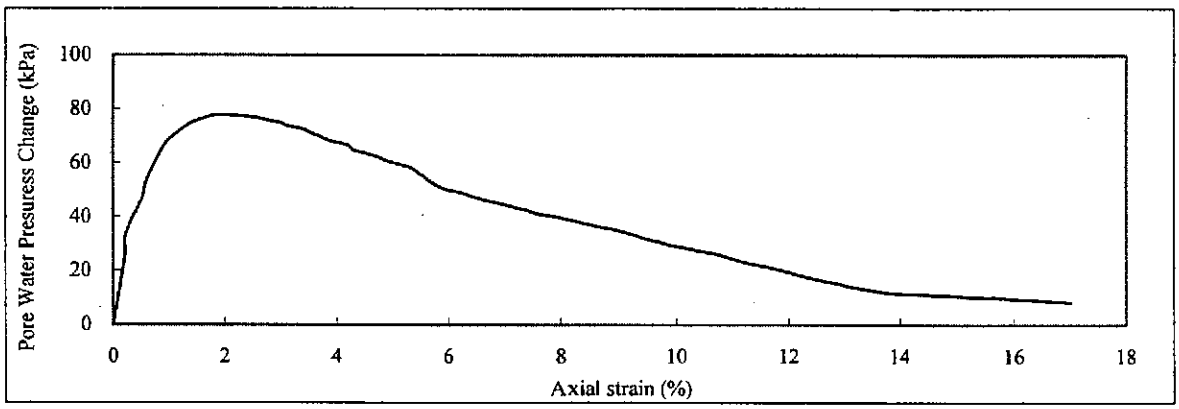
Deviator stress, Pore water pressure change & Stress ratio VS Axial Strain

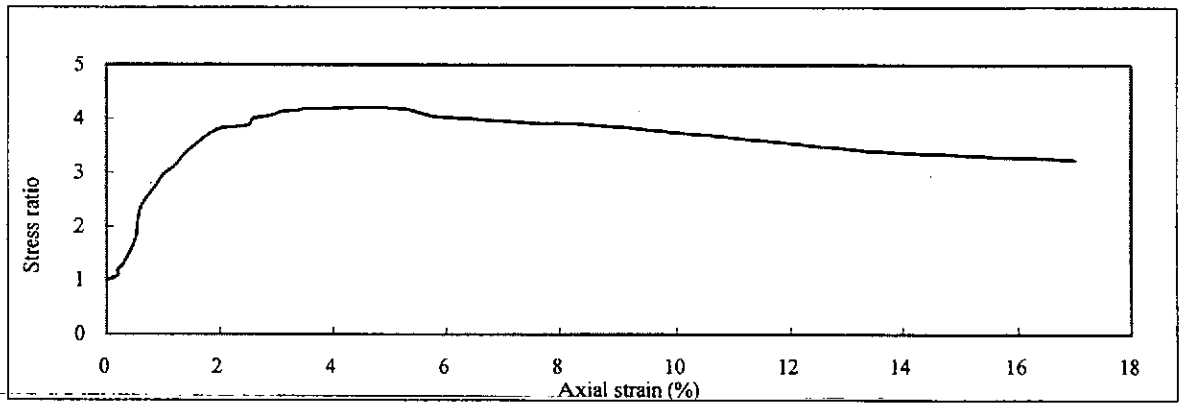
Job Reference No. : 65127070-K02J17001B1

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D019
Customer Sample No.	:	13	Depth (m)	:	17.40 - 18.40







FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Single Stage - Consolidated Undrained with Pore Water Pressure Measurement

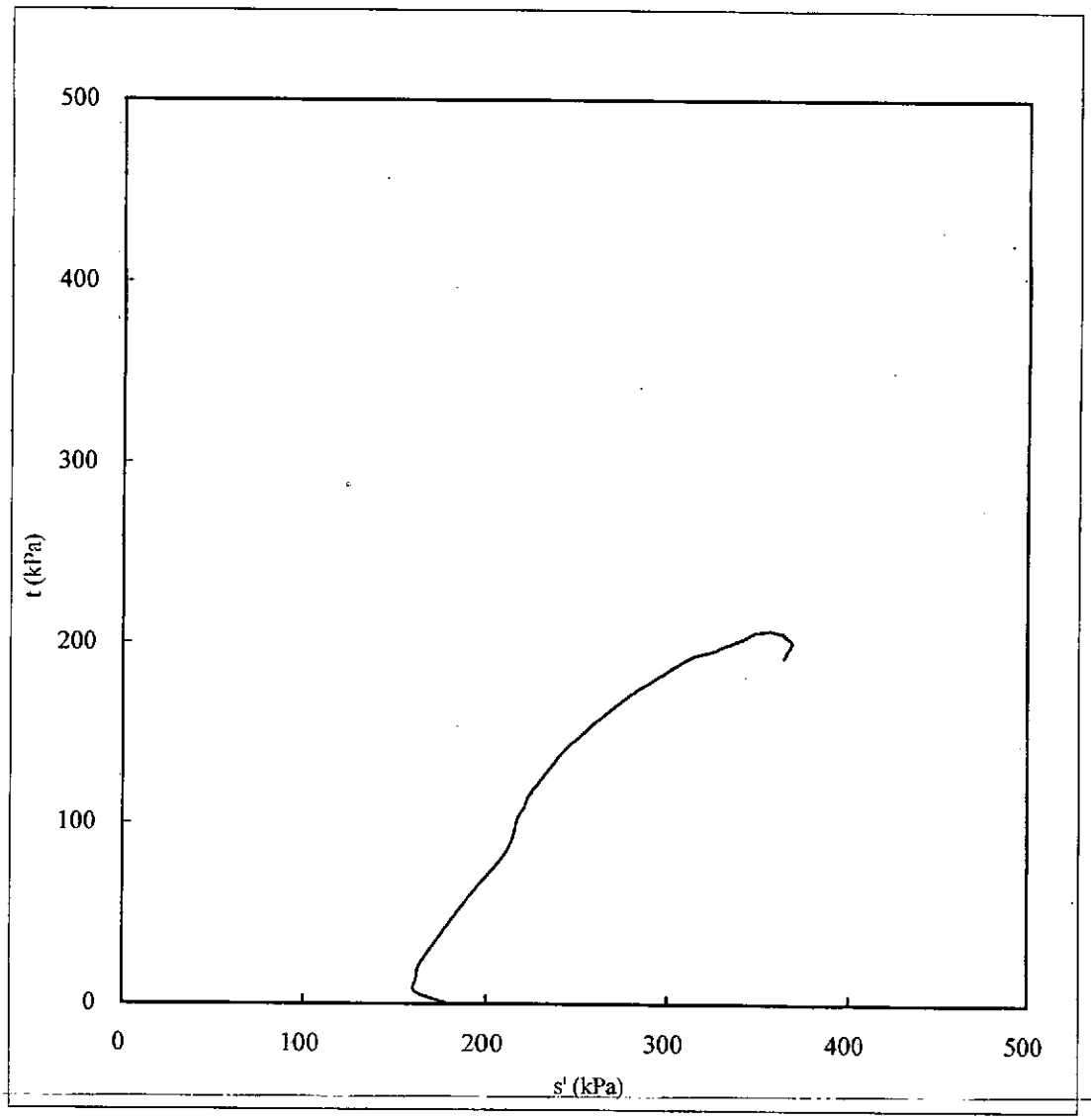
t VS s' Stress path plot

Job Reference No. : 65127070-K02J17001B1

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
Works Order No.	:	Nil	Contract No.	:	1024
Customer Sample No.	:	13	Borehole No.	:	D019
			Depth (m)	:	17.40 - 18.40

Specimen at failure (kPa)	s'	355.6
	t	207.4



FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Single Stage - Consolidated Undrained with Pore Water Pressure Measurement

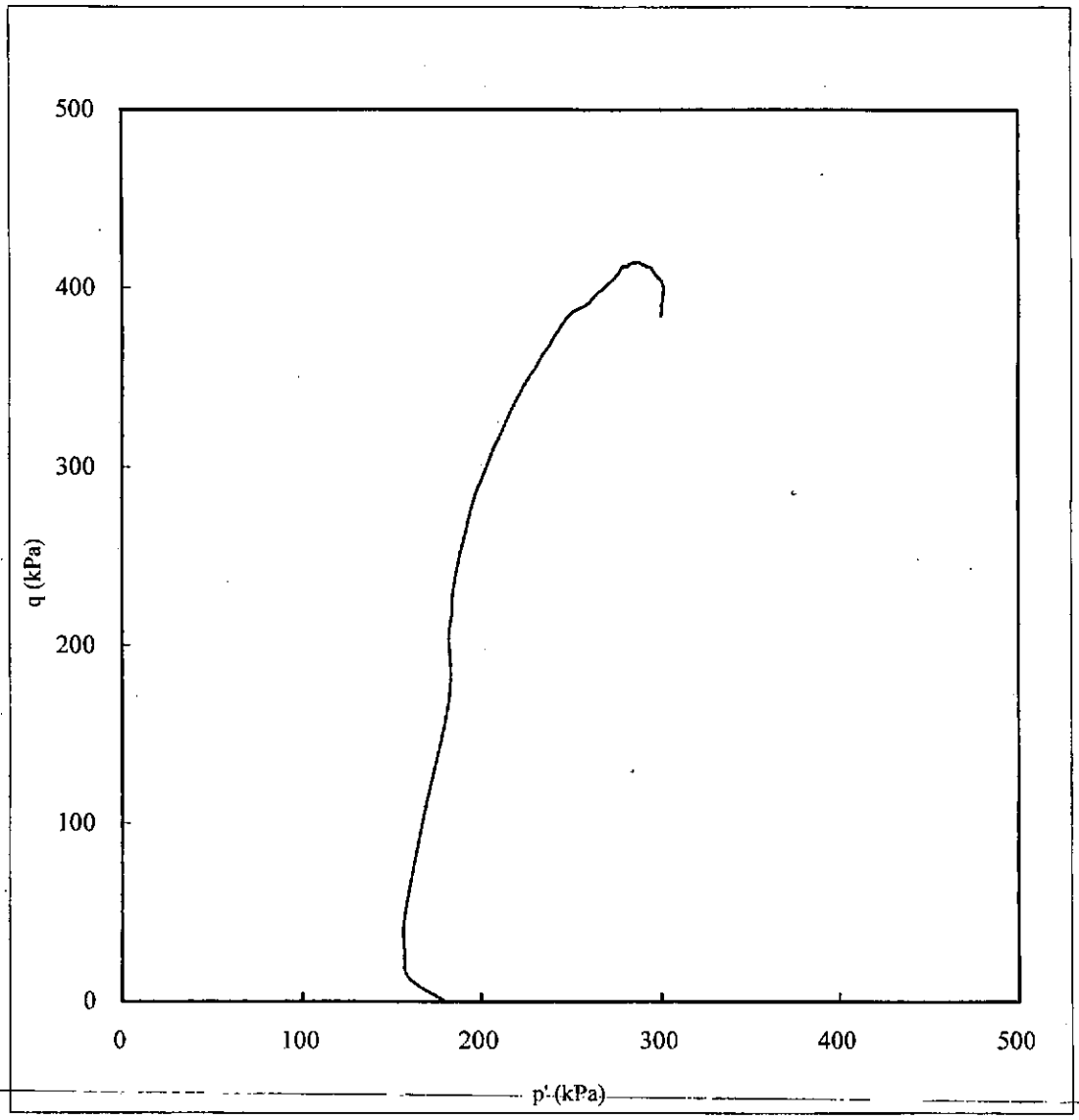
q VS p' Stress path plot

Job Reference No. : 65127070-K02J17001B1

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D019
Customer Sample No.	:	13	Depth (m)	:	17.40 - 18.40

Specimen at failure (kPa)	p'	286.4
	q	414.7



FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Saturation

Job Reference No. : 65127070-K02J17001B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D019

Customer Sample No. : 13

Depth (m) : 17.40 - 18.40

Laboratory information

Lab. Reference No. : K02J17001B1

Date test started : 4-Oct-08 10:45

Specimen Depth (m) : 18.00 - 18.20

Date test completed : 6-Oct-08 08:55

Test result :

Saturated : Cell Pressure = 275.4 kPa Pore water Pressure = 270.3 kPa B-Value = 0.96

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
0.6	0.6	0.8		
25.5	0.6	10.6		
25.5	20.3	17.7		
25.5	20.3	20.3	2.82	
50.2	20.3	33.6		0.54
50.2	45.3	35.4		
50.2	45.3	45.2	11.40	
75.1	45.3	60.0		0.59
75.1	70.4	70.3		
75.1	70.4	70.2	4.10	
100.4	70.4	85.1		0.59
100.4	95.3	95.6		
100.4	95.3	95.2	4.10	
125.4	95.3	112.6		0.70
125.4	120.6	120.6		
125.4	120.6	120.4	2.84	
150.4	120.6	138.7		0.73
150.4	145.4	139.4		
150.4	145.4	145.4	3.77	
175.2	145.4	165.1		0.79
175.2	170.8	165.2		
175.2	170.8	170.2	7.32	
200.4	170.8	193.0		0.90
200.4	195.7	193.1		
200.4	195.7	195.6	1.32	
225.2	195.7	218.1		0.91
225.2	220.7	217.7		
225.2	220.7	220.7	2.10	
250.4	220.7	244.4		0.94

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Saturation

Job Reference No. : 65127070-K02J17001B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D019

Customer Sample No. : 13

Depth (m) : 17.40 - 18.40

Laboratory information

Lab. Reference No. : K02J17001B1

Date test started : 4-Oct-08 10:45

Specimen Depth (m) : 18.00 - 18.20

Date test completed : 6-Oct-08 08:55

Test result :

Saturated : Cell Pressure = 275.4 kPa Pore water Pressure = 270.3 kPa B-Value = 0.96

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
250.5	245.1	244.6		
250.5	245.6	245.3	2.11	
275.2	245.8	269.0		0.96
275.6	270.4	269.3		
275.4	270.3	270.3	3.45	
		Total :	45.33	

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Consolidation

Job Reference No. : 65127070-K02J17001B1

Information supplied by customer

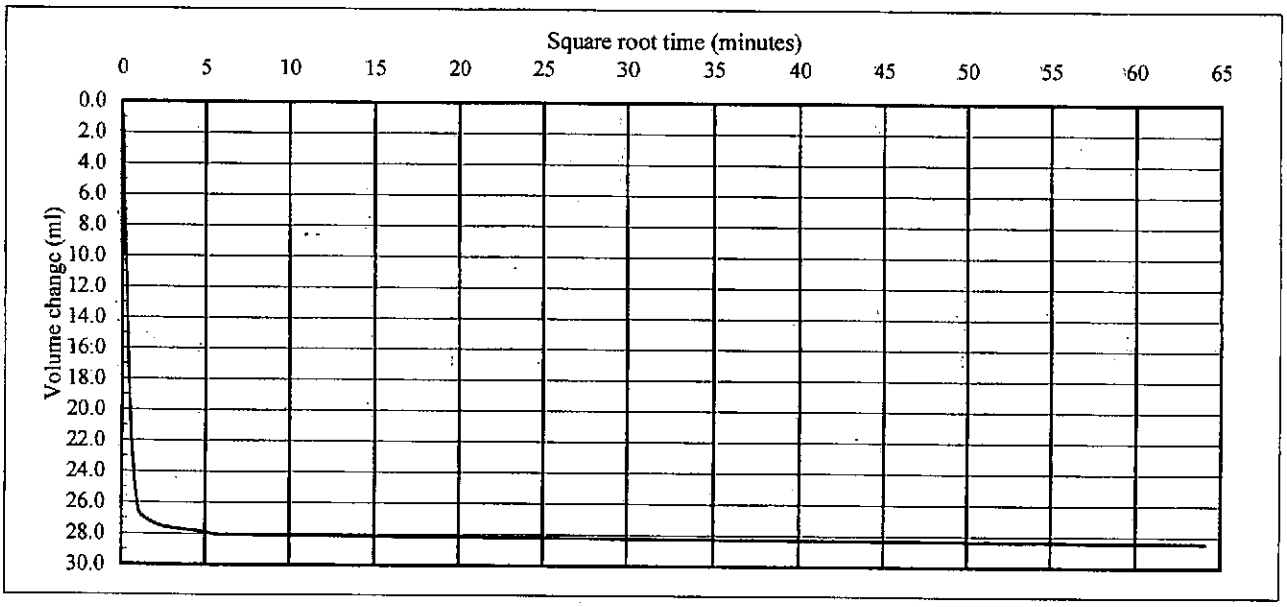
Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D019
Customer Sample No.	:	13	Depth (m)	:	17.40 - 18.40

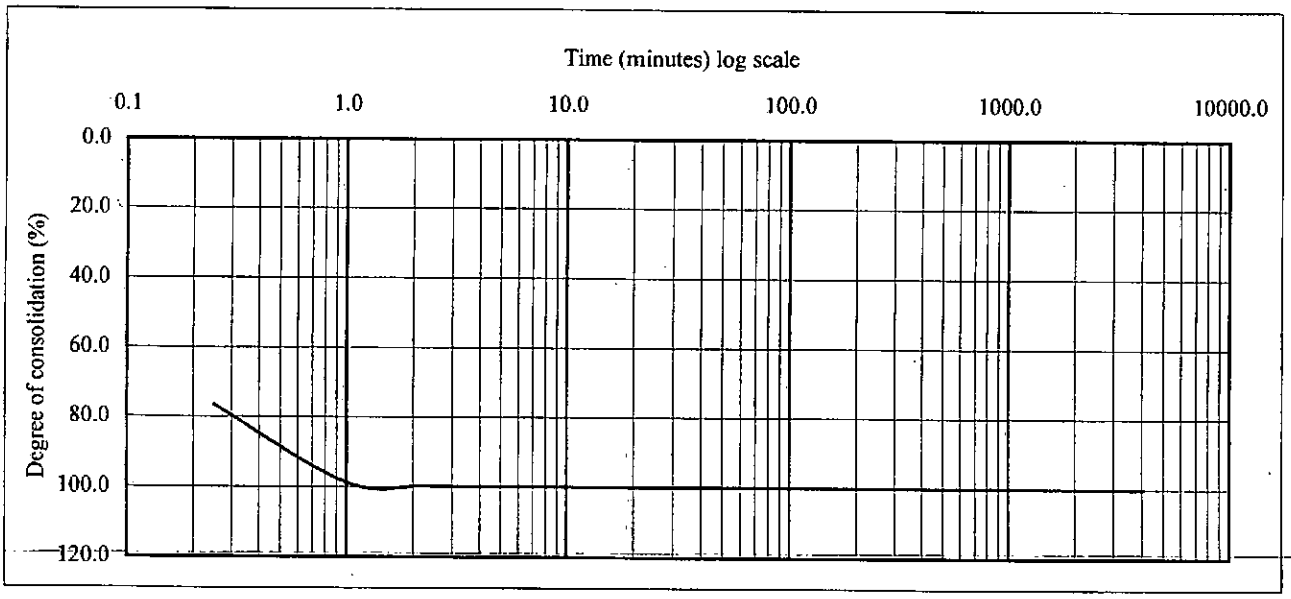
Laboratory information

Lab. Reference No.	:	K02J17001B1	Date test started	:	6-Oct-08	11:30
Specimen Depth (m)	:	18.00 - 18.20	Date test completed	:	9-Oct-08	08:00

Test result

Effective cell pressure (kPa)	=	180.0	Cell pressure (kPa)	=	450.0	Back pressure (kPa) =	270.0
Initial pore water pressure (kPa) =		440.1	Final pore water pressure (kPa) =		270.0		
Total volume change (ml)	=	28.44	t_{100} (min)	=	0.6	t_{50} (min)	= -





Form No.: S 041 008 Rev 4 (06/03/08)

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17001B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D019
Customer Sample No	:	13	Depth	:	17.40 - 18.40

Laboratory Information

Lab. Reference No.	:	K02J17001B1	Initial Volume	:	597	cm^3
Specimen Depth	:	18.00 - 18.20	Initial Area	:	4103.1	mm^2
Date test started	:	9-Oct-08 Time : 08:15	Initial Height	:	145.6	mm
Date test completed	:	9-Oct-08 Time : 16:30	Cell Pressure	:	450	kPa
Rate of displacement	:	0.05 mm/min	Back Pressure	:	270	kPa
Side drains	:	No	Effective Cell Pressure	:	180	kPa
			Proving ring ID	:	PR01	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
0.0	0.0	0	0.0	0.0	0.0	0.0	180.0	0.0	180.0	0.0	1.00
0.2	25.2	55	13.4	0.1	0.0	13.3	161.5	6.7	159.2	13.3	1.09
0.2	32.0	114	27.7	0.1	0.0	27.6	161.8	13.8	157.2	27.6	1.19
0.3	38.3	186	45.3	0.1	0.0	45.2	164.3	22.6	156.8	45.2	1.32
0.5	46.7	425	102.9	0.1	0.0	102.8	184.7	51.4	167.6	102.8	1.77
0.6	54.3	701	169.7	0.2	0.0	169.5	210.5	84.8	182.2	169.5	2.35
0.9	66.3	853	205.9	0.3	0.0	205.6	216.5	102.8	182.2	205.6	2.81
1.0	68.7	904	218.2	0.3	0.0	217.9	220.3	109.0	183.9	217.9	2.96
1.2	72.0	953	229.4	0.3	0.0	229.1	222.6	114.6	184.4	229.1	3.12
1.4	74.8	1029	247.2	0.4	0.0	246.8	228.6	123.4	187.5	246.8	3.35
1.6	76.3	1098	263.2	0.4	0.0	262.8	235.1	131.4	191.3	262.8	3.53
1.8	77.6	1156	276.7	0.5	0.0	276.2	240.5	138.1	194.5	276.2	3.70
2.0	77.8	1205	287.7	0.6	0.0	287.1	245.8	143.6	197.9	287.1	3.81
2.2	77.4	1225	292.0	0.6	0.0	291.4	248.3	145.7	199.7	291.4	3.84
2.5	77.0	1249	296.9	0.7	0.0	296.2	251.1	148.1	201.7	296.2	3.88
2.6	76.6	1312	311.3	0.7	0.0	310.6	258.7	155.3	206.9	310.6	4.00
2.8	75.7	1339	317.2	0.8	0.0	316.4	262.5	158.2	209.8	316.4	4.03
3.0	74.8	1377	325.6	0.8	0.0	324.8	267.6	162.4	213.5	324.8	4.09
3.1	73.9	1408	332.6	0.8	0.0	331.8	272.0	165.9	216.7	331.8	4.13
3.4	72.6	1443	339.7	0.9	0.0	338.8	276.8	169.4	220.3	338.8	4.15
3.5	71.5	1470	345.8	0.9	0.0	344.9	281.0	172.5	223.5	344.9	4.18
3.7	69.8	1501	352.4	1.0	0.0	351.4	285.9	175.7	227.3	351.4	4.19
3.9	68.1	1526	357.3	1.0	0.0	356.3	290.1	178.2	230.7	356.3	4.18
4.2	66.6	1560	364.2	1.1	0.0	363.1	295.0	181.6	234.4	363.1	4.20
4.3	64.8	1581	368.7	1.1	0.0	367.6	299.0	183.8	237.7	367.6	4.19
4.5	63.9	1605	373.5	1.2	0.0	372.3	302.3	186.2	240.2	372.3	4.21
4.7	62.6	1622	376.8	1.2	0.0	375.6	305.2	187.8	242.6	375.6	4.20
4.9	60.9	1650	382.4	1.2	0.0	381.2	309.7	190.6	246.2	381.2	4.20
5.3	58.5	1677	387.1	1.3	0.0	385.8	314.4	192.9	250.1	385.8	4.18
5.5	55.8	1691	389.5	1.4	0.0	388.1	318.3	194.1	253.6	388.1	4.12
5.7	52.8	1702	391.1	1.4	0.0	389.7	322.1	194.9	257.1	389.7	4.06
5.9	50.6	1715	393.4	1.5	0.0	391.9	325.4	196.0	260.0	391.9	4.03
6.1	49.7	1726	394.9	1.5	0.0	393.4	327.0	196.7	261.4	393.4	4.02
6.3	48.6	1740	397.2	1.5	0.0	395.7	329.3	197.9	263.3	395.7	4.01
6.5	47.1	1753	399.5	1.6	0.0	397.9	331.9	199.0	265.5	397.9	3.99
6.8	45.6	1764	400.6	1.6	0.0	399.0	333.9	199.5	267.4	399.0	3.97
7.0	44.6	1774	402.1	1.7	0.0	400.4	335.6	200.2	268.9	400.4	3.96
7.2	43.5	1784	403.6	1.7	0.0	401.9	337.5	201.0	270.5	401.9	3.94
7.4	42.6	1795	405.0	1.8	0.0	403.2	339.0	201.6	271.8	403.2	3.93
7.6	41.2	1805	406.5	1.8	0.0	404.7	341.2	202.4	273.7	404.7	3.92
7.9	40.2	1822	409.1	1.9	0.0	407.2	343.4	203.6	275.5	407.2	3.91
8.1	39.1	1840	412.0	1.9	0.0	410.1	346.0	205.1	277.6	410.1	3.91
8.3	38.1	1853	414.2	1.9	0.0	412.3	348.1	206.2	279.3	412.3	3.91
8.5	37.1	1857	414.1	2.0	0.0	412.1	349.0	206.1	280.3	412.1	3.88
8.7	36.2	1860	413.9	2.0	0.0	411.9	349.8	206.0	281.1	411.9	3.86

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Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17001B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Works Order No.	:	Nil	Contract No.	:	1024
Customer Sample No	:	13	Borehole No.	:	D019
			Depth	:	17.40 - 18.40

Laboratory Information

Lab. Reference No.	:	K02J17001B1	Initial Volume	:	597	cm^3
Specimen Depth	:	18.00 - 18.20	Initial Area	:	4103.1	mm^2
Date test started	:	9-Oct-08 Time : 08:15	Initial Height	:	145.6	mm
Date test completed	:	9-Oct-08 Time : 16:30	Cell Pressure	:	450	kPa
Rate of displacement	:	0.05 mm/min	Back Pressure	:	270	kPa
Side drains	:	No	Effective Cell Pressure	:	180	kPa
			Proving ring ID	:	PR01	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
8.9	35.4	1871	415.3	2.0	0.0	413.3	351.3	206.7	282.4	413.3	3.86
9.1	34.3	1878	416.0	2.1	0.0	413.9	352.7	207.0	283.7	413.9	3.84
9.3	33.0	1883	416.2	2.1	0.0	414.1	354.1	207.1	285.0	414.1	3.82
9.5	31.8	1890	416.8	2.1	0.0	414.7	355.6	207.4	286.4	414.7	3.80
9.7	30.8	1893	416.6	2.2	0.0	414.4	356.4	207.2	287.3	414.4	3.78
9.9	29.6	1895	416.1	2.2	0.0	413.9	357.4	207.0	288.4	413.9	3.75
10.1	28.9	1898	415.9	2.2	0.0	413.7	358.0	206.9	289.0	413.7	3.74
10.4	27.5	1902	415.3	2.3	0.0	413.0	359.0	206.5	290.2	413.0	3.71
10.6	26.7	1905	415.1	2.3	0.0	412.8	359.7	206.4	290.9	412.8	3.69
10.8	25.8	1907	414.6	2.4	0.0	412.2	360.3	206.1	291.6	412.2	3.67
11.1	23.9	1912	414.3	2.4	0.0	411.9	362.1	206.0	293.4	411.9	3.64
11.3	22.8	1916	414.1	2.4	0.0	411.7	363.1	205.9	294.4	411.7	3.62
11.6	21.6	1916	412.7	2.5	0.0	410.2	363.5	205.1	295.1	410.2	3.59
11.8	20.7	1916	411.8	2.5	0.0	409.3	364.0	204.7	295.7	409.3	3.57
12.0	19.6	1916	410.8	2.6	0.0	408.2	364.5	204.1	296.5	408.2	3.54
12.2	18.4	1916	409.9	2.6	0.0	407.3	365.3	203.7	297.4	407.3	3.52
12.5	17.0	1916	408.5	2.6	0.0	405.9	366.0	203.0	298.3	405.9	3.49
12.7	16.1	1919	408.3	2.7	0.0	405.6	366.7	202.8	299.1	405.6	3.47
12.9	15.3	1919	407.4	2.7	0.0	404.7	367.1	202.4	299.6	404.7	3.46
13.1	14.2	1919	406.4	2.7	0.0	403.7	367.7	201.9	300.4	403.7	3.43
13.4	13.1	1916	404.3	2.8	0.0	401.5	367.7	200.8	300.7	401.5	3.41
13.6	12.5	1919	404.1	2.8	0.0	401.3	368.2	200.7	301.3	401.3	3.40
13.9	11.7	1919	402.7	2.8	0.0	399.9	368.3	200.0	301.6	399.9	3.38
14.1	11.5	1919	401.7	2.9	0.0	398.8	367.9	199.4	301.4	398.8	3.37
14.4	11.3	1919	400.3	2.9	0.0	397.4	367.4	198.7	301.2	397.4	3.36
14.6	11.1	1922	400.1	2.9	0.0	397.2	367.5	198.6	301.3	397.2	3.35
14.8	11.0	1922	399.2	3.0	0.0	396.2	367.1	198.1	301.1	396.2	3.34
14.9	10.8	1922	398.7	3.0	0.0	395.7	367.1	197.9	301.1	395.7	3.34
15.1	10.6	1919	397.1	3.0	0.0	394.1	366.5	197.1	300.8	394.1	3.33
15.4	10.3	1919	395.7	3.1	0.0	392.6	366.0	196.3	300.6	392.6	3.31
15.5	10.2	1916	394.5	3.1	0.0	391.4	365.5	195.7	300.3	391.4	3.31
15.8	10.0	1916	393.1	3.1	0.0	390.0	365.0	195.0	300.0	390.0	3.29
15.9	9.8	1919	393.3	3.1	0.0	390.2	365.3	195.1	300.3	390.2	3.29
16.0	9.6	1919	392.9	3.1	0.0	389.8	365.3	194.9	300.3	389.8	3.29
16.2	9.3	1922	392.6	3.2	0.0	389.4	365.4	194.7	300.5	389.4	3.28
16.5	9.1	1922	391.2	3.2	0.0	388.0	364.9	194.0	300.2	388.0	3.27
16.7	8.7	1922	390.3	3.2	0.0	387.1	364.9	193.6	300.3	387.1	3.26
17.0	8.3	1916	387.5	3.3	0.0	384.2	363.8	192.1	299.8	384.2	3.24

Failure criteria : Maximum deviator stress

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Laboratory Report on Triaxial Compression Test

Photographic

Job Reference No. : 65127070-K02J17001B1

Information supplied customer

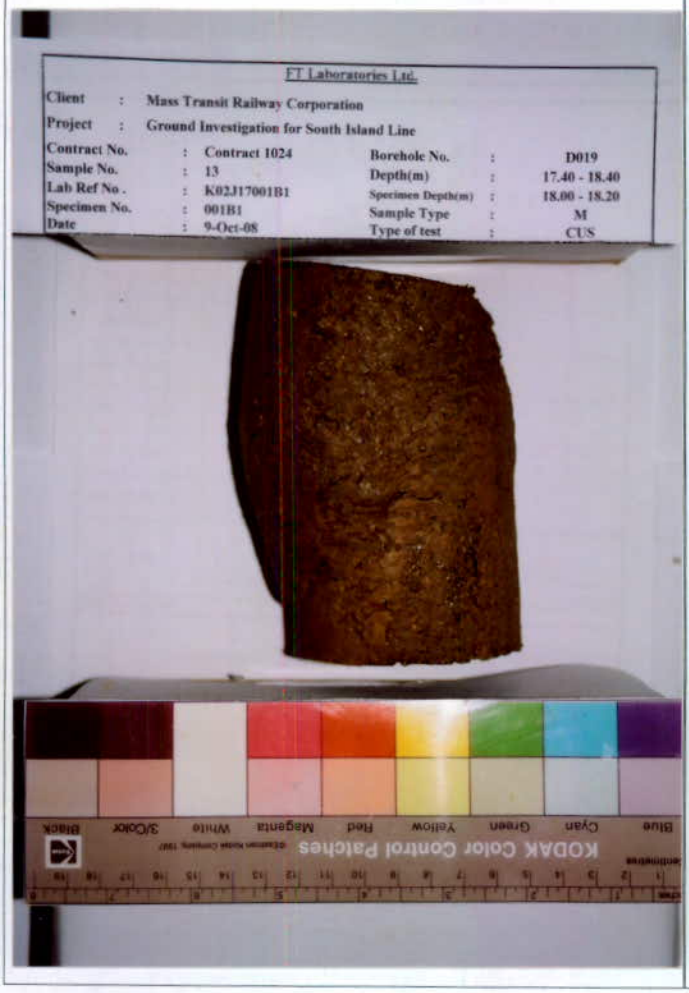
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : 1024
Borehole No. : D019
Depth (m) : 17.40 - 18.40
Customer Sample No. : 13

Laboratory information

Lab. Reference No. : K02J17001B1
Specimen Depth (m) : 18.00 - 18.20

BEFORE SPLIT



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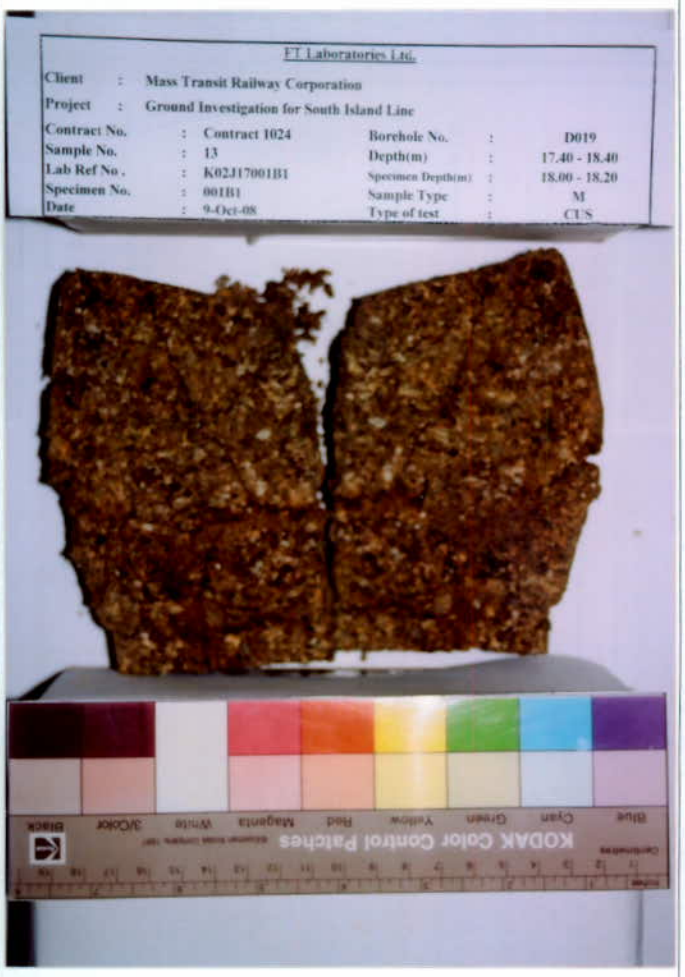

Form No.: S 041 010 Rev 4 (06/03/08)

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HKAS 071

Laboratory Report on Triaxial Compression Test

Summary of specimen data (Multi-stage) - Consolidated Undrained with Pore Water Pressure Measurement

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

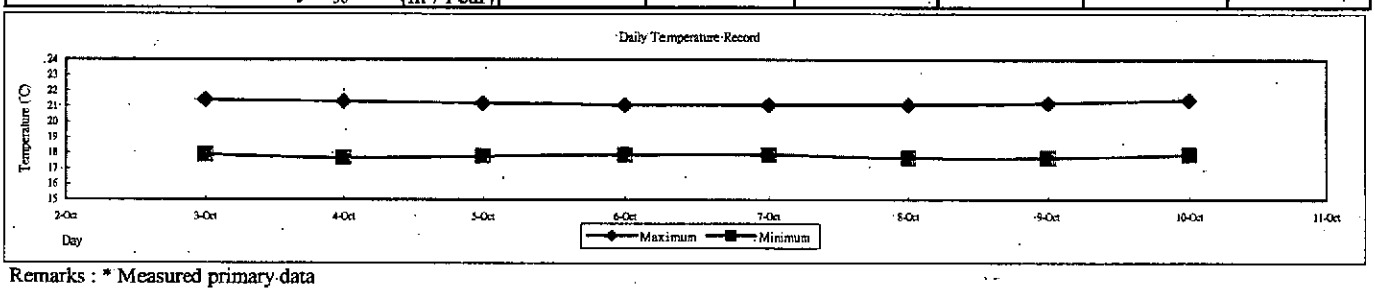
Project : Ground Investigation for South Island Line

Works Order No.	: Nil	Borehole No.	: D019
Customer Sample No.	: 13	Depth (m)	: 17.40 - 18.40
Sample origin	: CDT	Sample type	: Mazier
Contract No.	: 1024		

Laboratory information

Lab. Reference No.	: K02J17001B2	Date test started	: 3-Oct-08
Specimen Depth (m)	: 18.20 - 18.40	Date test completed	: 10-Oct-08
		Date sample received	: 2-Oct-08
Method of preparation	: Undisturbed (direct extrusion from tube sample)	Selected specimen by	: M.T.kwok (FT Lab Ltd)
% > 1/5 of specimen diameter	: -	Room temperature range °C	: 17.7-21.4
Method of moisture content	: GEOSPEC 3 : 2001: Test 5.1	Particle density (assumed)	: 2.65 Mg/m^3
Test method used	: GEOSPEC 3 : 2001: Test 15.2		
Soil description (Visual)	: Moist, brown, silty/clayey gravelly SAND.		

Stage		Saturation		Compression			
				1	2	3	
Effective cell pressure	(kPa)	5		85	175	265	
		Before	After	Before	Before	Before	After
Diameter of specimen	(mm)	73.4 *	-	-	-	-	-
Height of specimen	(mm)	147.8 *	-	-	-	-	-
Volume of specimen	(ml)	625.4	625.4	605.6	592.9	584.2	584.2
Wet mass of specimen	(g)	1221.0 *	1264.6	1244.8	1232.1	1223.4	1219.0*
Dry mass of specimen	(g)	1033.2 *	-	-	-	-	1033.2 *
Moisture content	(%)	18.2	22.4	20.5	19.3	18.5	18.0
Bulk density	(Mg/m^3)	1.952	2.022	2.055	2.078	2.094	2.087
Dry density	(Mg/m^3)	1.652	1.652	1.706	1.743	1.769	1.769
Void ratio		0.604	0.604	0.553	0.520	0.498	0.498
Degree of saturation	(%)	79.8	98.3	98.2	98.4	98.4	95.8
Coefficient of volume compressibility	(m^2/MN)	-	-	0.41	0.17	0.09	-
Coefficient of consolidation by t_{100}	(m^2/Year)	-	-	13738.83	14022.58	18966.59	-
Coefficient of consolidation by t_{50}	(m^2/Year)	-	-	-	-	-	-



Remarks : * Measured primary data

HOKLAS Approved Signatory: _____
YUE Wai Chun / VONG Hong lan

Date: 23 DEC 2008

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.

Address: Lot No.DD77 Section 1552 S.A. ss1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

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Laboratory Report on Triaxial Compression Test

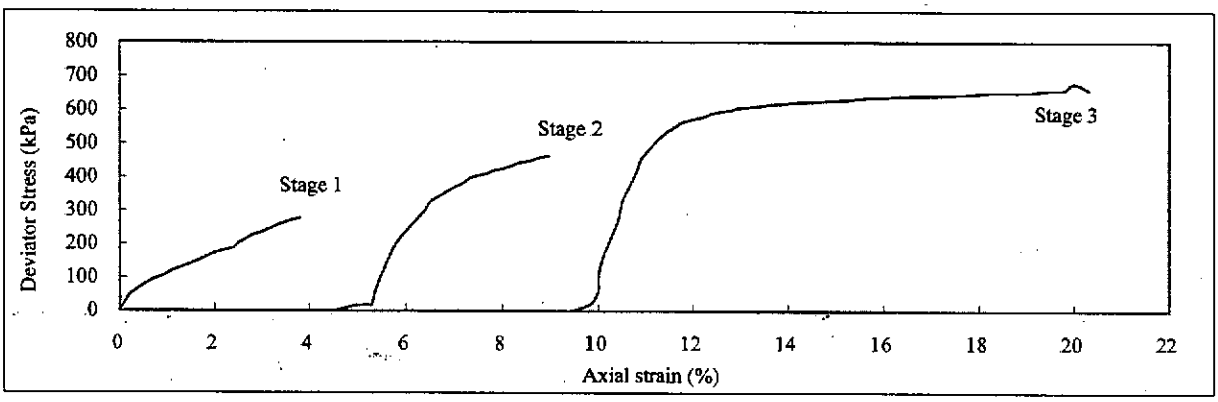
Multi Stage - Consolidated Undrained with Pore Water Pressure Measurement

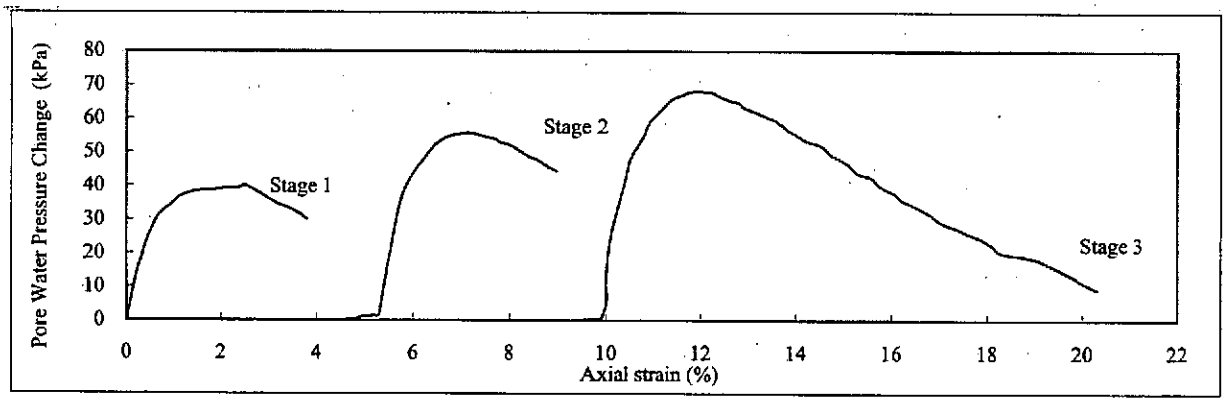
Deviator stress, Pore water pressure change & Stress ratio VS Axial Strain
Job Reference No. : 65127070-K02J17001B2

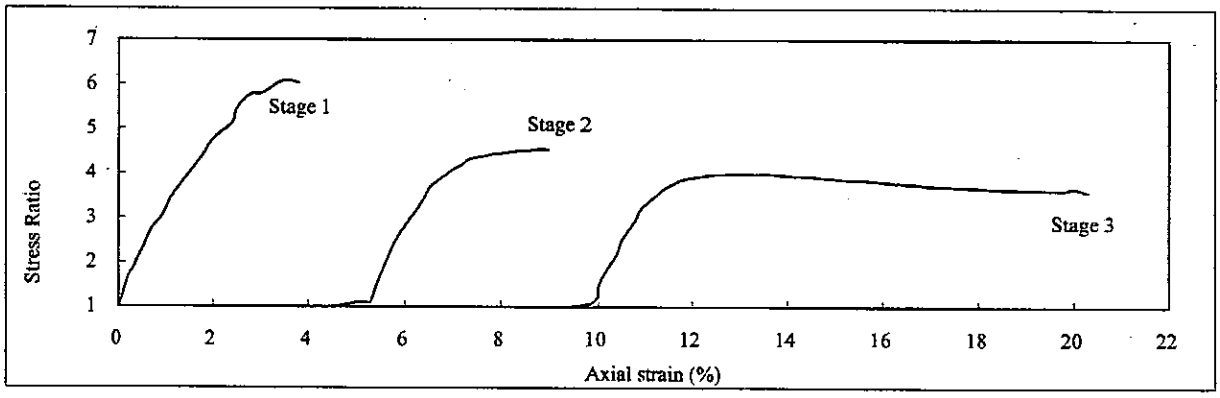
Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D019
Customer Sample No.	:	13	Depth (m)	:	17.40 - 18.40

— Stage 1 — Stage 2 — Stage 3







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Laboratory Report on Triaxial Compression Test

Multi Stage - Consolidated Undrained with Pore Water Pressure Measurement

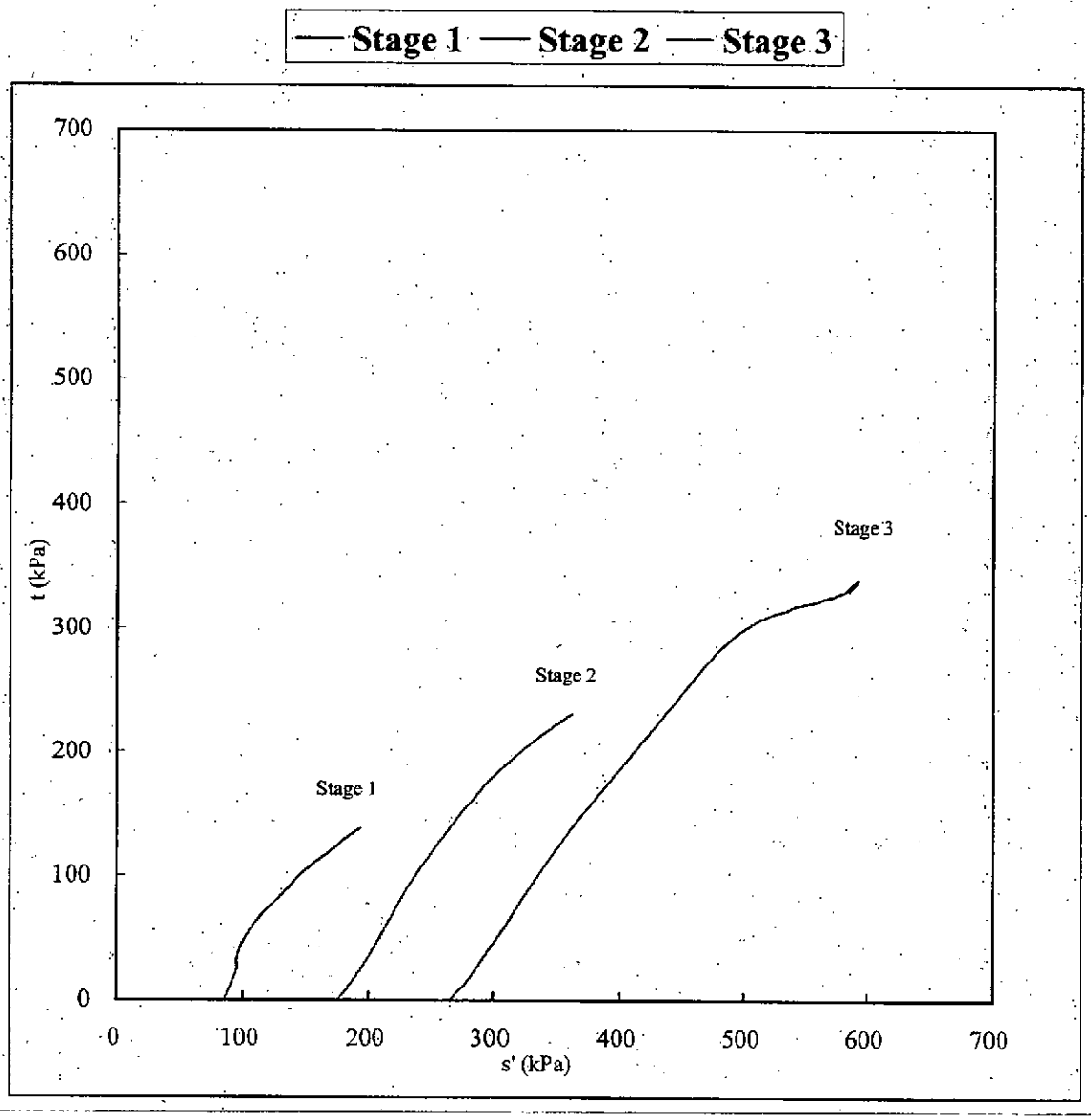
t VS s' Stress path plot

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D019
Customer Sample No.	:	13	Depth (m)	:	17.40 - 18.40

Stage		1	2	3
Specimen at failure (kPa)	s'	187.3	358.1	592.8
	t	134.4	228.9	339.1



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Laboratory Report on Triaxial Compression Test

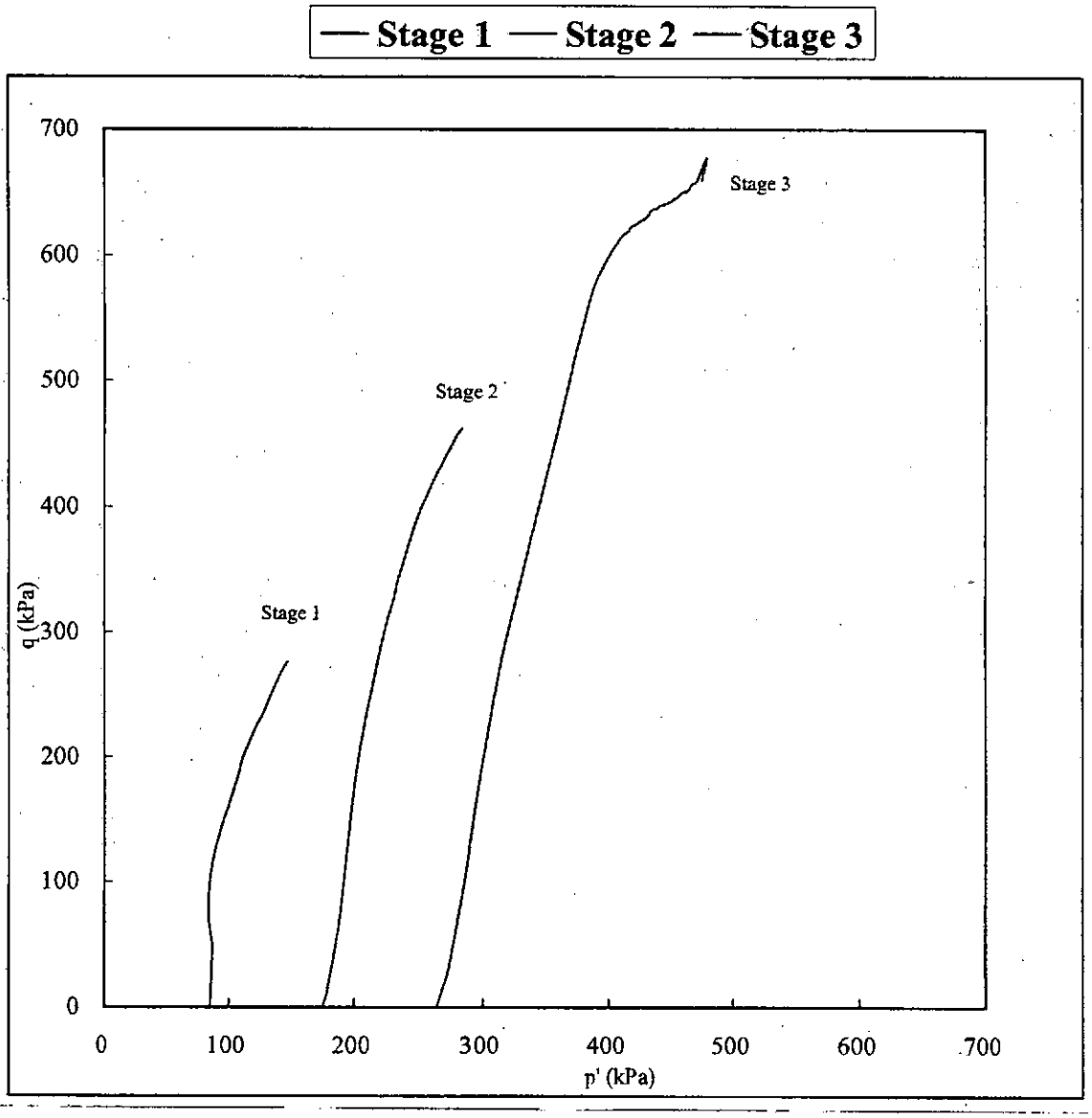
Multi Stage - Consolidated Undrained with Pore Water Pressure Measurement

q VS p' Stress path plot
Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D019
Customer Sample No.	:	13	Depth (m)	:	17.40 - 18.40

Stage		1	2	3
Specimen at failure (kPa)	p'	142.5	281.8	479.8
	q	268.8	457.7	678.2



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Laboratory Report on Triaxial Compression Test

Saturation

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works order No. : Nil

Borehole No. : D019

Customer sample No. : 13

Depth (m) : 17.40 - 18.40

Laboratory information

Lab. Reference No. : K02J17001B2

Date test started : 4-Oct-08 15:00

Specimen Depth (m) : 18.20 - 18.40

Date test completed : 6-Oct-08 08:30

Test result :

Saturated : Cell Pressure = 275.7 kPa Pore water Pressure = 270.8 kPa B-Value = 0.95

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
0.6	0.6	0.5		
25.7	0.6	19.5		
25.7	20.2	19.2		
25.3	20.8	20.0	-0.08	
50.6	20.8	35.7		0.62
50.6	45.2	37.0		
50.6	45.3	45.0	6.19	
75.8	45.3	57.1		0.48
75.8	70.4	58.2		
75.8	70.6	70.0	6.23	
100.1	70.6	82.8		0.53
100.1	95.7	83.0		
100.1	95.2	91.3	5.29	
125.5	95.2	103.6		0.48
125.5	120.1	116.4		
125.5	120.1	120.1	9.91	
150.3	120.1	137.4		0.70
150.3	145.4	138.2		
150.3	145.4	145.2	3.62	
175.2	145.4	164.4		0.77
175.2	170.4	164.6		
175.2	170.4	170.3	2.44	
200.7	170.4	190.9		0.81
200.7	195.4	190.2		
200.7	195.4	195.2	2.41	
225.4	195.4	216.2		0.85
225.4	220.4	218.6		
225.4	220.7	220.3	2.08	
250.8	220.7	243.2		0.90
250.8	245.3	243.8		
250.8	245.8	244.4	2.08	
275.3	245.8	267.7		0.95

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Saturation

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works order No. : Nil

Borehole No. : D019

Customer sample No. : 13

Depth (m) : 17.40 - 18.40

Laboratory information

Lab. Reference No. : K02J17001B2

Date test started : 4-Oct-08 15:00

Specimen Depth (m) : 18.20 - 18.40

Date test completed : 6-Oct-08 08:30

Test result :

Saturated : Cell Pressure = 275.7 kPa Pore water Pressure = 270.8 kPa B-Value = 0.95

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
275.6	270.9	267.9		
275.7	270.8	270.8	3.38	
		Total :	43.56	

FT Laboratories Ltd.
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Laboratory Report on Triaxial Compression Test

Stage 1 : Consolidation

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

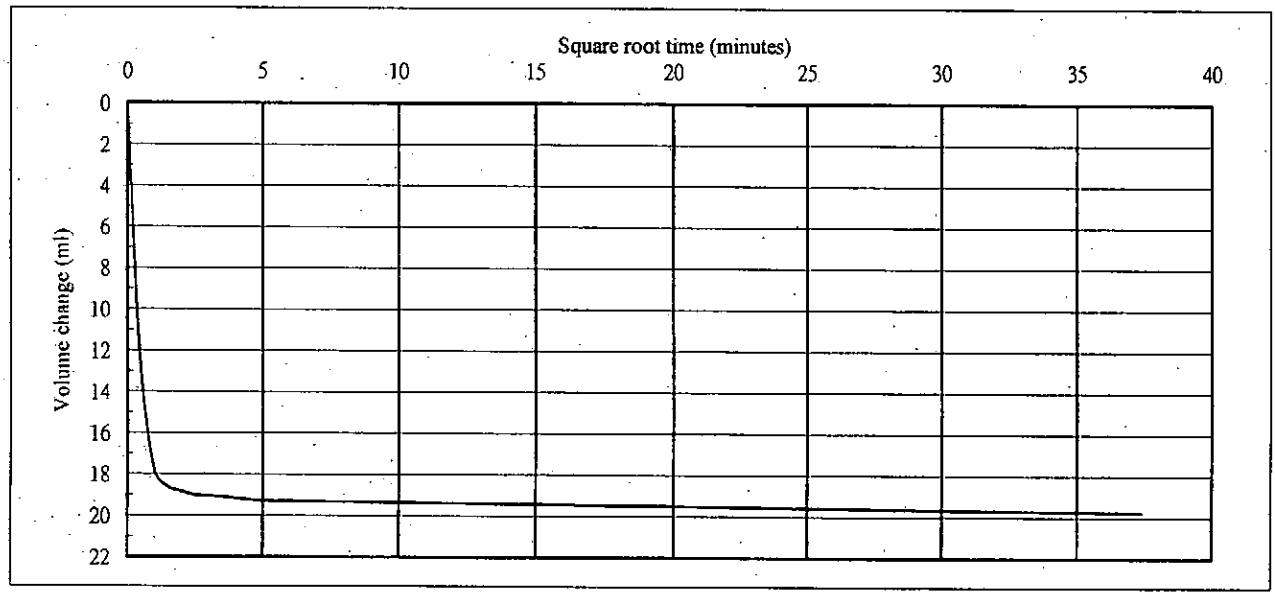
			Contract No.	:	1024
Works order No.	:	Nil	Borehole No.	:	D019
Customer sample No.	:	13	Depth (m)	:	17.40 - 18.40

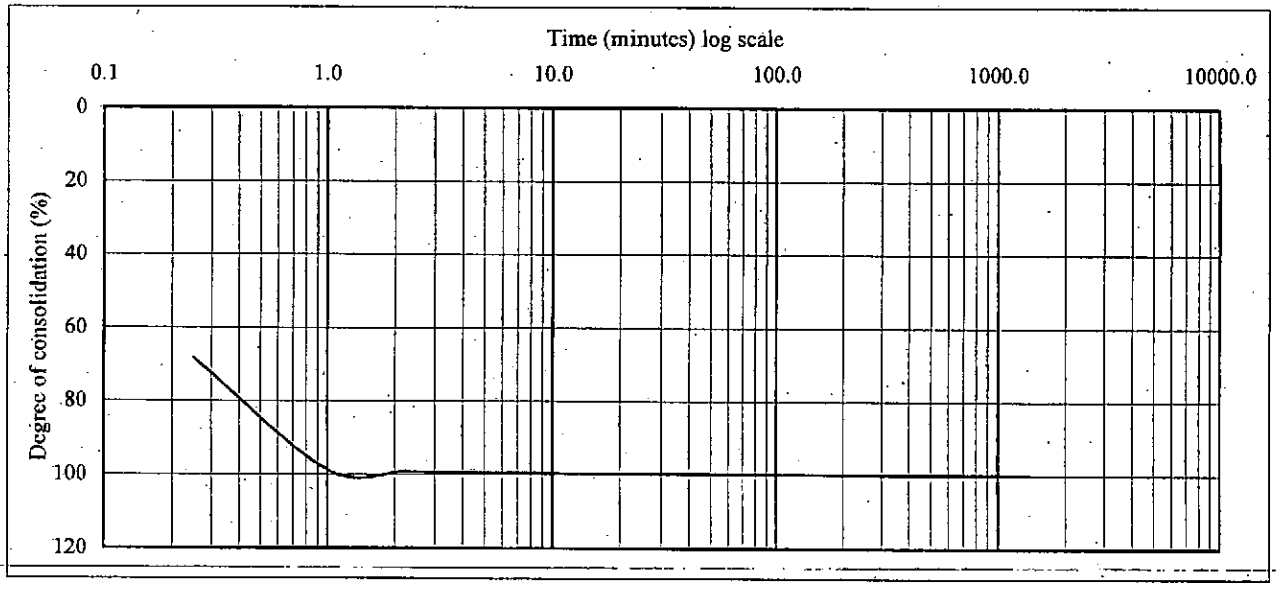
Laboratory information

Lab. Reference No.	:	K02J17001B2	Date test started	:	6-Oct-08	10:00
Specimen Depth (m)	:	18.20 - 18.40	Date test completed	:	7-Oct-08	09:20

Test result

Effective cell pressure (kPa)	=	85.0	Cell pressure (kPa)	=	355.0	Back pressure (kPa) =	270.0
Initial pore water pressure (kPa) =		347.1	Final pore water pressure (kPa) =		270.0		
Total volume change (ml)	=	19.77	t_{100} (min)	=	0.6	t_{50} (min)	= -





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Laboratory Report on Triaxial Compression Test

Stage 2 : Consolidation

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

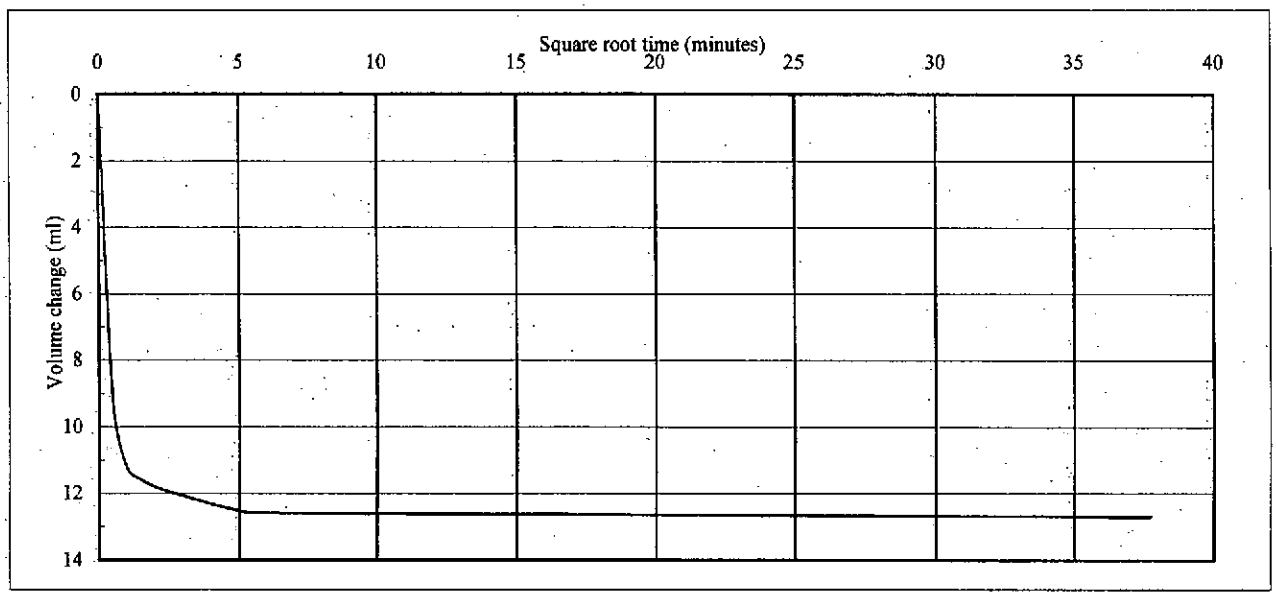
Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works order No.	:	Nil	Borehole No.	:	D019
Customer sample No.	:	13	Depth (m)	:	17.40 - 18.40

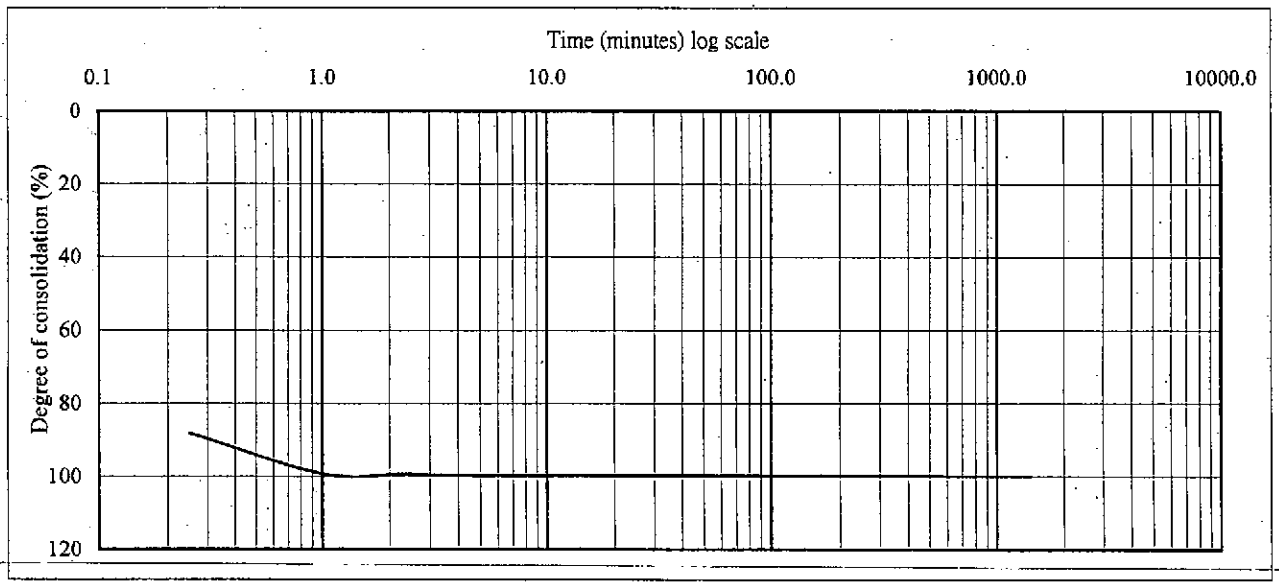
Laboratory information

Lab. Reference No.	:	K02J17001B2	Date test started	:	7-Oct-08	13:30
Specimen Depth (m)	:	18.20 - 18.40	Date test completed	:	8-Oct-08	13:15

Test result

Effective cell pressure (kPa)	=	175.0	Cell pressure (kPa)	=	445.0	Back pressure (kPa) =	270.0
Initial pore water pressure (kPa)	=	394.8	Final pore water pressure (kPa)	=	270.0		
Total volume change (ml)	=	12.70	t_{100} (min)	=	0.6	t_{50} (min) =	-





Form No.: S 041 014 Rev 4 (06/03/08)

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Stage 3 : Consolidation

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

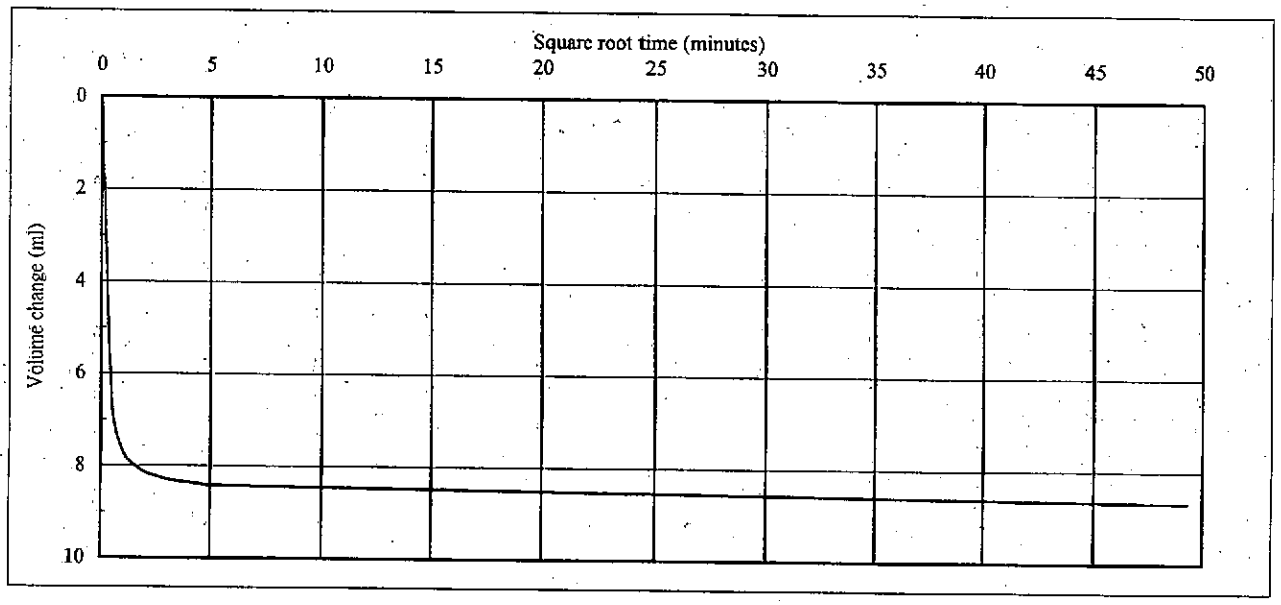
			Contract No.	:	1024
Works order No.	:	Nil	Borehole No.	:	D019
Customer sample No.	:	13	Depth (m)	:	17.40 - 18.40

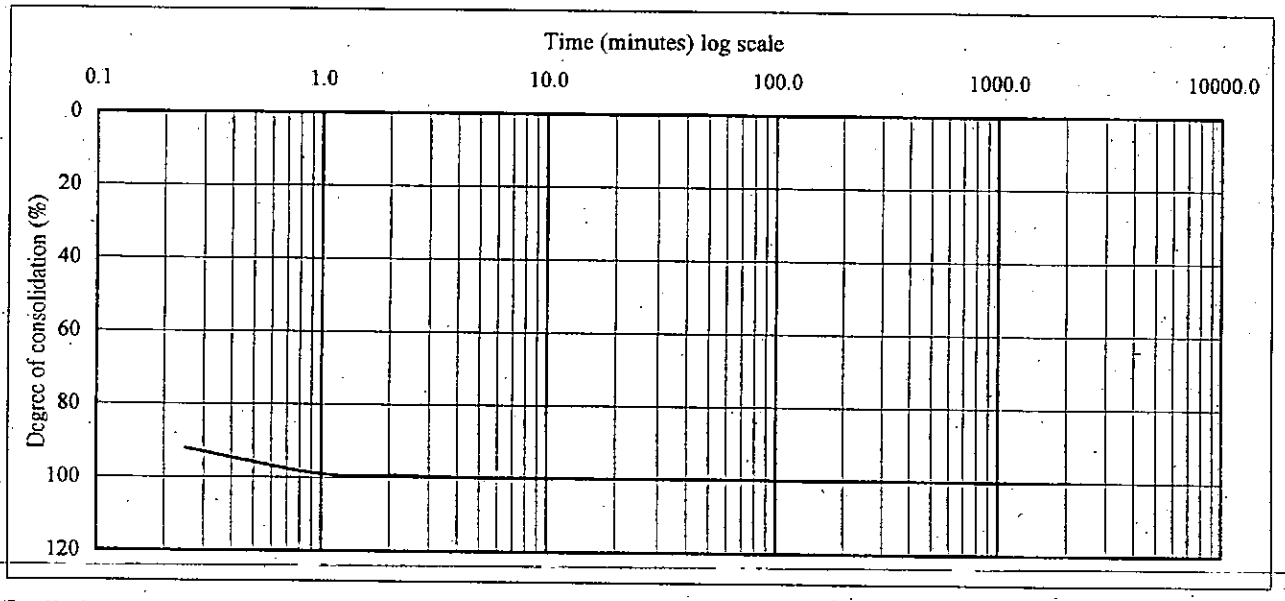
Laboratory information

Lab. Reference No.	:	K02J17001B2	Date test started	:	8-Oct-08	16:30
Specimen Depth (m)	:	18.20 - 18.40	Date test completed	:	10-Oct-08	09:00

Test result

Effective cell pressure (kPa)	=	265.0	Cell pressure (kPa)	=	535.0	Back pressure (kPa) =	270.0
Initial pore water pressure (kPa) =		424.8	Final pore water pressure (kPa) =		270.0		
Total volume change (ml)	=	8.69	t_{100} (min)	=	0.5	t_{50} (min)	= - -





Form No.: S 041 014 Rev 4 (06/03/08)

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D019
Customer Sample No	:	13	Depth	:	17.40 - 18.40

Laboratory Information

Lab. Reference No.	:	K02J17001B2		Initial Volume	:	605.6 cm^3
Specimen Depth	:	18.20 - 18.40		Initial Area	:	4142.2 mm^2
Date test started	:	7-Oct-08	Time : 09:30	Initial Height	:	146.2 mm
Date test completed	:	7-Oct-08	Time : 11:23	Cell Pressure	:	355 kPa
Rate of displacement	:	0.05	mm/min	Back Pressure	:	270 kPa
Side drains	:	No		Effective Cell Pressure	:	85 kPa
				Proving ring ID	:	PR09

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
0.0	0.0	0	0.0	0.0	0.0	0.0	85.0	0.0	85.0	0.0	1.00
0.2	13.9	200	48.2	0.1	0.0	48.1	95.2	24.1	87.1	48.1	1.68
0.3	18.4	238	57.4	0.1	0.0	57.3	95.3	28.7	85.7	57.3	1.86
0.4	23.3	283	67.9	0.1	0.0	67.8	95.6	33.9	84.3	67.8	2.10
0.5	26.5	319	76.6	0.1	0.0	76.5	96.8	38.3	84.0	76.5	2.31
0.6	29.7	359	86.2	0.2	0.0	86.0	98.3	43.0	84.0	86.0	2.56
0.7	31.8	394	94.4	0.2	0.0	94.2	100.3	47.1	84.6	94.2	2.77
0.9	34.1	432	103.5	0.2	0.0	103.3	102.6	51.7	85.3	103.3	3.03
1.1	36.7	502	119.8	0.3	0.0	119.5	108.1	59.8	88.1	119.5	3.47
1.3	37.8	546	130.1	0.3	0.0	129.8	112.1	64.9	90.5	129.8	3.75
1.5	38.4	592	140.8	0.4	0.0	140.4	116.8	70.2	93.4	140.4	4.01
1.7	38.7	642	152.3	0.4	0.0	151.9	122.3	76.0	96.9	151.9	4.28
1.8	38.6	671	159.0	0.5	0.0	158.5	125.7	79.3	99.2	158.5	4.42
2.0	39.0	732	173.2	0.5	0.0	172.7	132.4	86.4	103.6	172.7	4.75
2.4	39.4	800	188.4	0.6	0.0	187.8	139.5	93.9	108.2	187.8	5.12
2.5	40.1	851	200.4	0.6	0.0	199.8	144.8	99.9	111.5	199.8	5.45
2.8	37.9	961	225.5	0.7	0.0	224.8	159.5	112.4	122.0	224.8	5.77
3.0	36.1	1001	234.5	0.8	0.0	233.7	165.8	116.9	126.8	233.7	5.78
3.2	34.6	1061	247.9	0.8	0.0	247.1	174.0	123.6	132.8	247.1	5.90
3.4	33.5	1117	260.4	0.8	0.0	259.6	181.3	129.8	138.0	259.6	6.04
3.6	32.1	1159	269.7	0.9	0.0	268.8	187.3	134.4	142.5	268.8	6.08
3.8	30.0	1193	277.2	0.9	0.0	276.3	193.2	138.2	147.1	276.3	6.02

Failure criteria : Maximum stress ratio

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024
Works Order No. : Nil
Borehole No. : D019
Customer Sample No : 13
Depth : 17.40 - 18.40

Laboratory Information

Lab. Reference No. : K02J17001B2
Specimen Depth : 18.20 - 18.40
Date test started : 8-Oct-08 Time : 13:35
Date test completed : 8-Oct-08 Time : 15:42
Rate of displacement : 0.05 mm/min
Side drains : No

Initial Volume : 592.9 cm^3
Initial Area : 4245.9 mm^2
Initial Height : 139.7 mm
Cell Pressure : 445 kPa
Back Pressure : 270 kPa
Effective Cell Pressure : 175 kPa
Proving ring ID : PR01

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
4.5	0.0	0	0.0	1.1	0.0	0.0	175.0	0.0	175.0	0.0	1.00
4.6	0.1	14	3.1	1.1	0.0	2.0	175.9	1.0	175.6	2.0	1.01
4.7	0.3	35	7.7	1.1	0.0	6.6	178.0	3.3	176.9	6.6	1.04
4.9	0.6	62	13.9	1.2	0.0	12.7	180.8	6.4	178.6	12.7	1.07
4.9	0.9	69	15.5	1.2	0.0	14.3	181.3	7.2	178.9	14.3	1.08
5.0	1.1	76	17.0	1.2	0.0	15.8	181.8	7.9	179.2	15.8	1.09
5.2	1.4	83	18.5	1.2	0.0	17.3	182.3	8.7	179.4	17.3	1.10
5.3	1.6	90	20.0	1.2	0.0	18.8	182.8	9.4	179.7	18.8	1.11
5.4	10.0	324	72.3	1.3	0.0	71.0	200.5	35.5	188.7	71.0	1.43
5.7	32.8	787	174.8	1.3	0.0	173.5	229.0	86.8	200.0	173.5	2.22
5.9	41.1	1001	221.8	1.4	0.0	220.4	244.1	110.2	207.4	220.4	2.65
6.2	47.4	1218	269.2	1.4	0.0	267.8	261.5	133.9	216.9	267.8	3.10
6.4	51.4	1374	302.8	1.5	0.0	301.3	274.3	150.7	224.0	301.3	3.44
6.5	52.7	1481	326.1	1.5	0.0	324.6	284.6	162.3	230.5	324.6	3.65
6.7	54.4	1564	343.6	1.5	0.0	342.1	291.7	171.1	234.6	342.1	3.84
7.0	55.5	1684	368.9	1.6	0.0	367.3	303.2	183.7	241.9	367.3	4.07
7.2	55.7	1753	383.2	1.6	0.0	381.6	310.1	190.8	246.5	381.6	4.20
7.3	55.4	1812	395.6	1.6	0.0	394.0	316.6	197.0	250.9	394.0	4.29
7.5	54.6	1864	406.0	1.7	0.0	404.3	322.6	202.2	255.2	404.3	4.36
7.7	53.9	1895	411.9	1.7	0.0	410.2	326.2	205.1	257.8	410.2	4.39
7.8	53.0	1933	419.7	1.7	0.0	418.0	331.0	209.0	261.3	418.0	4.43
8.0	52.2	1964	425.5	1.7	0.0	423.8	334.7	211.9	264.1	423.8	4.45
8.2	50.5	2009	434.3	1.8	0.0	432.5	340.8	216.3	268.7	432.5	4.47
8.3	49.6	2036	439.8	1.8	0.0	438.0	344.4	219.0	271.4	438.0	4.49
8.4	48.8	2061	444.5	1.8	0.0	442.7	347.6	221.4	273.8	442.7	4.51
8.6	47.6	2088	449.5	1.8	0.0	447.7	351.3	223.9	276.6	447.7	4.51
8.8	45.8	2140	459.6	1.9	0.0	457.7	358.1	228.9	281.8	457.7	4.54
9.0	44.3	2164	463.8	1.9	0.0	461.9	361.7	231.0	284.7	461.9	4.53

Failure criteria : Maximum stress ratio

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D019

Customer Sample No : 13

Depth : 17.40 - 18.40

Laboratory Information

Lab. Reference No. : K02J17001B2

Specimen Depth : 18.20 - 18.40

Date test started : 10-Oct-08 Time : 09:30

Date test completed : 10-Oct-08 Time : 14:18

Rate of displacement : 0.05 mm/min

Side drains : No

Initial Volume : 584.2 cm^3

Initial Area : 4400.7 mm^2

Initial Height : 132.8 mm

Cell Pressure : 535 kPa

Back Pressure : 270 kPa

Effective Cell Pressure : 265 kPa

Proving ring ID : PR06

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
9.5	0.0	0	0.0	2.0	0.0	0.0	265.0	0.0	265.0	0.0	1.00
9.6	0.2	35	7.2	2.0	0.0	5.2	267.4	2.6	266.5	5.2	1.02
9.8	0.4	86	17.5	2.0	0.0	15.5	272.4	7.8	269.8	15.5	1.06
9.9	0.6	149	30.5	2.0	0.0	28.5	278.7	14.3	273.9	28.5	1.11
10.0	5.4	307	62.8	2.0	0.0	60.8	290.0	30.4	279.9	60.8	1.23
10.0	13.4	535	109.5	2.0	0.0	107.5	305.4	53.8	287.4	107.5	1.43
10.1	25.2	817	166.9	2.0	0.0	164.9	322.3	82.5	294.8	164.9	1.69
10.4	41.1	1314	267.6	2.1	0.0	265.5	356.7	132.8	312.4	265.5	2.19
10.5	47.2	1599	325.3	2.1	0.0	323.2	379.4	161.6	325.5	323.2	2.48
10.6	50.1	1758	357.1	2.1	0.0	355.0	392.4	177.5	333.2	355.0	2.65
10.8	54.9	2052	416.0	2.2	0.0	413.8	417.0	206.9	348.0	413.8	2.97
10.9	58.3	2249	455.2	2.2	0.0	453.0	433.2	226.5	357.7	453.0	3.19
11.2	63.0	2489	502.3	2.2	0.0	500.1	452.1	250.1	368.7	500.1	3.48
11.4	65.7	2629	529.2	2.2	0.0	527.0	462.8	263.5	375.0	527.0	3.64
11.6	66.9	2730	548.4	2.3	0.0	546.1	471.2	273.1	380.1	546.1	3.76
11.8	68.0	2825	566.2	2.3	0.0	563.9	479.0	282.0	385.0	563.9	3.86
12.2	67.9	2907	580.0	2.4	0.0	577.6	485.9	288.8	389.6	577.6	3.93
12.4	66.6	2967	590.7	2.4	0.0	588.3	492.6	294.2	394.5	588.3	3.97
12.6	65.5	3002	596.3	2.4	0.0	593.9	496.5	297.0	397.5	593.9	3.98
12.8	64.7	3028	599.9	2.4	0.0	597.5	499.1	298.8	399.5	597.5	3.98
12.9	63.4	3059	605.5	2.5	0.0	603.0	503.1	301.5	402.6	603.0	3.99
13.2	61.7	3091	609.7	2.5	0.0	607.2	506.9	303.6	405.7	607.2	3.99
13.4	60.4	3116	613.2	2.5	0.0	610.7	510.0	305.4	408.2	610.7	3.98
13.6	59.3	3142	616.8	2.6	0.0	614.2	512.8	307.1	410.4	614.2	3.99
13.8	56.9	3164	619.7	2.6	0.0	617.1	516.7	308.6	413.8	617.1	3.97
14.0	55.3	3180	621.4	2.6	0.0	618.8	519.1	309.4	416.0	618.8	3.95
14.2	53.5	3205	624.9	2.6	0.0	622.3	522.7	311.2	418.9	622.3	3.94
14.5	52.1	3224	626.4	2.7	0.0	623.7	524.8	311.9	420.8	623.7	3.93
14.7	49.5	3240	628.0	2.7	0.0	625.3	528.2	312.7	423.9	625.3	3.90
14.9	48.0	3256	629.6	2.7	0.0	626.9	530.5	313.5	426.0	626.9	3.89
15.1	46.3	3268	630.5	2.8	0.0	627.7	532.6	313.9	427.9	627.7	3.87
15.3	43.7	3294	633.9	2.8	0.0	631.1	536.9	315.6	431.7	631.1	3.85
15.6	42.3	3325	637.7	2.8	0.0	634.9	540.2	317.5	434.3	634.9	3.85
15.7	40.7	3338	639.4	2.8	0.0	636.6	542.6	318.3	436.5	636.6	3.84
15.9	38.9	3347	639.7	2.9	0.0	636.8	544.5	318.4	438.4	636.8	3.82
16.1	37.4	3360	640.6	2.9	0.0	637.7	546.5	318.9	440.2	637.7	3.80
16.2	35.9	3373	642.3	2.9	0.0	639.4	548.8	319.7	442.2	639.4	3.79
16.5	33.9	3389	643.0	2.9	0.0	640.1	551.2	320.1	444.5	640.1	3.77
16.8	31.6	3408	644.2	3.0	0.0	641.2	554.0	320.6	447.1	641.2	3.75
17.0	29.4	3420	645.1	3.0	0.0	642.1	556.7	321.1	449.6	642.1	3.73
17.2	28.2	3433	645.9	3.0	0.0	642.9	558.3	321.5	451.1	642.9	3.71
17.4	27.2	3446	646.7	3.0	0.0	643.7	559.7	321.9	452.4	643.7	3.71
17.6	25.9	3461	648.1	3.1	0.0	645.0	561.6	322.5	454.1	645.0	3.70
17.9	24.2	3484	649.9	3.1	0.0	646.8	564.2	323.4	456.4	646.8	3.69
18.1	22.3	3506	652.4	3.1	0.0	649.3	567.4	324.7	459.1	649.3	3.68

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17001B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D019

Customer Sample No : 13

Depth : 17.40 - 18.40

Laboratory Information

Lab. Reference No. : K02J17001B2

Specimen Depth : 18.20 - 18.40

Date test started : 10-Oct-08 Time : 09:30

Date test completed : 10-Oct-08 Time : 14:18

Rate of displacement : 0.05 mm/min

Side drains : No

Initial Volume : 584.2 cm^3

Initial Area : 4400.7 mm^2

Initial Height : 132.8 mm

Cell Pressure : 535 kPa

Back Pressure : 270 kPa

Effective Cell Pressure : 265 kPa

Proving ring ID : PR06

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
18.3	20.1	3522	653.8	3.2	0.0	650.6	570.2	325.3	461.8	650.6	3.66
18.7	19.2	3537	653.5	3.2	0.0	650.3	571.0	325.2	462.6	650.3	3.65
19.0	18.4	3553	654.0	3.3	0.0	650.7	572.0	325.4	463.5	650.7	3.64
19.2	17.3	3575	656.5	3.3	0.0	653.2	574.3	326.6	465.4	653.2	3.64
19.4	15.9	3601	659.5	3.3	0.0	656.2	577.2	328.1	467.8	656.2	3.63
19.6	14.5	3617	660.7	3.3	0.0	657.4	579.2	328.7	469.6	657.4	3.62
19.8	13.2	3636	662.6	3.4	0.0	659.2	581.4	329.6	471.5	659.2	3.62
20.0	11.3	3750	681.6	3.4	0.0	678.2	592.8	339.1	479.8	678.2	3.67
20.3	9.3	3661	663.0	3.4	0.0	659.6	585.5	329.8	475.6	659.6	3.58

Failure criteria : Maximum deviator stress

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Photographic

Job Reference No. : 65127070-K02J17001B2

Information supplied customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Borehole No. : D019

Depth (m) : 17.40 - 18.40

Laboratory information

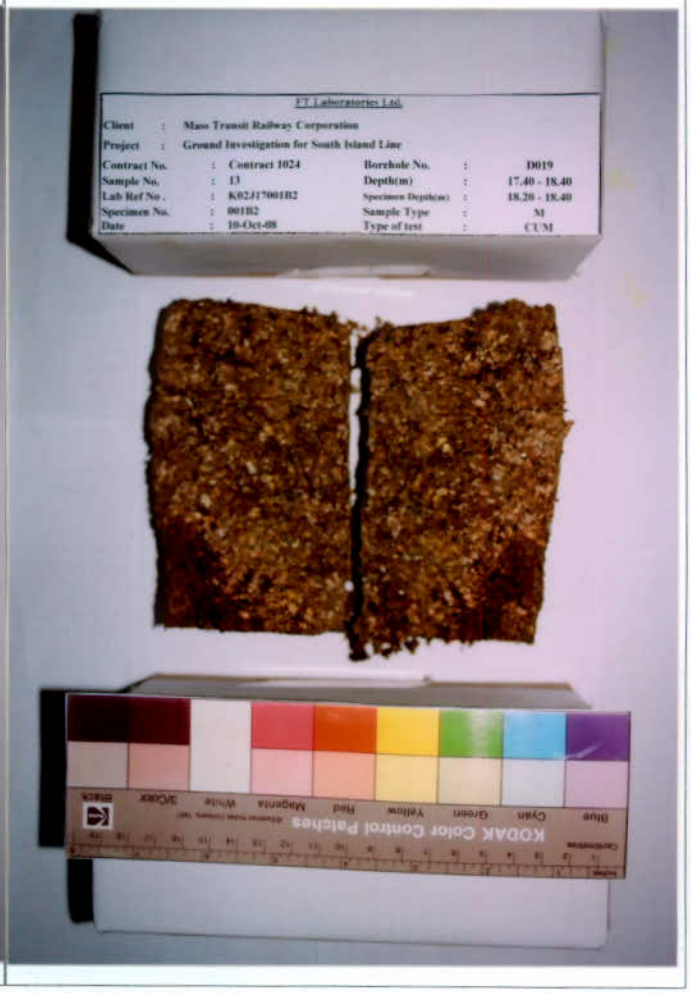
Lab. Reference No. : K02J17001B2

Specimen Depth (m) : 18.20 - 18.40

Customer Sample No. : 13

BEFORE SPLIT

AFTER SPLIT



Form No.: S 041 016 Rev 4 (06/03/08)

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Summary of specimen data - Consolidated Undrained with Pore Water Pressure Measurement

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

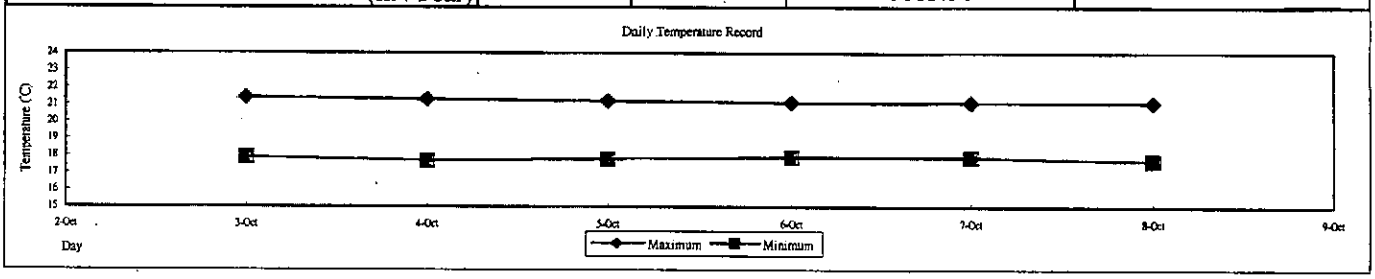
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Works Order No.	: Nil	Borehole No.	: D021
Customer Sample No.	: 9	Depth (m)	: 8.00 - 9.00
Sample Origin	: CD Monzonite	Sample type	: Mazier
Contract No.	: 1024		

Laboratory information

Lab. Reference No.	: K02J17002B1	Date test started	: 3-Oct-08
Specimen Depth (m)	: 8.60 - 8.80	Date test completed	: 8-Oct-08
		Date sample received	: 2-Oct-08
Method of preparation	: Undisturbed (direct extrusion from tube sample)	Selected specimen by	: C.H. Lo (FT Lab. Ltd)
% > 1/5 of specimen diameter	: -	Room temperature range(°C)	: 17.7-21.74
Method of moisture content	: GEOSPEC 3 : 2001: Test 5.1	Particle density (assumed)	: 2.65 Mg/m^3
Test method used	: GEOSPEC 3 : 2001: Test 15.2		
Soil description (Visual)	: Moist, yellowish brown, silty/clayey gravelly SAND.		

Stage		Saturation		Compression	
				Single	After
Effective cell pressure	(kPa)	5		85	
		Before	After	Before	
Diameter of specimen	(mm)	73.4 *	-	-	-
Height of specimen	(mm)	147.9 *	-	-	-
Volume of specimen	(cm^3)	625.8	625.8	607.1	607.1
Wet mass of specimen	(g)	1158.0 *	1181.7	1163.1	1158.7 *
Dry mass of specimen	(g)	903.0 *	-	-	903.0 *
Moisture content	(%)	28.2	30.8	28.7	28.3
Bulk density	(Mg/m^3)	1.850	1.888	1.916	1.909
Dry density	(Mg/m^3)	1.443	1.443	1.487	1.487
Void ratio		0.836	0.836	0.782	0.782
Degree of saturation	(%)	89.4	97.6	97.3	95.9
Coefficient of volume compressibility	(m^2/MN)	-	-	0.38	-
Coefficient of consolidation by t_{100}	(m^2/Year)	-	-	6114.51	-
Coefficient of consolidation by t_{50}	(m^2/Year)	-	-	6662.50	-



Remarks : *Measured primary data

HOKLAS Approved Signatory: YUE Wai Chun / VONG Hong Ian

Date: 23 DEC 2008

Address: Lot No.DD77 Section 1552 S.A. ss1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

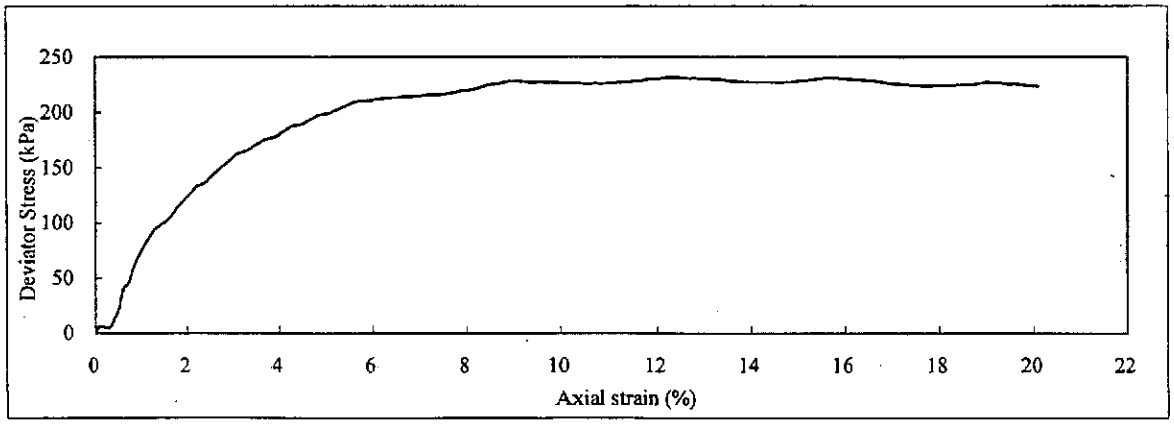
Single Stage - Consolidated Undrained with Pore Water Pressure Measurement

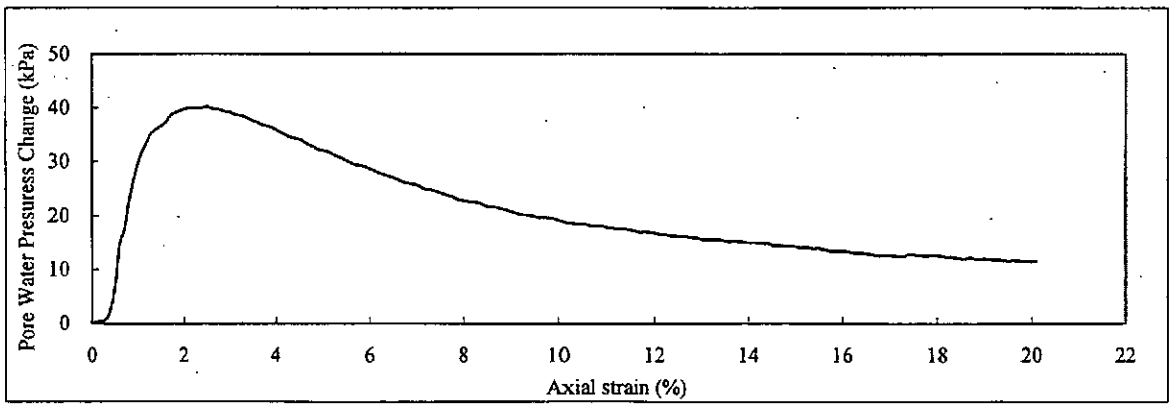
Deviator stress, Pore water pressure change & Stress ratio VS Axial Strain

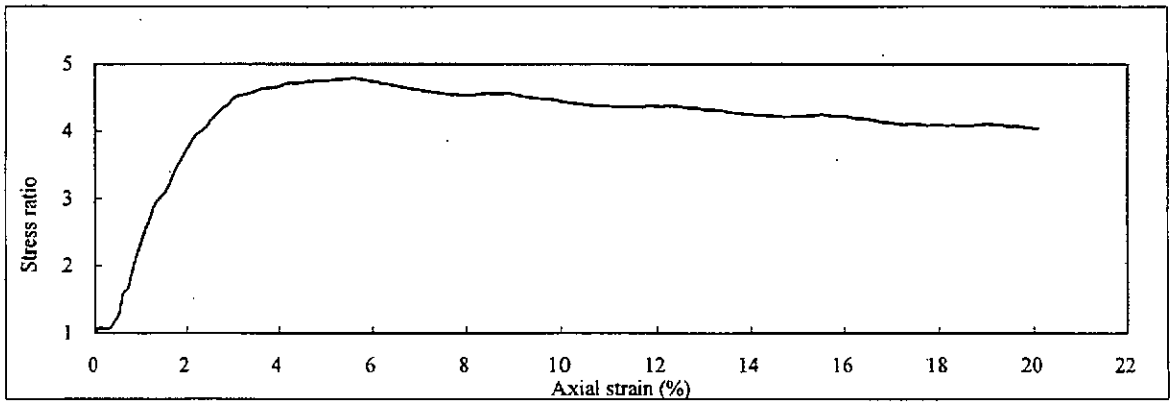
Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No.	:	9	Depth (m)	:	8.00 - 9.00







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Laboratory Report on Triaxial Compression Test

Single Stage - Consolidated Undrained with Pore Water Pressure Measurement

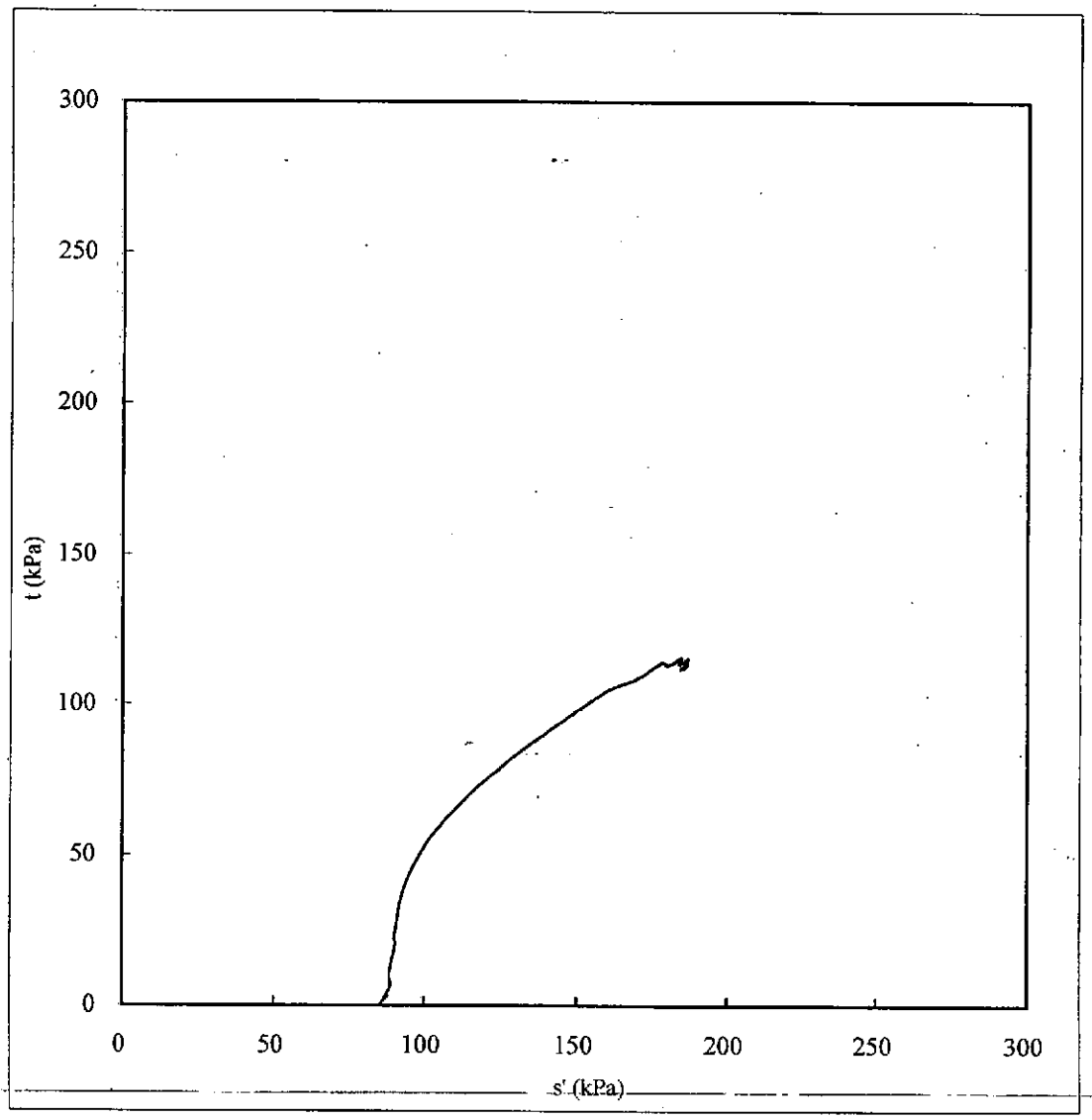
t VS s' Stress path plot

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No.	:	9	Depth (m)	:	8.00 - 9.00

Specimen at failure (kPa)	s'	184.6
	t	115.9



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Laboratory Report on Triaxial Compression Test

Single Stage - Consolidated Undrained with Pore Water Pressure Measurement

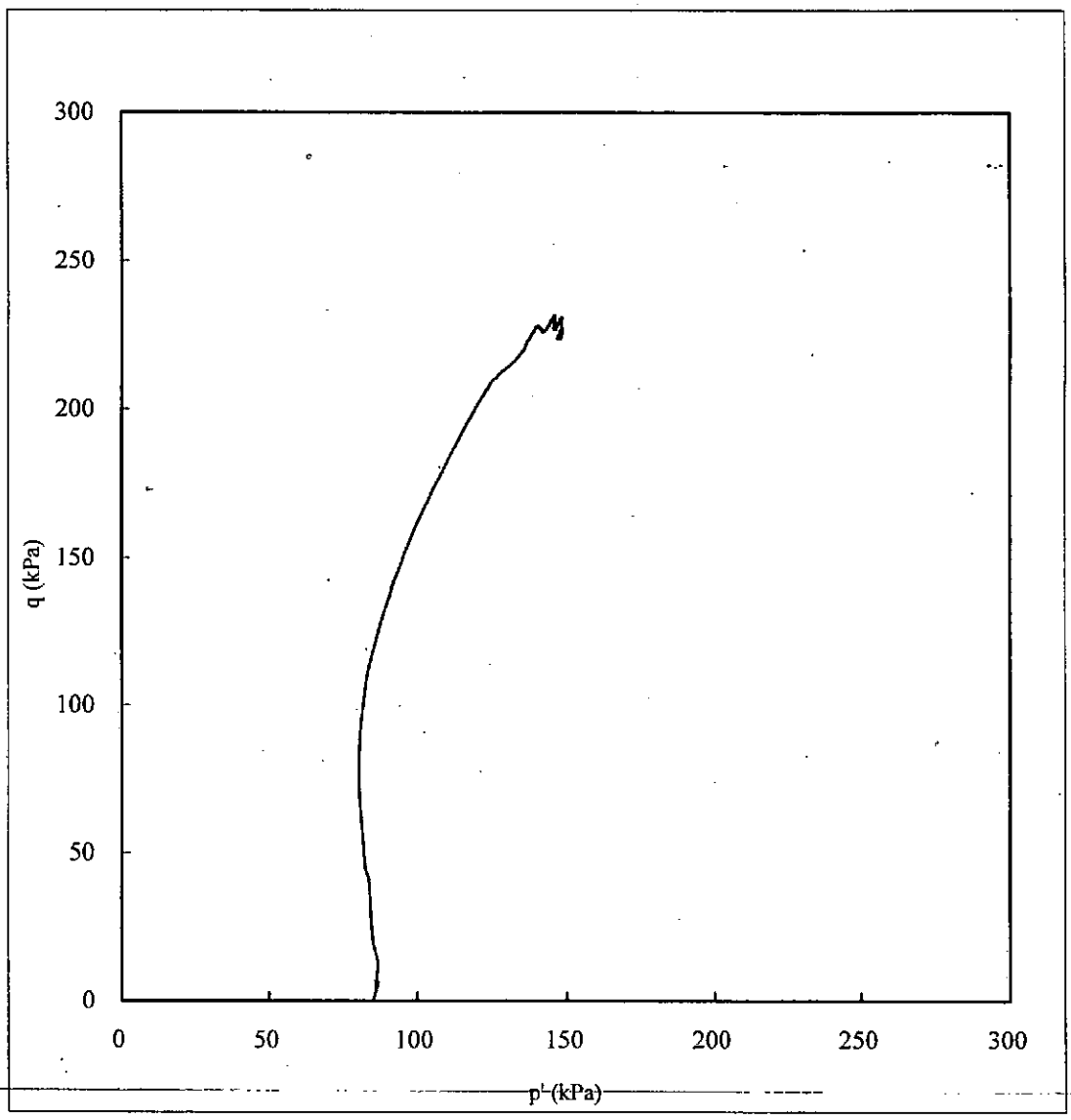
q VS p' Stress path plot

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No.	:	9	Depth (m)	:	8.00 - 9.00

Specimen at failure (kPa)	p'	146.0
	q	231.8



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Laboratory Report on Triaxial Compression Test
Saturation

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D021

Customer Sample No. : 9

Depth (m) : 8.00 - 9.00

Laboratory information

Lab. Reference No. : K02J17002B1

Date test started : 4-Oct-08 09:25

Specimen Depth (m) : 8.60 - 8.80

Date test completed : 6-Oct-08 08:35

Test result :

Saturated : Cell Pressure = 275.3 kPa Pore water Pressure = 270.4 kPa B-Value = 0.97

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
0.3	0.6	0.6		
25.4	0.6	18.1		
25.6	20.8	19.0		
25.6	20.4	20.4	7.35	
50.6	20.3	39.4		0.76
50.6	45.7	43.0		
50.6	45.2	45.1	7.48	
75.8	45.1	65.3		0.80
75.9	70.8	67.4		
75.9	70.5	70.5	1.66	
100.4	70.6	91.3		0.85
100.4	95.3	94.0		
100.4	95.8	95.3	1.37	
125.7	95.4	117.6		0.88
125.7	120.3	117.9		
125.7	120.6	120.4	0.57	
150.3	120.5	142.5		0.90
150.3	145.2	144.2		
150.3	145.3	145.3	1.58	
175.8	145.3	169.0		0.93
175.8	170.4	169.4		
175.8	170.9	170.4	1.15	
225.2	170.9	217.3		0.95
225.2	220.6	217.8		
225.2	220.7	220.1	0.92	
275.8	220.7	269.2		0.97
275.8	270.7	269.6		
275.3	270.6	270.4	1.66	

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Laboratory Report on Triaxial Compression Test
Saturation

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D021

Customer Sample No. : 9

Depth (m) : 8.00 - 9.00

Laboratory information

Lab. Reference No. : K02J17002B1

Date test started : 4-Oct-08 09:25

Specimen Depth (m) : 8.60 - 8.80

Date test completed : 6-Oct-08 08:35

Test result :

Saturated : Cell Pressure = 275.3 kPa Pore water Pressure = 270.4 kPa B-Value = 0.97

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
		Total :	23.74	

FT Laboratories Ltd.
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Laboratory Report on Triaxial Compression Test
Consolidation

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

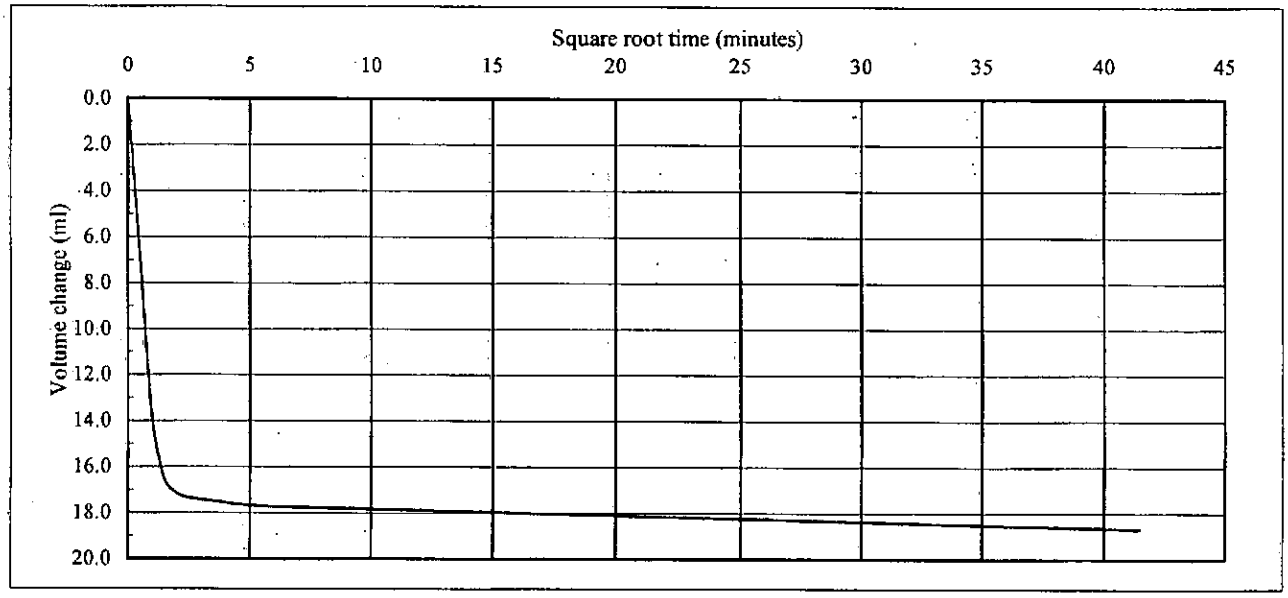
Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No.	:	9	Depth (m)	:	8.00 - 9.00

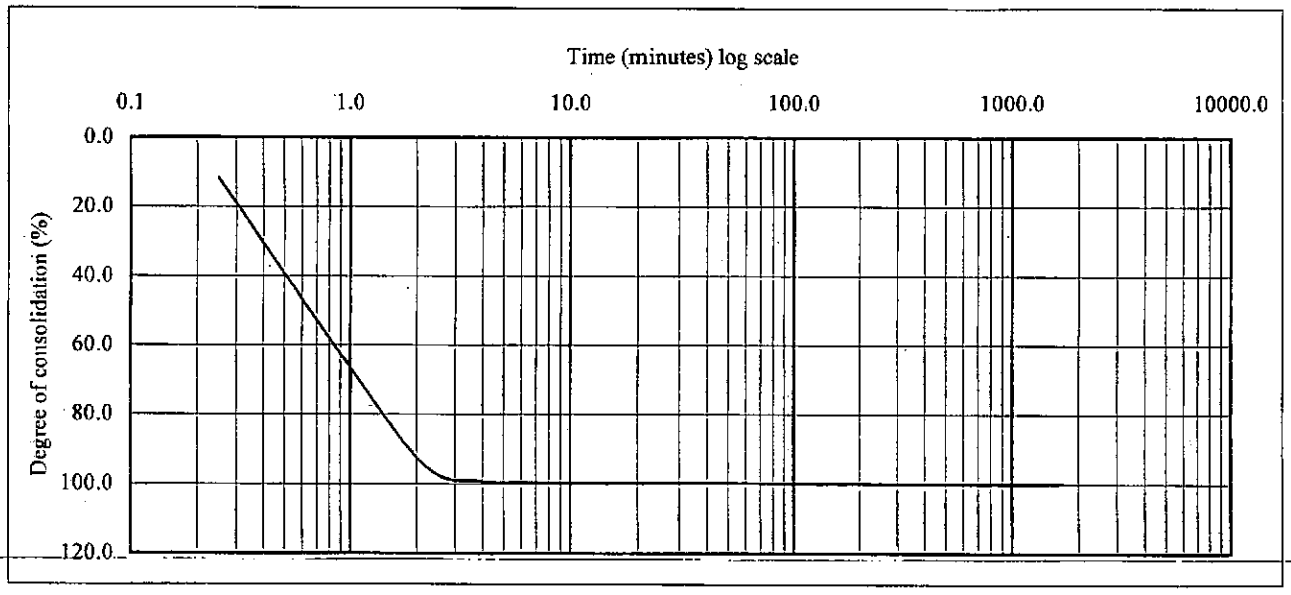
Laboratory information

Lab. Reference No.	:	K02J17002B1	Date test started	:	6-Oct-08	10:00
Specimen Depth (m)	:	8.60 - 8.80	Date test completed	:	7-Oct-08	15:00

Test result

Effective cell pressure (kPa)	=	85.0	Cell pressure (kPa)	=	355.0	Back pressure (kPa) =	270.0
Initial pore water pressure (kPa) =		349.2	Final pore water pressure (kPa) =		270.0		
Total volume change (ml)	=	18.68	t_{100} (min)	=	1.4	t_{50} (min) =	0.7





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科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No	:	9	Depth	:	8.00 - 9.00

Laboratory Information

Lab. Reference No.	:	K02J17002B1	Initial Volume	:	607.1	cm^3
Specimen Depth	:	8.60 - 8.80	Initial Area	:	4147.2	mm^2
Date test started	:	7-Oct-08 Time : 15:54	Initial Height	:	146.4	mm
Date test completed	:	8-Oct-08 Time : 08:42	Cell Pressure	:	355	kPa
Rate of displacement	:	0.0307 mm/min	Back Pressure	:	270	kPa
Side drains	:	No	Effective Cell Pressure	:	85	kPa
			Proving ring ID	:	PR03	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
0.0	0.0	0	0.0	0.0	0.0	0.0	85.0	0.0	85.0	0.0	1.00
0.1	0.3	26	6.3	0.0	0.0	6.3	87.9	3.2	86.8	6.3	1.07
0.3	0.7	21	5.1	0.1	0.0	5.0	86.8	2.5	86.0	5.0	1.06
0.4	2.7	54	13.1	0.1	0.0	13.0	88.8	6.5	86.6	13.0	1.16
0.5	7.2	90	21.5	0.1	0.0	21.4	88.5	10.7	84.9	21.4	1.28
0.6	14.8	170	40.8	0.2	0.0	40.6	90.5	20.3	83.7	40.6	1.58
0.7	17.3	188	45.0	0.2	0.0	44.8	90.1	22.4	82.6	44.8	1.66
0.8	22.6	241	57.5	0.2	0.0	57.3	91.1	28.7	81.5	57.3	1.92
0.9	26.6	281	67.1	0.3	0.0	66.8	91.8	33.4	80.7	66.8	2.14
1.0	29.7	316	75.4	0.3	0.0	75.1	92.9	37.6	80.3	75.1	2.36
1.1	32.1	348	82.9	0.3	0.0	82.6	94.2	41.3	80.4	82.6	2.56
1.2	33.9	374	89.1	0.3	0.0	88.8	95.5	44.4	80.7	88.8	2.74
1.3	35.4	400	95.3	0.4	0.0	94.9	97.1	47.5	81.2	94.9	2.91
1.5	36.6	425	100.9	0.4	0.0	100.5	98.7	50.3	81.9	100.5	3.08
1.6	37.4	441	104.6	0.4	0.0	104.2	99.7	52.1	82.3	104.2	3.19
1.7	38.4	464	109.9	0.5	0.0	109.4	101.3	54.7	83.1	109.4	3.35
1.8	39.0	486	115.2	0.5	0.0	114.7	103.4	57.4	84.2	114.7	3.49
1.9	39.4	506	119.6	0.5	0.0	119.1	105.2	59.6	85.3	119.1	3.61
2.0	39.7	525	124.1	0.5	0.0	123.6	107.1	61.8	86.5	123.6	3.73
2.1	39.9	544	128.5	0.6	0.0	127.9	109.1	64.0	87.7	127.9	3.84
2.2	40.0	564	132.9	0.6	0.0	132.3	111.2	66.2	89.1	132.3	3.94
2.4	40.0	583	137.2	0.6	0.0	136.6	113.3	68.3	90.5	136.6	4.04
2.5	40.2	601	141.2	0.7	0.0	140.5	115.1	70.3	91.6	140.5	4.14
2.6	40.0	618	145.2	0.7	0.0	144.5	117.3	72.3	93.2	144.5	4.21
2.7	39.7	636	149.1	0.7	0.0	148.4	119.5	74.2	94.8	148.4	4.28
2.8	39.7	650	152.3	0.7	0.0	151.6	121.1	75.8	95.8	151.6	4.35
2.9	39.3	666	155.8	0.8	0.0	155.0	123.2	77.5	97.4	155.0	4.39
3.0	39.2	683	159.8	0.8	0.0	159.0	125.3	79.5	98.8	159.0	4.47
3.1	38.8	699	163.3	0.8	0.0	162.5	127.5	81.3	100.4	162.5	4.52
3.3	38.4	713	166.2	0.9	0.0	165.3	129.3	82.7	101.7	165.3	4.55
3.4	38.0	723	168.5	0.9	0.0	167.6	130.8	83.8	102.9	167.6	4.57
3.5	37.6	736	171.2	0.9	0.0	170.3	132.6	85.2	104.2	170.3	4.59
3.6	37.3	746	173.5	0.9	0.0	172.6	134.0	86.3	105.2	172.6	4.62
3.7	36.8	759	176.1	1.0	0.0	175.1	135.8	87.6	106.6	175.1	4.63
3.9	36.4	769	178.2	1.0	0.0	177.2	137.2	88.6	107.7	177.2	4.65
4.0	35.9	781	180.9	1.0	0.0	179.9	139.1	90.0	109.1	179.9	4.66
4.1	35.5	794	183.5	1.0	0.0	182.5	140.8	91.3	110.3	182.5	4.69
4.2	35.1	806	186.2	1.1	0.0	185.1	142.5	92.6	111.6	185.1	4.71
4.3	34.6	817	188.4	1.1	0.0	187.3	144.1	93.7	112.8	187.3	4.72
4.5	34.1	827	190.4	1.1	0.0	189.3	145.6	94.7	114.0	189.3	4.72
4.6	33.7	839	193.1	1.2	0.0	191.9	147.3	96.0	115.3	191.9	4.74
4.7	33.2	848	194.9	1.2	0.0	193.7	148.7	96.9	116.4	193.7	4.74
4.8	32.8	859	197.1	1.2	0.0	195.9	150.2	98.0	117.5	195.9	4.75
4.9	32.3	867	198.9	1.2	0.0	197.7	151.6	98.9	118.6	197.7	4.75
5.1	31.9	876	200.5	1.3	0.0	199.2	152.7	99.6	119.5	199.2	4.75

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024
Works Order No. : Nil
Borehole No. : D021
Customer Sample No : 9
Depth : 8.00 - 9.00

Laboratory Information

Lab. Reference No. : K02J17002B1
Specimen Depth : 8.60 - 8.80
Date test started : 7-Oct-08 Time : 15:54
Date test completed : 8-Oct-08 Time : 08:42
Rate of displacement : 0.0307 mm/min
Side drains : No

Initial Volume : 607.1 cm^3
Initial Area : 4147.2 mm^2
Initial Height : 146.4 mm
Cell Pressure : 355 kPa
Back Pressure : 270 kPa
Effective Cell Pressure : 85 kPa
Proving ring ID : PR03

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
5.2	31.5	887	202.7	1.3	0.0	201.4	154.2	100.7	120.6	201.4	4.76
5.3	31.1	896	204.5	1.3	0.0	203.2	155.5	101.6	121.6	203.2	4.77
5.4	30.7	904	206.3	1.3	0.0	205.0	156.8	102.5	122.6	205.0	4.78
5.5	30.3	913	208.0	1.4	0.0	206.6	158.0	103.3	123.6	206.6	4.78
5.6	29.9	924	210.2	1.4	0.0	208.8	159.5	104.4	124.7	208.8	4.79
5.7	29.5	929	211.2	1.4	0.0	209.8	160.4	104.9	125.4	209.8	4.78
5.9	29.1	932	211.5	1.4	0.0	210.1	161.0	105.1	125.9	210.1	4.76
6.0	28.7	936	212.1	1.5	0.0	210.6	161.6	105.3	126.5	210.6	4.74
6.1	28.4	941	213.1	1.5	0.0	211.6	162.4	105.8	127.1	211.6	4.74
6.2	27.9	943	213.3	1.5	0.0	211.8	163.0	105.9	127.7	211.8	4.71
6.3	27.6	948	214.2	1.5	0.0	212.7	163.8	106.4	128.3	212.7	4.71
6.5	27.1	952	214.6	1.6	0.0	213.0	164.4	106.5	128.9	213.0	4.68
6.6	26.7	955	215.1	1.6	0.0	213.5	165.1	106.8	129.5	213.5	4.66
6.7	26.3	959	215.7	1.6	0.0	214.1	165.8	107.1	130.1	214.1	4.65
6.8	26.1	960	215.8	1.6	0.0	214.2	166.0	107.1	130.3	214.2	4.64
7.0	25.7	964	216.2	1.7	0.0	214.5	166.6	107.3	130.8	214.5	4.62
7.1	25.3	968	216.7	1.7	0.0	215.0	167.2	107.5	131.4	215.0	4.60
7.2	24.9	971	217.3	1.7	0.0	215.6	167.9	107.8	132.0	215.6	4.59
7.3	24.8	973	217.4	1.7	0.0	215.7	168.1	107.9	132.1	215.7	4.58
7.5	24.3	976	217.7	1.7	0.0	216.0	168.7	108.0	132.7	216.0	4.56
7.6	24.0	982	218.7	1.8	0.0	216.9	169.5	108.5	133.3	216.9	4.56
7.7	23.7	985	219.2	1.8	0.0	217.4	170.0	108.7	133.8	217.4	4.55
7.8	23.4	990	220.2	1.8	0.0	218.4	170.8	109.2	134.4	218.4	4.55
7.9	23.0	996	221.1	1.8	0.0	219.3	171.7	109.7	135.1	219.3	4.54
8.1	22.7	1001	221.8	1.9	0.0	219.9	172.3	110.0	135.6	219.9	4.53
8.2	22.5	1008	223.1	1.9	0.0	221.2	173.1	110.6	136.2	221.2	4.54
8.3	22.5	1013	224.0	1.9	0.0	222.1	173.6	111.1	136.5	222.1	4.55
8.4	22.2	1022	225.7	1.9	0.0	223.8	174.7	111.9	137.4	223.8	4.56
8.5	21.8	1029	227.0	1.9	0.0	225.1	175.8	112.6	138.2	225.1	4.56
8.7	21.6	1034	227.7	2.0	0.0	225.7	176.3	112.9	138.6	225.7	4.56
8.8	21.3	1041	229.0	2.0	0.0	227.0	177.2	113.5	139.4	227.0	4.56
8.9	21.2	1047	229.9	2.0	0.0	227.9	177.8	114.0	139.8	227.9	4.57
9.0	20.8	1048	230.0	2.0	0.0	228.0	178.2	114.0	140.2	228.0	4.55
9.1	20.6	1050	230.1	2.0	0.0	228.1	178.5	114.1	140.4	228.1	4.54
9.2	20.3	1050	229.9	2.1	0.0	227.8	178.6	113.9	140.6	227.8	4.52
9.4	20.1	1050	229.4	2.1	0.0	227.3	178.6	113.7	140.7	227.3	4.50
9.5	19.9	1052	229.5	2.1	0.0	227.4	178.8	113.7	140.9	227.4	4.49
9.6	19.7	1054	229.6	2.1	0.0	227.5	179.1	113.8	141.1	227.5	4.48
9.7	19.7	1054	229.4	2.1	0.0	227.3	179.0	113.7	141.1	227.3	4.48
9.9	19.5	1055	229.3	2.2	0.0	227.1	179.1	113.6	141.2	227.1	4.47
10.0	19.2	1055	229.0	2.2	0.0	226.8	179.2	113.4	141.4	226.8	4.45
10.1	19.0	1055	228.7	2.2	0.0	226.5	179.3	113.3	141.5	226.5	4.43
10.2	18.7	1057	228.9	2.2	0.0	226.7	179.7	113.4	141.9	226.7	4.42
10.4	18.5	1057	228.4	2.3	0.0	226.1	179.6	113.1	141.9	226.1	4.40
10.5	18.5	1057	228.1	2.3	0.0	225.8	179.4	112.9	141.8	225.8	4.40

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No	:	9	Depth	:	8.00 - 9.00

Laboratory Information

Lab. Reference No.	:	K02J17002B1		Initial Volume	:	607.1 cm^3
Specimen Depth	:	8.60 - 8.80		Initial Area	:	4147.2 mm^2
Date test started	:	7-Oct-08	Time : 15:54	Initial Height	:	146.4 mm
Date test completed	:	8-Oct-08	Time : 08:42	Cell Pressure	:	355 kPa
Rate of displacement	:	0.0307	mm/min	Back Pressure	:	270 kPa
Side drains	:	No		Effective Cell Pressure	:	85 kPa
				Proving ring ID	:	PR03

Axial Strain	Pore Pressure	Axial Force	Axial Stress	Membrane Correction	Side Drains Correction	Corrected Deviator Stress	Stress Path Parameters (s')	Stress Path Parameters (t)	Stress Path Parameters (p')	Stress Path Parameters (q)	Effective Principal Stress Ratio
%	kPa	N	kPa	kPa	kPa	kPa	kPa	kPa	kPa	kPa	
10.6	18.3	1059	228.2	2.3	0.0	225.9	179.7	113.0	142.0	225.9	4.39
10.7	18.1	1061	228.4	2.3	0.0	226.1	180.0	113.1	142.3	226.1	4.38
10.9	18.1	1062	228.2	2.3	0.0	225.9	179.9	113.0	142.2	225.9	4.38
11.0	17.8	1066	228.7	2.3	0.0	226.4	180.4	113.2	142.7	226.4	4.37
11.1	17.8	1068	228.8	2.4	0.0	226.4	180.4	113.2	142.7	226.4	4.37
11.2	17.5	1071	229.3	2.4	0.0	226.9	181.0	113.5	143.1	226.9	4.36
11.4	17.5	1075	229.6	2.4	0.0	227.2	181.1	113.6	143.2	227.2	4.37
11.5	17.3	1080	230.4	2.4	0.0	228.0	181.7	114.0	143.7	228.0	4.37
11.6	17.2	1082	230.5	2.4	0.0	228.1	181.9	114.1	143.8	228.1	4.36
11.7	16.9	1085	231.0	2.5	0.0	228.5	182.4	114.3	144.3	228.5	4.36
11.8	17.0	1092	232.3	2.5	0.0	229.8	182.9	114.9	144.6	229.8	4.38
12.0	16.8	1096	232.5	2.5	0.0	230.0	183.2	115.0	144.9	230.0	4.37
12.1	16.6	1099	233.0	2.5	0.0	230.5	183.7	115.3	145.2	230.5	4.37
12.2	16.5	1104	233.8	2.5	0.0	231.3	184.2	115.7	145.6	231.3	4.38
12.3	16.4	1108	234.3	2.6	0.0	231.7	184.5	115.9	145.8	231.7	4.38
12.4	16.3	1110	234.4	2.6	0.0	231.8	184.6	115.9	146.0	231.8	4.37
12.5	16.2	1110	234.1	2.6	0.0	231.5	184.6	115.8	146.0	231.5	4.36
12.7	16.1	1108	233.2	2.6	0.0	230.6	184.2	115.3	145.8	230.6	4.35
12.8	16.0	1110	233.3	2.6	0.0	230.7	184.4	115.4	145.9	230.7	4.34
12.9	16.0	1110	233.1	2.6	0.0	230.5	184.3	115.3	145.8	230.5	4.34
13.0	15.7	1110	232.8	2.7	0.0	230.1	184.4	115.1	146.0	230.1	4.32
13.1	15.6	1111	232.9	2.7	0.0	230.2	184.5	115.1	146.1	230.2	4.32
13.3	15.6	1111	232.4	2.7	0.0	229.7	184.3	114.9	146.0	229.7	4.31
13.4	15.6	1111	232.1	2.7	0.0	229.4	184.1	114.7	145.9	229.4	4.31
13.5	15.4	1110	231.5	2.7	0.0	228.8	184.0	114.4	145.9	228.8	4.29
13.6	15.3	1108	230.8	2.7	0.0	228.1	183.8	114.1	145.7	228.1	4.27
13.8	15.3	1108	230.3	2.8	0.0	227.5	183.5	113.8	145.5	227.5	4.26
13.9	15.1	1108	230.0	2.8	0.0	227.2	183.5	113.6	145.6	227.2	4.25
14.0	15.0	1110	230.1	2.8	0.0	227.3	183.7	113.7	145.8	227.3	4.25
14.1	15.0	1110	229.8	2.8	0.0	227.0	183.5	113.5	145.7	227.0	4.24
14.3	14.9	1111	229.7	2.8	0.0	226.9	183.6	113.5	145.7	226.9	4.24
14.4	14.9	1113	229.8	2.9	0.0	226.9	183.6	113.5	145.7	226.9	4.24
14.5	14.6	1115	229.9	2.9	0.0	227.0	183.9	113.5	146.1	227.0	4.22
14.6	14.5	1115	229.6	2.9	0.0	226.7	183.9	113.4	146.1	226.7	4.22
14.8	14.4	1119	229.8	2.9	0.0	226.9	184.1	113.5	146.2	226.9	4.21
14.9	14.3	1122	230.2	2.9	0.0	227.3	184.4	113.7	146.5	227.3	4.21
15.0	14.3	1126	230.7	2.9	0.0	227.8	184.6	113.9	146.6	227.8	4.22
15.1	14.1	1131	231.5	3.0	0.0	228.5	185.2	114.3	147.1	228.5	4.22
15.3	14.1	1134	231.7	3.0	0.0	228.7	185.3	114.4	147.1	228.7	4.23
15.4	13.9	1141	232.8	3.0	0.0	229.8	186.0	114.9	147.7	229.8	4.23
15.5	14.0	1145	233.3	3.0	0.0	230.3	186.2	115.2	147.8	230.3	4.24
15.6	13.8	1148	233.7	3.0	0.0	230.7	186.6	115.4	148.1	230.7	4.24
15.7	13.6	1150	233.8	3.0	0.0	230.8	186.8	115.4	148.3	230.8	4.23
15.8	13.4	1152	233.9	3.1	0.0	230.8	187.0	115.4	148.5	230.8	4.22
16.0	13.5	1152	233.3	3.1	0.0	230.2	186.6	115.1	148.2	230.2	4.22

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D021

Customer Sample No : 9

Depth : 8.00 - 9.00

Laboratory Information

Lab. Reference No.	:	K02J17002B1		Initial Volume	:	607.1	cm^3
Specimen Depth	:	8.60 - 8.80		Initial Area	:	4147.2	mm^2
Date test started	:	7-Oct-08	Time : 15:54	Initial Height	:	146.4	mm
Date test completed	:	8-Oct-08	Time : 08:42	Cell Pressure	:	355	kPa
Rate of displacement	:	0.0307	mm/min	Back Pressure	:	270	kPa
Side drains	:	No		Effective Cell Pressure	:	85	kPa
				Proving ring ID	:	PR03	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
16.1	13.4	1152	233.0	3.1	0.0	229.9	186.6	115.0	148.2	229.9	4.21
16.2	13.2	1152	232.7	3.1	0.0	229.6	186.6	114.8	148.3	229.6	4.20
16.3	13.1	1152	232.5	3.1	0.0	229.4	186.6	114.7	148.4	229.4	4.19
16.4	13.1	1152	232.2	3.1	0.0	229.1	186.5	114.6	148.3	229.1	4.19
16.6	12.9	1152	231.6	3.2	0.0	228.4	186.3	114.2	148.2	228.4	4.17
16.7	12.7	1150	231.0	3.2	0.0	227.8	186.2	113.9	148.2	227.8	4.15
16.8	12.6	1148	230.4	3.2	0.0	227.2	186.0	113.6	148.1	227.2	4.14
16.9	12.7	1147	229.7	3.2	0.0	226.5	185.6	113.3	147.8	226.5	4.13
17.1	12.6	1145	228.8	3.2	0.0	225.6	185.2	112.8	147.6	225.6	4.12
17.2	12.4	1145	228.6	3.2	0.0	225.4	185.3	112.7	147.7	225.4	4.10
17.3	12.4	1145	228.3	3.3	0.0	225.0	185.1	112.5	147.6	225.0	4.10
17.4	12.8	1145	228.0	3.3	0.0	224.7	184.6	112.4	147.1	224.7	4.11
17.6	12.7	1145	227.5	3.3	0.0	224.2	184.4	112.1	147.0	224.2	4.10
17.7	12.6	1143	226.8	3.3	0.0	223.5	184.2	111.8	146.9	223.5	4.09
17.8	12.5	1145	226.9	3.3	0.0	223.6	184.3	111.8	147.0	223.6	4.08
17.9	12.7	1148	227.3	3.3	0.0	224.0	184.3	112.0	147.0	224.0	4.10
18.1	12.5	1152	227.5	3.4	0.0	224.1	184.6	112.1	147.2	224.1	4.09
18.2	12.3	1154	227.5	3.4	0.0	224.1	184.8	112.1	147.4	224.1	4.08
18.3	12.4	1155	227.6	3.4	0.0	224.2	184.7	112.1	147.3	224.2	4.09
18.4	12.2	1159	228.0	3.4	0.0	224.6	185.1	112.3	147.7	224.6	4.09
18.6	12.0	1162	228.1	3.4	0.0	224.7	185.4	112.4	147.9	224.7	4.08
18.7	12.2	1164	228.2	3.5	0.0	224.7	185.2	112.4	147.7	224.7	4.09
18.8	12.0	1169	229.0	3.5	0.0	225.5	185.8	112.8	148.2	225.5	4.09
18.9	11.9	1175	229.7	3.5	0.0	226.2	186.2	113.1	148.5	226.2	4.09
19.0	12.0	1180	230.5	3.5	0.0	227.0	186.5	113.5	148.7	227.0	4.11
19.2	11.8	1180	229.9	3.5	0.0	226.4	186.4	113.2	148.7	226.4	4.09
19.3	11.9	1182	229.9	3.5	0.0	226.4	186.3	113.2	148.6	226.4	4.10
19.4	11.7	1180	229.3	3.6	0.0	225.7	186.2	112.9	148.5	225.7	4.08
19.5	11.6	1180	229.0	3.6	0.0	225.4	186.1	112.7	148.5	225.4	4.07
19.6	11.7	1182	229.1	3.6	0.0	225.5	186.1	112.8	148.5	225.5	4.08
19.8	11.6	1180	228.2	3.6	0.0	224.6	185.7	112.3	148.3	224.6	4.06
19.9	11.6	1178	227.6	3.6	0.0	224.0	185.4	112.0	148.1	224.0	4.05
20.0	11.5	1178	227.3	3.6	0.0	223.7	185.4	111.9	148.1	223.7	4.04
20.1	11.5	1180	227.3	3.7	0.0	223.6	185.3	111.8	148.0	223.6	4.04

Failure criteria : Maximum deviator stress

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Photographic

Job Reference No. : 65127070-K02J17002B1

Information supplied customer

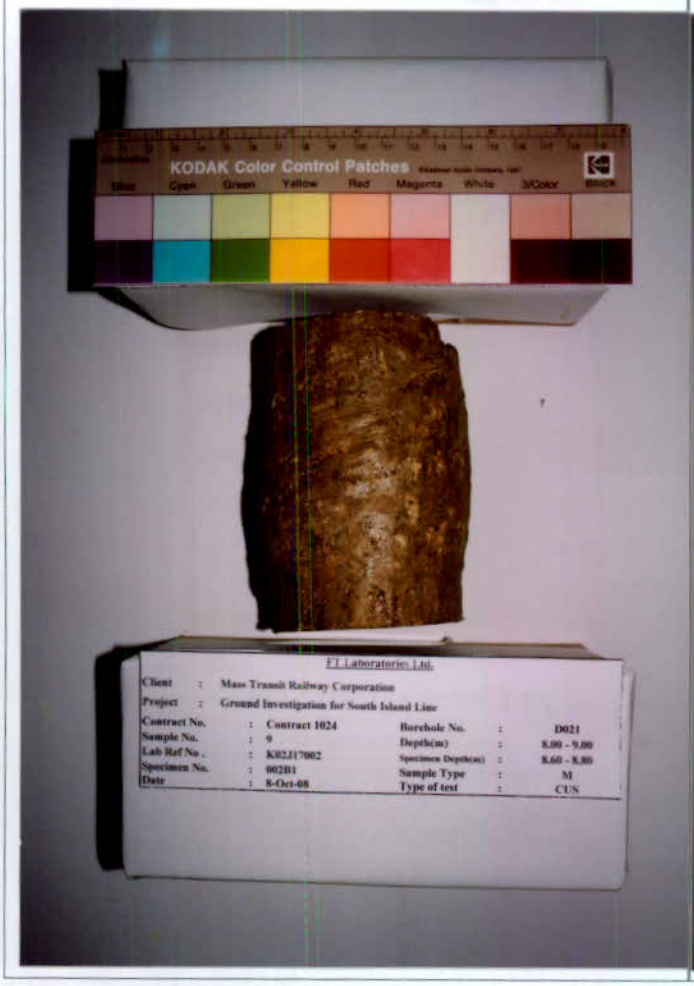
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Contract No. : 1024
Borehole No. : D021
Depth (m) : 8.00 - 9.00
Customer Sample No. : 9

Laboratory information

Lab. Reference No. : K02J17002B1
Specimen Depth (m) : 8.60 - 8.80

BEFORE SPLIT



AFTER SPLIT

Form No.: S 041 010 Rev 4 (06/03/08)

FT Laboratories Ltd.
科達測檢試驗所有限公司

HOKLAS 071

Laboratory Report on Triaxial Compression Test

Summary of specimen data (Multi-stage) - Consolidated Undrained with Pore Water Pressure Measurement

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

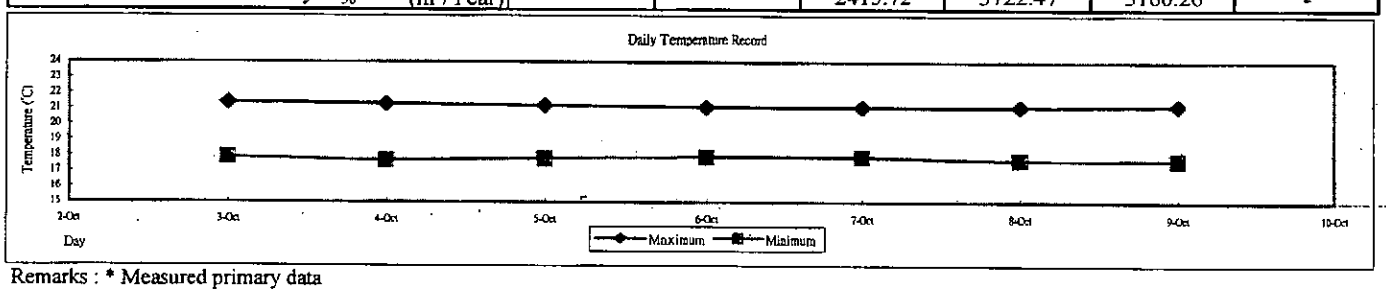
Project : Ground Investigation for South Island Line

Works Order No.	: Nil	Borehole No.	: D021
Customer Sample No.	: 9	Depth (m)	: 8.00 - 9.00
Sample origin	: CD Monzonite	Sample type	: Mazier
Contract No.	: 1024		

Laboratory information

Lab. Reference No.	: K02J17002B2	Date test started	: 3-Oct-08
Specimen Depth (m)	: 8.80 - 9.00	Date test completed	: 9-Oct-08
		Date sample received	: 2-Oct-08
Method of preparation	: Undisturbed (direct extrusion from tube sample)	Selected specimen by	: M.T.Kwok (FT Lab Ltd)
% > 1/5 of specimen diameter	: -	Room temperature range °C	: 17.7-21.4
Method of moisture content	: GEOSPEC 3 : 2001: Test 5.1	Particle density (assumed)	: 2.65 Mg/m^3
Test method used	: GEOSPEC 3 : 2001: Test 15.2		
Soil description (Visual)	: Moist, yellowish brown, silty/clayey gravelly SAND		

Stage		Saturation		Compression			
				1	2	3	
Effective cell pressure	(kPa)	5		40	80	120	
		Before	After	Before	Before	Before	After
Diameter of specimen	(mm)	73.4 *	-	-	-	-	-
Height of specimen	(mm)	147.8 *	-	-	-	-	-
Volume of specimen	(ml)	625.4	625.4	616.9	608.9	601.2	601.2
Wet mass of specimen	(g)	1174.8 *	1195.5	1187.0	1179.1	1171.4	1168.0*
Dry mass of specimen	(g)	923.6 *	-	-	-	-	923.6 *
Moisture content	(%)	27.2	29.4	28.5	27.6	26.8	26.5
Bulk density	(Mg/m^3)	1.878	1.912	1.924	1.936	1.948	1.943
Dry density	(Mg/m^3)	1.477	1.477	1.497	1.517	1.536	1.536
Void ratio		0.794	0.794	0.770	0.747	0.725	0.725
Degree of saturation	(%)	90.8	98.1	98.1	97.9	98.0	96.9
Coefficient of volume compressibility	(m^2/MN)	-	-	0.38	0.24	0.18	-
Coefficient of consolidation by t_{100}	(m^2/Year)	-	-	1829.17	2492.74	2093.38	-
Coefficient of consolidation by t_{50}	(m^2/Year)	-	-	2415.72	3722.47	3160.26	-



Remarks : * Measured primary data

HOKLAS Approved Signatory: YUE Wai Chun / VONG Hong Ian

Date: 23 DEC 2008

Address: Lot No.DD77 Section 1552 S.A. ssIRP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

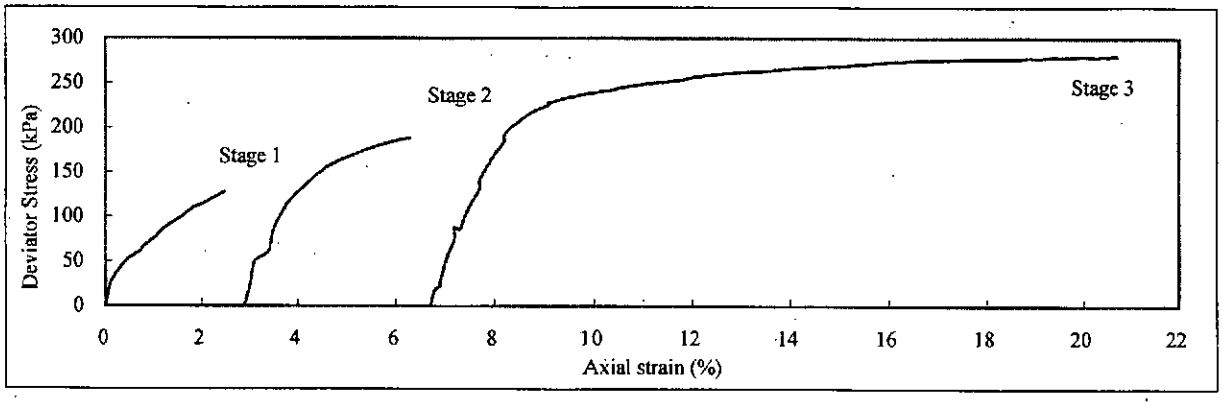
Multi Stage - Consolidated Undrained with Pore Water Pressure Measurement

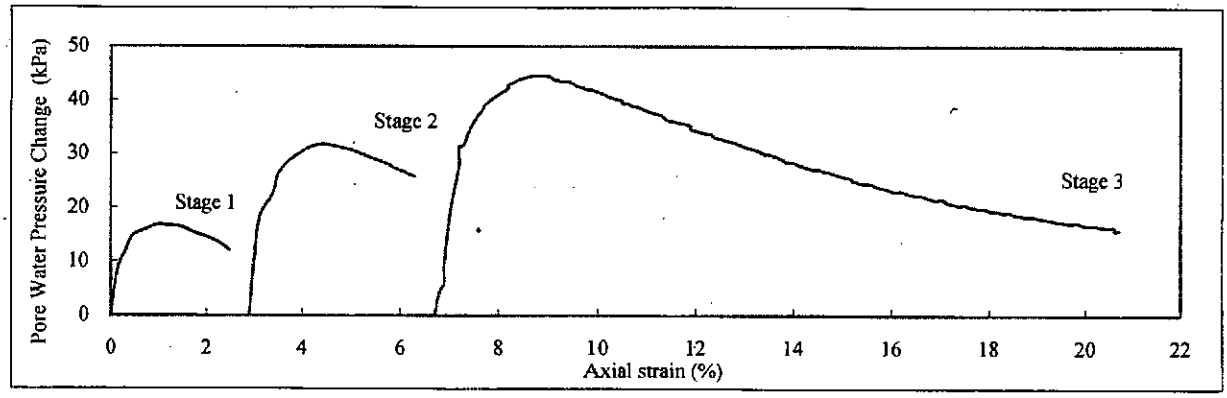
Deviator stress, Pore water pressure change & Stress ratio VS Axial Strain
Job Reference No. : 65127070-K02J17002B2

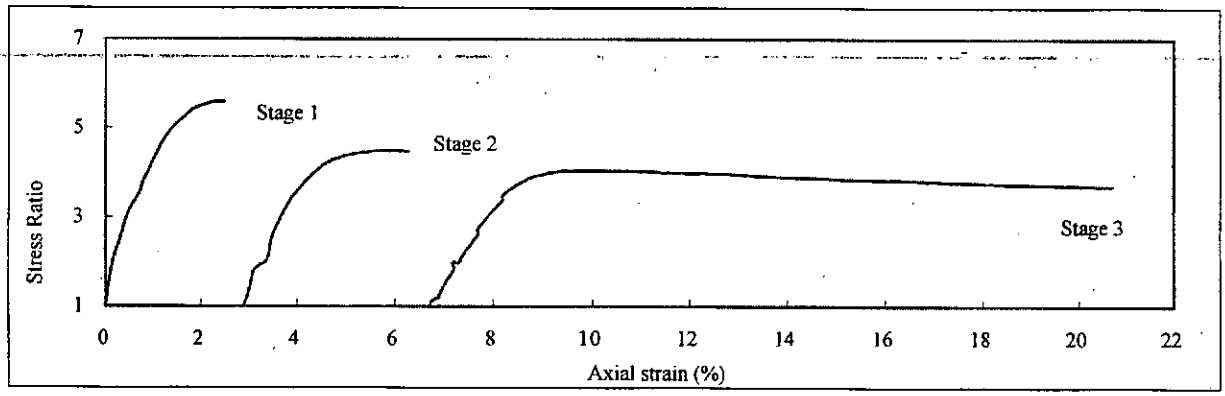
Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No.	:	9	Depth (m)	:	8.00 - 9.00

— Stage 1 — Stage 2 — Stage 3







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Laboratory Report on Triaxial Compression Test

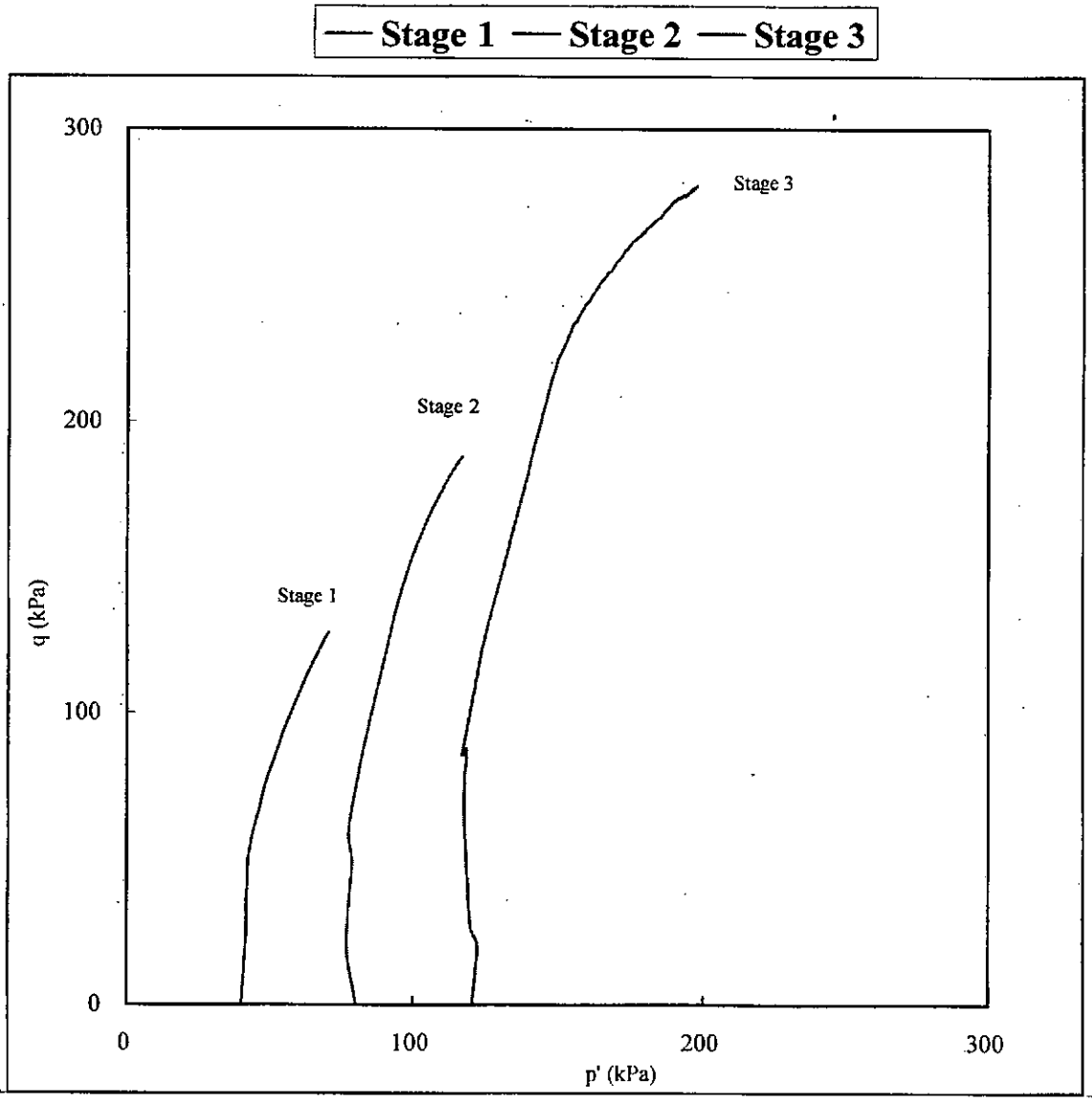
Multi Stage - Consolidated Undrained with Pore Water Pressure Measurement

q VS p' Stress path plot
Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No.	:	9	Depth (m)	:	8.00 - 9.00

Stage		1	2	3
Specimen at failure (kPa)	p'	67.3	115.4	197.6
	q	122.0	186.1	280.6



FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

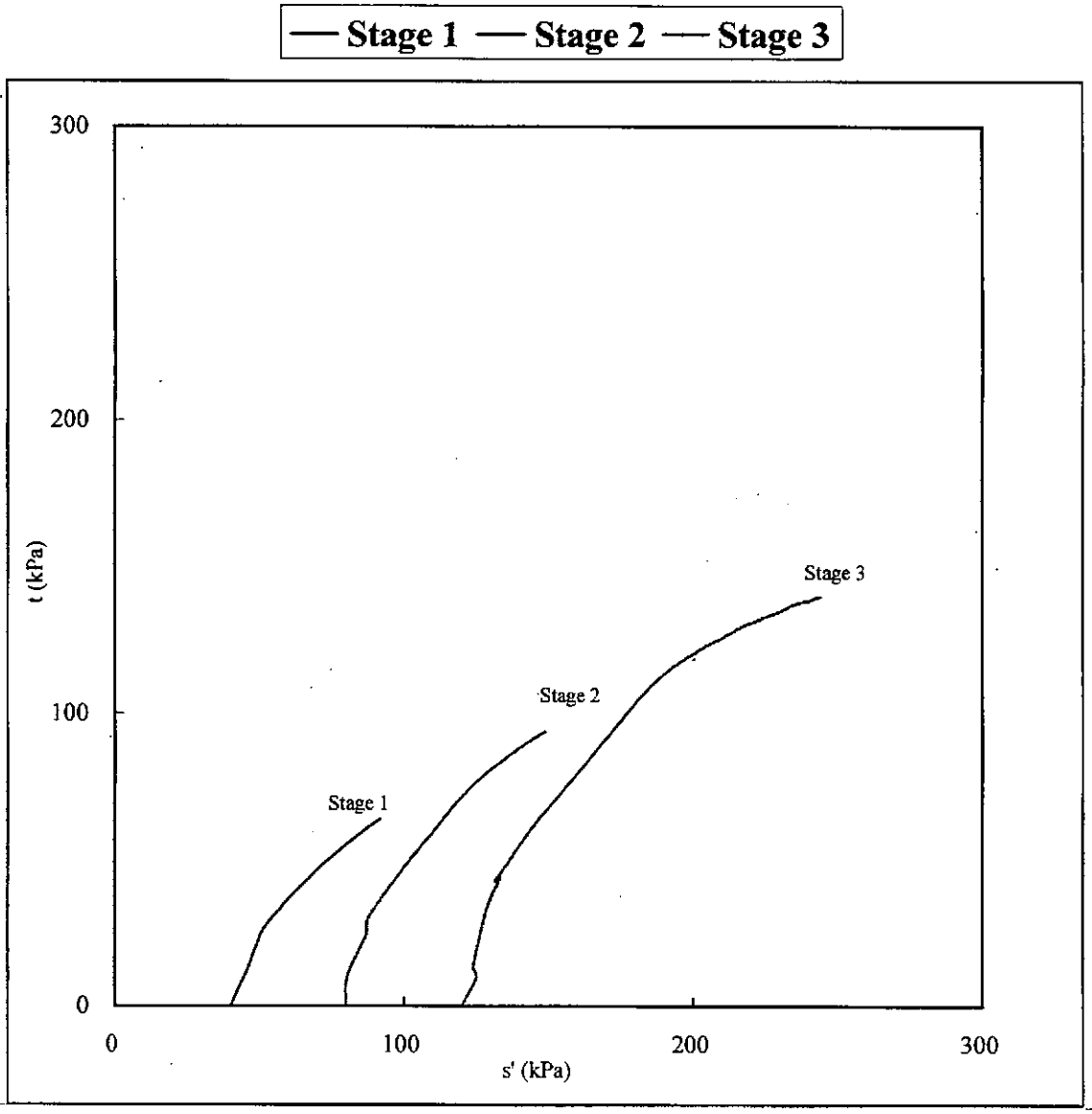
Multi Stage - Consolidated Undrained with Pore Water Pressure Measurement

t VS s' Stress path plot
Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No.	:	9	Depth (m)	:	8.00 - 9.00

Stage		1	2	3
Specimen at failure (kPa)	s'	87.6	146.5	244.4
	t	61.0	93.1	140.3



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Laboratory Report on Triaxial Compression Test

Saturation

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works order No. : Nil

Borehole No. : D021

Customer sample No. : 9

Depth (m) : 8.00 - 9.00

Laboratory information

Lab. Reference No. : K02J17002B2

Date test started : 05-Oct-08 08:45

Specimen Depth (m) : 8.80 - 9.00

Date test completed : 06-Oct-08 08:40

Test result :

Saturated : Cell Pressure = 275.4 kPa Pore water Pressure = 270.6 kPa B-Value = 0.97

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
0.6	0.3	0.3		
25.8	0.3	14.2		
25.5	20.5	15.4		
25.5	20.7	20.7	4.97	
50.4	20.7	36.6		0.64
50.4	45.8	39.0		
50.4	45.4	45.2	2.52	
75.6	45.4	63.3		0.72
75.6	70.9	66.2		
75.6	70.2	70.0	1.89	
100.8	70.3	89.4		0.77
100.9	95.2	92.6		
100.9	95.7	95.6	2.17	
125.6	95.7	116.1		0.83
125.5	120.3	118.9		
125.5	120.6	120.4	1.58	
150.8	120.6	142.7		0.88
150.8	145.4	143.4		
150.8	145.8	145.5	1.53	
175.7	145.8	168.2		0.91
175.7	150.1	168.8		
175.7	170.2	170.1	1.69	
225.6	170.2	217.0		0.94
225.6	220.7	218.9		
225.6	220.6	220.4	1.14	
275.6	220.6	268.9		0.97
275.6	270.3	269.3		
275.4	270.8	270.6	3.25	
		Total :	20.74	

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Stage 1 : Consolidation

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

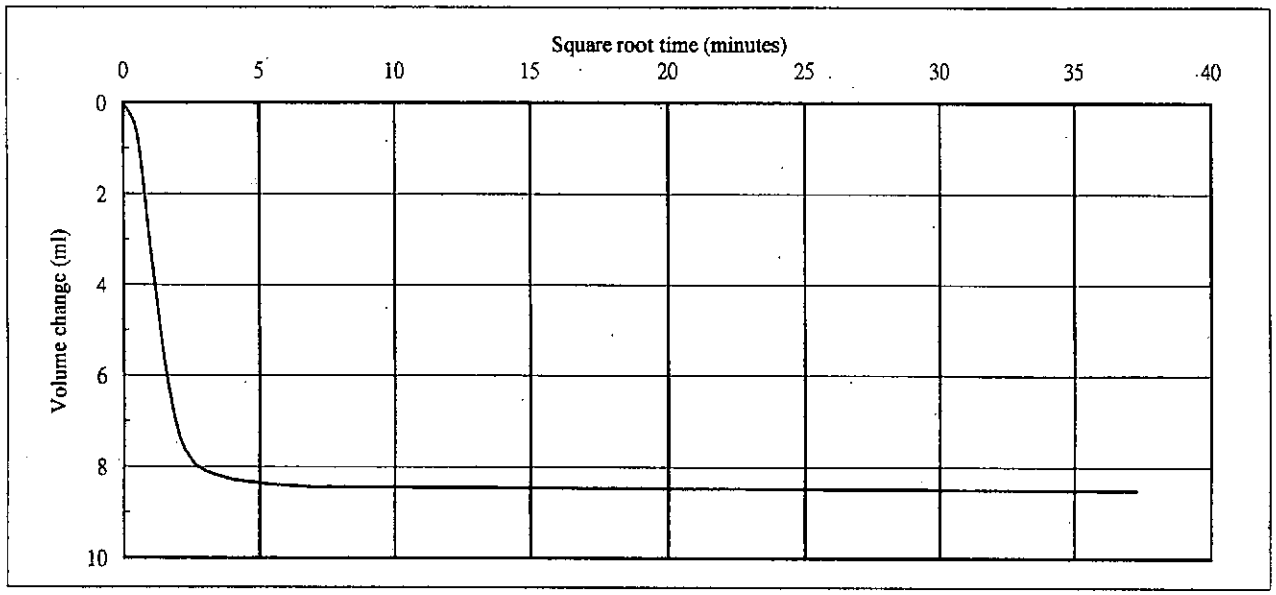
Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works order No.	:	Nil	Borehole No.	:	D021
Customer sample No.	:	9	Depth (m)	:	8.00 - 9.00

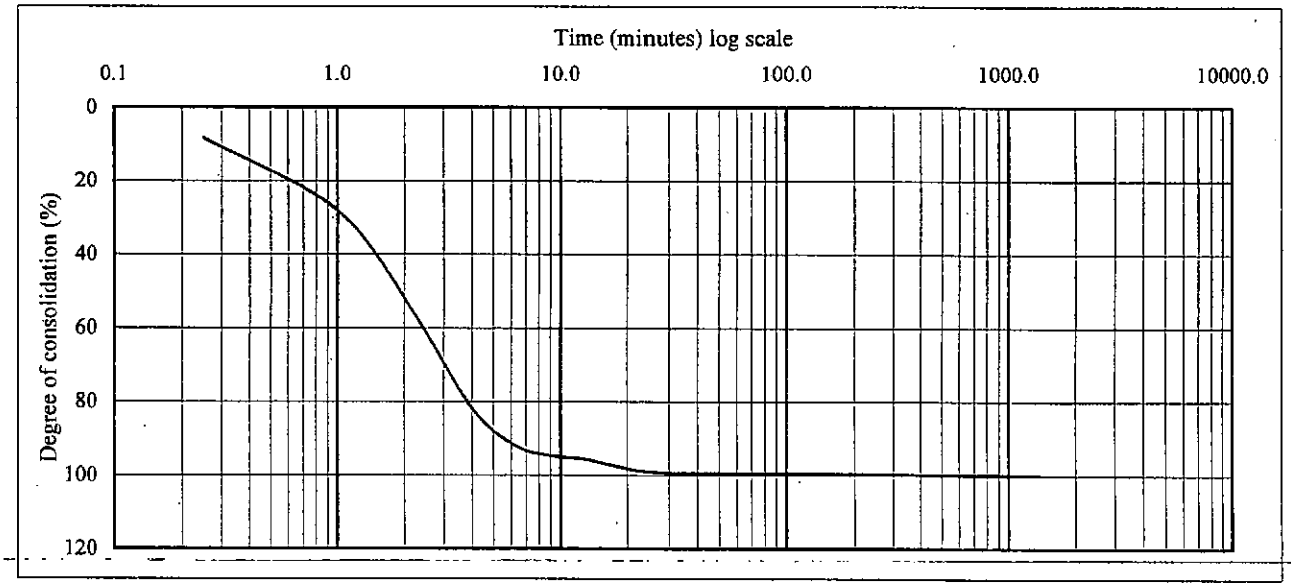
Laboratory information

Lab. Reference No.	:	K02J17002B2	Date test started	:	6-Oct-08	10:10
Specimen Depth (m)	:	8.80 - 9.00	Date test completed	:	7-Oct-08	09:20

Test result

Effective cell pressure (kPa)	=	40.0	Cell pressure (kPa)	=	310.0	Back pressure (kPa) =	270.0
Initial pore water pressure (kPa) =		305.6	Final pore water pressure (kPa) =		270.0		
Total volume change (ml)	=	8.51	t_{100} (min)	=	4.8	t_{50} (min) =	1.8





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科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Stage 2 : Consolidation

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

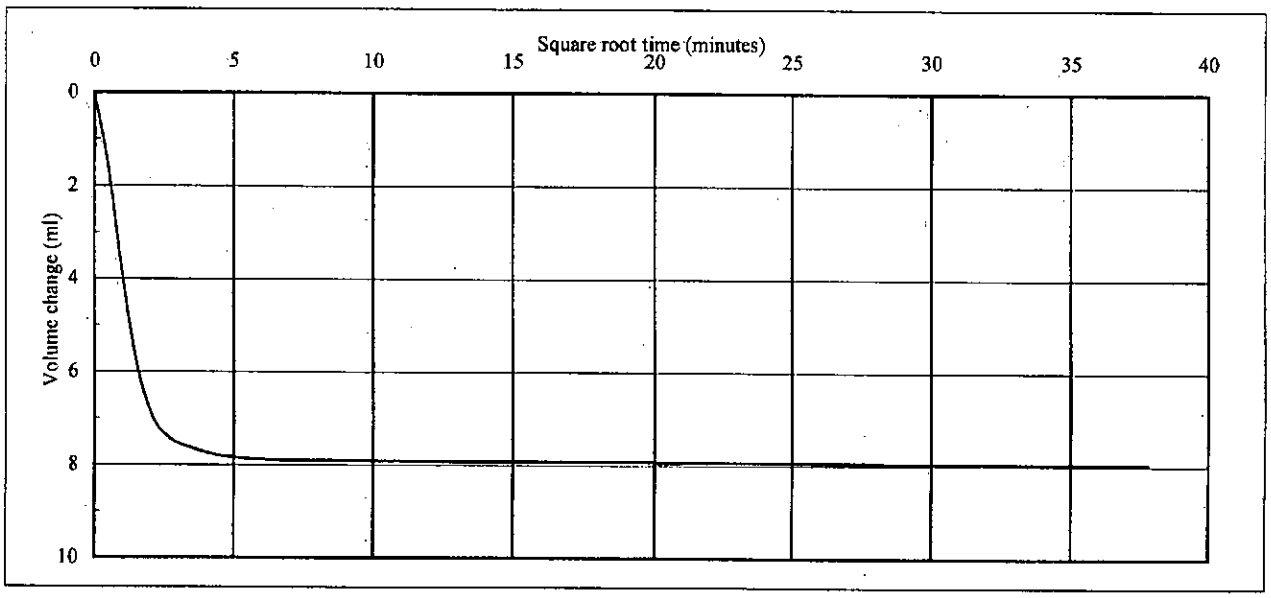
Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works order No.	:	Nil	Borehole No.	:	D021
Customer sample No.	:	9	Depth (m)	:	8.00 - 9.00

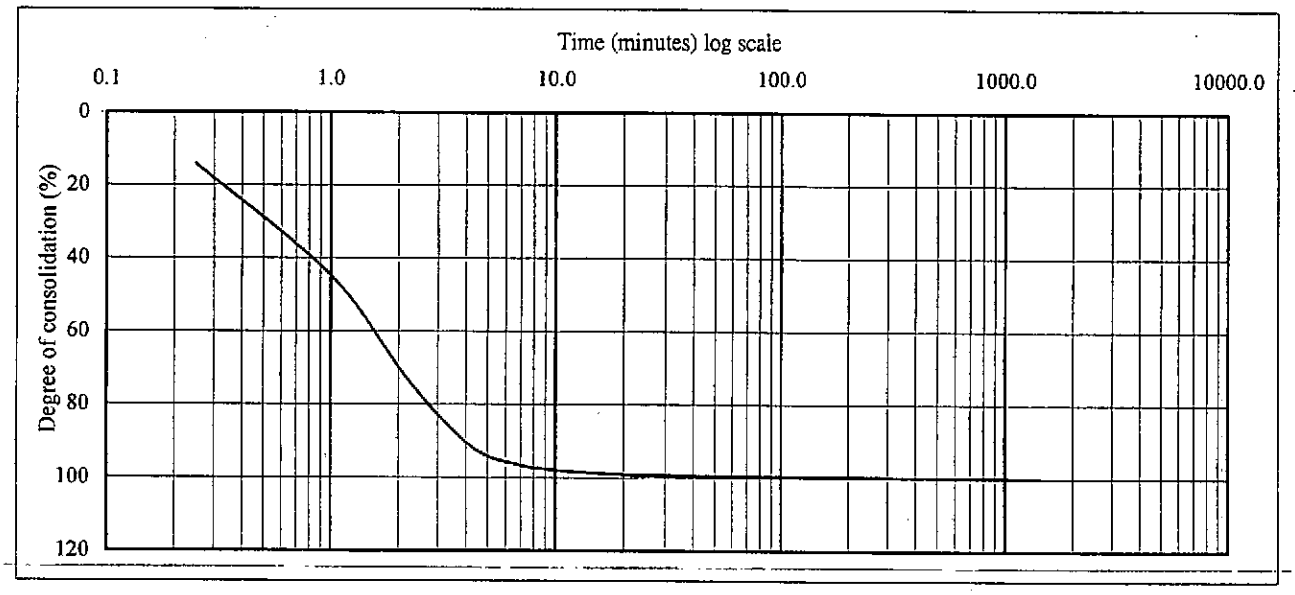
Laboratory information

Lab. Reference No.	:	K02J17002B2	Date test started	:	7-Oct-08	13:25
Specimen Depth (m)	:	8.80 - 9.00	Date test completed	:	8-Oct-08	13:15

Test result

Effective cell pressure (kPa)	=	80.0	Cell pressure (kPa)	=	350.0	Back pressure (kPa) =	270.0
Initial pore water pressure (kPa) =		322.7	Final pore water pressure (kPa) =		270.0		
Total volume change (ml)	=	7.96	t_{100} (min)	=	3.6	t_{50} (min) =	1.1





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Laboratory Report on Triaxial Compression Test

Stage 3 : Consolidation

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

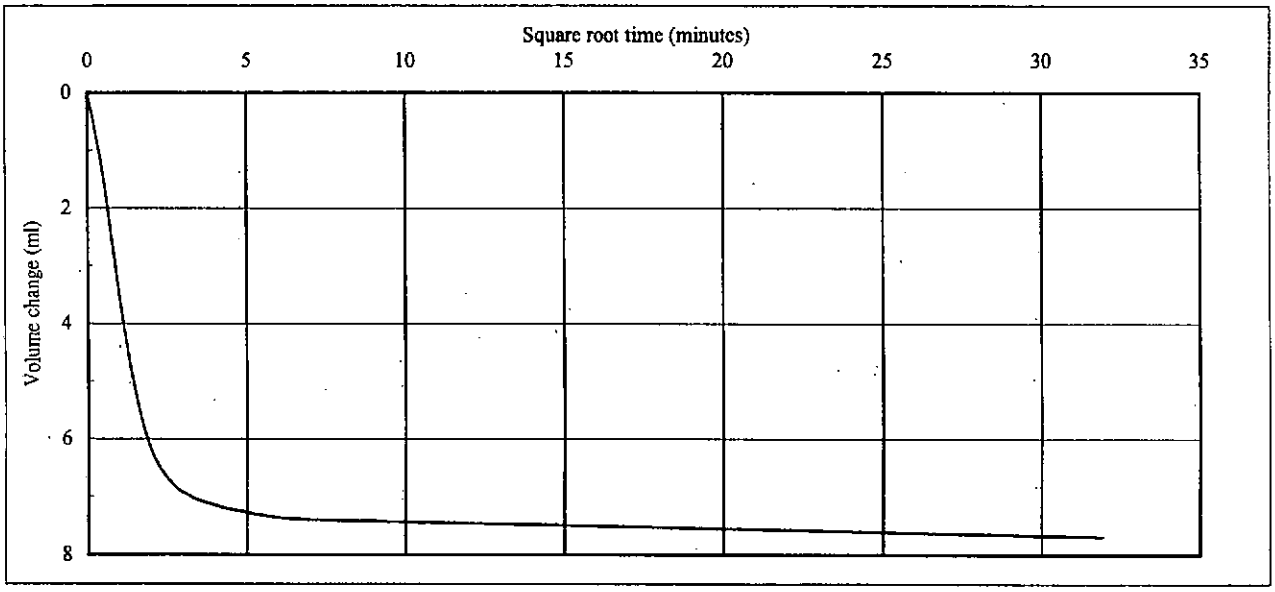
Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works order No.	:	Nil	Borehole No.	:	D021
Customer sample No.	:	9	Depth (m)	:	8.00 - 9.00

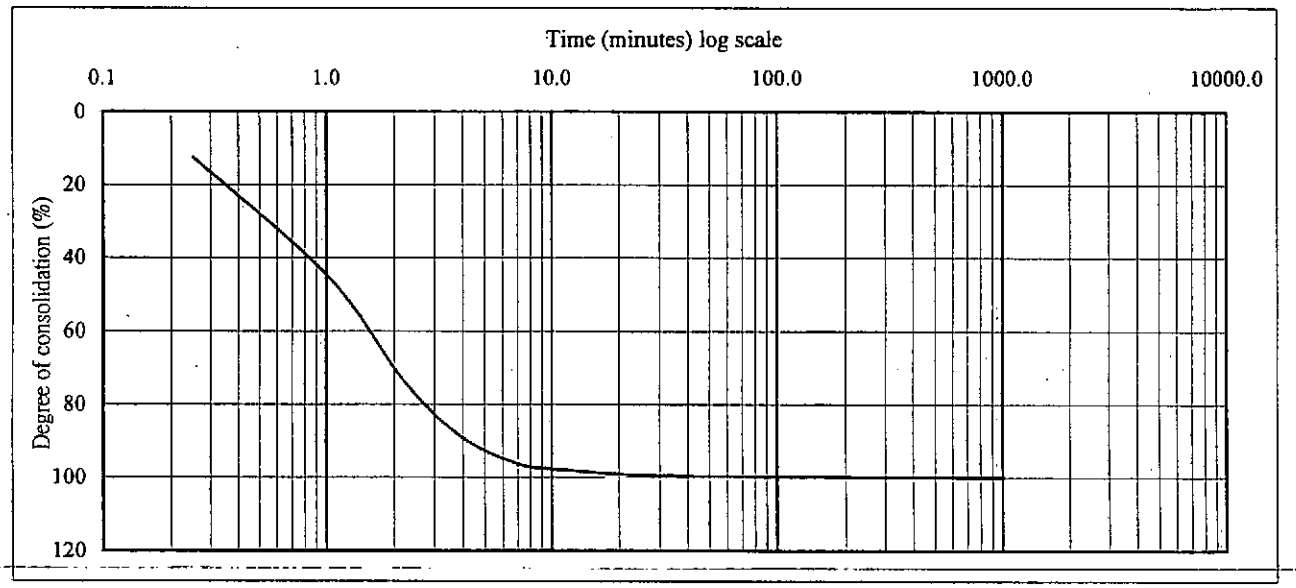
Laboratory information

Lab. Reference No.	:	K02J17002B2	Date test started	:	8-Oct-08	15:453
Specimen Depth (m)	:	8.80 - 9.00	Date test completed	:	9-Oct-08	08:45

Test result

Effective cell pressure (kPa)	=	120.0	Cell pressure (kPa)	=	390.0	Back pressure (kPa) =	270.0
Initial pore water pressure (kPa) =		341.6	Final pore water pressure (kPa) =		270.0		
Total volume change (ml)	=	7.69	t_{100} (min)	=	4.4	t_{50} (min)	= 1.2





FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024
Works Order No. : Nil
Borehole No. : D021
Customer Sample No : 9
Depth : 8.00 - 9.00

Laboratory Information

Lab. Reference No. : K02J17002B2
Specimen Depth : 8.80 - 9.00
Date test started : 7-Oct-08 Time : 09:30
Date test completed : 7-Oct-08 Time : 10:45
Rate of displacement : 0.05 mm/min
Side drains : No

Initial Volume : 616.9 cm^3
Initial Area : 4193 mm^2
Initial Height : 147.1 mm
Cell Pressure : 310 kPa
Back Pressure : 270 kPa
Effective Cell Pressure : 40 kPa
Proving ring ID : PR07

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
0.0	0.0	0	0.0	0.0	0.0	0.0	40.0	0.0	40.0	0.0	1.00
0.1	6.5	103	24.5	0.0	0.0	24.5	45.8	12.3	41.7	24.5	1.73
0.2	9.9	147	35.0	0.1	0.0	34.9	47.6	17.5	41.7	34.9	2.16
0.3	11.9	177	42.1	0.1	0.0	42.0	49.1	21.0	42.1	42.0	2.49
0.4	14.0	205	48.8	0.1	0.0	48.7	50.4	24.4	42.2	48.7	2.87
0.5	15.1	229	54.2	0.1	0.0	54.1	52.0	27.1	42.9	54.1	3.17
0.7	15.9	259	61.2	0.2	0.0	61.0	54.6	30.5	44.4	61.0	3.53
0.8	16.2	285	67.5	0.2	0.0	67.3	57.5	33.7	46.2	67.3	3.83
1.0	16.9	322	76.1	0.3	0.0	75.8	61.0	37.9	48.4	75.8	4.28
1.2	16.7	368	86.8	0.3	0.0	86.5	66.6	43.3	52.1	86.5	4.71
1.4	16.6	400	94.1	0.4	0.0	93.7	70.3	46.9	54.6	93.7	5.00
1.6	16.0	432	101.4	0.4	0.0	101.0	74.5	50.5	57.7	101.0	5.21
1.8	15.2	468	109.5	0.5	0.0	109.0	79.3	54.5	61.1	109.0	5.40
2.0	14.7	489	114.2	0.5	0.0	113.7	82.2	56.9	63.2	113.7	5.49
2.3	13.4	526	122.6	0.6	0.0	122.0	87.6	61.0	67.3	122.0	5.59
2.5	12.1	553	128.5	0.6	0.0	127.9	91.9	64.0	70.5	127.9	5.58

Failure criteria : Maximum stress ratio

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No	:	9	Depth	:	8.00 - 9.00

Laboratory Information

Lab. Reference No.	:	K02J17002B2		Initial Volume	:	608.9 cm^3
Specimen Depth	:	8.80 - 9.00		Initial Area	:	4265.8 mm^2
Date test started	:	8-Oct-08	Time : 13:35	Initial Height	:	142.8 mm
Date test completed	:	8-Oct-08	Time : 15:11	Cell Pressure	:	350 kPa
Rate of displacement	:	0.05	mm/min	Back Pressure	:	270 kPa
Side drains	:	No		Effective Cell Pressure	:	80 kPa
				Proving ring ID	:	PR20

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
2.9	0.0	0	0.0	0.7	0.0	0.0	80.0	0.0	80.0	0.0	1.00
3.0	9.8	93	21.1	0.8	0.0	20.3	80.4	10.2	77.0	20.3	1.29
3.1	17.4	217	49.4	0.8	0.0	48.6	86.9	24.3	78.8	48.6	1.78
3.2	19.9	240	54.5	0.8	0.0	53.7	87.0	26.9	78.0	53.7	1.89
3.4	22.7	273	61.9	0.8	0.0	61.1	87.9	30.6	77.7	61.1	2.07
3.5	26.1	377	85.2	0.9	0.0	84.3	96.1	42.2	82.0	84.3	2.56
3.7	28.4	471	106.4	0.9	0.0	105.5	104.4	52.8	86.8	105.5	3.04
3.9	29.8	545	122.8	1.0	0.0	121.8	111.1	60.9	90.8	121.8	3.43
4.2	31.3	615	138.1	1.0	0.0	137.1	117.3	68.6	94.4	137.1	3.82
4.5	31.7	680	152.2	1.1	0.0	151.1	123.9	75.6	98.7	151.1	4.13
4.7	31.3	717	160.1	1.1	0.0	159.0	128.2	79.5	101.7	159.0	4.26
5.0	30.7	752	167.4	1.2	0.0	166.2	132.4	83.1	104.7	166.2	4.37
5.2	30.1	771	171.4	1.2	0.0	170.2	135.0	85.1	106.6	170.2	4.41
5.4	29.3	794	176.1	1.3	0.0	174.8	138.1	87.4	109.0	174.8	4.45
5.7	28.3	820	181.3	1.3	0.0	180.0	141.7	90.0	111.7	180.0	4.48
5.9	27.3	838	184.8	1.4	0.0	183.4	144.4	91.7	113.8	183.4	4.48
6.1	26.6	852	187.5	1.4	0.0	186.1	146.5	93.1	115.4	186.1	4.49
6.3	25.8	862	189.4	1.5	0.0	187.9	148.2	94.0	116.8	187.9	4.47

Failure criteria : Maximum stress ratio

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No	:	9	Depth	:	8.00 - 9.00

Laboratory Information

Lab. Reference No.	:	K02J17002B2	Initial Volume	:	601.2	cm^3
Specimen Depth	:	8.80 - 9.00	Initial Area	:	4375.2	mm^2
Date test started	:	8-Oct-08 Time : 17:02	Initial Height	:	137.4	mm
Date test completed	:	9-Oct-08 Time : 08:14	Cell Pressure	:	390	kPa
Rate of displacement	:	0.0213 mm/min	Back Pressure	:	270	kPa
Side drains	:	No	Effective Cell Pressure	:	120	kPa
			Proving ring ID	:	PR06	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
6.7	0.0	0	0.0	1.5	0.0	0.0	120.0	0.0	120.0	0.0	1.00
6.8	4.3	92	19.6	1.5	0.0	18.1	124.8	9.1	121.7	18.1	1.16
6.9	6.1	111	23.6	1.5	0.0	22.1	125.0	11.1	121.3	22.1	1.19
6.9	9.4	133	28.3	1.5	0.0	26.8	124.0	13.4	119.5	26.8	1.24
7.0	17.6	231	49.1	1.6	0.0	47.5	126.2	23.8	118.2	47.5	1.46
7.1	23.2	301	63.9	1.6	0.0	62.3	128.0	31.2	117.6	62.3	1.64
7.2	27.5	361	76.6	1.6	0.0	75.0	130.0	37.5	117.5	75.0	1.81
7.2	31.1	421	89.3	1.6	0.0	87.7	132.8	43.9	118.1	87.7	1.99
7.3	31.6	412	87.2	1.6	0.0	85.6	131.2	42.8	116.9	85.6	1.97
7.4	34.0	478	101.2	1.6	0.0	99.6	135.8	49.8	119.2	99.6	2.16
7.5	35.8	532	112.5	1.7	0.0	110.8	139.6	55.4	121.1	110.8	2.32
7.6	37.3	580	122.4	1.7	0.0	120.7	143.1	60.4	122.9	120.7	2.46
7.7	38.4	630	133.0	1.7	0.0	131.3	147.3	65.7	125.4	131.3	2.61
7.7	38.9	675	142.3	1.7	0.0	140.6	151.4	70.3	128.0	140.6	2.73
7.8	39.6	722	152.2	1.7	0.0	150.5	155.7	75.3	130.6	150.5	2.87
7.9	40.3	766	161.3	1.7	0.0	159.6	159.5	79.8	132.9	159.6	3.00
8.0	41.0	811	170.5	1.7	0.0	168.8	163.4	84.4	135.3	168.8	3.14
8.1	41.6	849	178.3	1.8	0.0	176.5	166.7	88.3	137.2	176.5	3.25
8.2	42.2	887	186.1	1.8	0.0	184.3	170.0	92.2	139.2	184.3	3.37
8.2	42.8	918	192.7	1.8	0.0	190.9	172.7	95.5	140.8	190.9	3.47
8.3	43.2	950	199.1	1.8	0.0	197.3	175.5	98.7	142.6	197.3	3.57
8.4	43.7	975	204.2	1.8	0.0	202.4	177.5	101.2	143.8	202.4	3.65
8.5	44.0	998	208.6	1.8	0.0	206.8	179.4	103.4	144.9	206.8	3.72
8.6	44.3	1017	212.4	1.8	0.0	210.6	181.0	105.3	145.9	210.6	3.78
8.7	44.5	1039	216.8	1.9	0.0	214.9	183.0	107.5	147.1	214.9	3.85
8.8	44.5	1055	219.8	1.9	0.0	217.9	184.5	109.0	148.1	217.9	3.89
8.9	44.6	1067	222.2	1.9	0.0	220.3	185.6	110.2	148.8	220.3	3.92
9.0	44.5	1080	224.6	1.9	0.0	222.7	186.9	111.4	149.7	222.7	3.95
9.1	44.1	1093	227.0	1.9	0.0	225.1	188.5	112.6	150.9	225.1	3.97
9.1	43.9	1102	229.0	1.9	0.0	227.1	189.7	113.6	151.8	227.1	3.98
9.2	43.7	1112	230.7	1.9	0.0	228.8	190.7	114.4	152.6	228.8	4.00
9.3	43.5	1121	232.4	2.0	0.0	230.4	191.7	115.2	153.3	230.4	4.01
9.4	43.5	1131	234.1	2.0	0.0	232.1	192.6	116.1	153.9	232.1	4.03
9.5	43.2	1137	235.2	2.0	0.0	233.2	193.4	116.6	154.5	233.2	4.04
9.6	42.6	1143	236.2	2.0	0.0	234.2	194.5	117.1	155.5	234.2	4.03
9.7	42.4	1153	237.9	2.0	0.0	235.9	195.6	118.0	156.2	235.9	4.04
9.8	42.0	1159	239.0	2.0	0.0	237.0	196.5	118.5	157.0	237.0	4.04
9.9	41.9	1165	240.0	2.1	0.0	237.9	197.1	119.0	157.4	237.9	4.05
10.0	41.5	1172	241.0	2.1	0.0	238.9	198.0	119.5	158.1	238.9	4.04
10.1	41.1	1178	242.1	2.1	0.0	240.0	198.9	120.0	158.9	240.0	4.04
10.2	40.7	1184	243.1	2.1	0.0	241.0	199.8	120.5	159.6	241.0	4.04
10.3	40.4	1188	243.5	2.1	0.0	241.4	200.3	120.7	160.1	241.4	4.03
10.4	40.1	1194	244.5	2.1	0.0	242.4	201.1	121.2	160.7	242.4	4.03
10.5	39.9	1200	245.5	2.1	0.0	243.4	201.8	121.7	161.2	243.4	4.04
10.5	39.4	1207	246.8	2.1	0.0	244.7	203.0	122.4	162.2	244.7	4.04

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No	:	9	Depth	:	8.00 - 9.00

Laboratory Information

Lab. Reference No.	:	K02J17002B2		Initial Volume	:	601.2 cm^3
Specimen Depth	:	8.80 - 9.00		Initial Area	:	4375.2 mm^2
Date test started	:	8-Oct-08	Time : 17:02	Initial Height	:	137.4 mm
Date test completed	:	9-Oct-08	Time : 08:14	Cell Pressure	:	390 kPa
Rate of displacement	:	0.0213	mm/min	Back Pressure	:	270 kPa
Side drains	:	No		Effective Cell Pressure	:	120 kPa
				Proving ring ID	:	PR06

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
10.6	39.3	1210	247.2	2.2	0.0	245.0	203.2	122.5	162.4	245.0	4.04
10.7	38.9	1216	248.2	2.2	0.0	246.0	204.1	123.0	163.1	246.0	4.03
10.8	38.8	1222	249.2	2.2	0.0	247.0	204.7	123.5	163.5	247.0	4.04
10.9	38.4	1226	249.6	2.2	0.0	247.4	205.3	123.7	164.1	247.4	4.03
11.0	38.0	1232	250.6	2.2	0.0	248.4	206.2	124.2	164.8	248.4	4.03
11.1	37.7	1238	251.6	2.2	0.0	249.4	207.0	124.7	165.4	249.4	4.03
11.2	37.4	1241	252.0	2.3	0.0	249.7	207.5	124.9	165.8	249.7	4.02
11.3	37.2	1248	253.0	2.3	0.0	250.7	208.2	125.4	166.4	250.7	4.03
11.4	36.4	1251	253.3	2.3	0.0	251.0	209.1	125.5	167.3	251.0	4.00
11.5	36.1	1254	253.7	2.3	0.0	251.4	209.6	125.7	167.7	251.4	4.00
11.6	35.9	1260	254.7	2.3	0.0	252.4	210.3	126.2	168.2	252.4	4.00
11.7	35.7	1264	255.0	2.3	0.0	252.7	210.7	126.4	168.5	252.7	4.00
11.8	35.5	1270	256.0	2.3	0.0	253.7	211.4	126.9	169.1	253.7	4.00
11.9	35.2	1276	257.0	2.4	0.0	254.6	212.1	127.3	169.7	254.6	4.00
11.9	34.6	1279	257.6	2.4	0.0	255.2	213.0	127.6	170.5	255.2	3.99
12.0	34.3	1286	258.6	2.4	0.0	256.2	213.8	128.1	171.1	256.2	3.99
12.1	34.0	1292	259.6	2.4	0.0	257.2	214.6	128.6	171.7	257.2	3.99
12.2	33.8	1295	259.9	2.4	0.0	257.5	215.0	128.8	172.0	257.5	3.99
12.3	33.7	1302	260.9	2.4	0.0	258.5	215.6	129.3	172.5	258.5	4.00
12.4	33.0	1305	261.2	2.4	0.0	258.8	216.4	129.4	173.3	258.8	3.97
12.5	32.8	1311	262.2	2.4	0.0	259.8	217.1	129.9	173.8	259.8	3.98
12.6	32.6	1314	262.5	2.5	0.0	260.0	217.4	130.0	174.1	260.0	3.97
12.7	32.3	1321	263.5	2.5	0.0	261.0	218.2	130.5	174.7	261.0	3.98
12.8	32.1	1324	263.8	2.5	0.0	261.3	218.6	130.7	175.0	261.3	3.97
12.9	31.7	1327	264.2	2.5	0.0	261.7	219.2	130.9	175.5	261.7	3.96
13.0	31.3	1330	264.5	2.5	0.0	262.0	219.7	131.0	176.0	262.0	3.95
13.1	31.0	1333	264.8	2.5	0.0	262.3	220.2	131.2	176.4	262.3	3.95
13.2	30.8	1336	265.1	2.5	0.0	262.6	220.5	131.3	176.7	262.6	3.94
13.3	30.6	1340	265.5	2.6	0.0	262.9	220.9	131.5	177.0	262.9	3.94
13.4	30.0	1343	265.8	2.6	0.0	263.2	221.6	131.6	177.7	263.2	3.92
13.5	30.0	1346	266.1	2.6	0.0	263.5	221.8	131.8	177.8	263.5	3.93
13.6	29.6	1349	266.4	2.6	0.0	263.8	222.3	131.9	178.3	263.8	3.92
13.7	29.3	1355	267.4	2.6	0.0	264.8	223.1	132.4	179.0	264.8	3.92
13.8	28.9	1355	267.0	2.6	0.0	264.4	223.3	132.2	179.2	264.4	3.90
13.8	28.8	1362	268.3	2.6	0.0	265.7	224.1	132.9	179.8	265.7	3.91
13.9	28.4	1365	268.6	2.6	0.0	266.0	224.6	133.0	180.3	266.0	3.90
14.0	28.4	1368	268.9	2.7	0.0	266.2	224.7	133.1	180.3	266.2	3.91
14.1	28.0	1371	269.2	2.7	0.0	266.5	225.3	133.3	180.8	266.5	3.90
14.2	27.7	1374	269.5	2.7	0.0	266.8	225.7	133.4	181.2	266.8	3.89
14.3	27.3	1378	269.8	2.7	0.0	267.1	226.3	133.6	181.7	267.1	3.88
14.4	27.1	1381	270.1	2.7	0.0	267.4	226.6	133.7	182.0	267.4	3.88
14.5	27.1	1384	270.4	2.7	0.0	267.7	226.8	133.9	182.1	267.7	3.88
14.6	26.8	1387	270.7	2.7	0.0	268.0	227.2	134.0	182.5	268.0	3.88
14.7	26.6	1390	271.0	2.7	0.0	268.3	227.6	134.2	182.8	268.3	3.87
14.8	26.4	1393	271.3	2.8	0.0	268.5	227.9	134.3	183.1	268.5	3.87

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科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024
Works Order No. : Nil
Borehole No. : D021
Customer Sample No : 9
Depth : 8.00 - 9.00

Laboratory Information

Lab. Reference No. : K02J17002B2
Specimen Depth : 8.80 - 9.00
Date test started : 8-Oct-08 Time : 17:02
Date test completed : 9-Oct-08 Time : 08:14
Rate of displacement : 0.0213 mm/min
Side drains : No

Initial Volume : 601.2 cm^3
Initial Area : 4375.2 mm^2
Initial Height : 137.4 mm
Cell Pressure : 390 kPa
Back Pressure : 270 kPa
Effective Cell Pressure : 120 kPa
Proving ring ID : PR06

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
14.9	26.1	1397	271.6	2.8	0.0	268.8	228.3	134.4	183.5	268.8	3.86
15.0	25.8	1400	271.9	2.8	0.0	269.1	228.8	134.6	183.9	269.1	3.86
15.1	25.6	1403	272.2	2.8	0.0	269.4	229.1	134.7	184.2	269.4	3.85
15.2	25.3	1406	272.5	2.8	0.0	269.7	229.6	134.9	184.6	269.7	3.85
15.2	25.0	1406	272.5	2.8	0.0	269.7	229.9	134.9	184.9	269.7	3.84
15.3	24.8	1412	273.4	2.8	0.0	270.6	230.5	135.3	185.4	270.6	3.84
15.4	24.5	1416	273.7	2.8	0.0	270.9	231.0	135.5	185.8	270.9	3.84
15.5	24.5	1419	274.0	2.9	0.0	271.1	231.1	135.6	185.9	271.1	3.84
15.6	24.4	1422	274.3	2.9	0.0	271.4	231.3	135.7	186.1	271.4	3.84
15.7	24.0	1428	275.2	2.9	0.0	272.3	232.2	136.2	186.8	272.3	3.84
15.8	23.7	1431	275.5	2.9	0.0	272.6	232.6	136.3	187.2	272.6	3.83
15.9	23.5	1435	275.8	2.9	0.0	272.9	233.0	136.5	187.5	272.9	3.83
16.0	23.2	1441	276.6	2.9	0.0	273.7	233.7	136.9	188.0	273.7	3.83
16.1	22.9	1444	276.9	2.9	0.0	274.0	234.1	137.0	188.4	274.0	3.82
16.2	23.1	1447	277.2	2.9	0.0	274.3	234.1	137.2	188.3	274.3	3.83
16.3	22.8	1450	277.5	3.0	0.0	274.5	234.5	137.3	188.7	274.5	3.82
16.4	22.5	1454	277.8	3.0	0.0	274.8	234.9	137.4	189.1	274.8	3.82
16.5	22.3	1457	278.0	3.0	0.0	275.0	235.2	137.5	189.4	275.0	3.81
16.6	22.3	1460	278.3	3.0	0.0	275.3	235.4	137.7	189.5	275.3	3.82
16.7	22.0	1463	278.6	3.0	0.0	275.6	235.8	137.8	189.9	275.6	3.81
16.8	21.8	1463	278.2	3.0	0.0	275.2	235.8	137.6	189.9	275.2	3.80
16.9	21.4	1466	278.5	3.0	0.0	275.5	236.4	137.8	190.4	275.5	3.79
17.0	21.6	1469	278.8	3.1	0.0	275.7	236.3	137.9	190.3	275.7	3.80
17.1	21.4	1473	279.0	3.1	0.0	275.9	236.6	138.0	190.6	275.9	3.80
17.1	21.1	1476	279.6	3.1	0.0	276.5	237.2	138.3	191.1	276.5	3.80
17.2	20.9	1476	279.3	3.1	0.0	276.2	237.2	138.1	191.2	276.2	3.79
17.3	20.7	1479	279.5	3.1	0.0	276.4	237.5	138.2	191.4	276.4	3.78
17.4	20.4	1479	279.2	3.1	0.0	276.1	237.7	138.1	191.6	276.1	3.77
17.5	20.6	1482	279.5	3.1	0.0	276.4	237.6	138.2	191.5	276.4	3.78
17.6	20.3	1485	279.7	3.1	0.0	276.6	238.0	138.3	191.9	276.6	3.77
17.7	20.1	1488	280.0	3.1	0.0	276.9	238.4	138.5	192.2	276.9	3.77
17.8	19.9	1492	280.2	3.2	0.0	277.0	238.6	138.5	192.4	277.0	3.77
17.9	19.9	1495	280.5	3.2	0.0	277.3	238.8	138.7	192.5	277.3	3.77
18.0	19.6	1495	280.2	3.2	0.0	277.0	238.9	138.5	192.7	277.0	3.76
18.1	19.4	1498	280.4	3.2	0.0	277.2	239.2	138.6	193.0	277.2	3.76
18.2	19.4	1501	280.7	3.2	0.0	277.5	239.4	138.8	193.1	277.5	3.76
18.3	19.1	1501	280.3	3.2	0.0	277.1	239.5	138.6	193.3	277.1	3.75
18.4	19.2	1504	280.6	3.2	0.0	277.4	239.5	138.7	193.3	277.4	3.75
18.5	18.9	1504	280.2	3.2	0.0	277.0	239.6	138.5	193.4	277.0	3.74
18.6	18.6	1507	280.5	3.3	0.0	277.2	240.0	138.6	193.8	277.2	3.73
18.7	18.7	1507	280.1	3.3	0.0	276.8	239.7	138.4	193.6	276.8	3.73
18.7	18.5	1511	280.7	3.3	0.0	277.4	240.2	138.7	194.0	277.4	3.73
18.8	18.3	1514	280.9	3.3	0.0	277.6	240.5	138.8	194.2	277.6	3.73
18.9	18.4	1517	281.2	3.3	0.0	277.9	240.6	139.0	194.2	277.9	3.74
19.0	18.2	1517	280.8	3.3	0.0	277.5	240.6	138.8	194.3	277.5	3.73

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17002B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D021
Customer Sample No	:	9	Depth	:	8.00 - 9.00

Laboratory Information

Lab. Reference No.	:	K02J17002B2		Initial Volume	:	601.2 cm^3
Specimen Depth	:	8.80 - 9.00		Initial Area	:	4375.2 mm^2
Date test started	:	8-Oct-08	Time : 17:02	Initial Height	:	137.4 mm
Date test completed	:	9-Oct-08	Time : 08:14	Cell Pressure	:	390 kPa
Rate of displacement	:	0.0213	mm/min	Back Pressure	:	270 kPa
Side drains	:	No		Effective Cell Pressure	:	120 kPa
				Proving ring ID	:	PR06

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
19.1	18.0	1520	281.1	3.3	0.0	277.8	240.9	138.9	194.6	277.8	3.72
19.2	17.9	1523	281.3	3.3	0.0	278.0	241.1	139.0	194.8	278.0	3.72
19.3	17.7	1530	282.1	3.4	0.0	278.7	241.7	139.4	195.2	278.7	3.72
19.4	17.5	1533	282.4	3.4	0.0	279.0	242.0	139.5	195.5	279.0	3.72
19.5	17.4	1533	282.0	3.4	0.0	278.6	241.9	139.3	195.5	278.6	3.72
19.6	17.3	1536	282.2	3.4	0.0	278.8	242.1	139.4	195.6	278.8	3.71
19.7	17.1	1539	282.5	3.4	0.0	279.1	242.5	139.6	195.9	279.1	3.71
19.8	17.3	1542	282.7	3.4	0.0	279.3	242.4	139.7	195.8	279.3	3.72
19.9	17.1	1545	282.9	3.4	0.0	279.5	242.7	139.8	196.1	279.5	3.72
20.0	16.8	1549	283.2	3.4	0.0	279.8	243.1	139.9	196.5	279.8	3.71
20.1	16.7	1549	282.8	3.5	0.0	279.3	243.0	139.7	196.4	279.3	3.70
20.2	16.8	1552	283.0	3.5	0.0	279.5	243.0	139.8	196.4	279.5	3.71
20.3	16.6	1552	282.7	3.5	0.0	279.2	243.0	139.6	196.5	279.2	3.70
20.4	16.4	1558	283.5	3.5	0.0	280.0	243.6	140.0	196.9	280.0	3.70
20.5	16.4	1558	283.1	3.5	0.0	279.6	243.4	139.8	196.8	279.6	3.70
20.6	16.4	1561	283.3	3.5	0.0	279.8	243.5	139.9	196.9	279.8	3.70
20.6	15.9	1564	283.9	3.5	0.0	280.4	244.3	140.2	197.6	280.4	3.69
20.7	15.9	1568	284.1	3.5	0.0	280.6	244.4	140.3	197.6	280.6	3.70

Failure criteria : Maximum deviator stress

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Laboratory Report on Triaxial Compression Test

Photographic

Job Reference No. : 65127070-K02J17002B2

Information supplied customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024
Borehole No. : D021
Depth (m) : 8.00 - 9.00

Laboratory information

Lab. Reference No. : K02J17002B2
Specimen Depth (m) : 8.80 - 9.00

Customer Sample No. : 9

BEFORE SPLIT

AFTER SPLIT

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

Summary of specimen data - Consolidated Undrained with Pore Water Pressure Measurement

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

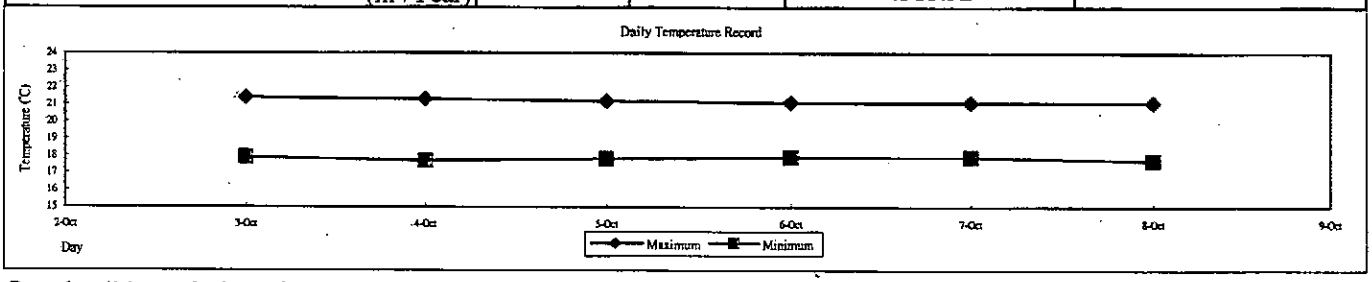
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Works Order No.	: Nil	Borehole No.	: D022A
Customer Sample No.	: 13	Depth (m)	: 10.50 - 11.50
Sample Origin	: CDG	Sample type	: Mazier
Contract No.	: 1024		

Laboratory information

Lab. Reference No.	: K02J17003B1	Date test started	: 3-Oct-08
Specimen Depth (m)	: 11.10 - 11.30	Date test completed	: 8-Oct-08
		Date sample received	: 2-Oct-08
Method of preparation	: Undisturbed (direct extrusion from tube sample)	Selected specimen by	: C.H. Lo (FT Lab. Ltd)
% > 1/5 of specimen diameter	: -	Room temperature range(°C)	: 17.7-21.4
Method of moisture content	: GEOSPEC 3 : 2001: Test 5.1	Particle density (assumed)	: 2.65 Mg/m^3
Test method used	: GEOSPEC 3 : 2001: Test 15.2		
Soil description (Visual)	: Moist, yellowish brown, silty/clayey gravelly SAND.		

Stage		Saturation		Compression	
				Single	After
Effective cell pressure	(kPa)	5		105	
		Before	After	Before	
Diameter of specimen	(mm)	73.4 *	-	-	-
Height of specimen	(mm)	147.9 *	-	-	-
Volume of specimen	(cm^3)	625.8	625.8	600.7	600.7
Wet mass of specimen	(g)	1179.5 *	1196.7	1171.6	1169.4 *
Dry mass of specimen	(g)	926.3 *	-	-	926.3 *
Moisture content	(%)	27.3	29.2	26.5	26.2
Bulk density	(Mg/m^3)	1.885	1.912	1.950	1.947
Dry density	(Mg/m^3)	1.480	1.480	1.542	1.542
Void ratio		0.791	0.791	0.719	0.719
Degree of saturation	(%)	91.5	97.8	97.7	96.6
Coefficient of volume compressibility	(m^2/MN)	-	-	0.41	-
Coefficient of consolidation by t_{100}	(m^2/Year)	-	-	3897.23	-
Coefficient of consolidation by t_{50}	(m^2/Year)	-	-	4315.92	-



Remarks : *Measured primary data

HOKLAS Approved Signatory: _____
YUE Wai Chun / VONG Hong Ian

Date: 23 DEC 2008

Address: Lot No.DD77 Section 1552 S.A. ss1 RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test

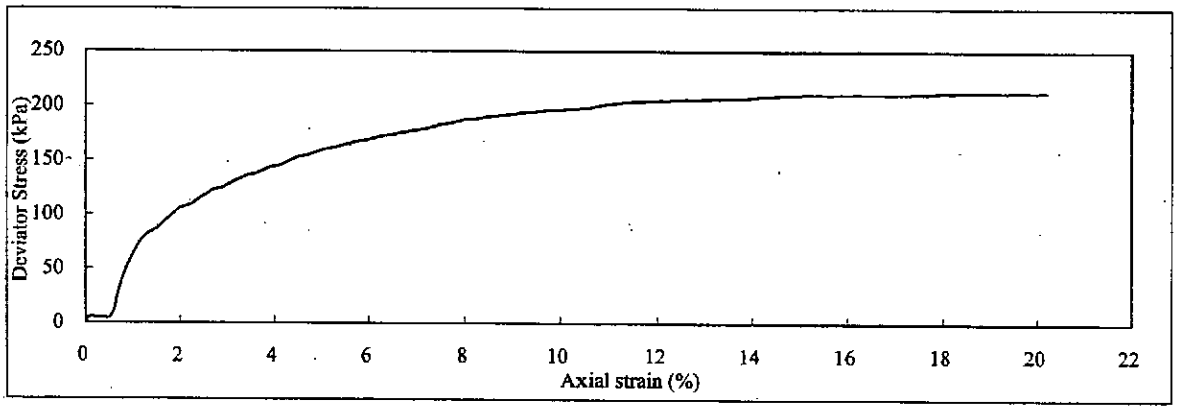
Single Stage - Consolidated Undrained with Pore Water Pressure Measurement

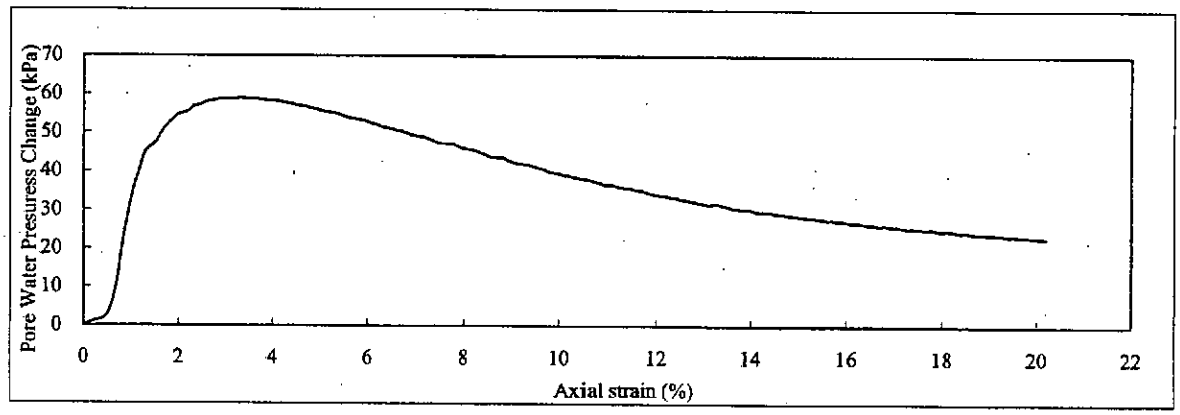
Deviator stress, Pore water pressure change & Stress ratio VS Axial Strain

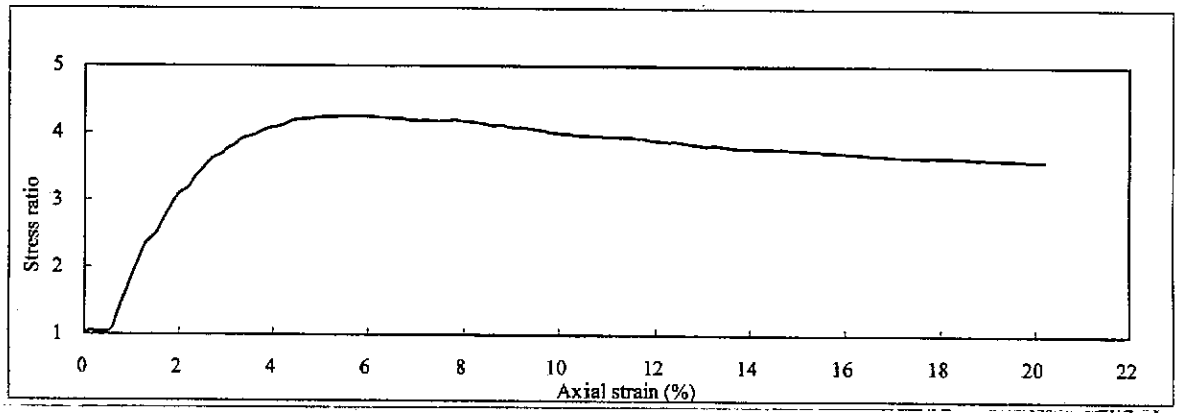
Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No.	:	13	Depth (m)	:	10.50 - 11.50







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Laboratory Report on Triaxial Compression Test

Single Stage - Consolidated Undrained with Pore Water Pressure Measurement

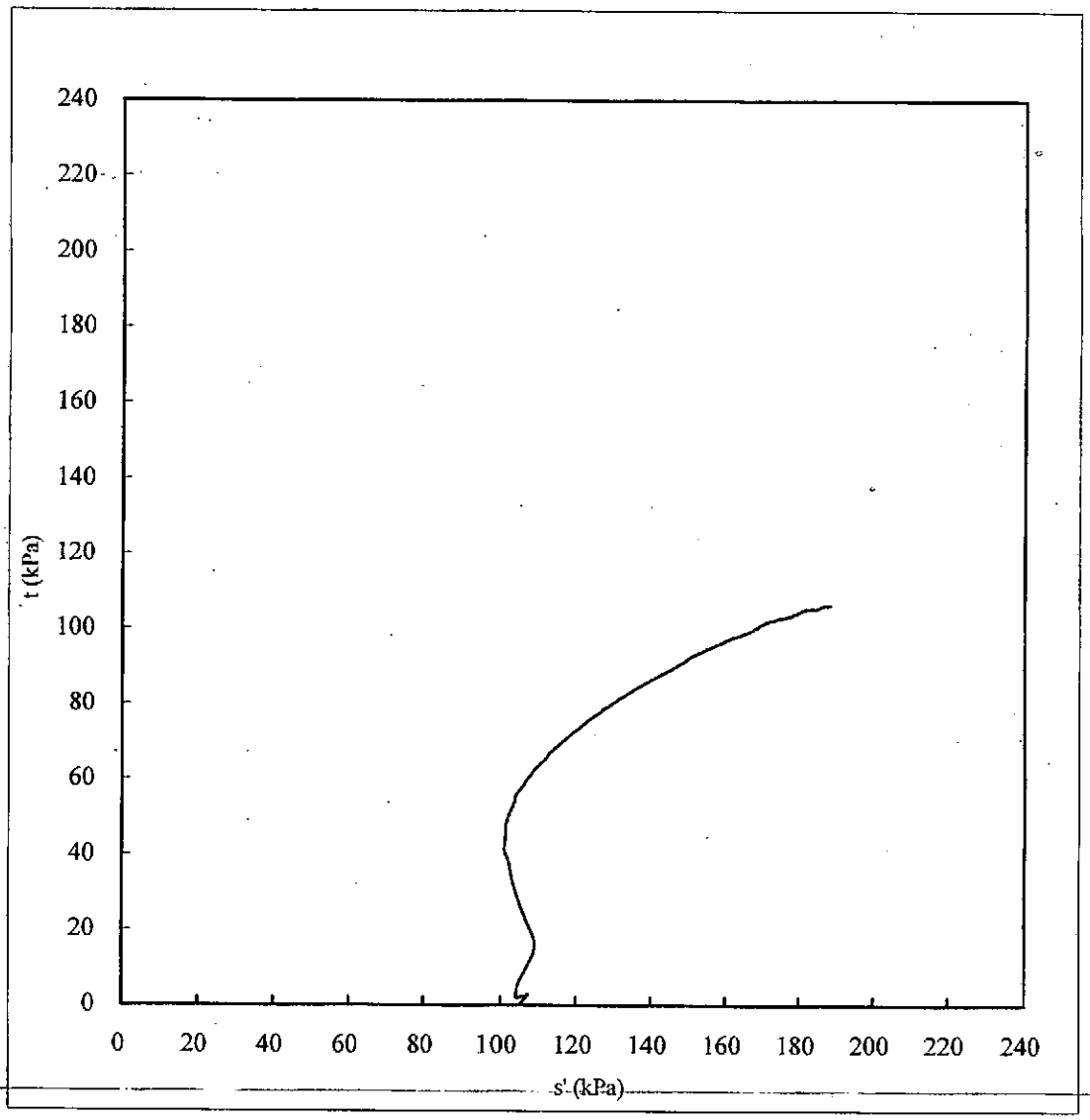
t VS s' Stress path plot

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No.	:	13	Depth (m)	:	10.50 - 11.50

Specimen at failure (kPa)	s'	187.2
	t	106.4



FT Laboratories Ltd.
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Laboratory Report on Triaxial Compression Test

Single Stage - Consolidated Undrained with Pore Water Pressure Measurement

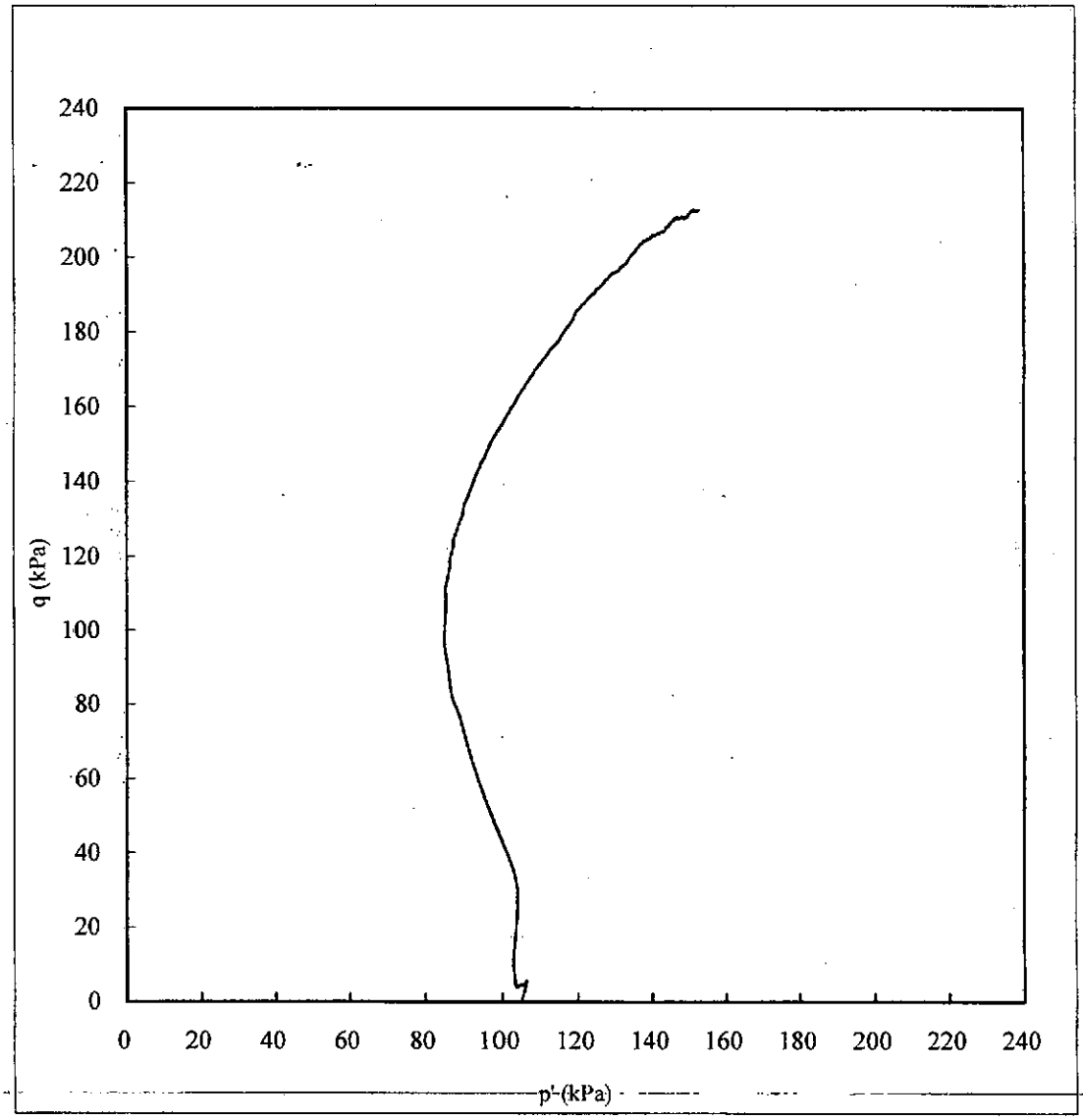
q VS p' Stress path plot

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No.	:	13	Depth (m)	:	10.50 - 11.50

Specimen at failure (kPa)	p'	151.7
	q	212.8



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Laboratory Report on Triaxial Compression Test
Saturation

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D022A

Customer Sample No. : 13

Depth (m) : 10.50 - 11.50

Laboratory information

Lab. Reference No. : K02J17003B1

Date test started : 5-Oct-08 09:10

Specimen Depth (m) : 11.10 - 11.30

Date test completed : 6-Oct-08 08:40

Test result :

Saturated : Cell Pressure = 250.4 kPa Pore water Pressure = 245.3 kPa B-Value = 0.97

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
0.7	0.5	0.5		
25.4	0.5	15.5		
25.6	20.1	16.8		
25.6	20.9	20.4	3.40	
50.9	20.8	38.1		0.70
50.8	45.7	40.2		
50.8	45.6	45.6	4.57	
75.7	45.3	64.5		0.76
75.7	70.0	66.2		
75.7	70.5	70.4	2.48	
100.8	70.5	91.2		0.83
100.8	95.7	92.8		
100.8	95.9	95.4	1.76	
125.0	95.4	116.2		0.86
125.9	120.3	117.5		
125.9	120.5	120.5	1.33	
150.2	120.6	141.9		0.88
150.2	145.9	143.4		
150.2	145.8	145.6	0.78	
175.4	145.8	168.8		0.92
175.4	170.0	169.3		
175.4	170.8	170.4	1.05	
200.7	170.7	194.4		0.95
200.7	195.2	194.8		
200.7	195.9	195.6	0.35	
250.8	195.9	244.2		0.97
250.7	245.7	244.6		
250.4	245.3	245.3	1.52	

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Saturation

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D022A

Customer Sample No. : 13

Depth (m) : 10.50 - 11.50

Laboratory information

Lab. Reference No. : K02J17003B1

Date test started : 5-Oct-08 09:10

Specimen Depth (m) : 11.10 - 11.30

Date test completed : 6-Oct-08 08:40

Test result :

Saturated : Cell Pressure = 250.4 kPa Pore water Pressure = 245.3 kPa B-Value = 0.97

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
		Total :	17.24	

FT Laboratories Ltd.
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Laboratory Report on Triaxial Compression Test
Consolidation

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

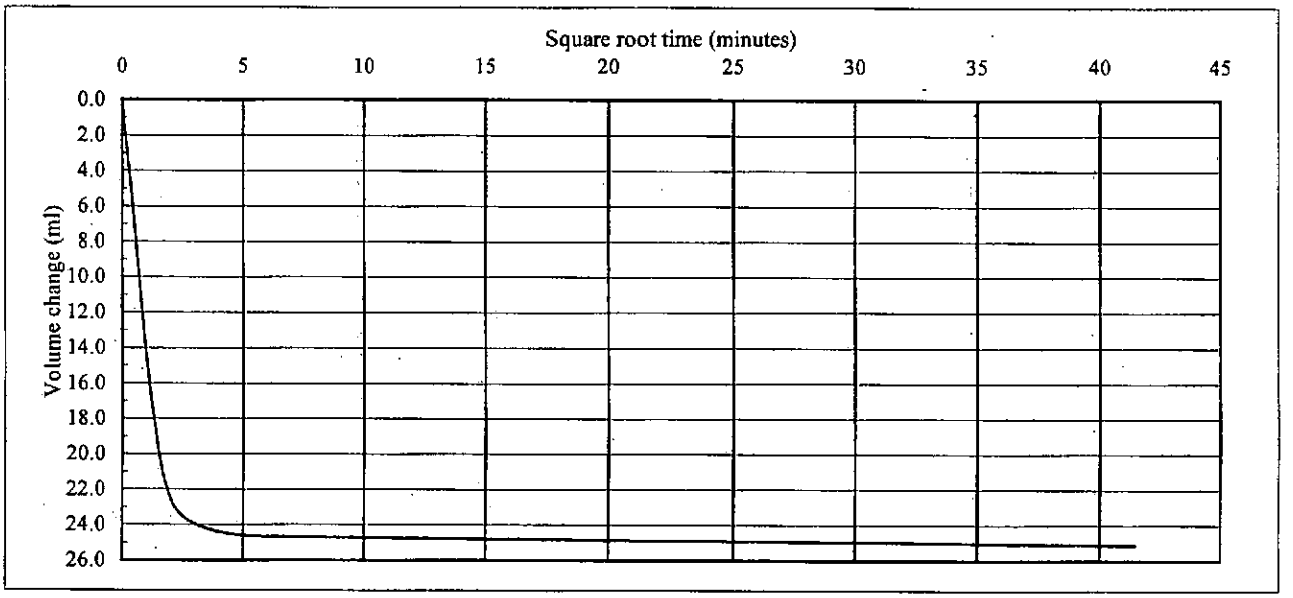
Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No.	:	13	Depth (m)	:	10.50 - 11.50

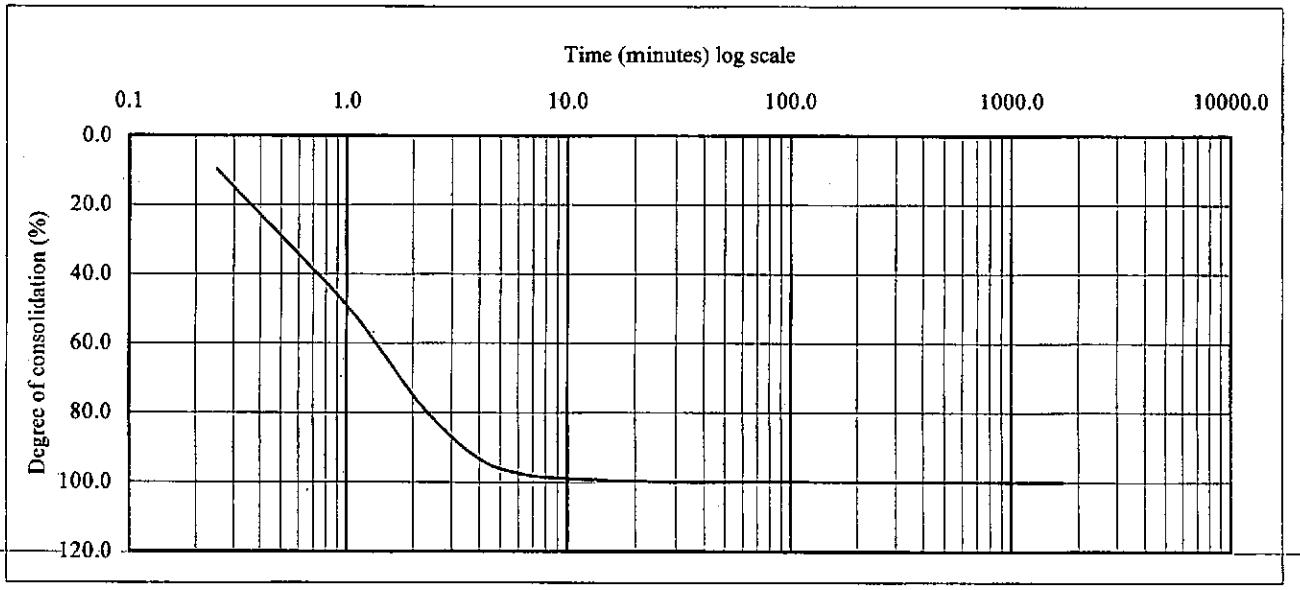
Laboratory information

Lab. Reference No.	:	K02J17003B1	Date test started	:	6-Oct-08	10:20
Specimen Depth (m)	:	11.10 - 11.30	Date test completed	:	7-Oct-08	15:00

Test result

Effective cell pressure (kPa)	=	105.0	Cell pressure (kPa)	=	350.0	Back pressure (kPa) =	245.0
Initial pore water pressure (kPa) =		342.3	Final pore water pressure (kPa) =		245.0		
Total volume change (ml)	=	25.12	t_{100} (min)	=	2.3	t_{50} (min)	= 1.0





FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No	:	13	Depth	:	10.50 - 11.50

Laboratory Information

Lab. Reference No.	:	K02J17003B1	Initial Volume	:	600.7	cm^3
Specimen Depth	:	11.10 - 11.30	Initial Area	:	4118.2	mm^2
Date test started	:	7-Oct-08 Time : 15:58	Initial Height	:	145.9	mm
Date test completed	:	8-Oct-08 Time : 08:46	Cell Pressure	:	350	kPa
Rate of displacement	:	0.0307 mm/min	Back Pressure	:	245	kPa
Side drains	:	No	Effective Cell Pressure	:	105	kPa
			Proving ring ID	:	PR20	

Axial Strain	Pore Pressure	Axial Force	Axial Stress	Membrane Correction	Side Drains Correction	Corrected Deviator Stress	Stress Path Parameters (s')	Stress Path Parameters (t)	Stress Path Parameters (p')	Stress Path Parameters (q)	Effective Principal Stress Ratio
%	kPa	N	kPa	kPa	kPa	kPa	kPa	kPa	kPa	kPa	
0.0	0.0	0	0.0	0.0	0.0	0.0	105.0	0.0	105.0	0.0	1.00
0.1	0.4	23	5.5	0.0	0.0	5.5	107.4	2.8	106.4	5.5	1.05
0.2	1.0	19	4.7	0.1	0.0	4.6	106.3	2.3	105.5	4.6	1.04
0.4	1.7	19	4.7	0.1	0.0	4.6	105.6	2.3	104.8	4.6	1.04
0.5	2.8	18	4.2	0.1	0.0	4.1	104.3	2.1	103.6	4.1	1.04
0.6	5.7	46	11.0	0.2	0.0	10.8	104.7	5.4	102.9	10.8	1.11
0.7	11.3	128	30.8	0.2	0.0	30.6	109.0	15.3	103.9	30.6	1.33
0.8	20.4	186	44.7	0.2	0.0	44.5	106.9	22.3	99.4	44.5	1.53
0.9	27.6	230	55.2	0.2	0.0	55.0	104.9	27.5	95.7	55.0	1.71
1.0	33.4	266	64.0	0.3	0.0	63.7	103.5	31.9	92.8	63.7	1.89
1.1	37.8	296	71.1	0.3	0.0	70.8	102.6	35.4	90.8	70.8	2.05
1.2	41.6	323	77.4	0.3	0.0	77.1	102.0	38.6	89.1	77.1	2.22
1.3	45.0	344	82.3	0.4	0.0	81.9	101.0	41.0	87.3	81.9	2.37
1.5	47.4	365	87.2	0.4	0.0	86.8	101.0	43.4	86.5	86.8	2.51
1.6	49.4	384	91.7	0.4	0.0	91.3	101.3	45.7	86.0	91.3	2.64
1.7	51.2	400	95.4	0.5	0.0	94.9	101.3	47.5	85.4	94.9	2.76
1.8	52.6	415	99.0	0.5	0.0	98.5	101.7	49.3	85.2	98.5	2.88
1.9	53.8	433	103.1	0.5	0.0	102.6	102.5	51.3	85.4	102.6	3.00
2.0	54.7	447	106.3	0.5	0.0	105.8	103.2	52.9	85.6	105.8	3.10
2.2	55.5	459	109.0	0.6	0.0	108.4	103.7	54.2	85.6	108.4	3.19
2.3	56.6	471	111.8	0.6	0.0	111.2	104.0	55.6	85.5	111.2	3.30
2.4	57.0	486	115.1	0.6	0.0	114.5	105.3	57.3	86.2	114.5	3.39
2.5	57.4	498	117.8	0.7	0.0	117.1	106.2	58.6	86.6	117.1	3.46
2.6	58.0	508	120.2	0.7	0.0	119.5	106.8	59.8	86.8	119.5	3.54
2.7	58.2	521	123.0	0.7	0.0	122.3	108.0	61.2	87.6	122.3	3.61
2.9	58.7	531	125.2	0.8	0.0	124.4	108.5	62.2	87.8	124.4	3.69
3.0	58.7	543	128.0	0.8	0.0	127.2	109.9	63.6	88.7	127.2	3.75
3.1	58.7	552	129.9	0.8	0.0	129.1	110.9	64.6	89.3	129.1	3.79
3.2	58.6	563	132.2	0.8	0.0	131.4	112.1	65.7	90.2	131.4	3.83
3.3	59.0	571	134.2	0.9	0.0	133.3	112.7	66.7	90.4	133.3	3.90
3.4	58.8	580	136.1	0.9	0.0	135.2	113.8	67.6	91.3	135.2	3.93
3.6	58.7	591	138.3	0.9	0.0	137.4	115.0	68.7	92.1	137.4	3.97
3.7	58.6	599	140.2	0.9	0.0	139.3	116.1	69.7	92.8	139.3	4.00
3.8	58.5	608	142.1	1.0	0.0	141.1	117.1	70.6	93.5	141.1	4.03
3.9	58.3	617	144.0	1.0	0.0	143.0	118.2	71.5	94.4	143.0	4.06
4.1	58.2	626	145.7	1.0	0.0	144.7	119.2	72.4	95.0	144.7	4.09
4.2	57.9	634	147.6	1.1	0.0	146.5	120.4	73.3	95.9	146.5	4.11
4.3	57.7	645	149.9	1.1	0.0	148.8	121.7	74.4	96.9	148.8	4.15
4.4	57.5	656	152.2	1.1	0.0	151.1	123.1	75.6	97.9	151.1	4.18
4.5	57.1	664	154.0	1.1	0.0	152.9	124.4	76.5	98.9	152.9	4.19
4.7	56.8	673	155.7	1.2	0.0	154.5	125.5	77.3	99.7	154.5	4.21
4.8	56.4	680	157.2	1.2	0.0	156.0	126.6	78.0	100.6	156.0	4.21
4.9	56.2	687	158.6	1.2	0.0	157.4	127.5	78.7	101.3	157.4	4.23
5.0	55.8	694	160.1	1.2	0.0	158.9	128.7	79.5	102.2	158.9	4.23
5.1	55.5	701	161.5	1.3	0.0	160.2	129.6	80.1	102.9	160.2	4.24

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Works Order No. : Nil
Customer Sample No : 13

Contract No. : 1024
Borehole No. : D022A
Depth : 10.50 - 11.50

Laboratory Information

Lab. Reference No. : K02J17003B1
Specimen Depth : 11.10 - 11.30
Date test started : 7-Oct-08 Time : 15:58
Date test completed : 8-Oct-08 Time : 08:46
Rate of displacement : 0.0307 mm/min
Side drains : No

Initial Volume : 600.7 cm^3
Initial Area : 4118.2 mm^2
Initial Height : 145.9 mm
Cell Pressure : 350 kPa
Back Pressure : 245 kPa
Effective Cell Pressure : 105 kPa
Proving ring ID : PR20

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
5.3	55.1	708	162.8	1.3	0.0	161.5	130.7	80.8	103.7	161.5	4.24
5.4	54.8	715	164.3	1.3	0.0	163.0	131.7	81.5	104.5	163.0	4.25
5.5	54.4	722	165.7	1.3	0.0	164.4	132.8	82.2	105.4	164.4	4.25
5.6	54.0	727	166.7	1.4	0.0	165.3	133.7	82.7	106.1	165.3	4.24
5.7	53.7	734	168.1	1.4	0.0	166.7	134.7	83.4	106.9	166.7	4.25
5.9	53.3	741	169.4	1.4	0.0	168.0	135.7	84.0	107.7	168.0	4.25
6.0	52.9	747	170.4	1.4	0.0	169.0	136.6	84.5	108.4	169.0	4.24
6.1	52.5	754	171.8	1.5	0.0	170.3	137.7	85.2	109.3	170.3	4.24
6.2	52.1	759	172.8	1.5	0.0	171.3	138.6	85.7	110.0	171.3	4.24
6.3	51.6	764	173.9	1.5	0.0	172.4	139.6	86.2	110.9	172.4	4.23
6.5	51.1	771	175.1	1.5	0.0	173.6	140.7	86.8	111.8	173.6	4.22
6.6	50.7	776	176.1	1.6	0.0	174.5	141.6	87.3	112.5	174.5	4.21
6.7	50.5	782	177.1	1.6	0.0	175.5	142.3	87.8	113.0	175.5	4.22
6.8	50.0	785	177.7	1.6	0.0	176.1	143.1	88.1	113.7	176.1	4.20
6.9	49.5	790	178.7	1.6	0.0	177.1	144.1	88.6	114.5	177.1	4.19
7.1	49.0	797	179.9	1.7	0.0	178.2	145.1	89.1	115.4	178.2	4.18
7.2	48.9	803	180.9	1.7	0.0	179.2	145.7	89.6	115.8	179.2	4.19
7.3	48.4	808	181.9	1.7	0.0	180.2	146.7	90.1	116.7	180.2	4.18
7.4	47.9	815	183.2	1.7	0.0	181.5	147.9	90.8	117.6	181.5	4.18
7.5	47.4	822	184.6	1.7	0.0	182.9	149.1	91.5	118.6	182.9	4.18
7.7	47.2	829	185.8	1.8	0.0	184.0	149.8	92.0	119.1	184.0	4.18
7.8	47.0	836	187.2	1.8	0.0	185.4	150.7	92.7	119.8	185.4	4.20
7.9	46.5	841	188.1	1.8	0.0	186.3	151.7	93.2	120.6	186.3	4.18
8.0	46.0	847	189.1	1.8	0.0	187.3	152.7	93.7	121.4	187.3	4.17
8.2	45.6	850	189.5	1.9	0.0	187.6	153.2	93.8	121.9	187.6	4.16
8.3	45.2	855	190.4	1.9	0.0	188.5	154.1	94.3	122.6	188.5	4.15
8.4	44.7	861	191.4	1.9	0.0	189.5	155.1	94.8	123.5	189.5	4.14
8.5	44.2	864	192.0	1.9	0.0	190.1	155.9	95.1	124.2	190.1	4.13
8.6	43.7	868	192.5	1.9	0.0	190.6	156.6	95.3	124.8	190.6	4.11
8.8	43.7	873	193.3	2.0	0.0	191.3	157.0	95.7	125.1	191.3	4.12
8.9	43.1	876	193.8	2.0	0.0	191.8	157.8	95.9	125.8	191.8	4.10
9.0	42.6	880	194.4	2.0	0.0	192.4	158.6	96.2	126.5	192.4	4.08
9.1	42.2	883	195.0	2.0	0.0	193.0	159.3	96.5	127.1	193.0	4.07
9.2	42.1	889	195.9	2.0	0.0	193.9	159.9	97.0	127.5	193.9	4.08
9.4	41.7	892	196.2	2.1	0.0	194.1	160.4	97.1	128.0	194.1	4.07
9.5	41.3	896	196.8	2.1	0.0	194.7	161.1	97.4	128.6	194.7	4.06
9.6	40.9	899	197.4	2.1	0.0	195.3	161.8	97.7	129.2	195.3	4.05
9.7	40.5	903	197.9	2.1	0.0	195.8	162.4	97.9	129.8	195.8	4.04
9.8	40.0	904	198.1	2.1	0.0	196.0	163.0	98.0	130.3	196.0	4.02
10.0	39.6	908	198.4	2.2	0.0	196.2	163.5	98.1	130.8	196.2	4.00
10.1	39.2	911	198.9	2.2	0.0	196.7	164.2	98.4	131.4	196.7	3.99
10.2	39.1	915	199.5	2.2	0.0	197.3	164.6	98.7	131.7	197.3	3.99
10.3	38.7	917	199.6	2.2	0.0	197.4	165.0	98.7	132.1	197.4	3.98
10.5	38.2	922	200.3	2.2	0.0	198.1	165.9	99.1	132.8	198.1	3.97
10.6	37.8	925	200.9	2.3	0.0	198.6	166.5	99.3	133.4	198.6	3.96

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D022A

Customer Sample No : 13

Depth : 10.50 - 11.50

Laboratory Information

Lab. Reference No.	:	K02J17003B1	Initial Volume	:	600.7	cm^3
Specimen Depth	:	11.10 - 11.30	Initial Area	:	4118.2	mm^2
Date test started	:	7-Oct-08 Time : 15:58	Initial Height	:	145.9	mm
Date test completed	:	8-Oct-08 Time : 08:46	Cell Pressure	:	350	kPa
Rate of displacement	:	0.0307 mm/min	Back Pressure	:	245	kPa
Side drains	:	No	Effective Cell Pressure	:	105	kPa
			Proving ring ID	:	PR20	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
10.7	37.5	931	201.8	2.3	0.0	199.5	167.3	99.8	134.0	199.5	3.96
10.8	37.2	936	202.7	2.3	0.0	200.4	168.0	100.2	134.6	200.4	3.96
10.9	36.7	941	203.6	2.3	0.0	201.3	169.0	100.7	135.4	201.3	3.95
11.1	36.6	946	204.3	2.3	0.0	202.0	169.4	101.0	135.7	202.0	3.95
11.2	36.1	952	205.2	2.4	0.0	202.8	170.3	101.4	136.5	202.8	3.94
11.3	35.9	955	205.7	2.4	0.0	203.3	170.8	101.7	136.9	203.3	3.94
11.4	35.8	957	205.9	2.4	0.0	203.5	171.0	101.8	137.0	203.5	3.94
11.6	35.3	960	206.2	2.4	0.0	203.8	171.6	101.9	137.6	203.8	3.92
11.7	35.2	964	206.7	2.4	0.0	204.3	172.0	102.2	137.9	204.3	3.93
11.8	34.7	966	206.8	2.4	0.0	204.4	172.5	102.2	138.4	204.4	3.91
11.9	34.4	967	207.0	2.5	0.0	204.5	172.9	102.3	138.8	204.5	3.90
12.0	34.1	971	207.5	2.5	0.0	205.0	173.4	102.5	139.2	205.0	3.89
12.2	33.8	973	207.4	2.5	0.0	204.9	173.7	102.5	139.5	204.9	3.88
12.3	33.5	976	207.9	2.5	0.0	205.4	174.2	102.7	140.0	205.4	3.87
12.4	33.5	978	208.0	2.5	0.0	205.5	174.3	102.8	140.0	205.5	3.87
12.5	33.1	981	208.5	2.6	0.0	205.9	174.9	103.0	140.5	205.9	3.86
12.7	32.7	983	208.4	2.6	0.0	205.8	175.2	102.9	140.9	205.8	3.85
12.8	32.4	985	208.6	2.6	0.0	206.0	175.6	103.0	141.3	206.0	3.84
12.9	32.1	987	208.7	2.6	0.0	206.1	176.0	103.1	141.6	206.1	3.83
13.0	31.9	988	208.8	2.6	0.0	206.2	176.2	103.1	141.8	206.2	3.82
13.1	31.6	990	208.9	2.6	0.0	206.3	176.6	103.2	142.2	206.3	3.81
13.3	31.8	994	209.2	2.7	0.0	206.5	176.5	103.3	142.0	206.5	3.82
13.4	31.3	995	209.3	2.7	0.0	206.6	177.0	103.3	142.6	206.6	3.80
13.5	31.2	997	209.5	2.7	0.0	206.8	177.2	103.4	142.7	206.8	3.80
13.6	30.7	999	209.6	2.7	0.0	206.9	177.8	103.5	143.3	206.9	3.78
13.7	30.5	1001	209.7	2.7	0.0	207.0	178.0	103.5	143.5	207.0	3.78
13.9	30.4	1004	210.0	2.8	0.0	207.2	178.2	103.6	143.7	207.2	3.78
14.0	30.3	1010	210.8	2.8	0.0	208.0	178.7	104.0	144.0	208.0	3.78
14.1	29.9	1011	210.9	2.8	0.0	208.1	179.2	104.1	144.5	208.1	3.77
14.2	29.7	1015	211.4	2.8	0.0	208.6	179.6	104.3	144.8	208.6	3.77
14.4	29.6	1018	211.6	2.8	0.0	208.8	179.8	104.4	145.0	208.8	3.77
14.5	29.4	1022	212.1	2.8	0.0	209.3	180.3	104.7	145.4	209.3	3.77
14.6	29.2	1025	212.6	2.9	0.0	209.7	180.7	104.9	145.7	209.7	3.77
14.7	29.1	1029	213.1	2.9	0.0	210.2	181.0	105.1	146.0	210.2	3.77
14.9	28.7	1031	212.9	2.9	0.0	210.0	181.3	105.0	146.3	210.0	3.75
15.0	28.6	1032	213.1	2.9	0.0	210.2	181.5	105.1	146.5	210.2	3.75
15.1	28.5	1036	213.5	2.9	0.0	210.6	181.8	105.3	146.7	210.6	3.75
15.2	28.2	1038	213.6	2.9	0.0	210.7	182.2	105.4	147.0	210.7	3.74
15.3	28.2	1039	213.7	3.0	0.0	210.7	182.2	105.4	147.0	210.7	3.74
15.5	27.9	1041	213.6	3.0	0.0	210.6	182.4	105.3	147.3	210.6	3.73
15.6	27.6	1041	213.3	3.0	0.0	210.3	182.6	105.2	147.5	210.3	3.72
15.7	27.7	1043	213.5	3.0	0.0	210.5	182.6	105.3	147.5	210.5	3.72
15.8	27.4	1045	213.6	3.0	0.0	210.6	182.9	105.3	147.8	210.6	3.71
16.0	27.2	1048	213.8	3.1	0.0	210.7	183.2	105.4	148.0	210.7	3.71
16.1	26.9	1050	213.9	3.1	0.0	210.8	183.5	105.4	148.4	210.8	3.70

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Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B1

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D022A

Customer Sample No : 13

Depth : 10.50 - 11.50

Laboratory Information

Lab. Reference No.	:	K02J17003B1	Initial Volume	:	600.7	cm^3
Specimen Depth	:	11.10 - 11.30	Initial Area	:	4118.2	mm^2
Date test started	:	7-Oct-08 Time : 15:58	Initial Height	:	145.9	mm
Date test completed	:	8-Oct-08 Time : 08:46	Cell Pressure	:	350	kPa
Rate of displacement	:	0.0307 mm/min	Back Pressure	:	245	kPa
Side drains	:	No	Effective Cell Pressure	:	105	kPa
			Proving ring ID	:	PR20	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
16.2	27.0	1052	214.0	3.1	0.0	210.9	183.5	105.5	148.3	210.9	3.70
16.3	26.8	1052	213.7	3.1	0.0	210.6	183.5	105.3	148.4	210.6	3.69
16.4	26.6	1053	213.8	3.1	0.0	210.7	183.8	105.4	148.6	210.7	3.69
16.6	26.3	1055	213.7	3.1	0.0	210.6	184.0	105.3	148.9	210.6	3.68
16.7	26.1	1057	213.8	3.1	0.0	210.7	184.3	105.4	149.1	210.7	3.67
16.8	26.3	1059	213.9	3.2	0.0	210.7	184.1	105.4	148.9	210.7	3.68
16.9	26.0	1059	213.6	3.2	0.0	210.4	184.2	105.2	149.1	210.4	3.66
17.1	25.8	1062	213.8	3.2	0.0	210.6	184.5	105.3	149.4	210.6	3.66
17.2	25.6	1064	213.9	3.2	0.0	210.7	184.8	105.4	149.6	210.7	3.65
17.3	25.4	1066	214.0	3.2	0.0	210.8	185.0	105.4	149.9	210.8	3.65
17.4	25.5	1069	214.4	3.2	0.0	211.2	185.1	105.6	149.9	211.2	3.66
17.5	25.3	1071	214.5	3.3	0.0	211.2	185.3	105.6	150.1	211.2	3.65
17.7	25.2	1073	214.3	3.3	0.0	211.0	185.3	105.5	150.1	211.0	3.64
17.8	25.3	1076	214.8	3.3	0.0	211.5	185.5	105.8	150.2	211.5	3.65
17.9	25.0	1080	215.2	3.3	0.0	211.9	186.0	106.0	150.6	211.9	3.65
18.0	24.8	1083	215.7	3.3	0.0	212.4	186.4	106.2	151.0	212.4	3.65
18.2	24.9	1085	215.5	3.4	0.0	212.1	186.2	106.1	150.8	212.1	3.65
18.3	24.6	1088	215.9	3.4	0.0	212.5	186.7	106.3	151.2	212.5	3.64
18.4	24.4	1090	216.0	3.4	0.0	212.6	186.9	106.3	151.5	212.6	3.64
18.5	24.5	1092	216.1	3.4	0.0	212.7	186.9	106.4	151.4	212.7	3.64
18.6	24.2	1094	216.2	3.4	0.0	212.8	187.2	106.4	151.7	212.8	3.63
18.8	24.0	1095	216.0	3.4	0.0	212.6	187.3	106.3	151.9	212.6	3.62
18.9	24.1	1097	216.1	3.4	0.0	212.7	187.3	106.4	151.8	212.7	3.63
19.0	23.8	1099	216.1	3.5	0.0	212.6	187.5	106.3	152.1	212.6	3.62
19.1	23.9	1101	216.2	3.5	0.0	212.7	187.5	106.4	152.0	212.7	3.62
19.3	23.7	1102	216.0	3.5	0.0	212.5	187.6	106.3	152.1	212.5	3.61
19.4	23.5	1104	216.1	3.5	0.0	212.6	187.8	106.3	152.4	212.6	3.61
19.5	23.6	1106	216.2	3.5	0.0	212.7	187.8	106.4	152.3	212.7	3.61
19.6	23.4	1108	216.2	3.5	0.0	212.7	188.0	106.4	152.5	212.7	3.61
19.7	23.3	1109	216.3	3.6	0.0	212.7	188.1	106.4	152.6	212.7	3.60
19.9	23.2	1111	216.1	3.6	0.0	212.5	188.1	106.3	152.6	212.5	3.60
20.0	23.1	1113	216.2	3.6	0.0	212.6	188.2	106.3	152.8	212.6	3.60
20.1	23.0	1115	216.3	3.6	0.0	212.7	188.4	106.4	152.9	212.7	3.59
20.2	22.9	1116	216.3	3.6	0.0	212.7	188.5	106.4	153.0	212.7	3.59

Failure criteria : Maximum deviator stress

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Laboratory Report on Triaxial Compression Test

Photographic

Job Reference No. : 65127070-K02J17003B1

Information supplied customer

Customer	: Mass Transit Railway Corporation	Contract No.	:	1024
Project	: Ground Investigation for South Island Line	Borehole No.	:	D022A
		Depth (m)	:	10.50 - 11.50
		Customer Sample No.	:	13

Laboratory information

Lab. Reference No. : K02J17003B1

Specimen Depth (m) : 11.10 - 11.30

BEFORE SPLIT

AFTER SPLIT

Form No.: S 041 010 Rev 4 (06/03/08)

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HOKLAS 071

Laboratory Report on Triaxial Compression Test

Summary of specimen data (Multi-stage) - Consolidated Undrained with Pore Water Pressure Measurement

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

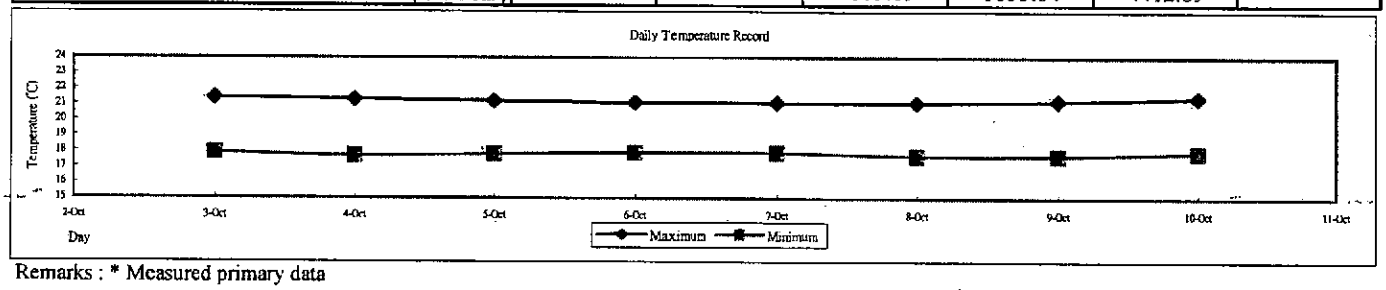
Project : Ground Investigation for South Island Line

Works Order No.	: Nil	Borehole No.	: D022A
Customer Sample No.	: 13	Depth (m)	: 10.50 - 11.50
Sample origin	: CDG	Sample type	: Mazier
Contract No.	: 1024		

Laboratory information

Lab. Reference No.	: K02J17003B2	Date test started	: 3-Oct-08
Specimen Depth (m)	: 11.30 - 11.50	Date test completed	: 10-Oct-08
		Date sample received	: 2-Oct-08
Method of preparation	: Undisturbed (direct extrusion from tube sample)	Selected specimen by	: M.T.Kwok (FT Lab Ltd)
% > 1/5 of specimen diameter	: -	Room temperature range °C	: 17.7-21.4
Method of moisture content	: GEOSPEC 3 : 2001: Test 5.1	Particle density (assumed)	: 2.65 Mg/m^3
Test method used	: GEOSPEC 3 : 2001: Test 15.2		
Soil description (Visual)	: Moist, yellowish brown, silty/clayey gravelly SAND.		

Stage		Saturation		Compression			
				1	2	3	
Effective cell pressure	(kPa)	5		50	105	160	
		Before	After	Before	Before	Before	After
Diameter of specimen	(mm)	73.4 *	-	-	-	-	-
Height of specimen	(mm)	147.8 *	-	-	-	-	-
Volume of specimen	(ml)	625.4	625.4	610.8	599.3	591.8	591.8
Wet mass of specimen	(g)	1206.0 *	1218.6	1204.0	1192.5	1185.0	1181.6*
Dry mass of specimen	(g)	960.6 *	-	-	-	-	960.6 *
Moisture content	(%)	25.6	26.9	25.4	24.2	23.4	23.0
Bulk density	(Mg/m^3)	1.928	1.949	1.971	1.990	2.002	1.997
Dry density	(Mg/m^3)	1.536	1.536	1.573	1.603	1.623	1.623
Void ratio		0.725	0.725	0.685	0.653	0.633	0.633
Degree of saturation	(%)	93.4	98.3	98.3	98.2	98.0	96.3
Coefficient of volume compressibility	(m^2/MN)	-	-	0.52	0.29	0.16	-
Coefficient of consolidation by t_{100}	(m^2/Year)	-	-	1410.71	1306.07	2219.34	-
Coefficient of consolidation by t_{50}	(m^2/Year)	-	-	1805.65	1655.64	4412.89	-



Remarks : * Measured primary data

HOKLAS Approved Signatory: YUE Wai Chun / VONG Hong Ian

Date: 23 DEC 2008

Address: Lot No.DD77 Section 1552 S.A. ss1RP, Ng Chow South Road, Ping Che, N.T. Tel: 27584861 Fax: 27588962

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Laboratory Report on Triaxial Compression Test

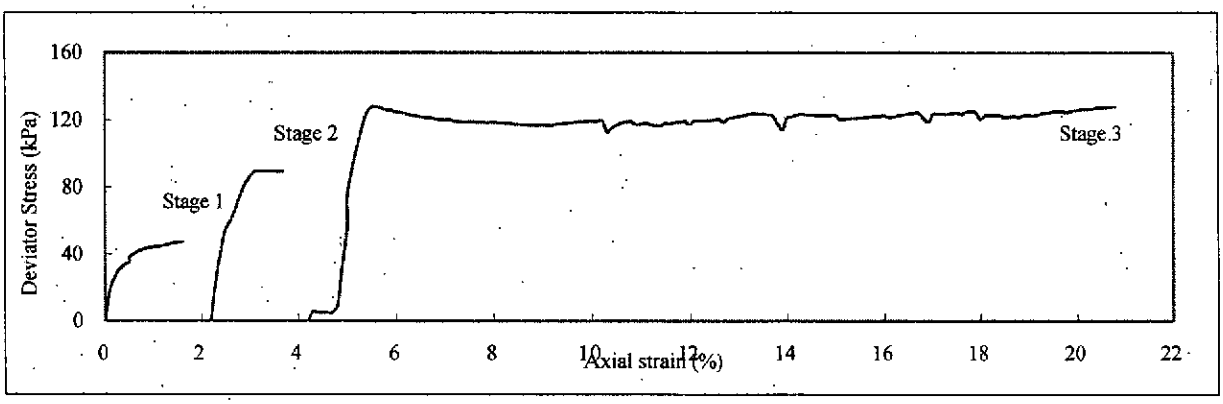
Multi Stage - Consolidated Undrained with Pore Water Pressure Measurement

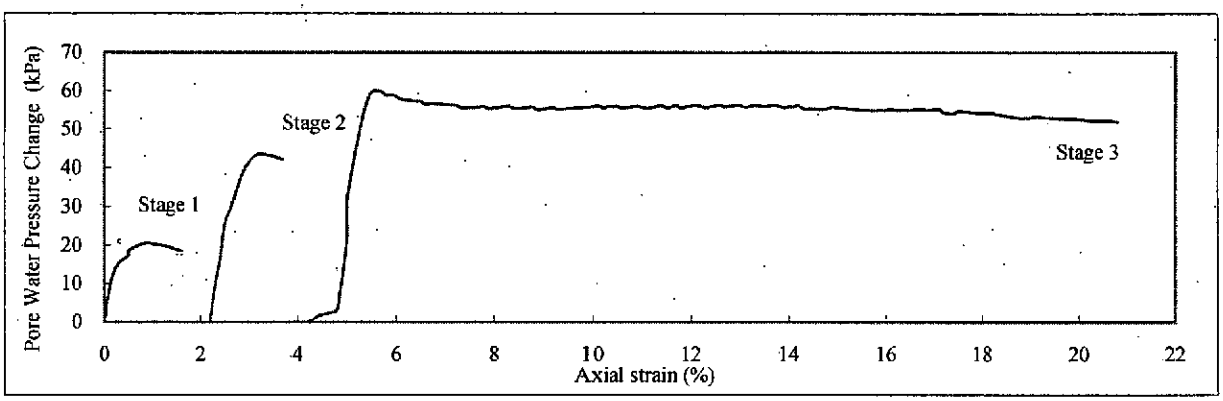
Deviator stress, Pore water pressure change & Stress ratio VS Axial Strain
Job Reference No. : 65127070-K02J17003B2

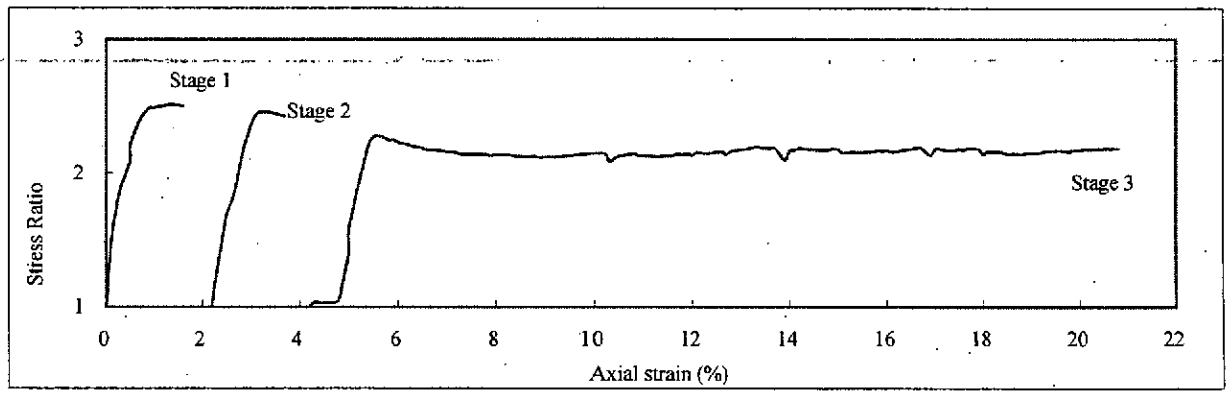
Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No.	:	13	Depth (m)	:	10.50 - 11.50

— Stage 1 — Stage 2 — Stage 3







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Laboratory Report on Triaxial Compression Test

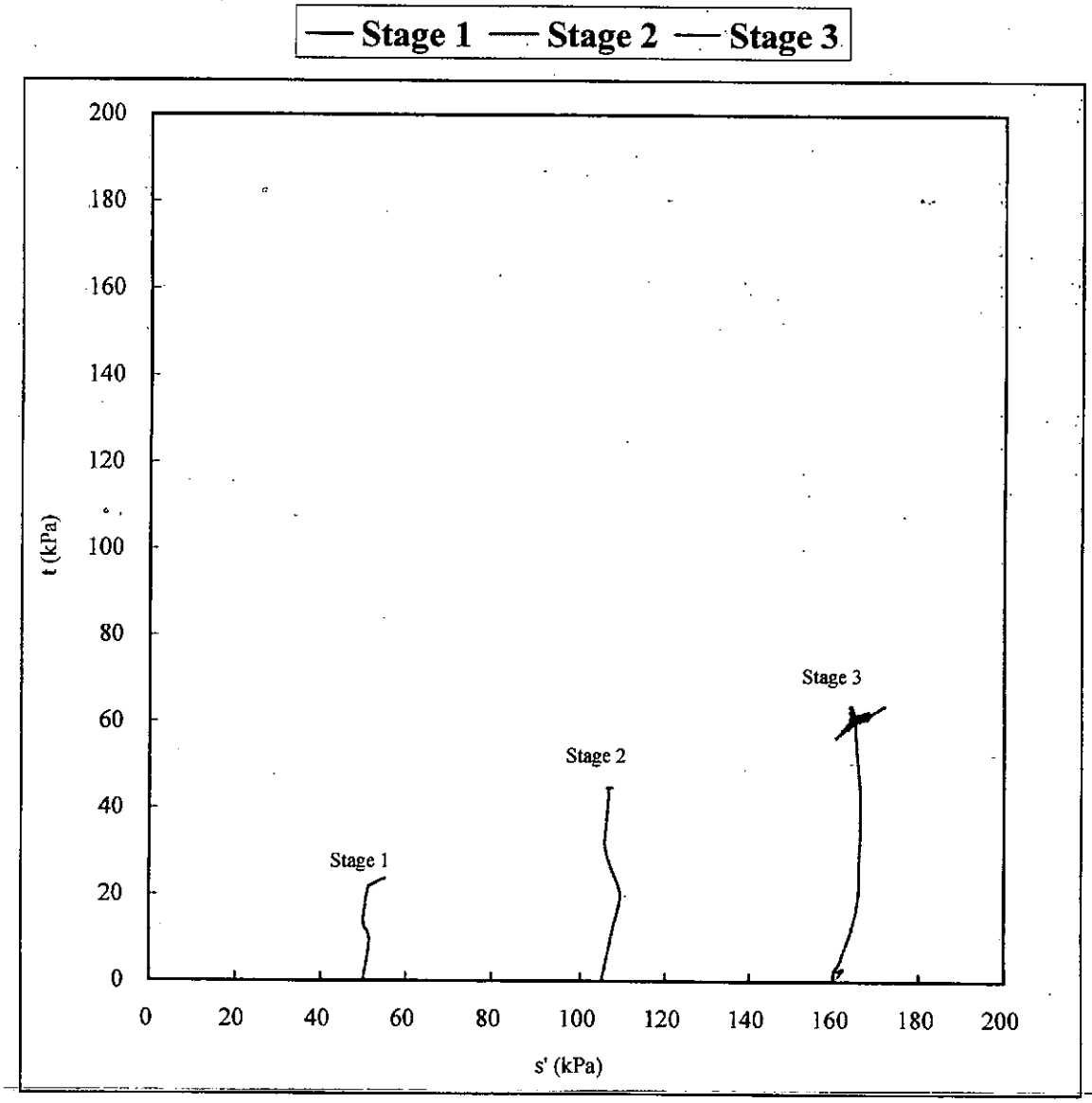
Multi Stage - Consolidated Undrained with Pore Water Pressure Measurement

t VS s' Stress path plot
Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No.	:	13	Depth (m)	:	10.50 - 11.50

Stage		1	2	3
Specimen at failure (kPa)	s'	54.1	106.3	163.9
	t	23.3	44.8	63.9



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Laboratory Report on Triaxial Compression Test

Multi Stage - Consolidated Undrained with Pore Water Pressure Measurement

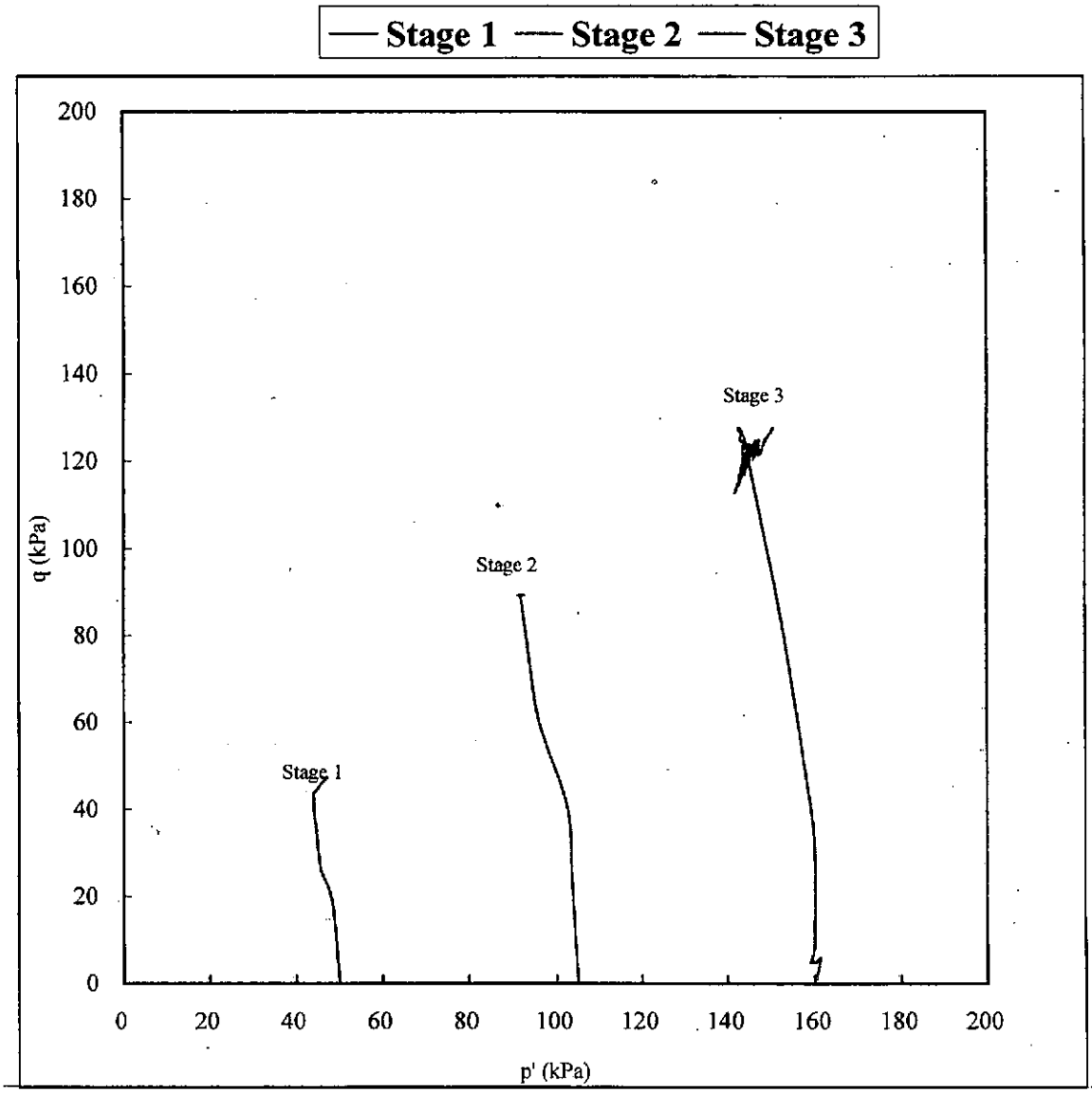
q VS p' Stress path plot

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line	Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No.	:	13	Depth (m)	:	10.50 - 11.50

Stage		1	2	3
Specimen at failure (kPa)	p'	46.3	91.3	142.6
	q	46.5	89.5	127.7



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Laboratory Report on Triaxial Compression Test

Saturation

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works order No. : Nil

Borehole No. : D022A

Customer sample No. : 13

Depth (m) : 10.50 - 11.50

Laboratory information

Lab. Reference No. : K02J17003B2

Date test started : 5-Oct-08 09:40

Specimen Depth (m) : 11.30 - 11.50

Date test completed : 7-Oct-08 10:00

Test result :

Saturated : Cell Pressure = 225.5 kPa Pore water Pressure = 220.4 kPa B-Value = 0.97

Cell Pressure kPa	Back Pressure kPa	Pore water Pressure kPa	Volume change ml	B-Value
0.6	0.7	0.7		
25.9	0.7	21.6		
25.9	20.4	21.4		
25.9	20.3	21.2	2.91	
50.4	20.5	40.8		0.80
50.2	45.8	41.8		
50.2	45.2	45.2	2.13	
75.9	45.2	66.8		0.84
75.1	70.8	67.5		
75.1	70.3	70.1	1.78	
100.6	70.3	92.0		0.86
100.6	95.2	93.4		
100.6	95.6	95.3	1.96	
125.8	95.7	117.5		0.88
125.0	120.1	117.8		
125.0	120.5	120.4	1.28	
150.5	120.4	143.4		0.90
150.9	145.3	144.2		
150.9	145.8	145.6	0.64	
175.4	145.8	168.4		0.93
175.4	170.6	168.9		
175.4	170.5	170.2	0.80	
225.7	170.5	219.0		0.97
225.7	220.3	219.6		
225.5	220.6	220.4	1.14	
		Total :	12.64	

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Laboratory Report on Triaxial Compression Test

Stage 1 : Consolidation

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

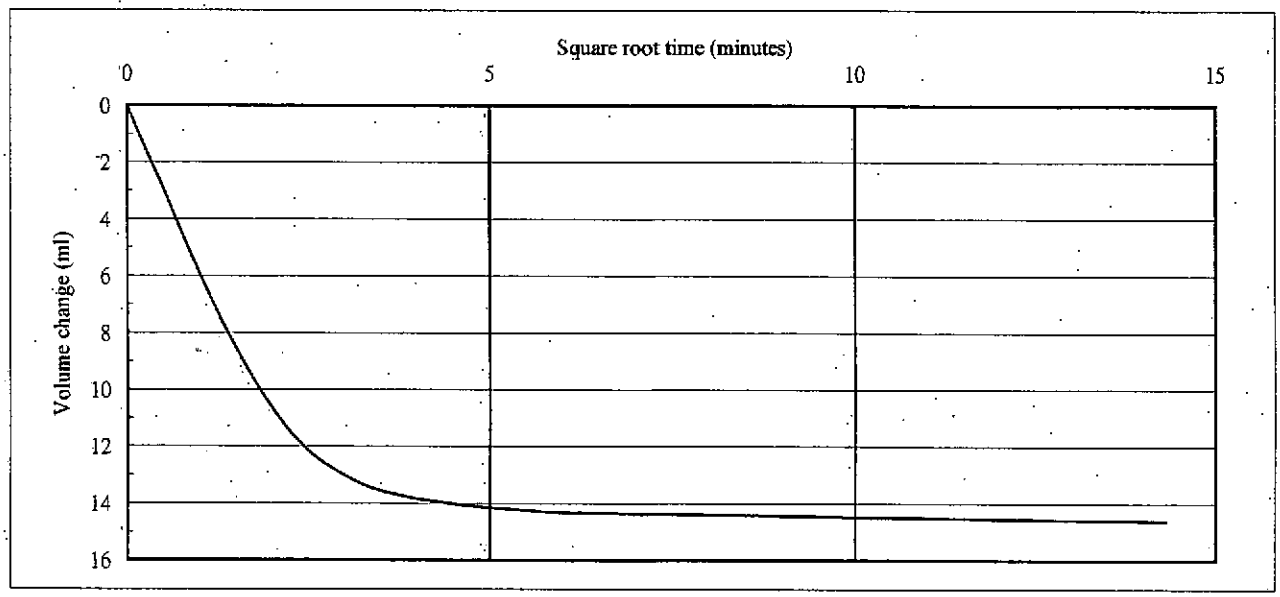
Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works order No.	:	Nil	Borehole No.	:	D022A
Customer sample No.	:	13	Depth (m)	:	10.50 - 11.50

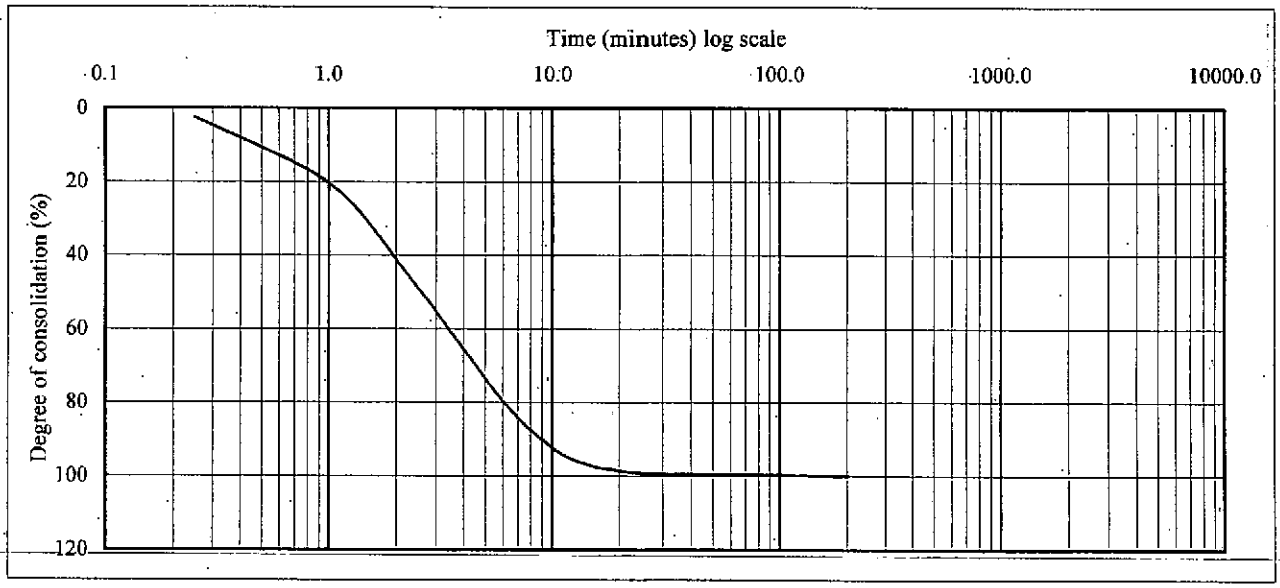
Laboratory information

Lab. Reference No.	:	K02J17003B2	Date test started	:	7-Oct-08	10:15
Specimen Depth (m)	:	11.30 - 11.50	Date test completed	:	7-Oct-08	13:40

Test result

Effective cell pressure (kPa)	=	50.0	Cell pressure (kPa)	=	270.0	Back pressure (kPa) =	220.0
Initial pore water pressure (kPa) =		264.6	Final pore water pressure (kPa) =		220.0		
Total volume change (ml)	=	14.62	t_{100} (min)	=	6.3	t_{50} (min) =	2.4





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Laboratory Report on Triaxial Compression Test

Stage 2 : Consolidation

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

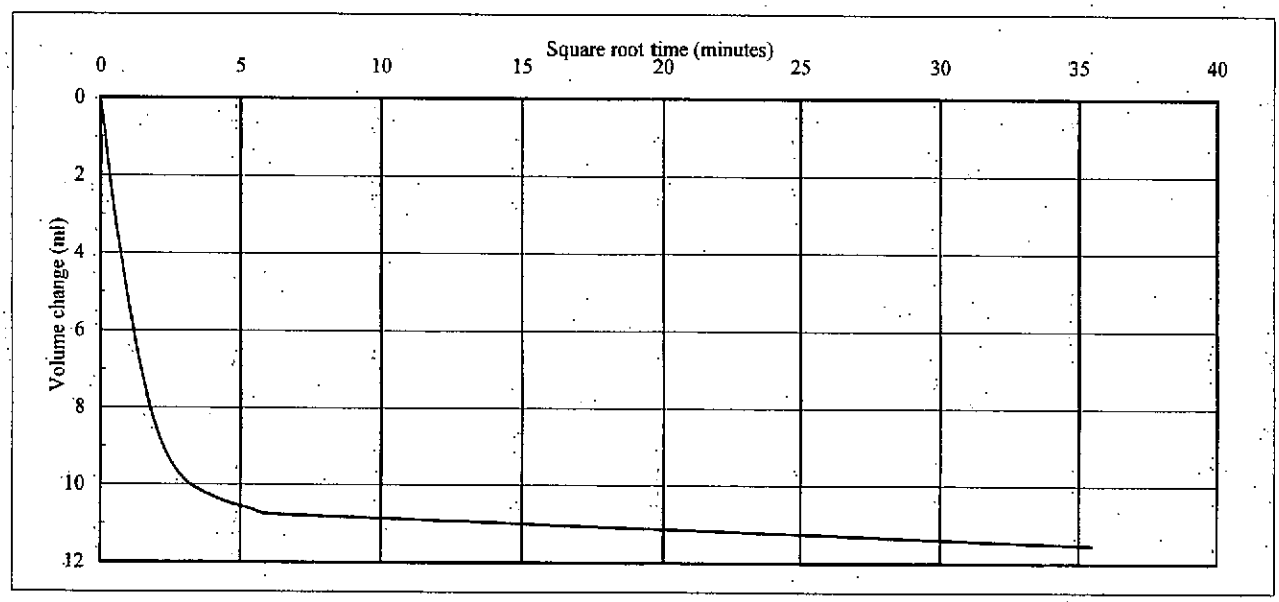
			Contract No.	:	1024
Works order No.	:	Nil	Borehole No.	:	D022A
Customer sample No.	:	13	Depth (m)	:	10.50 - 11.50

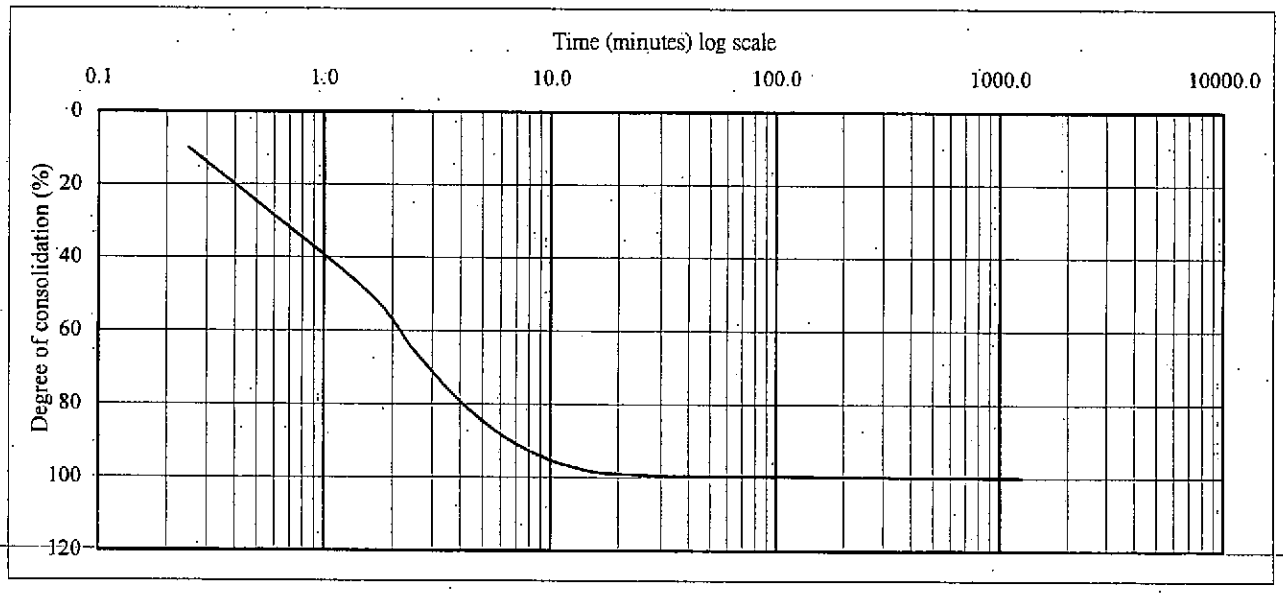
Laboratory information

Lab. Reference No.	:	K02J17003B2	Date test started	:	7-Oct-08	16:00
Specimen Depth (m)	:	11.30 - 11.50	Date test completed	:	8-Oct-08	13:00

Test result

Effective cell pressure (kPa)	=	105.0	Cell pressure (kPa)	=	325.0	Back pressure (kPa)	=	220.0
Initial pore water pressure (kPa)	=	285.1	Final pore water pressure (kPa)	=	220.0			
Total volume change (ml)	=	11.54	t_{100} (min)	=	6.8	t_{50} (min)	=	2.5





Form No.: S 041 014 Rev 4 (06/03/08)

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Laboratory Report on Triaxial Compression Test

Stage 3 : Consolidation

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

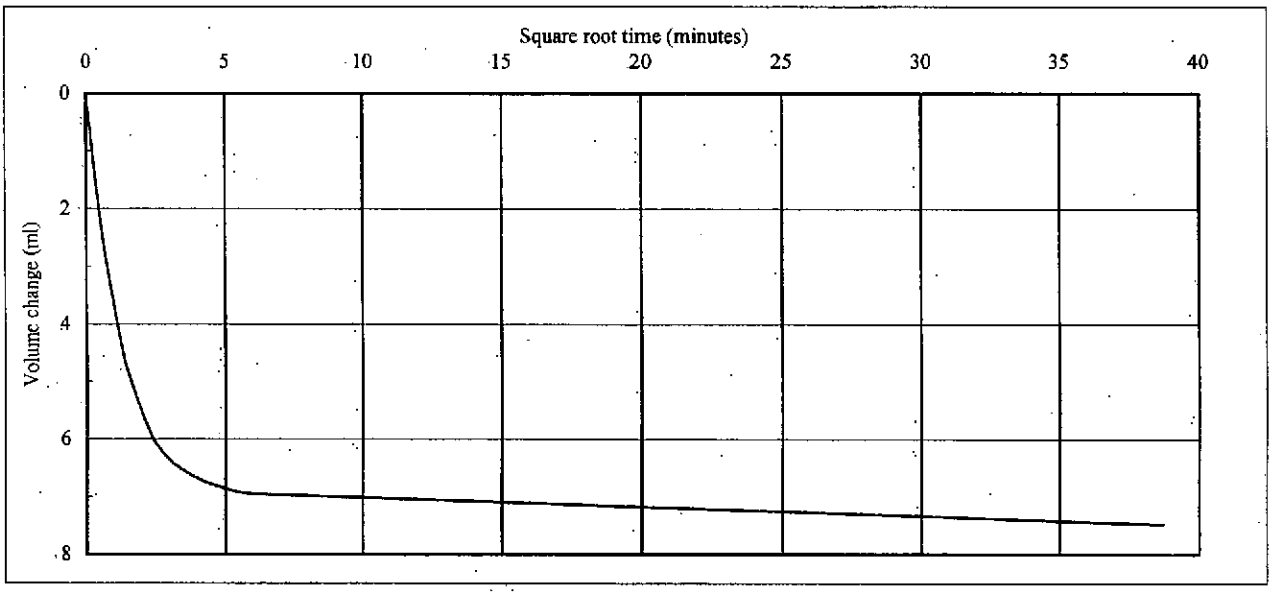
Customer	:	Mass Transit Railway Corporation			
Project	:	Ground Investigation for South Island Line			
			Contract No.	:	1024
Works order No.	:	Nil	Borehole No.	:	D022A
Customer sample No.	:	13	Depth (m)	:	10.50 - 11.50

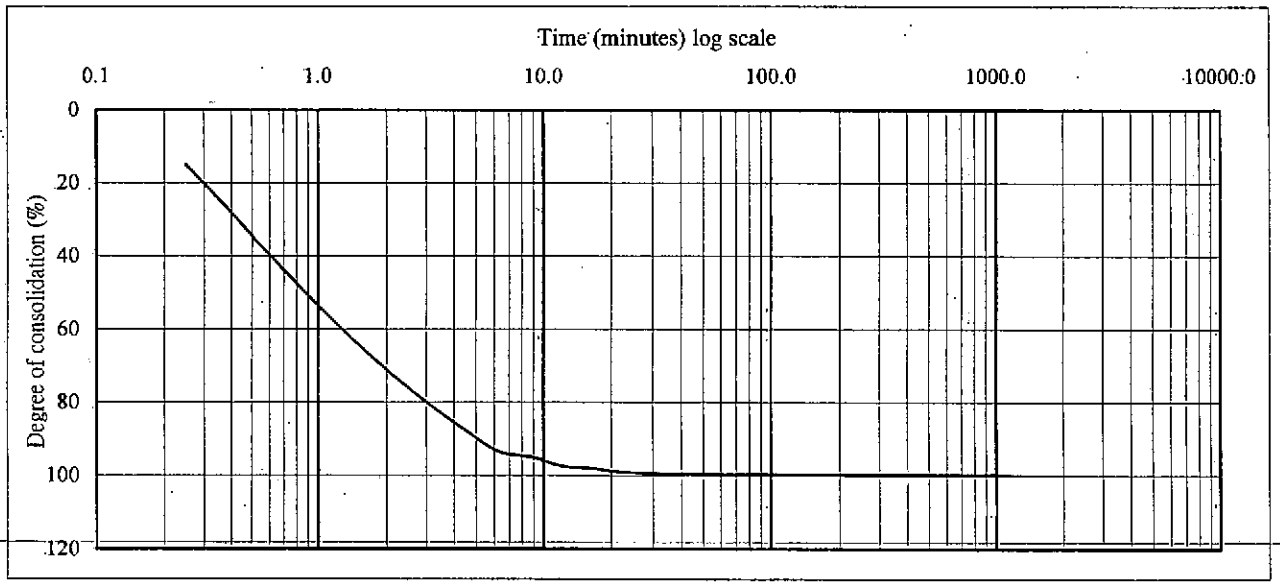
Laboratory information

Lab. Reference No.	:	K02J17003B2	Date test started	:	8-Oct-08	16:00
Specimen Depth (m)	:	11.30 - 11.50	Date test completed	:	9-Oct-08	16:50

Test result

Effective cell pressure (kPa)	=	160.0	Cell pressure (kPa)	=	380.0	Back pressure (kPa) =	220.0
Initial pore water pressure (kPa) =		296.5	Final pore water pressure (kPa) =		220.0		
Total volume change (ml)	=	7.48	t_{100} (min)	=	4.0	t_{50} (min) =	0.9





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Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No	:	13	Depth	:	10.50 - 11.50

Laboratory Information

Lab. Reference No.	:	K02J17003B2	Initial Volume	:	610.8	cm^3
Specimen Depth	:	11.30 - 11.50	Initial Area	:	4165.5	mm^2
Date test started	:	7-Oct-08 Time : 13:50	Initial Height	:	146.6	mm
Date test completed	:	7-Oct-08 Time : 14:36	Cell Pressure	:	270	kPa
Rate of displacement	:	0.05 mm/min	Back Pressure	:	220	kPa
Side drains	:	No	Effective Cell Pressure	:	50	kPa
			Proving ring ID	:	PR09	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
0.0	0.0	0	0.0	0.0	0.0	0.0	50.0	0.0	50.0	0.0	1.00
0.1	8.0	79	18.9	0.0	0.0	18.9	51.5	9.5	48.3	18.9	1.45
0.2	12.7	108	25.8	0.1	0.0	25.7	50.2	12.9	45.9	25.7	1.69
0.3	15.2	129	30.8	0.1	0.0	30.7	50.2	15.4	45.0	30.7	1.88
0.5	17.3	150	35.8	0.1	0.0	35.7	50.6	17.9	44.6	35.7	2.09
0.5	18.4	160	38.1	0.1	0.0	38.0	50.6	19.0	44.3	38.0	2.20
0.7	19.9	177	42.1	0.2	0.0	41.9	51.1	21.0	44.1	41.9	2.39
0.9	20.6	185	43.9	0.2	0.0	43.7	51.3	21.9	44.0	43.7	2.49
1.0	20.4	186	44.3	0.3	0.0	44.0	51.6	22.0	44.3	44.0	2.49
1.3	19.7	194	46.0	0.3	0.0	45.7	53.2	22.9	45.5	45.7	2.51
1.4	19.2	198	46.9	0.4	0.0	46.5	54.1	23.3	46.3	46.5	2.51
1.6	18.5	202	47.7	0.4	0.0	47.3	55.2	23.7	47.3	47.3	2.50

Failure criteria : Maximum stress ratio

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No	:	13	Depth	:	10.50 - 11.50

Laboratory Information

Lab. Reference No.	:	K02J17003B2	Initial Volume	:	599.3	cm^3
Specimen Depth	:	11.30 - 11.50	Initial Area	:	4179	mm^2
Date test started	:	8-Oct-08 Time : 13:35	Initial Height	:	143.4	mm
Date test completed	:	8-Oct-08 Time : 14:20	Cell Pressure	:	325	kPa
Rate of displacement	:	0.05 mm/min	Back Pressure	:	220	kPa
Side drains	:	No	Effective Cell Pressure	:	105	kPa
			Proving ring ID	:	PR09	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
2.2	0.0	0	0.0	0.6	0.0	0.0	105.0	0.0	105.0	0.0	1.00
2.3	9.1	102	23.8	0.6	0.0	23.2	107.5	11.6	103.6	23.2	1.24
2.4	15.6	173	40.4	0.6	0.0	39.8	109.3	19.9	102.7	39.8	1.45
2.5	24.9	233	54.3	0.6	0.0	53.7	107.0	26.9	98.0	53.7	1.67
2.6	28.6	258	60.0	0.7	0.0	59.3	106.1	29.7	96.2	59.3	1.78
2.7	32.0	284	66.2	0.7	0.0	65.5	105.8	32.8	94.8	65.5	1.90
2.9	39.1	352	81.7	0.7	0.0	81.0	106.4	40.5	92.9	81.0	2.23
3.1	42.8	386	89.6	0.8	0.0	88.8	106.6	44.4	91.8	88.8	2.43
3.3	43.5	390	90.3	0.8	0.0	89.5	106.3	44.8	91.3	89.5	2.46
3.7	42.2	392	90.3	0.9	0.0	89.4	107.5	44.7	92.6	89.4	2.42

Failure criteria : Maximum stress ratio

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024
Works Order No. : Nil
Borehole No. : D022A
Customer Sample No : 13
Depth : 10.50 - 11.50

Laboratory Information

Lab. Reference No. : K02J17003B2
Specimen Depth : 11.30 - 11.50
Date test started : 9-Oct-08 Time : 17:07
Date test completed : 10-Oct-08 Time : 08:49
Rate of displacement : 0.0258 mm/min
Side drains : No

Initial Volume : 591.8 cm^3
Initial Area : 4207.9 mm^2
Initial Height : 140.6 mm
Cell Pressure : 380 kPa
Back Pressure : 220 kPa
Effective Cell Pressure : 160 kPa
Proving ring ID : PR20

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
4.2	0.0	0	0.0	1.0	0.0	0.0	160.0	0.0	160.0	0.0	1.00
4.3	0.6	30	6.8	1.1	0.0	5.7	162.3	2.9	161.3	5.7	1.04
4.4	1.4	26	6.0	1.1	0.0	4.9	161.1	2.5	160.2	4.9	1.03
4.5	1.8	26	6.0	1.1	0.0	4.9	160.7	2.5	159.8	4.9	1.03
4.6	2.2	26	6.0	1.1	0.0	4.9	160.3	2.5	159.4	4.9	1.03
4.7	2.5	26	6.0	1.1	0.0	4.9	160.0	2.5	159.1	4.9	1.03
4.8	3.2	47	10.7	1.2	0.0	9.5	161.6	4.8	160.0	9.5	1.06
4.9	11.3	153	34.5	1.2	0.0	33.3	165.4	16.7	159.8	33.3	1.22
5.0	21.5	249	56.2	1.2	0.0	55.0	166.0	27.5	156.8	55.0	1.40
5.0	30.7	333	75.2	1.2	0.0	74.0	166.3	37.0	154.0	74.0	1.57
5.1	38.9	405	91.3	1.2	0.0	90.1	166.2	45.1	151.1	90.1	1.74
5.2	46.1	464	104.6	1.2	0.0	103.4	165.6	51.7	148.4	103.4	1.91
5.3	52.2	515	116.0	1.3	0.0	114.7	165.2	57.4	146.0	114.7	2.06
5.4	56.9	556	124.9	1.3	0.0	123.6	164.9	61.8	144.3	123.6	2.20
5.5	59.5	573	128.7	1.3	0.0	127.4	164.2	63.7	143.0	127.4	2.27
5.6	60.0	575	129.0	1.3	0.0	127.7	163.9	63.9	142.6	127.7	2.28
5.7	59.8	573	128.4	1.3	0.0	127.1	163.8	63.6	142.6	127.1	2.27
5.8	58.8	570	127.5	1.4	0.0	126.1	164.3	63.1	143.2	126.1	2.25
5.9	58.9	570	127.4	1.4	0.0	126.0	164.1	63.0	143.1	126.0	2.25
6.0	58.6	564	126.1	1.4	0.0	124.7	163.8	62.4	143.0	124.7	2.23
6.1	57.8	564	125.9	1.4	0.0	124.5	164.5	62.3	143.7	124.5	2.22
6.2	57.6	563	125.4	1.4	0.0	124.0	164.4	62.0	143.7	124.0	2.21
6.3	57.4	559	124.5	1.5	0.0	123.0	164.1	61.5	143.6	123.0	2.20
6.4	57.2	557	124.0	1.5	0.0	122.5	164.1	61.3	143.6	122.5	2.19
6.5	57.2	556	123.4	1.5	0.0	121.9	163.8	61.0	143.4	121.9	2.19
6.6	56.3	554	122.9	1.5	0.0	121.4	164.4	60.7	144.2	121.4	2.17
6.7	56.7	554	122.8	1.5	0.0	121.3	164.0	60.7	143.7	121.3	2.17
6.8	56.6	552	122.3	1.6	0.0	120.7	163.8	60.4	143.6	120.7	2.17
7.0	56.4	550	121.6	1.6	0.0	120.0	163.6	60.0	143.6	120.0	2.16
7.1	56.3	552	121.9	1.6	0.0	120.3	163.9	60.2	143.8	120.3	2.16
7.2	56.3	549	121.0	1.6	0.0	119.4	163.4	59.7	143.5	119.4	2.15
7.3	55.7	547	120.5	1.6	0.0	118.9	163.8	59.5	143.9	118.9	2.14
7.4	55.4	547	120.3	1.7	0.0	118.6	163.9	59.3	144.1	118.6	2.13
7.5	55.6	549	120.6	1.7	0.0	118.9	163.9	59.5	144.0	118.9	2.14
7.6	55.6	549	120.5	1.7	0.0	118.8	163.8	59.4	144.0	118.8	2.14
7.7	55.7	549	120.3	1.7	0.0	118.6	163.6	59.3	143.8	118.6	2.14
7.8	55.9	549	120.2	1.7	0.0	118.5	163.4	59.3	143.6	118.5	2.14
7.9	55.2	549	120.1	1.8	0.0	118.3	164.0	59.2	144.2	118.3	2.13
8.0	55.5	550	120.3	1.8	0.0	118.5	163.8	59.3	144.0	118.5	2.13
8.1	55.6	550	120.2	1.8	0.0	118.4	163.6	59.2	143.9	118.4	2.13
8.3	56.0	550	119.9	1.8	0.0	118.1	163.1	59.1	143.4	118.1	2.14
8.4	55.4	549	119.4	1.8	0.0	117.6	163.4	58.8	143.8	117.6	2.12
8.5	55.4	549	119.3	1.9	0.0	117.4	163.3	58.7	143.7	117.4	2.12
8.6	55.5	549	119.1	1.9	0.0	117.2	163.1	58.6	143.6	117.2	2.12
8.7	55.6	549	119.0	1.9	0.0	117.1	163.0	58.6	143.4	117.1	2.12

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D022A

Customer Sample No : 13

Depth : 10.50 - 11.50

Laboratory Information

Lab. Reference No. : K02J17003B2

Specimen Depth : 11.30 - 11.50

Date test started : 9-Oct-08 Time : 17:07

Date test completed : 10-Oct-08 Time : 08:49

Rate of displacement : 0.0258 mm/min

Side drains : No

Initial Volume : 591.8 cm^3

Initial Area : 4207.9 mm^2

Initial Height : 140.6 mm

Cell Pressure : 380 kPa

Back Pressure : 220 kPa

Effective Cell Pressure : 160 kPa

Proving ring ID : PR20

Axial Strain	Pore Pressure	Axial Force	Axial Stress	Membrane Correction	Side Drains Correction	Corrected Deviator Stress	Stress Path Parameters (s')	Stress Path Parameters (t)	Stress Path Parameters (p')	Stress Path Parameters (q)	Effective Principal Stress Ratio
%	kPa	N	kPa	kPa	kPa	kPa	kPa	kPa	kPa	kPa	
8.8	55.8	549	118.9	1.9	0.0	117.0	162.7	58.5	143.2	117.0	2.12
8.9	55.0	549	118.8	1.9	0.0	116.9	163.5	58.5	144.0	116.9	2.11
9.0	55.2	550	119.0	1.9	0.0	117.1	163.4	58.6	143.8	117.1	2.12
9.1	55.4	550	118.9	2.0	0.0	116.9	163.1	58.5	143.6	116.9	2.12
9.2	55.6	550	118.7	2.0	0.0	116.7	162.8	58.4	143.3	116.7	2.12
9.3	55.1	554	119.4	2.0	0.0	117.4	163.6	58.7	144.0	117.4	2.12
9.4	55.2	556	119.6	2.0	0.0	117.6	163.6	58.8	144.0	117.6	2.12
9.5	55.3	557	119.9	2.0	0.0	117.9	163.7	59.0	144.0	117.9	2.13
9.6	55.4	559	120.1	2.0	0.0	118.1	163.7	59.1	144.0	118.1	2.13
9.7	55.5	563	120.7	2.1	0.0	118.6	163.8	59.3	144.0	118.6	2.13
9.9	55.7	566	121.2	2.1	0.0	119.1	163.9	59.6	144.0	119.1	2.14
10.0	55.8	568	121.4	2.1	0.0	119.3	163.9	59.7	144.0	119.3	2.14
10.1	56.1	568	121.3	2.1	0.0	119.2	163.5	59.6	143.6	119.2	2.15
10.2	55.5	570	121.6	2.1	0.0	119.5	164.3	59.8	144.3	119.5	2.14
10.3	55.9	540	115.1	2.2	0.0	112.9	160.6	56.5	141.7	112.9	2.08
10.4	55.8	552	117.5	2.2	0.0	115.3	161.9	57.7	142.6	115.3	2.11
10.5	56.0	559	118.9	2.2	0.0	116.7	162.4	58.4	142.9	116.7	2.12
10.6	55.4	566	120.3	2.2	0.0	118.1	163.7	59.1	144.0	118.1	2.13
10.7	55.6	570	120.9	2.2	0.0	118.7	163.8	59.4	144.0	118.7	2.14
10.8	55.8	573	121.5	2.2	0.0	119.3	163.9	59.7	144.0	119.3	2.14
10.9	56.0	564	119.5	2.3	0.0	117.2	162.6	58.6	143.1	117.2	2.13
11.1	55.4	570	120.3	2.3	0.0	118.0	163.6	59.0	143.9	118.0	2.13
11.2	55.6	566	119.5	2.3	0.0	117.2	163.0	58.6	143.5	117.2	2.12
11.3	55.9	564	119.0	2.3	0.0	116.7	162.5	58.4	143.0	116.7	2.12
11.4	56.2	564	118.8	2.3	0.0	116.5	162.1	58.3	142.6	116.5	2.12
11.5	55.5	571	120.2	2.3	0.0	117.9	163.5	59.0	143.8	117.9	2.13
11.6	55.8	571	120.0	2.4	0.0	117.6	163.0	58.8	143.4	117.6	2.13
11.7	56.2	577	121.0	2.4	0.0	118.6	163.1	59.3	143.3	118.6	2.14
11.8	55.5	577	120.9	2.4	0.0	118.5	163.8	59.3	144.0	118.5	2.13
11.9	55.8	580	121.5	2.4	0.0	119.1	163.8	59.6	143.9	119.1	2.14
12.0	56.0	573	119.8	2.4	0.0	117.4	162.7	58.7	143.1	117.4	2.13
12.1	56.3	584	121.9	2.4	0.0	119.5	163.5	59.8	143.5	119.5	2.15
12.3	55.6	585	122.0	2.5	0.0	119.5	164.2	59.8	144.2	119.5	2.14
12.4	55.8	587	122.2	2.5	0.0	119.7	164.1	59.9	144.1	119.7	2.15
12.5	56.1	589	122.4	2.5	0.0	119.9	163.9	60.0	143.9	119.9	2.15
12.6	56.3	592	123.0	2.5	0.0	120.5	164.0	60.3	143.9	120.5	2.16
12.7	55.8	584	121.1	2.5	0.0	118.6	163.5	59.3	143.7	118.6	2.14
12.8	56.0	594	123.1	2.5	0.0	120.6	164.3	60.3	144.2	120.6	2.16
12.9	56.1	598	123.7	2.5	0.0	121.2	164.5	60.6	144.3	121.2	2.17
13.0	56.3	603	124.6	2.6	0.0	122.0	164.7	61.0	144.4	122.0	2.18
13.1	55.7	605	124.9	2.6	0.0	122.3	165.5	61.2	145.1	122.3	2.17
13.2	55.9	610	125.8	2.6	0.0	123.2	165.7	61.6	145.2	123.2	2.18
13.3	56.2	613	126.4	2.6	0.0	123.8	165.7	61.9	145.1	123.8	2.19
13.4	56.1	613	126.2	2.6	0.0	123.6	165.7	61.8	145.1	123.6	2.19
13.5	55.8	613	126.1	2.6	0.0	123.5	166.0	61.8	145.4	123.5	2.19

FT Laboratories Ltd.
科達測檢試驗所有限公司

Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

Contract No. : 1024

Works Order No. : Nil

Borehole No. : D022A

Customer Sample No : 13

Depth : 10.50 - 11.50

Laboratory Information

Lab. Reference No. : K02J17003B2

Specimen Depth : 11.30 - 11.50

Date test started : 9-Oct-08 Time : 17:07

Date test completed : 10-Oct-08 Time : 08:49

Rate of displacement : 0.0258 mm/min

Side drains : No

Initial Volume : 591.8 cm^3

Initial Area : 4207.9 mm^2

Initial Height : 140.6 mm

Cell Pressure : 380 kPa

Back Pressure : 220 kPa

Effective Cell Pressure : 160 kPa

Proving ring ID : PR20

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio
13.6	56.0	612	125.6	2.6	0.0	123.0	165.5	61.5	145.0	123.0	2.18
13.7	56.3	612	125.4	2.7	0.0	122.7	165.1	61.4	144.6	122.7	2.18
13.9	55.6	571	116.9	2.7	0.0	114.2	161.5	57.1	142.5	114.2	2.09
14.0	55.8	605	123.6	2.7	0.0	120.9	164.7	60.5	144.5	120.9	2.16
14.1	55.8	610	124.5	2.7	0.0	121.8	165.1	60.9	144.8	121.8	2.17
14.2	56.2	615	125.4	2.7	0.0	122.7	165.2	61.4	144.7	122.7	2.18
14.3	55.4	619	126.0	2.7	0.0	123.3	166.3	61.7	145.7	123.3	2.18
14.4	55.3	619	125.8	2.8	0.0	123.0	166.2	61.5	145.7	123.0	2.17
14.5	55.4	619	125.7	2.8	0.0	122.9	166.1	61.5	145.6	122.9	2.17
14.6	55.2	619	125.6	2.8	0.0	122.8	166.2	61.4	145.7	122.8	2.17
14.7	55.2	619	125.4	2.8	0.0	122.6	166.1	61.3	145.7	122.6	2.17
14.8	55.3	619	125.3	2.8	0.0	122.5	166.0	61.3	145.5	122.5	2.17
14.9	55.8	620	125.5	2.8	0.0	122.7	165.6	61.4	145.1	122.7	2.18
15.0	55.6	622	125.7	2.8	0.0	122.9	165.9	61.5	145.4	122.9	2.18
15.1	55.5	610	123.1	2.9	0.0	120.2	164.6	60.1	144.6	120.2	2.15
15.3	55.3	615	123.8	2.9	0.0	120.9	165.2	60.5	145.0	120.9	2.15
15.4	55.1	615	123.7	2.9	0.0	120.8	165.3	60.4	145.2	120.8	2.15
15.5	55.0	617	123.9	2.9	0.0	121.0	165.5	60.5	145.3	121.0	2.15
15.6	55.0	619	124.1	2.9	0.0	121.2	165.6	60.6	145.4	121.2	2.15
15.7	54.9	622	124.6	2.9	0.0	121.7	166.0	60.9	145.7	121.7	2.16
15.8	54.9	626	125.2	2.9	0.0	122.3	166.3	61.2	145.9	122.3	2.16
15.9	55.0	626	125.0	3.0	0.0	122.0	166.0	61.0	145.7	122.0	2.16
16.0	54.9	629	125.6	3.0	0.0	122.6	166.4	61.3	146.0	122.6	2.17
16.1	55.1	624	124.4	3.0	0.0	121.4	165.6	60.7	145.4	121.4	2.16
16.2	54.9	627	124.9	3.0	0.0	121.9	166.1	61.0	145.7	121.9	2.16
16.3	54.9	631	125.5	3.0	0.0	122.5	166.4	61.3	145.9	122.5	2.17
16.4	55.0	634	126.0	3.0	0.0	123.0	166.5	61.5	146.0	123.0	2.17
16.5	54.9	638	126.6	3.0	0.0	123.6	166.9	61.8	146.3	123.6	2.18
16.6	55.1	641	127.1	3.1	0.0	124.0	166.9	62.0	146.2	124.0	2.18
16.7	55.1	645	127.7	3.1	0.0	124.6	167.2	62.3	146.4	124.6	2.19
16.9	55.0	617	121.8	3.1	0.0	118.7	164.4	59.4	144.6	118.7	2.13
17.0	55.2	641	126.5	3.1	0.0	123.4	166.5	61.7	145.9	123.4	2.18
17.1	55.1	643	126.7	3.1	0.0	123.6	166.7	61.8	146.1	123.6	2.18
17.2	54.3	643	126.6	3.1	0.0	123.5	167.5	61.8	146.9	123.5	2.17
17.3	54.1	643	126.4	3.1	0.0	123.3	167.6	61.7	147.0	123.3	2.16
17.4	54.0	647	126.9	3.2	0.0	123.7	167.9	61.9	147.2	123.7	2.17
17.5	54.6	650	127.5	3.2	0.0	124.3	167.6	62.2	146.8	124.3	2.18
17.6	54.6	645	126.3	3.2	0.0	123.1	167.0	61.6	146.4	123.1	2.17
17.7	54.5	654	127.9	3.2	0.0	124.7	167.9	62.4	147.1	124.7	2.18
17.8	54.3	656	128.0	3.2	0.0	124.8	168.1	62.4	147.3	124.8	2.18
17.9	54.2	656	127.9	3.2	0.0	124.7	168.2	62.4	147.4	124.7	2.18
18.0	54.1	634	123.6	3.2	0.0	120.4	166.1	60.2	146.0	120.4	2.14
18.1	54.1	647	125.9	3.3	0.0	122.6	167.2	61.3	146.8	122.6	2.16
18.2	54.1	648	126.1	3.3	0.0	122.8	167.3	61.4	146.8	122.8	2.16
18.4	53.6	650	126.1	3.3	0.0	122.8	167.8	61.4	147.3	122.8	2.15

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Laboratory Report on Triaxial Compression Test
Compression

Job Reference No. : 65127070-K02J17003B2

Information supplied by customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

			Contract No.	:	1024
Works Order No.	:	Nil	Borehole No.	:	D022A
Customer Sample No	:	13	Depth	:	10.50 - 11.50

Laboratory Information

Lab. Reference No.	:	K02J17003B2	Initial Volume	:	591.8	cm^3
Specimen Depth	:	11.30 - 11.50	Initial Area	:	4207.9	mm^2
Date test started	:	9-Oct-08 Time : 17:07	Initial Height	:	140.6	mm
Date test completed	:	10-Oct-08 Time : 08:49	Cell Pressure	:	380	kPa
Rate of displacement	:	0.0258 mm/min	Back Pressure	:	220	kPa
Side drains.	:	No	Effective Cell Pressure	:	160	kPa
			Proving ring ID	:	PR20	

Axial Strain %	Pore Pressure kPa	Axial Force N	Axial Stress kPa	Membrane Correction kPa	Side Drains Correction kPa	Corrected Deviator Stress kPa	Stress Path Parameters (s') kPa	Stress Path Parameters (t) kPa	Stress Path Parameters (p') kPa	Stress Path Parameters (q) kPa	Effective Principal Stress Ratio -
18.5	53.4	643	124.6	3.3	0.0	121.3	167.3	60.7	147.0	121.3	2.14
18.6	53.2	647	125.1	3.3	0.0	121.8	167.7	60.9	147.4	121.8	2.14
18.7	53.0	650	125.6	3.3	0.0	122.3	168.2	61.2	147.8	122.3	2.14
18.8	52.9	647	124.8	3.3	0.0	121.5	167.9	60.8	147.6	121.5	2.13
18.9	52.9	654	126.0	3.4	0.0	122.6	168.4	61.3	148.0	122.6	2.14
19.0	52.9	656	126.2	3.4	0.0	122.8	168.5	61.4	148.0	122.8	2.15
19.1	53.3	654	125.7	3.4	0.0	122.3	167.9	61.2	147.5	122.3	2.15
19.2	53.1	657	126.2	3.4	0.0	122.8	168.3	61.4	147.8	122.8	2.15
19.3	53.0	664	127.4	3.4	0.0	124.0	169.0	62.0	148.3	124.0	2.16
19.4	53.0	666	127.6	3.4	0.0	124.2	169.1	62.1	148.4	124.2	2.16
19.5	52.9	670	128.1	3.4	0.0	124.7	169.5	62.4	148.7	124.7	2.16
19.6	52.8	673	128.6	3.5	0.0	125.1	169.8	62.6	148.9	125.1	2.17
19.8	52.7	671	127.9	3.5	0.0	124.4	169.5	62.2	148.8	124.4	2.16
19.9	52.7	677	128.8	3.5	0.0	125.3	170.0	62.7	149.1	125.3	2.17
20.0	52.5	678	128.9	3.5	0.0	125.4	170.2	62.7	149.3	125.4	2.17
20.1	52.5	684	129.8	3.5	0.0	126.3	170.7	63.2	149.6	126.3	2.17
20.2	52.3	685	130.0	3.5	0.0	126.5	171.0	63.3	149.9	126.5	2.17
20.3	52.1	687	130.1	3.6	0.0	126.5	171.2	63.3	150.1	126.5	2.17
20.4	52.2	691	130.6	3.6	0.0	127.0	171.3	63.5	150.1	127.0	2.18
20.5	52.1	692	130.8	3.6	0.0	127.2	171.5	63.6	150.3	127.2	2.18
20.6	52.1	694	131.0	3.6	0.0	127.4	171.6	63.7	150.4	127.4	2.18
20.7	52.0	696	131.1	3.6	0.0	127.5	171.8	63.8	150.5	127.5	2.18
20.8	51.9	698	131.3	3.6	0.0	127.7	172.0	63.9	150.7	127.7	2.18

Failure criteria : Maximum deviator stress

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Laboratory Report on Triaxial Compression Test

Photographic

Job Reference No. : 65127070-K02J17003B2

Information supplied customer

Customer : Mass Transit Railway Corporation

Project : Ground Investigation for South Island Line

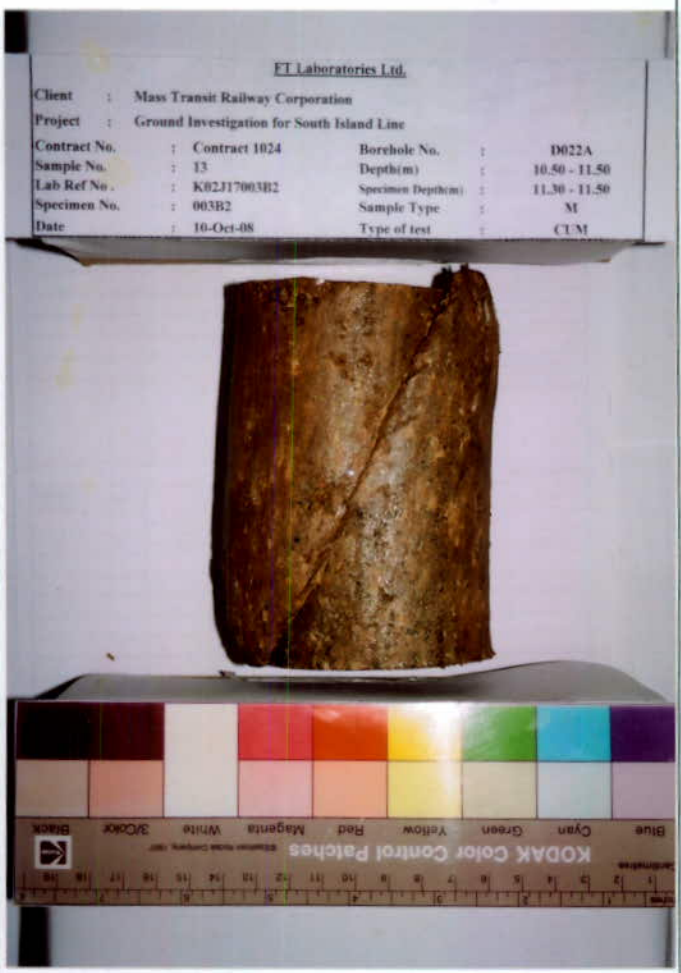
Contract No. : 1024
Borehole No. : D022A
Depth (m) : 10.50 - 11.50

Laboratory information

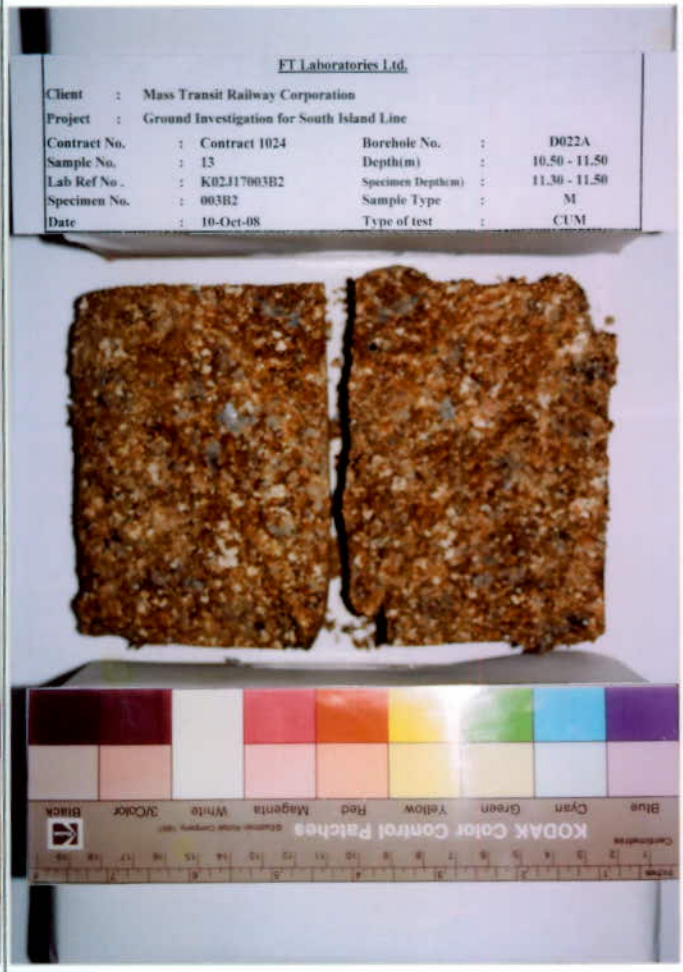
Lab. Reference No. : K02J17003B2
Specimen Depth (m) : 11.30 - 11.50

Customer Sample No. : 13

BEFORE SPLIT



AFTER SPLIT



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HKAS 071

Laboratory Report on Triaxial Compression Test

Summary of specimen data - Consolidated Undrained with Pore Water Pressure Measurement

Job Reference No. : 65127070-K02J17004B1

Information supplied by customer

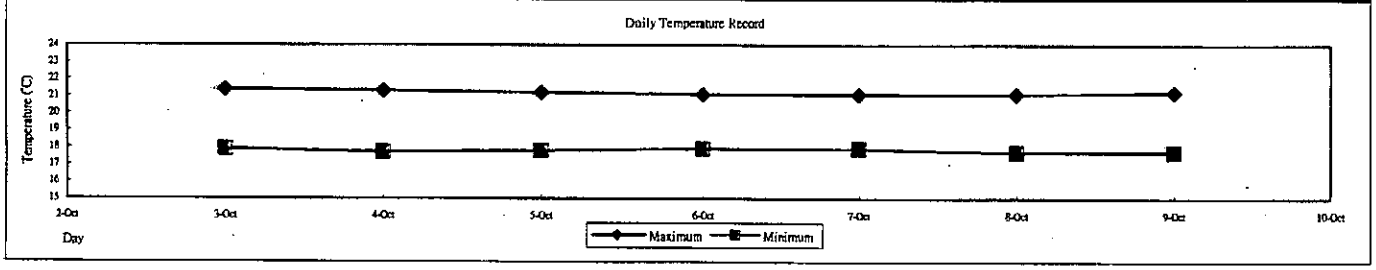
Customer : Mass Transit Railway Corporation
Project : Ground Investigation for South Island Line

Works Order No.	: Nil	Borehole No.	: D024
Customer Sample No.	: 5.	Depth (m)	: 7.50 - 8.50
Sample Origin	: CD Monzonite	Sample type	: Mazier
Contract No.	: 1024		

Laboratory information

Lab. Reference No.	: K02J17004B1	Date test started	: 3-Oct-08
Specimen Depth (m)	: 8.10 - 8.30	Date test completed	: 9-Oct-08
		Date sample received	: 2-Oct-08
Method of preparation	: Undisturbed (direct extrusion from tube sample)	Selected specimen by	: M.T. Kwok (FT Lab. Ltd)
% > 1/5 of specimen diameter	: -	Room temperature range(°C)	: 17.7-21.4
Method of moisture content	: GEOSPEC 3 : 2001: Test 5.1	Particle density	: 2.68 Mg/m^3
Test method used	: GEOSPEC 3 : 2001: Test 15.2		
Soil description (Visual)	: Moist, brown, silty/clayey gravelyy SAND.		

Stage		Saturation		Compression	
				Single	After
Effective cell pressure	(kPa)	5		75	
		Before	After	Before	
Diameter of specimen	(mm)	73.4 *	-	-	-
Height of specimen	(mm)	147.8 *	-	-	-
Volume of specimen	(cm^3)	625.4	625.4	583.1	583.1
Wet mass of specimen	(g)	1208.6 *	1214.8	1172.5	1170.1 *
Dry mass of specimen	(g)	952.1 *	-	-	952.1 *
Moisture content	(%)	26.9	27.6	23.2	22.9
Bulk density	(Mg/m^3)	1.933	1.943	2.011	2.007
Dry density	(Mg/m^3)	1.522	1.522	1.633	1.633
Void ratio		0.761	0.761	0.641	0.641
Degree of saturation	(%)	94.7	97.2	97.0	95.7
Coefficient of volume compressibility	(m^2/MN)	-	-	0.98	-
Coefficient of consolidation by t_{100}	(m^2/Year)	-	-	1191.33	-
Coefficient of consolidation by t_{50}	(m^2/Year)	-	-	871.83	-



Remarks : *Measured primary data

HOKLAS Approved Signatory: YUE Wai Chun / VONG Hong Ian

Date: 23 DEC 2008

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