The Sizewell C Project

6.14 Environmental Statement Addendum
Volume 3: Environmental Statement Addendum Appendices
Chapter 2 Main Development Site Appendix 2.13.A
Phase 2 Geo-Environmental Interpretative Report Part 7 of 25

Revision: 2.0

Applicable Regulation: Regulation 5(2)(a)

PINS Reference Number: EN010012

January 2021

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

SizewellC
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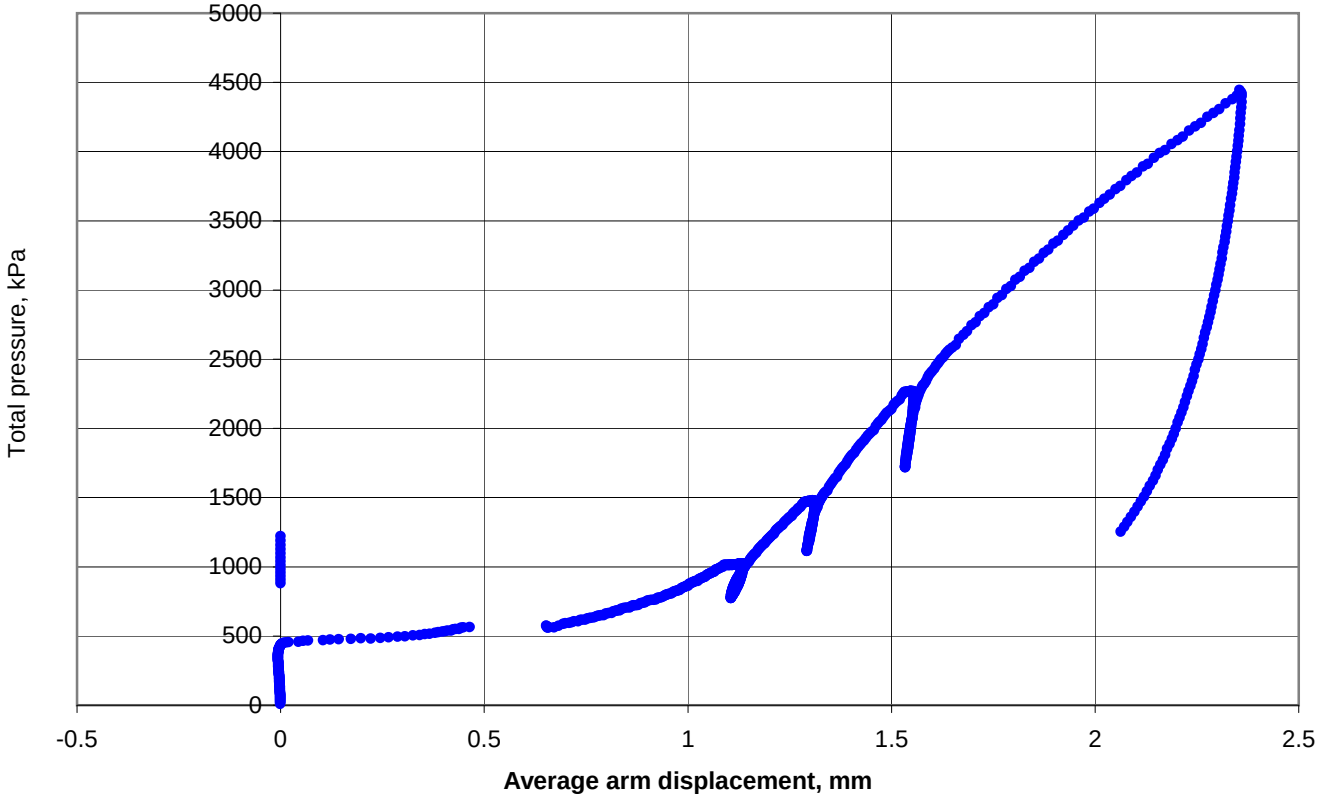
Self Boring Pressuremeter Test

Soil Mechanics

Date	25-Jul-10
Probe	SBP-3 930911
Material	Gravel and sands

Test reference	B4T15
GWL (mbgl)	
Test pocket (mbgl)	40.60-41.60

BH	SBP2009_4
Test	15
Depth, m	41.10



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)	1110	$P_{o\ LO}$ (kPa)		$P_{o\ MR}$ (kPa)	1109
$P_{o\ curve\ modelling}$ (kPa)				$P_{o\ drained}$ (kPa)	2016

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)		$c_{u\ unloading}$ (kPa)		p_L (kPa)	
ϕ_{cv} (deg)	30.0	ϕ (deg)	52.4	ν (deg)	28.9

Initial shear modulus (Average arm)

G_i (MPa)	72

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	162	0.135			0.514	2.7	
2	347	0.081			0.743	36.5	
3	486	0.087			0.719	39.6	

Remarks

Max test pressure = 2271 kPa. Max av displ = 1.56 mm. Max arm displ = 1.98 mm (Arm3). No of loops = 3 . Analysis type: Average arm.

Notes:

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Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T15

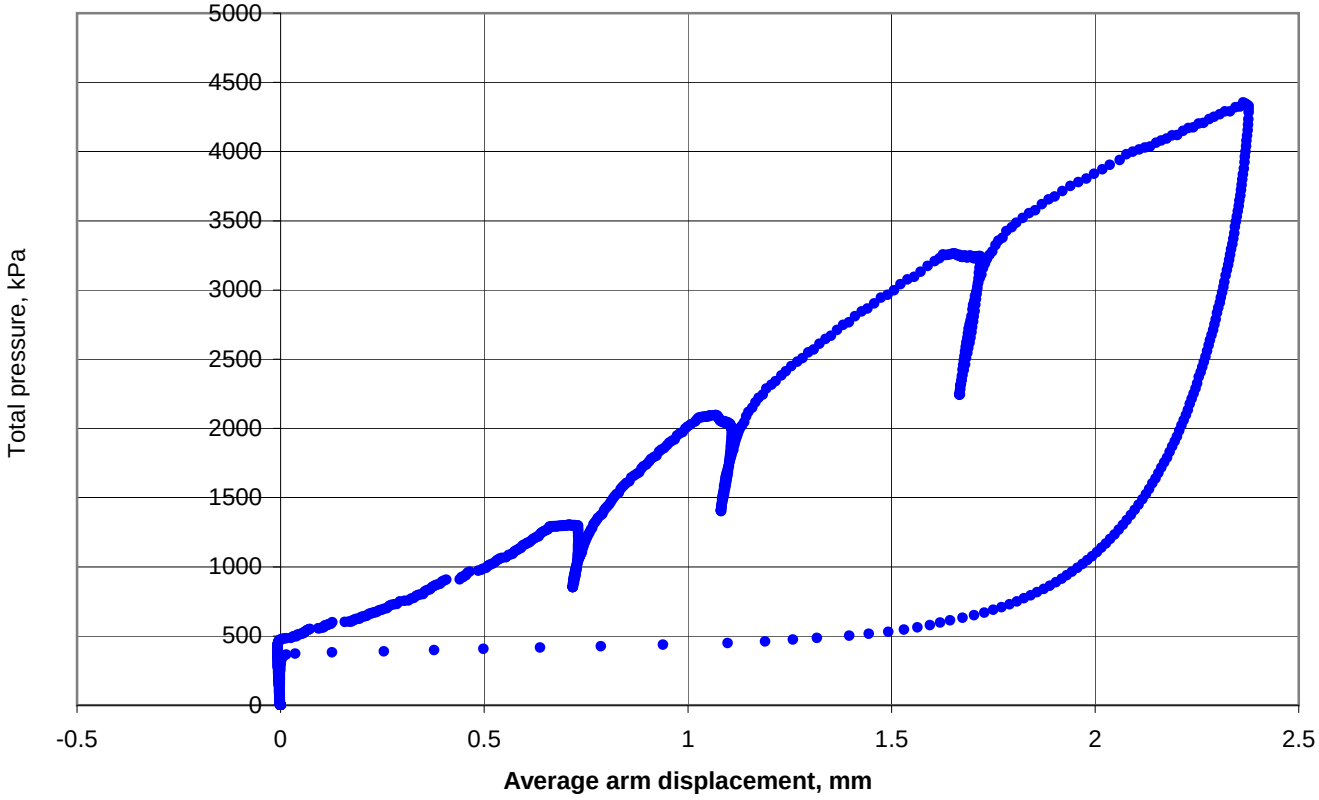
Self Boring Pressuremeter Test

Soil Mechanics

Date	26-Jul-10
Probe	SBP-3 930911
Material	Sand and clays

Test reference	B4T16
GWL (mbgl)	
Test pocket (mbgl)	42.60-43.60

BH	SBP2009_4
Test	16
Depth, m	43.10



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)	1290	$P_{o\ LO}$ (kPa)		$P_{o\ MR}$ (kPa)	1292
$P_{o\ curve\ modelling}$ (kPa)				$P_{o\ drained}$ (kPa)	1851

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)		$c_{u\ unloading}$ (kPa)		p_L (kPa)	
ϕ_{cv} (deg)	30.0	ϕ (deg)	50.8	ν (deg)	26.6

Initial shear modulus (Average arm)

G_i (MPa)	61

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	356	0.056			0.666	16.9	
2	402	0.107			0.696	30.1	
3	413	0.224			0.680	33.5	

Remarks

Max test pressure = 4356 kPa. Max av displ = 2.38 mm. Max arm displ = 2.8 mm (Arm2). No of loops = 3 . Analysis type: Average arm.

Notes:

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Figure

SBP2009_4 T16

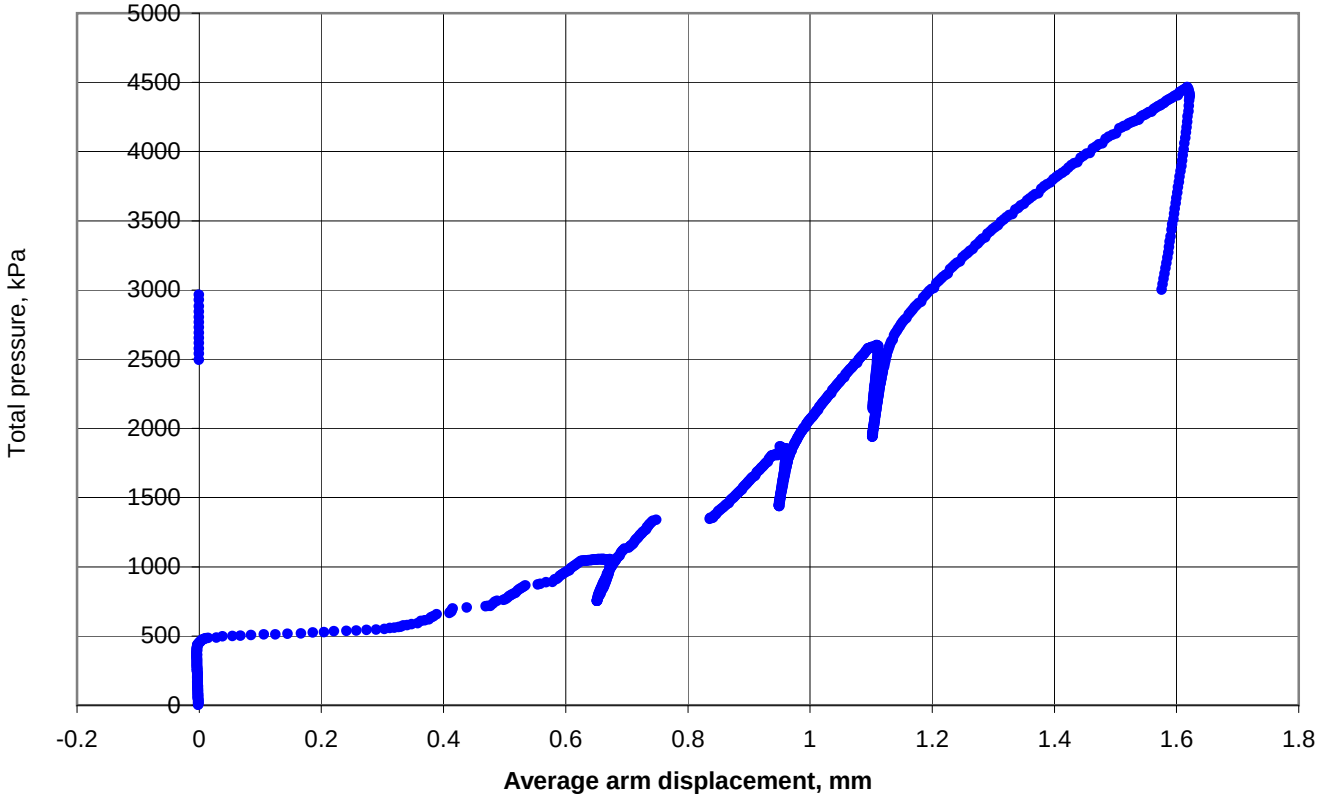
Self Boring Pressuremeter Test

Soil Mechanics

Date	26-Jul-10
Probe	SBP-3 930911
Material	Sand and clays

Test reference	B4T17
GWL (mbgl)	
Test pocket (mbgl)	43.60-44.60

BH	SBP2009_4
Test	17
Depth, m	44.10



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)	1495	$P_{o\ LO}$ (kPa)		$P_{o\ MR}$ (kPa)	1496
$P_{o\ curve\ modelling}$ (kPa)				$P_{o\ drained}$ (kPa)	2368

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)		$c_{u\ unloading}$ (kPa)		p_L (kPa)	
ϕ_{cv} (deg)	30.0	ϕ (deg)	44.2	ν (deg)	17.6

Initial shear modulus (Average arm)

G_i (MPa)	101

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	257	0.096			0.675	14.8	
2	585	0.035			0.874	170.6	
3	761	0.023			0.877	211.4	

Remarks

Max test pressure = 2601 kPa. Max av displ = 1.11 mm. Max arm displ = 1.66 mm (Arm3). No of loops = 3 . Analysis type: Average arm. Arm 2 sticking.

Notes:

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Figure

SBP2009_4 T17

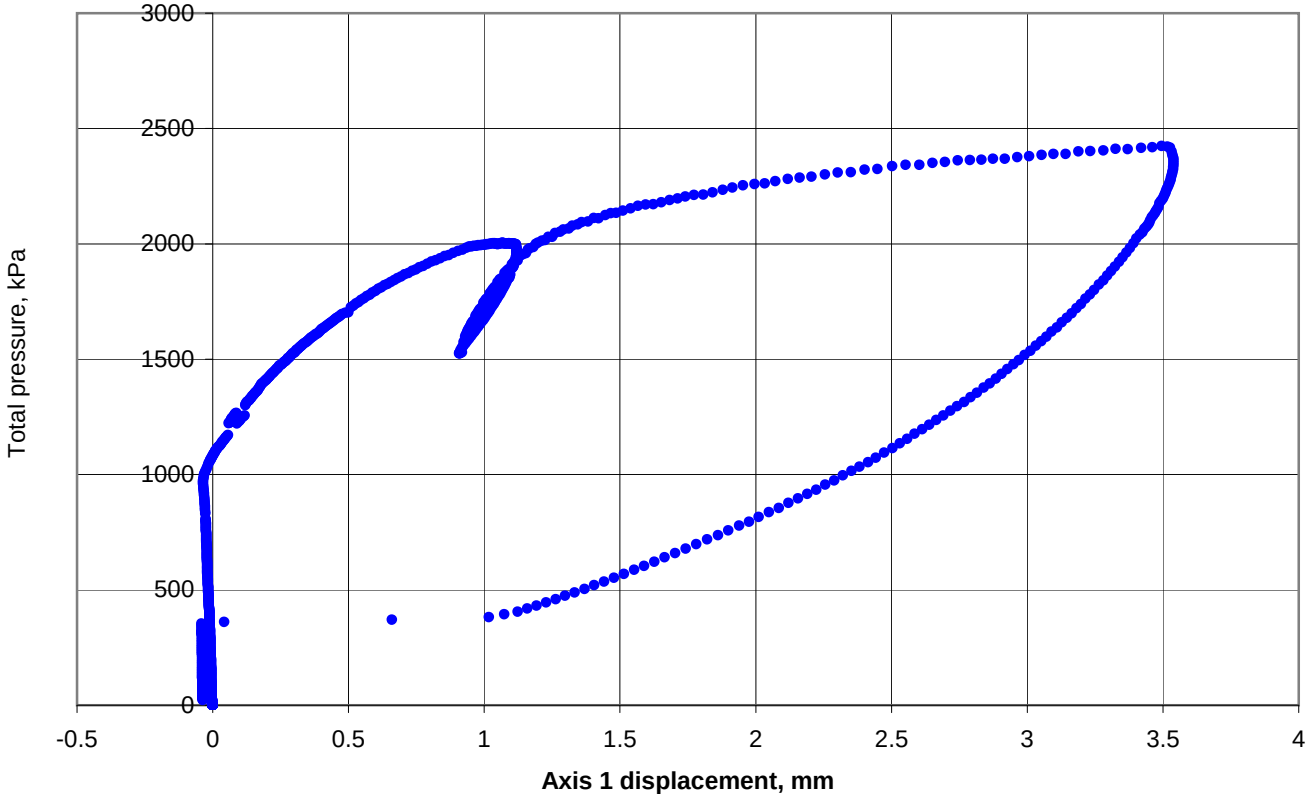
Self Boring Pressuremeter Test

Soil Mechanics

Date	28-Jul-10
Probe	SBP-3 930911
Material	Sand and clays

Test reference	B4T18
GWL (mbgl)	
Test pocket (mbgl)	45.10-46.10

BH	SBP2009_4
Test	18
Depth, m	45.60



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	995	$P_{o\ LO}$ (kPa)	995	$P_{o\ MR}$ (kPa)	1128
$P_{o\ curve\ modelling}$ (kPa)	966			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)	382	$c_{u\ unloading}$ (kPa)	372	p_L (kPa)	3198
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Axis 1)

G_i (MPa)	39

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	45	0.903	0.709	11.7			

Remarks

Max test pressure = 2424 kPa. Max av displ = 3.55 mm. Max arm displ = 10.52 mm (Arm2). No of loops = 1 . Analysis type: Axis 1. Arm 2 offline during early part of test

Notes:

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Figure

SBP2009_4 T18

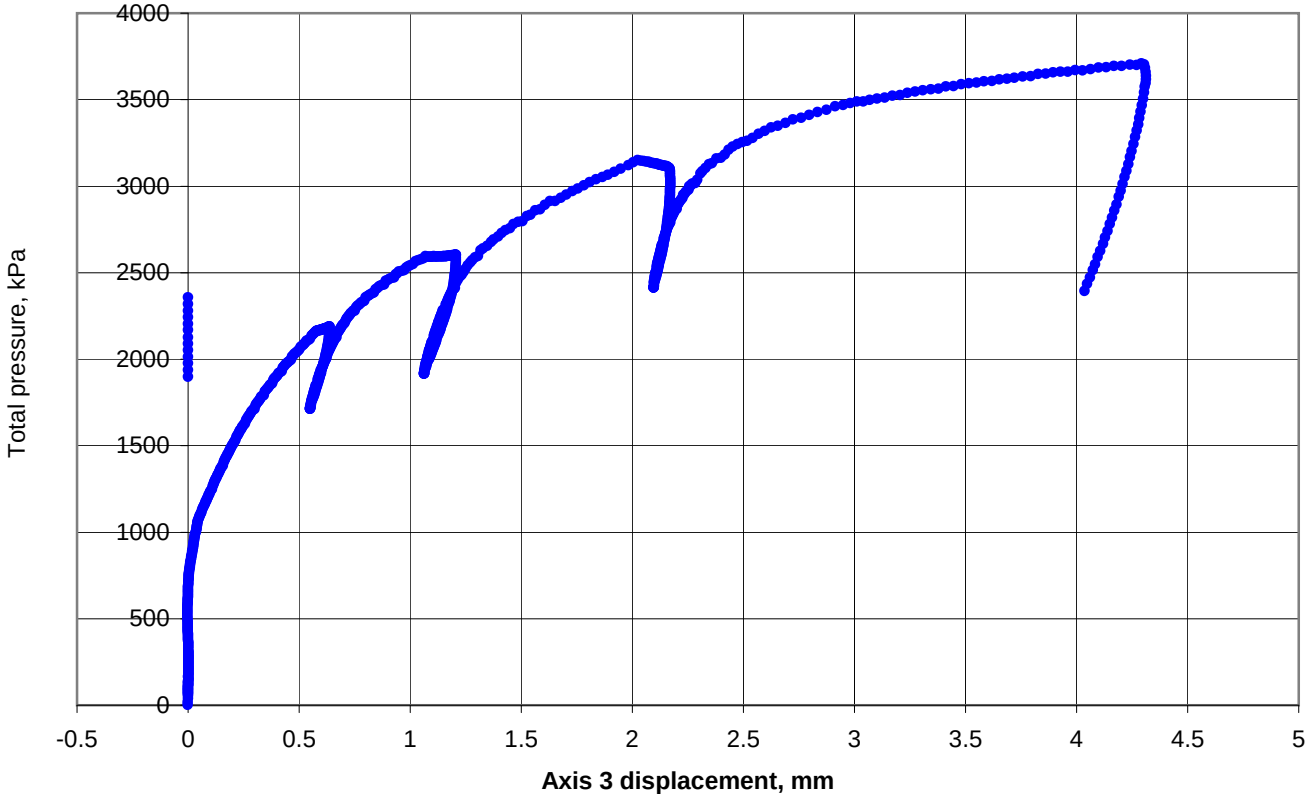
Self Boring Pressuremeter Test

Soil Mechanics

Date	29-Jul-10
Probe	SBP-3 930911
Material	Clays

Test reference	B4T19
GWL (mbgl)	
Test pocket (mbgl)	46.60-47.60

BH	SBP2009_4
Test	19
Depth, m	47.10



In situ horizontal stress (Axis 3)

$P_{o\ BE}$ (kPa)	1100	$P_{o\ LO}$ (kPa)	1070	$P_{o\ MR}$ (kPa)	1139
$P_{o\ curve\ modelling}$ (kPa)	356			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 3)

$c_{u\ loading}$ (kPa)	862	$c_{u\ unloading}$ (kPa)	635	p_L (kPa)	5311
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Axis 3)

G_i (MPa)	59

Unload-reload loop shear modulus (Axis 3)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	95	0.332	0.697	11.7			
2	87	0.588	0.729	16.0			
3	136	0.252	0.657	11.4			

Remarks

Max test pressure = 3151 kPa. Max av displ = 1.29 mm. Max arm displ = 2.17 mm (Arm3). No of loops = 3 . Analysis type: Axis 3. Arm 1 liftoff after Loop 2

Notes:

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Figure

SBP2009_4 T19

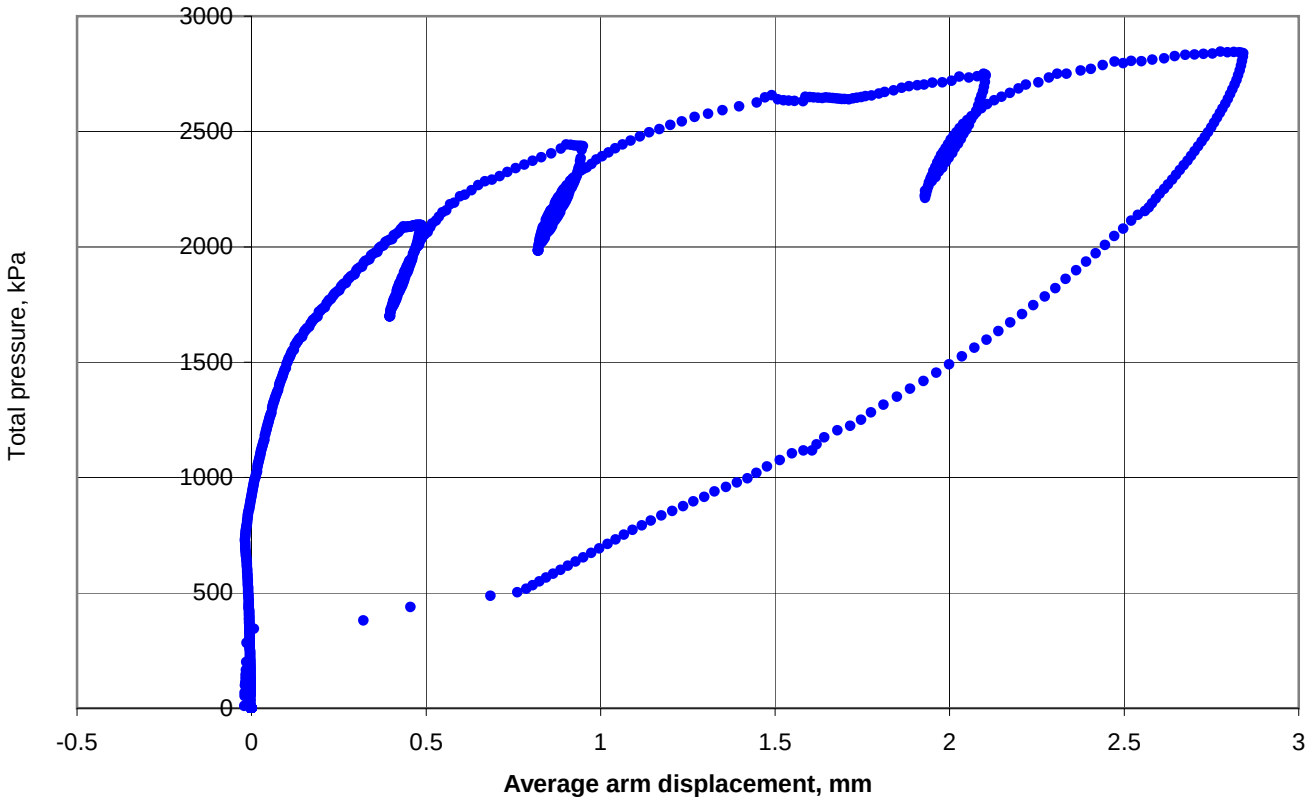
Self Boring Pressuremeter Test

Soil Mechanics

Date	30-Jul-10
Probe	SBP-3 930911
Material	Clays

Test reference	B4T20
GWL (mbgl)	
Test pocket (mbgl)	48.10-49.10

BH	SBP2009_4
Test	20
Depth, m	48.60



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)	780	$P_{o\ LO}$ (kPa)	780	$P_{o\ MR}$ (kPa)	936
$P_{o\ curve\ modelling}$ (kPa)	1115			$P_{o\ drained}$ (kPa)	

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)	385	$c_{u\ unloading}$ (kPa)	354	p_L (kPa)	3674
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Average arm)

G_i (MPa)	139

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	88	0.384	0.669	9.1			
2	67	0.541	0.492	2.2			
3	60	0.734	0.565	4.0			

Remarks

Max test pressure = 2846 kPa. Max av displ = 2.84 mm. Max arm displ = 4.73 mm (Arm1). No of loops = 3 . Analysis type: Average arm. Arm responses somewhat erratic

Notes:

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Figure

SBP2009_4 T20

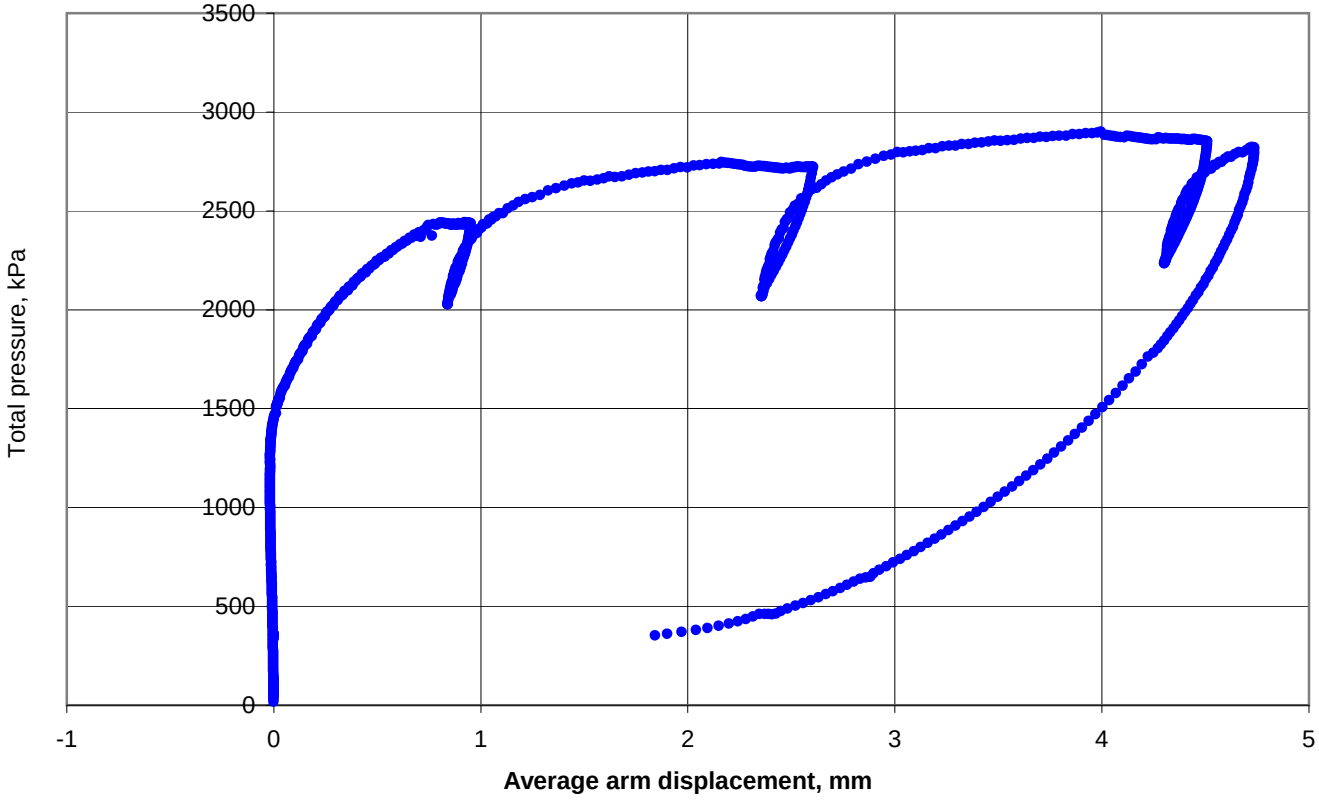
Self Boring Pressuremeter Test

Soil Mechanics

Date	03-Aug-10
Probe	SBP-3 930911
Material	Clays

Test reference	B4T21
GWL (mbgl)	
Test pocket (mbgl)	49.10-50.10

BH	SBP2009_4
Test	21
Depth, m	49.60



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)	1600	$P_{o\ LO}$ (kPa)	1601	$P_{o\ MR}$ (kPa)	1527
$P_{o\ curve\ modelling}$ (kPa)	948			$P_{o\ drained}$ (kPa)	

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)	177	$c_{u\ unloading}$ (kPa)	386	p_L (kPa)	3170
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Average arm)

G_i (MPa)	46

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	72	0.462	0.619	5.9			
2	55	1.022	0.804	23.9			
3	60	0.801	0.614	6.2			

Remarks

Max test pressure = 2900 kPa. Max av displ = 4.51 mm. Max arm displ = 5.02 mm (Arm3). No of loops = 3 . Analysis type: Average arm.

Notes:

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Project No. M0102-10

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Figure

SBP2009_4 T21

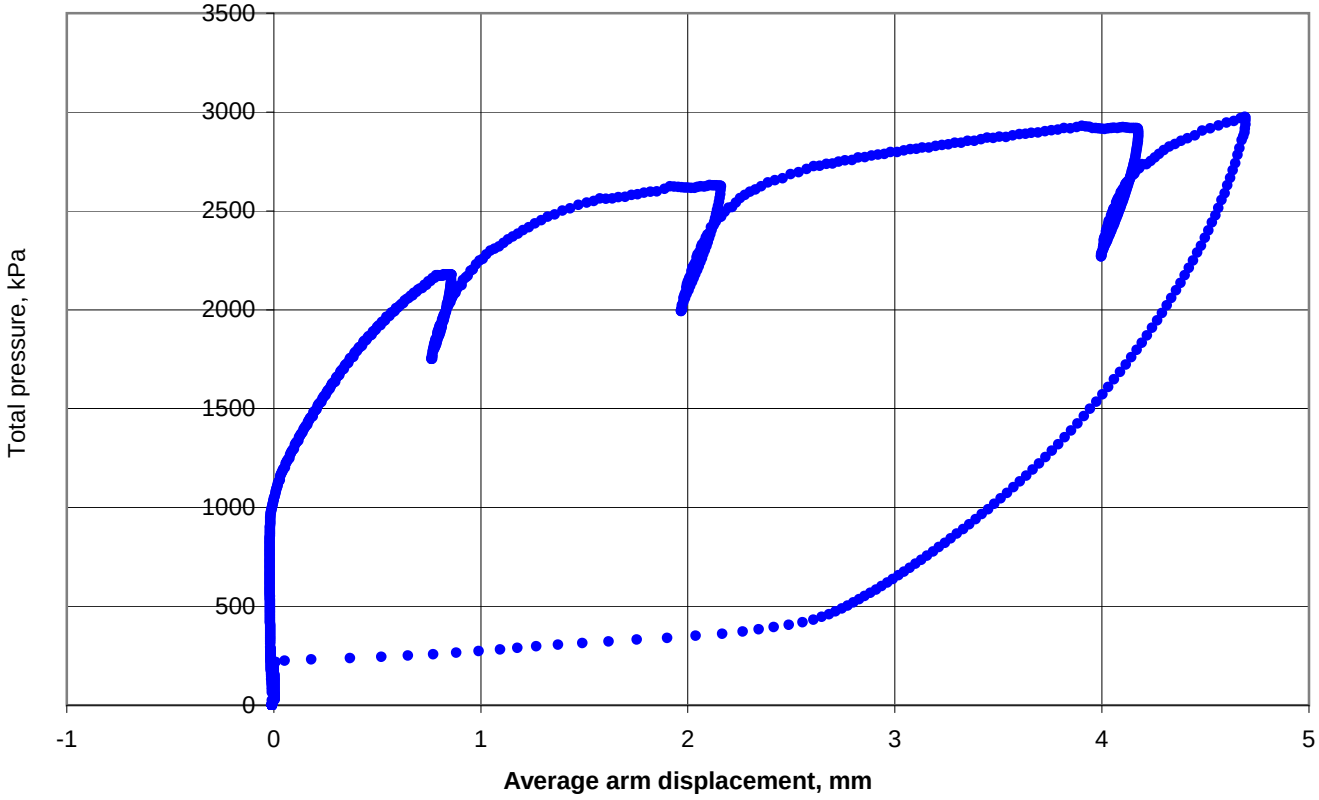
Self Boring Pressuremeter Test

Soil Mechanics

Date	04-Aug-10
Probe	SBP-3 930911
Material	Clays

Test reference	B4T22
GWL (mbgl)	
Test pocket (mbgl)	50.10-51.10

BH	SBP2009_4
Test	22
Depth, m	50.60



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)	1060	$P_{o\ LO}$ (kPa)	1059	$P_{o\ MR}$ (kPa)	1224
$P_{o\ curve\ modelling}$ (kPa)	800			$P_{o\ drained}$ (kPa)	

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)	417	$c_{u\ unloading}$ (kPa)	300	p_L (kPa)	3677
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Average arm)

G_i (MPa)	38

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	79	0.371	0.641	6.7			
2	64	0.761	0.606	5.8			
3	68	0.615	0.626	6.7			

Remarks

Max test pressure = 2975 kPa. Max av displ = 4.69 mm. Max arm displ = 5.33 mm (Arm3). No of loops = 3 . Analysis type: Average arm.

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

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Figure

SBP2009_4 T22

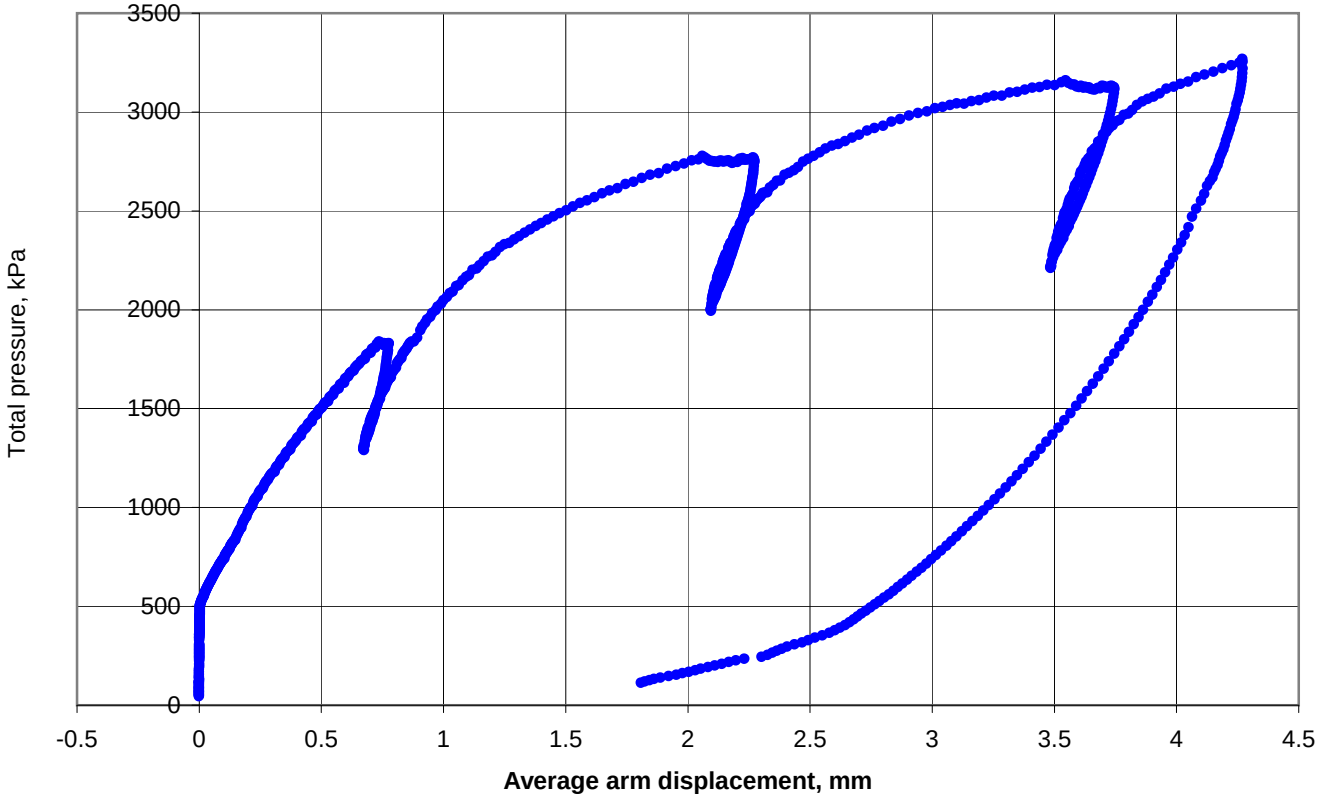
Self Boring Pressuremeter Test

Soil Mechanics

Date	04-Aug-10
Probe	SBP-3 930911
Material	Clays

Test reference	B4T23
GWL (mbgl)	
Test pocket (mbgl)	51.10-51.80

BH	SBP2009_4
Test	23
Depth, m	51.30



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)	520	$P_{o\ LO}$ (kPa)	520	$P_{o\ MR}$ (kPa)	543
$P_{o\ curve\ modelling}$ (kPa)	875			$P_{o\ drained}$ (kPa)	

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)	776	$c_{u\ unloading}$ (kPa)	537	p_L (kPa)	4635
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Average arm)

G_i (MPa)	51

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	89	0.342	0.582	4.7			
2	81	0.617	0.571	5.1			
3	72	1.021	0.614	7.7			

Remarks

Max test pressure = 3160 kPa. Max av displ = 3.75 mm. Max arm displ = 4.6 mm (Arm1). No of loops = 3 . Analysis type: Average arm.

Notes:

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Project No. M0102-10

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Figure **SBP2009_4 T23**

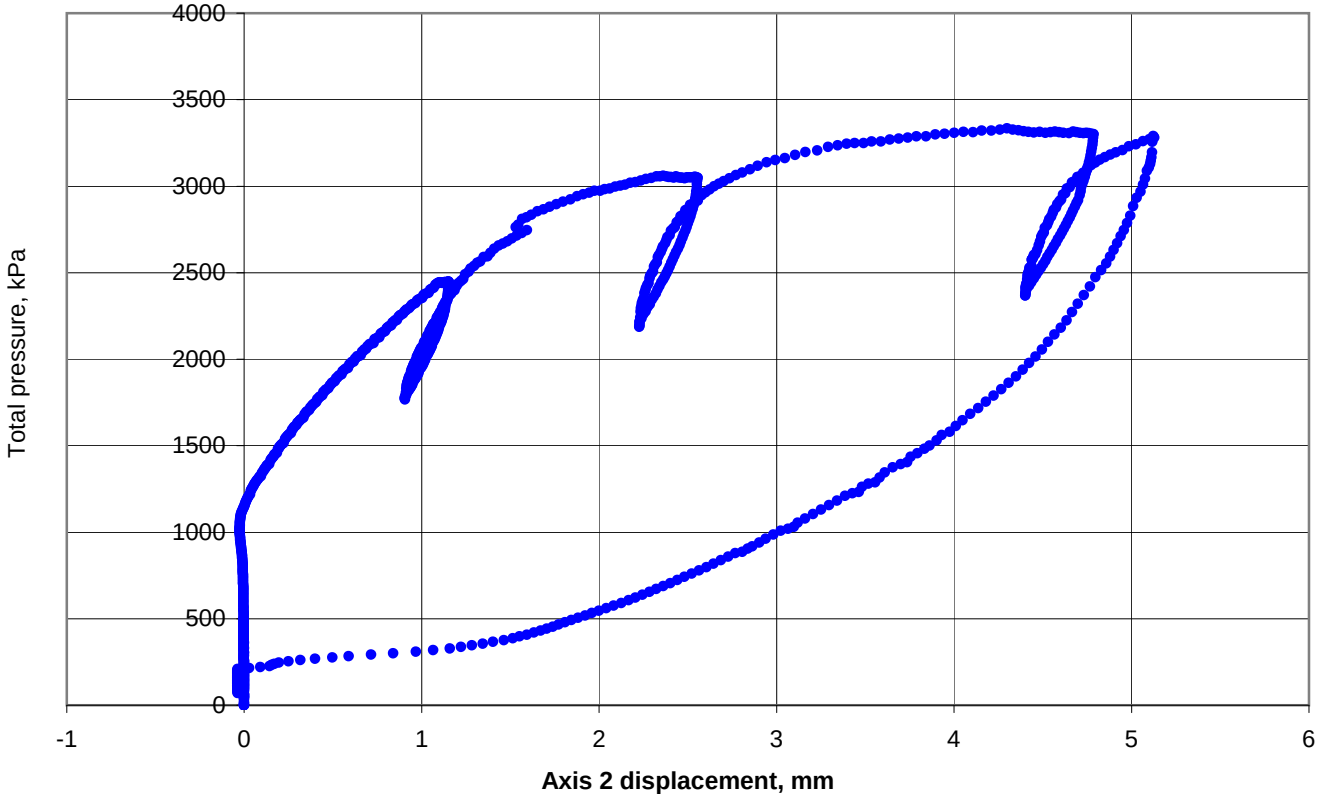
Self Boring Pressuremeter Test

Soil Mechanics

Date	07-Aug-10
Probe	SBP-3 930911
Material	Clays

Test reference	B4T24
GWL (mbgl)	
Test pocket (mbgl)	52.10-53.10

BH	SBP2009_4
Test	24
Depth, m	52.60



In situ horizontal stress (Axis 2)

$P_{o\ BE}$ (kPa)	1120	$P_{o\ LO}$ (kPa)	1119	$P_{o\ MR}$ (kPa)	1228
$P_{o\ curve\ modelling}$ (kPa)	1142			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 2)

$c_{u\ loading}$ (kPa)	745	$c_{u\ unloading}$ (kPa)	532	p_L (kPa)	4748
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Axis 2)

G_i (MPa)	34

Unload-reload loop shear modulus (Axis 2)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	56	1.064	0.624	6.1			
2	56	1.364	0.484	2.8			
3	53	1.503	0.548	4.5			

Remarks

Max test pressure = 3334 kPa. Max av displ = 4.21 mm. Max arm displ = 4.79 mm (Arm2). No of loops = 3 . Analysis type: Axis 2. Arm 1 lift off during Loop 1. Arm 3 sticking during Loop 3.

Notes:

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Project No. M0102-10

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Figure

SBP2009_4 T24

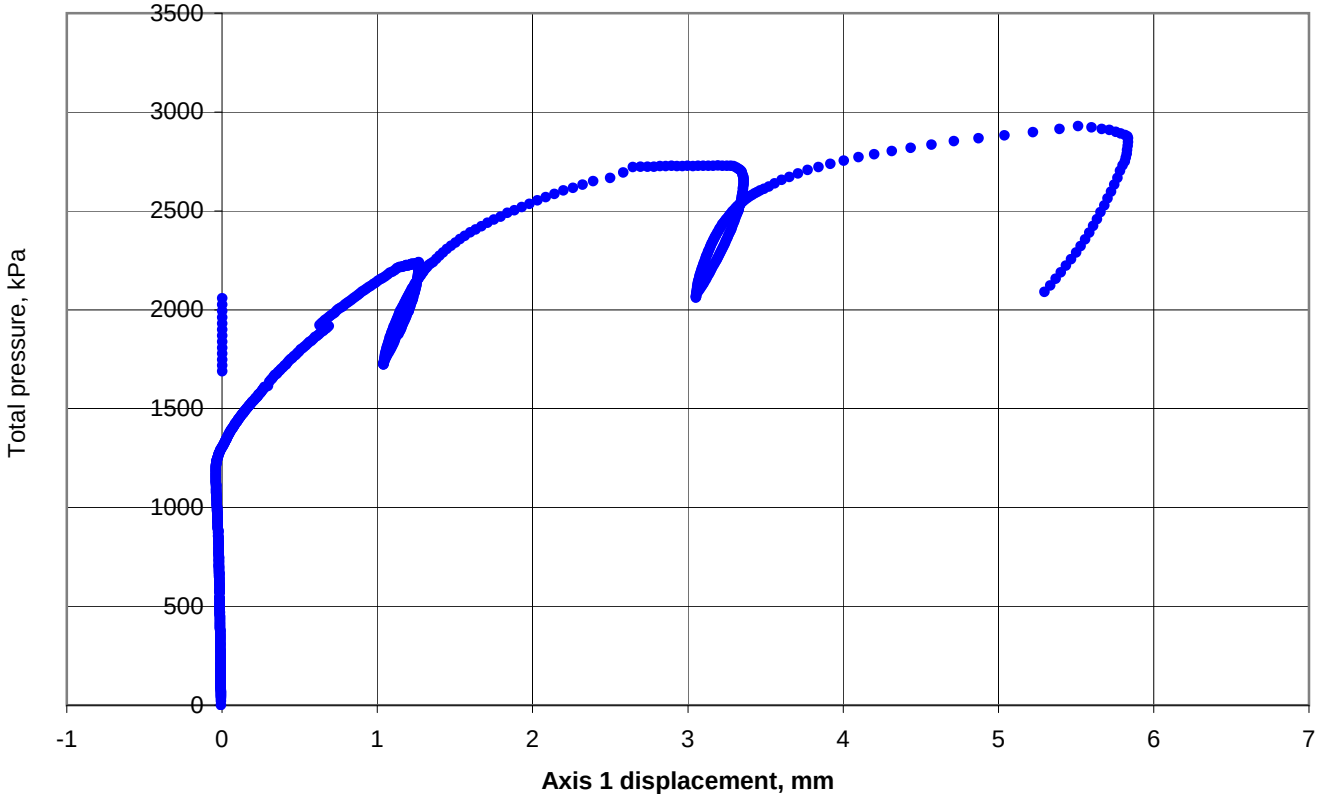
Self Boring Pressuremeter Test

Soil Mechanics

Date	18-Aug-10
Probe	SBP-3 930911
Material	Stiff silty clay

Test reference	B4T25
GWL (mbgl)	
Test pocket (mbgl)	56.60-57.60

BH	SBP2009_4
Test	25
Depth, m	57.10



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	1195	$P_{o\ LO}$ (kPa)	1219	$P_{o\ MR}$ (kPa)	1169
$P_{o\ curve\ modelling}$ (kPa)	1194			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)	535	$c_{u\ unloading}$ (kPa)	411	p_L (kPa)	3801
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Axis 1)

G_i (MPa)	29

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	46	0.981	0.677	7.1			
2	41	1.232	0.570	3.6			

Remarks

Max test pressure = 2729 kPa. Max av displ = 3.03 mm. Max arm displ = 9.08 mm (Arm2). No of loops = 2 . Analysis type: Axis 1. Arm 2 sticking. Arm 3 late lift off

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

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Figure

SBP2009_4 T25

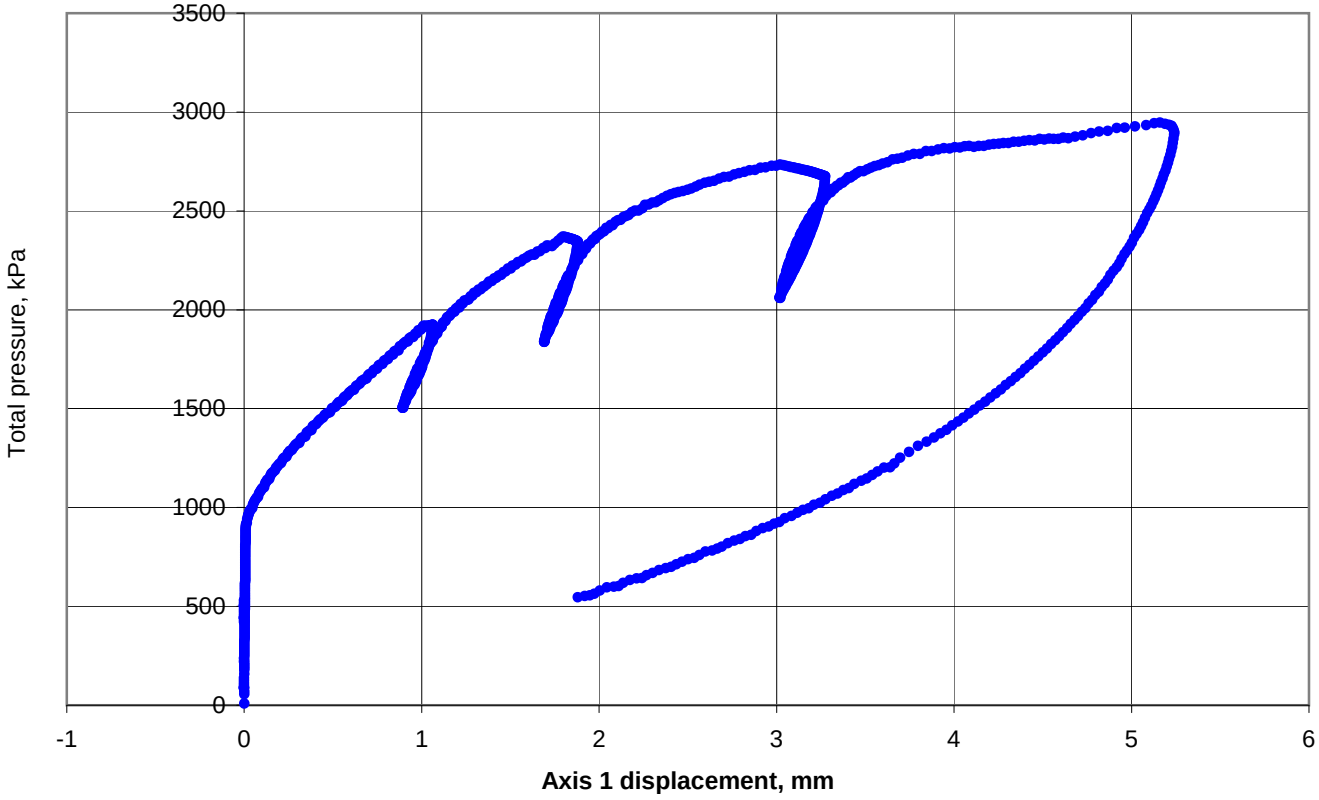
Self Boring Pressuremeter Test

Soil Mechanics

Date	19-Aug-10
Probe	SBP-3 930911
Material	Stiff silty clay

Test reference	B4T26
GWL (mbgl)	
Test pocket (mbgl)	57.10-58.10

BH	SBP2009_4
Test	26
Depth, m	57.60



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	930	$P_{o\ LO}$ (kPa)	940	$P_{o\ MR}$ (kPa)	929
$P_{o\ curve\ modelling}$ (kPa)	1278			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)	787	$c_{u\ unloading}$ (kPa)	427	p_L (kPa)	4404
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Axis 1)

G_i (MPa)	42

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	48	0.697	0.802	15.0			
2	54	0.771	0.718	10.0			
3	50	1.021	0.727	11.8			

Remarks

Max test pressure = 2734 kPa. Max av displ = 3.15 mm. Max arm displ = 3.91 mm (Arm2). No of loops = 3 . Analysis type: Axis 1. Arm 2 and 3 sticking

Notes:

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Figure

SBP2009_4 T26

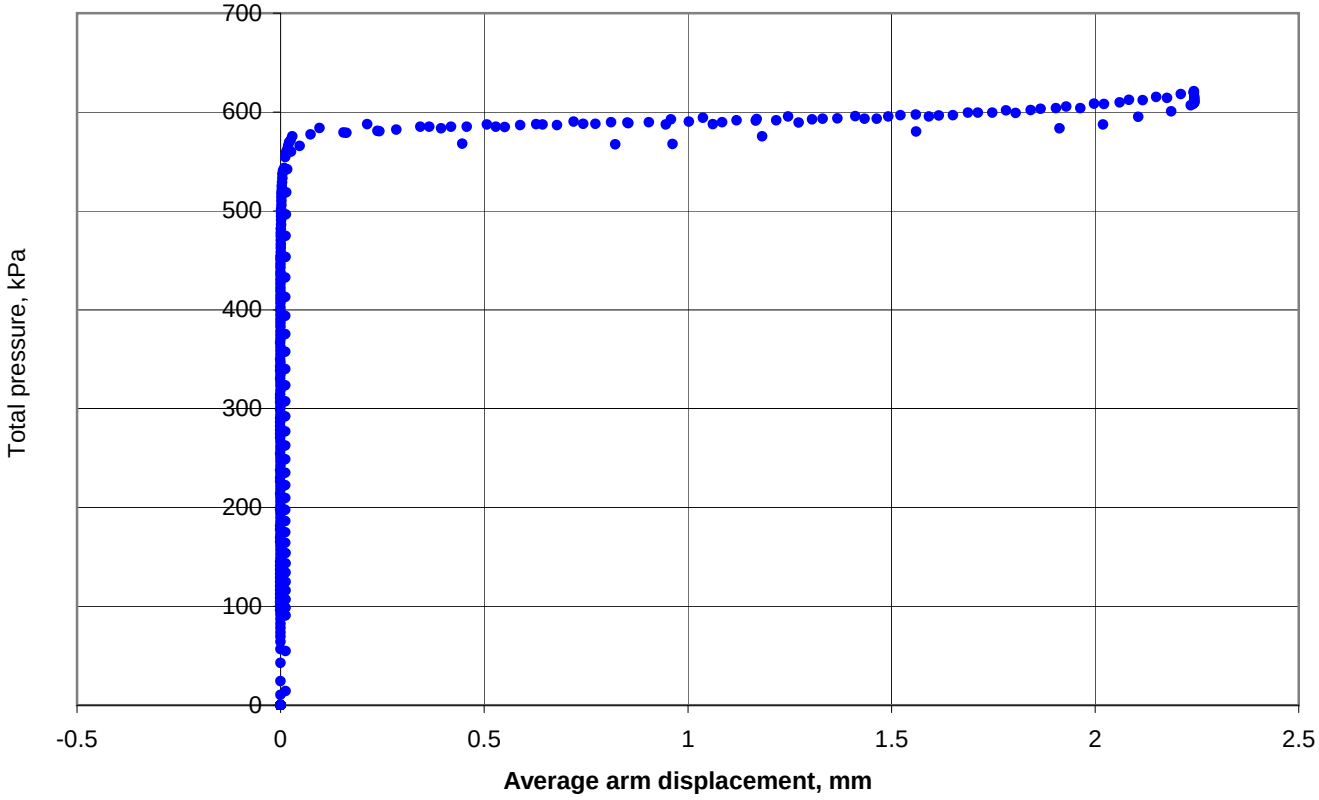
Self Boring Pressuremeter Test

Soil Mechanics

Date	20-Aug-10
Probe	SBP-3 930911
Material	Stiff silty clay

Test reference	B4T27
GWL (mbgl)	
Test pocket (mbgl)	58.60-59.60

BH	SBP2009_4
Test	27
Depth, m	59.10



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)		$P_{o\ LO}$ (kPa)		$P_{o\ MR}$ (kPa)	
$P_{o\ curve\ modelling}$ (kPa)				$P_{o\ drained}$ (kPa)	

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)		$c_{u\ unloading}$ (kPa)		p_L (kPa)	
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Average arm)

G_i (MPa)	0

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	

Remarks

Max test pressure = 621 kPa. Max av displ = 2.24 mm. Max arm displ = 3.88 mm (Arm2). No of loops = 0 . Analysis type: Average arm. Test pocket disturbed. No suitable data for analysis.

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T27

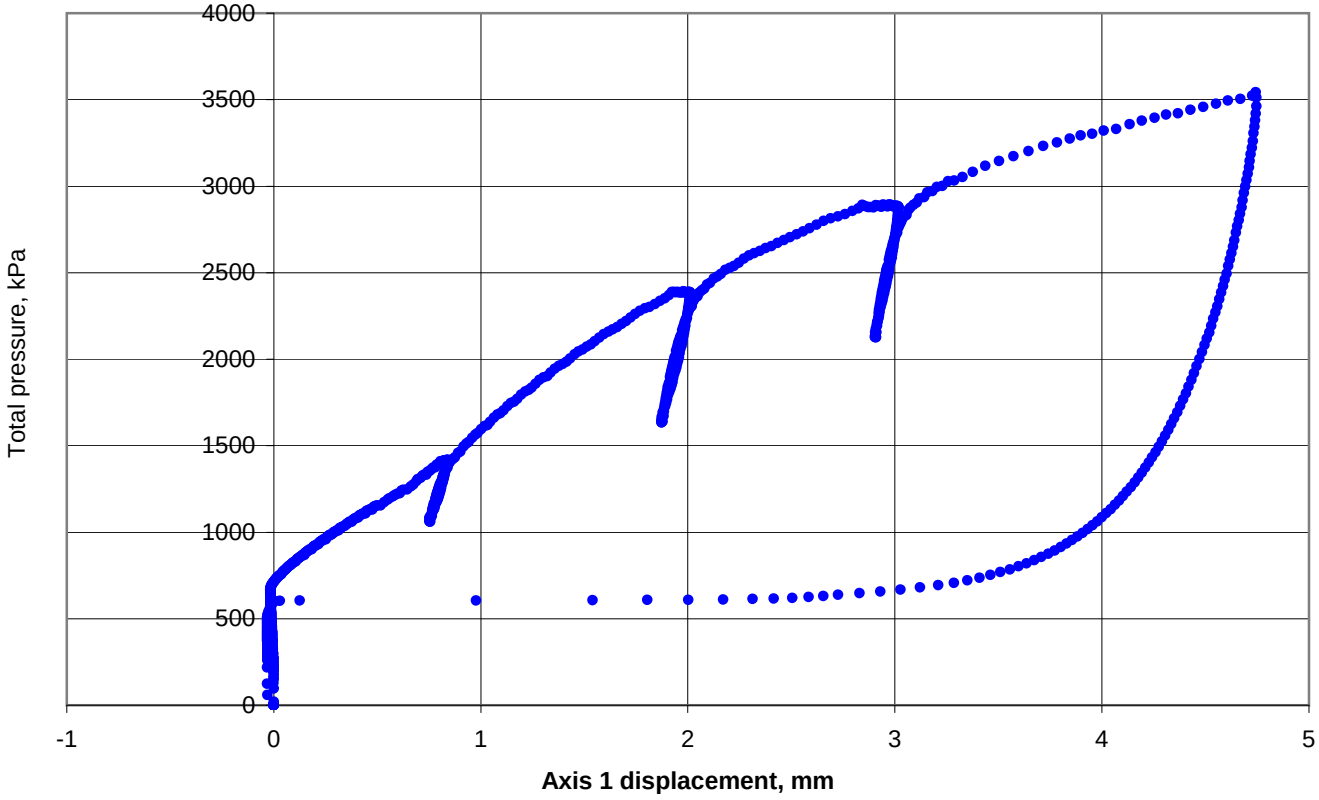
Self Boring Pressuremeter Test

Soil Mechanics

Date	31-Aug-11
Probe	SBP-3 930911
Material	Stiff silty clay

Test reference	B4T31
GWL (mbgl)	
Test pocket (mbgl)	62.30-63.40

BH	SBP2009_4
Test	31
Depth, m	63.40



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	1690	$P_{o\ LO}$ (kPa)	690	$P_{o\ MR}$ (kPa)	812
$P_{o\ curve\ modelling}$ (kPa)	1277			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)	923	$c_{u\ unloading}$ (kPa)	444	p_L (kPa)	5333
ϕ_{cv} (deg)	30.0	ϕ (deg)	32.8	ν (deg)	3.3

Initial shear modulus (Axis 1)

G_i (MPa)	21

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	86	0.367	0.833	30.2	0.852	31.5	
2	116	0.573	0.871	62.9	0.848	45.7	
3	143	0.456	0.754	31.3	0.841	52.7	

Remarks

Max test pressure = 3293 kPa. Max av displ = 2.83 mm. Max arm displ = 3.9 mm (Arm1). No of loops = 3 . Analysis type: Axis 1. Arm 3 sticking during Loop 3. Drained and undrained analysis carried out.

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T31

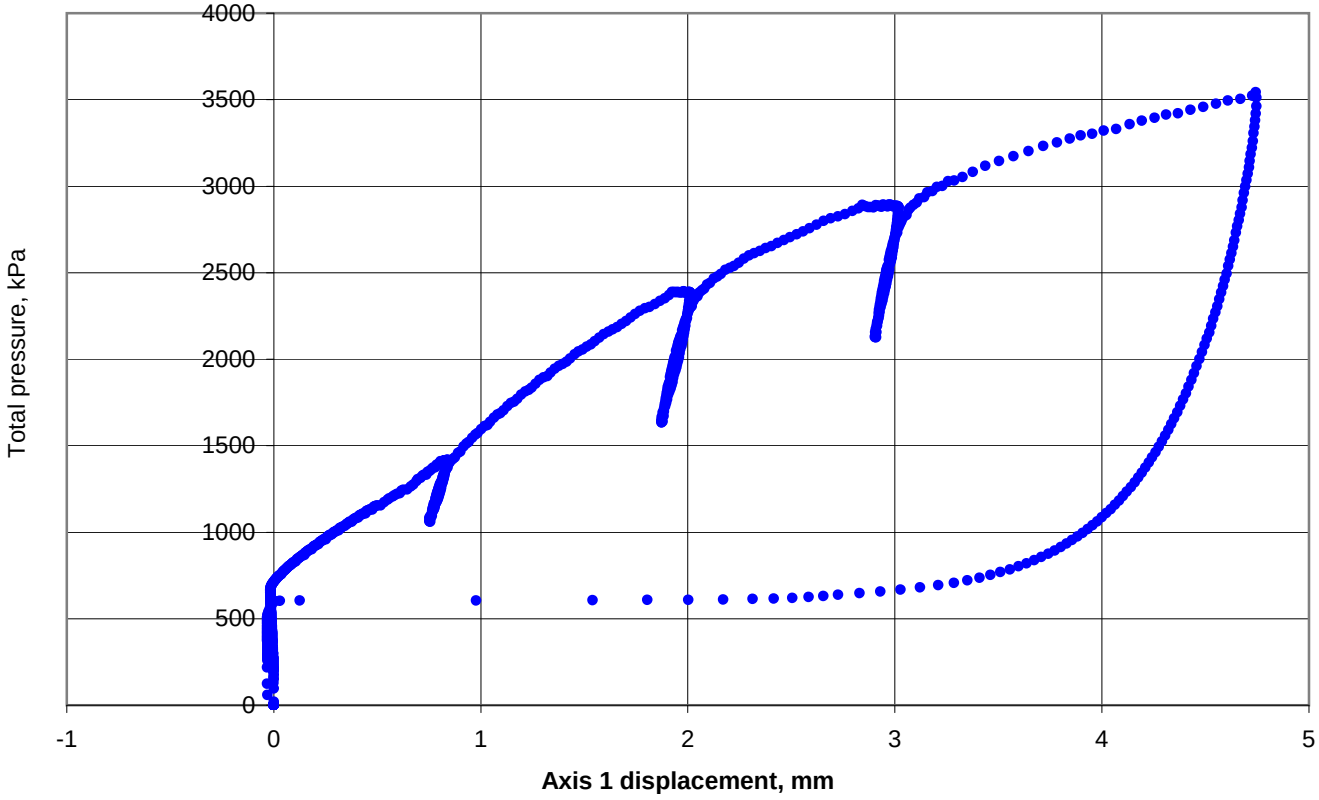
Self Boring Pressuremeter Test

Soil Mechanics

Date	31-Aug-11
Probe	SBP-3 930911
Material	Stiff silty clay

Test reference	B4T31
GWL (mbgl)	
Test pocket (mbgl)	62.30-63.40

BH	SBP2009_4
Test	31
Depth, m	63.40



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	1690	$P_{o\ LO}$ (kPa)	690	$P_{o\ MR}$ (kPa)	812
$P_{o\ curve\ modelling}$ (kPa)	1277			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)	923	$c_{u\ unloading}$ (kPa)	444	p_L (kPa)	5333
ϕ_{cv} (deg)	30.0	ϕ (deg)	32.8	ν (deg)	3.3

Initial shear modulus (Axis 1)

G_i (MPa)	21

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	86	0.367	0.833	30.2	0.852	31.5	
2	116	0.573	0.871	62.9	0.848	45.7	
3	143	0.456	0.754	31.3	0.841	52.7	

Remarks

Max test pressure = 3293 kPa. Max av displ = 2.83 mm. Max arm displ = 3.9 mm (Arm1). No of loops = 3 . Analysis type: Axis 1. Arm 3 sticking during Loop 3. Drained and undrained analysis carried out.

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T31

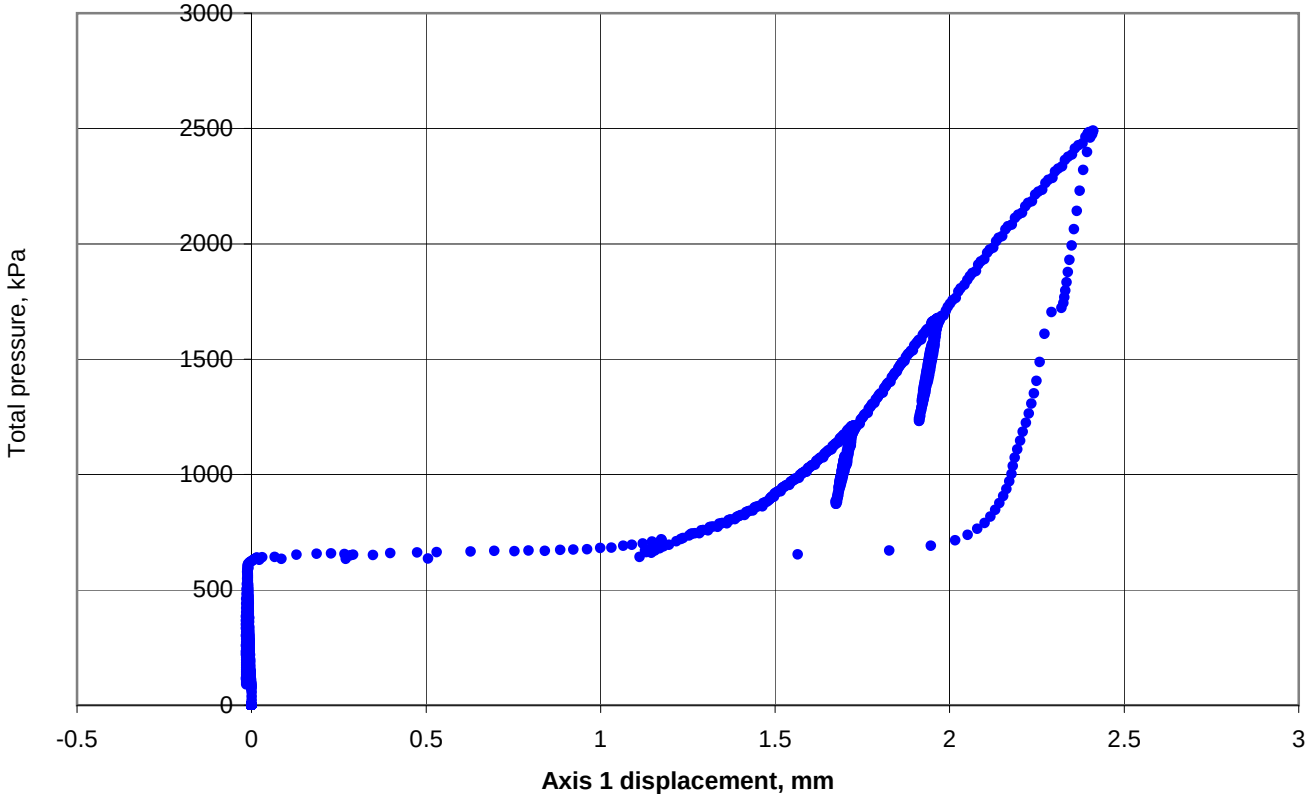
Self Boring Pressuremeter Test

Soil Mechanics

Date	02-Sep-11
Probe	SBP-3 930911
Material	Sands

Test reference	B4T33
GWL (mbgl)	
Test pocket (mbgl)	66.10-67.10

BH	SBP2009_4
Test	33
Depth, m	66.60



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	1150	$P_{o\ LO}$ (kPa)		$P_{o\ MR}$ (kPa)	1152
$P_{o\ curve\ modelling}$ (kPa)				$P_{o\ drained}$ (kPa)	1501

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)		$c_{u\ unloading}$ (kPa)		p_L (kPa)	
ϕ_{cv} (deg)	30.0	ϕ (deg)	50.9	ν (deg)	26.9

Initial shear modulus (Axis 1)

G_i (MPa)	46

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	149	0.220			0.914	86.8	
2	185	0.234			0.850	64.8	

Remarks

Max test pressure = 2491 kPa. Max av displ = 2.2 mm. Max arm displ = 2.93 mm (Arm2). No of loops = 2 . Analysis type: Axis 1. Arm 3 sticking

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T33

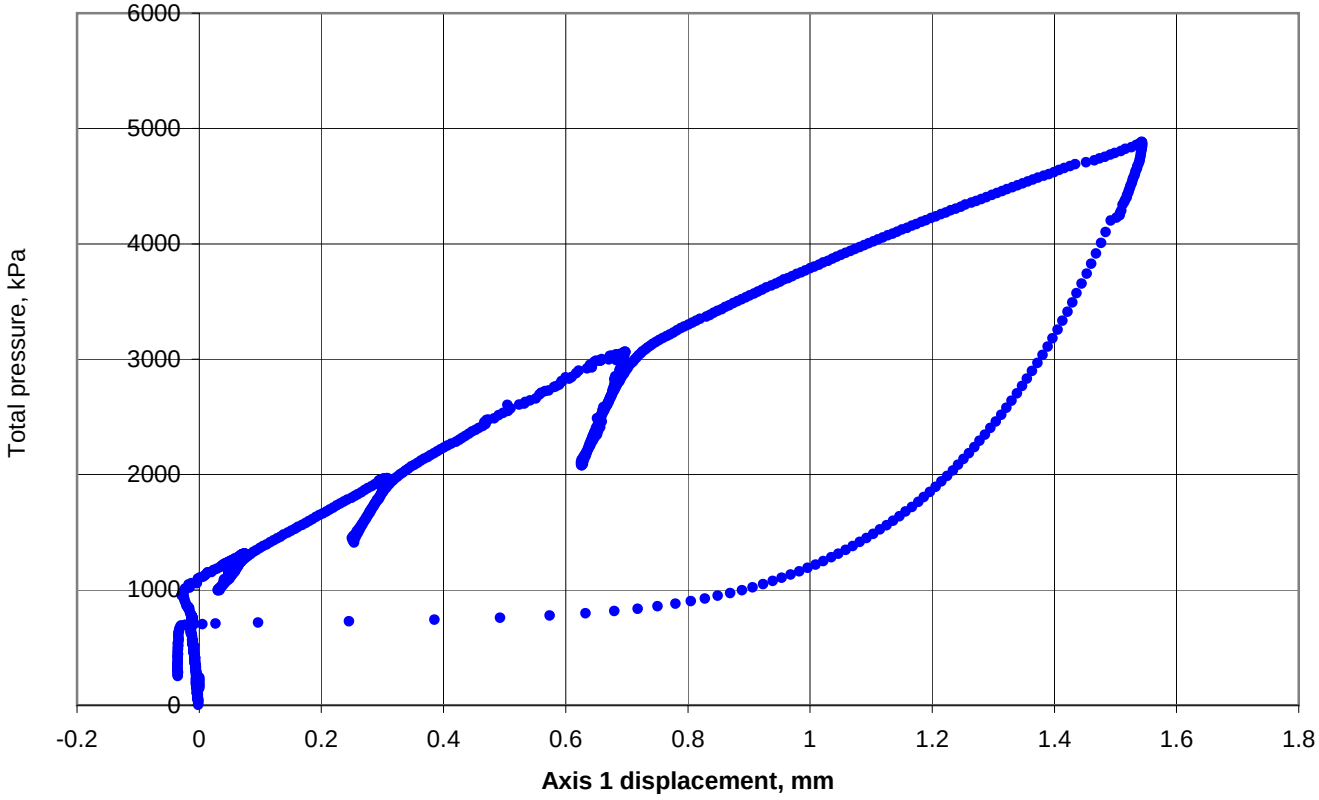
Self Boring Pressuremeter Test

Soil Mechanics

Date	03-Sep-11
Probe	SBP-3 930911
Material	grey clay with claystone b

Test reference	B4T36
GWL (mbgl)	
Test pocket (mbgl)	70.60-71.60

BH	SBP2009_4
Test	36
Depth, m	71.10



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	1675	$P_{o\ LO}$ (kPa)		$P_{o\ MR}$ (kPa)	1678
$P_{o\ curve\ modelling}$ (kPa)				$P_{o\ drained}$ (kPa)	2440

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)		$c_{u\ unloading}$ (kPa)		p_L (kPa)	
ϕ_{cv} (deg)	30.0	ϕ (deg)	48.1	ν (deg)	22.9

Initial shear modulus (Axis 1)

G_i (MPa)	65

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	162	0.186			0.750	21.6	
2	202	0.250			0.848	63.1	
3	277	0.279			0.914	146.5	

Remarks

Max test pressure = 3905 kPa. Max av displ = 1.97 mm. Max arm displ = 3.12 mm (Arm3). No of loops = 3 . Analysis type: Axis 1. Arm 2 some erratic behaviour. Arm 3 sticking intermittently

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T36

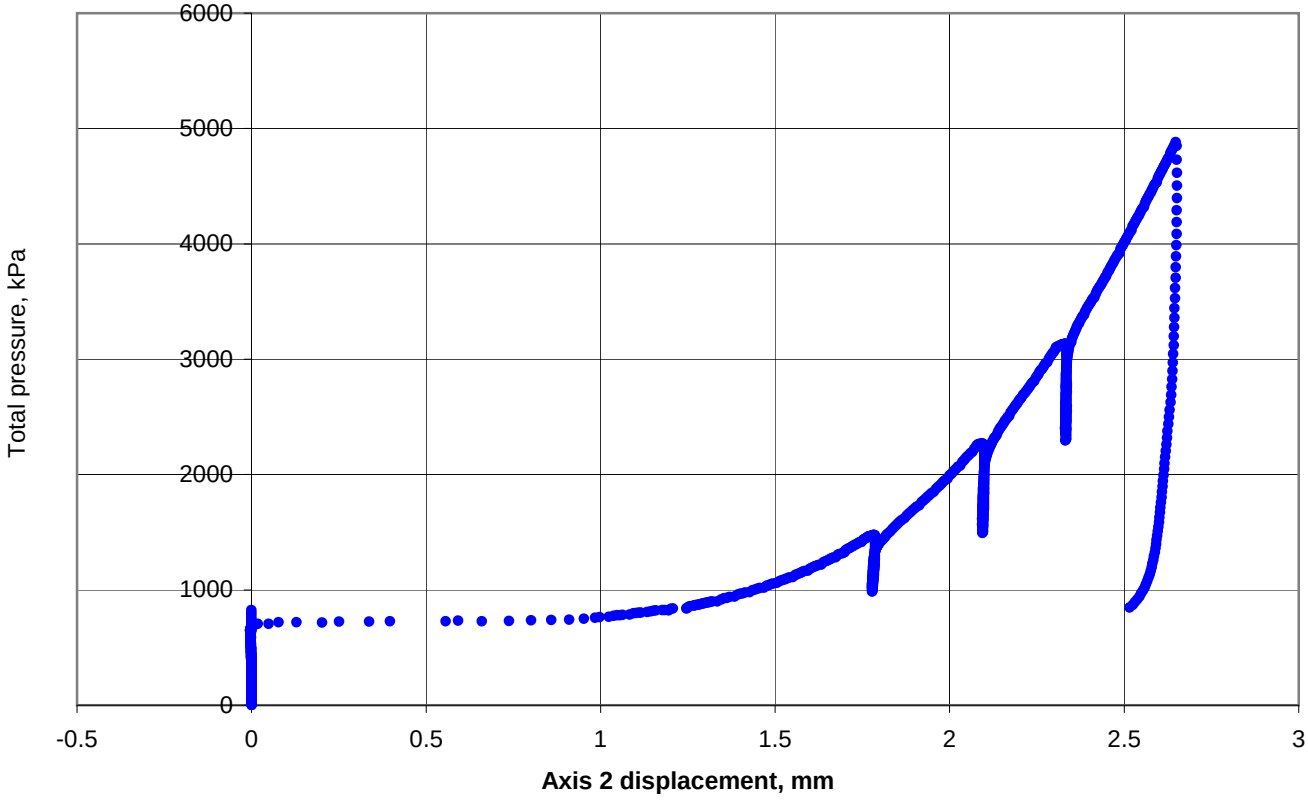
Self Boring Pressuremeter Test

Soil Mechanics

Date	04-Sep-11
Probe	SBP-3 930911
Material	grey clay with claystone b

Test reference	B4T37
GWL (mbgl)	
Test pocket (mbgl)	72.20-73.20

BH	SBP2009_4
Test	37
Depth, m	72.70



In situ horizontal stress (Axis 2)

$P_{o\ BE}$ (kPa)	1857	$P_{o\ LO}$ (kPa)		$P_{o\ MR}$ (kPa)	3096
$P_{o\ curve\ modelling}$ (kPa)				$P_{o\ drained}$ (kPa)	NA

Shear strength (Axis 2)

$c_{u\ loading}$ (kPa)		$c_{u\ unloading}$ (kPa)		p_L (kPa)	
ϕ_{cv} (deg)	30.0	ϕ (deg)	NA	ν (deg)	NA

Initial shear modulus (Axis 2)

G_i (MPa)	130

Unload-reload loop shear modulus (Axis 2)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	1008	0.037			NA	NA	
2	3240	0.018			NA	NA	
3	10486	0.007			NA	NA	

Remarks

Max test pressure = 3134 kPa. Max av displ = 1.06 mm. Max arm displ = 2.34 mm (Arm2). No of loops = 3 . Analysis type: Axis 2. Amr 3 sticking

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

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Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T37

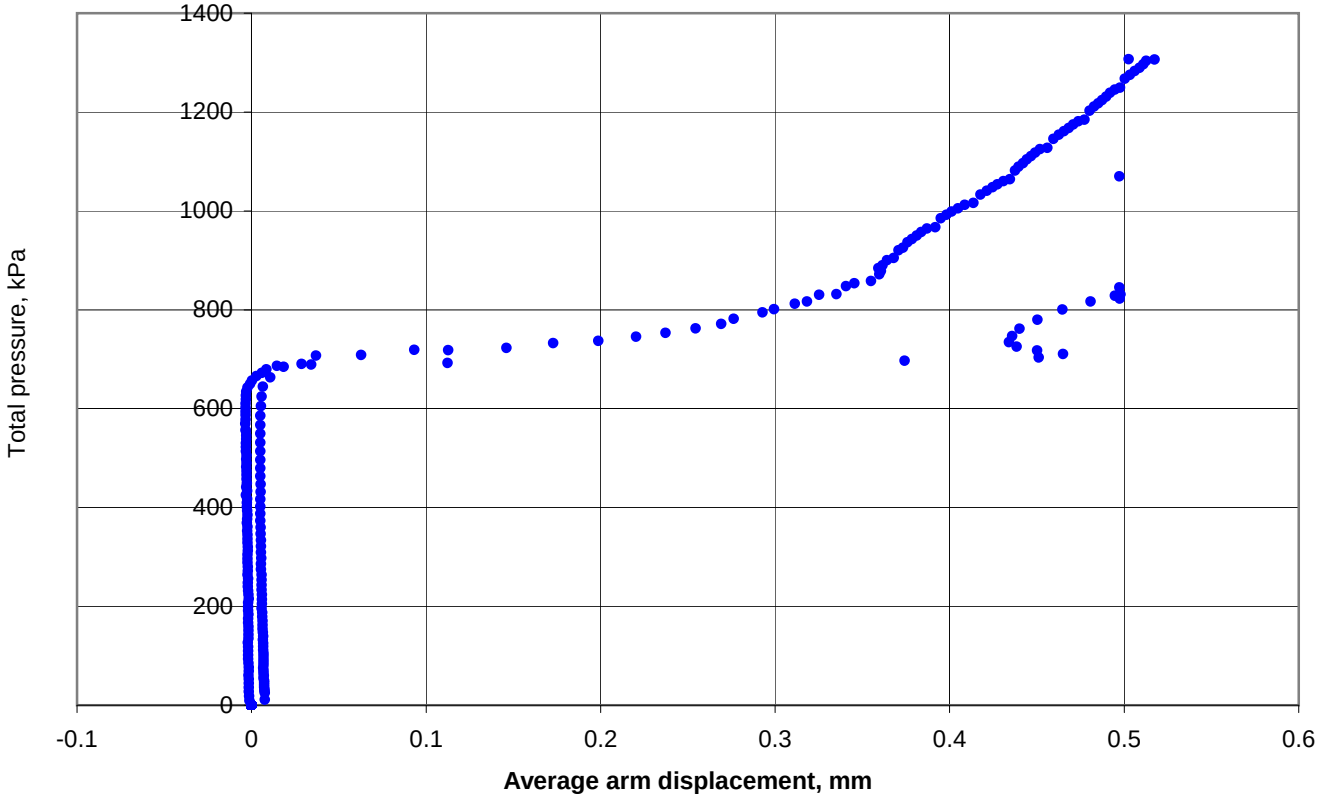
Self Boring Pressuremeter Test

Soil Mechanics

Date	04-Sep-11
Probe	SBP-3 930911
Material	grey clay with claystone b

Test reference	B4T38
GWL (mbgl)	
Test pocket (mbgl)	73.20-74.20

BH	SBP2009_4
Test	38
Depth, m	73.70



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)		$P_{o\ LO}$ (kPa)		$P_{o\ MR}$ (kPa)	
$P_{o\ curve\ modelling}$ (kPa)				$P_{o\ drained}$ (kPa)	

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)		$c_{u\ unloading}$ (kPa)		p_L (kPa)	
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Average arm)

G_i (MPa)	0

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	

Remarks

Max test pressure = 1307 kPa. Max av displ = 0.52 mm. Max arm displ = 0.88 mm (Arm2). No of loops = 0 . Analysis type: Average arm. Burst at 1300 kPa. No suitable data for analysis

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T38

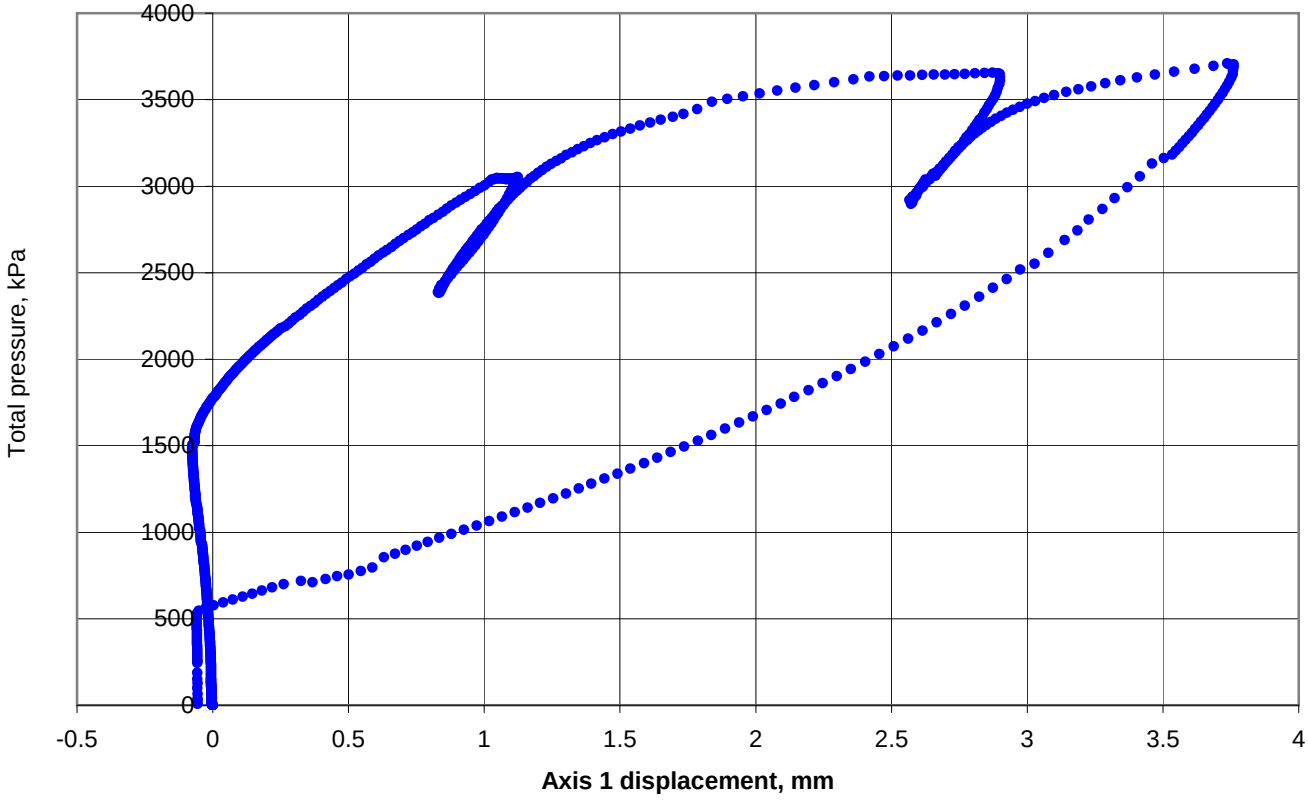
Self Boring Pressuremeter Test

Soil Mechanics

Date	05-Sep-11
Probe	SBP-3 930911
Material	Stiff grey silty clay

Test reference	B4T39
GWL (mbgl)	
Test pocket (mbgl)	74.70-75.70

BH	SBP2009_4
Test	39
Depth, m	75.20



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	1600	$P_{o\ LO}$ (kPa)	1598	$P_{o\ MR}$ (kPa)	1591
$P_{o\ curve\ modelling}$ (kPa)	1730			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)	907	$c_{u\ unloading}$ (kPa)	668	p_L (kPa)	5818
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Axis 1)

G_i (MPa)	52

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	49	1.233	0.757	12.8			
2	41	1.129	0.716	8.1			

Remarks

Max test pressure = 3710 kPa. Max av displ = 4.82 mm. Max arm displ = 10.58 mm (Arm2). No of loops = 2 . Analysis type: Axis 1. Arm 2 offline during part of test. Arm 3 stuck.

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T39

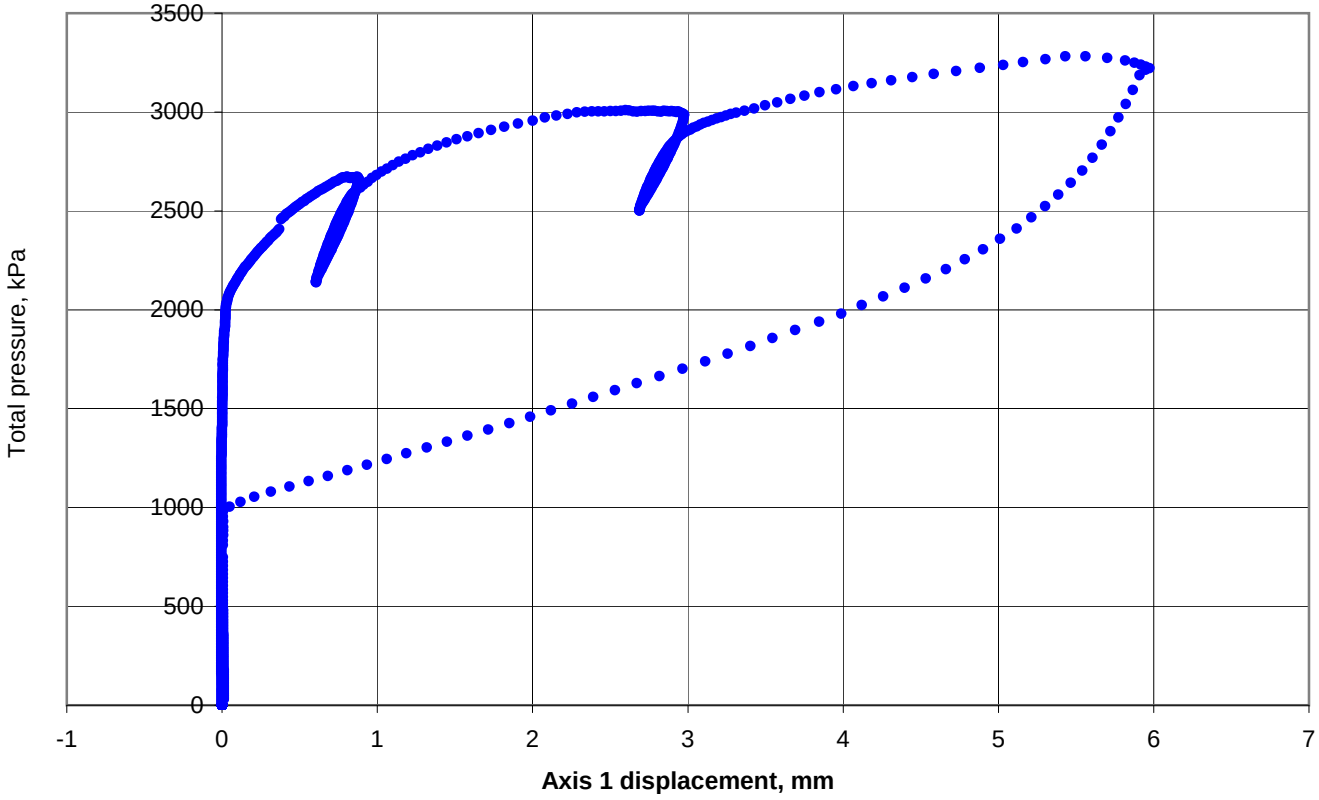
Self Boring Pressuremeter Test

Soil Mechanics

Date	14-Sep-11
Probe	SBP-3 930911
Material	Stiff clay

Test reference	B4T40
GWL (mbgl)	
Test pocket (mbgl)	76.60-77.60

BH	SBP2009_4
Test	40
Depth, m	77.10



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	1950	$P_{o\ LO}$ (kPa)	2017	$P_{o\ MR}$ (kPa)	1900
$P_{o\ curve\ modelling}$ (kPa)	2174			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)	221	$c_{u\ unloading}$ (kPa)	335	p_L (kPa)	3823
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Axis 1)

G_i (MPa)	22

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	40	1.158	0.780	13.2			
2	35	1.115	0.711	7.5			

Remarks

Max test pressure = 3282 kPa. Max av displ = 4.97 mm. Max arm displ = 10.49 mm (Arm2). No of loops = 2 . Analysis type: Axis 1. Arm 2 offline at start of test

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T40

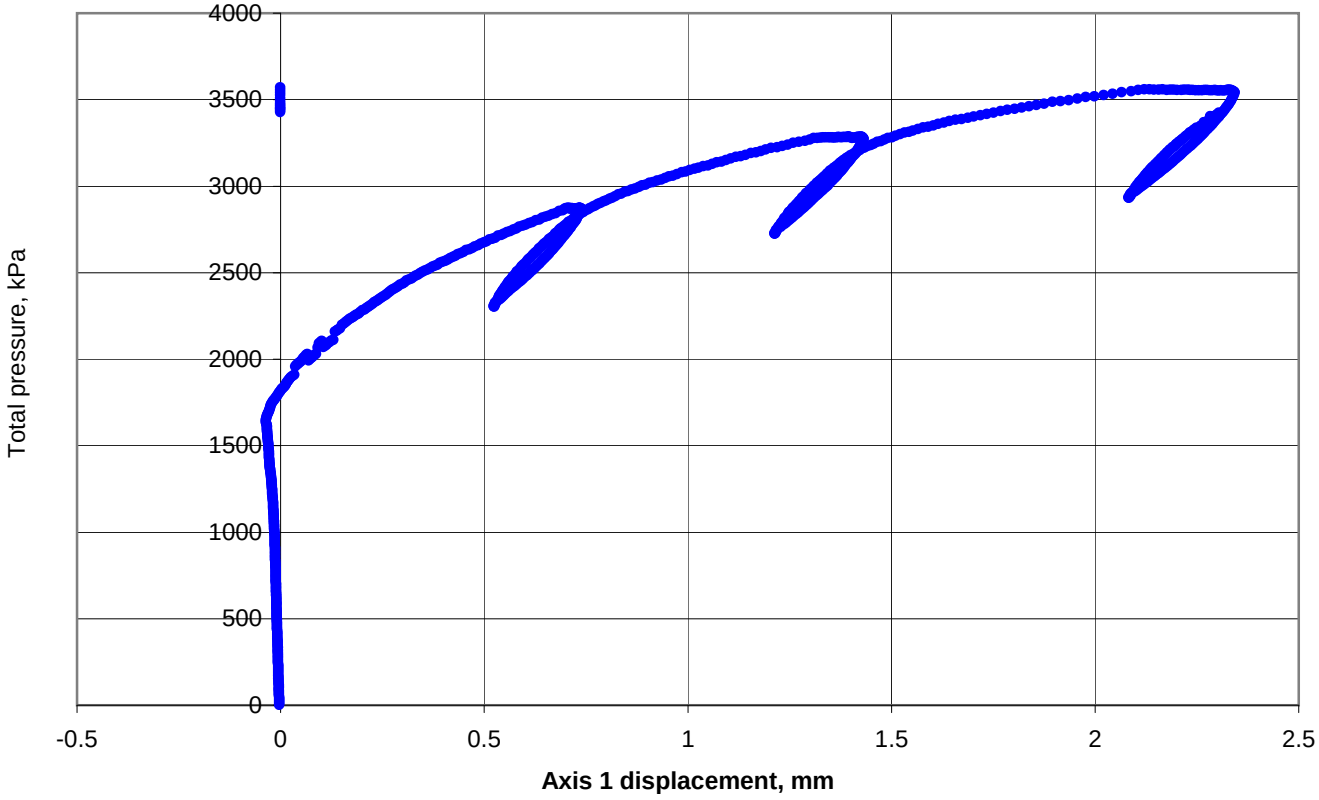
Self Boring Pressuremeter Test

Soil Mechanics

Date	15-Sep-11
Probe	SBP-3 930911
Material	Stiff clay

Test reference	B4T41
GWL (mbgl)	
Test pocket (mbgl)	77.60-78.60

BH	SBP2009_4
Test	41
Depth, m	78.10



In situ horizontal stress (Axis 1)

$P_{o\ BE}$ (kPa)	1665	$P_{o\ LO}$ (kPa)	1661	$P_{o\ MR}$ (kPa)	1879
$P_{o\ curve\ modelling}$ (kPa)	1626			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 1)

$c_{u\ loading}$ (kPa)	685	$c_{u\ unloading}$ (kPa)	184	p_L (kPa)	5233
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Axis 1)

G_i (MPa)	59

Unload-reload loop shear modulus (Axis 1)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	58	0.946	0.739	13.1			
2	54	0.917	0.762	14.3			
3	50	1.044	0.769	14.5			

Remarks

Max test pressure = 3288 kPa. Max av displ = 3.55 mm. Max arm displ = 10.5 mm (Arm2). No of loops = 3 . Analysis type: Axis 1. Arm 2 offline at start of test. Test terminated early during unloading

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T41

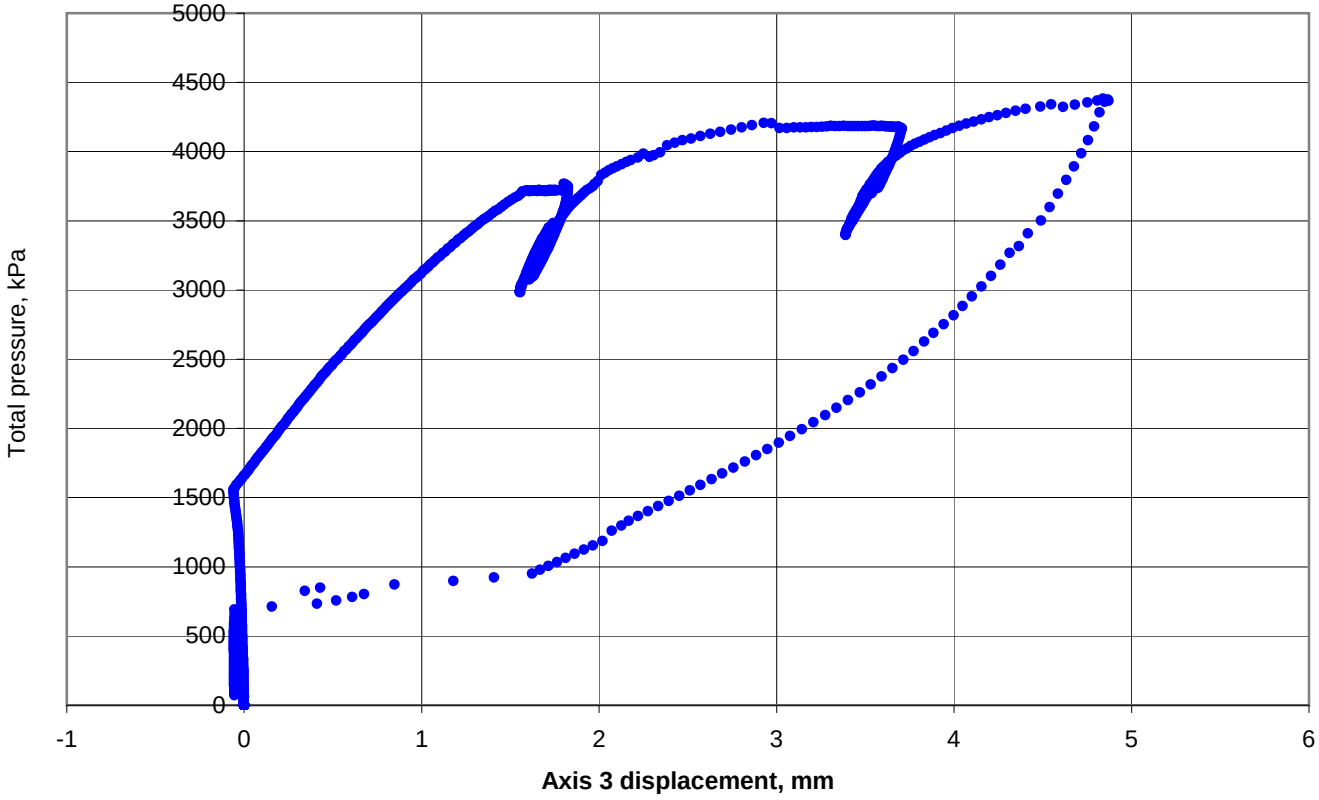
Self Boring Pressuremeter Test

Soil Mechanics

Date	16-Sep-11
Probe	SBP-3 930911
Material	Stiff clay

Test reference	B4T42
GWL (mbgl)	
Test pocket (mbgl)	79.60-80.60

BH	SBP2009_4
Test	42
Depth, m	80.10



In situ horizontal stress (Axis 3)

$P_{o\ BE}$ (kPa)	1590	$P_{o\ LO}$ (kPa)	1588	$P_{o\ MR}$ (kPa)	1598
$P_{o\ curve\ modelling}$ (kPa)	2100			$P_{o\ drained}$ (kPa)	

Shear strength (Axis 3)

$c_{u\ loading}$ (kPa)	1392	$c_{u\ unloading}$ (kPa)	586	p_L (kPa)	6761
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Axis 3)

G_i (MPa)	37

Unload-reload loop shear modulus (Axis 3)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	63	0.994	0.752	15.9			
2	50	1.202	0.704	10.5			

Remarks

Max test pressure = 4383 kPa. Max av displ = 6.16 mm. Max arm displ = 10.55 mm (Arm2). No of loops = 2 . Analysis type: Axis 3. Arm 2 ofline at start of test and intermittently during test

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T42

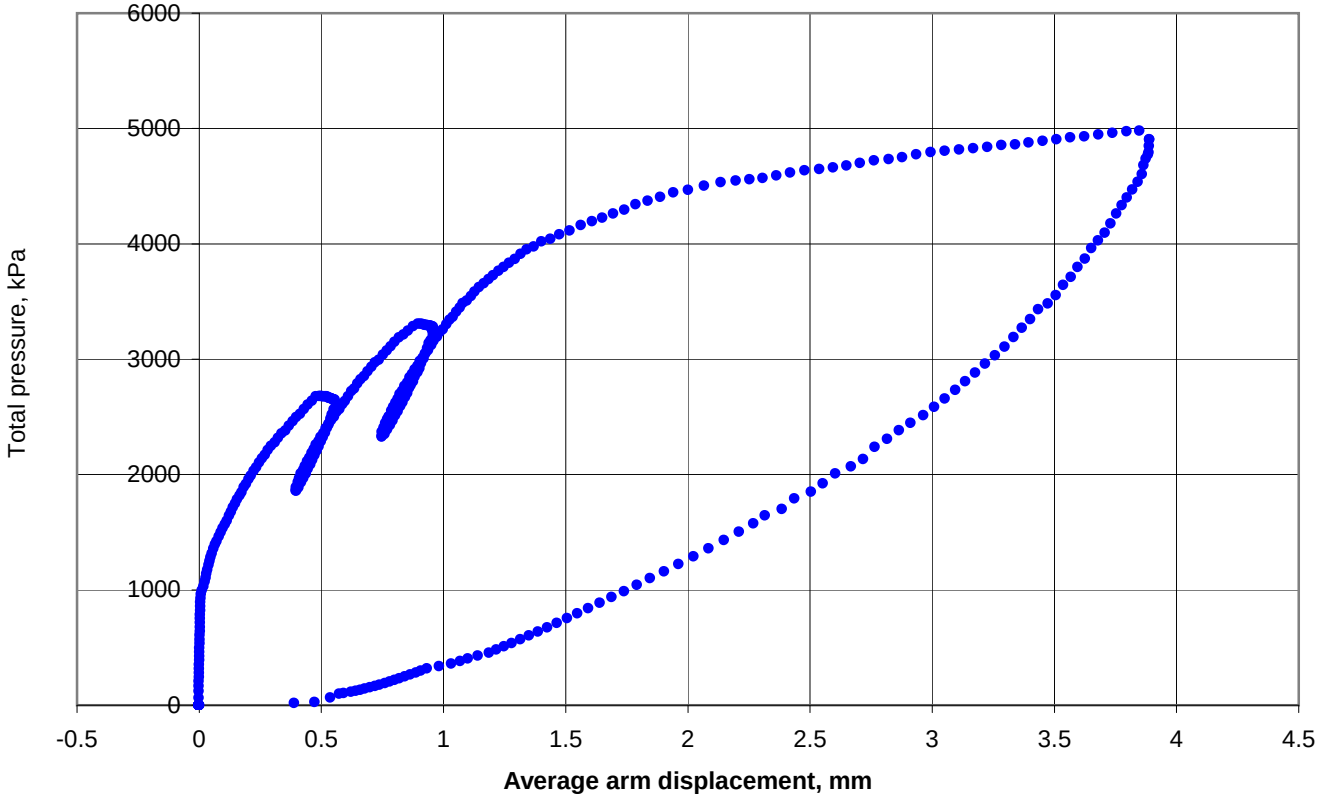
Self Boring Pressuremeter Test

Soil Mechanics

Date	19-Sep-11
Probe	SBP-6 960521
Material	Clay

Test reference	B4T43
GWL (mbgl)	
Test pocket (mbgl)	81.10-82.27

BH	SBP2009_4
Test	43
Depth, m	81.87



In situ horizontal stress (Average arm)

$P_{o\ BE}$ (kPa)	1410	$P_{o\ LO}$ (kPa)	1304	$P_{o\ MR}$ (kPa)	1408
$P_{o\ curve\ modelling}$ (kPa)	1554			$P_{o\ drained}$ (kPa)	

Shear strength (Average arm)

$c_{u\ loading}$ (kPa)	791	$c_{u\ unloading}$ (kPa)	925	p_L (kPa)	6386
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Average arm)

G_i (MPa)	98

Unload-reload loop shear modulus (Average arm)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	96	0.612	0.730	17.7			
2	91	0.793	0.770	22.9			

Remarks

Max test pressure = 4983 kPa. Max av displ = 3.89 mm. Max arm displ = 4.6 mm (Arm3). No of loops = 2 . Analysis type: Average arm.

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T43

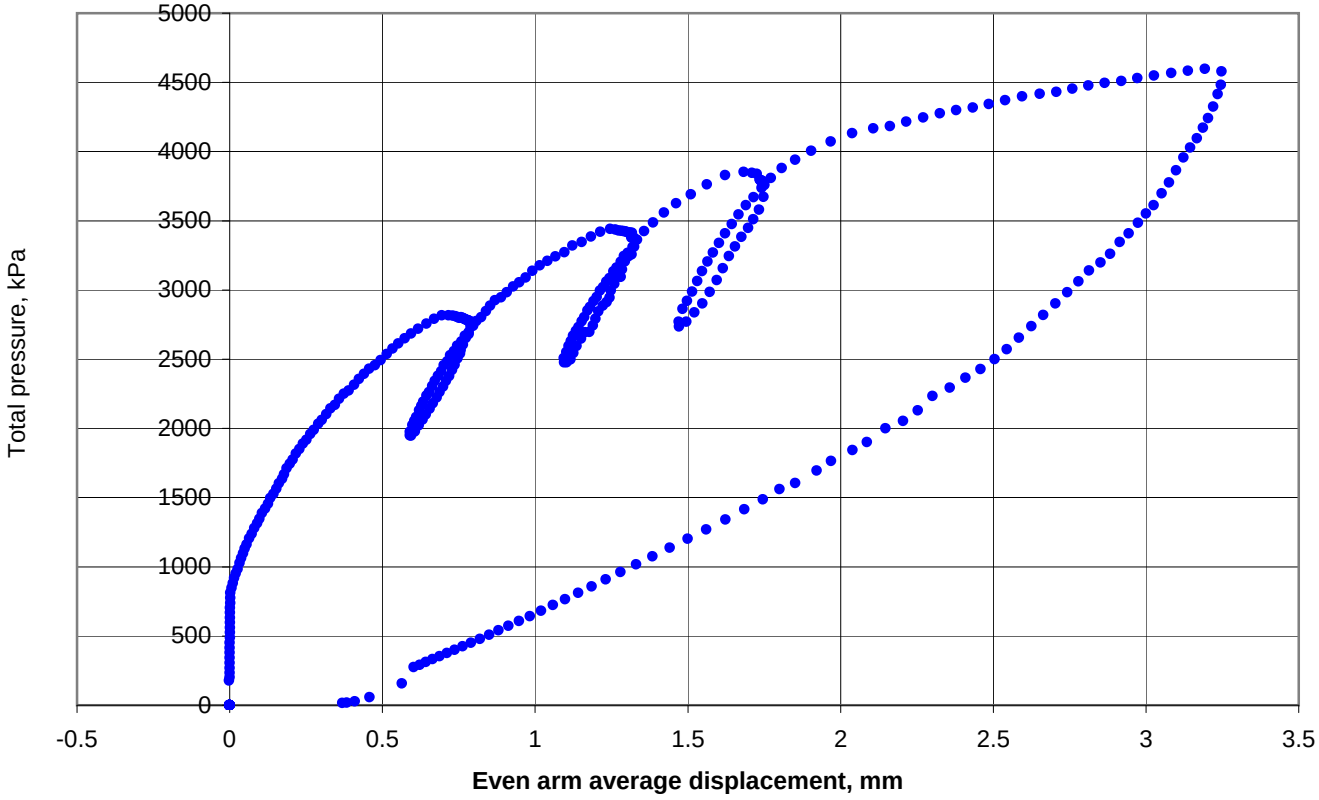
Self Boring Pressuremeter Test

Soil Mechanics

Date	19-Sep-11
Probe	SBP-6 960521
Material	Clay

Test reference	B4T44
GWL (mbgl)	
Test pocket (mbgl)	82.27-83.25

BH	SBP2009_4
Test	44
Depth, m	82.85



In situ horizontal stress (Even arm average)

$P_{o\ BE}$ (kPa)	1135	$P_{o\ LO}$ (kPa)	1595	$P_{o\ MR}$ (kPa)	1138
$P_{o\ curve\ modelling}$ (kPa)	1645			$P_{o\ drained}$ (kPa)	

Shear strength (Even arm average)

$c_{u\ loading}$ (kPa)	1293	$c_{u\ unloading}$ (kPa)	967	p_L (kPa)	7250
ϕ_{cv} (deg)		ϕ (deg)		ν (deg)	

Initial shear modulus (Even arm average)

G_i (MPa)	90

Unload-reload loop shear modulus (Even arm average)

Loop ref	G_{ur} (MPa)	ε_c (%)	Non linear stiffness interpretation				Remarks
			Undrained		Drained		
			β	α (MPa)	Gradient	Intercept, MPa	
1	87	0.853	0.790	26.2			
2	85	0.991	0.747	19.5			
3	83	1.220	0.748	21.3			

Remarks

Max test pressure = 4598 kPa. Max av displ = 3.17 mm. Max arm displ = 4.43 mm (Arm1). No of loops = 3 . Analysis type: Even arm average. Arm 3 lift off during Loop 1

Notes:

Project ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL

Project No. M0102-10

Carried out for NNB Generation Company Limited

Figure

SBP2009_4 T44

ENCLOSURE A

CALIBRATION REGISTERS

SBP-6 No. 960521

SBP-3 No. 930111

SBP-3 No Dylan

Pressuremeter Calibration Register

Soil Mechanics

Instrument :	SBP - MPX Type D 6 arm	Serial No.	960521

	Arm calibrations (mV / mm)						Pressure cell calibrations (mV / MPa)			
Date	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	Arm 6	TPC	PPA	PPB	Cable (m)
22-Apr-10	294.7	325.2	297.2	308.7	302.3	316.8				
18-Aug-10	310.3	315.4	301.2	306.8	294.8	298.5	558.8	221.0	233.8	
Average	**303**	**320**	**299**	**308**	**299**	**308**	**559**	**221**	**234**	
01-Oct-10	278.7	298.6	305.6	308.1	287.5	293.1	535.2	257.5		Repaired
17-Nov-10	293.7	303.9	295.7	308.1	291.7	297.5	558.9	253.8	235.1	
Average	**286**	**301**	**301**	**308**	**290**	**295**	**547**	**256**	**235**	

	Calculated arm zeroes (mV)						Calculated pressure cell zeroes (mV)			
22-Apr-10	112.7	160.7	-92.5	-183.4	200.0	425.9				
18-Aug-10	77.2	184.2	-238.8	-98.5	-30.7	374.3	-1339.9	35.9	-1081.7	
Average	**95.0**	**172.4**	**-165.6**	**-140.9**	**84.7**	**400.1**	**-1339.9**	**35.9**	**-1081.7**	
01-Oct-10	49.4	192.3	-84.4	-98.4	-48.4	384.9	-1550.7	-199.1		
17-Nov-10	118.9	272.7	-99.0	-56.1	42.4	466.1	-1304.1	-67.1	-1162.1	
Average	**84.2**	**232.5**	**-91.7**	**-77.2**	**-3.0**	**425.5**	**-1427.4**	**-133.1**	**-1162.1**	

Date	Membrane calibrations					Tests
	File ref.	Intercept (kPa)	Slope (kPa/mm)	Comprssn (mm/GPa)	Remarks	
22-Apr-10		25.1	12.8			
13-Jul-10	C3T1	38.6	23			
19-Aug-10	C3T4	-3.6	12			
07-Sep-10	C3T5	59.2	21			
18-Sep-10	C3T6	45.0	20			
Average		**33**	**18**			

Notes:

Slope 10 kPa/mm

Offset 10 kPa

Project SIZEWELL C POWER STATION ONSHORE INVESTIGATION

Project No. A0012-10

Carried out for NNB Generation Company Limited

Table

SBP-6 960521

Pressuremeter Calibration Register

Soil Mechanics

Instrument :	SBP-MPX 3 arm	Serial No.	930111

	Arm calibrations (mV / mm)						Pressure cell calibrations (mV / MPa)			
Date	Arm 1	Arm 2	Arm 3				TPC	PPA	PPB	Cable (m)
27-Jul-10	308.4	273.1	292.7				650.6	(213)	(233)	
18-Sep-10	313.1	273.1	292.3				650.1	214.4	233.8	
13-Oct-10	329.9	318.5	285.7				633.2	211.8	229.1	
19-Nov-10	333.9	300.8	285.8				654.1	215.0	233.6	
Average	**332**	**310**	**286**				**647**	**213**	**232**	

Date	Calculated arm zeroes (mV)						Calculated pressure cell zeroes (mV)			
27-Jul-10	-7.7	133.7	128.5				-745.8			
18-Sep-10	43.0	149.4	253.9				608.3	-467.4	-758.5	
13-Oct-10	19.5	-43.5	84.8				-662.6	550.6	-429.9	
19-Nov-10	99.2	7.4	92.2				-754.3	496.3	-442.4	
Average 2010	**59**	**-18**	**88**				**-708**	**523**	**-436**	

Date	Membrane stiffness calibration			
	File ref.	Intercept (kPa)	Slope (kPa/mm)	Remarks
08-Jul-10	C2009T1	56	18	
08-Jul-10	C2009T2	50	17	
08-Jul-10	C2009T3	44	17	
08-Jul-10	C2009T4	46	15	
08-Jul-10		44	17	
27-Jul-10	C2009T5	20	11	
27-Jul-10	C2009T6	20	9	
27-Jul-10		14	10	
10-Aug-10	C2009T7	42	8	
01-Sep-10	C2009T8	14	8	
19-Sep-10	C2009T9	54	29	
30-Sep-10	C2T10	46	28	
13-Oct-10		22	12	
Average 2010		**36**	**15**	

Notes:

Project SIZEWELL C POWER STATION ONSHORE INVESTIGATION

Project No. A0012-10

Carried out for NNB Generation Company Limited

Table

PMT CAL

Pressuremeter Calibration Register

Soil Mechanics

Instrument :	SBP-MPX 3 arm	Serial No.	Dylan

	Arm calibrations (mV / mm)						Pressure cell calibrations (mV / MPa)			
Date	Arm 1	Arm 2	Arm 3				TPC	PPA	PPB	Cable (m)
16-Jul-10	303.5	288.2	288.0				402.9	234.3	244.3	
Average	**304**	**288**	**288**				**403**	**234**	**244**	

Date	Calculated arm zeroes (mV)						Calculated pressure cell zeroes (mV)			
16-Jul-10	-126.1	-361.1	-363.9				-1279.4	-7.4	-1880.1	
Average 2010	**-126**	**-361**	**-364**				**-1279**	**-7**	**-1880**	

Date	Membrane stiffness calibration			
	File ref.	Intercept (kPa)	Slope (kPa/mm)	Remarks
16-Jul-10		29	8	
05-Aug-10		12	14	
07-Aug-10		21	10	
Average 2010		**21**	**11**	

Notes:

Project SIZEWELL C POWER STATION ONSHORE INVESTIGATION

Project No. A0012-10

Carried out for NNB Generation Company Limited

Table

SBP-3 Dylan

ENCLOSURE B

EXAMPLE ANALYSES

Notes on Pressuremeter Test Results	Key
Example Undrained Analysis Output	14 sheets
Example Drained Analysis Output	12 sheets

Notes on Pressuremeter Test Results

Soil Mechanics

KEY TO RESULTS

P_o	Pressure corresponding to regeneration of in situ strain.
c_u	Undrained shear strength.
p_L	Limit pressure.
G_i	Initial shear modulus.
G_{ur}	Shear modulus derived from unload-reload loop.
ε_c	Cavity strain range over which loop has been performed.
G_s	Shear modulus = $\alpha \gamma^{\beta-1}$ for non-linear stiffness model
γ	Shear strain
α	Shear stress constant = $\eta \beta$
η	Radial stress constant
β	Elastic exponent

NOTES ON RESULTS

1. Summary results are presented for the pressuremeter tests carried out at this site. Full details of the tests and analysis are presented in Enclosure A. Where appropriate, the summary results presented here are based on a graphical average of all three strain axes of the pressuremeter. Use of average readings for strain arms reduces the influence of movement of the pressuremeter relative to the test pocket and may therefore be considered to be a more reliable result. Reference should be made to graphical data and test notes to assess the reliability of individual results.

2. The material type quoted is the presumed geological horizon. Reference should be made to borehole records for a full description.

3. The depth quoted for the test is the depth of the centre of the expanding section of the pressuremeter, corresponding to the location of the strain arms.

4. The test references used are the references assigned by the logging and analysis software. These take the form of BxxTyy, where xx is a two digit abbreviation of the borehole number and yy is a two digit test number, sequential for each borehole.

5. In cohesive soils the in situ total horizontal stress ($ó_{ho}$) is usually assessed using either the 'lift-off' method or the modified Marsland and Randolph method. The former assumes an idealised insertion of the pressuremeter into the ground without disturbance; the latter can only be applied where the material strength allows some yielding of the material within the pressure capacity of the instrument. As a result an accurate assessment of in situ horizontal stress may not always be reliably made. It is also possible to determine the in situ horizontal stress from the curve fitting procedure described in Section 9 below and this has been used where appropriate. The best estimate of in situ stress is a subjective assessment of the various results obtained from the different methods. This is used in the calculation of shear strength from the loading part of the test curve.

6. A pressuremeter test fails the ground in shear and all moduli quoted are shear moduli. Unload-reload loops are performed in tests to provide an estimate of unload-reload shear modulus (G_{ur}). The actual value of G_{ur} is dependant on stress level and cavity strain range and the value given should be normalised as appropriate.

7. It is normal practice to carry out two or more unload-reload loops during a test. Results from these individual loops are presented consecutively (ie G_{ur} for loop 1 is presented above G_{ur} for loop 2). The cavity strain range (ε_c) over which the loop has been performed is presented alongside the relevant G_{ur} value.

8. Shear modulus (G) and Young's Modulus (E) are theoretically related by:

$$E = 2G(1+ \nu)$$

where ν is Poisson's Ratio

Due to the finite stiffness of the equipment and the potential in accuracies associated with the methods used to assess the compression of the instrument membrane it is not possible to accurately measure shear moduli in excess of about 3000 MPa and in such circumstances values are reported simply as greater than 3000 MPa.

9. Non-linear stiffness/strain response

The Windle and Wroth (1977) interpretation is used to derive a value of shear modulus from the whole of an unload-reload loop; this values is quoted along with the corresponding change in strain during the loop. However, the elastic response of a soil is known to be non-linear and measurements of stiffness are therefore dependent on the magnitude of the corresponding strain. The Bolton and Whittle (1999) analysis extends the interpretation to give a comprehensive description of this non-linear relationship by looking at smaller increments of pressure and strain other than the points at the extreme ends of the loop. The shear modulus can be determined for the individual data points on the reloading part of the unload-reload loop from the increments of pressure and strain relative to an origin which is taken as the minimum values of stress and strain for the loop.

According to Bolton & Whittle (1999) the variation of stiffness (shear modulus, G_s) with strain (cavity strain, γ_c) seen during reloading in an unload-reload loop can be expressed as a power law, $G_s = \alpha \gamma_c^{\beta-1}$. The theory indicates a linear relationship between the log of radial stress and the log of shear strain, defined by a line with gradient β (the elastic exponent) and intercept η (radial stress constant). The shear stress constant α is equal to $\eta\beta$. These values are reported on the test summary sheets.

A curve fitting method of test interpretation has been developed from this approach.

10. Tests terminated by membrane rupture before the full testing cycle could be completed have been identified as such on the individual test summary.

B2T12 - SUMMARY OF RESULTS
[File made with WinSitu Version 1.4.1.1]

[DETAILS OF TEST]
Project : M0102-10
Site : Sizewell C
Borehole : SBP2009_2
Test name : B2T12
Test date : 31 Oct 10
Test depth : 62.00 Metres
Water table : Metres
Ambient PWP : 780.0 kPa
Material : Sandy clay
Probe : Digital 6 arm weak rock self boring pressuremeter
Diameter : 89.1 mm
Data analysed using average arm displacement curve
A non-linear analysis of the rebound cycles has been carried out
The file includes results from a curve fitting analysis

Analysed by on 23 Nov 10

Remarks: Instrument tip at 62.5m. 90% seal during boring.

[RESULTS FOR CAVITY REFERENCE PRESSURE]
Strain Origin (mm) : "Arm ave=0.003"
Po from Marsland & Randolph (kPa) : "Arm ave=491.9"
Po from Lift off (kPa) : "Arm ave=774.3"
PWP versus Total Stress (kPa) : "PPC Ave=696.3"
Best estimate of Po (kPa) : "Arm ave=740.0"

[UNDRAINED STRENGTH PARAMETERS]
Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=915.7"
Limit pressure (kPa) : "Arm ave=5633"
Jefferies 1988 - Cu (kPa) : "Arm ave=539.3"
Undrained yield stress (kPa) : "Arm ave=1122.6"

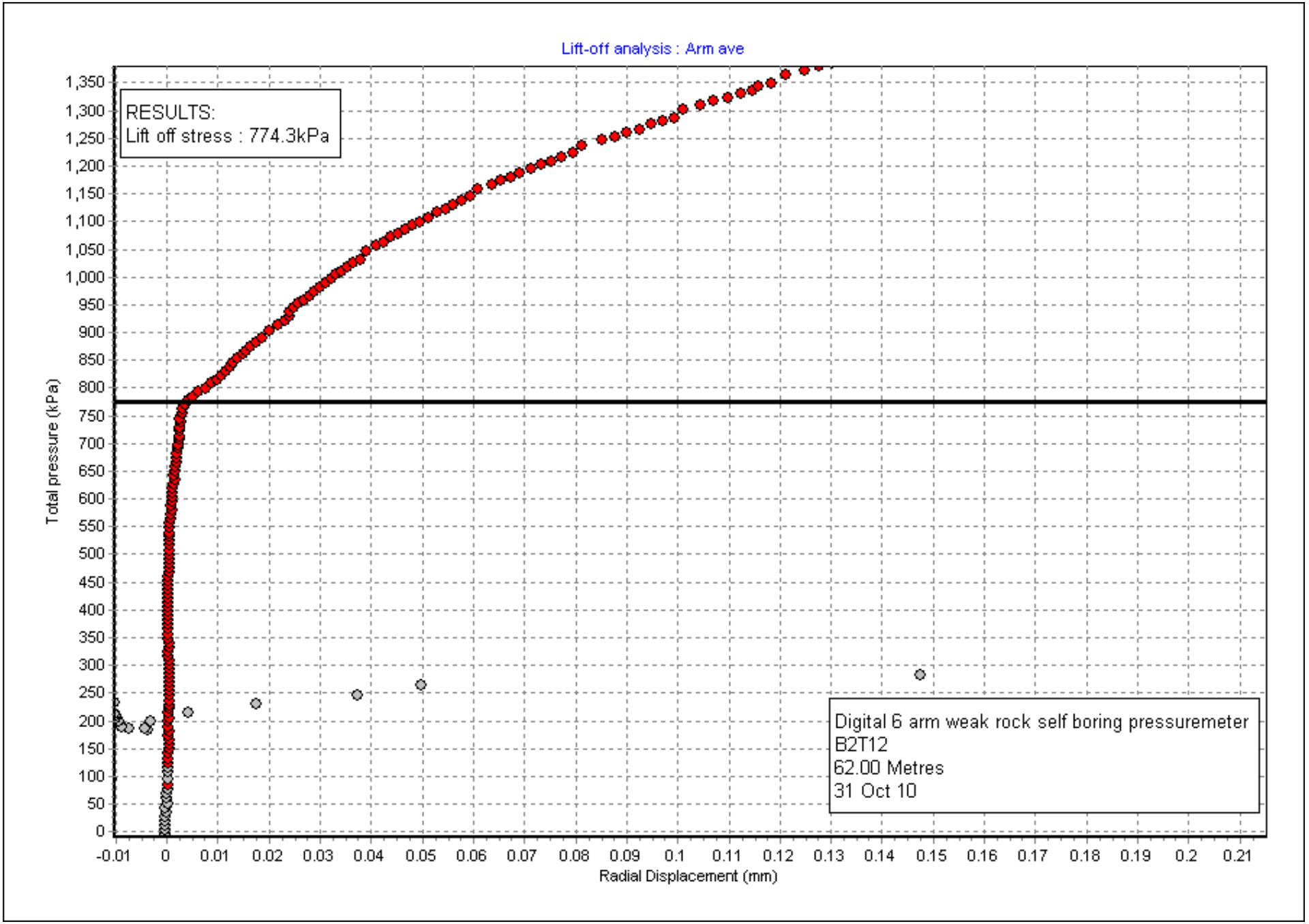
[LINEAR INTERPRETATION OF SHEAR MODULUS G]
Initial slope shear modulus (MPa) :"Arm ave=158.3"

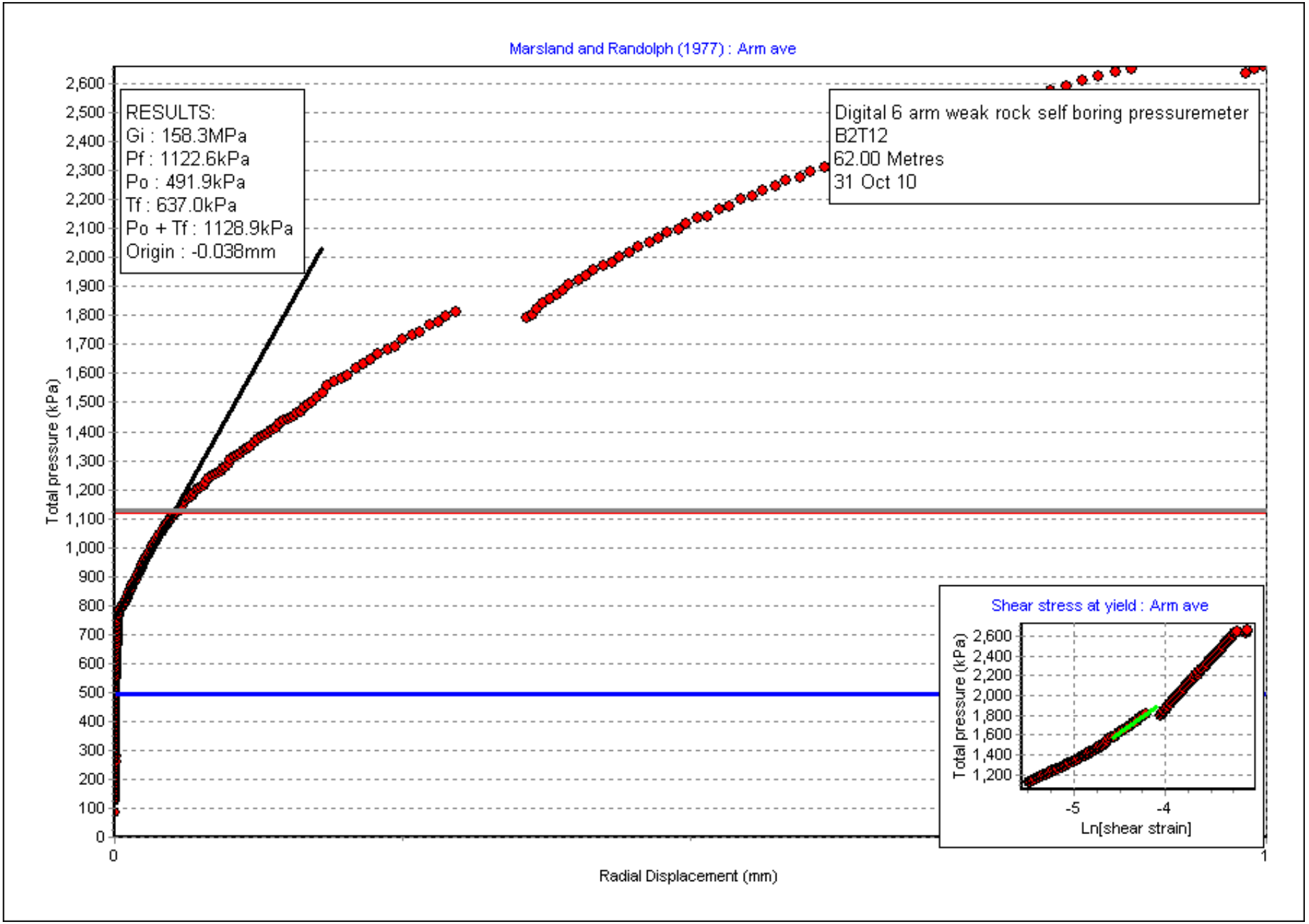
Axis	Loop No	Value (MPa)	Mean Strain (%)	Mean Pc (kPa)	dE (%)	dPc (kPa)
Arm ave	1	166.2	0.695	1536	0.183	305
Arm ave	2	131.5	2.026	2289	0.322	424
Arm ave	3	136.8	3.857	2854	0.281	385

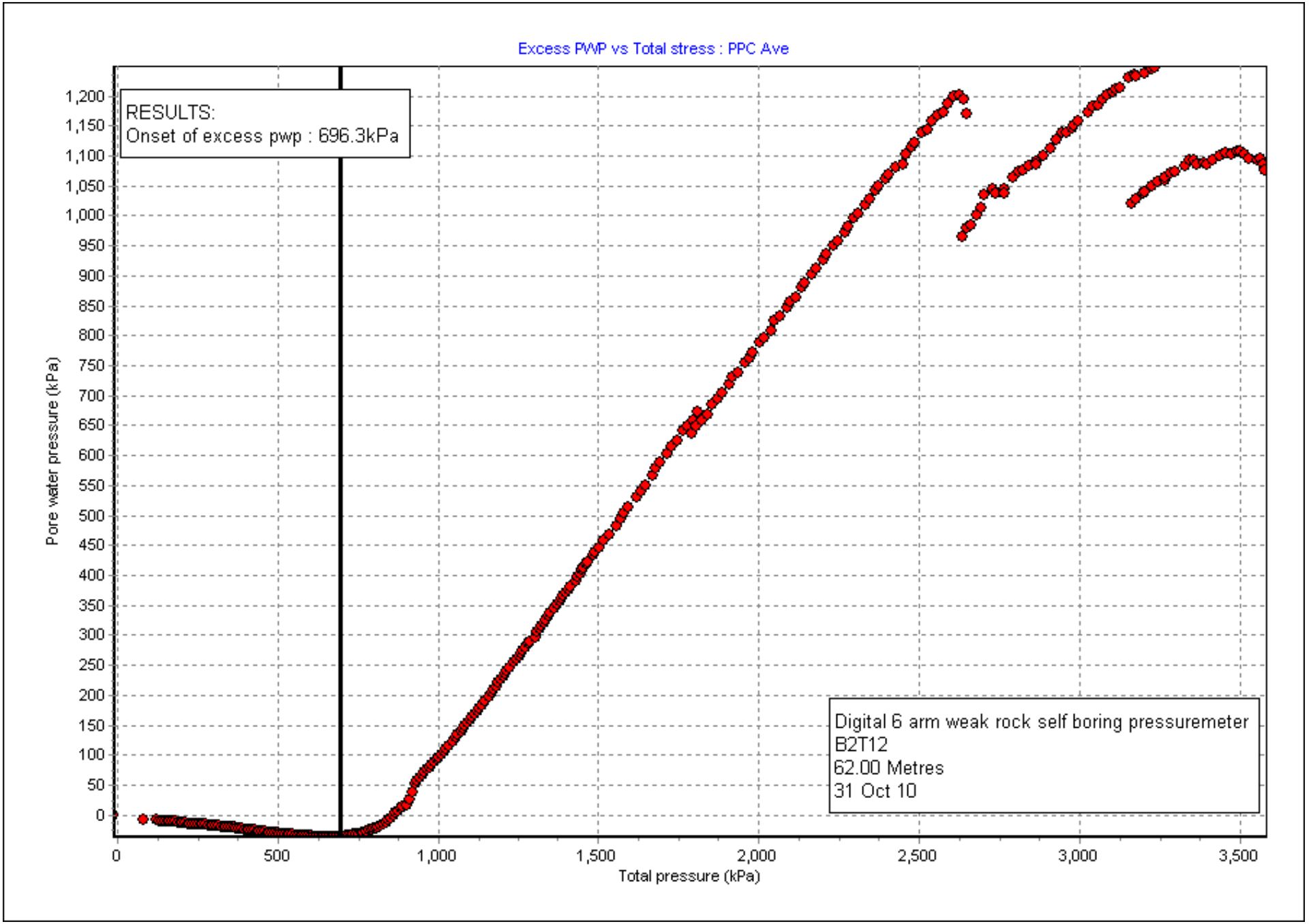
[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

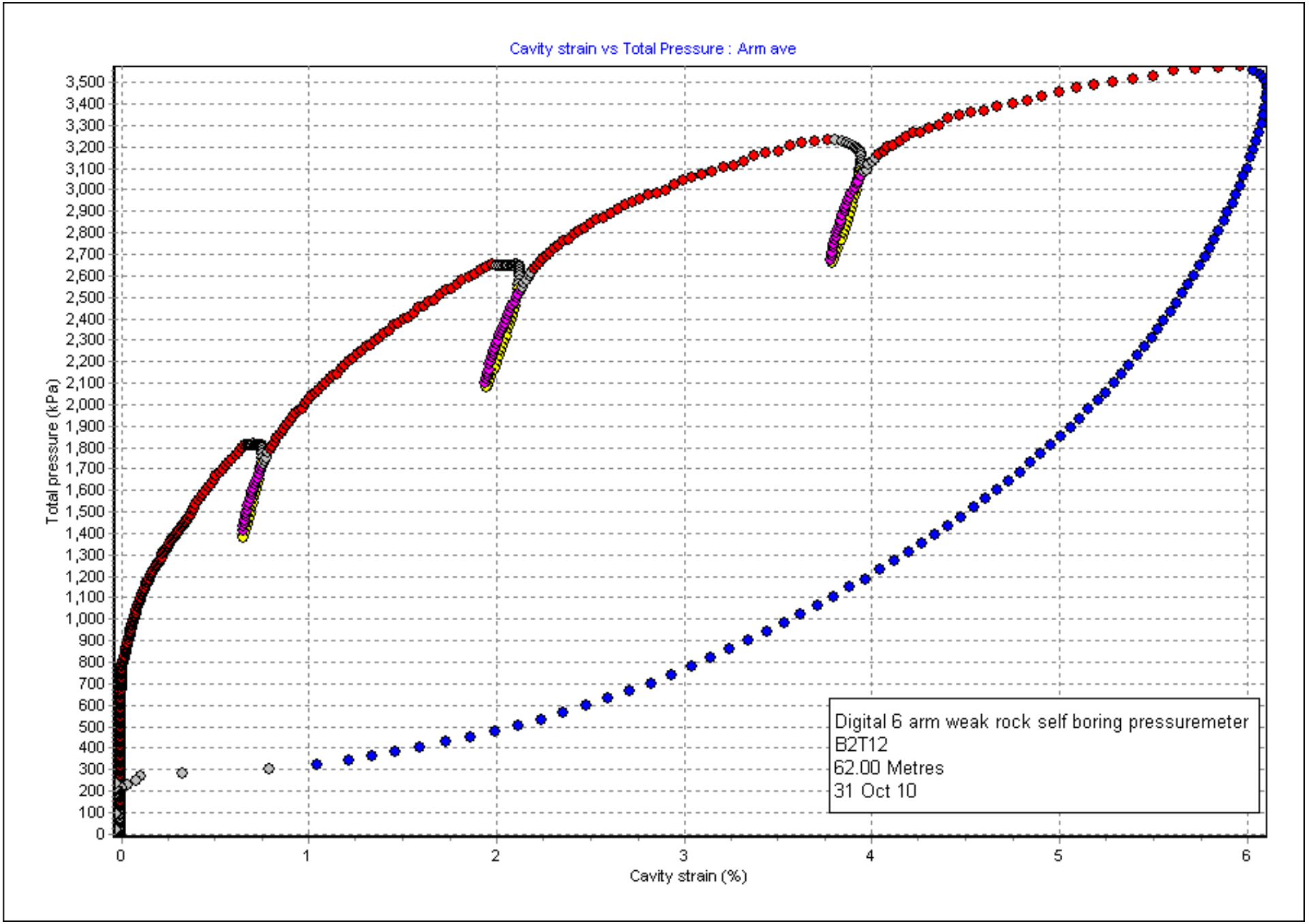
Axis	Loop No	Intercept (MPa)	Alpha (MPa)	Gradient
Arm ave	1	14.545	8.912	0.613
Arm ave	2	22.658	15.825	0.698
Arm ave	3	25.160	17.910	0.712

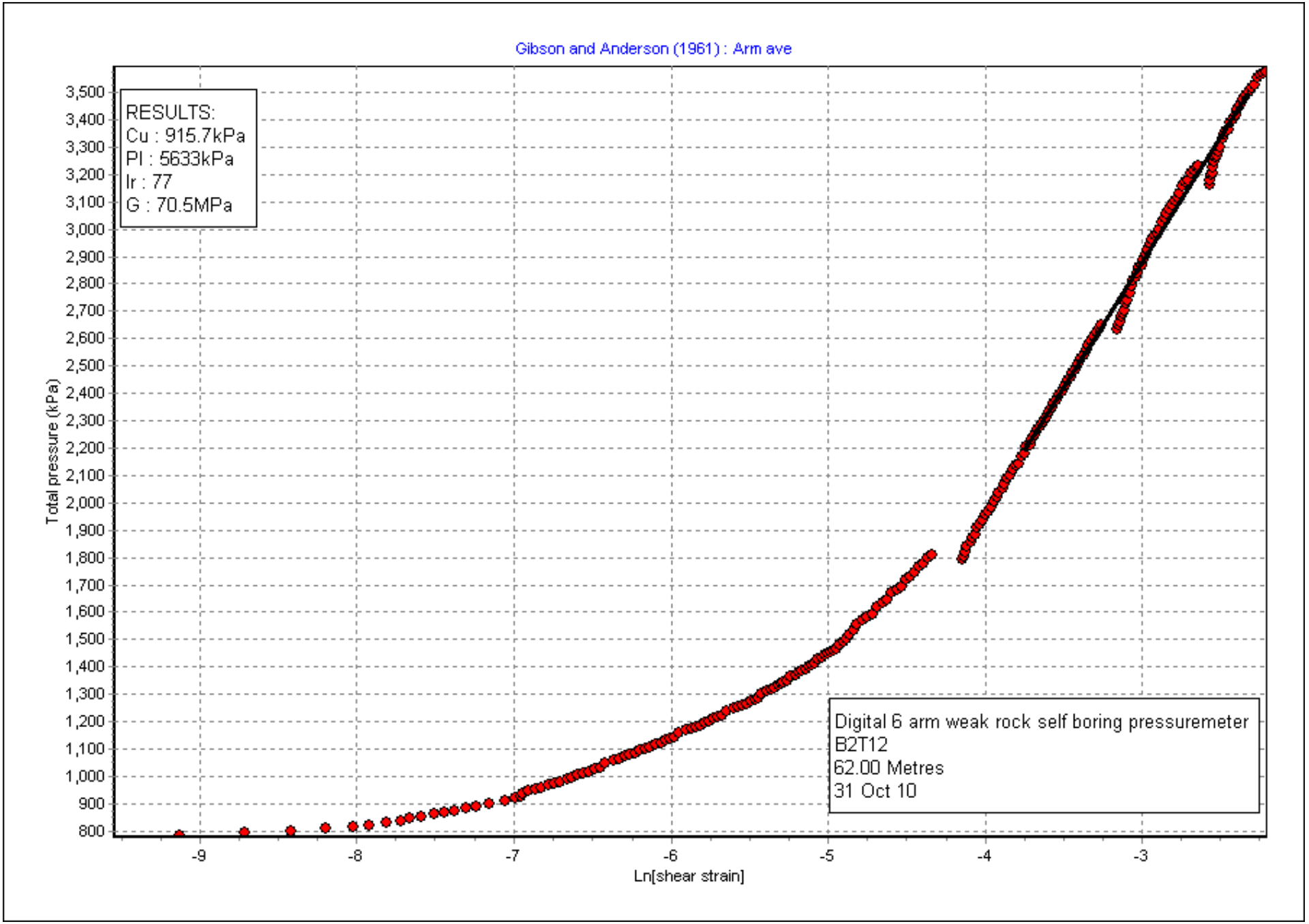
[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]
Axis is Arm ave
Strain Origin (mm) : 0.41
Po (kPa) : 1300
Cu (kPa) : 605.5
Limit pressure (kPa) : 5011
Non-linear exponent : 0.712
Calculated alpha (MPa) : 17.489
G at yield (MPa) : 68.2

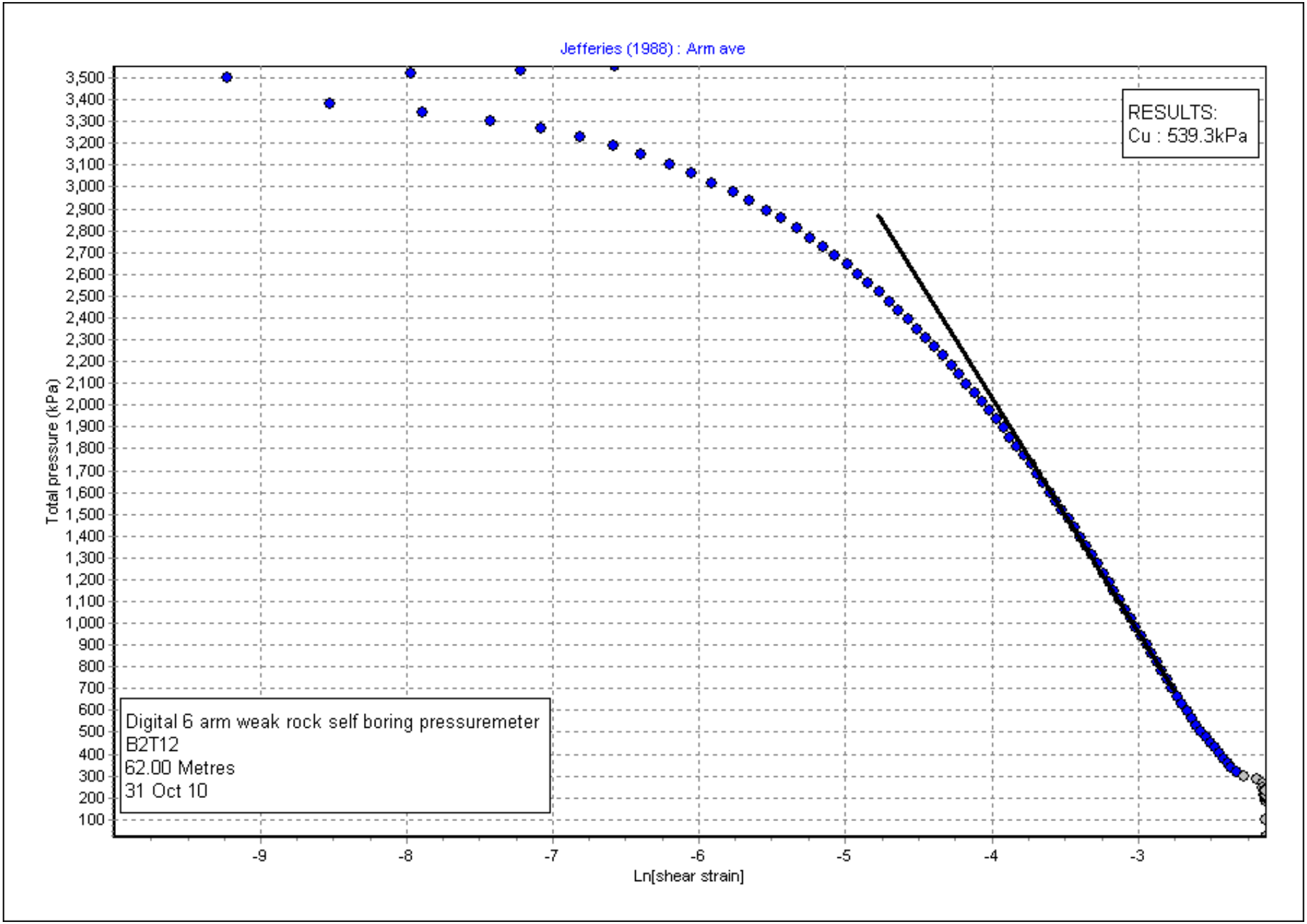

Lift-off analysis : Arm ave
RESULTS:
Lift off stress : 774.3kPa
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
Total pressure (kPa)
Radial Displacement (mm)
1,350
1,300
1,250
1,200
1,150
1,100
1,050
1,000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-0.01
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
0.11
0.12
0.13
0.14
0.15
0.16
0.17
0.18
0.19
0.2
0.21

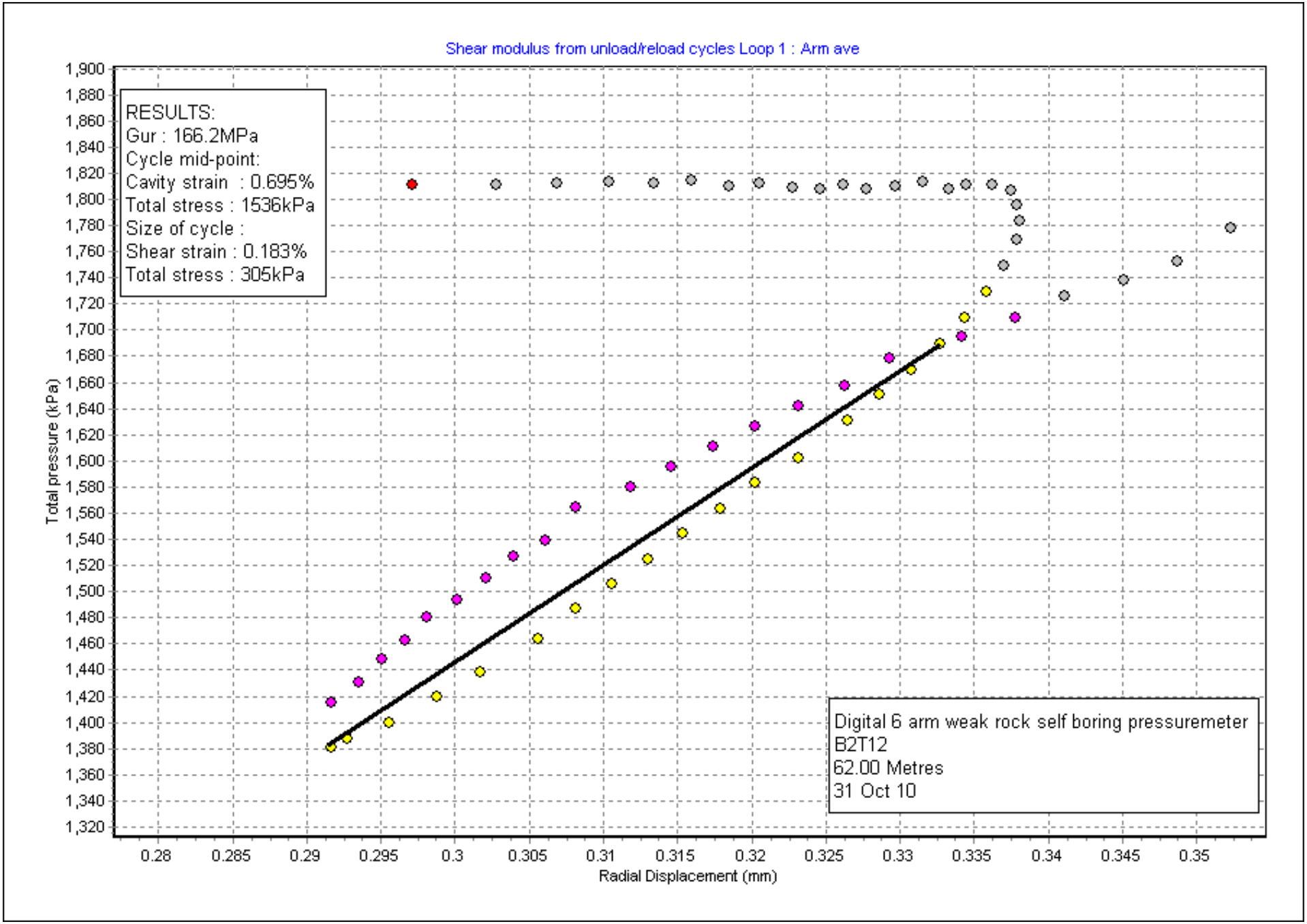

Marsland and Randolph (1977) : Arm ave
RESULTS:
Gi : 158.3MPa
Pf : 1122.6kPa
Po : 491.9kPa
Tf : 637.0kPa
Po + Tf : 1128.9kPa
Origin : -0.038mm
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
Total pressure (kPa)
Radial Displacement (mm)
Shear stress at yield : Arm ave
Total pressure (kPa)
Ln[shear strain]

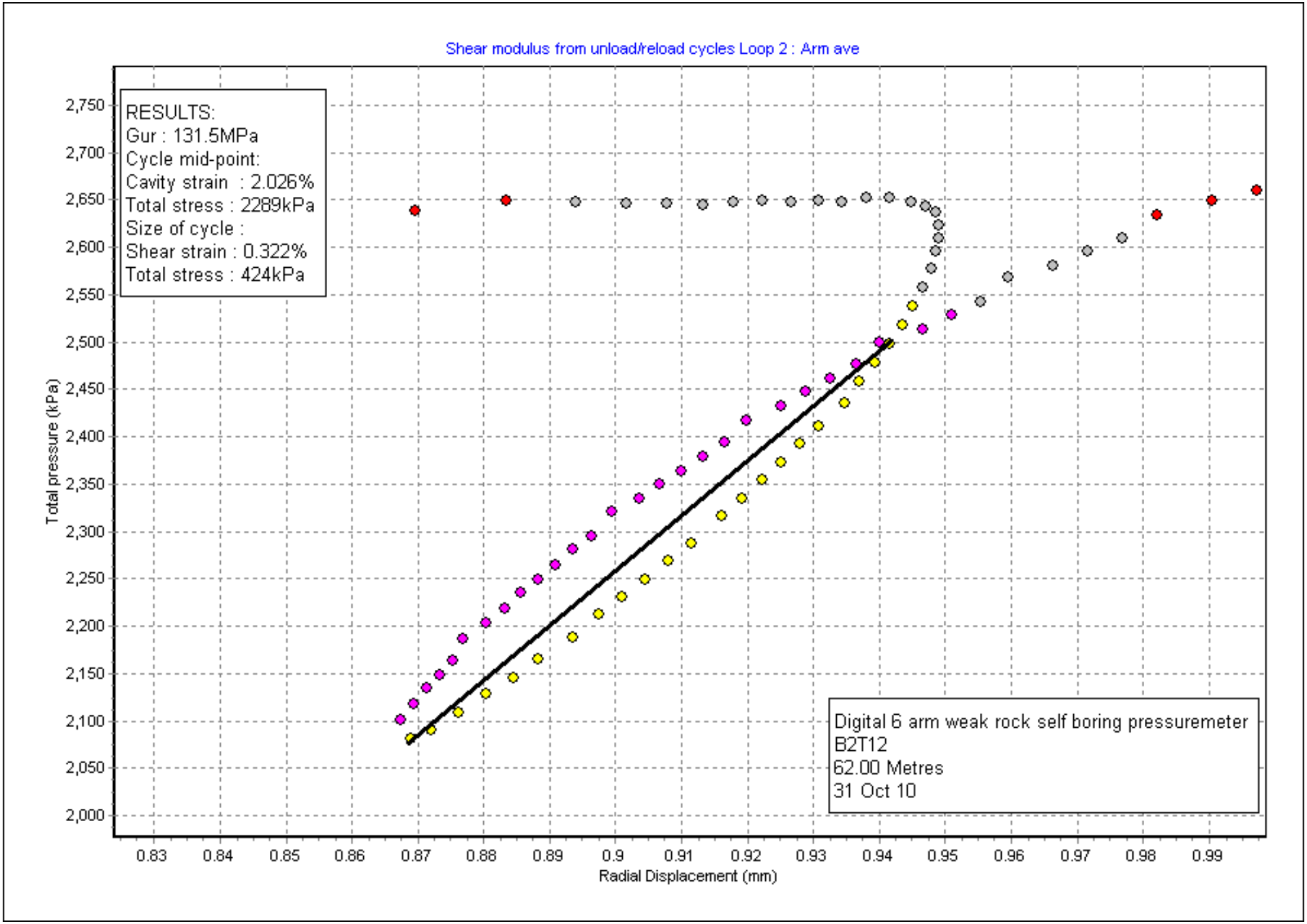

Excess PWP vs Total stress : PPC Ave
RESULTS:
Onset of excess pwp : 696.3kPa
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
Pore water pressure (kPa)
Total pressure (kPa)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1,000
1,050
1,100
1,150
1,200
0
500
1,000
1,500
2,000
2,500
3,000
3,500

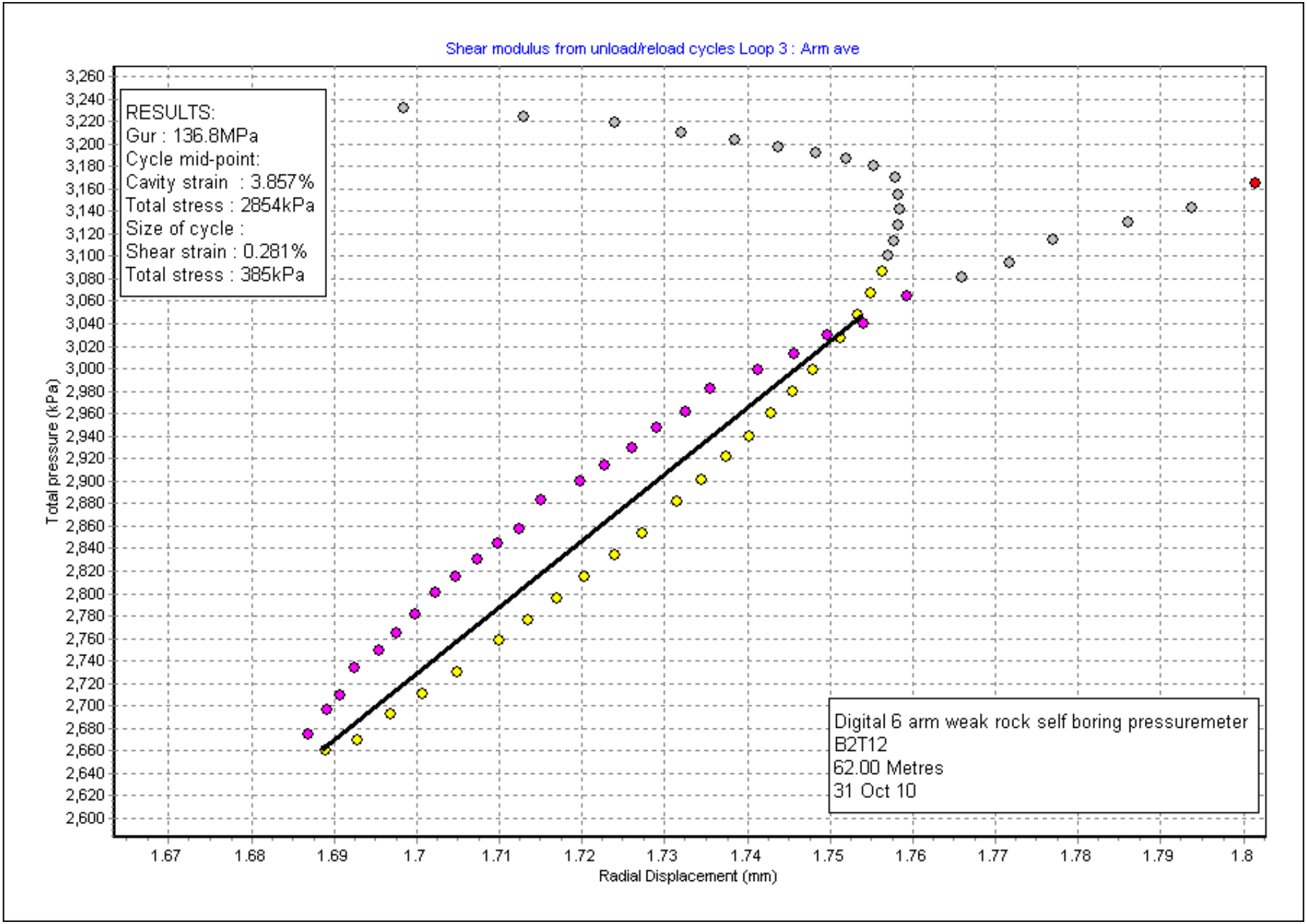

Cavity strain vs Total Pressure : Arm ave
Total pressure (kPa)
3,500
3,400
3,300
3,200
3,100
3,000
2,900
2,800
2,700
2,600
2,500
2,400
2,300
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
0
1
2
3
4
5
6
Cavity strain (%)
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10

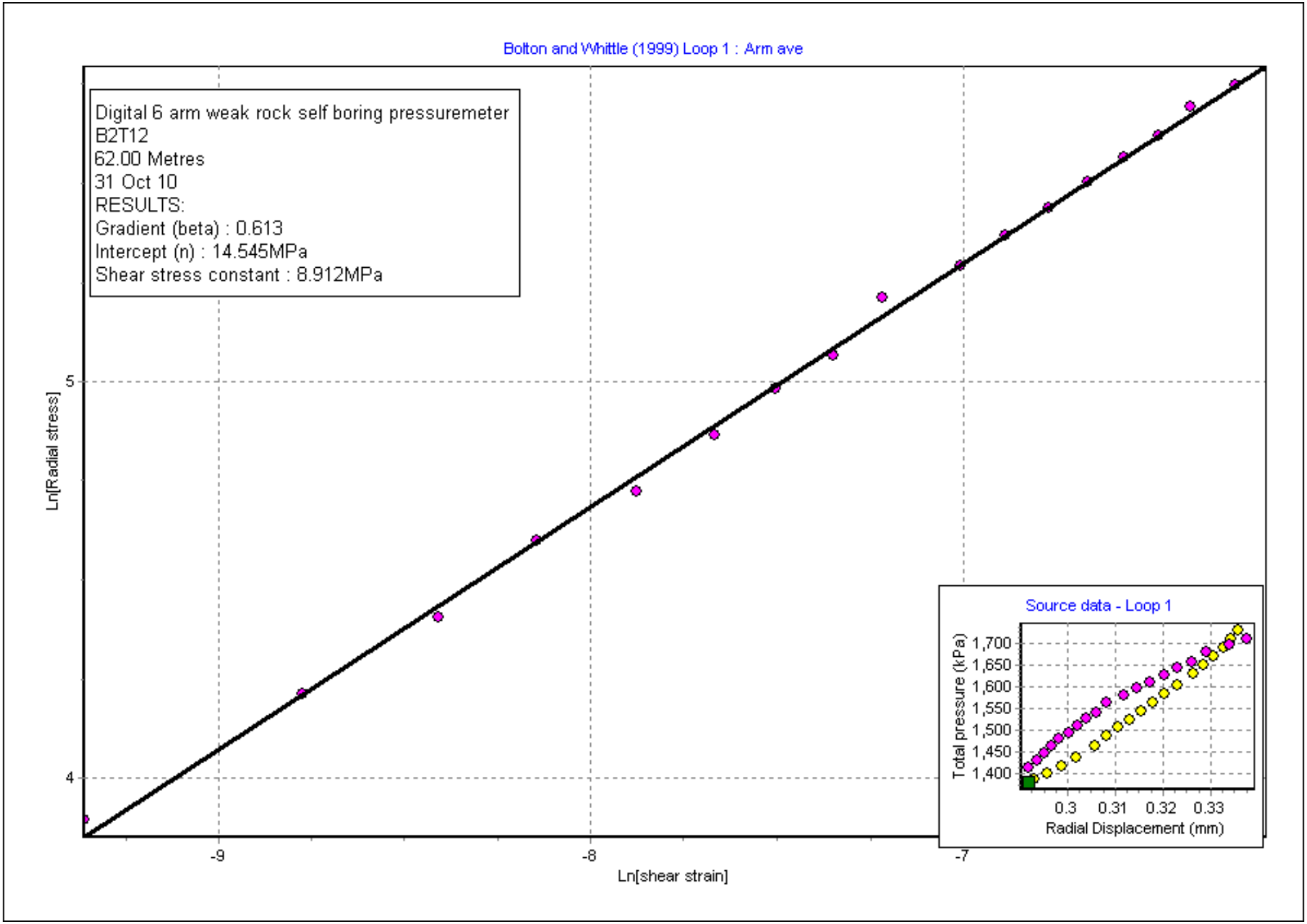

Gibson and Anderson (1961) : Arm ave
RESULTS:
Cu : 915.7kPa
Pl : 5633kPa
Ir : 77
G : 70.5MPa
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
Total pressure (kPa)
Ln[shear strain]
3,500
3,400
3,300
3,200
3,100
3,000
2,900
2,800
2,700
2,600
2,500
2,400
2,300
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
-9
-8
-7
-6
-5
-4
-3

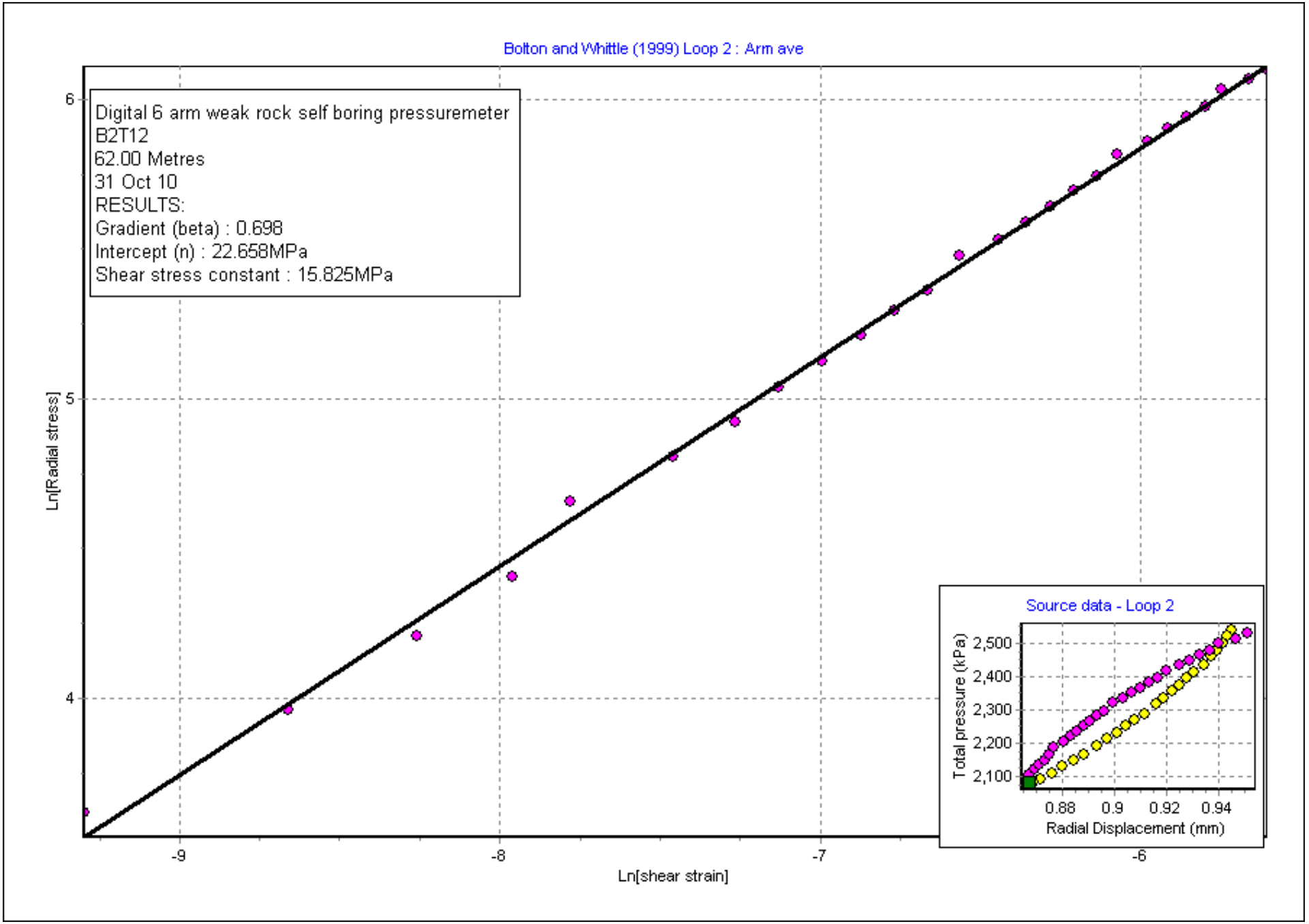

Jefferies (1988) : Arm ave
RESULTS:
Cu : 539.3kPa
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
Total pressure (kPa)
Ln[shear strain]
3,500
3,400
3,300
3,200
3,100
3,000
2,900
2,800
2,700
2,600
2,500
2,400
2,300
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
-9
-8
-7
-6
-5
-4
-3

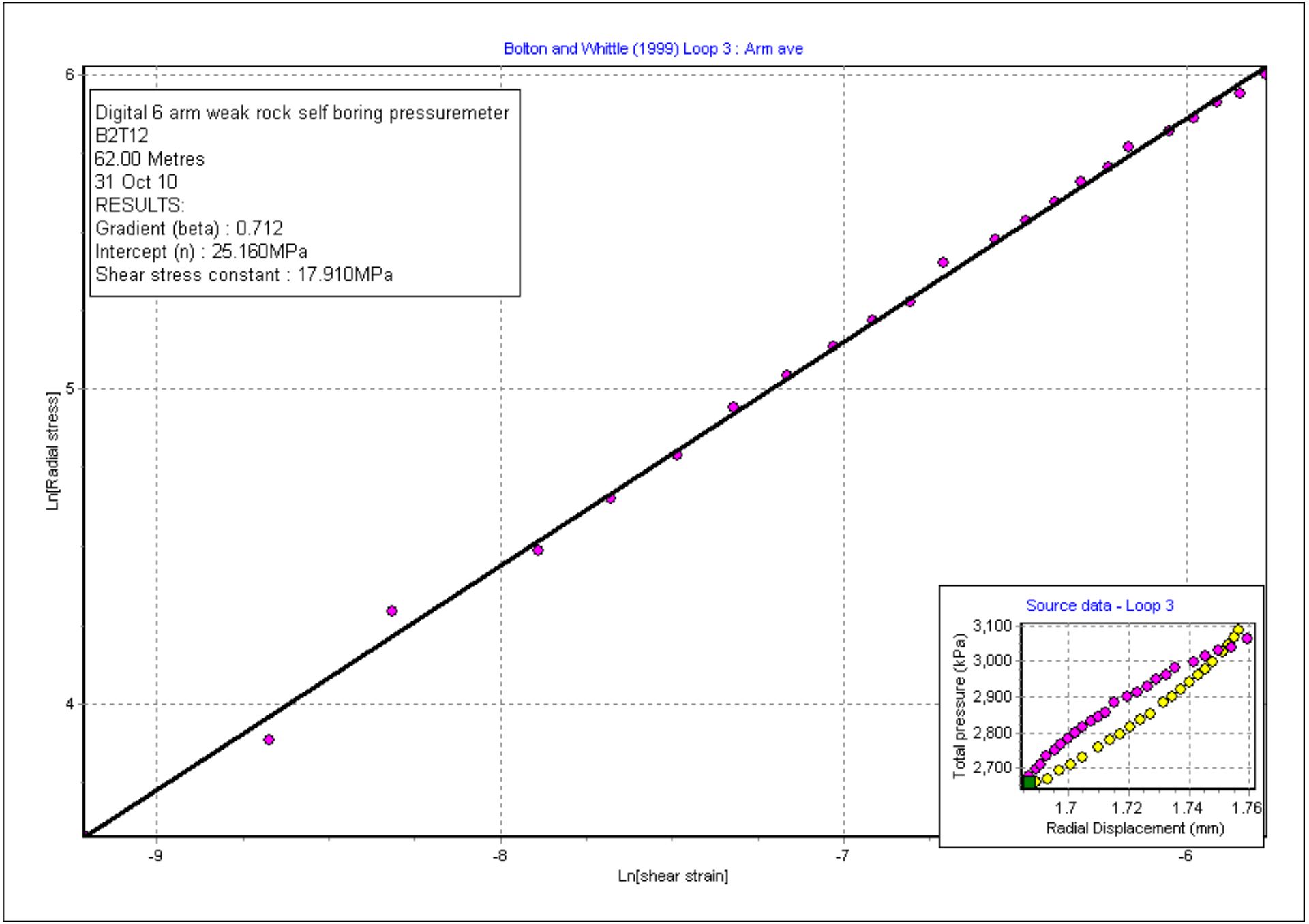

Shear modulus from unload/reload cycles Loop 1 : Arm ave
RESULTS:
Gur : 166.2MPa
Cycle mid-point:
Cavity strain : 0.695%
Total stress : 1536kPa
Size of cycle :
Shear strain : 0.183%
Total stress : 305kPa
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
Total pressure (kPa)
1,900
1,880
1,860
1,840
1,820
1,800
1,780
1,760
1,740
1,720
1,700
1,680
1,660
1,640
1,620
1,600
1,580
1,560
1,540
1,520
1,500
1,480
1,460
1,440
1,420
1,400
1,380
1,360
1,340
1,320
0.28
0.285
0.29
0.295
0.3
0.305
0.31
0.315
0.32
0.325
0.33
0.335
0.34
0.345
0.35
Radial Displacement (mm)

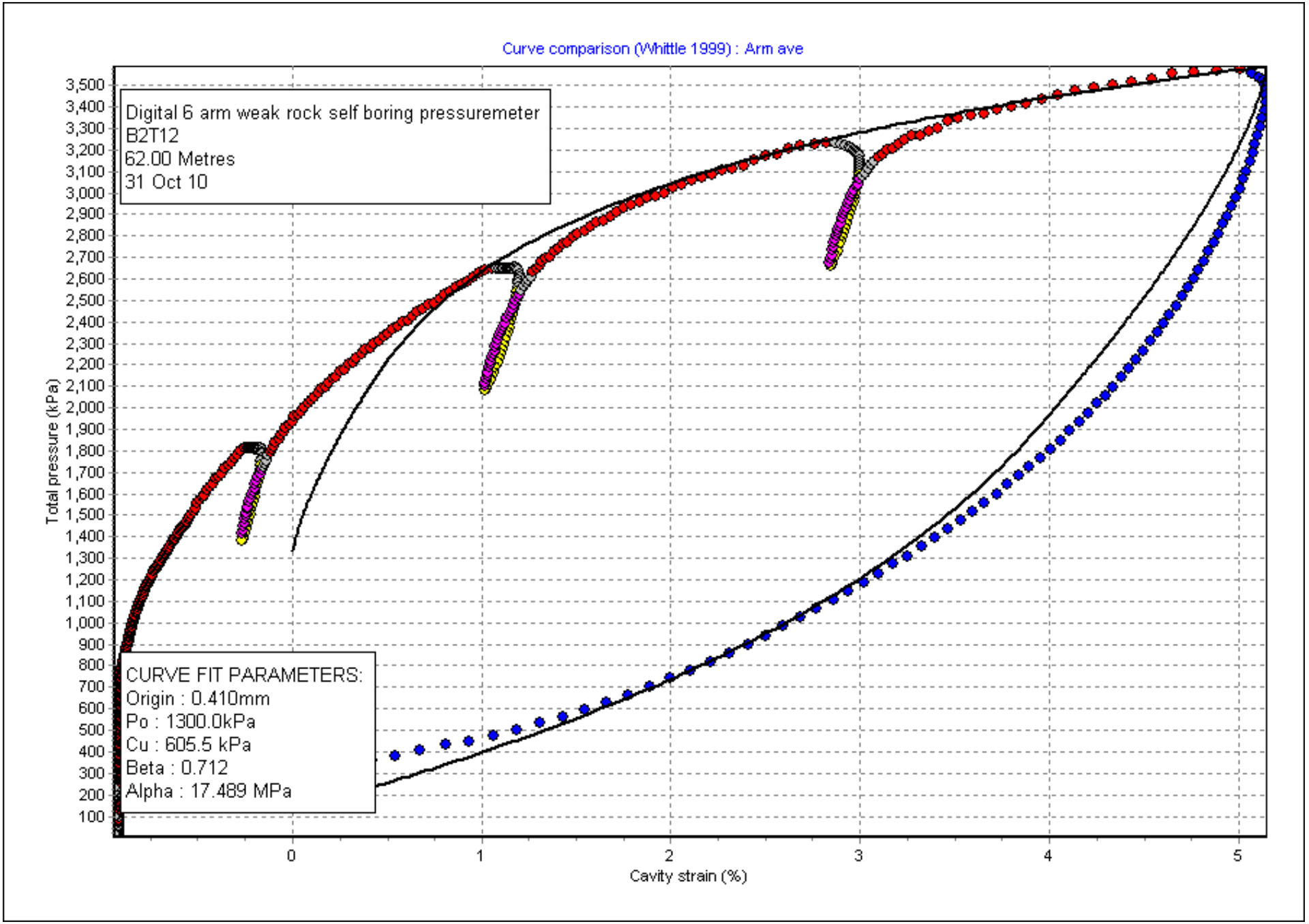

Shear modulus from unload/reload cycles Loop 2 : Arm ave
RESULTS:
Gur : 131.5MPa
Cycle mid-point:
Cavity strain : 2.026%
Total stress : 2289kPa
Size of cycle :
Shear strain : 0.322%
Total stress : 424kPa
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
Total pressure (kPa)
2,750
2,700
2,650
2,600
2,550
2,500
2,450
2,400
2,350
2,300
2,250
2,200
2,150
2,100
2,050
2,000
0.83
0.84
0.85
0.86
0.87
0.88
0.89
0.9
0.91
0.92
0.93
0.94
0.95
0.96
0.97
0.98
0.99
Radial Displacement (mm)


Shear modulus from unload/reload cycles Loop 3 : Arm ave
RESULTS:
Gur : 136.8MPa
Cycle mid-point:
Cavity strain : 3.857%
Total stress : 2854kPa
Size of cycle :
Shear strain : 0.281%
Total stress : 385kPa
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
Total pressure (kPa)
Radial Displacement (mm)
3,260
3,240
3,220
3,200
3,180
3,160
3,140
3,120
3,100
3,080
3,060
3,040
3,020
3,000
2,980
2,960
2,940
2,920
2,900
2,880
2,860
2,840
2,820
2,800
2,780
2,760
2,740
2,720
2,700
2,680
2,660
2,640
2,620
2,600
1.67
1.68
1.69
1.7
1.71
1.72
1.73
1.74
1.75
1.76
1.77
1.78
1.79
1.8


Bolton and Whittle (1999) Loop 1 : Arm ave
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
RESULTS:
Gradient (beta) : 0.613
Intercept (n) : 14.545MPa
Shear stress constant : 8.912MPa
Ln[Radial stress]
5
4
-9
-8
-7
Ln[shear strain]
Source data - Loop 1
Total pressure (kPa)
1,700
1,650
1,600
1,550
1,500
1,450
1,400
0.3
0.31
0.32
0.33
Radial Displacement (mm)


Bolton and Whittle (1999) Loop 2 : Arm ave
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
RESULTS:
Gradient (beta) : 0.698
Intercept (n) : 22.658MPa
Shear stress constant : 15.825MPa
Ln[Radial stress]
Ln[shear strain]
6
5
4
-9
-8
-7
-6
Source data - Loop 2
Total pressure (kPa)
2,500
2,400
2,300
2,200
2,100
0.88
0.9
0.92
0.94
Radial Displacement (mm)


Bolton and Whittle (1999) Loop 3 : Arm ave
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
RESULTS:
Gradient (beta) : 0.712
Intercept (n) : 25.160MPa
Shear stress constant : 17.910MPa
Ln[Radial stress]
Ln[shear strain]
6
5
4
-9
-8
-7
-6
Source data - Loop 3
Total pressure (kPa)
3,100
3,000
2,900
2,800
2,700
1.7
1.72
1.74
1.76
Radial Displacement (mm)


Curve comparison (Whittle 1999) : Arm ave
Digital 6 arm weak rock self boring pressuremeter
B2T12
62.00 Metres
31 Oct 10
CURVE FIT PARAMETERS:
Origin : 0.410mm
Po : 1300.0kPa
Cu : 605.5 kPa
Beta : 0.712
Alpha : 17.489 MPa
Total pressure (kPa)
Cavity strain (%)
3,500
3,400
3,300
3,200
3,100
3,000
2,900
2,800
2,700
2,600
2,500
2,400
2,300
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1
2
3
4
5

B1T3 - SUMMARY OF RESULTS
[File made with WinSitu Version 1.4.1.1]

[DETAILS OF TEST]
Project : M1002-11
Site : Sizewell
Borehole : SBP2009_1
Test name : B1T3
Test date : 7 Oct 10
Test depth : 19.20 Metres
Water table : Metres
Ambient PWP : 200.0 kPa
Material : Sand
Probe : Digital 6 arm weak rock self boring pressuremeter
Diameter : 89.0 mm
Data analysed using average arm displacement curve

Analysed by on 1 Apr 11

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]
Strain Origin (mm) : "Arm ave=1.765"
Po from Marsland & Randolph (kPa) : "Arm ave=742.1"
Po from Mohr-Coulomb yield (kPa) : "Arm ave=1272.8"
Best estimate of Po (kPa) : "Arm ave=740.0"

[UNDRAINED STRENGTH PARAMETERS]
Undrained yield stress (kPa) : "Arm ave=1766.2"
Mohr-Coulomb yield stress (kPa) : "Arm ave=1765.3"

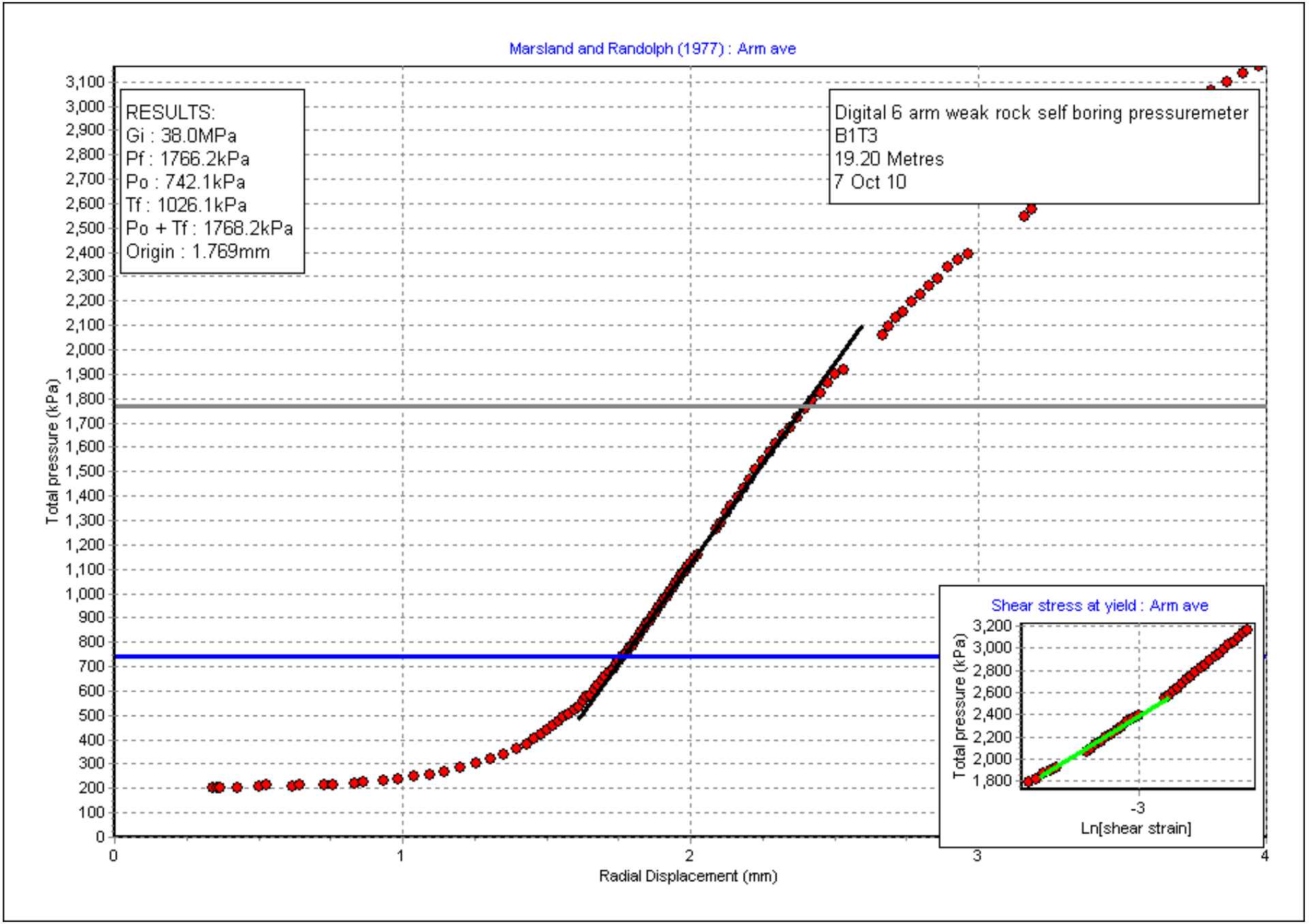
[DRAINED ANALYSIS OF SANDS - HUGHES et al 1977]
Constant volume friction angle (°) : 30.0
Angle of internal friction (°) : "Arm ave=44.9"
Dilation angle (°) : "Arm ave=18.5"
Gradient of log-log plot : "Arm ave=0.545"

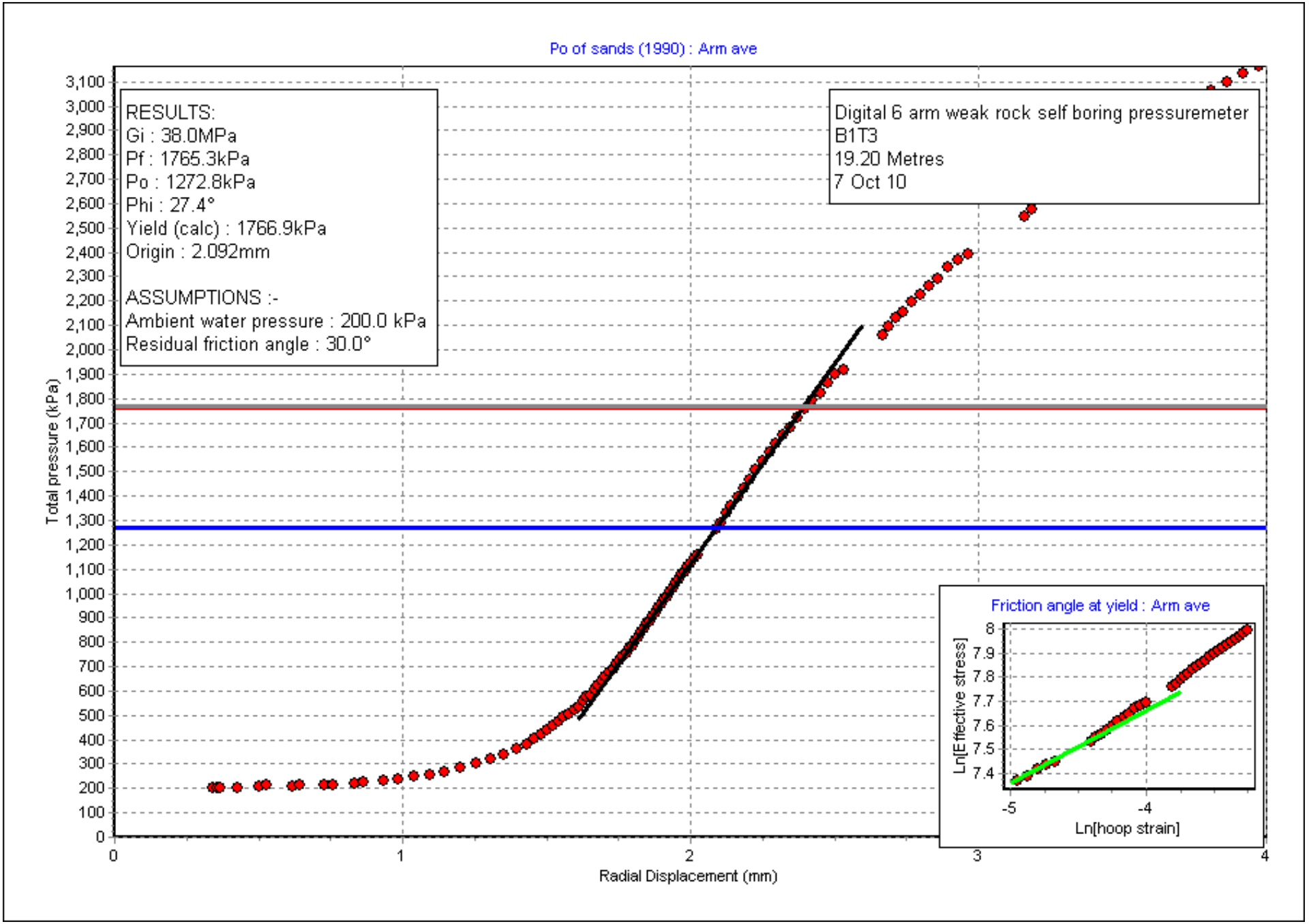
[LINEAR INTERPRETATION OF SHEAR MODULUS G]
Initial slope shear modulus (MPa) :"Arm ave=38.0"

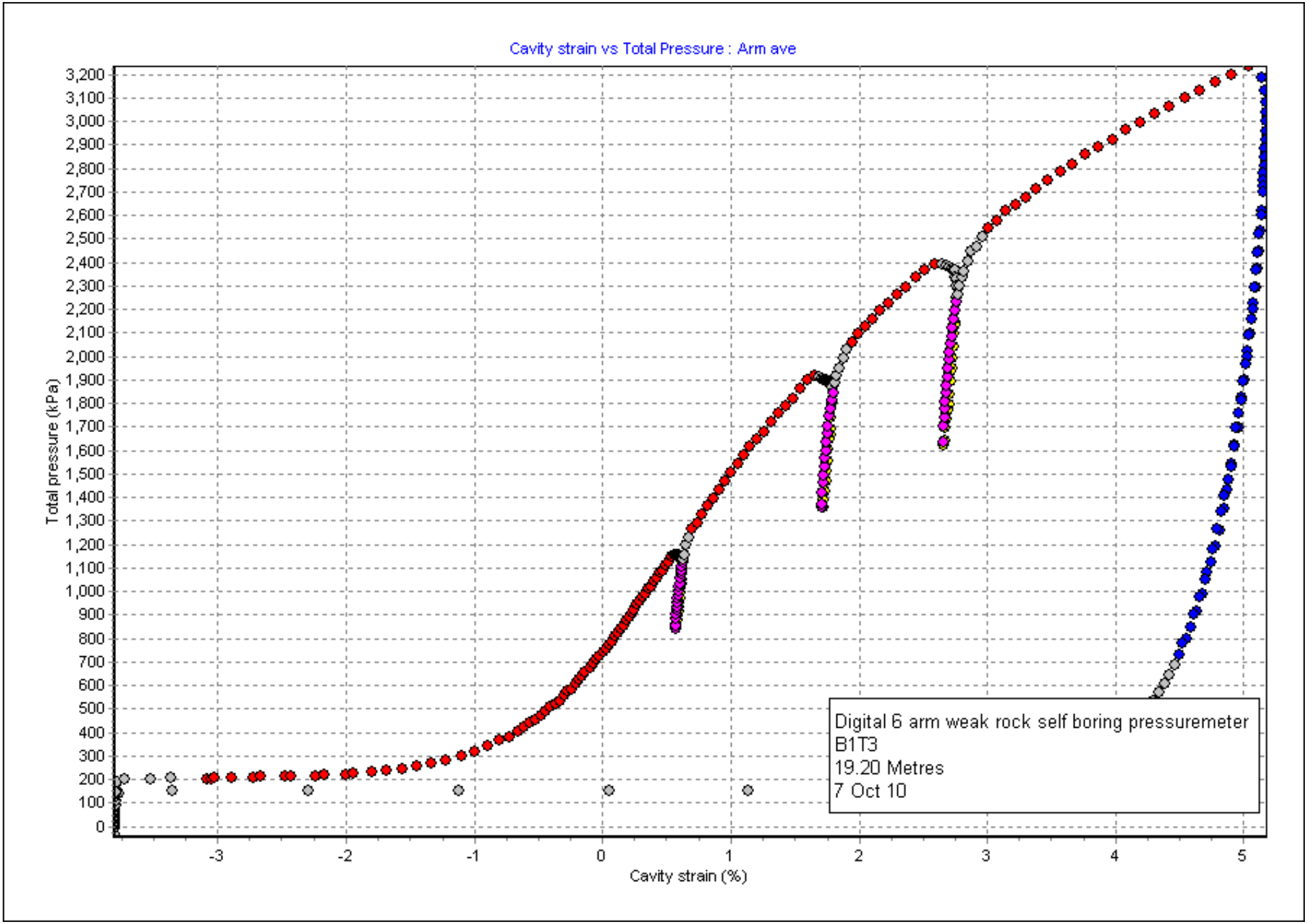
Axis	Loop No	Value (MPa)	Mean Strain (%)	Mean Pc (kPa)	dE (%)	dPc (kPa)
Arm ave	1	257.8	0.596	973	0.103	266
Arm ave	2	308.1	1.753	1586	0.150	462
Arm ave	3	310.0	2.707	1913	0.183	567

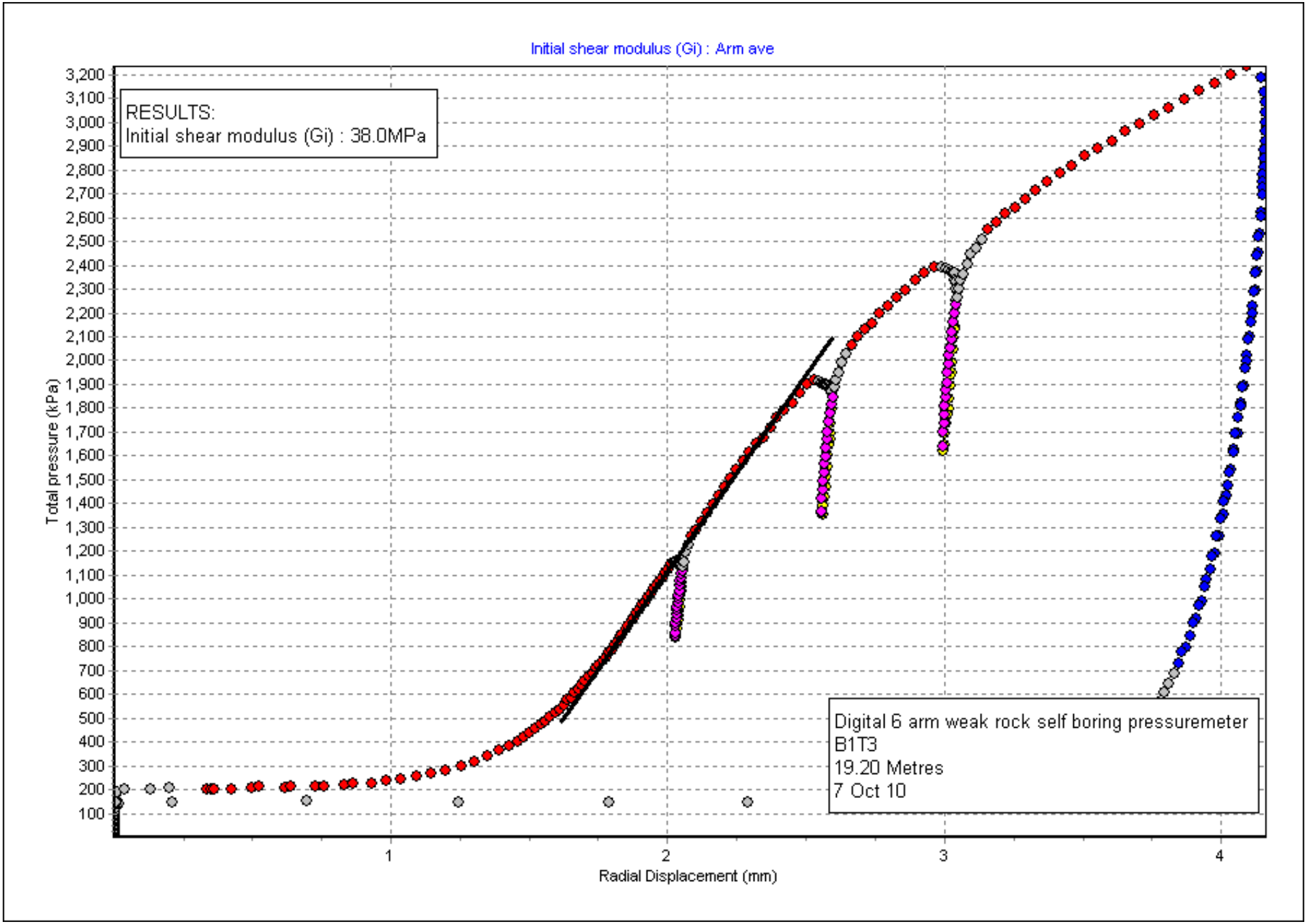
[DRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

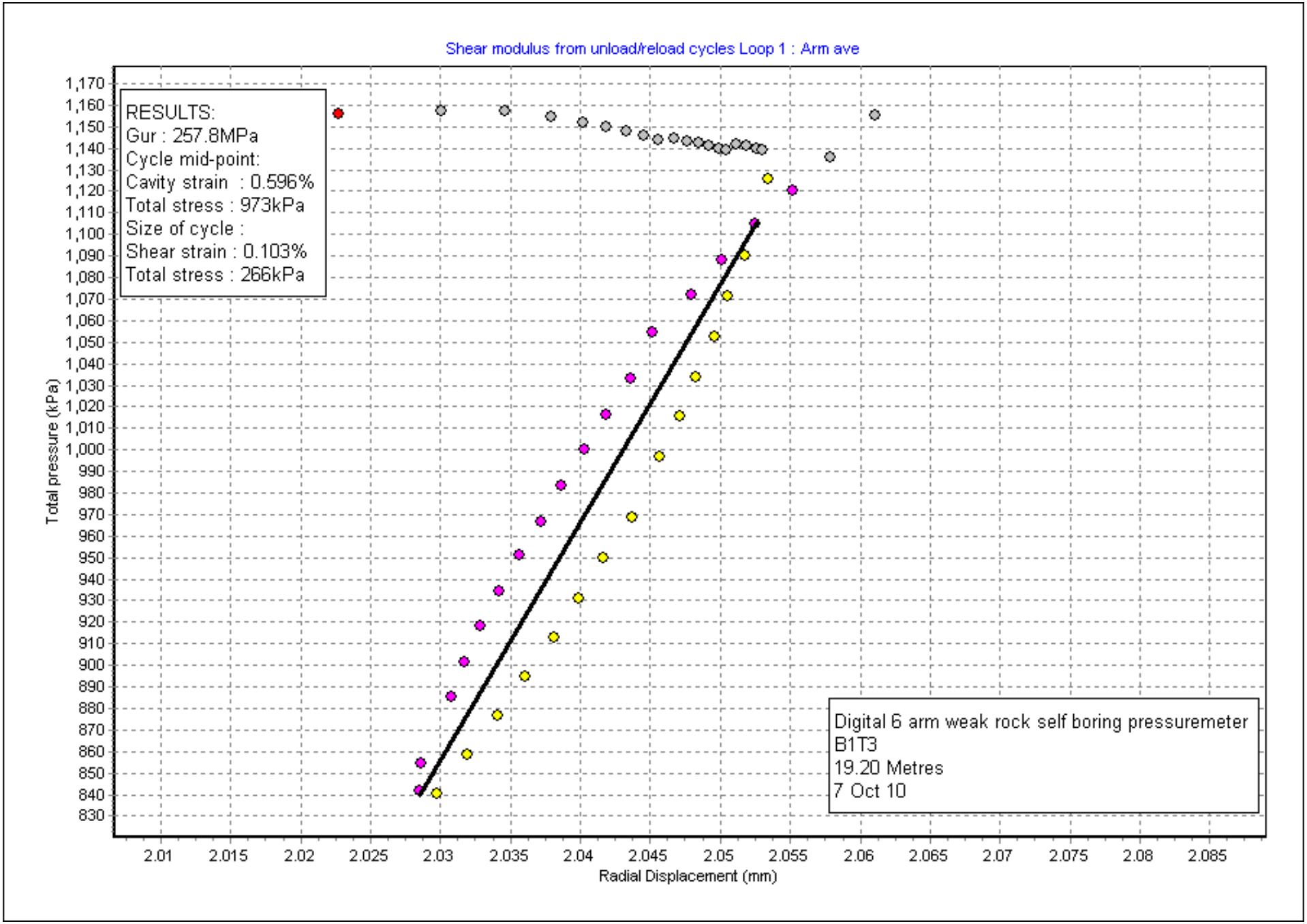
Axis	Loop No	Constant (MPa)	Gradient
Arm ave	1	38.175	0.773
Arm ave	2	30.634	0.716
Arm ave	3	47.638	0.757

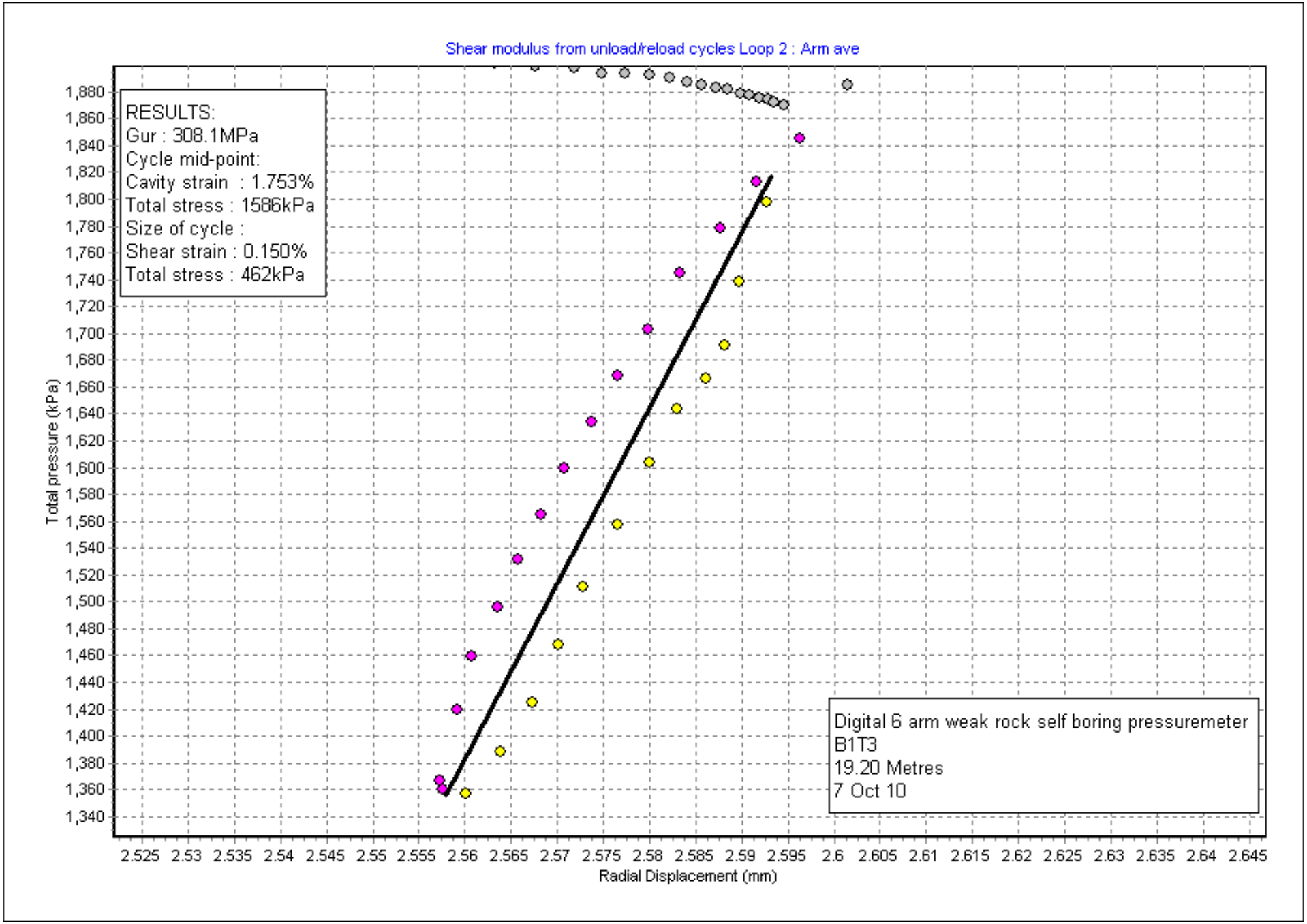

Marsland and Randolph (1977) : Arm ave
RESULTS:
Gi : 38.0MPa
Pf : 1766.2kPa
Po : 742.1kPa
Tf : 1026.1kPa
Po + Tf : 1768.2kPa
Origin : 1.769mm
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10
Total pressure (kPa)
Radial Displacement (mm)
Shear stress at yield : Arm ave
Total pressure (kPa)
Ln[shear strain]

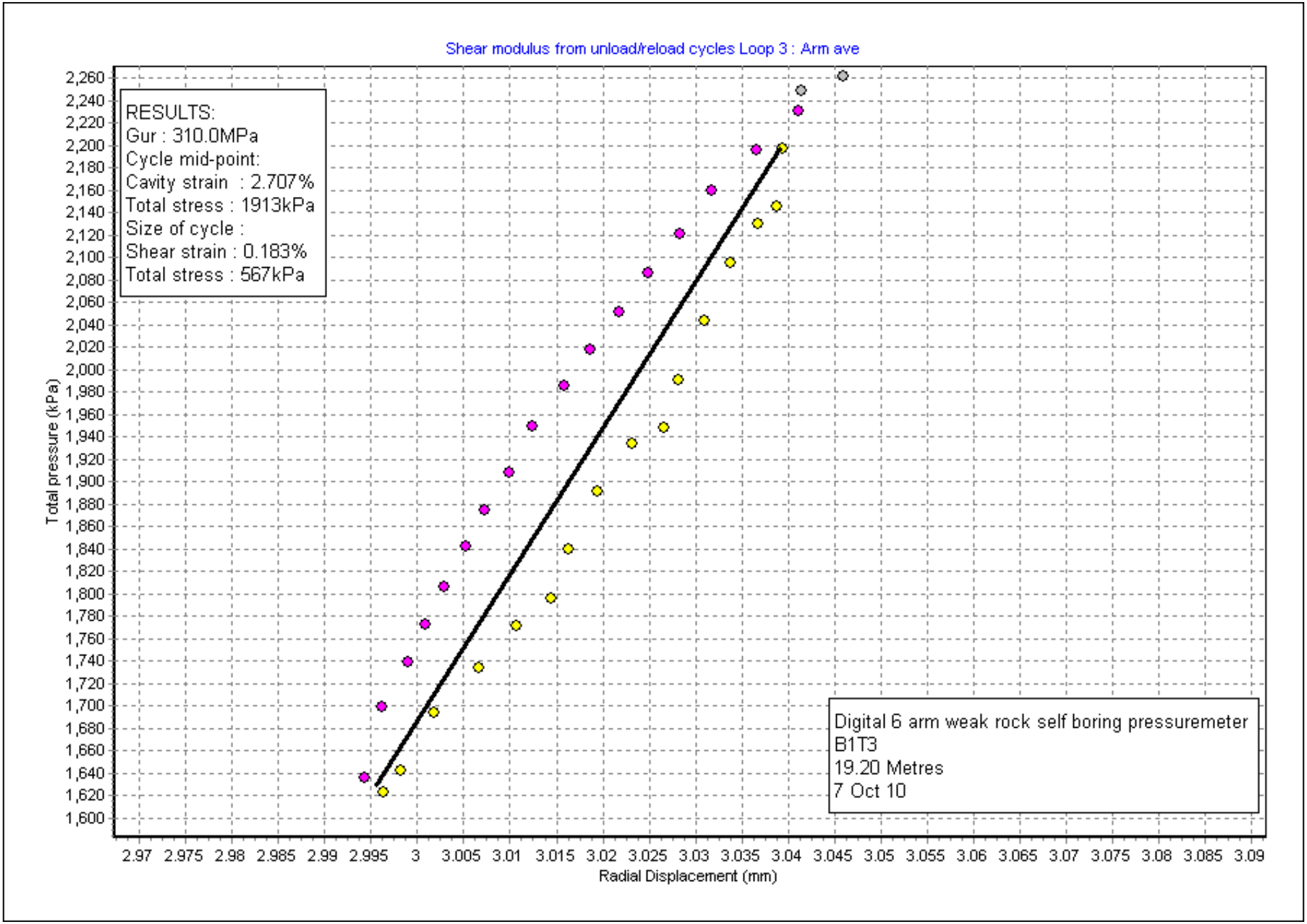

Po of sands (1990) : Arm ave
RESULTS:
Gi : 38.0MPa
Pf : 1765.3kPa
Po : 1272.8kPa
Phi : 27.4°
Yield (calc) : 1766.9kPa
Origin : 2.092mm
ASSUMPTIONS :-
Ambient water pressure : 200.0 kPa
Residual friction angle : 30.0°
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10
Total pressure (kPa)
Radial Displacement (mm)
Friction angle at yield : Arm ave
Ln[Effective stress]
Ln[hoop strain]

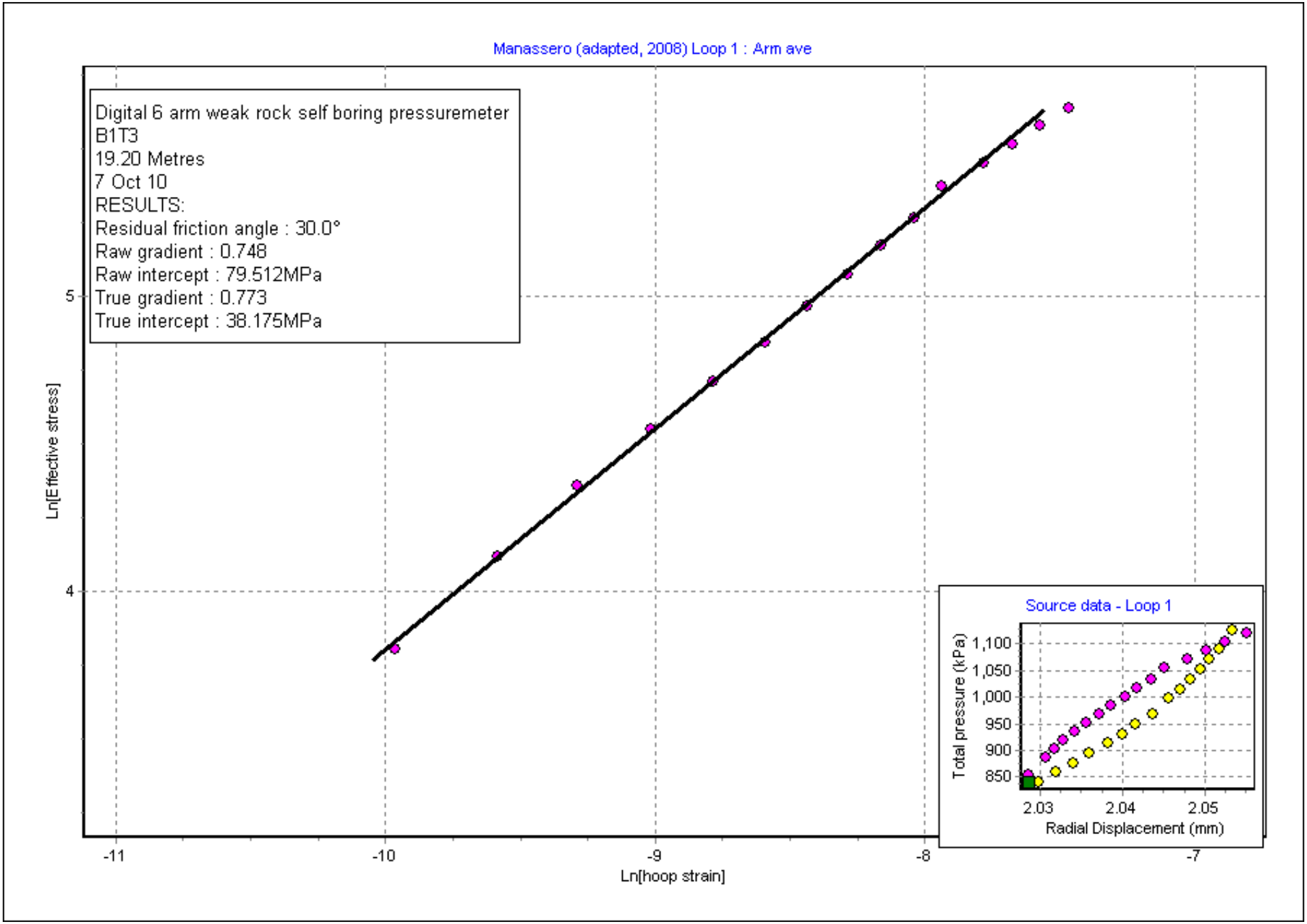

Cavity strain vs Total Pressure : Arm ave
Total pressure (kPa)
3,200
3,100
3,000
2,900
2,800
2,700
2,600
2,500
2,400
2,300
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
-3
-2
-1
0
1
2
3
4
5
Cavity strain (%)
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10

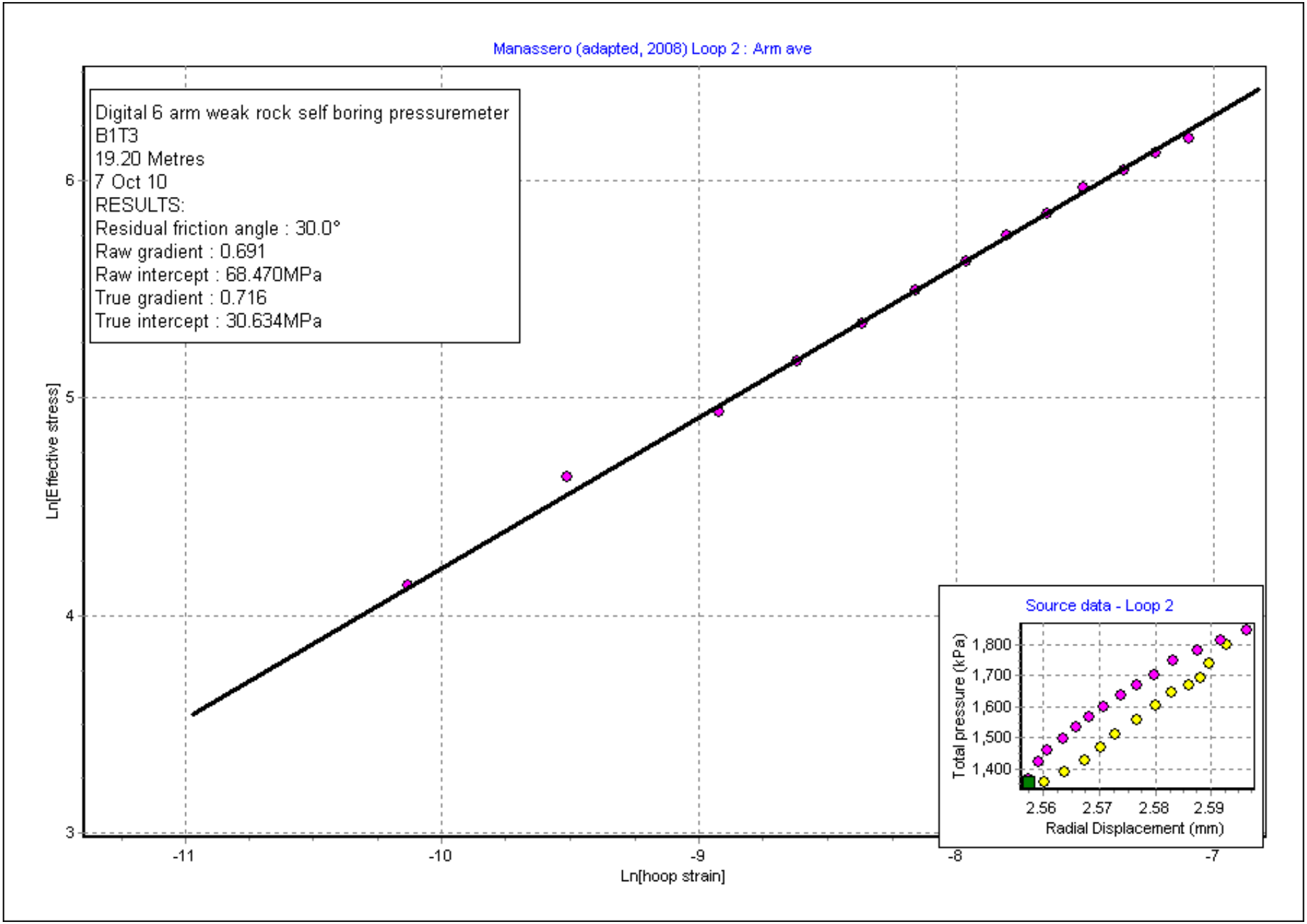

Initial shear modulus (Gi) : Arm ave
RESULTS:
Initial shear modulus (Gi) : 38.0MPa
Total pressure (kPa)
Radial Displacement (mm)
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10

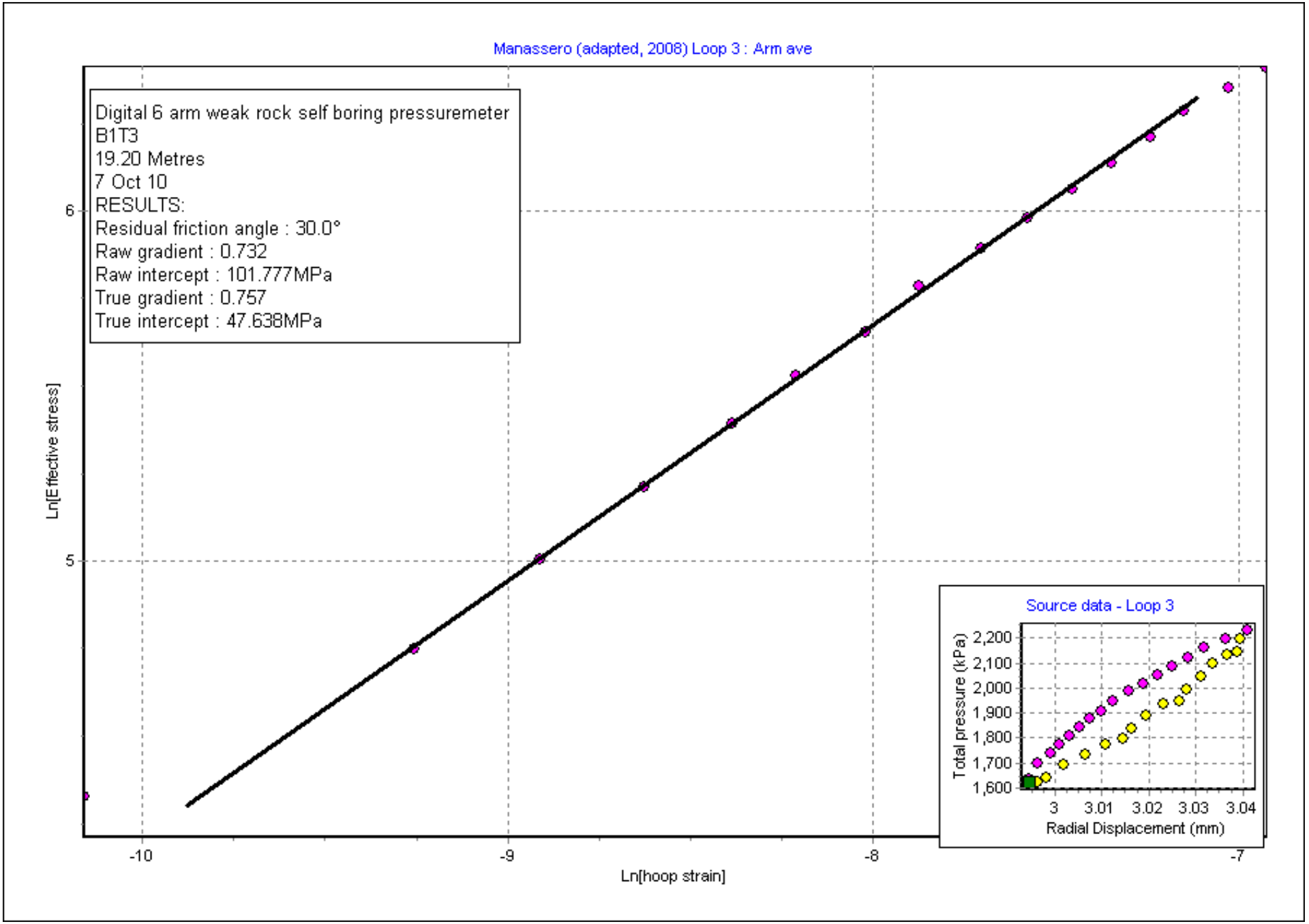

Shear modulus from unload/reload cycles Loop 1 : Arm ave
RESULTS:
Gur : 257.8MPa
Cycle mid-point:
Cavity strain : 0.596%
Total stress : 973kPa
Size of cycle :
Shear strain : 0.103%
Total stress : 266kPa
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10
Total pressure (kPa)
Radial Displacement (mm)
1,170
1,160
1,150
1,140
1,130
1,120
1,110
1,100
1,090
1,080
1,070
1,060
1,050
1,040
1,030
1,020
1,010
1,000
990
980
970
960
950
940
930
920
910
900
890
880
870
860
850
840
830
2.01
2.015
2.02
2.025
2.03
2.035
2.04
2.045
2.05
2.055
2.06
2.065
2.07
2.075
2.08
2.085

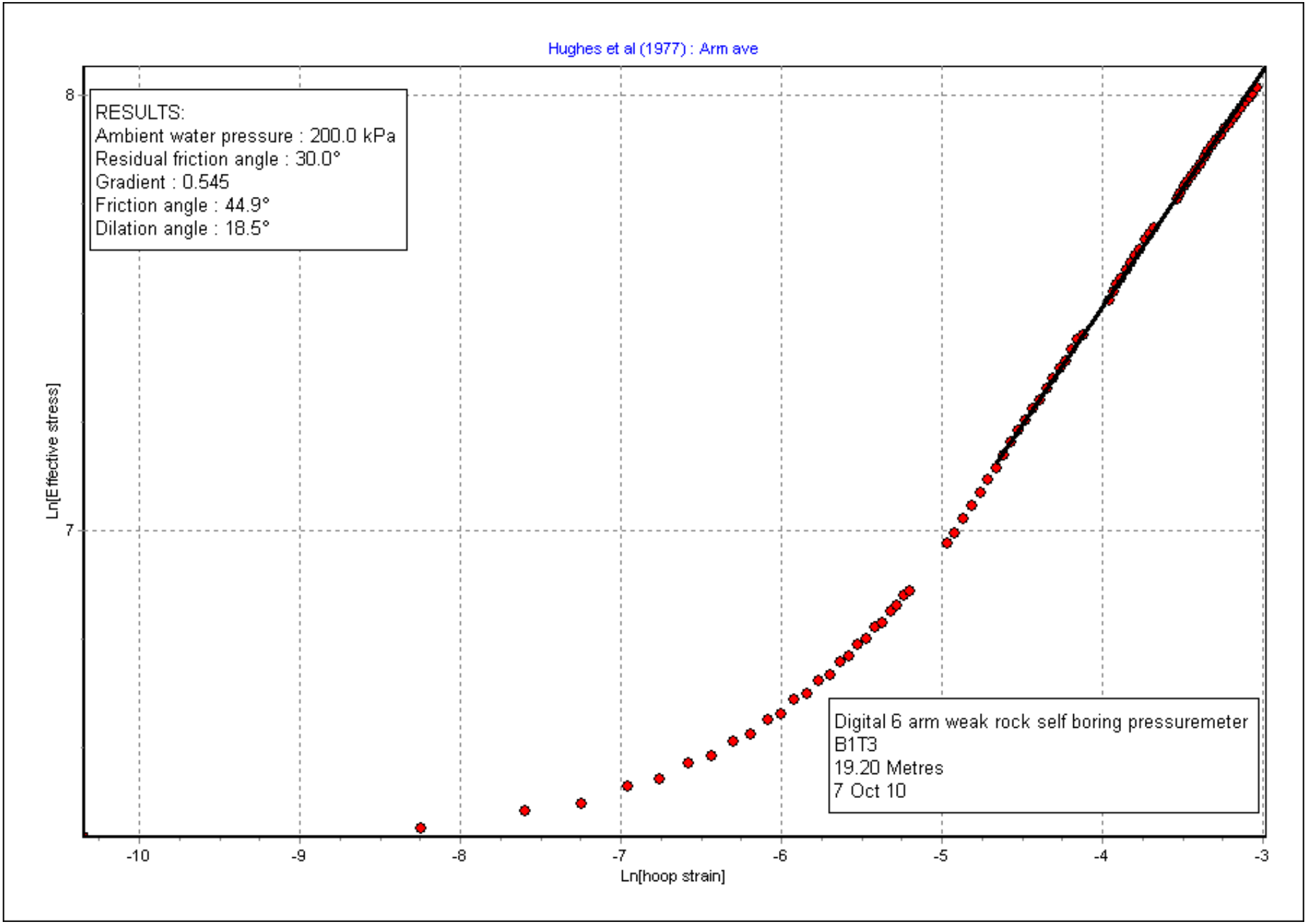

Shear modulus from unload/reload cycles Loop 2 : Arm ave
RESULTS:
Gur : 308.1MPa
Cycle mid-point:
Cavity strain : 1.753%
Total stress : 1586kPa
Size of cycle :
Shear strain : 0.150%
Total stress : 462kPa
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10
Total pressure (kPa)
1,880
1,860
1,840
1,820
1,800
1,780
1,760
1,740
1,720
1,700
1,680
1,660
1,640
1,620
1,600
1,580
1,560
1,540
1,520
1,500
1,480
1,460
1,440
1,420
1,400
1,380
1,360
1,340
2.525 2.53 2.535 2.54 2.545 2.55 2.555 2.56 2.565 2.57 2.575 2.58 2.585 2.59 2.595 2.6 2.605 2.61 2.615 2.62 2.625 2.63 2.635 2.64 2.645
Radial Displacement (mm)


Shear modulus from unload/reload cycles Loop 3 : Arm ave
RESULTS:
Gur : 310.0MPa
Cycle mid-point:
Cavity strain : 2.707%
Total stress : 1913kPa
Size of cycle :
Shear strain : 0.183%
Total stress : 567kPa
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10
Total pressure (kPa)
Radial Displacement (mm)
2,260
2,240
2,220
2,200
2,180
2,160
2,140
2,120
2,100
2,080
2,060
2,040
2,020
2,000
1,980
1,960
1,940
1,920
1,900
1,880
1,860
1,840
1,820
1,800
1,780
1,760
1,740
1,720
1,700
1,680
1,660
1,640
1,620
1,600
2.97 2.975 2.98 2.985 2.99 2.995 3 3.005 3.01 3.015 3.02 3.025 3.03 3.035 3.04 3.045 3.05 3.055 3.06 3.065 3.07 3.075 3.08 3.085 3.09


Manassero (adapted, 2008) Loop 1 : Arm ave
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10
RESULTS:
Residual friction angle : 30.0°
Raw gradient : 0.748
Raw intercept : 79.512MPa
True gradient : 0.773
True intercept : 38.175MPa
Ln[Effective stress]
5
4
-11
-10
-9
-8
-7
Ln[hoop strain]
Source data - Loop 1
Total pressure (kPa)
1,100
1,050
1,000
950
900
850
2.03
2.04
2.05
Radial Displacement (mm)


Manassero (adapted, 2008) Loop 2 : Arm ave
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10
RESULTS:
Residual friction angle : 30.0°
Raw gradient : 0.691
Raw intercept : 68.470MPa
True gradient : 0.716
True intercept : 30.634MPa
Ln[Effective stress]
Ln[hoop strain]
6
5
4
3
-11
-10
-9
-8
-7
Source data - Loop 2
Total pressure (kPa)
1,800
1,700
1,600
1,500
1,400
2.56
2.57
2.58
2.59
Radial Displacement (mm)


Manassero (adapted, 2008) Loop 3 : Arm ave
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10
RESULTS:
Residual friction angle : 30.0°
Raw gradient : 0.732
Raw intercept : 101.777MPa
True gradient : 0.757
True intercept : 47.638MPa
Ln[Effective stress]
6
5
-10
-9
-8
-7
Ln[hoop strain]
Source data - Loop 3
Total pressure (kPa)
2,200
2,100
2,000
1,900
1,800
1,700
1,600
3
3.01
3.02
3.03
3.04
Radial Displacement (mm)


Hughes et al (1977) : Arm ave
RESULTS:
Ambient water pressure : 200.0 kPa
Residual friction angle : 30.0°
Gradient : 0.545
Friction angle : 44.9°
Dilation angle : 18.5°
Digital 6 arm weak rock self boring pressuremeter
B1T3
19.20 Metres
7 Oct 10
Ln[Effective stress]
Ln[hoop strain]
8
7
-10
-9
-8
-7
-6
-5
-4
-3

Appendix F – Ground Investigation Factual Reports

On-shore Investigations Phase 1 for Sizewell Site 2011

CONTINUED

ESG Environmental Scientifics Group

Soil Mechanics

Report No A0012-10/4

ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

FACTUAL REPORT ON GROUND INVESTIGATION

VOLUME 4 : GEOTECHNICAL LABORATORY TESTING

Carried out for: NNB Generation Company Limited

August 2011

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Soil Mechanics part of Environmental Scientifics Group

ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE
FACTUAL REPORT ON GROUND INVESTIGATION

VOLUME 4 : GEOTECHNICAL LABORATORY TESTING

Report No: A0012-10/4

Date: August 2011

Employer:

NNB Generation Company Limited
40 Grosvenor Place
Victoria
London
SW1X 7EN

Issue No	Date	Details
1	August 2011	Report as submitted

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REPORT STRUCTURE

VOLUME NO	TITLE	REPORT NO
1	TEXT, MONITORING AND DRAWINGS	A0012-10/1
2A	EXPLORATORY HOLE RECORDS: 1:25 SCALE BOREHOLE LOGS	A0012-10/2A
2B	EXPLORATORY HOLE RECORDS: 1:25 SCALE BOREHOLE AND TRIAL PIT LOGS 1:100 SCALE BOREHOLE LOGS SPLIT TUBE SAMPLE DESCRIPTIONS DISCONTINUITY LOGS	A0012-10/2B
3A	IN SITU TESTING: DRILLING PARAMETER RESULTS MENARD PRESSUREMETER TESTING	A0012-10/3A
3B	IN SITU TESTING: CONE PENETRATION TESTING GEOPHYSICAL TESTING PUMPING TEST	A0012-10/3B
3C	IN SITU TESTING: SELF BORING PRESSUREMETER TESTING	A0012-10/3C
4	**GEOTECHNICAL LABORATORY TESTING**	**A0012-10/4**
5	PHOTOGRAPHS	A0012-10/5
6	COMPREHENSIVE AND DATA INTEGRATION REPORT	A0012-10/6

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A GEOTECHNICAL LABORATORY TEST RESULTS

ENCLOSURE A
GEOTECHNICAL LABORATORY TESTING

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INDEX PROPERTIES - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	p Mg/m^3	p_d Mg/m^3	w %	< 425 µm sieve %	W_L %	W_P %	I_P	p_s Mg/m^3	Remarks
CBH 2009_1	9	47.10	47.50	CS	Stiff grey slightly gravelly silty CLAY.	1.67	1.09	53	97 n	91 a	35	56		
CBH 2009_1	15	68.75	69.20	CS	Stiff brown mottled grey slightly sandy CLAY.	2.18	1.83	19	100 n	48 a	18	30		
CBH 2009_1	16	75.24	75.64	CS	Stiff greyish brown slightly sandy CLAY.			44	100 n	127 a	40	87	2.61-p	
CBH 2009_1	17	80.10	80.50	CS	Very stiff brown silty CLAY.			31	100 n	96 a	31	65	2.66-p	
CBH 2009_1	18	84.35	84.75	CS	Greyish brown slightly sandy slightly gravelly CLAY.			39	96 n	136 a	43	93	2.66-p	
CBH 2009_1UA	3	1.20	1.65	U	Black brown and grey silty SAND with occasional shell fragments.	2.07	1.76	18					2.79-p	
CBH 2009_1UA	15	5.90	6.35	U	Soft to firm brownish grey slightly organic slightly sandy fibrous CLAY.			160	98 n	223 a	101	122		
CBH 2009_1UA	21	8.00	8.45	U	Firm dark brown peaty CLAY.	1.10	0.26	324						
CBH 2009_1UA	25	9.40	9.85	U	Greyish black peaty gravelly SAND.			48	79 s	32 b	NP			
CBH 2009_1UA	27	10.10	10.55	U	Grey slightly gravelly SAND with occasional clay pockets.	2.05	1.69	23					2.68-p	
CBH 2009_1UA	51	18.50	18.95	U	Stiff to very stiff grey SAND with shell fragments.	2.02	1.71	18						
CBH 2009_1UA	72	27.60	28.05	U	Grey SAND with shell fragments.	2.05	1.72	19					2.69-p	
CBH 2009_1UA	94	36.70	37.15	U	Firm to stiff brownish grey SAND with shell fragments.	1.97	1.65	19					2.67-p	
CBH 2009_1UA	114	45.10	45.55	U	Soft to firm greyish brown very sandy CLAY with rare shell fragments.	1.90	1.49	27	72 s	41 a	19	22		
CBH 2009_1UA	116	45.80	46.25	U	Firm to stiff dark brownish grey slightly sandy slightly organic CLAY.	1.66	1.15	45	100 n	108 a	51	57	2.70-p	
CBH 2009_1UA	118	46.50	46.95	U	Firm to stiff greyish brown slightly sandy CLAY.	1.74	1.23	42	92 n	97 a	30	67		
CBH 2009_2	15	43.40	43.80	CS	Firm to stiff brownish grey slightly sandy CLAY.			43						
CBH 2009_2	16	49.75	50.15	CS	Stiff brownish grey slightly sandy CLAY.	1.78	1.21	47	98 n	92 a	37	55	2.63-p	
CBH 2009_2	17	51.80	52.20	CS	Stiff greyish brown slightly sandy CLAY.			35	100 n	78 a	26	52		
CBH 2009_2	18	54.80	55.20	CS	Firm to stiff brownish grey slightly sandy CLAY.	1.94	1.46	33	98 s	75 a	26	49	2.62-p	
CBH 2009_2	20	58.50	58.90	CS	Soft brownish grey slightly sandy silty CLAY.	1.99	1.57	27	96 n	32 a	21	11	2.63-p	
CBH 2009_2	21	61.75	62.15	CS	Firm to stiff brownish grey slightly sandy CLAY.	2.06	1.66	24	100 n	55 a	21	34		
CBH 2009_2	22	65.10	65.50	CS	Brownish grey silty SAND.	2.06	1.70	21					2.62-p	
CBH 2009_2	23	70.90	71.30	CS	Light greyish brown SAND.	1.97	1.56	26					2.61-p	
CBH 2009_2	24	74.00	74.40	CS	Firm to stiff dark grey slightly sandy CLAY.	1.74	1.19	46	97 n	102 a	40	62		
CBH 2009_2	25	77.10	77.50	CS	Firm greyish brown slightly sandy CLAY.	1.69	1.17	45	91 n	129 a	40	89		
CBH 2009_2U	7	1.90	2.53	U	Greyish brown slightly clayey gravelly SAND with 1 cobble.	2.14	1.86	15					2.64-p	
CBH 2009_2UA	8	5.00	5.45	U	Firm grey CLAY with organic fibrous clay partings.	1.42	0.71	99	100 n	143 a	54	89		
CBH 2009_2UA	25	10.80	11.25	U	Light brown slightly gravelly SAND.	2.05	1.75	17					2.63-p	
CBH 2009_2UA	51	19.90	20.35	U	Grey and light grey slightly gravelly SAND with occasional shell fragments.	1.98	1.62	22					2.67-p	
CBH 2009_2UA	69	28.30	28.75	U	Grey SAND with shell fragments.	2.07	1.75	18					2.65-p	
CBH 2009_2UA	90	37.40	37.85	U	Grey SAND with shell fragments.	1.97	1.64	20					2.68-p	

General notes: All above tests carried out to BS1377 : 1990 definitive method in all cases unless annotated otherwise. See individual test reports for further details.

Key :

p	bulk density, linear	W_L Liquid limit	W_P	Plastic limit	<425um preparation	p_s	particle density
p_d	dry density	a 4 point cone test	NP	non - plastic	n from natural soil	-g = gas jar	
w	moisture content	b 1 point cone test	I_P	Plasticity Index	s sieved specimen	-p = small pyknometer	

INDEX PROPERTIES - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	p Mg/m^3	p_d Mg/m^3	w %	< 425 µm sieve %	W_L %	W_P %	I_P	p_s Mg/m^3	Remarks
CBH 2009_4	9	47.55	47.95	CS	Brownish grey clayey SILT.			44						
CBH 2009_4	12	50.30	50.75	CS	Stiff brownish grey slightly gravelly silty CLAY.			50	100 n	81 a	33	48		
CBH 2009_4	13	53.50	53.90	CS	Very stiff greyish brown CLAY.	1.92	1.43	34	100 n	77 a	31	46	2.67-p	
CBH 2009_4U	10	3.15	3.60	U	Orangish brown slightly gravelly SAND with occasional shell fragments and clay pockets.	2.00	1.72	16					2.64-p	
CBH 2009_4U	18	5.40	5.85	U	Firm black spongy fibrous PEAT.	0.84	0.49	71						
CBH 2009_4U	46	13.55	14.00	U	Stiff brownish grey SAND with shell fragments.	2.05	1.70	20					2.65-p	
CBH 2009_4U	71	22.00	22.45	U	Stiff grey SAND with shell fragments.	2.13	1.81	18					2.65-p	
CBH 2009_4U	97	30.50	30.95	U	Brownish grey SAND with shell fragments.	1.98	1.73	15					2.67-g	
CBH 2009_4U	111	37.70	38.15	U	Grey SAND with shell fragments.	2.09	1.77	18					2.69-p	
CBH 2009_5	12	43.80	44.20	CS	Stiff to very stiff slightly sandy CLAY.			46	100 n	99 a	40	59		
CBH 2009_5	13	46.80	47.20	CS	Stiff greyish brown silty CLAY.			27	100 n	86 a	28	58		
CBH 2009_5	14	49.70	50.10	CS	Very stiff brownish grey silty CLAY.	1.68	1.08	55	99 n	105 a	43	62		
CBH 2009_5	15	52.80	53.20	CS	Stiff greyish brown slightly sandy CLAY.			33						
CBH 2009_5UB	7	3.40	3.85	U	Brownish grey organic SAND with frequent rootlets.			20						
CBH 2009_5UB	10	4.10	4.55	U	Soft brownish grey slightly organic slightly sandy CLAY.			71	100 n	98 a	39	59		
CBH 2009_5UB	15	5.50	5.95	U	Very soft grey slightly organic slightly sandy CLAY.	1.54	0.89	73						
CBH 2009_5UB	42	14.60	15.05	U	Greyish brown SAND with shell fragments.	2.05	1.73	19					2.67-p	
CBH 2009_5UB	66	23.00	23.45	U	Grey SAND with shell fragments.	2.04	1.77	15					2.66-p	
CBH 2009_5UB	81	29.30	29.75	U	Grey SAND with shell fragments.	2.10	1.78	18						
CBH 2009_5UB	103	40.30	40.75	U	Grey SAND with occasional shell fragments.	2.04	1.69	21					2.73-p	
CBH 2009_6	9	43.00	43.40	CS	Stiff brownish grey slightly sandy CLAY.			41	100 s	101 a	37	64		
CBH 2009_6	10	45.42	45.76	CS	Stiff greyish brown silty CLAY.			43						
CBH 2009_6	11	49.70	50.10	CS	Stiff brownish grey slightly sandy CLAY.			44	100 n	84 a	31	53		
CBH 2009_6	12	52.70	53.09	CS	Stiff brownish grey CLAY with occasional silt partings.	1.93	1.46	32	99 n	77 a	28	49		
CBH 2009_6U	12	4.00	4.45	U	Yellowish brown silty SAND.	2.07	1.79	16					2.64-p	
CBH 2009_6U	20	6.80	7.25	U	Firm brownish grey clayey fibrous PEAT.			77	100 n	167 a	96	71		
CBH 2009_6U	22	7.50	7.95	U	Dark brown and dark grey peaty CLAY with abundant plant remains.			271						
CBH 2009_6U	24	8.20	8.65	U	Firm black fibrous PEAT.	1.12	0.12	842						
CBH 2009_6U	44	15.20	15.65	U	Brown SAND with shell fragments.	2.05	1.68	22					2.66-p	
CBH 2009_6U	69	23.60	24.05	U	Grey SAND with ocasional silt pockets and shell fragments.	2.14	1.83	17					2.67-p	
CBH 2009_6U	94	32.70	33.15	U	Grey SAND with shell fragments.	2.13	1.81	18					2.67-p	
CBH 2009_6U	121	41.55	42.25	U	Grey SAND with shell fragments.	1.96	1.66	18					2.68-g	

General notes: All above tests carried out to BS1377 : 1990 definitive method in all cases unless annotated otherwise. See individual test reports for further details.

Key :

p	bulk density, linear	W_L Liquid limit	W_P	Plastic limit	<425um preparation	p_s	particle density
p_d	dry density	a 4 point cone test	NP	non - plastic	n from natural soil	-g = gas jar	
w	moisture content	b 1 point cone test	I_P	Plasticity Index	s sieved specimen	-p = small pyknometer	

INDEX PROPERTIES - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	ρ Mg/m^3	ρ_d Mg/m^3	w %	< 425 µm sieve %	W_L %	W_P %	I_P	ρ_s Mg/m^3	Remarks
CBH 2009_7	16	51.60	51.95	CS	Very weak greyish brown MUDSTONE and very soft brown clay.	1.81	1.30	39	93 n	79 a	36	43	2.64-p	One sufficient sized piece of mudstone used for all testing.
CBH 2009_7	17	54.35	54.75	CS	Firm to stiff greyish brown fissured CLAY.			42	100 n	66 a	27	39		
CBH 2009_7U	16	5.40	5.85	U	Greyish brown slightly gravelly SAND with occasional clay pockets and rare shell	2.12	1.85	15					2.63-p	
CBH 2009_7U	24	8.20	8.65	U	Firm pseudo fibrous PEAT.	1.10	0.28	294	100 n	498 b	NP			
CBH 2009_7U	48	16.60	17.05	U	Greyish brown SAND with occasional shell fragments.	2.11	1.79	18					2.63-p	
CBH 2009_7U	74	25.00	25.45	U	Grey SAND with shell fragments.	2.06	1.79	15					2.70-p	
CBH 2009_7U	99	34.10	34.55	U	Grey SAND with occasional shell fragments.	2.09	1.83	14						
CBH 2009_7U	121	41.90	42.35	U	Greyish brown SAND with occasional shell fragments.	1.95	1.65	18					2.66-p	
CBH 2009_8U	4	2.80	3.25	U	Light brownish grey slightly gravelly SAND.								2.62-p	
CBH 2009_8U	10	6.65	7.10	U	Soft grey slightly organic slightly sandy CLAY with occasional rootlets.			58	99 n	79 a	37	42		
CBH 2009_8U	17	8.20	8.65	U	Soft to firm grey slightly sandy CLAY.			64	100 n	84 a	32	52	2.64-p	
CBH 2009_8U	27	11.10	11.55	U	Soft to firm dark grey slightly sandy organic CLAY with rare plant remains.			60	99 n	86 a	35	51	2.61-p	
CBH 2009_8U	33	12.75	13.20	U	Brownish grey slightly organic SAND.			20	94 s	21 b	NP			
CBH 2009_8U	35	13.00	13.45	U	Light grey slightly organic SAND.			19						
CBH 2009_8U	50	17.55	18.00	U	Grey SAND with shell fragments.	1.98	1.67	19					2.66-g	
CBH 2009_8U	73	26.00	26.45	U	Grey to brownish grey silty SAND with shell fragments and pockets of very silty clay	2.01	1.69	19					2.64-p	
CBH 2009_8U	95	35.05	35.50	U	Brownish grey SAND with shell fragments.	2.05	1.80	14					2.64-g	
CBH 2009_8U	113	43.55	44.00	U	Grey SAND with shell fragments.	2.05	1.75	17						
CBH 2009_8U	119	47.90	48.35	U	Firm to stiff greyish brown CLAY.			38	99 n	114 a	35	79		
CBH 2009_8U	121	48.77	49.32	CS	Very stiff brownish grey fissured slightly sandy silty CLAY.			37	100 n	88 a	29	59		
CBH 2009_8U	122	51.36	51.56	CS	Very stiff brownish grey slightly sandy CLAY.	1.75	1.18	48	100 n	104 a	38	66		
CBH 2009_8U	124	54.52	54.72	CS	Stiff grey silty CLAY.			44	100 n	94 a	43	51		
CBH 2009_8U	125	58.23	58.72	CS	Very stiff greyish brown slightly sandy CLAY.	1.95	1.49	31	96 n	84 a	31	53	2.63-p	
CBH 2009_8U	126	61.32	61.72	CS	Firm brownish grey slightly gravelly sandy CLAY.			33	96 n	39 a	17	22	2.68-p	
CBH 2009_8U	128	67.41	67.69	CS	Brownish grey clayey SAND.	2.09	1.69	24	100 n	28 b	NP		2.63-p	
CBH 2009_8U	129	72.00	72.10	CS	Soft to firm grey and brown sandy CLAY.	2.06	1.67	23	100 s	27 a	19	8	2.65-p	
CBH 2009_8U	130	74.60	75.22	CS	Stiff dark grey slightly sandy fissured CLAY.	1.93	1.34	40	96 n	111 a	44	67		
CBH 2009_8U	131	78.05	78.50	CS	Stiff brownish grey slightly sandy CLAY.	1.72	1.16	48	98 n	138 a	43	95	2.67-p	
CBH 2009_8U	132	81.12	81.60	CS	Very stiff brownish grey slightly sandy silty fissured CLAY.	1.81	1.26	44	99 n	96 a	42	54	2.72-p	
CBH 2009_8U	133	84.12	84.60	CS	Very stiff brown slightly sandy CLAY.	1.93	1.55	32	95 n	98 a	31	67		
CBH 2009_9U	44	14.15	14.60	U	Light brown SAND with shell fragments.	2.04	1.70	20					2.65-p	
CBH 2009_9U	65	23.20	23.65	U	Reddish brown SAND with shell fragments.	2.03	1.72	18					2.63-p	

General notes: All above tests carried out to BS1377 : 1990 definitive method in all cases unless annotated otherwise. See individual test reports for further details.

Key :

ρ	bulk density, linear	W_L Liquid limit	W_P	Plastic limit	<425um preparation	ρ_s	particle density
ρ_d	dry density	a 4 point cone test	NP	non - plastic	n from natural soil	-g = gas jar	
w	moisture content	b 1 point cone test	I_P	Plasticity Index	s sieved specimen	-p = small pyknometer	

INDEX PROPERTIES - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	ρ Mg/m^3	ρ_d Mg/m^3	w %	< 425 µm sieve %	W_L %	W_P %	I_P	ρ_s Mg/m^3	Remarks
CBH 2009_9U	83	31.55	32.00	U	Firm to stiff brownish grey SAND with shell fragments.	2.14	1.81	18					2.67-p	
CBH 2009_9U	99	40.85	41.00	U	Stiff to very stiff grey SAND with shell fragments.	2.12	1.78	19					2.68-p	
CBH 2009_9U	125	52.75	53.20	U	Firm to stiff brownish grey slightly sandy CLAY.	1.78	1.25	42	100 n	80 a	32	48	2.65-p	
CBH 2009_9U	129	54.05	54.50	U	Firm to stiff grey clayey SILT.			46	100 n	76 a	47	29		
CBH 2009_9U	130	54.55	55.00	U	Firm to stiff grey silty CLAY.			48	100 n	100 a	48	52		
CBH 2009_10	20	50.45	50.90	CS	Very stiff brownish grey slightly sandy CLAY.	1.79	1.23	46	96 n	88 a	43	45		
CBH 2009_10	21	53.35	53.80	CS	Stiff to very stiff greyish brown slightly sandy CLAY.			41	100 n	93 a	35	58		
CBH 2009_11U	34	14.35	14.80	U	Orangish brown SAND with rare clay pockets.	2.05	1.74	18					2.63-p	
CBH 2009_11U	52	23.05	23.50	U	Orangish brown SAND.	1.80	1.58	14						
CBH 2009_11U	69	31.55	32.00	U	Grey slightly gravelly SAND with occasional shell fragments.	2.03	1.72	18					2.64-p	
CBH 2009_11U	88	41.55	42.00	U	Firm grey sandy silty CLAY with occasional shell fragments.	2.07	1.67	24					2.70-p	
CBH 2009_11U	90	42.10	42.55	U	Firm brown sandy silty CLAY.			29	91 n	38 a	19	19		
CBH 2009_11U	128	56.10	56.50	U	Firm to stiff brownish grey slightly sandy CLAY.			43	100 n	89 a	41	48	2.62-p	
SPT 2009_3	37	44.90	45.50	CS	Stiff greyish brown slightly gravelly silty CLAY.			58	73 s	85 a	45	40		

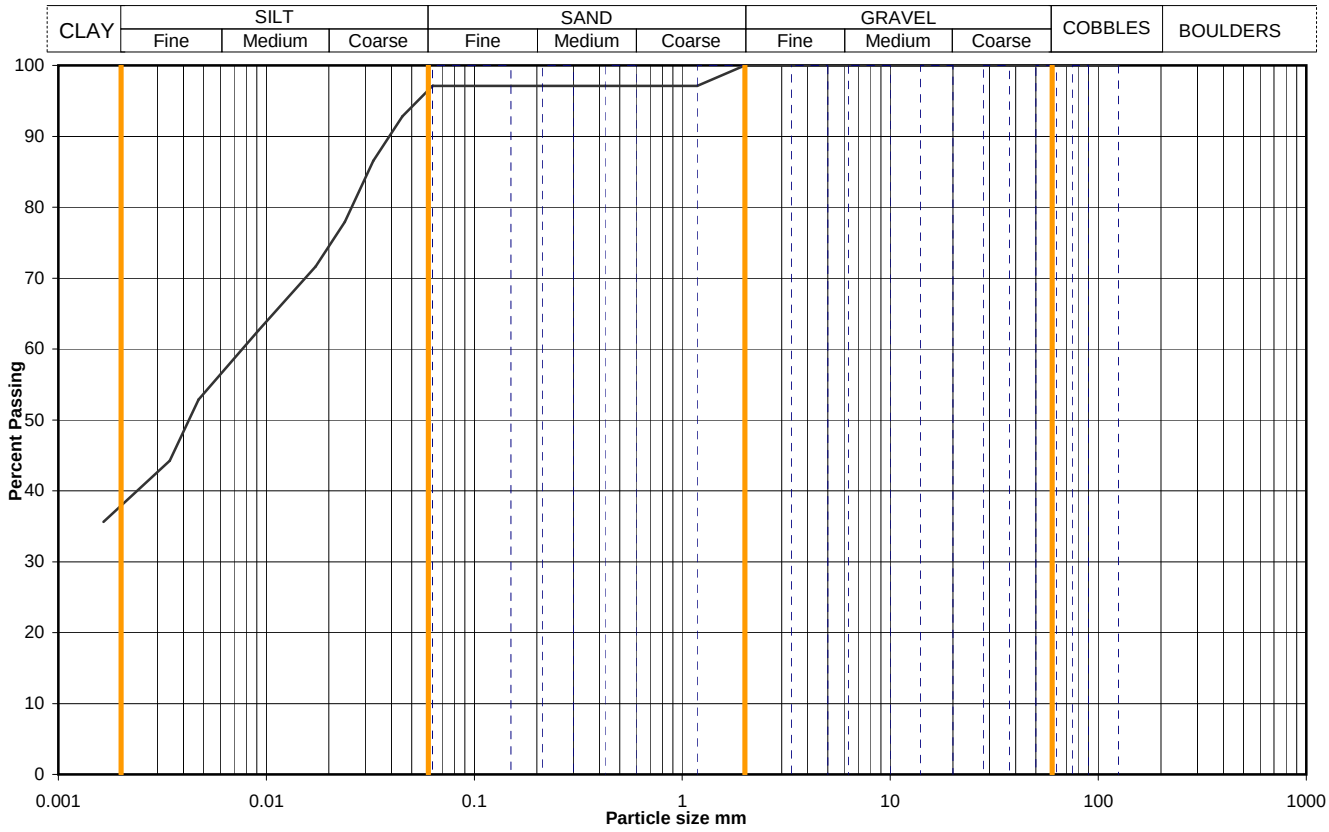
General notes: All above tests carried out to BS1377 : 1990 definitive method in all cases unless annotated otherwise. See individual test reports for further details.

Key :

ρ	bulk density, linear	W_L Liquid limit	W_P	Plastic limit	<425um preparation	ρ_s	particle density
ρ_d	dry density	a 4 point cone test	NP	non - plastic	n from natural soil	-g = gas jar	
w	moisture content	b 1 point cone test	I_P	Plasticity Index	s sieved specimen	-p = small pyknometer	

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	47.10		
			Samp No	9	Type	CS
			ID	ESGA0012-10201010080000001878		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0451	93
75	100	0.0327	87
63	100	0.0239	78
50	100	0.0172	72
37.5	100	0.0092	63
28	100	0.0047	53
20	100	0.0034	44
14	100	0.0016	36
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	97	Particle density, Mg/m3	
0.600	97		
0.425	97	2.65 assumed	
0.300	97	Dry mass of sample, kg	
0.212	97		
0.150	97	0.0	
0.063	97		

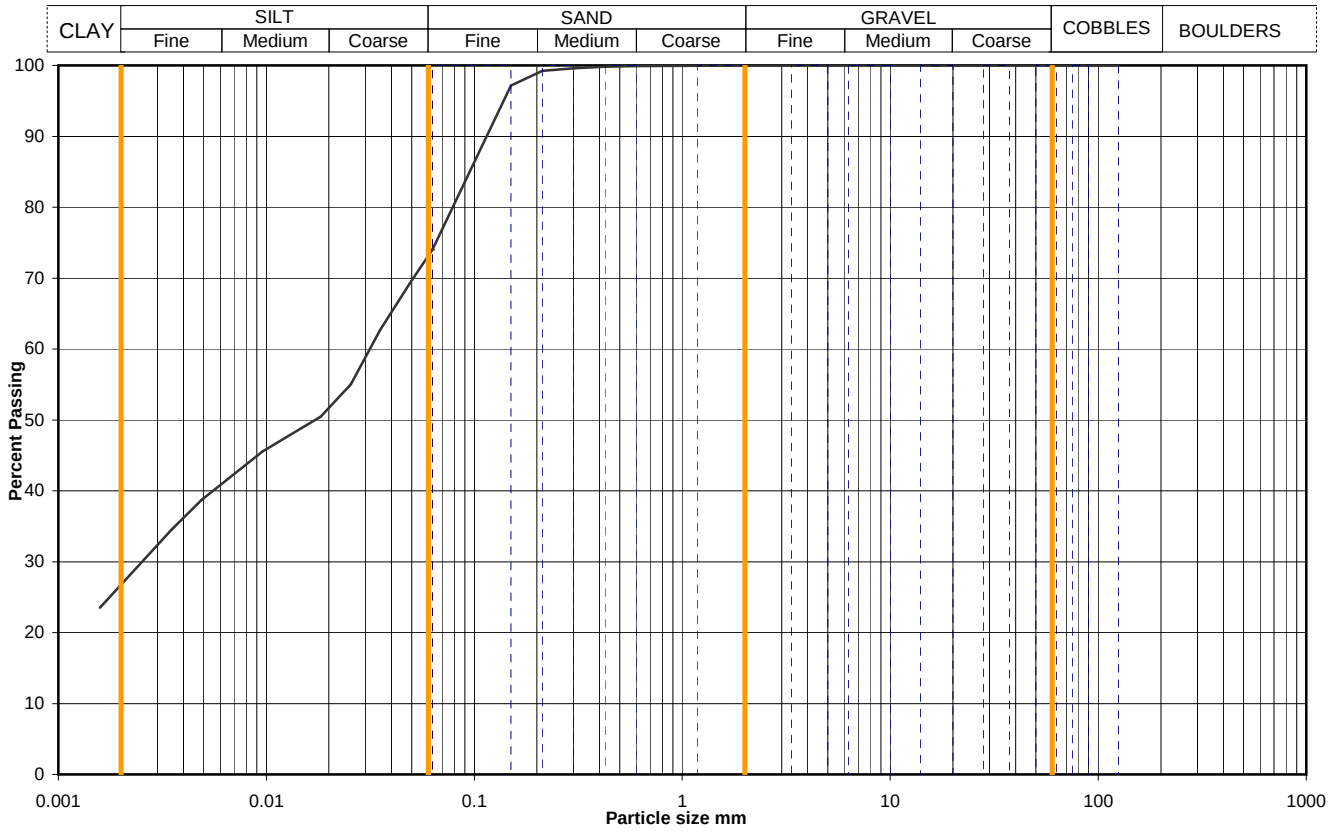
Soil description	Stiff grey slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	4	4
	Silt	58	58
	Clay	38	38

Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	68.75		
			Samp No	15	Type	CS
			ID	ESGA0012-10201010080000001883		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	74
90	100	0.0486	69
75	100	0.0352	63
63	100	0.0255	55
50	100	0.0183	50
37.5	100	0.0096	46
28	100	0.0049	39
20	100	0.0035	35
14	100	0.0016	24
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100	Particle density, Mg/m3	
0.600	100		
0.425	100	2.65 assumed	
0.300	100	Dry mass of sample, kg	
0.212	99		
0.150	97	1.8	
0.063	74		

Soil description	Stiff brown mottled grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	27	27
	Silt	46	46
	Clay	27	27

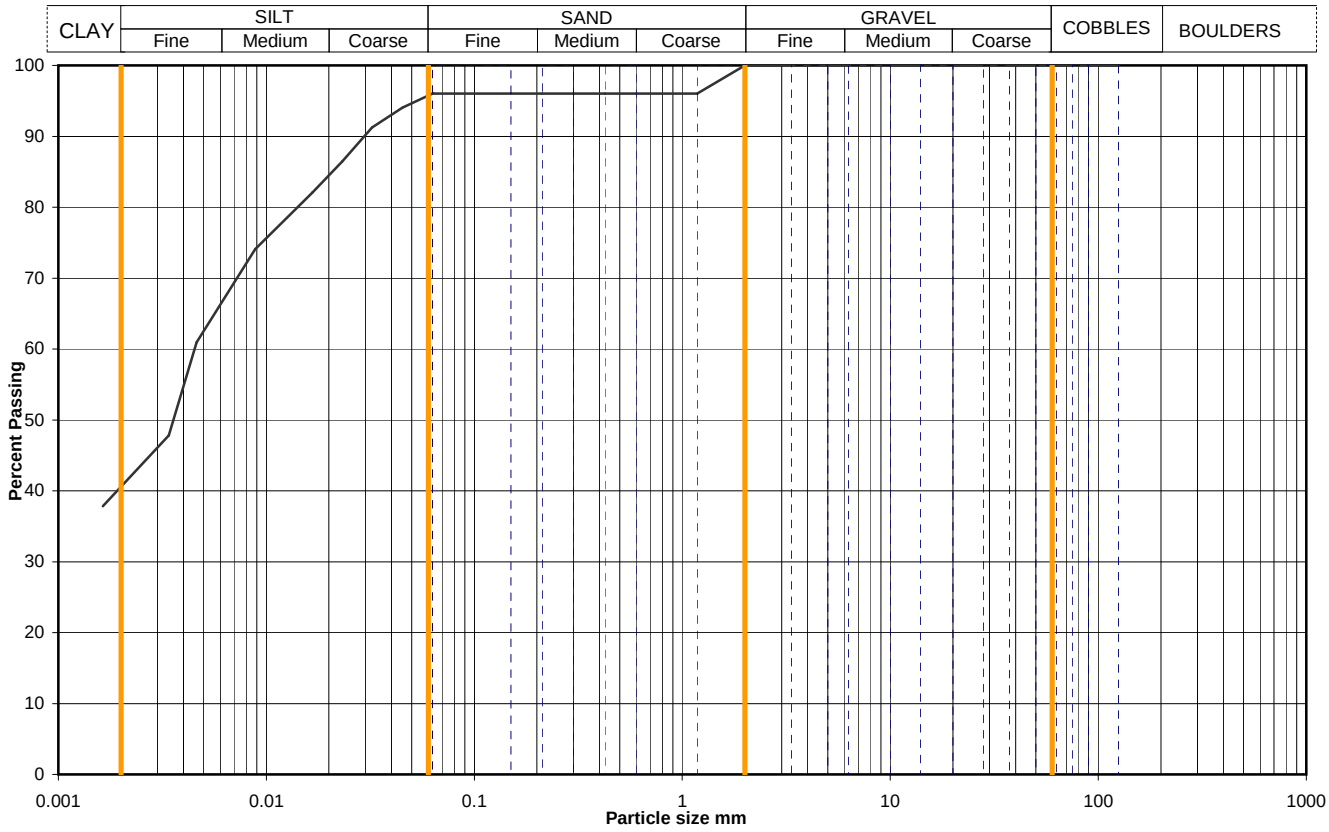
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 2**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	84.35		
			Samp No	18	Type	CS
			ID	ESGA0012-10201010080000001886		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	96
90	100	0.0451	94
75	100	0.0322	91
63	100	0.0232	86
50	100	0.0167	82
37.5	100	0.0088	74
28	100	0.0046	61
20	100	0.0034	48
14	100	0.0016	38
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	96	Particle density, Mg/m3	
0.600	96		
0.425	96	2.66 measured	
0.300	96	Dry mass of sample, kg	
0.212	96		
0.150	96	0.0	
0.063	96		

Soil description	Greyish brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	4	4
	Silt	55	55
	Clay	41	41

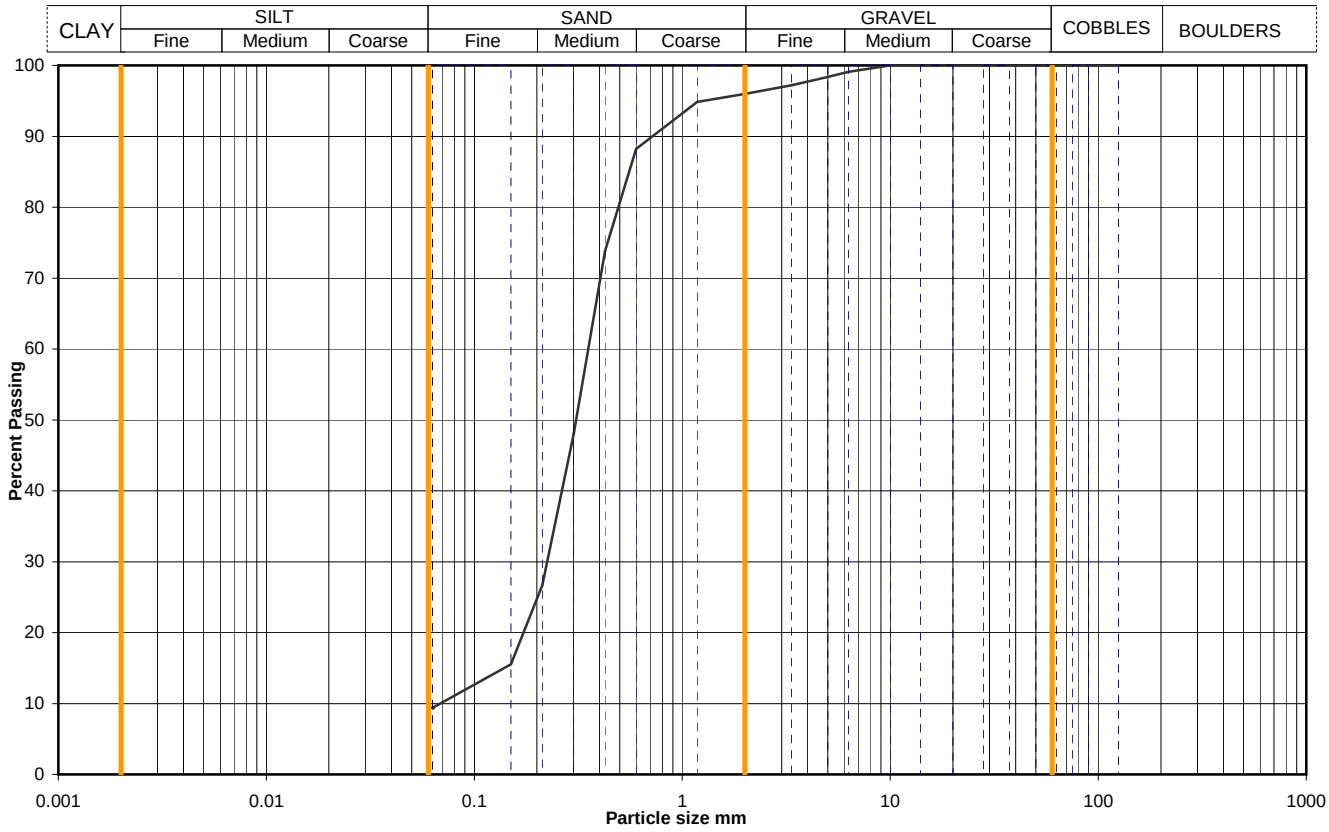
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 3**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	1.20		
			Samp No	3	Type	U
			ID	ESGA0012-10201010080000001727		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5.0	98		
3.35	97		
2.00	96		
1.18	95		
0.600	88		
0.425	74		
0.300	48	Dry mass of sample, kg	
0.212	27		
0.150	16	3.4	
0.063	9		

Soil description	Black brown and grey silty SAND with occasional shell fragments.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	4	4
	Sand	87	87
	Silt	silt+clay =	
	Clay	9	9

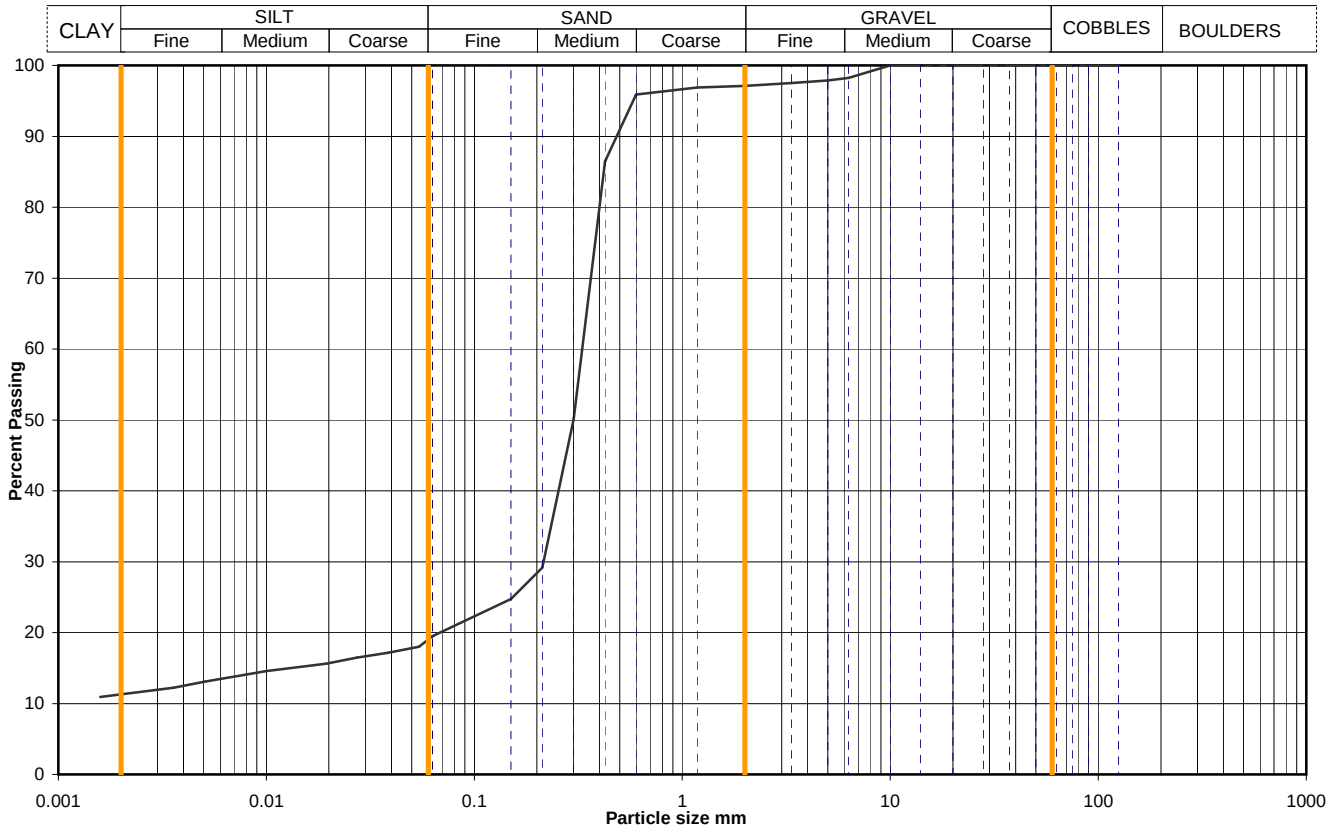
Uniformity Coefficient	D_{60} / D_{10}	5

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 4**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	10.10		
			Samp No	27	Type	U
			ID	ESGA0012-10201010080000001754		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	19
90	100	0.0542	18
75	100	0.0385	17
63	100	0.0273	16
50	100	0.0194	16
37.5	100	0.0101	15
28	100	0.0051	13
20	100	0.0036	12
14	100	0.0016	11
10	100		
6.3	98		
5.0	98		
3.35	98		
2.00	97		
1.18	97	Particle density, Mg/m3	
0.600	96		
0.425	86	2.68 measured	
0.300	50	Dry mass of sample, kg	
0.212	29		
0.150	25	4.1	
0.063	19		

Soil description	Grey slightly gravelly SAND with occasional clay pockets.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	78	78
	Silt	8	8
	Clay	11	11

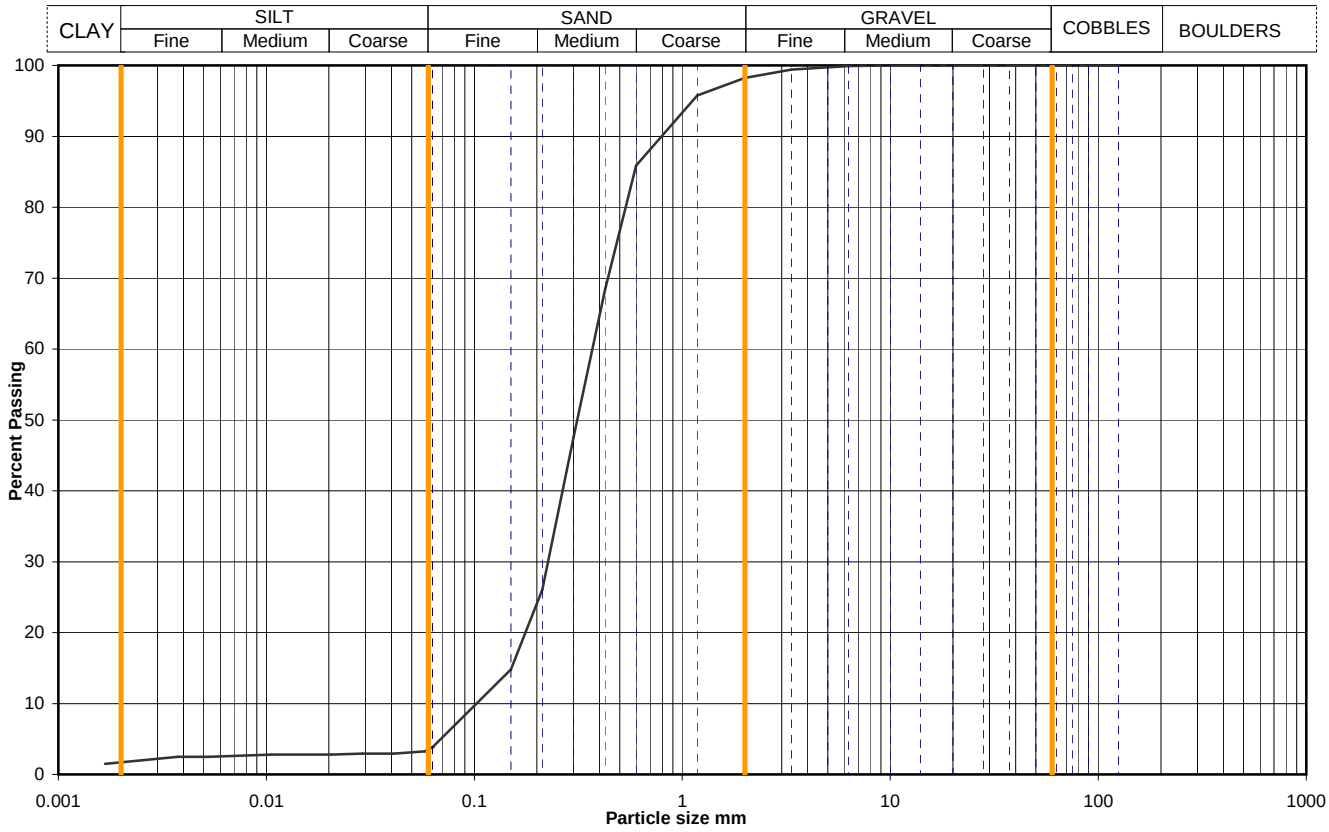
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 5**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	18.50		
			Samp No	51	Type	U
			ID	ESGA0012-10201010080000001778		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	4
90	100	0.0579	3
75	100	0.0410	3
63	100	0.0290	3
50	100	0.0205	3
37.5	100	0.0106	3
28	100	0.0053	3
20	100	0.0038	3
14	100	0.0017	1
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	98		
1.18	96	Particle density, Mg/m3	
0.600	86		
0.425	68	2.65 assumed	
0.300	48	Dry mass of sample, kg	
0.212	26		
0.150	15	6.3	
0.063	4		

Soil description	Stiff to very stiff grey SAND with shell fragments.
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377
Remarks	

Sample Proportions *<60mm values to aid description only	Whole	*<60mm
Cobbles / boulders	0	0
Gravel	2	2
Sand	95	95
Silt	2	2
Clay	1	1

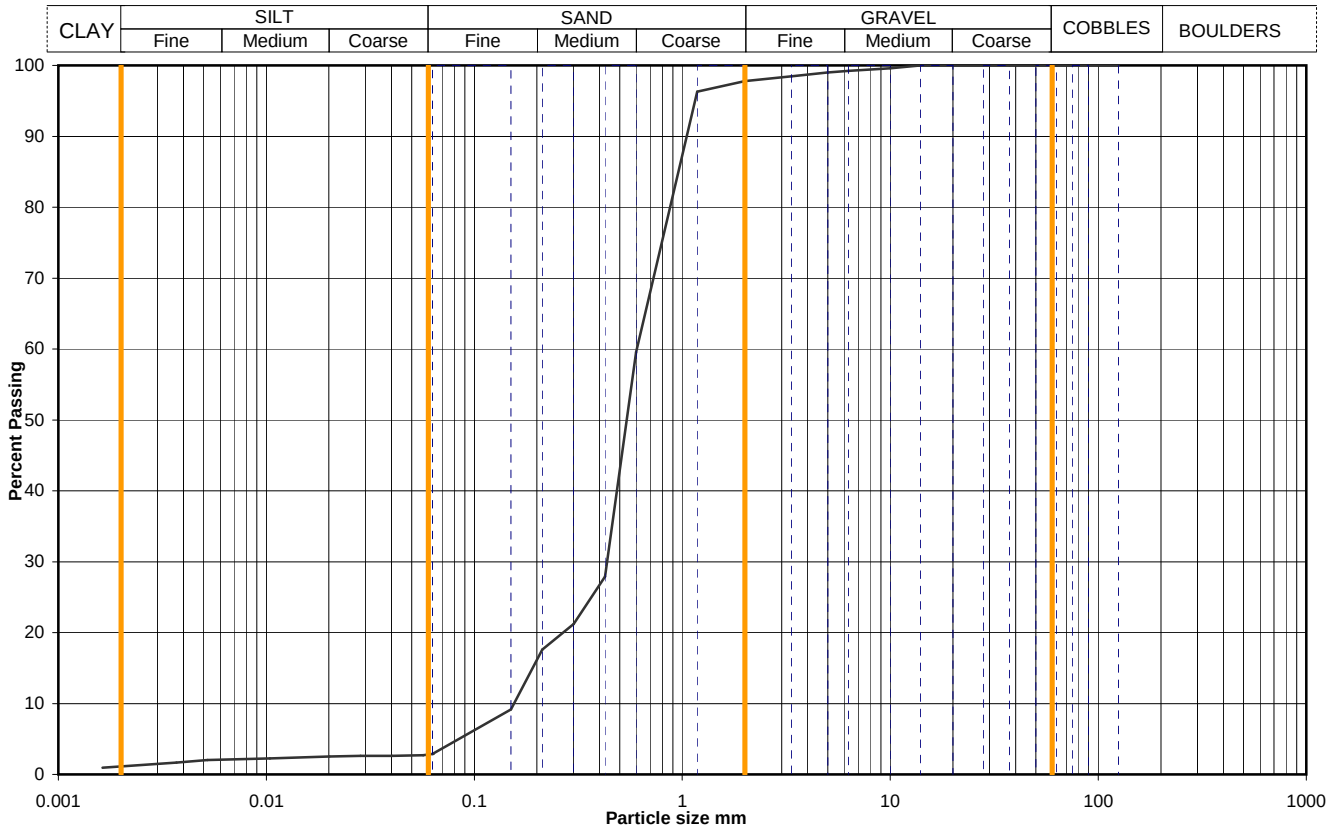
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref				Figure
SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**PSD 6**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	27.60		
			Samp No	72	Type	U
			ID	ESGA0012-10201010080000001804		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	3
90	100	0.0567	3
75	100	0.0401	3
63	100	0.0284	3
50	100	0.0201	3
37.5	100	0.0104	2
28	100	0.0052	2
20	100	0.0037	2
14	100	0.0016	1
10	100		
6.3	99		
5.0	99		
3.35	98		
2.00	98		
1.18	96	Particle density, Mg/m3	
0.600	60		
0.425	28	2.69 measured	
0.300	21	Dry mass of sample, kg	
0.212	18		
0.150	9	3.3	
0.063	3		

Soil description	Grey SAND with shell fragments.
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
*<60mm values to aid description only	Cobbles / boulders	0	0
	Gravel	2	2
	Sand	95	95
	Silt	2	2
	Clay	1	1

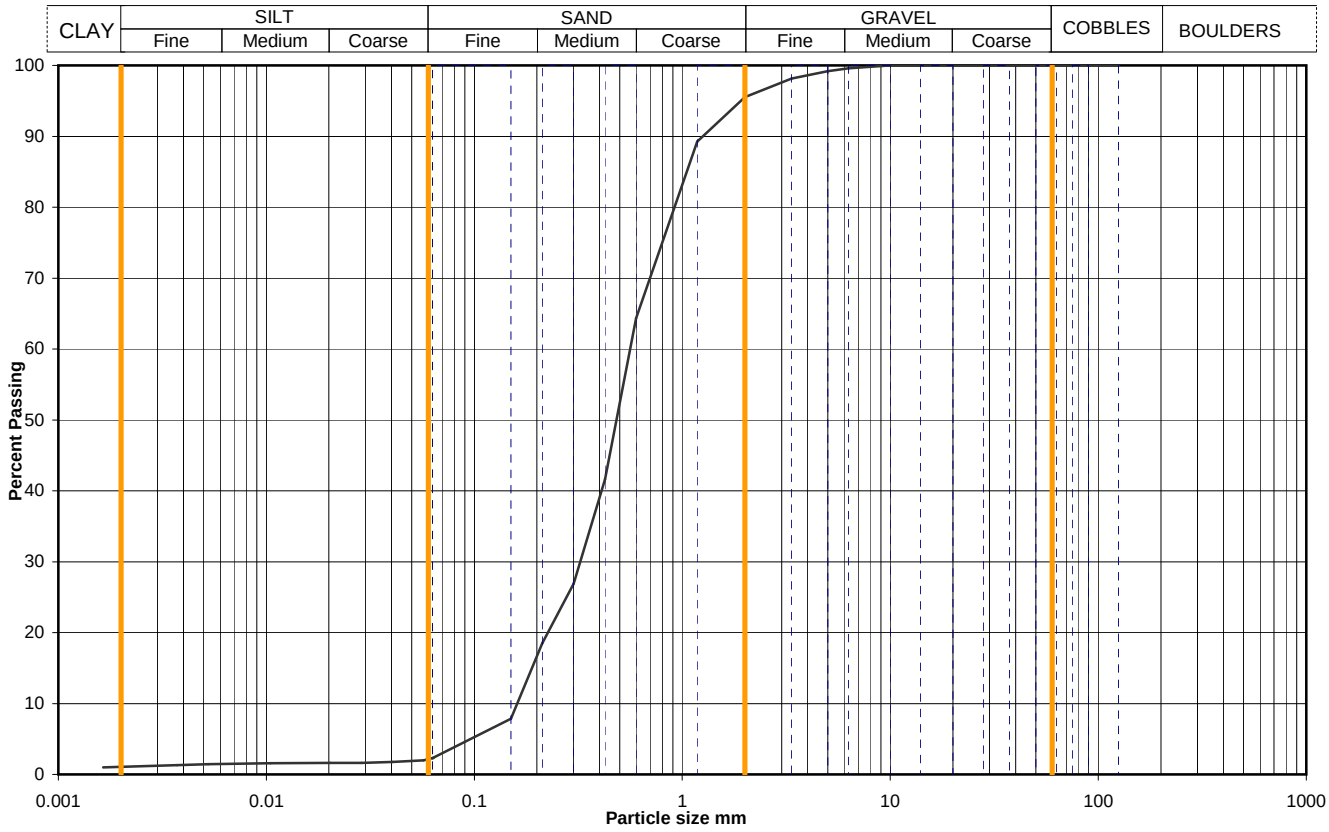
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref			Figure
SLR 2,9 Rev 84 Sept 08	Soil Mechanics	Printed:13/05/2011 09:46	PSD 7

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	36.70		
			Samp No	94	Type	U
			ID	ESGA0012-10201010080000001830		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	2
90	100	0.0571	2
75	100	0.0405	2
63	100	0.0287	2
50	100	0.0203	2
37.5	100	0.0105	2
28	100	0.0053	1
20	100	0.0037	1
14	100	0.0016	1
10	100		
6.3	100		
5.0	99		
3.35	98		
2.00	96		
1.18	89	Particle density, Mg/m3	
0.600	64		
0.425	42	2.67 measured	
0.300	27	Dry mass of sample, kg	
0.212	18		
0.150	8	4.9	
0.063	2		

Soil description	Firm to stiff brownish grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	4	4
	Sand	93	93
	Silt	2	2
	Clay	1	1

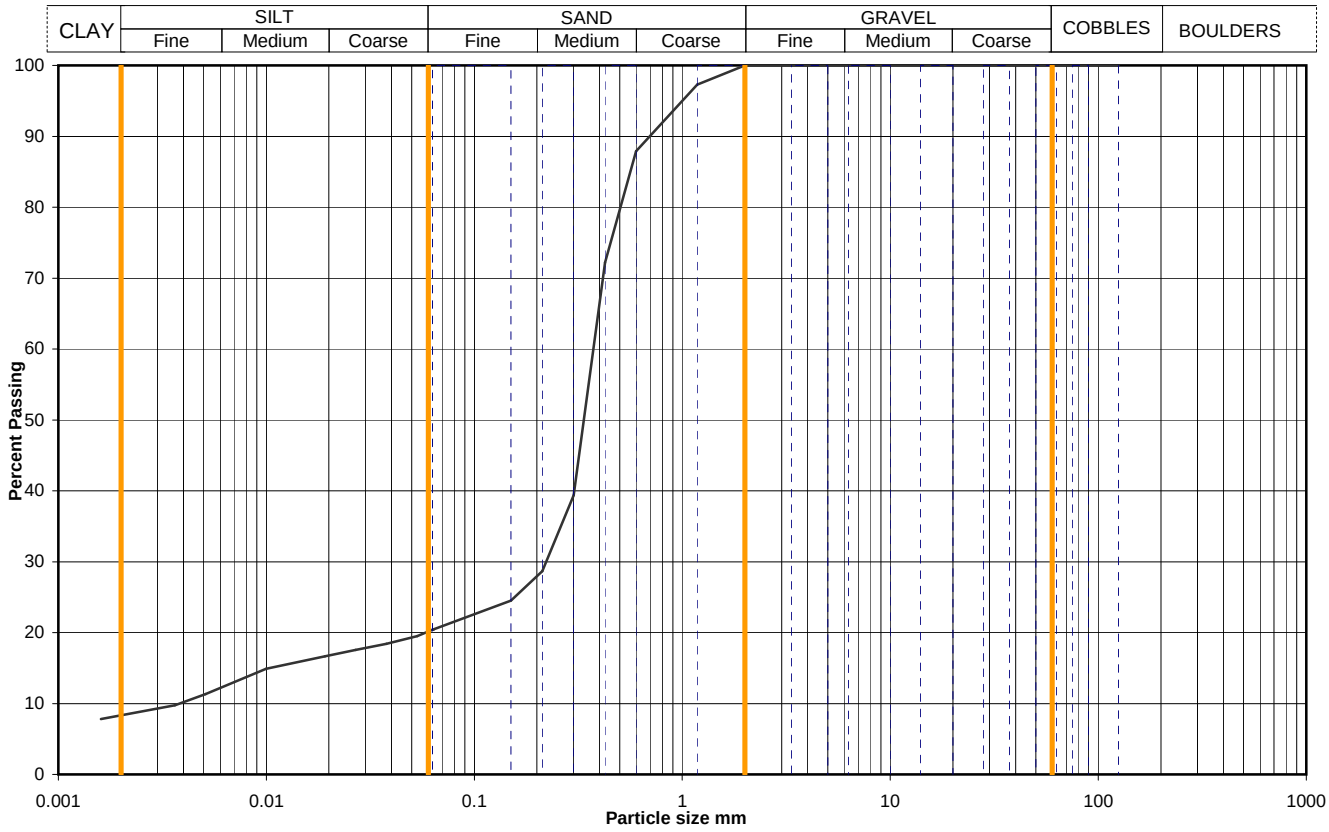
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 8**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	45.10		
			Samp No	114	Type	U
			ID	ESGA0012-10201010080000001854		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	20
90	100	0.0531	19
75	100	0.0378	18
63	100	0.0269	18
50	100	0.0191	17
37.5	100	0.0100	15
28	100	0.0051	11
20	100	0.0036	10
14	100	0.0016	8
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	97	Particle density, Mg/m3	
0.600	88		
0.425	72	2.65 assumed	
0.300	39	Dry mass of sample, kg	
0.212	29		
0.150	24	0.1	
0.063	20		

Soil description	Soft to firm greyish brown very sandy CLAY with rare shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	80	80
	Silt	12	12
	Clay	8	8

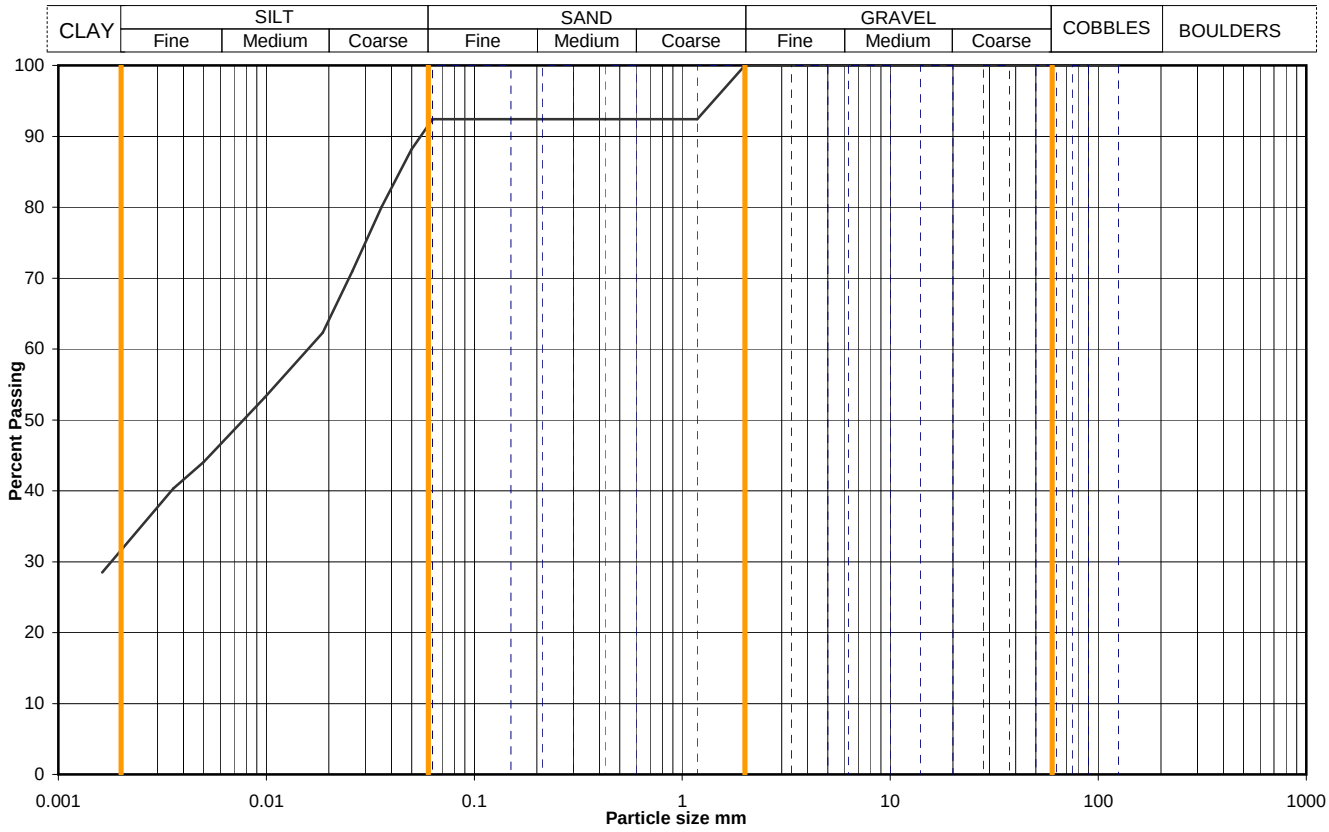
Uniformity Coefficient	D_{60} / D_{10}	97

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 9**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	46.50		
			Samp No	118	Type	U
			ID	ESGA0012-10201010080000001858		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	92
90	100	0.0498	88
75	100	0.0359	80
63	100	0.0259	71
50	100	0.0187	62
37.5	100	0.0098	53
28	100	0.0050	44
20	100	0.0036	40
14	100	0.0016	28
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	92	Particle density, Mg/m3	
0.600	92		
0.425	92	2.65 assumed	
0.300	92	Dry mass of sample, kg	
0.212	92		
0.150	92	0.0	
0.063	92		

Soil description	Firm to stiff greyish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	8	8
	Silt	60	60
	Clay	32	32

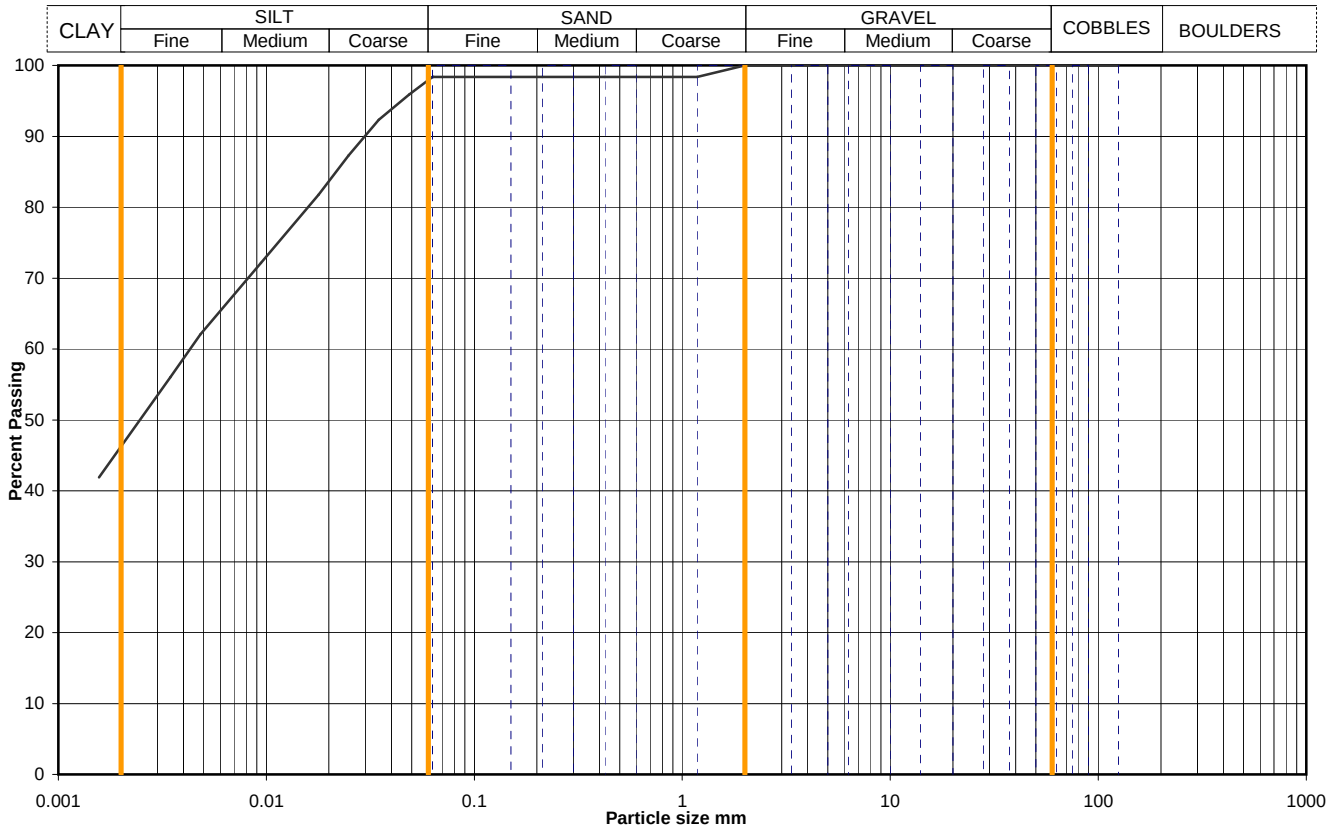
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 10**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	49.75		
			Samp No	16	Type	CS
			ID	ESGA0012-10201008240000000379		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	98
90	100	0.0486	96
75	100	0.0347	92
63	100	0.0249	87
50	100	0.0178	82
37.5	100	0.0094	72
28	100	0.0048	62
20	100	0.0035	56
14	100	0.0016	42
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	98	Particle density, Mg/m3	
0.600	98		
0.425	98	2.63 measured	
0.300	98	Dry mass of sample, kg	
0.212	98		
0.150	98	0.0	
0.063	98		

Soil description	Stiff brownish grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	2	2
	Silt	52	52
	Clay	46	46

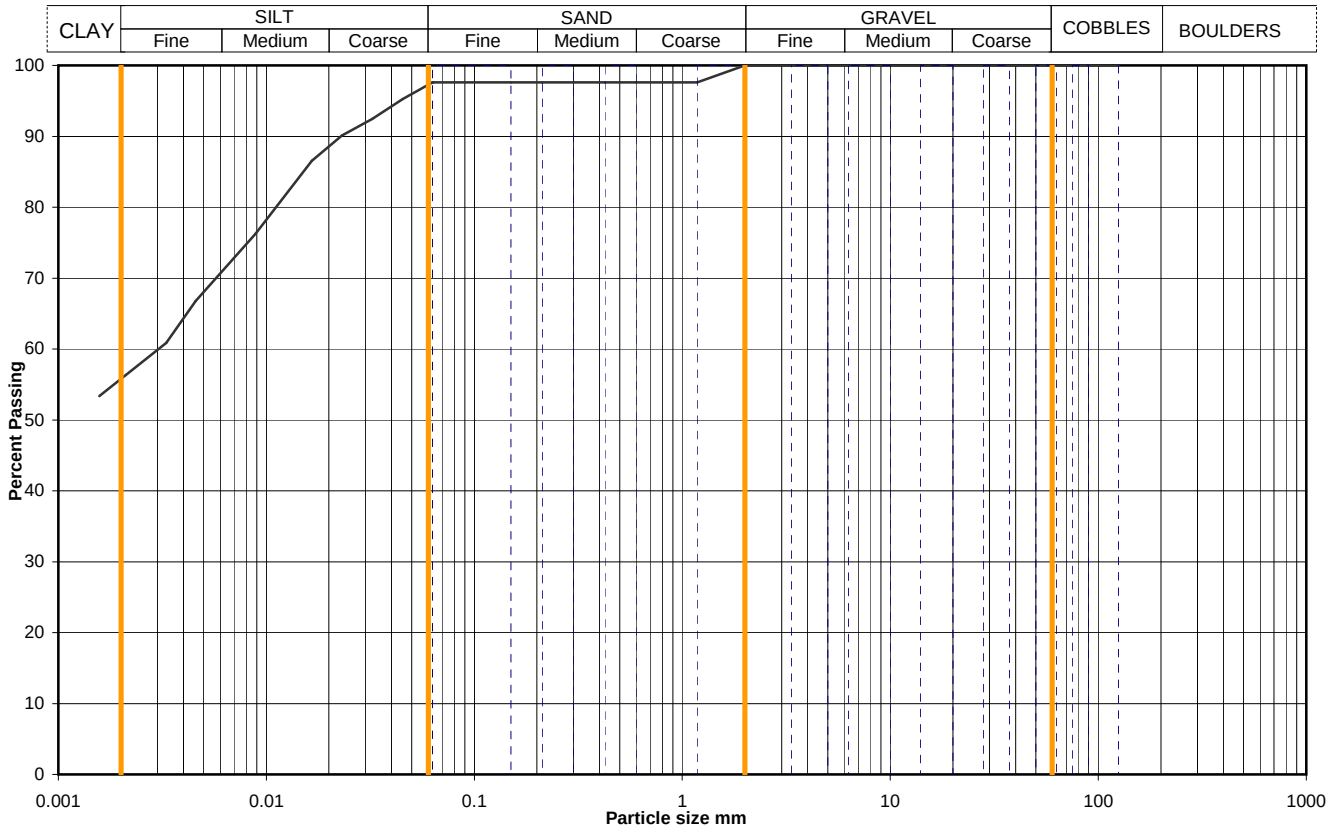
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 11**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	54.80		
			Samp No	18	Type	CS
			ID	ESGA0012-10201008240000000382		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	98
90	100	0.0453	95
75	100	0.0324	92
63	100	0.0231	90
50	100	0.0165	87
37.5	100	0.0089	76
28	100	0.0046	67
20	100	0.0033	61
14	100	0.0016	53
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	98	Particle density, Mg/m3	
0.600	98		
0.425	98	2.62 measured	
0.300	98	Dry mass of sample, kg	
0.212	98		
0.150	98	0.0	
0.063	98		

Soil description	Firm to stiff brownish grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	3	3
	Silt	41	41
	Clay	56	56

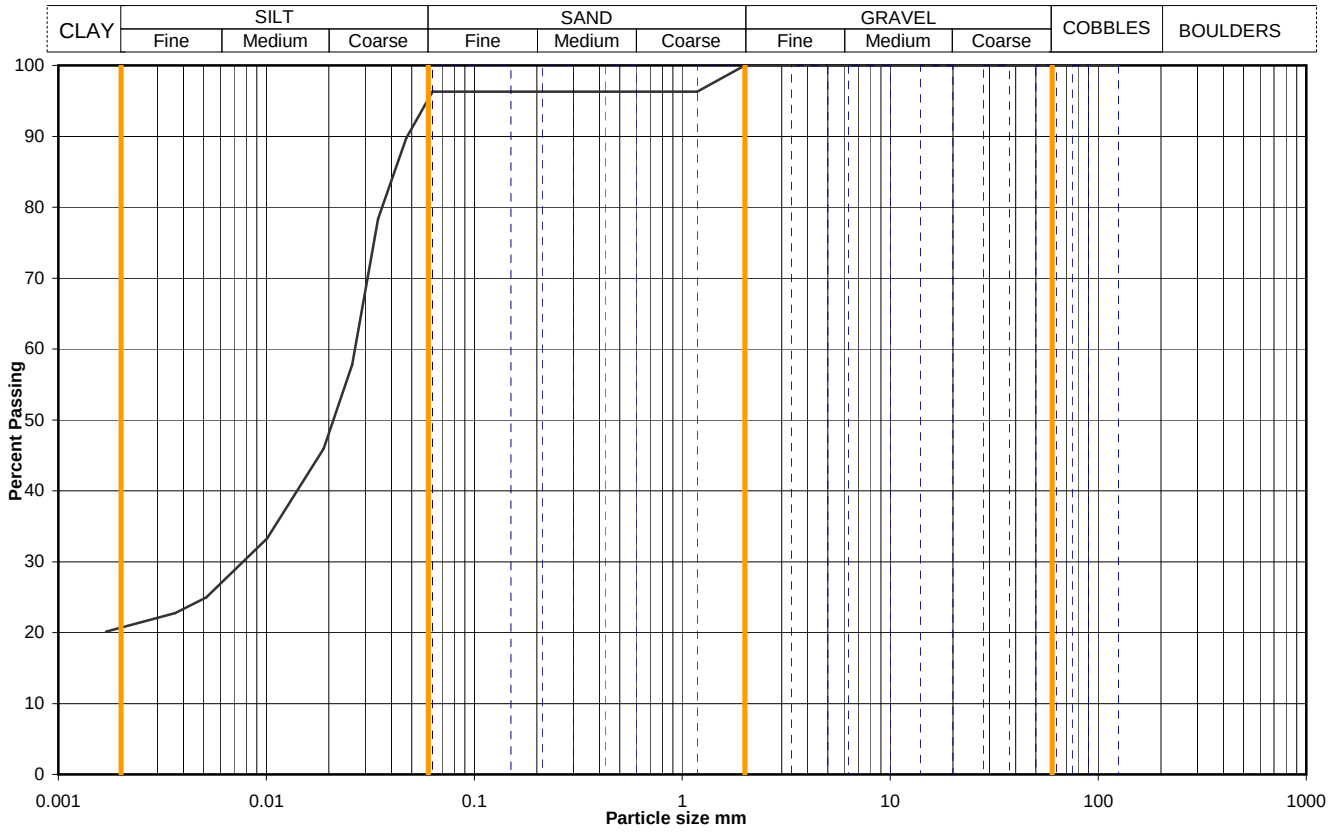
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 12**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	58.50		
			Samp No	20	Type	CS
			ID	ESGA0012-10201008240000000383		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	96
90	100	0.0471	90
75	100	0.0345	78
63	100	0.0259	58
50	100	0.0189	46
37.5	100	0.0101	33
28	100	0.0051	25
20	100	0.0037	23
14	100	0.0017	20
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	96	Particle density, Mg/m3	
0.600	96		
0.425	96	2.63 measured	
0.300	96	Dry mass of sample, kg	
0.212	96		
0.150	96	0.0	
0.063	96		

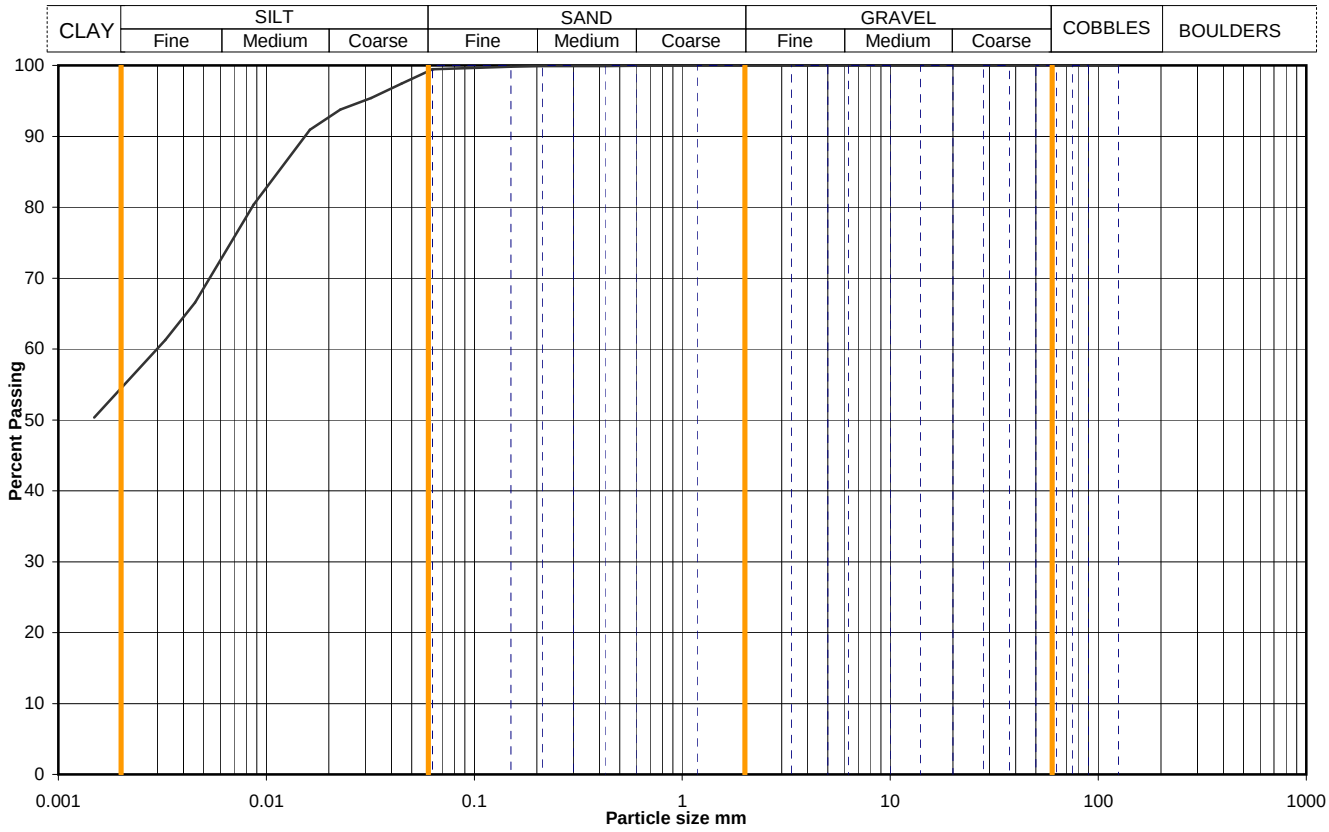
Soil description	Soft brownish grey slightly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	5	5
	Silt	74	74
	Clay	21	21

Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	61.75		
			Samp No	21	Type	CS
			ID	ESGA0012-10201008240000000384		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	99
90	100	0.0447	97
75	100	0.0319	95
63	100	0.0227	94
50	100	0.0162	91
37.5	100	0.0087	80
28	100	0.0045	67
20	100	0.0033	61
14	100	0.0015	50
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100	Particle density, Mg/m3	
0.600	100		
0.425	100	2.65 assumed	
0.300	100	Dry mass of sample, kg	
0.212	100		
0.150	100	1.4	
0.063	99		

Soil description	Firm to stiff brownish grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	1	1
	Silt	45	45
	Clay	54	54

Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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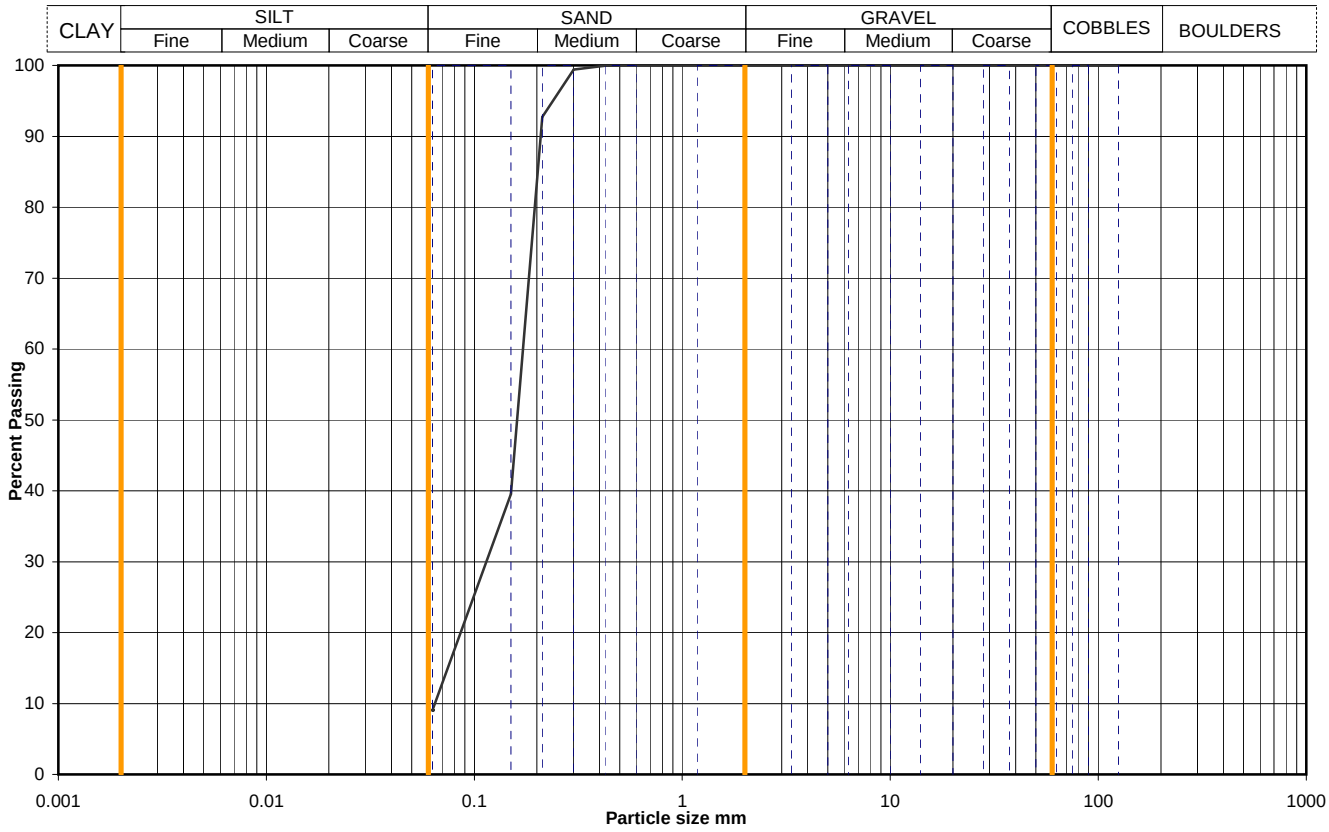
Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	65.10		
			Samp No	22	Type	CS
			ID	ESGA0012-10201008240000000385		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	99	Dry mass of sample, kg	
0.212	93		
0.150	40	1.2	
0.063	9		

Soil description	Brownish grey silty SAND.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	91	91
	Silt	silt+clay =	
	Clay	9	9

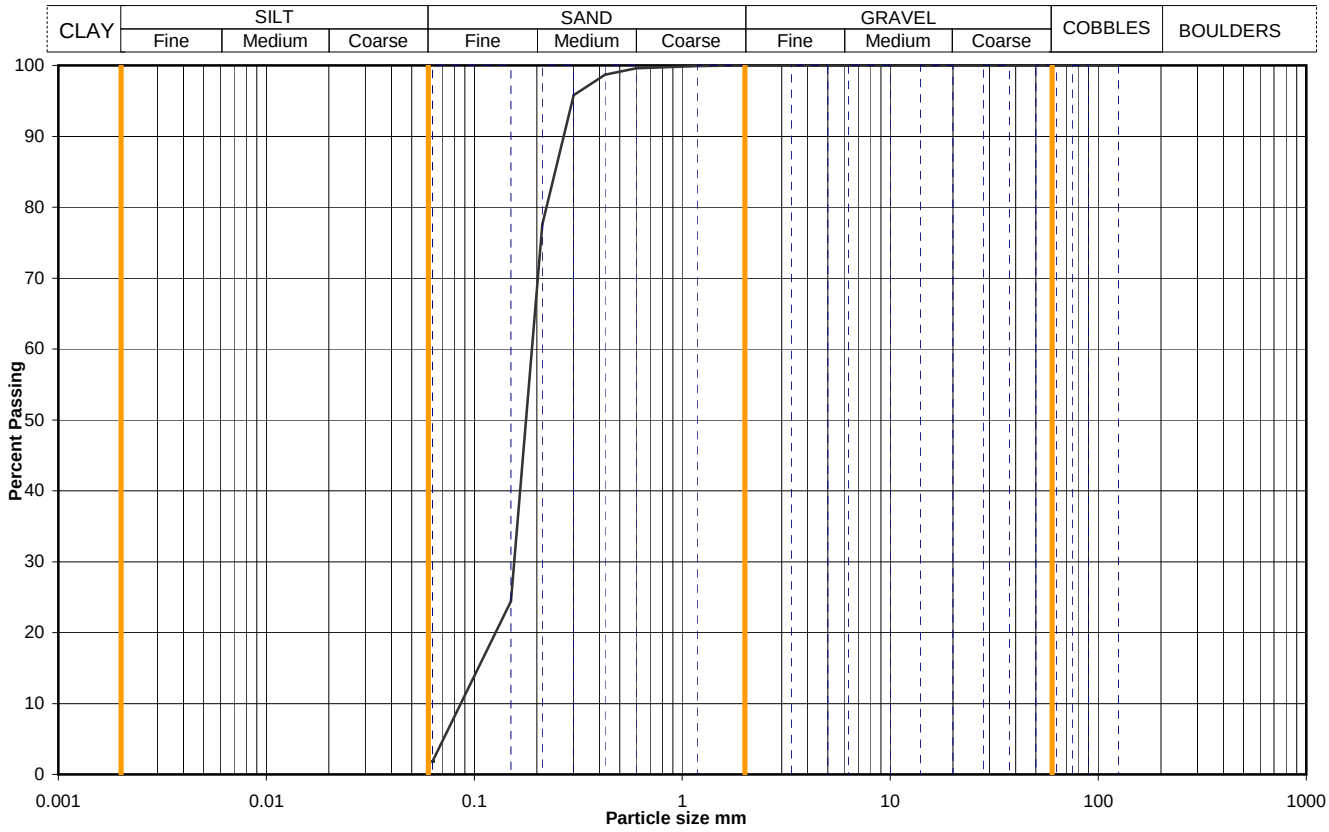
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 15**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	70.90		
			Samp No	23	Type	CS
			ID	ESGA0012-10201008240000000386		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	99		
0.300	96	Dry mass of sample, kg	
0.212	78		
0.150	24	2.1	
0.063	2		

Soil description	Light greyish brown SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	98	98
	Silt	silt+clay =	
	Clay	2	2

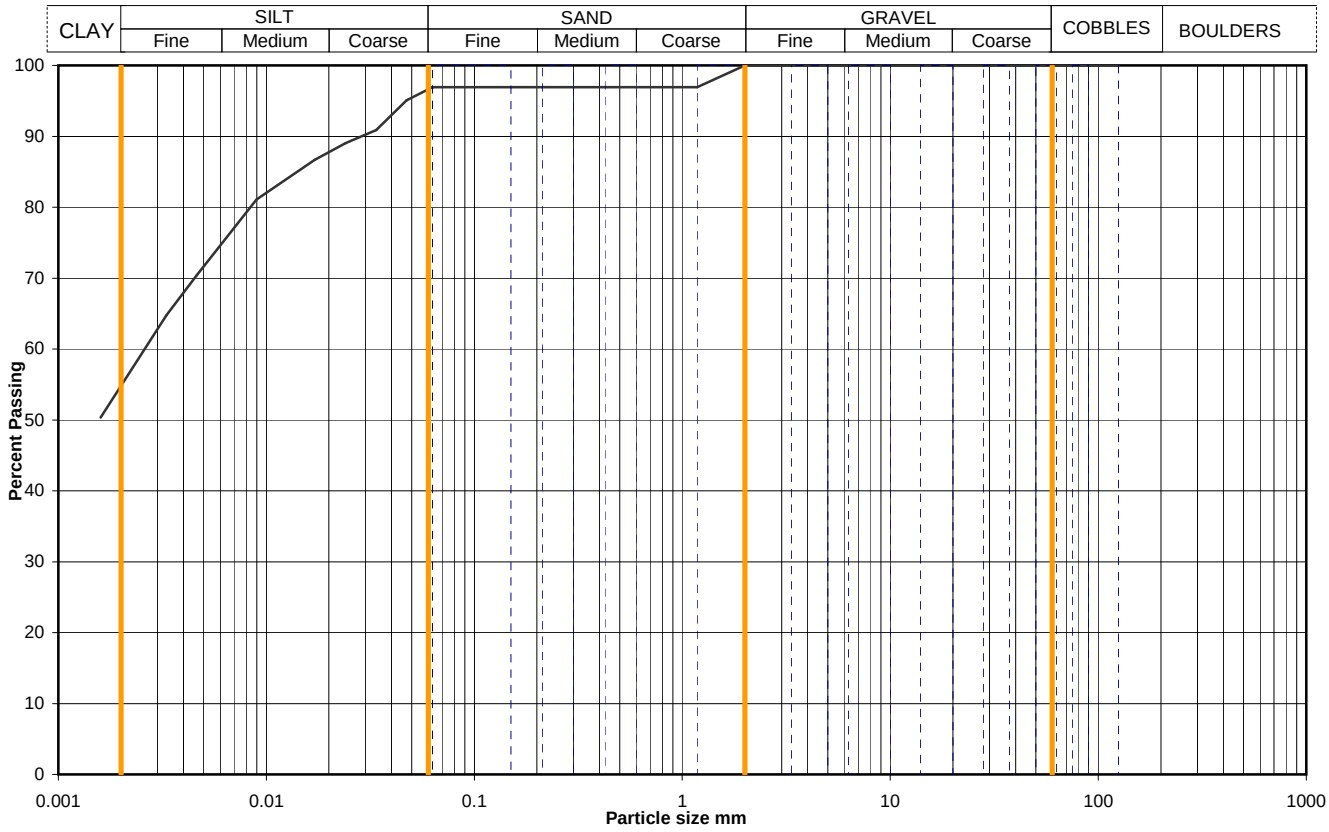
Uniformity Coefficient	D_{60} / D_{10}	2

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 16**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	74.00		
			Samp No	24	Type	CS
			ID	ESGA0012-10201008240000000387		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0472	95
75	100	0.0338	91
63	100	0.0240	89
50	100	0.0171	87
37.5	100	0.0090	81
28	100	0.0046	70
20	100	0.0033	65
14	100	0.0016	50
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	97	Particle density, Mg/m3	
0.600	97		
0.425	97	2.65 assumed	
0.300	97	Dry mass of sample, kg	
0.212	97		
0.150	97	0.0	
0.063	97		

Soil description	Firm to stiff dark grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	3	3
	Silt	42	42
	Clay	55	55

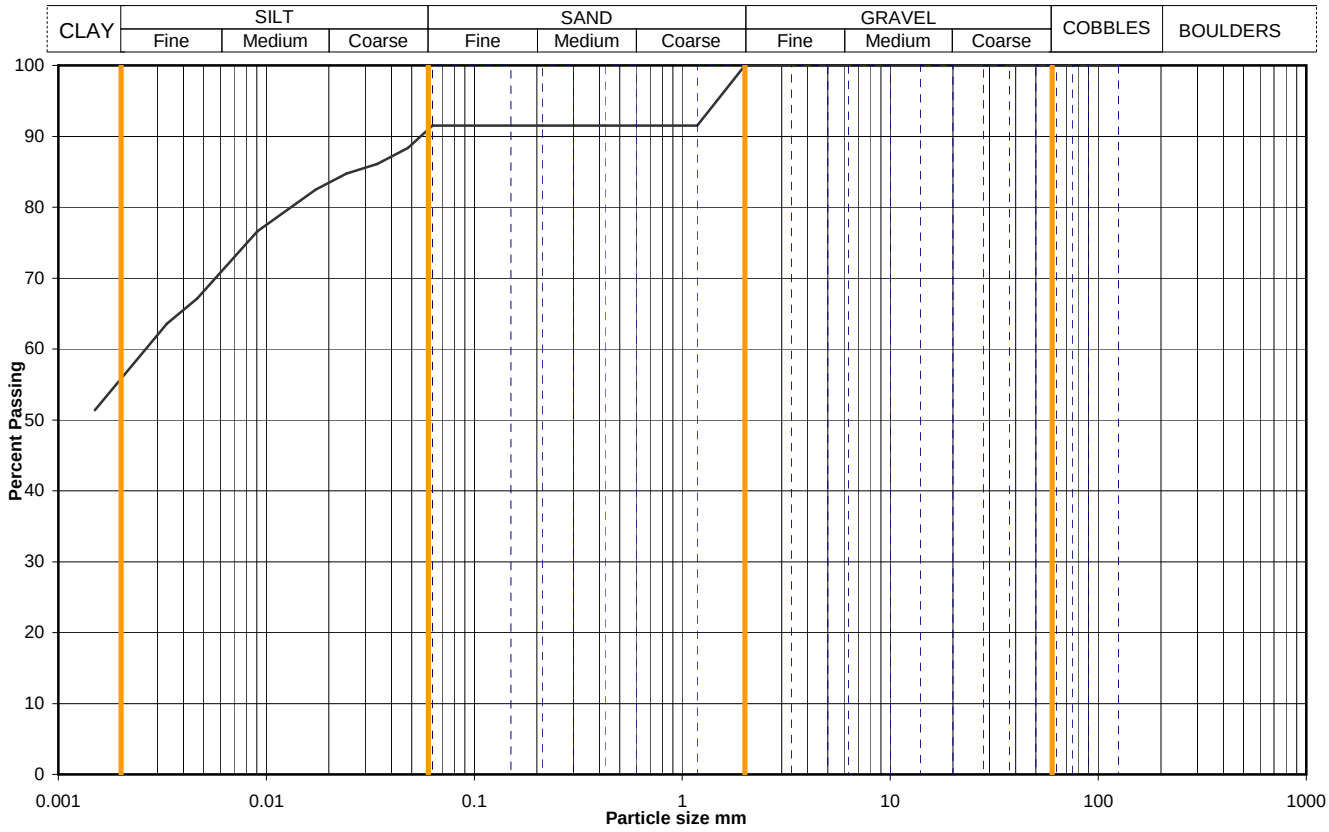
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 17**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	77.10		
			Samp No	25	Type	CS
			ID	ESGA0012-10201008240000000388		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	91
90	100	0.0479	88
75	100	0.0341	86
63	100	0.0242	85
50	100	0.0172	82
37.5	100	0.0091	77
28	100	0.0047	67
20	100	0.0033	64
14	100	0.0015	51
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	91	Particle density, Mg/m3	
0.600	91		
0.425	91	2.65 assumed	
0.300	91	Dry mass of sample, kg	
0.212	91		
0.150	91	0.0	
0.063	91		

Soil description	Firm greyish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	9	9
	Silt	35	35
	Clay	56	56

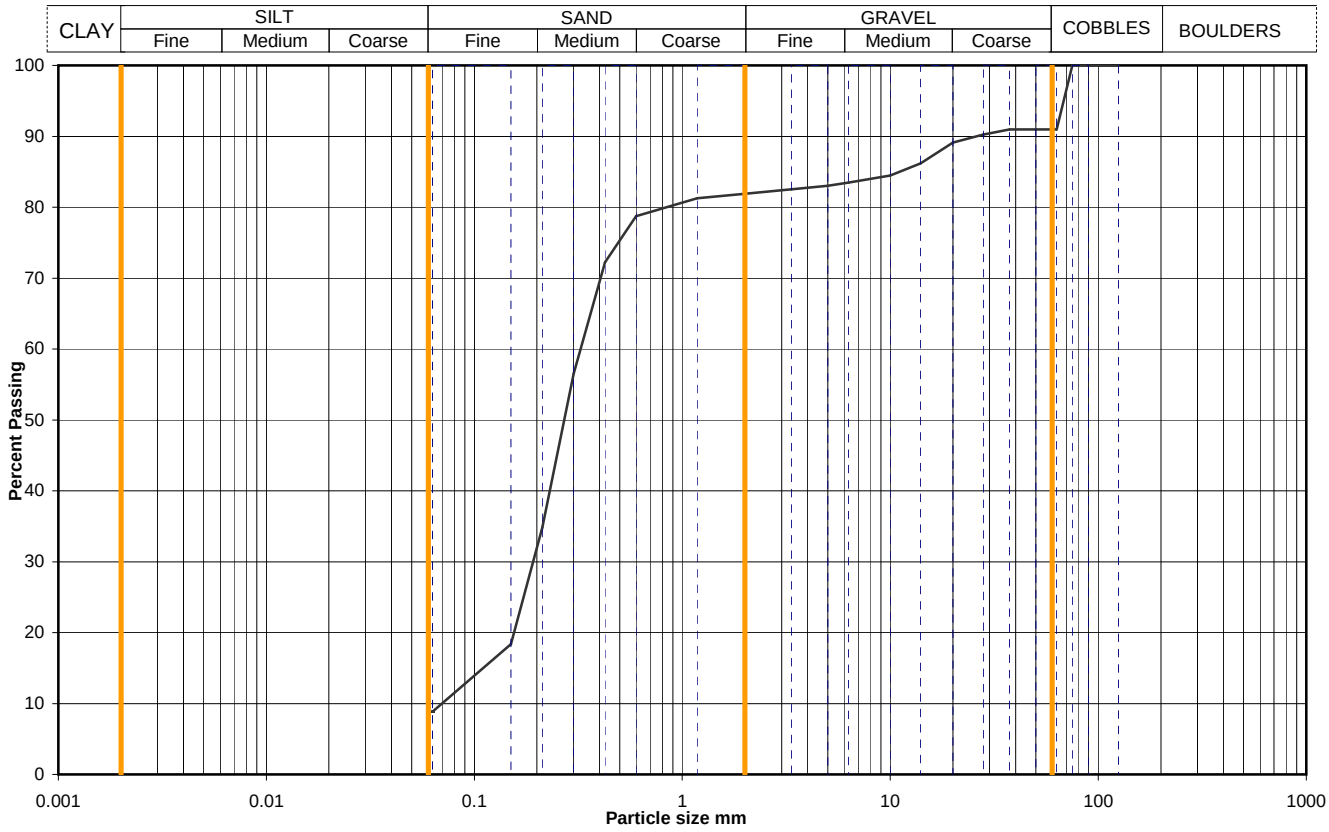
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 18**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	1.90		
			Samp No	7	Type	U
			ID	ESGA0012-10201010180000002065		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	91		
50	91		
37.5	91		
28	90		
20	89		
14	86		
10	84		
6.3	83		
5.0	83		
3.35	83		
2.00	82		
1.18	81		
0.600	79		
0.425	72		
0.300	57	Dry mass of sample, kg	
0.212	35		
0.150	18	6.4	
0.063	9		

Soil description	Greyish brown slightly clayey gravelly SAND with 1 cobble.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	9	0
	Gravel	9	10
	Sand	73	80
	Silt	silt+clay =	
	Clay	9	10

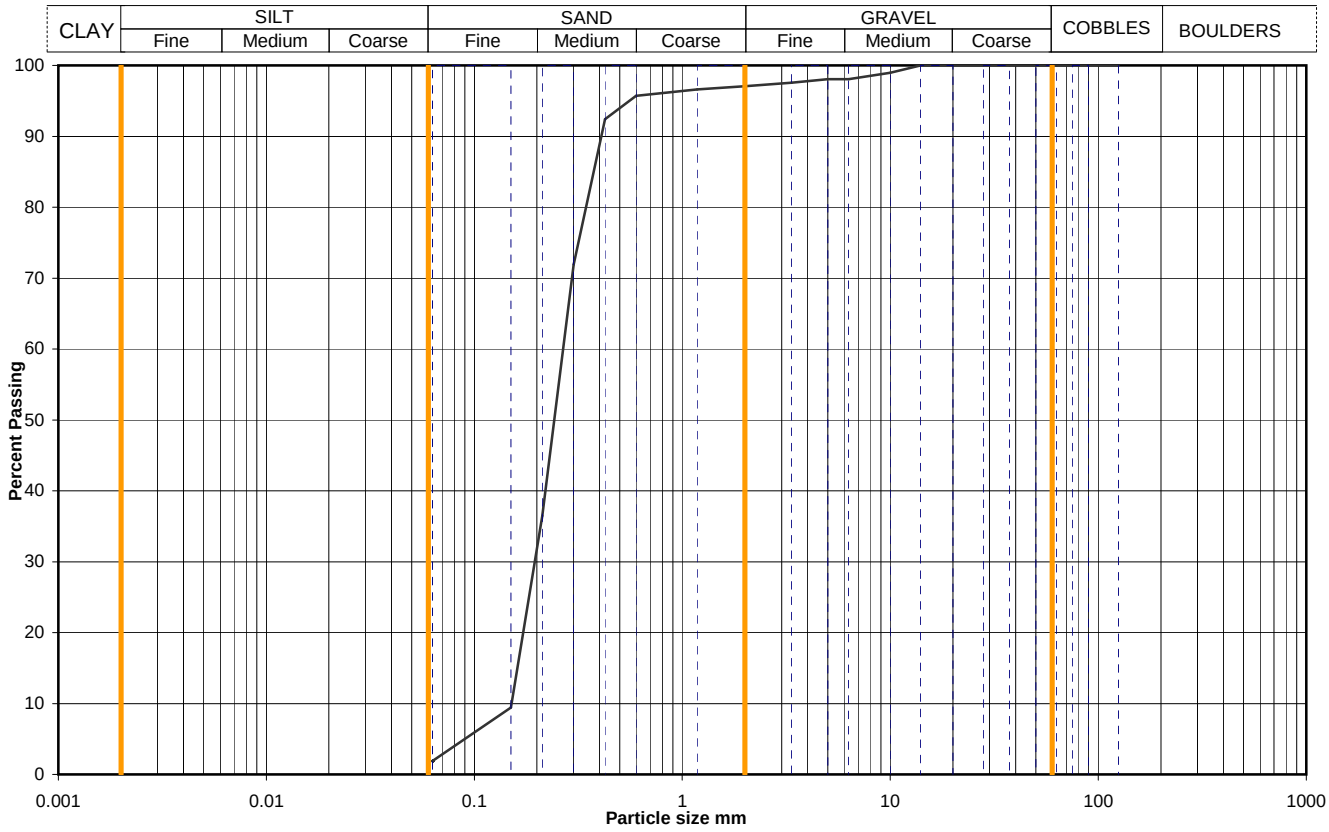
Uniformity Coefficient	D_{60} / D_{10}	5

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 19**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	10.80		
			Samp No	25	Type	U
			ID	ESGA0012-10201010190000002168		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5.0	98		
3.35	98		
2.00	97		
1.18	97		
0.600	96		
0.425	92		
0.300	72	Dry mass of sample, kg	
0.212	36		
0.150	9	5.9	
0.063	2		

Soil description	Light brown slightly gravelly SAND.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	95	95
	Silt	silt+clay =	
	Clay	2	2

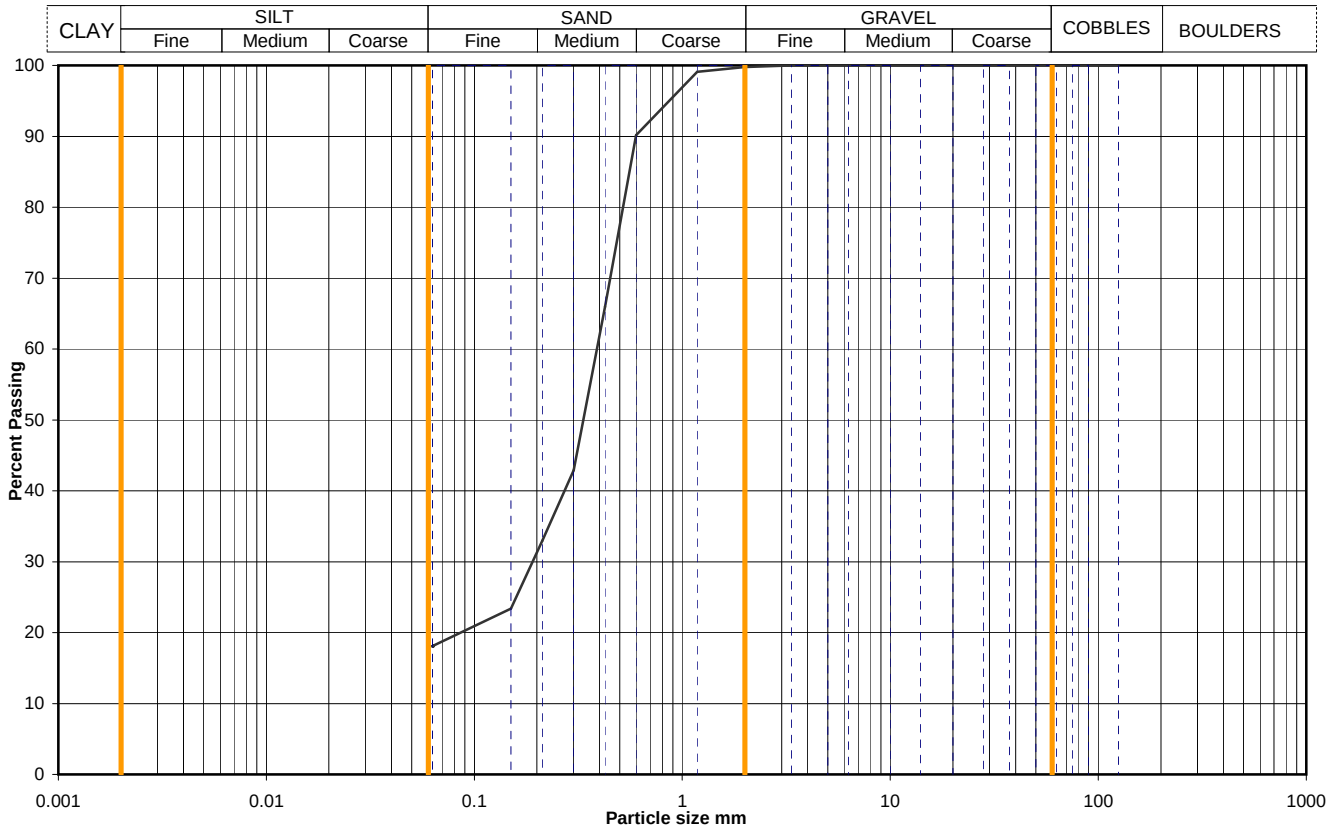
Uniformity Coefficient	D_{60} / D_{10}	2

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 20**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	15.00		
			Samp No	37	Type	U
			ID	ESGA0012-10201010190000002180		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99		
0.600	90		
0.425	66		
0.300	43	Dry mass of sample, kg	
0.212	33		
0.150	23	2.8	
0.063	18		

Soil description	Dark grey silty SAND with rare shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	82	82
	Silt	silt+clay =	
	Clay	18	18

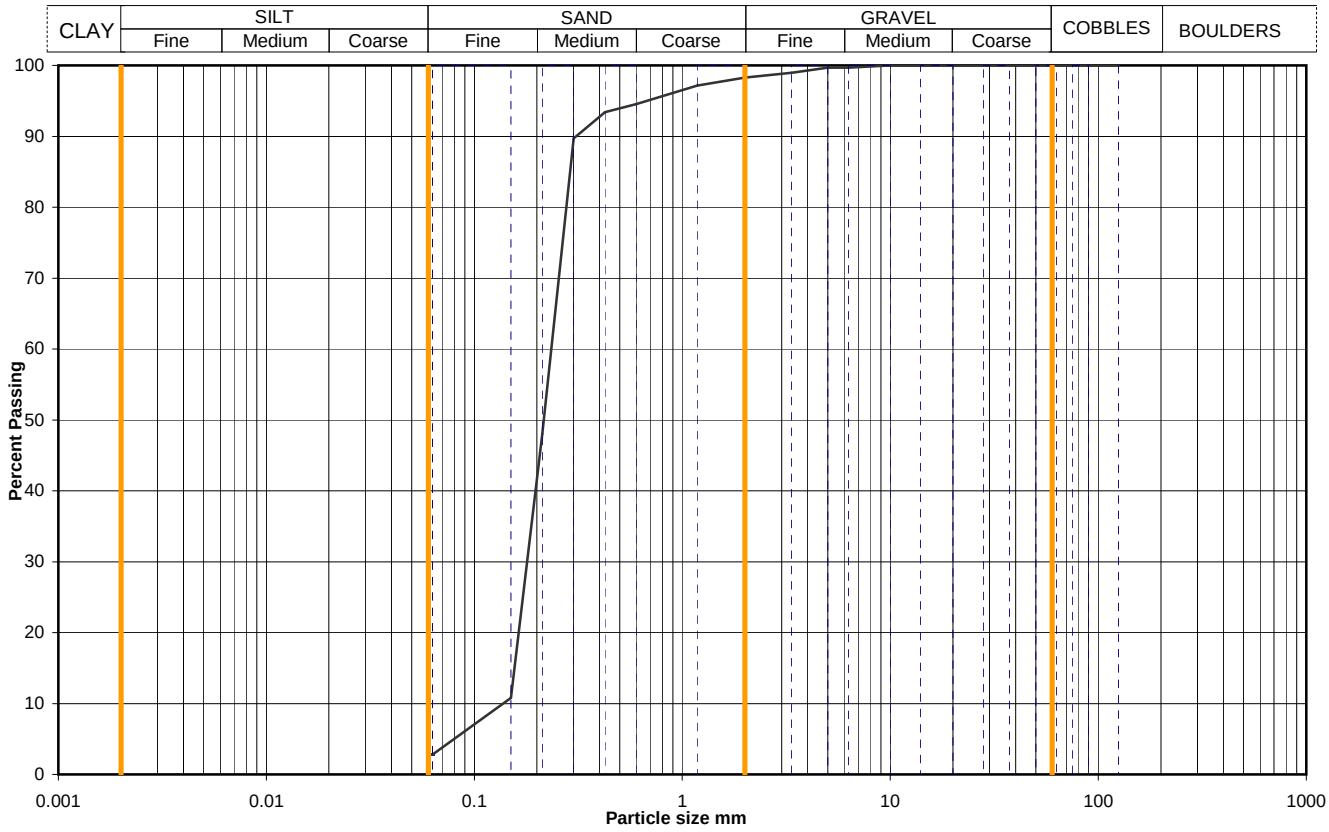
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:46	**Figure** **PSD 21**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	19.90		
			Samp No	51	Type	U
			ID	ESGA0012-10201010210000002295		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	98		
1.18	97		
0.600	95		
0.425	93		
0.300	90	Dry mass of sample, kg	
0.212	48		
0.150	11	3.0	
0.063	3		

Soil description	Grey and light grey slightly gravelly SAND with occasional shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	2	2
	Sand	95	95
	Silt	silt+clay =	
	Clay	3	3

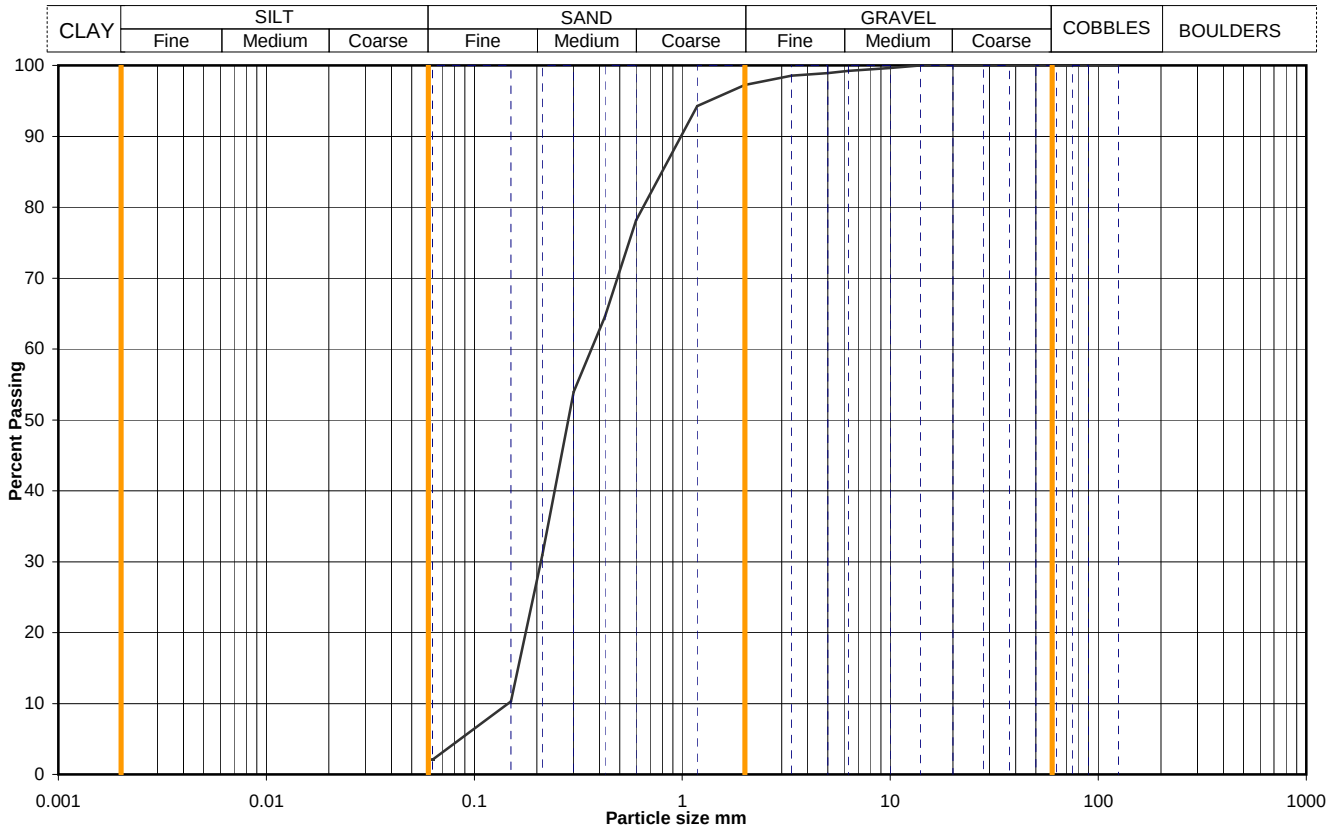
Uniformity Coefficient	D_{60} / D_{10}	2

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 22**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	28.30		
			Samp No	69	Type	U
			ID	ESGA0012-10201010210000002320		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5.0	99		
3.35	99		
2.00	97		
1.18	94		
0.600	78		
0.425	65		
0.300	54	Dry mass of sample, kg	
0.212	31		
0.150	10	3.4	
0.063	2		

Soil description	Grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	95	95
	Silt	silt+clay =	
	Clay	2	2

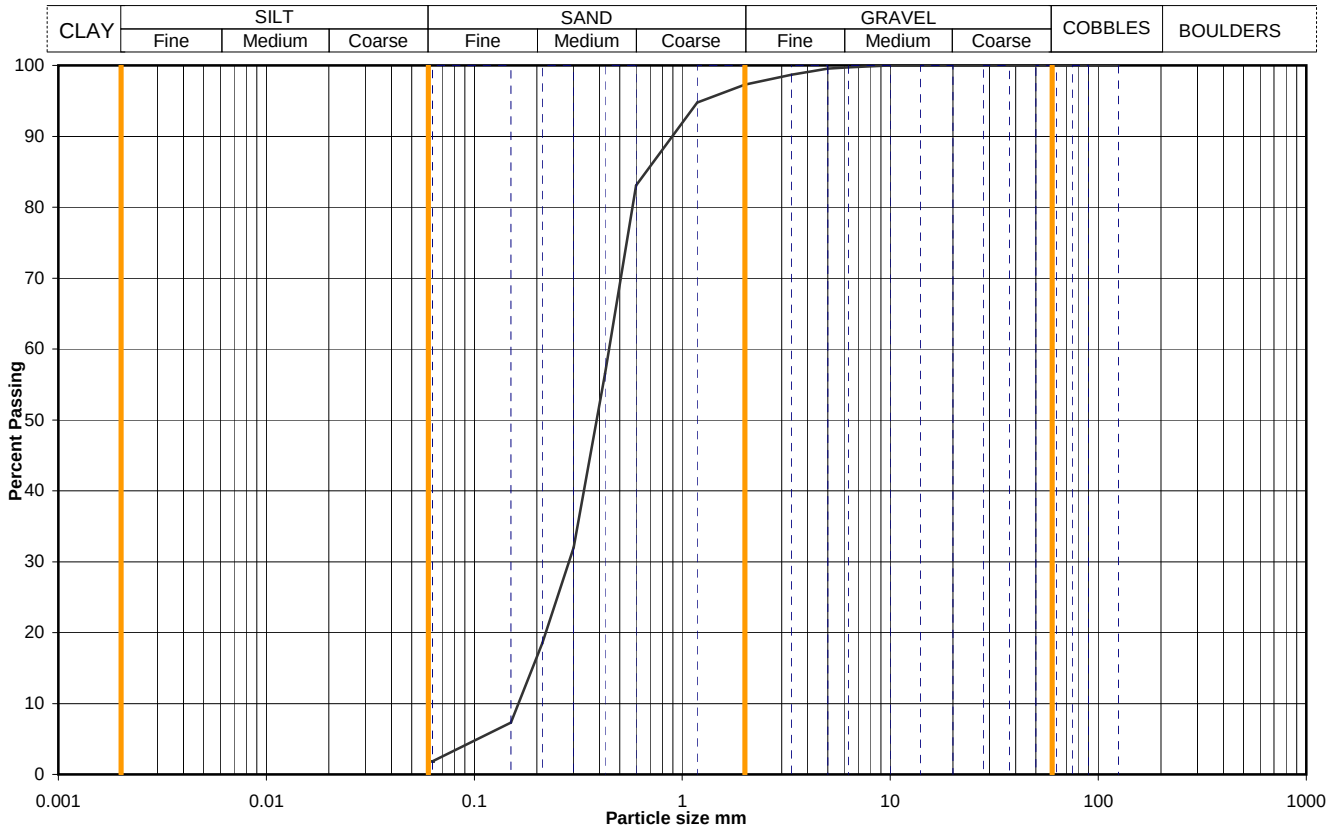
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 23**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	37.40		
			Samp No	90	Type	U
			ID	ESGA0012-10201010210000002345		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	97		
1.18	95		
0.600	83		
0.425	57		
0.300	32	Dry mass of sample, kg	
0.212	19		
0.150	7	4.1	
0.063	2		

Soil description	Grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	95	95
	Silt	silt+clay =	
	Clay	2	2

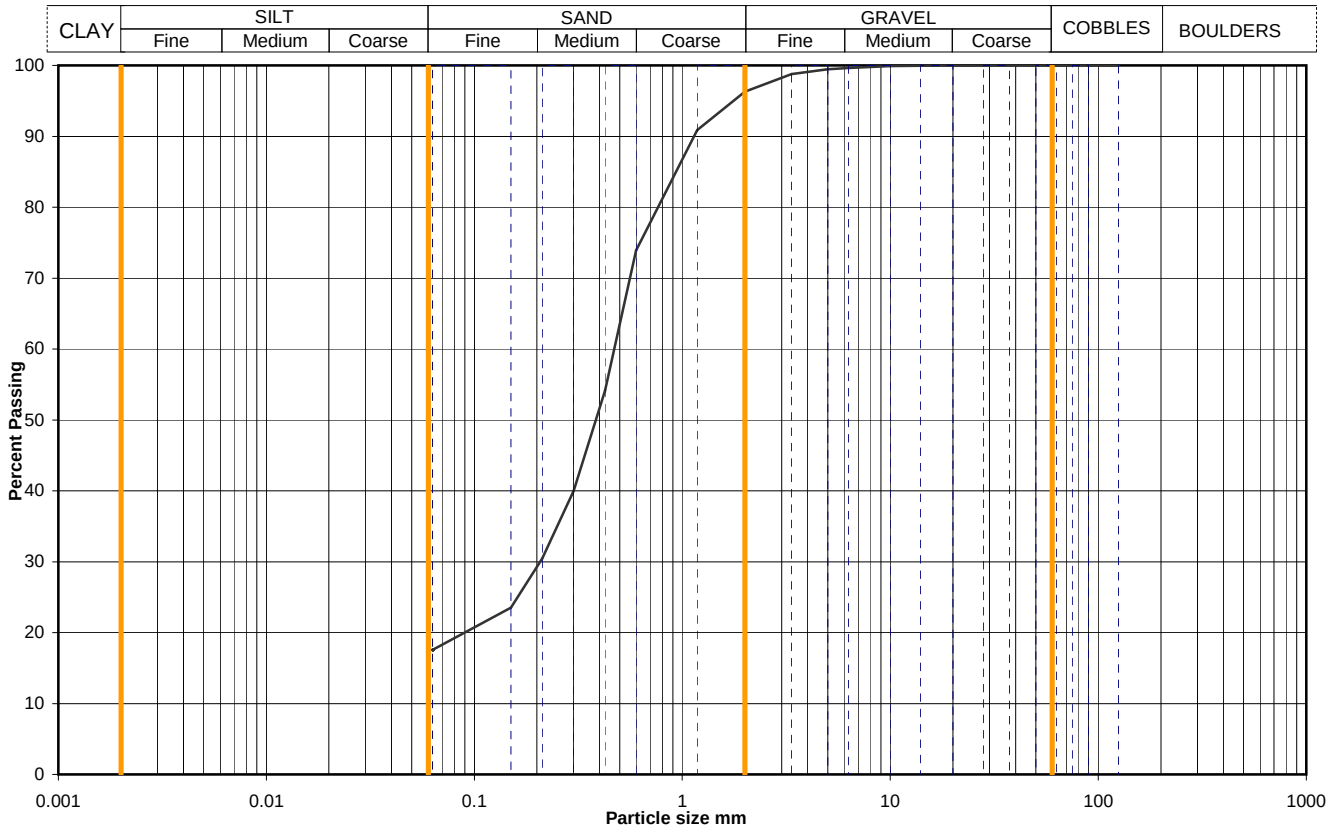
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 24**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	40.20		
			Samp No	98	Type	U
			ID	ESGA0012-10201010210000002290		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	99		
3.35	99		
2.00	96		
1.18	91		
0.600	74		
0.425	54		
0.300	40	Dry mass of sample, kg	
0.212	30		
0.150	23	3.4	
0.063	18		

Soil description	Dark grey silty SAND with rare shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	4	4
	Sand	79	79
	Silt	silt+clay =	
	Clay	17	17

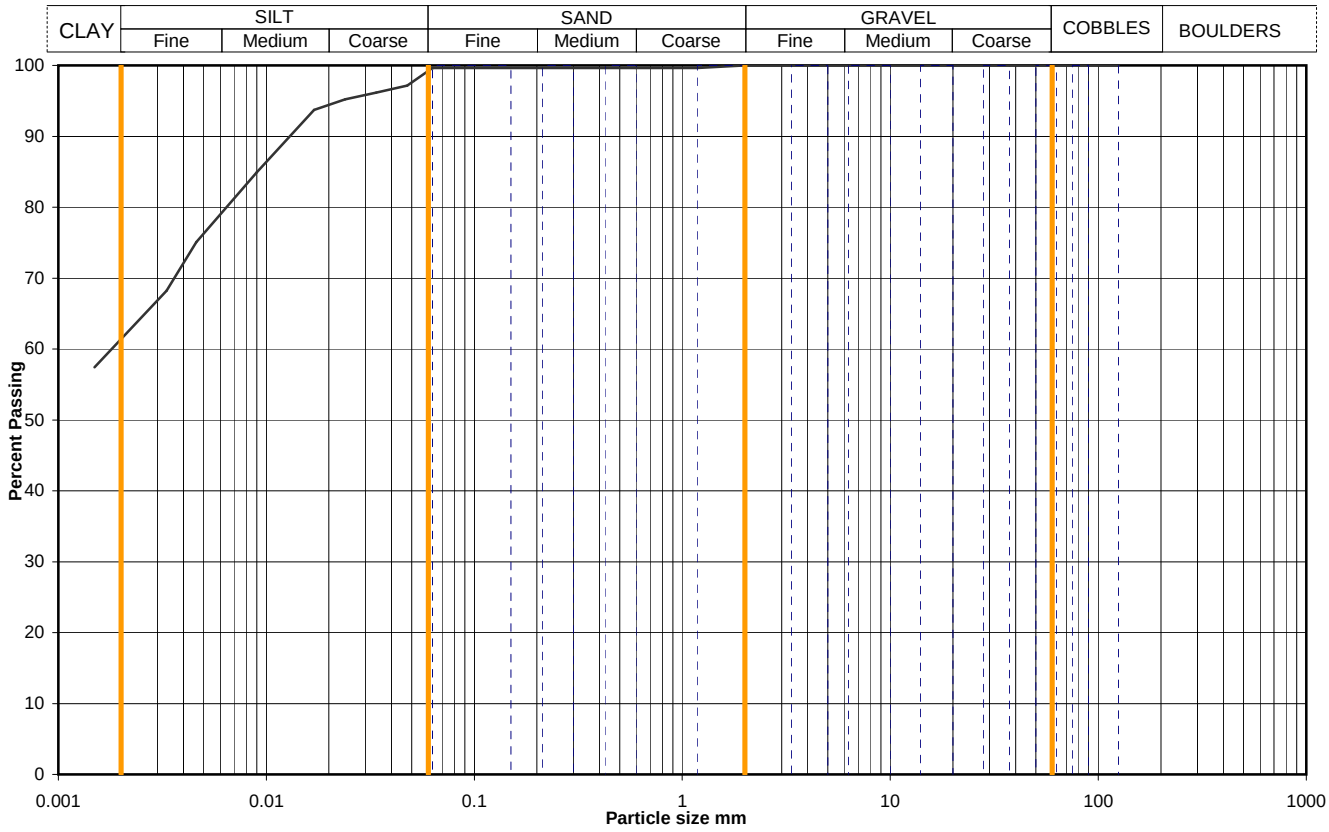
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 25**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_4		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	53.50		
			Samp No	13	Type	CS
			ID	ESGA0012-10201007260000000093		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	100
90	100	0.0475	97
75	100	0.0337	96
63	100	0.0239	95
50	100	0.0170	94
37.5	100	0.0090	85
28	100	0.0046	75
20	100	0.0033	68
14	100	0.0015	57
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100	Particle density, Mg/m3	
0.600	100		
0.425	100	2.67 measured	
0.300	100	Dry mass of sample, kg	
0.212	100		
0.150	100	0.0	
0.063	100		

Soil description	Very stiff greyish brown CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	1	1
	Silt	38	38
	Clay	61	61

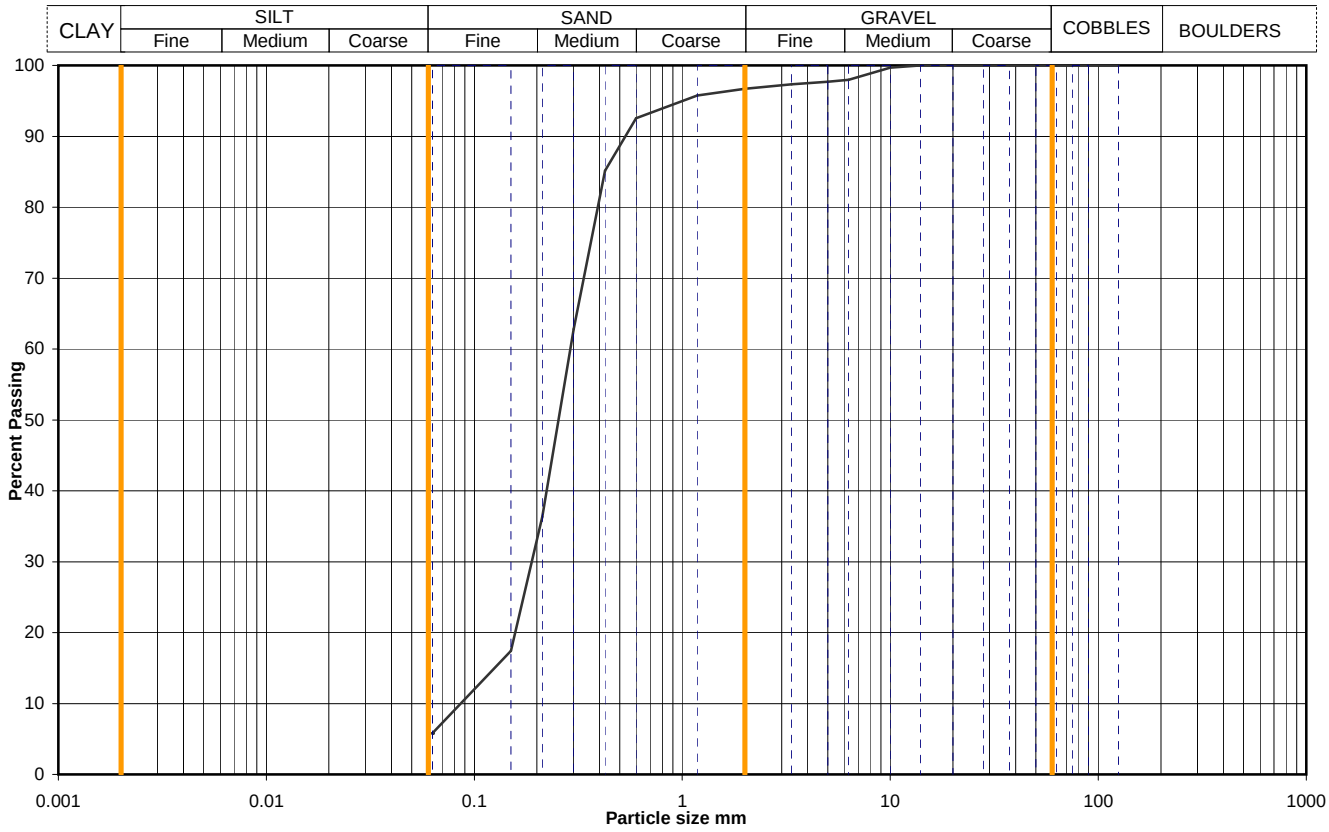
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 26**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_4U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	3.15		
			Samp No	10	Type	U
			ID	ESGA0012-10201009100000000574		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	98		
5.0	98		
3.35	97		
2.00	97		
1.18	96		
0.600	93		
0.425	85		
0.300	63	Dry mass of sample, kg	
0.212	36		
0.150	17	4.4	
0.063	6		

Soil description	Orangish brown slightly gravelly SAND with occasional shell fragments and clay pockets.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	91	91
	Silt	silt+clay =	
	Clay	6	6

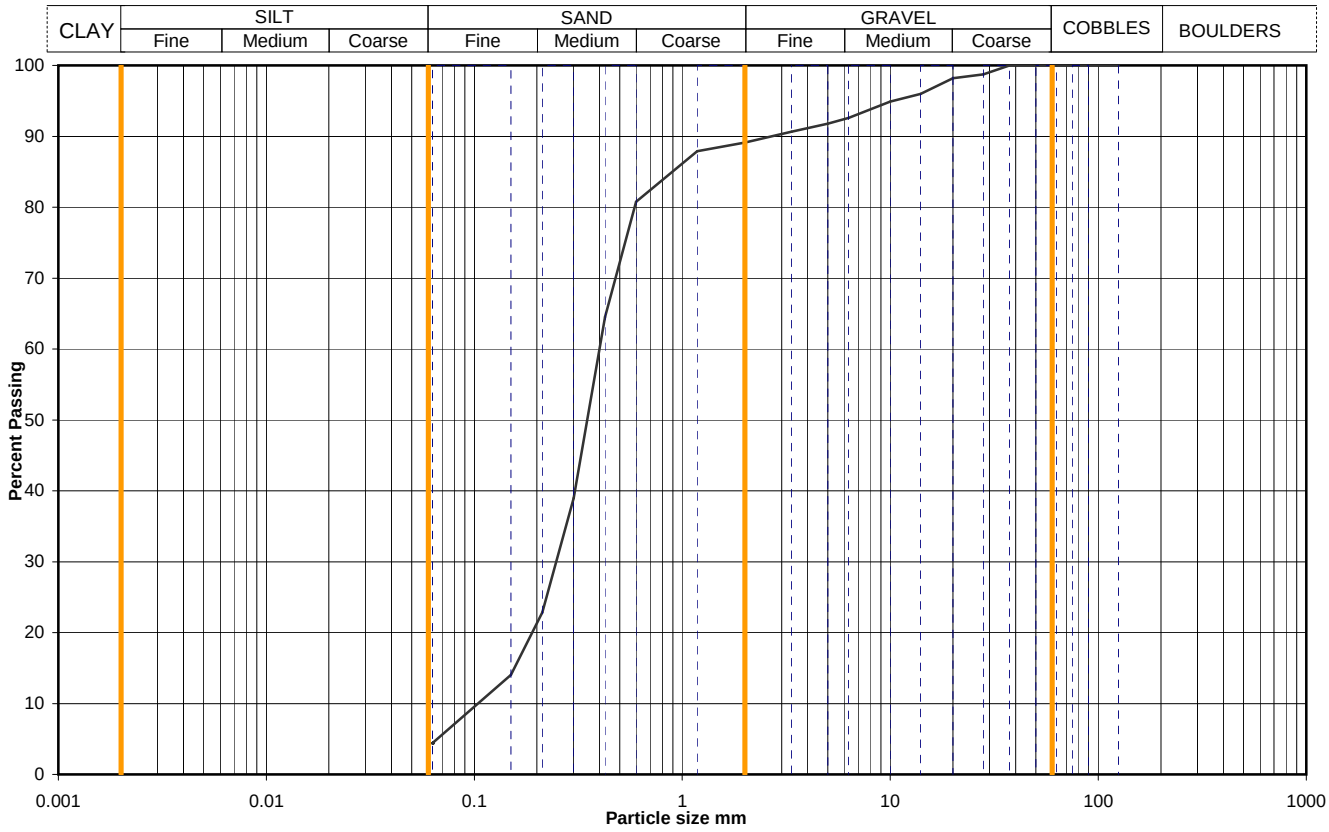
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 27**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_4U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	4.45		
			Samp No	14	Type	U
			ID	ESGA0012-10201009100000000578		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	99		
20	98		
14	96		
10	95		
6.3	93		
5.0	92		
3.35	91		
2.00	89		
1.18	88		
0.600	81		
0.425	65		
0.300	39	Dry mass of sample, kg	
0.212	23		
0.150	14	5.9	
0.063	4		

Soil description	Orangish brown gravelly SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	11	11
	Sand	85	85
	Silt	silt+clay =	
	Clay	4	4

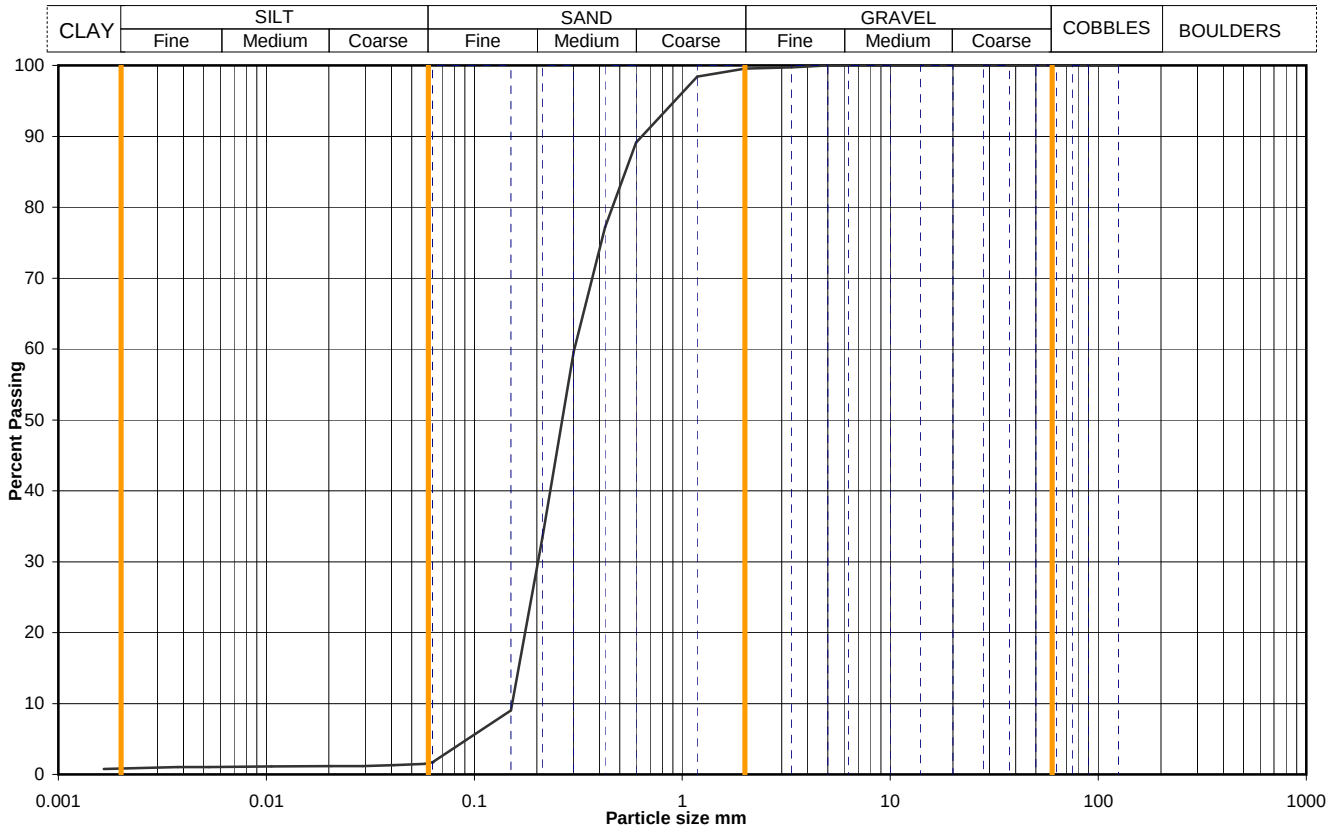
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 28**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_4U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	13.55		
			Samp No	46	Type	U
			ID	ESGA0012-10201009100000000610		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	2
90	100	0.0577	1
75	100	0.0409	1
63	100	0.0290	1
50	100	0.0205	1
37.5	100	0.0106	1
28	100	0.0053	1
20	100	0.0038	1
14	100	0.0017	1
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	98	Particle density, Mg/m3	
0.600	89		
0.425	77	2.65 measured	
0.300	60	Dry mass of sample, kg	
0.212	33		
0.150	9	2.0	
0.063	2		

Soil description	Stiff brownish grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	98	98
	Silt	1	1
	Clay	1	1

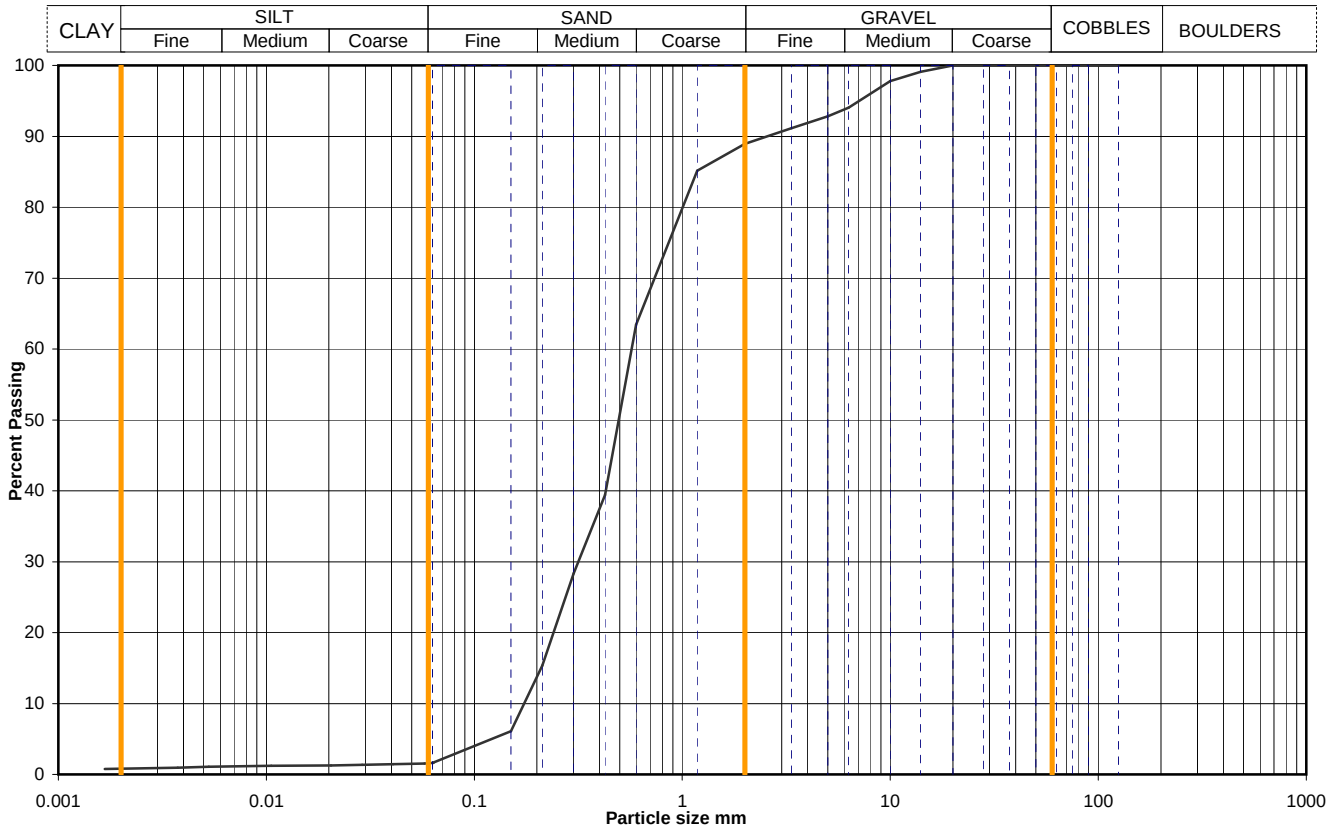
Uniformity Coefficient	D_{60} / D_{10}	2

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 29**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_4U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	22.00		
			Samp No	71	Type	U
			ID	ESGA0012-10201009130000000658		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	2
90	100	0.0575	2
75	100	0.0408	1
63	100	0.0289	1
50	100	0.0204	1
37.5	100	0.0106	1
28	100	0.0053	1
20	100	0.0038	1
14	99	0.0017	1
10	98		
6.3	94		
5.0	93		
3.35	91		
2.00	89		
1.18	85	Particle density, Mg/m3	
0.600	63		
0.425	39	2.65 measured	
0.300	28	Dry mass of sample, kg	
0.212	15		
0.150	6	4.3	
0.063	2		

Soil description	Stiff grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	11	11
	Sand	87	87
	Silt	1	1
	Clay	1	1

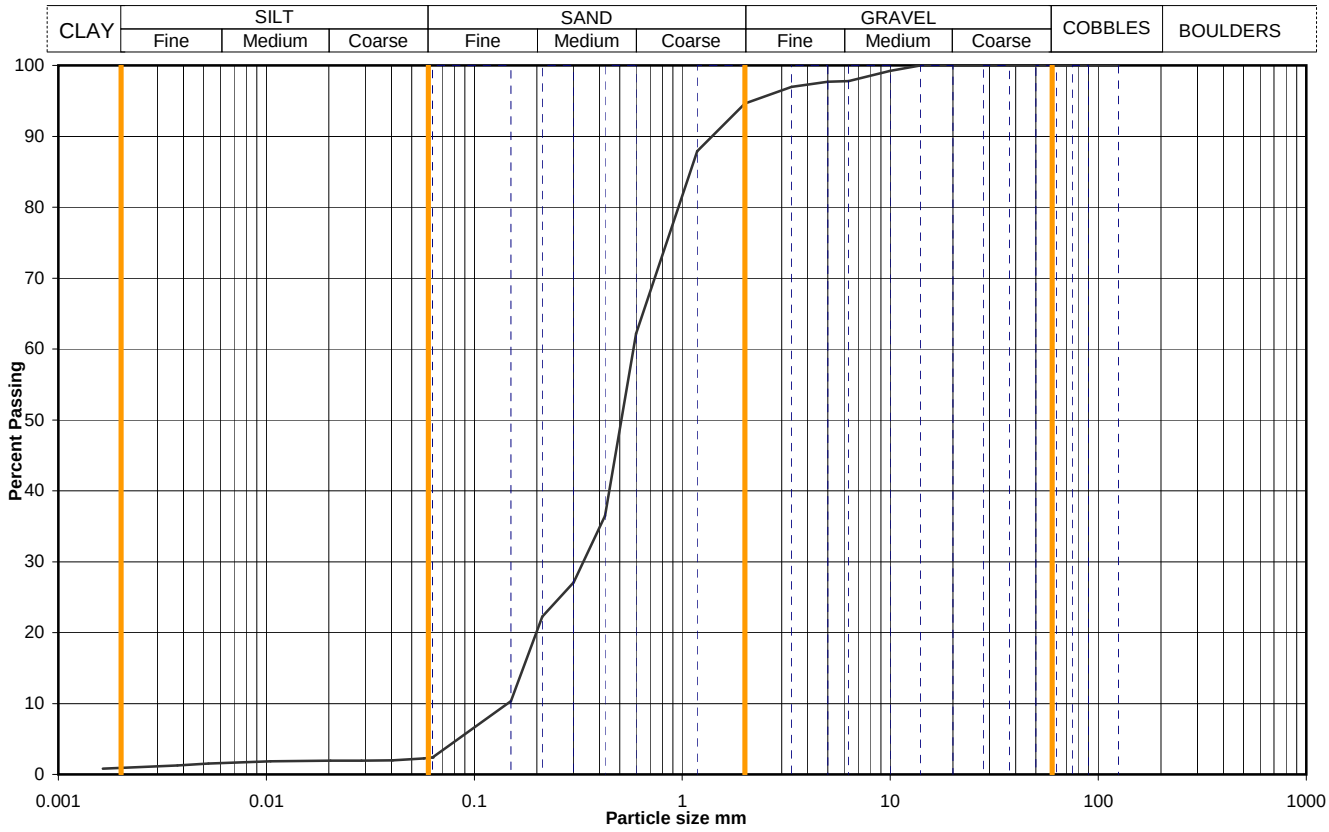
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 30**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_4U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	30.50		
			Samp No	97	Type	U
			ID	ESGA0012-10201009140000000779		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	2
90	100	0.0572	2
75	100	0.0406	2
63	100	0.0287	2
50	100	0.0203	2
37.5	100	0.0105	2
28	100	0.0053	2
20	100	0.0037	1
14	100	0.0016	1
10	99		
6.3	98		
5.0	98		
3.35	97		
2.00	95		
1.18	88	Particle density, Mg/m3	
0.600	62		
0.425	36	2.67 measured	
0.300	27	Dry mass of sample, kg	
0.212	22		
0.150	10	5.0	
0.063	2		

Soil description	Brownish grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	5	5
	Sand	92	92
	Silt	2	2
	Clay	1	1

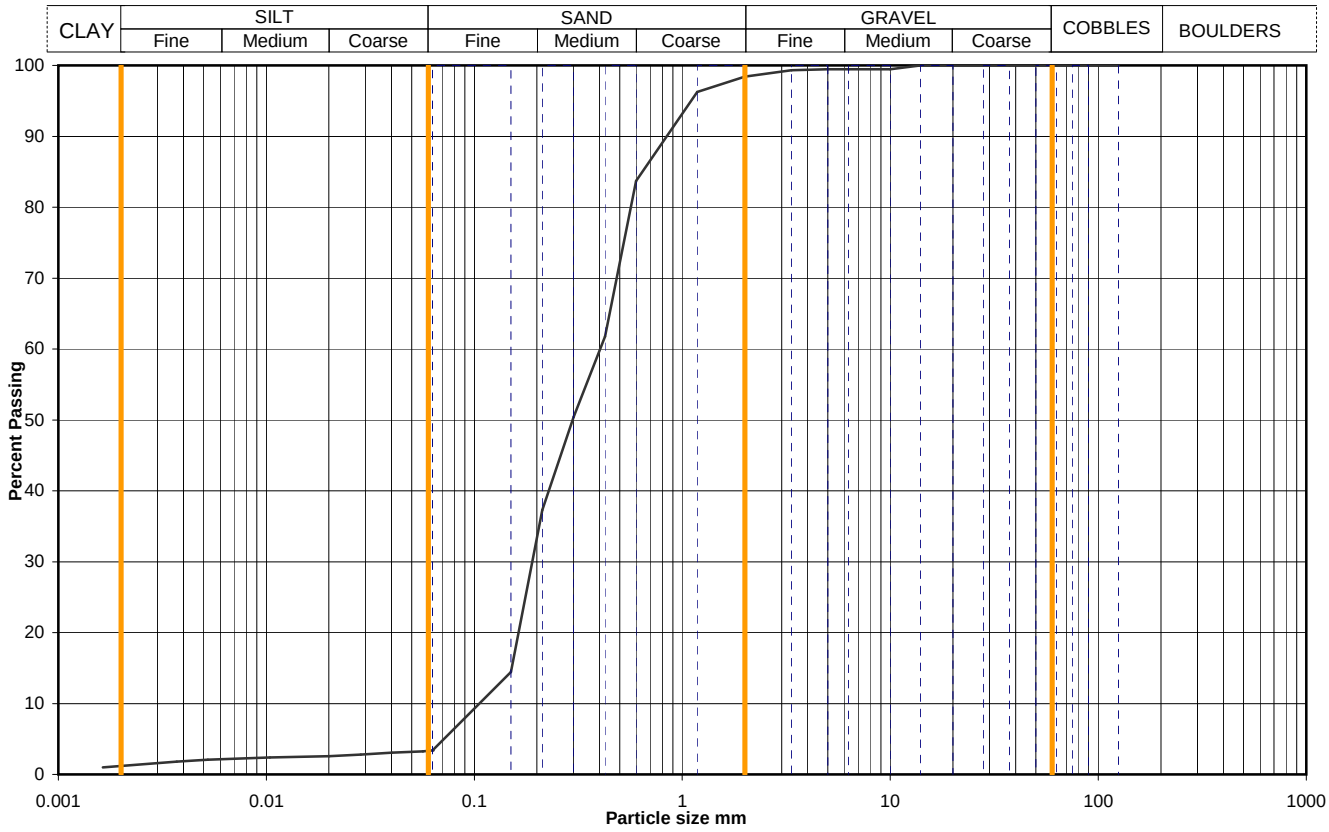
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 31**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_4U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	37.70		
			Samp No	111	Type	U
			ID	ESGA0012-10201009150000000806		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	3
90	100	0.0566	3
75	100	0.0401	3
63	100	0.0284	3
50	100	0.0201	3
37.5	100	0.0104	2
28	100	0.0052	2
20	100	0.0037	2
14	100	0.0016	1
10	99		
6.3	99		
5.0	99		
3.35	99		
2.00	98		
1.18	96	Particle density, Mg/m3	
0.600	84		
0.425	62	2.69 measured	
0.300	50	Dry mass of sample, kg	
0.212	37		
0.150	14	2.7	
0.063	3		

Soil description	Grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	2	2
	Sand	95	95
	Silt	2	2
	Clay	1	1

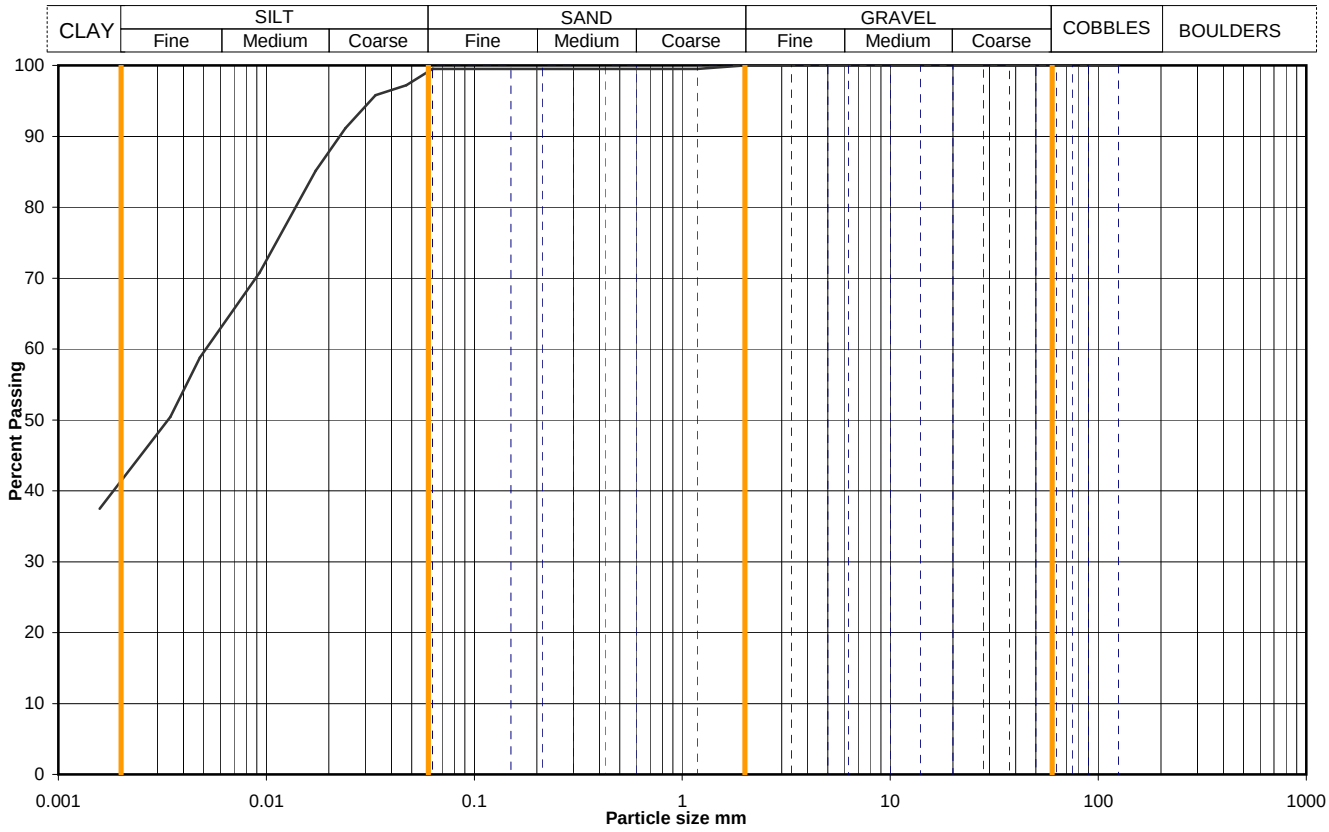
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 32**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	49.70		
			Samp No	14	Type	CS
			ID	ESGA0012-10201007230000000018		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	99
90	100	0.0471	97
75	100	0.0335	96
63	100	0.0240	91
50	100	0.0173	85
37.5	100	0.0093	71
28	100	0.0048	59
20	100	0.0035	50
14	100	0.0016	37
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99	Particle density, Mg/m3	
0.600	99		
0.425	99	2.65 assumed	
0.300	99	Dry mass of sample, kg	
0.212	99		
0.150	99	0.0	
0.063	99		

Soil description	Very stiff brownish grey silty CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	1	1
	Silt	58	58
	Clay	41	41

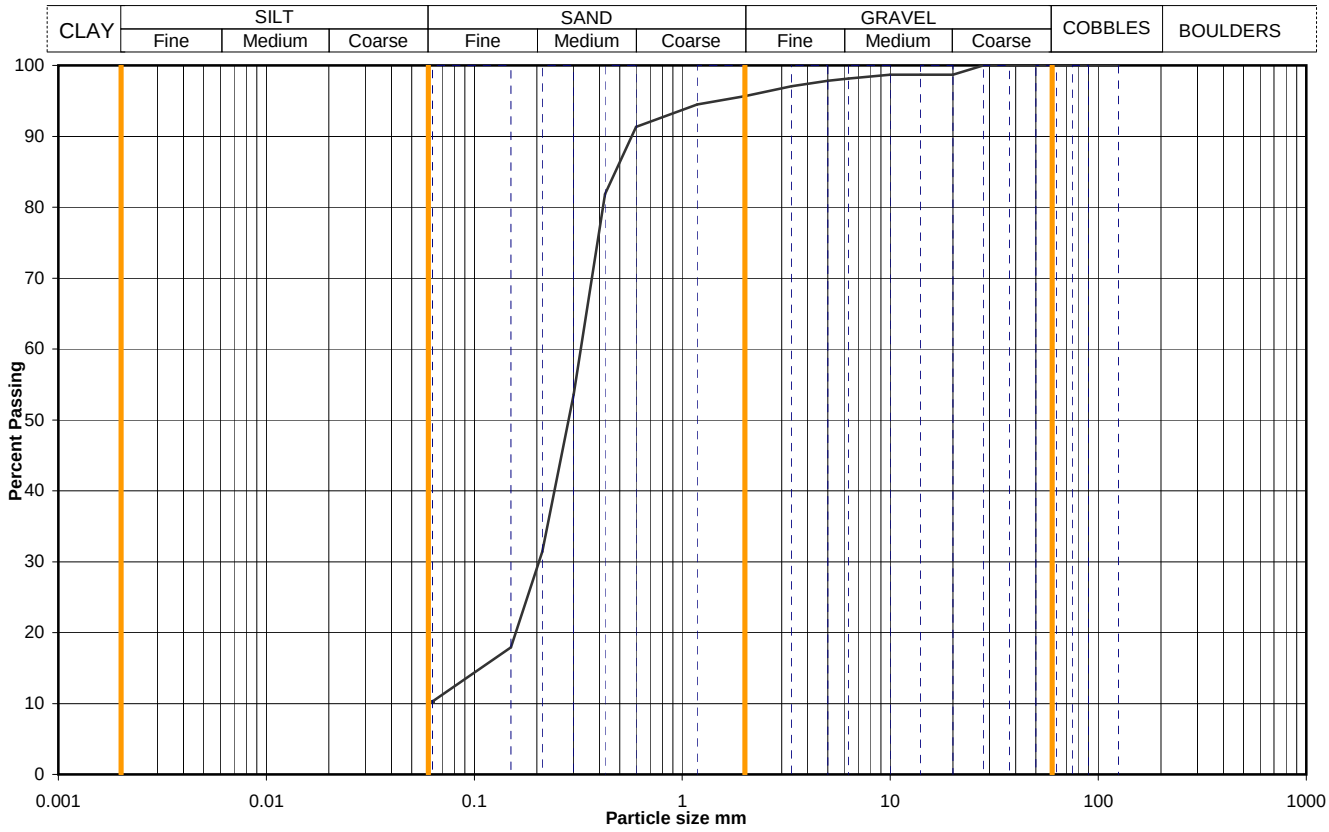
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 33**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	1.80		
			Samp No	5	Type	U
			ID	ESGA0012-10201010010000001198		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	99		
10	99		
6.3	98		
5.0	98		
3.35	97		
2.00	96		
1.18	95		
0.600	91		
0.425	82		
0.300	54	Dry mass of sample, kg	
0.212	31		
0.150	18	2.0	
0.063	10		

Soil description	Brownish grey slightly gravelly silty SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	4	4
	Sand	85	85
	Silt	silt+clay =	
	Clay	11	11

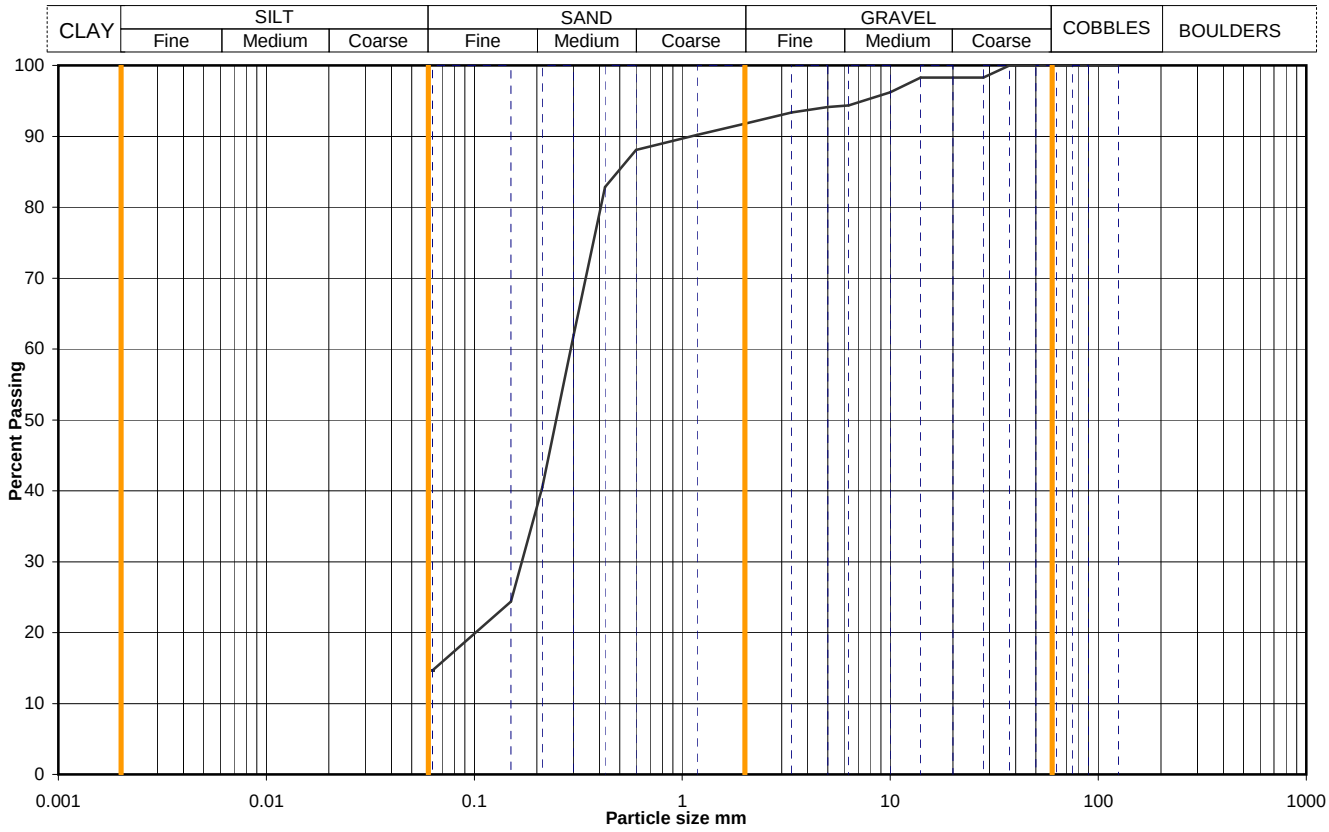
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 34**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5UB		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	2.70		
			Samp No	5	Type	U
			ID	ESGA0012-10201010010000001223		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	98		
20	98		
14	98		
10	96		
6.3	94		
5.0	94		
3.35	93		
2.00	92		
1.18	90		
0.600	88		
0.425	83		
0.300	62	Dry mass of sample, kg	
0.212	41		
0.150	24	3.9	
0.063	15		

Soil description	Firm to stiff brownish grey slightly sandy very gravelly CLAY with frequent rootlets.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	8	8
	Sand	77	77
	Silt	silt+clay =	
	Clay	15	15

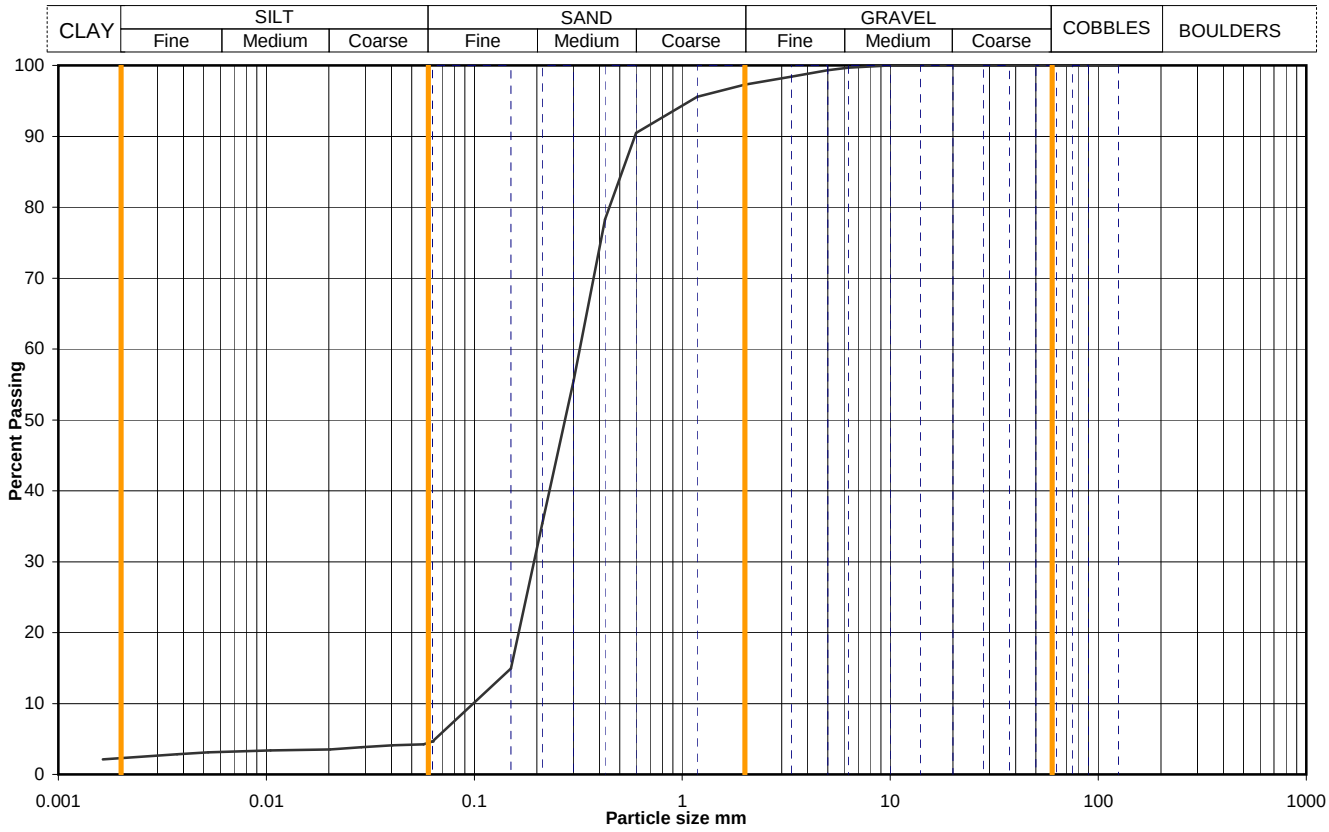
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 35**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5UB		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	14.60		
			Samp No	42	Type	U
			ID	ESGA0012-10201010010000001261		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	5
90	100	0.0571	4
75	100	0.0404	4
63	100	0.0286	4
50	100	0.0203	4
37.5	100	0.0105	3
28	100	0.0053	3
20	100	0.0037	3
14	100	0.0016	2
10	100		
6.3	100		
5.0	99		
3.35	98		
2.00	97		
1.18	96	Particle density, Mg/m3	
0.600	90		
0.425	78	2.67 measured	
0.300	56	Dry mass of sample, kg	
0.212	35		
0.150	15	3.3	
0.063	5		

Soil description	Greyish brown SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	93	93
	Silt	2	2
	Clay	2	2

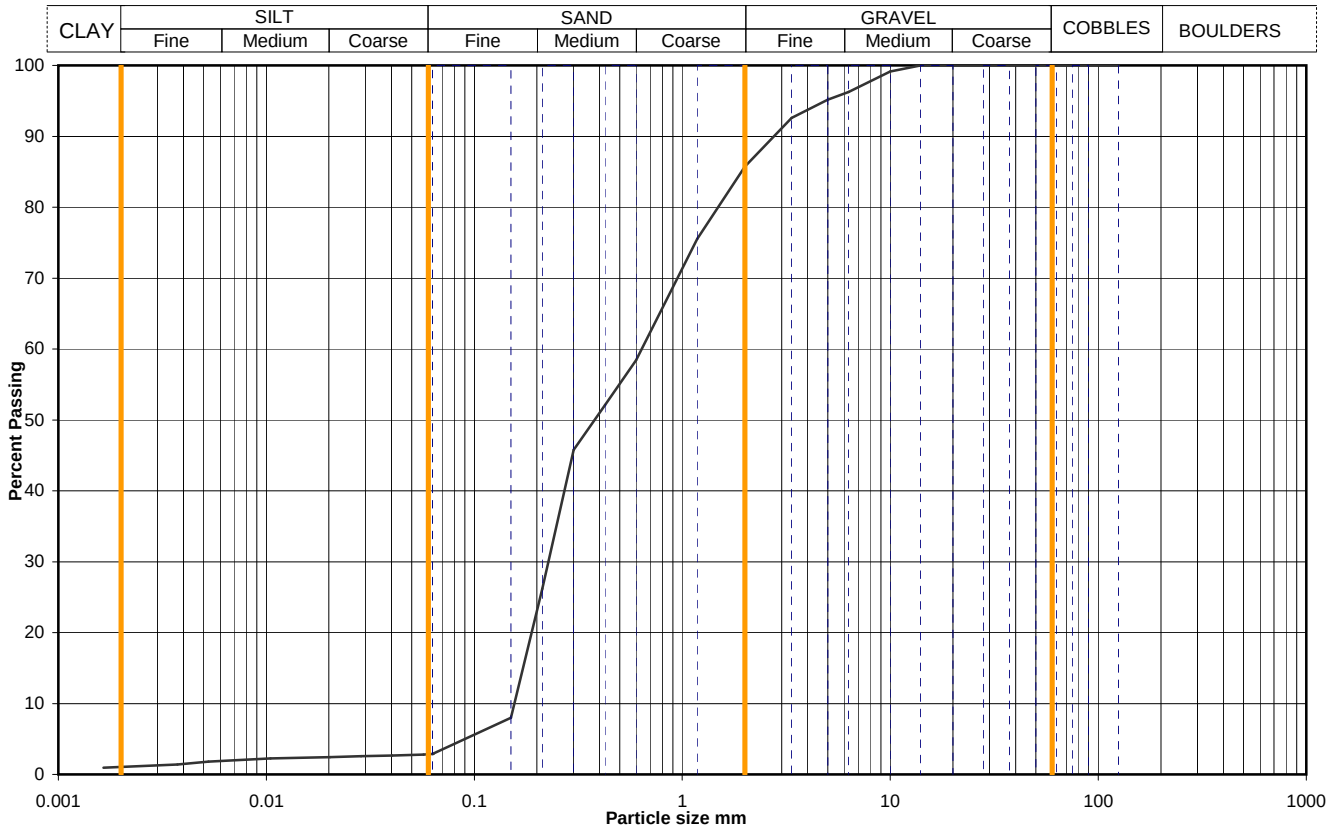
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 36**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5UB		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	23.00		
			Samp No	66	Type	U
			ID	ESGA0012-10201010040000001309		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	3
90	100	0.0569	3
75	100	0.0403	3
63	100	0.0285	3
50	100	0.0202	2
37.5	100	0.0105	2
28	100	0.0053	2
20	100	0.0037	1
14	100	0.0016	1
10	99		
6.3	96		
5.0	95		
3.35	93		
2.00	86		
1.18	76	Particle density, Mg/m3	
0.600	58		
0.425	52	2.66 measured	
0.300	46	Dry mass of sample, kg	
0.212	26		
0.150	8	6.7	
0.063	3		

Soil description	Grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	14	14
	Sand	83	83
	Silt	2	2
	Clay	1	1

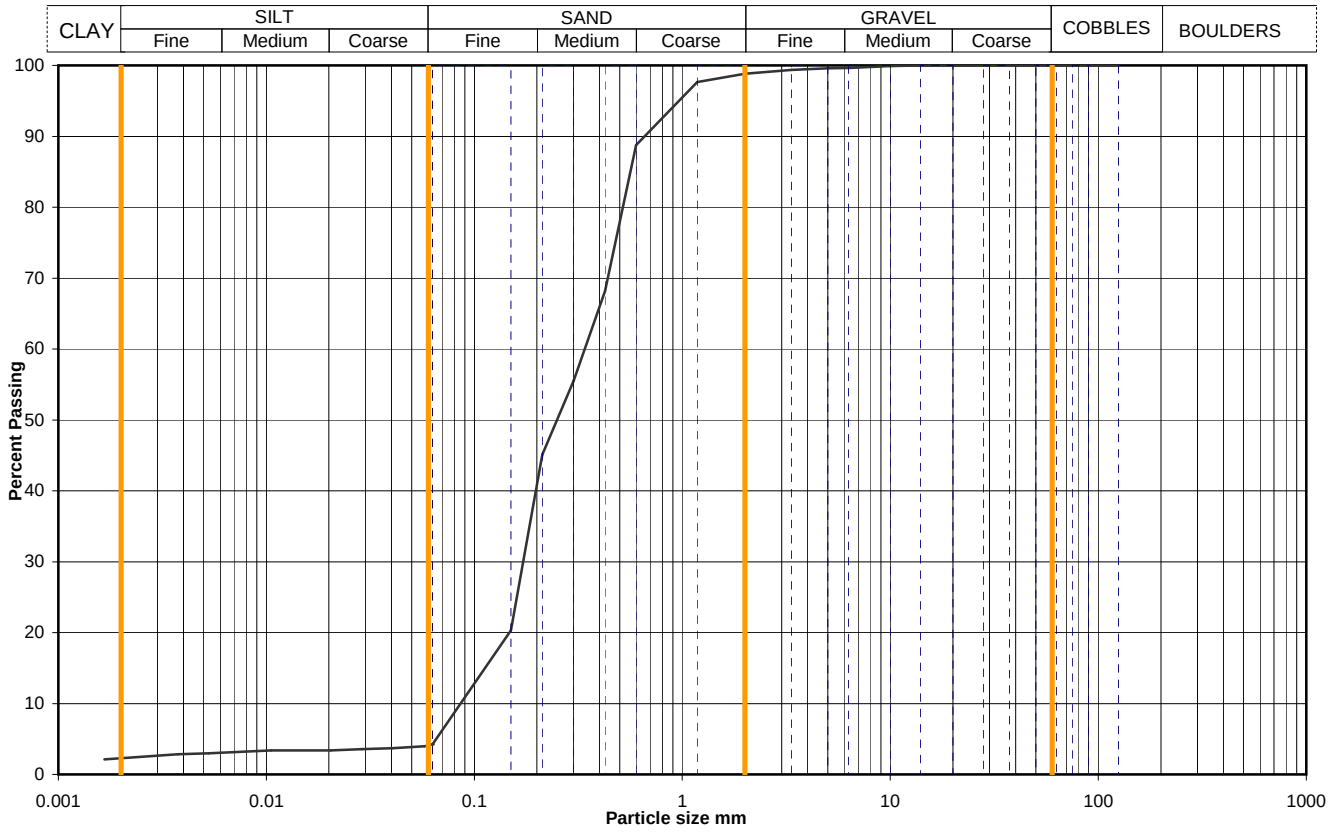
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 37**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5UB		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	29.30		
			Samp No	81	Type	U
			ID	ESGA0012-10201010050000001440		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	4
90	100	0.0575	4
75	100	0.0408	4
63	100	0.0289	4
50	100	0.0204	3
37.5	100	0.0105	3
28	100	0.0053	3
20	100	0.0037	3
14	100	0.0017	2
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	98	Particle density, Mg/m3	
0.600	89		
0.425	68	2.65 assumed	
0.300	56	Dry mass of sample, kg	
0.212	45		
0.150	20	5.4	
0.063	4		

Soil description	Grey SAND with shell fragments.
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377
Remarks	

Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	1	1
	Sand	95	95
	Silt	2	2
	Clay	2	2

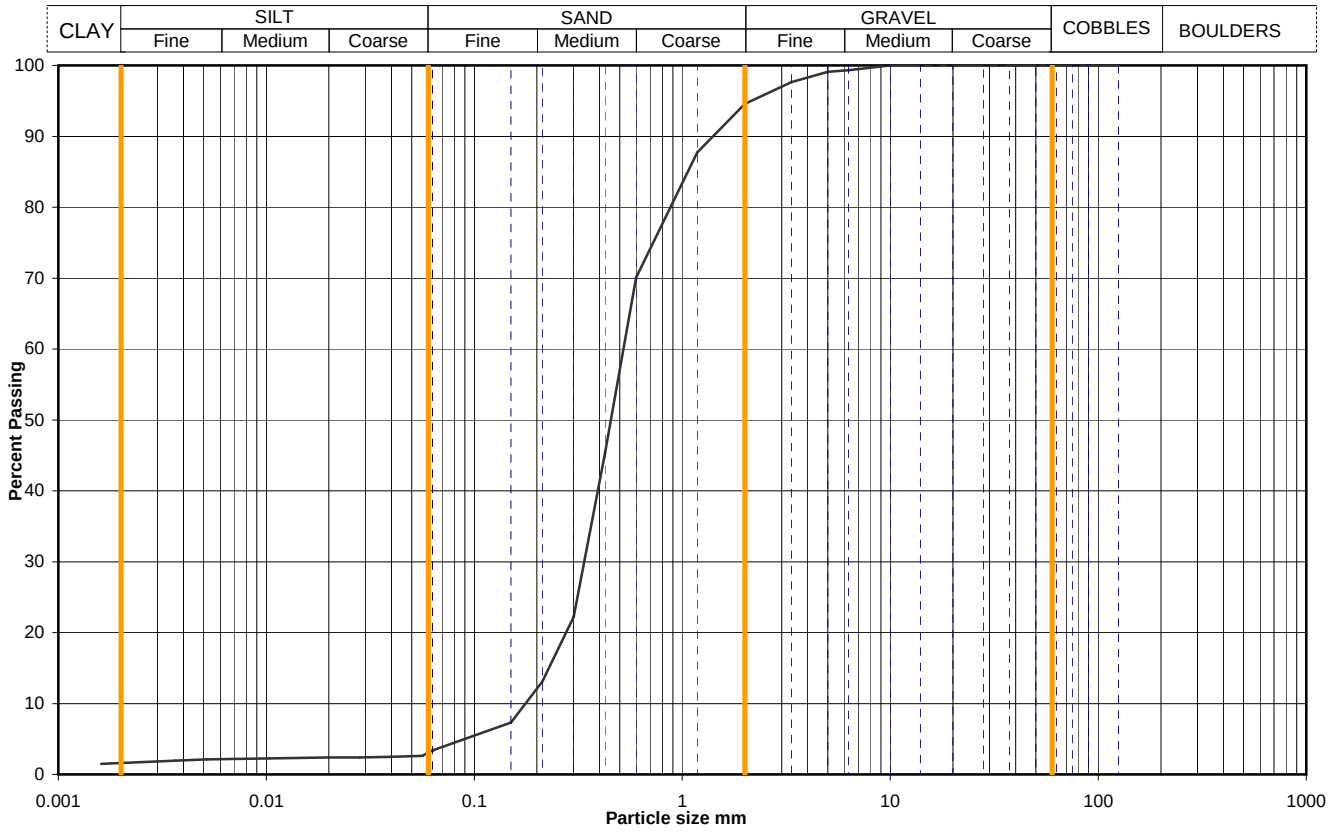
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 38**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5UB		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	40.30		
			Samp No	103	Type	U
			ID	ESGA0012-10201010050000001470		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	3
90	100	0.0561	3
75	100	0.0397	2
63	100	0.0281	2
50	100	0.0199	2
37.5	100	0.0103	2
28	100	0.0052	2
20	100	0.0037	2
14	100	0.0016	2
10	100		
6.3	99		
5.0	99		
3.35	98		
2.00	95		
1.18	88	Particle density, Mg/m3	
0.600	70		
0.425	45	2.73 measured	
0.300	22	Dry mass of sample, kg	
0.212	13		
0.150	7	1.7	
0.063	3		

Soil description	Grey SAND with occasional shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	5	5
	Sand	92	92
	Silt	1	1
	Clay	2	2

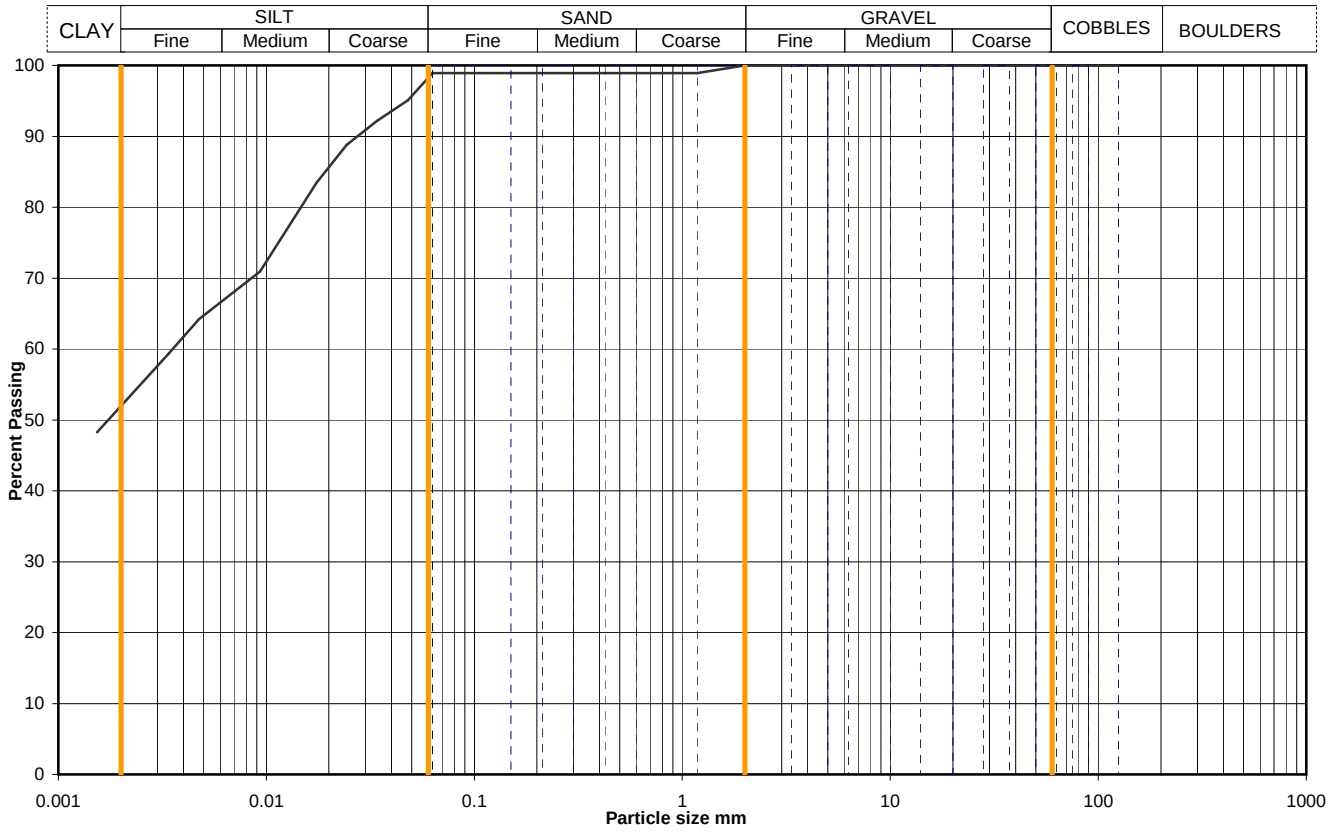
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 39**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	52.70		
			Samp No	12	Type	CS
			ID	ESGA0012-10201007230000000031		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	99
90	100	0.0479	95
75	100	0.0341	92
63	100	0.0244	89
50	100	0.0175	83
37.5	100	0.0093	71
28	100	0.0047	64
20	100	0.0034	59
14	100	0.0015	48
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99	Particle density, Mg/m3	
0.600	99		
0.425	99	2.65 assumed	
0.300	99	Dry mass of sample, kg	
0.212	99		
0.150	99	0.0	
0.063	99		

Soil description	Stiff brownish grey CLAY with occasional silt partings.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	2	2
	Silt	46	46
	Clay	52	52

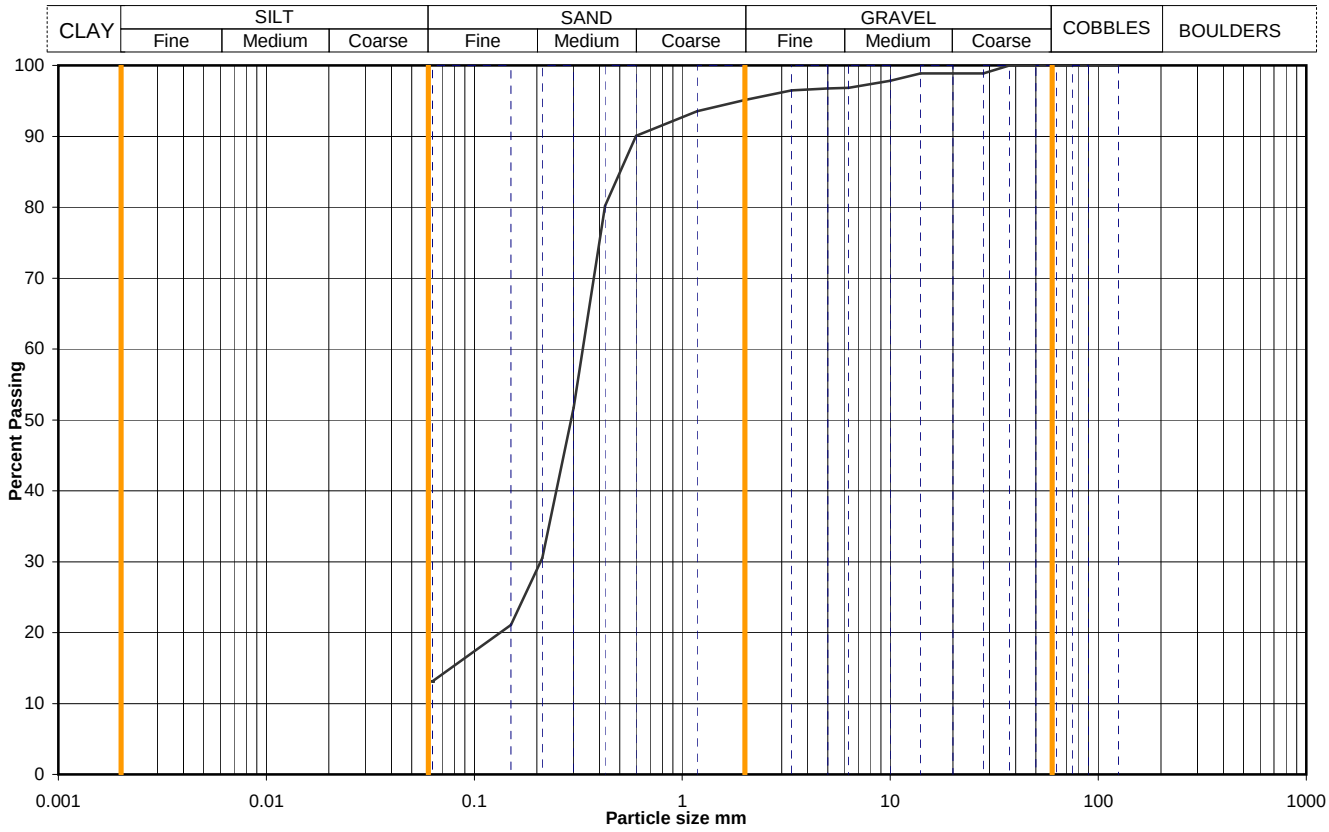
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 40**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	2.60		
			Samp No	8	Type	U
			ID	ESGA0012-10201010050000001492		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	99		
20	99		
14	99		
10	98		
6.3	97		
5.0	97		
3.35	96		
2.00	95		
1.18	94		
0.600	90		
0.425	80		
0.300	52	Dry mass of sample, kg	
0.212	31		
0.150	21	3.5	
0.063	13		

Soil description	Greyish brown silty gravelly SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	5	5
	Sand	82	82
	Silt	silt+clay =	
	Clay	13	13

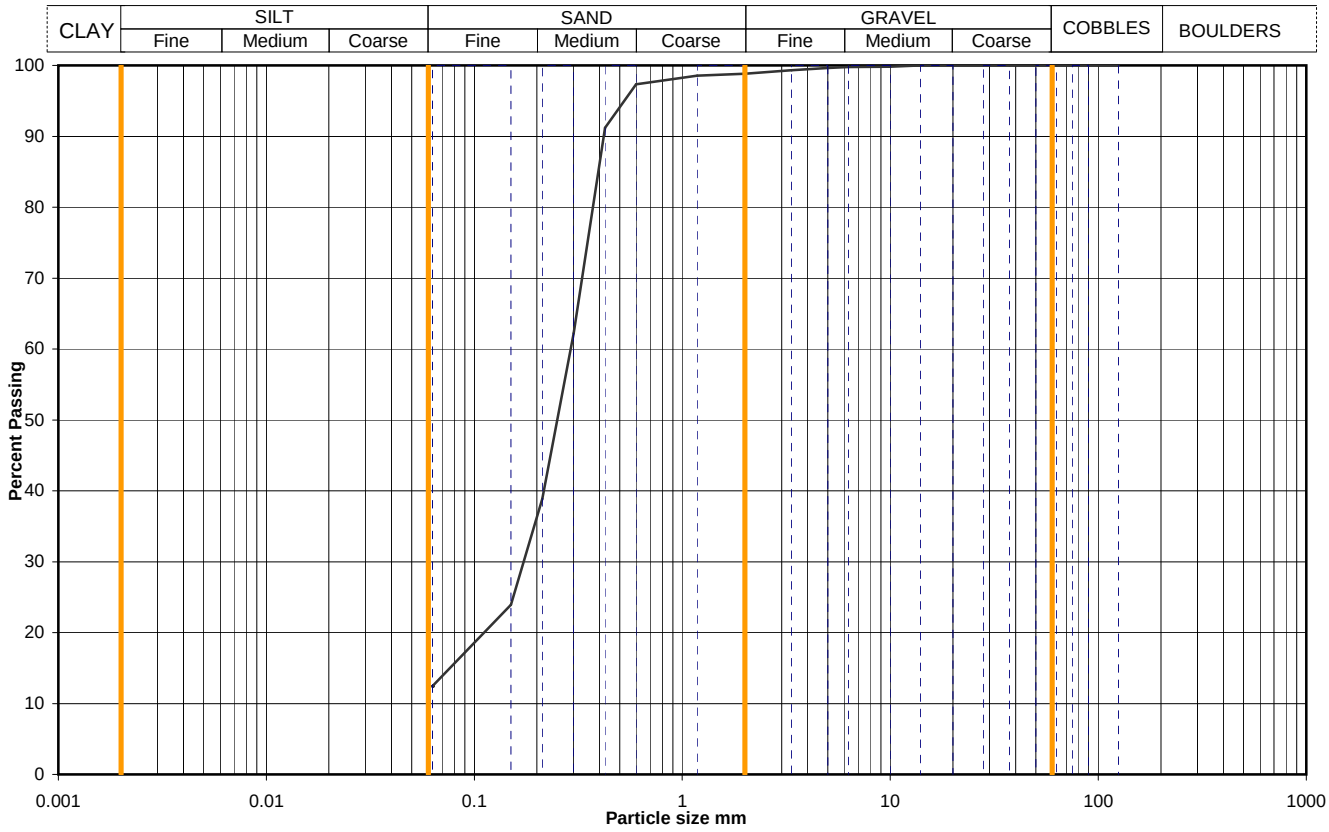
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 41**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	4.00		
			Samp No	12	Type	U
			ID	ESGA0012-10201010050000001496		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	99		
0.600	97		
0.425	91		
0.300	62	Dry mass of sample, kg	
0.212	39		
0.150	24	5.8	
0.063	12		

Soil description	Yellowish brown silty SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	1	1
	Sand	86	86
	Silt	silt+clay =	
	Clay	13	13

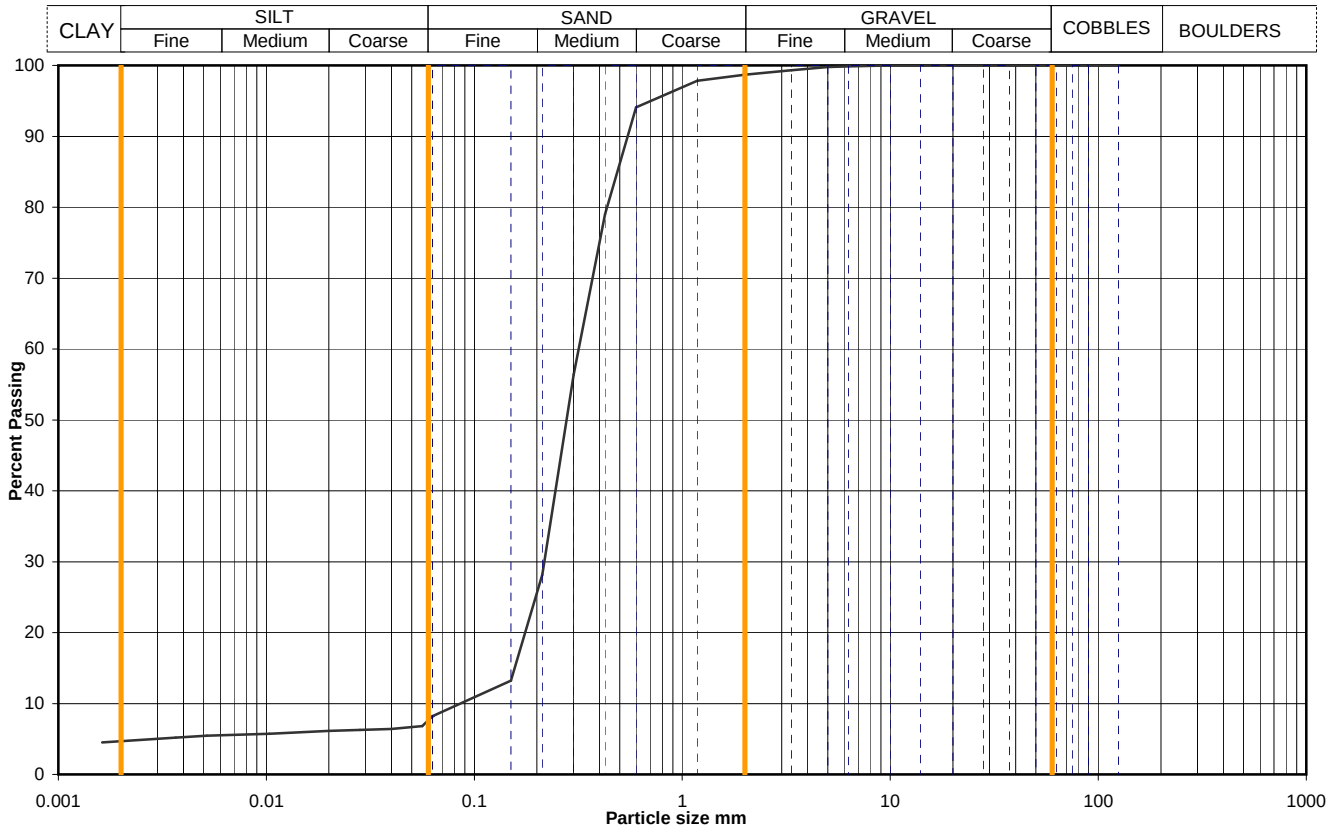
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 42**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	15.20		
			Samp No	44	Type	U
			ID	ESGA0012-10201010050000001528		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	8
90	100	0.0562	7
75	100	0.0398	6
63	100	0.0282	6
50	100	0.0200	6
37.5	100	0.0103	6
28	100	0.0052	5
20	100	0.0037	5
14	100	0.0016	5
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	98	Particle density, Mg/m3	
0.600	94		
0.425	79	2.66 measured	
0.300	56	Dry mass of sample, kg	
0.212	28		
0.150	13	6.2	
0.063	8		

Soil description	Brown SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	1	1
	Sand	91	91
	Silt	3	3
	Clay	5	5

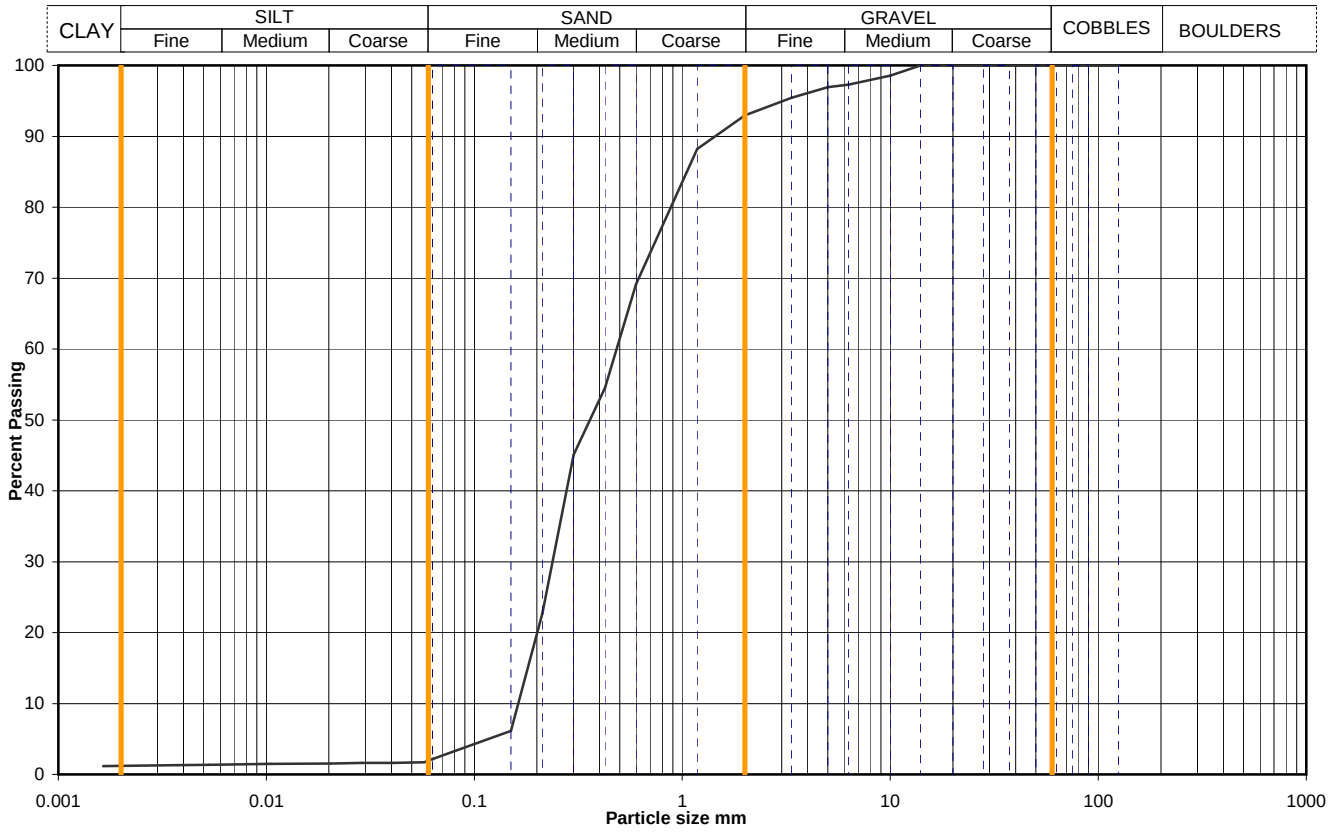
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:47	**Figure** **PSD 43**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	23.60		
			Samp No	69	Type	U
			ID	ESGA0012-10201010050000001553		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	2
90	100	0.0575	2
75	100	0.0407	2
63	100	0.0288	2
50	100	0.0204	2
37.5	100	0.0105	1
28	100	0.0053	1
20	100	0.0037	1
14	100	0.0016	1
10	99		
6.3	97		
5.0	97		
3.35	95		
2.00	93		
1.18	88	Particle density, Mg/m3	
0.600	69		
0.425	55	2.67 measured	
0.300	45	Dry mass of sample, kg	
0.212	23		
0.150	6	5.2	
0.063	2		

Soil description	Grey SAND with ocasional silt pockets and shell fragments.
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377
Remarks	

Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	7	7
	Sand	91	91
	Silt	1	1
	Clay	1	1

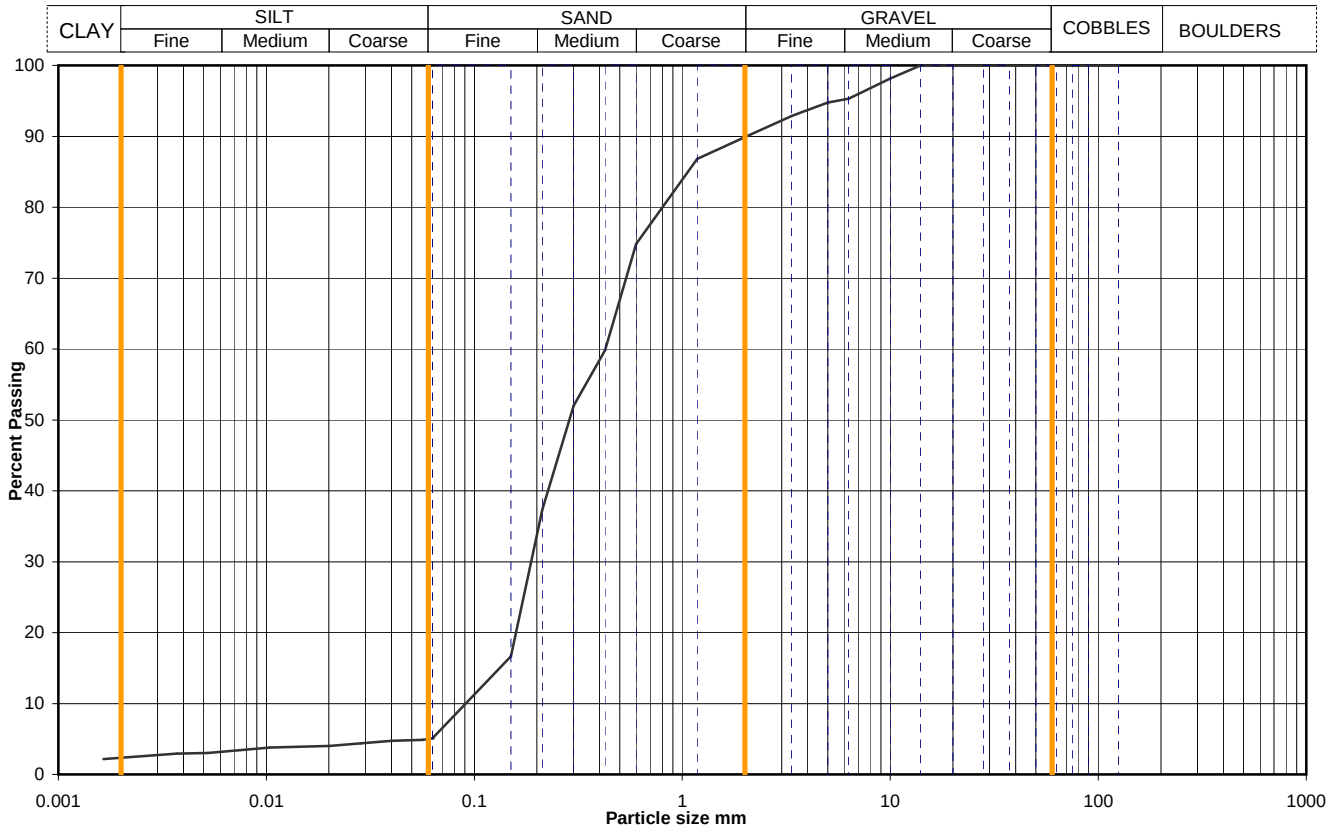
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref			Figure
SLR 2,9 Rev 84 Sept 08	Soil Mechanics	Printed:13/05/2011 09:48	**PSD 44**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	32.70		
			Samp No	94	Type	U
			ID	ESGA0012-10201010050000001579		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	5
90	100	0.0565	5
75	100	0.0400	5
63	100	0.0284	4
50	100	0.0201	4
37.5	100	0.0104	4
28	100	0.0052	3
20	100	0.0037	3
14	100	0.0016	2
10	98		
6.3	95		
5.0	95		
3.35	93		
2.00	90		
1.18	87	Particle density, Mg/m3	
0.600	75		
0.425	60	2.67 measured	
0.300	52	Dry mass of sample, kg	
0.212	37		
0.150	17	4.8	
0.063	5		

Soil description	Grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	10	10
	Sand	85	85
	Silt	3	3
	Clay	2	2

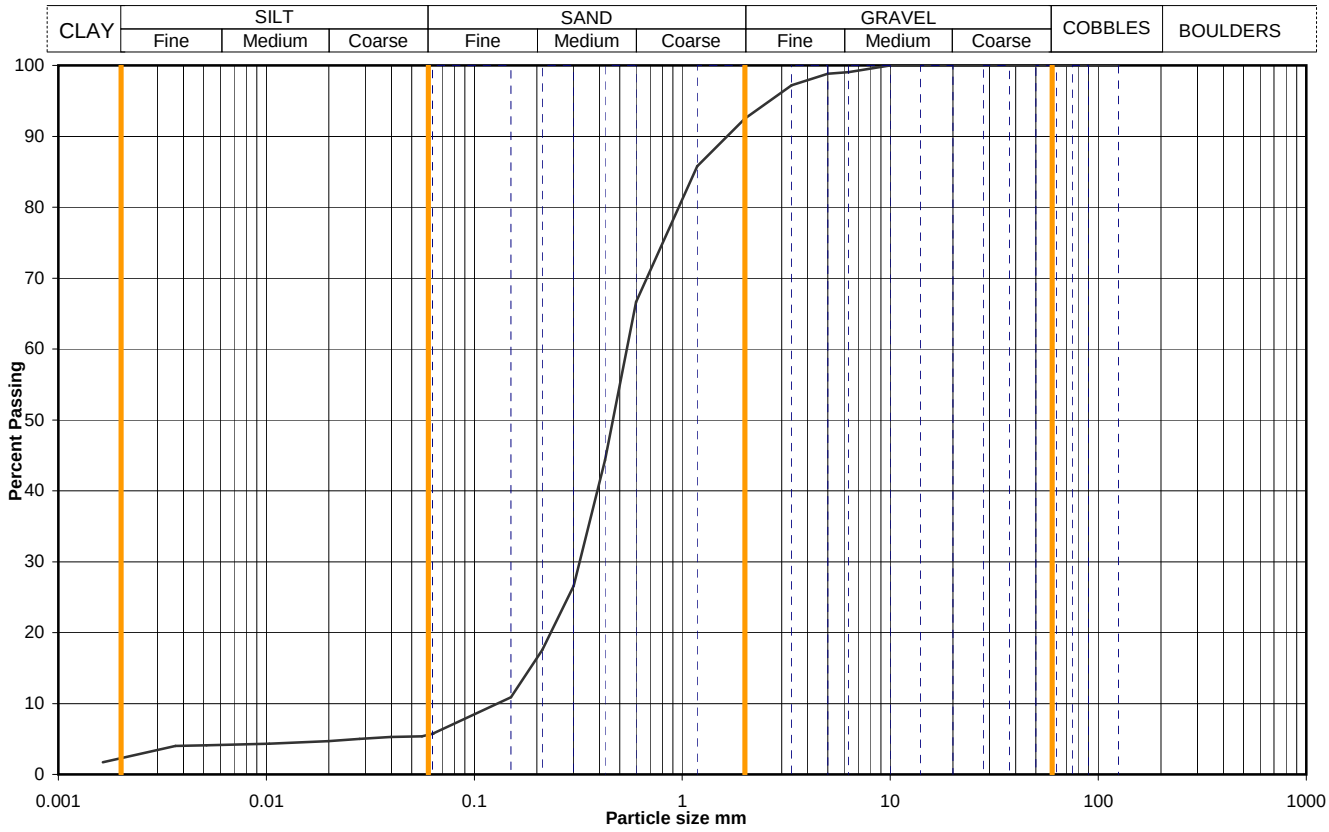
Uniformity Coefficient	D_{60} / D_{10}	5

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 45**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	41.55		
			Samp No	121	Type	U
			ID	ESGA0012-10201010050000001606		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	6
90	100	0.0560	5
75	100	0.0396	5
63	100	0.0281	5
50	100	0.0199	5
37.5	100	0.0103	4
28	100	0.0052	4
20	100	0.0037	4
14	100	0.0016	2
10	100		
6.3	99		
5.0	99		
3.35	97		
2.00	92		
1.18	86	Particle density, Mg/m3	
0.600	67		
0.425	44	2.68 measured	
0.300	27	Dry mass of sample, kg	
0.212	18		
0.150	11	6.3	
0.063	6		

Soil description	Grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	8	8
	Sand	87	87
	Silt	3	3
	Clay	2	2

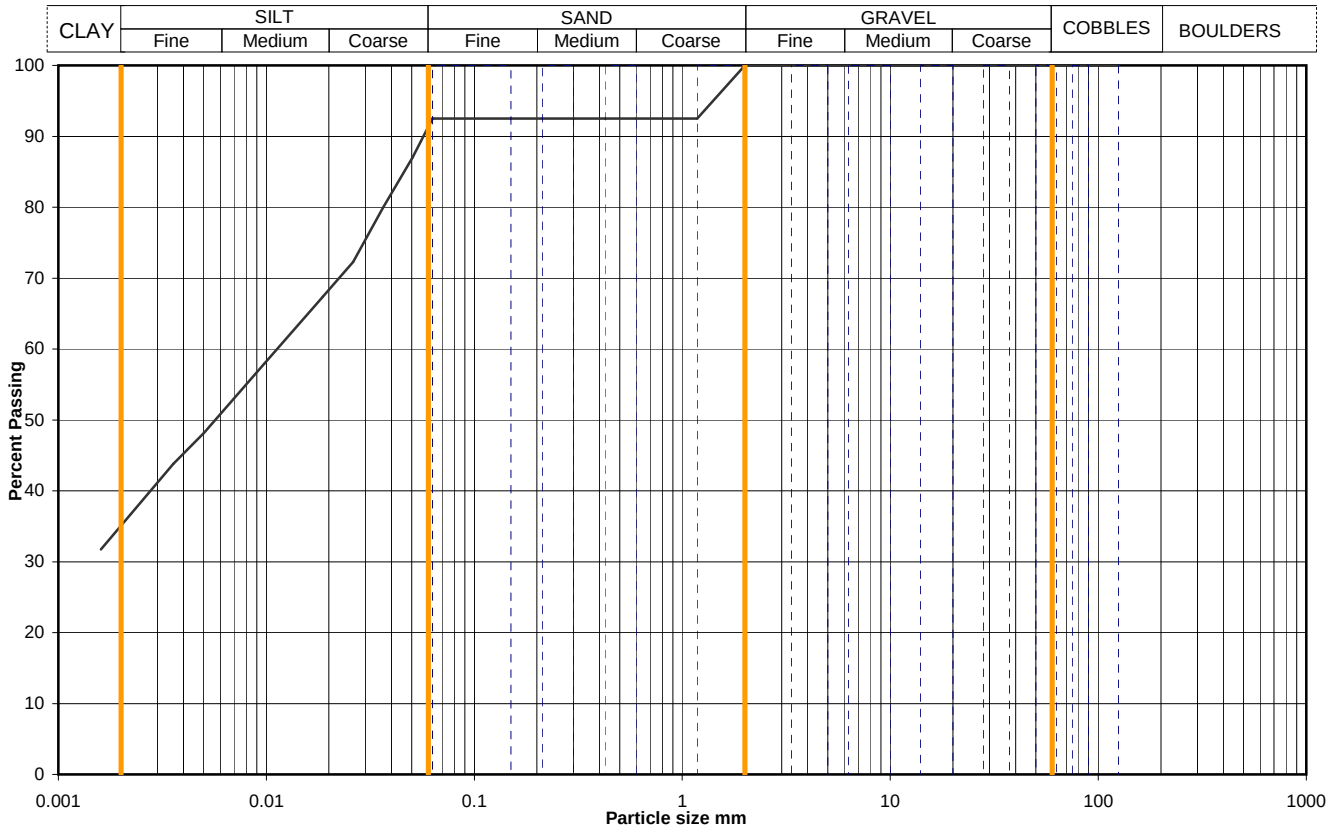
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 46**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_7		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	51.60		
			Samp No	16	Type	CS
			ID	ESGA0012-10201009140000000688		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	93
90	100	0.0506	87
75	100	0.0363	80
63	100	0.0261	72
50	100	0.0187	67
37.5	100	0.0098	58
28	100	0.0050	48
20	100	0.0036	44
14	100	0.0016	32
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	93	Particle density, Mg/m3	
0.600	93		
0.425	93	2.64 measured	
0.300	93	Dry mass of sample, kg	
0.212	93		
0.150	93	0.0	
0.063	93		

Soil description	Very weak greyish brown MUDSTONE and very soft brown clay.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	9	9
	Silt	56	56
	Clay	35	35

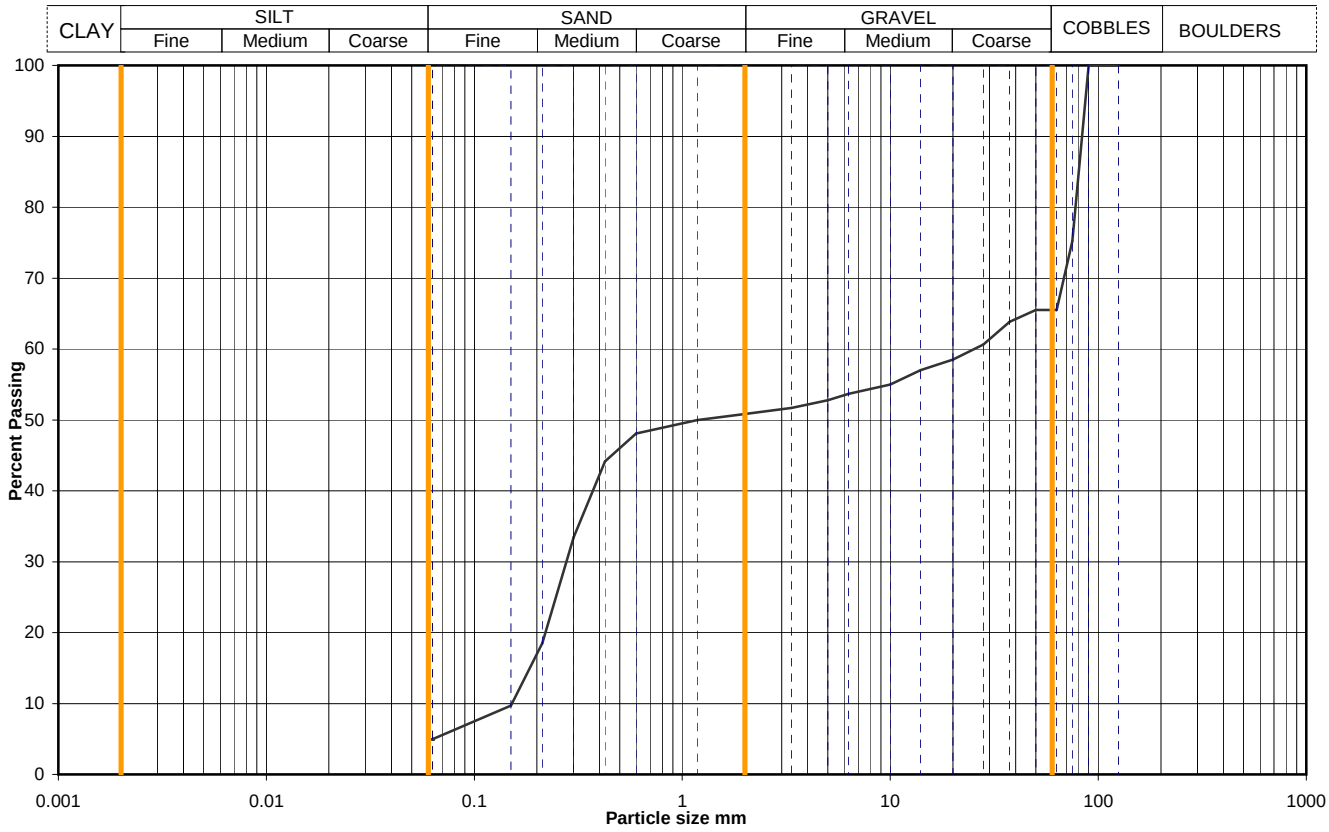
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 47**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	4.00		
			Samp No	12	Type	U
			ID	ESGA0012-10201010210000002378		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	75		
63	65		
50	65		
37.5	64		
28	61		
20	59		
14	57		
10	55		
6.3	54		
5.0	53		
3.35	52		
2.00	51		
1.18	50		
0.600	48		
0.425	44		
0.300	33	Dry mass of sample, kg	
0.212	18		
0.150	10	4.0	
0.063	5		

Soil description	Greyish brown slightly organic silty very gravelly SAND with 2 cobbles.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	35	0
	Gravel	14	22
	Sand	46	71
	Silt	silt+clay =	
	Clay	5	8

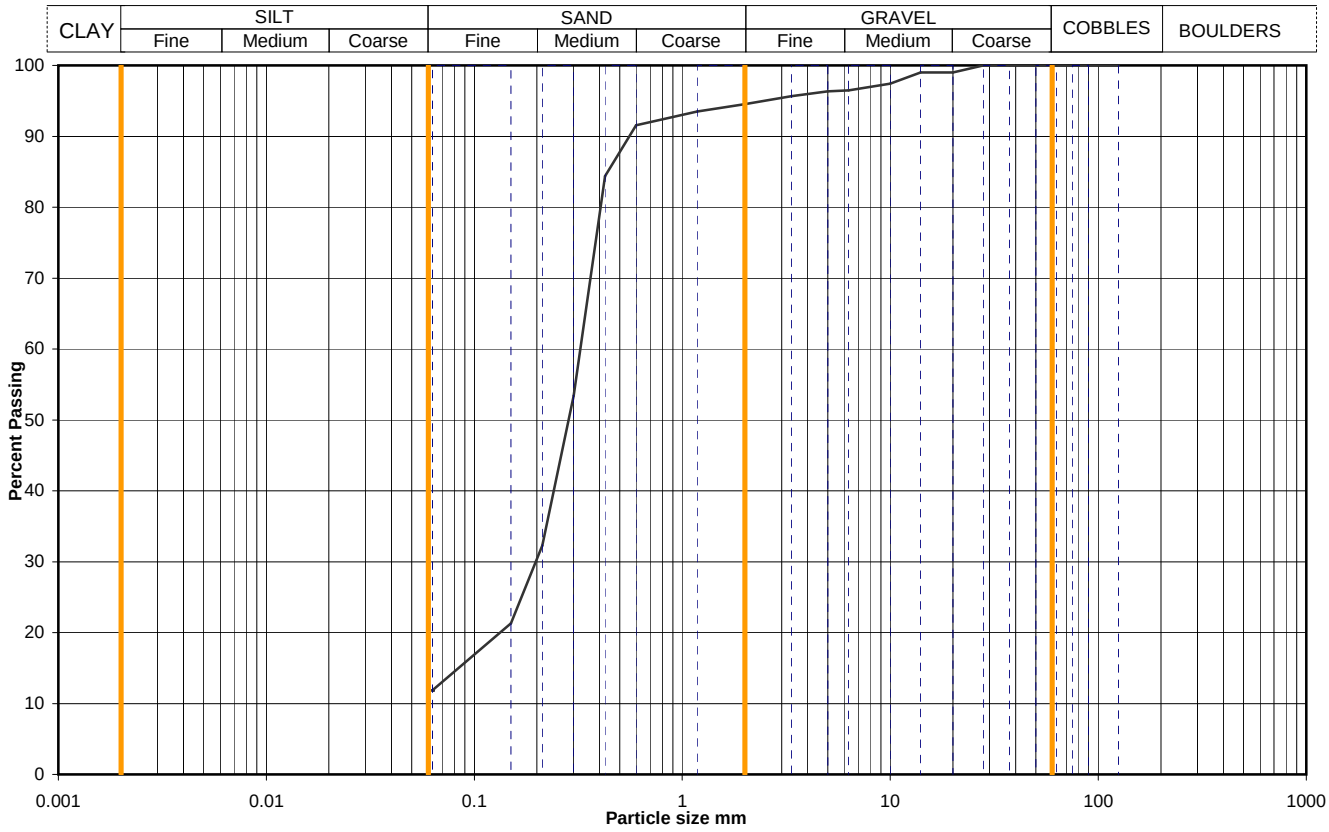
Uniformity Coefficient	D_{60} / D_{10}	167

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 48**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	5.40		
			Samp No	16	Type	U
			ID	ESGA0012-10201010260000002492		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	99		
10	97		
6.3	96		
5.0	96		
3.35	96		
2.00	95		
1.18	94		
0.600	92		
0.425	84		
0.300	53	Dry mass of sample, kg	
0.212	32		
0.150	21	2.3	
0.063	12		

Soil description	Greyish brown slightly gravelly SAND with occasional clay pockets and rare shell fragments.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	5	5
	Sand	83	83
	Silt	silt+clay =	
	Clay	12	12

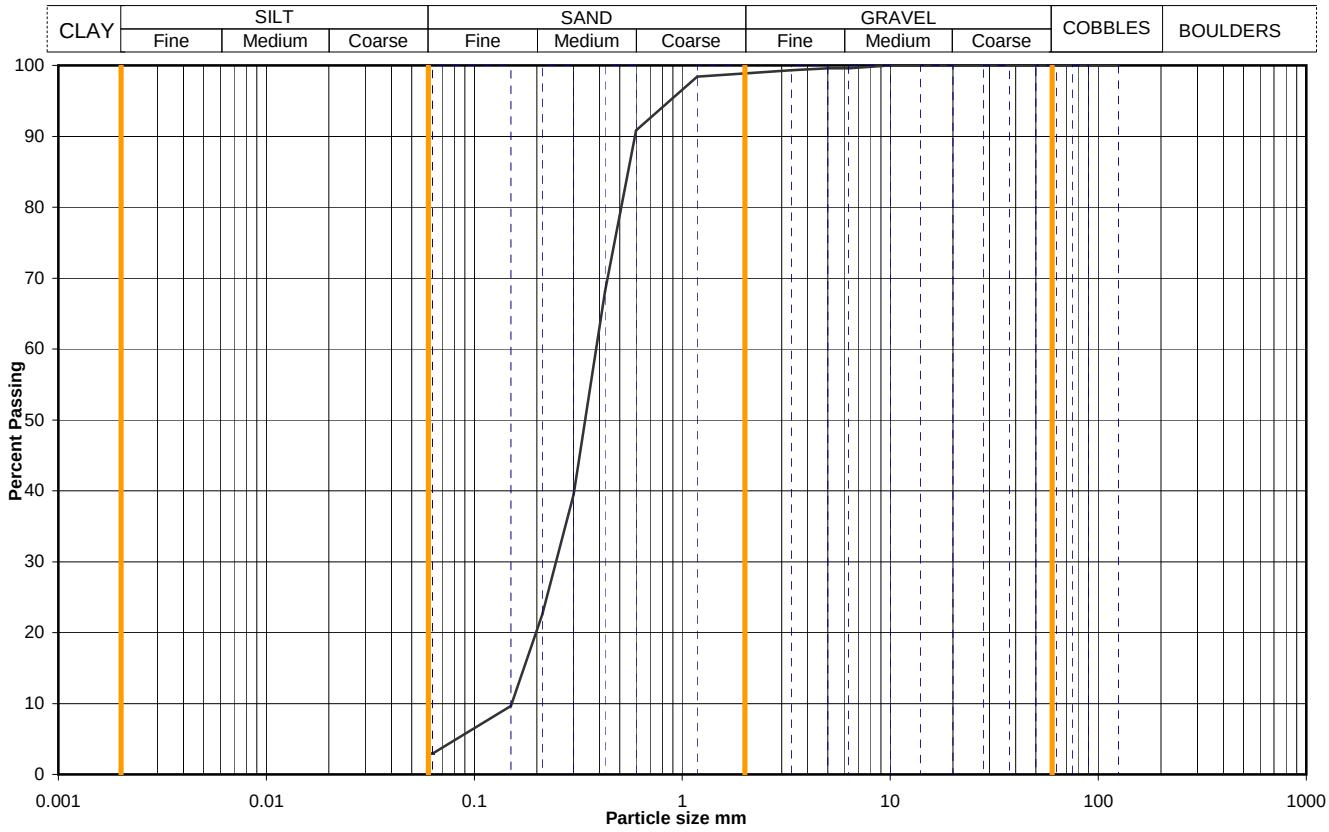
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 49**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	16.60		
			Samp No	48	Type	U
			ID	ESGA0012-10201010260000002524		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	98		
0.600	91		
0.425	68		
0.300	40	Dry mass of sample, kg	
0.212	23		
0.150	10	5.0	
0.063	3		

Soil description	Greyish brown SAND with occasional shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	1	1
	Sand	96	96
	Silt	silt+clay =	
	Clay	3	3

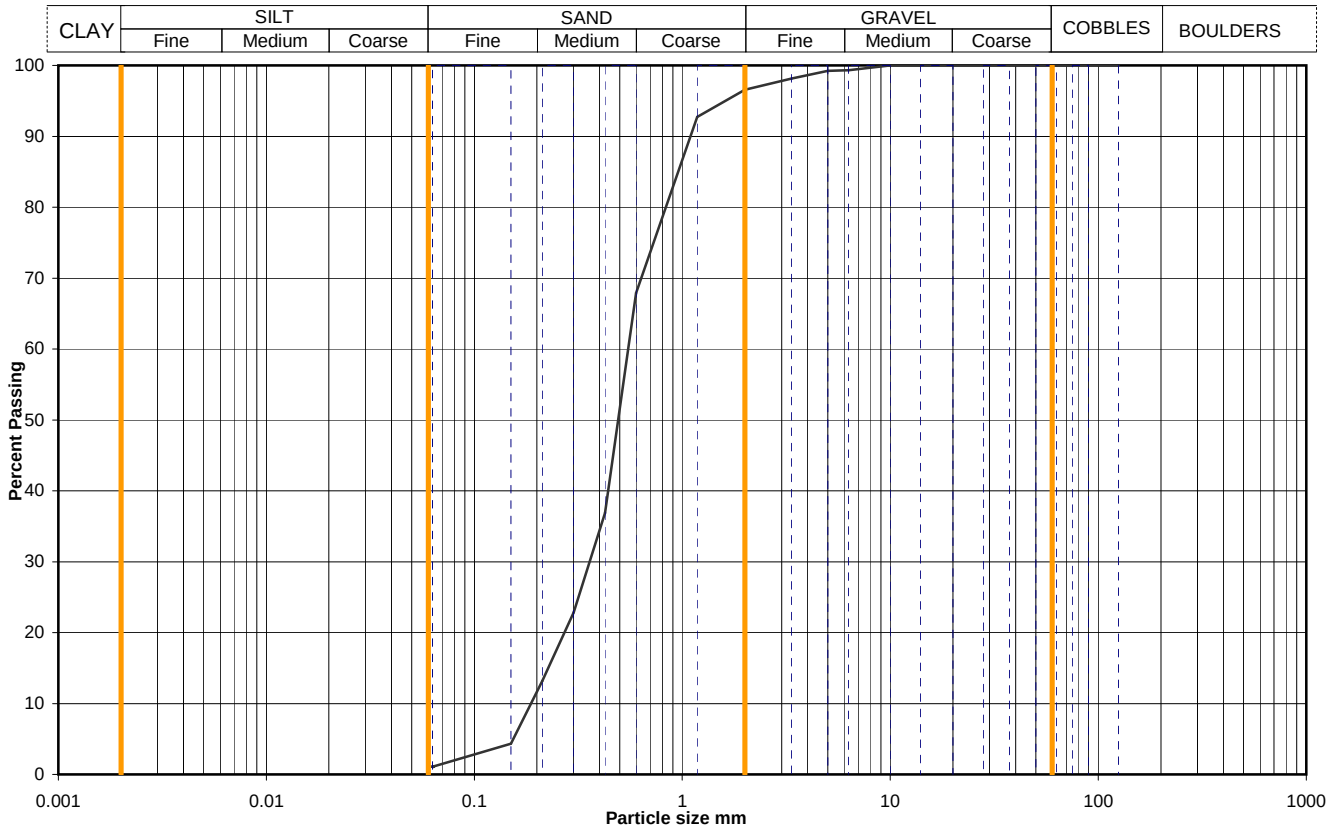
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 50**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	25.00		
			Samp No	74	Type	U
			ID	ESGA0012-10201010260000002551		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5.0	99		
3.35	98		
2.00	97		
1.18	93		
0.600	68		
0.425	37		
0.300	23	Dry mass of sample, kg	
0.212	13		
0.150	4	5.5	
0.063	1		

Soil description	Grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	96	96
	Silt	silt+clay =	
	Clay	1	1

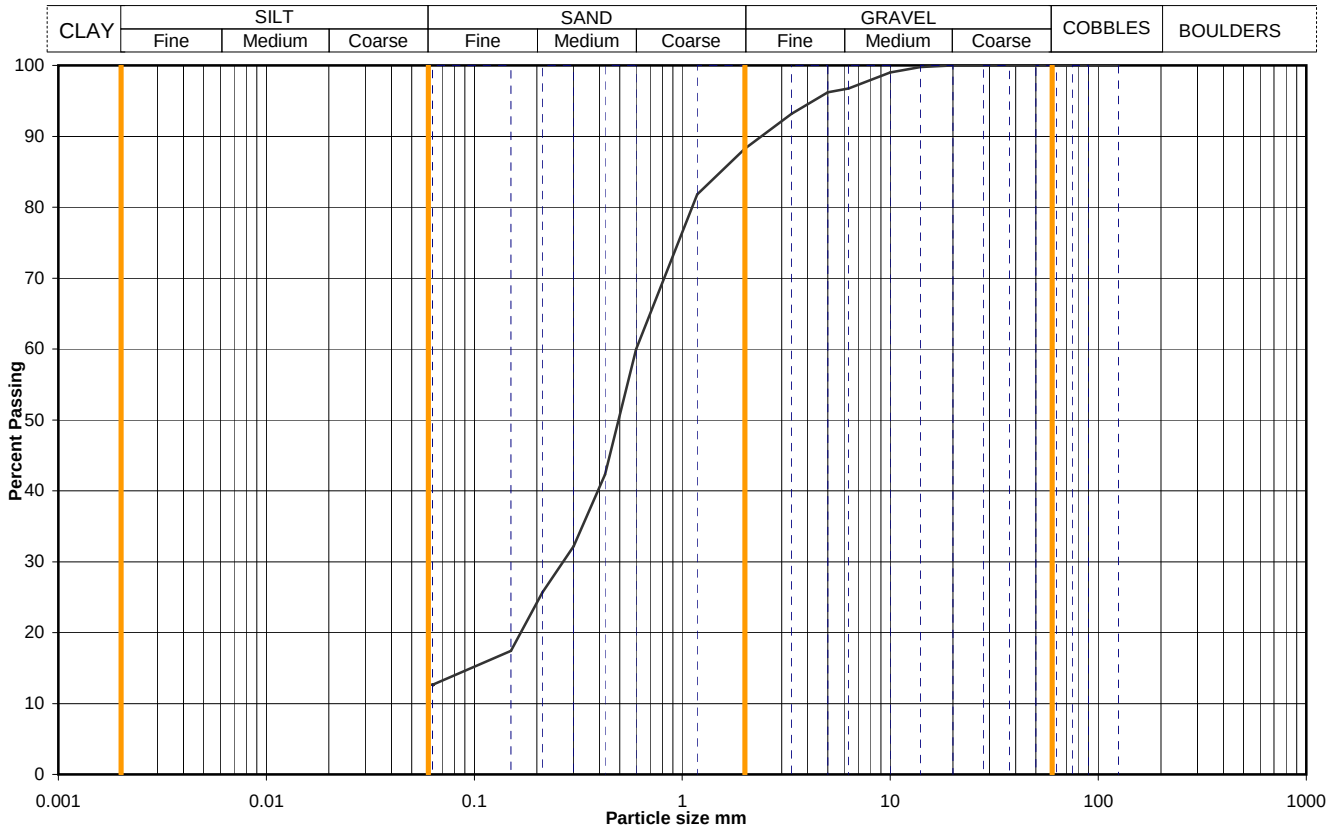
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 51**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	32.70		
			Samp No	95	Type	U
			ID	ESGA0012-10201010260000002572		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	97		
5.0	96		
3.35	93		
2.00	88		
1.18	82		
0.600	60		
0.425	42		
0.300	32	Dry mass of sample, kg	
0.212	26		
0.150	17	3.8	
0.063	13		

Soil description	Dark grey silty SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	12	12
	Sand	76	76
	Silt	silt+clay =	
	Clay	12	12

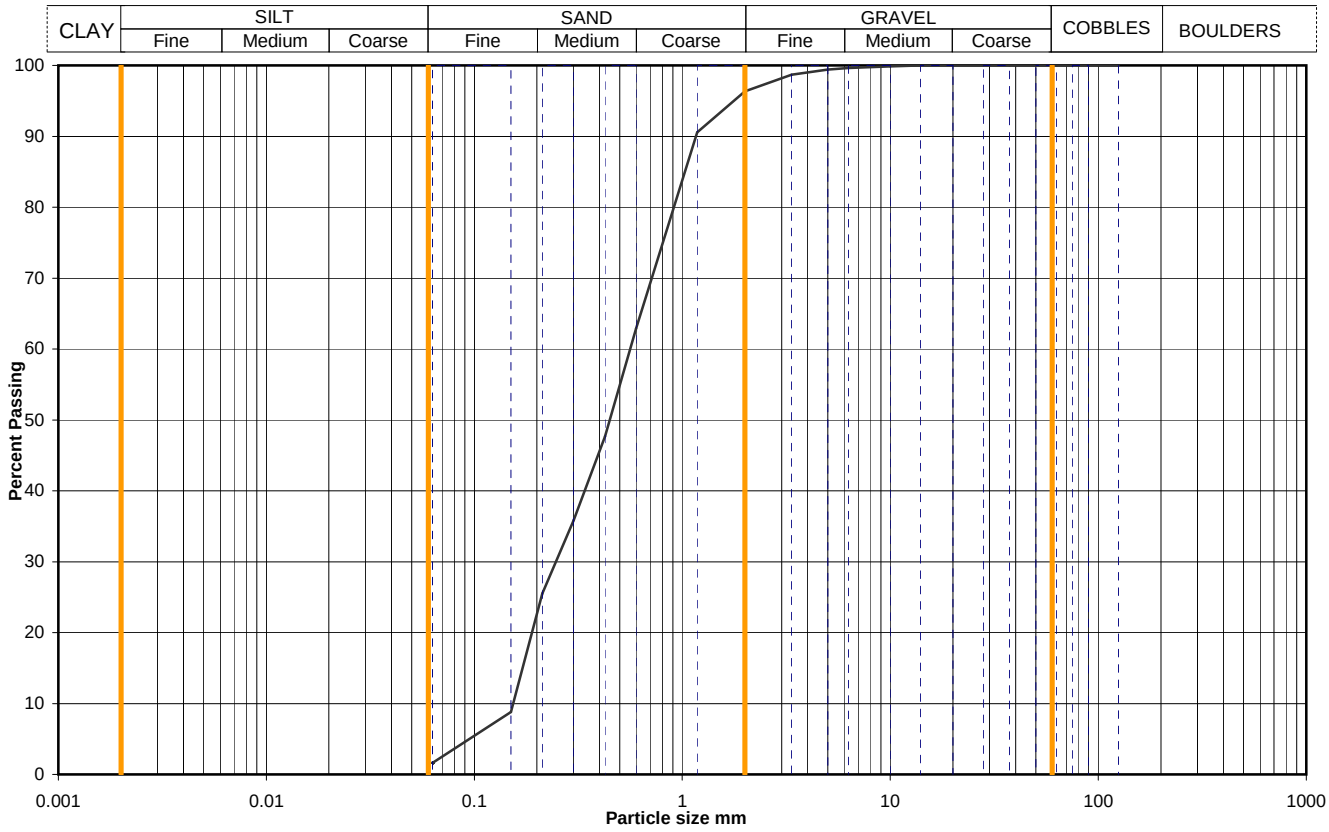
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 52**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	34.10		
			Samp No	99	Type	U
			ID	ESGA0012-10201010260000002577		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	99		
3.35	99		
2.00	96		
1.18	91		
0.600	63		
0.425	48		
0.300	36	Dry mass of sample, kg	
0.212	25		
0.150	9	2.2	
0.063	2		

Soil description	Grey SAND with occasional shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	4	4
	Sand	95	95
	Silt	silt+clay =	
	Clay	1	1

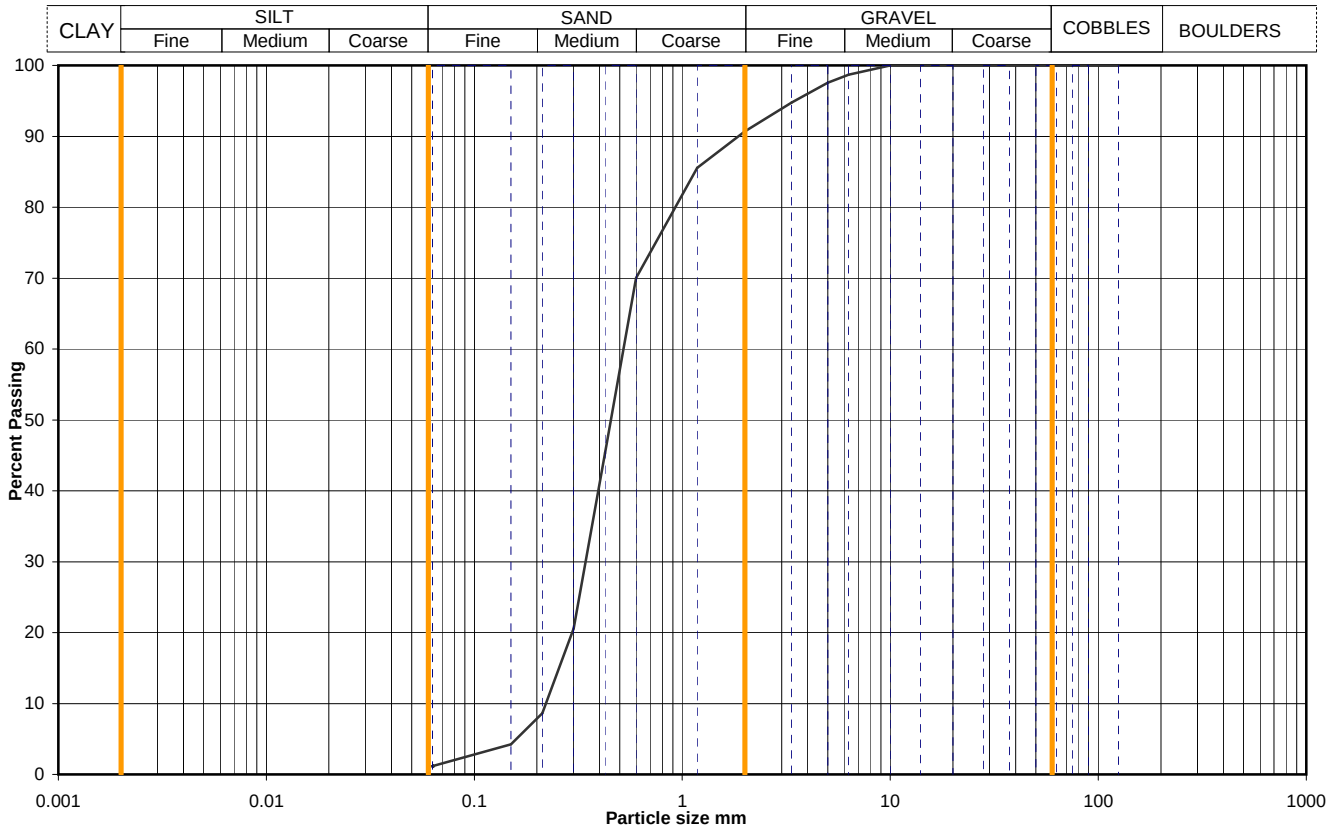
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 53**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	41.90		
			Samp No	121	Type	U
			ID	ESGA0012-10201010260000002599		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5.0	98		
3.35	95		
2.00	91		
1.18	86		
0.600	70		
0.425	45		
0.300	21	Dry mass of sample, kg	
0.212	9		
0.150	4	4.3	
0.063	1		

Soil description	Greyish brown SAND with occasional shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	9	9
	Sand	90	90
	Silt	silt+clay =	
	Clay	1	1

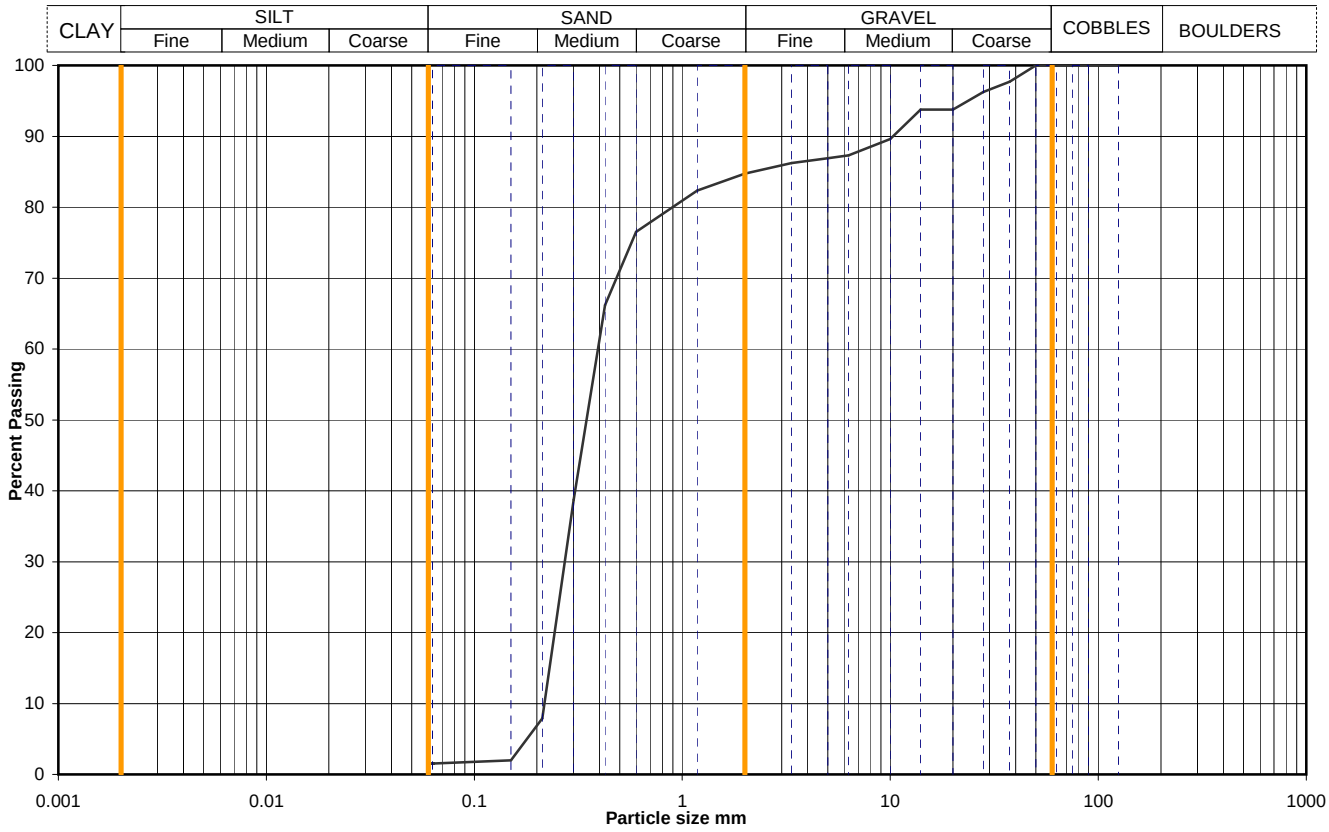
Uniformity Coefficient	D_{60} / D_{10}	2

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 54**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	3.80		
			Samp No	6	Type	U
			ID	ESGA0012-10201009200000000869		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	98		
28	96		
20	94		
14	94		
10	90		
6.3	87		
5.0	87		
3.35	86		
2.00	85		
1.18	82		
0.600	77		
0.425	66		
0.300	39	Dry mass of sample, kg	
0.212	8	4.5	
0.150	2		
0.063	2		

Soil description	Light brown gravelly SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	15	15
	Sand	83	83
	Silt	silt+clay =	
	Clay	2	2

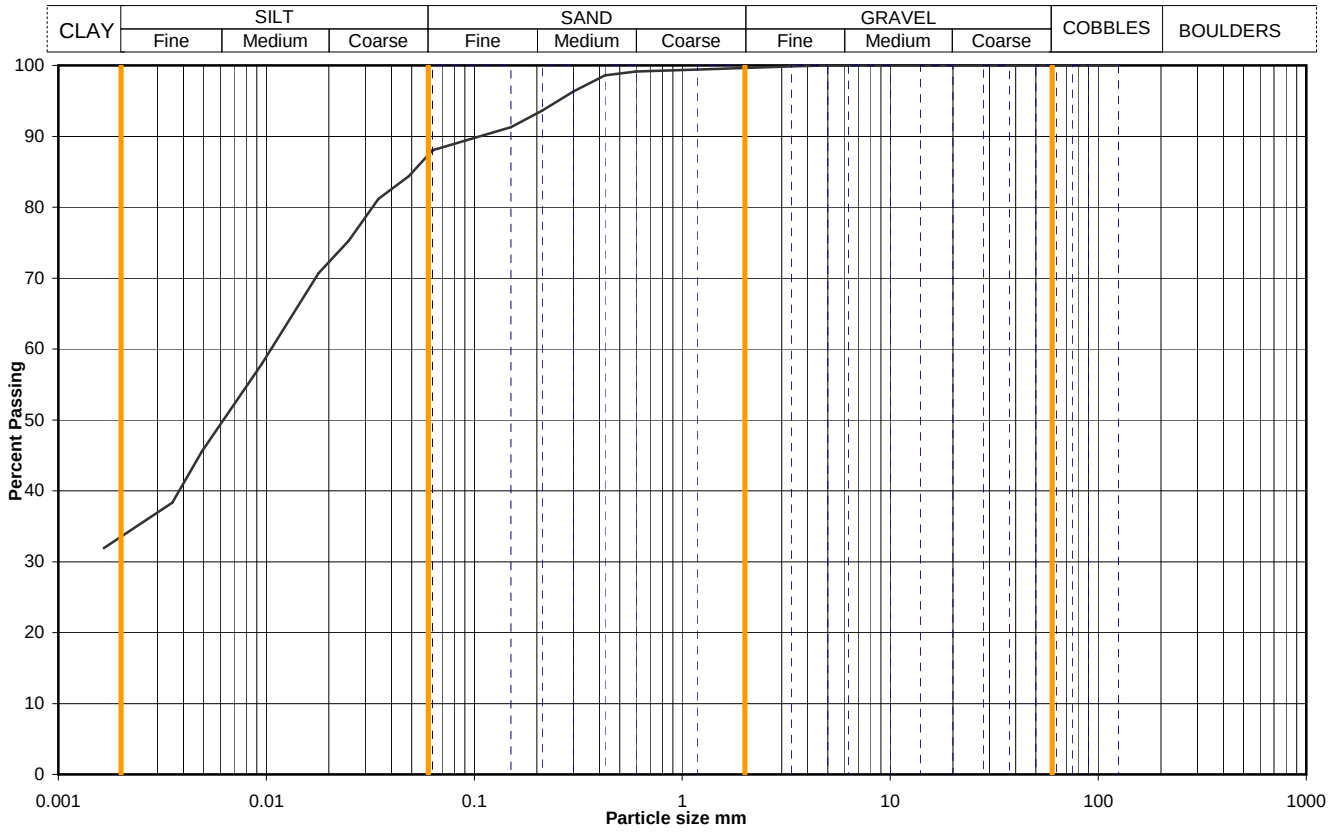
Uniformity Coefficient	D_{60} / D_{10}	2

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 55**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	6.65		
			Samp No	10	Type	U
			ID	ESGA0012-10201009200000000874		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	88
90	100	0.0485	84
75	100	0.0346	81
63	100	0.0249	75
50	100	0.0178	71
37.5	100	0.0095	58
28	100	0.0049	46
20	100	0.0035	38
14	100	0.0017	32
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99	Particle density, Mg/m3	
0.600	99		
0.425	99	2.65 assumed	
0.300	96	Dry mass of sample, kg	
0.212	94		
0.150	91	2.2	
0.063	88		

Soil description	Soft grey slightly organic slightly sandy CLAY with occasional rootlets.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	12	12
	Silt	54	54
	Clay	34	34

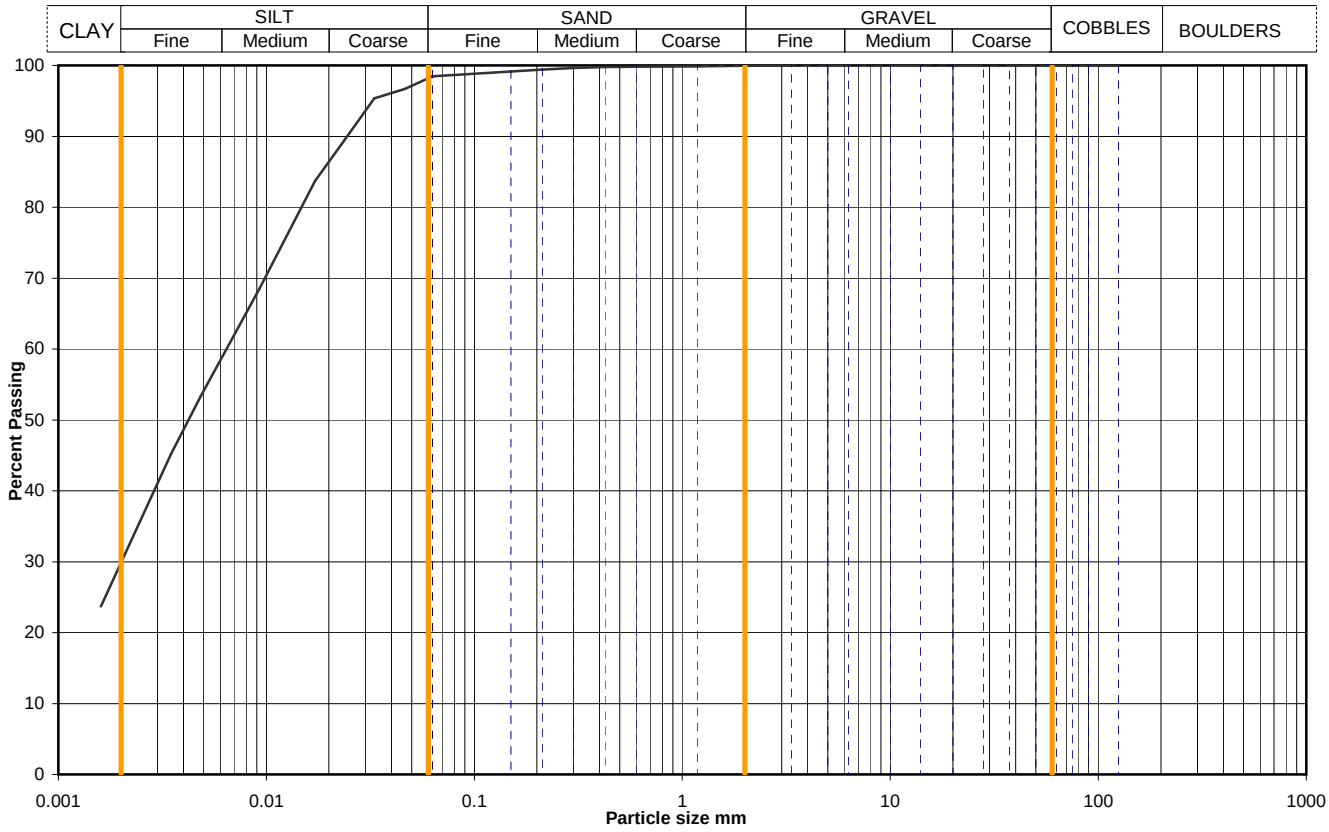
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 56**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	8.20		
			Samp No	17	Type	U
			ID	ESGA0012-10201009200000000880		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	98
90	100	0.0465	97
75	100	0.0330	95
63	100	0.0238	90
50	100	0.0171	84
37.5	100	0.0092	68
28	100	0.0048	53
20	100	0.0035	45
14	100	0.0016	24
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100	Particle density, Mg/m3	
0.600	100		
0.425	100	2.64 measured	
0.300	100	Dry mass of sample, kg	
0.212	99		
0.150	99	1.3	
0.063	98		

Soil description	Soft to firm grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	2	2
	Silt	68	68
	Clay	30	30

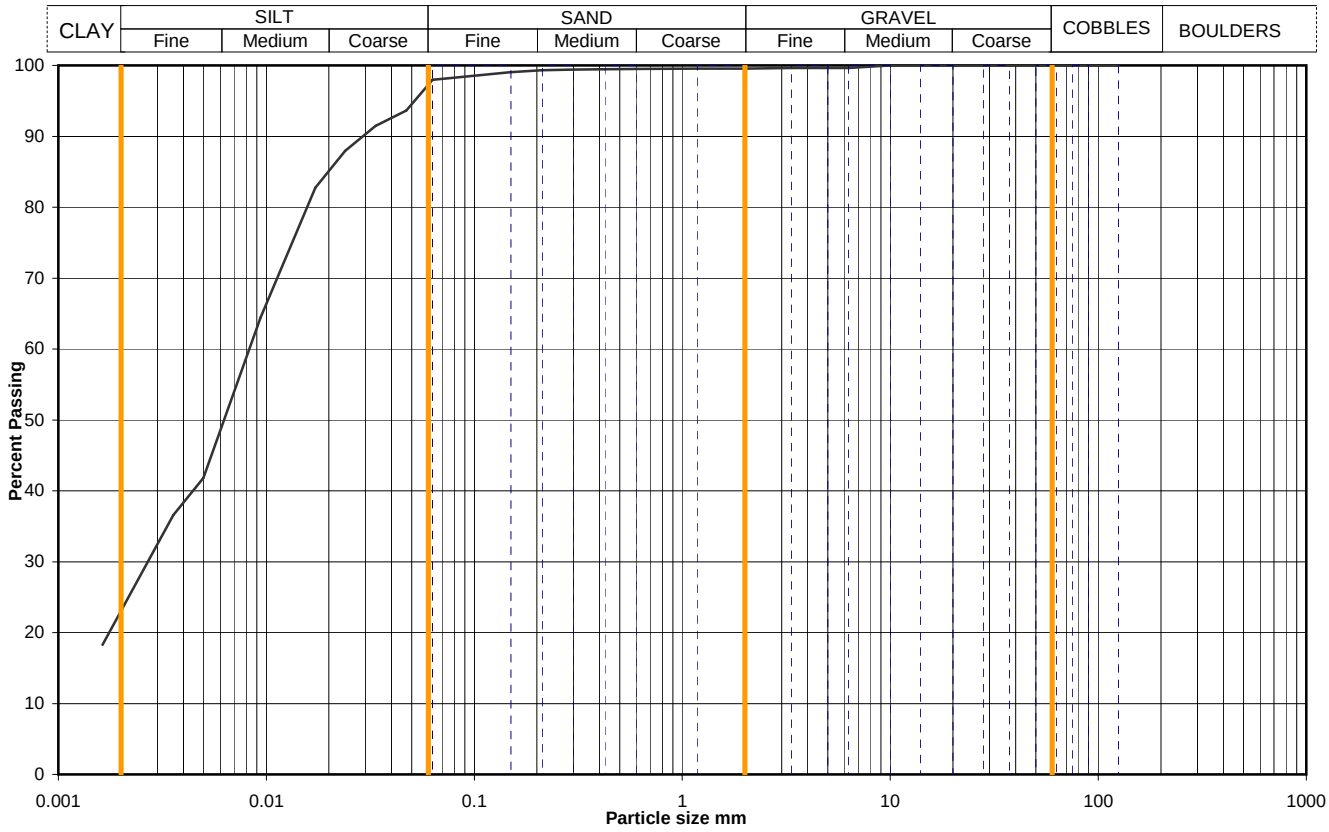
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 57**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	11.10		
			Samp No	27	Type	U
			ID	ESGA0012-10201009200000000890		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	98
90	100	0.0470	94
75	100	0.0335	91
63	100	0.0240	88
50	100	0.0172	83
37.5	100	0.0094	64
28	100	0.0050	42
20	100	0.0036	37
14	100	0.0016	18
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100	Particle density, Mg/m3	
0.600	99		
0.425	99	2.61 measured	
0.300	99	Dry mass of sample, kg	
0.212	99		
0.150	99	1.3	
0.063	98		

Soil description	Soft to firm dark grey slightly sandy organic CLAY with rare plant remains.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions *<60mm values to aid description only	Whole	*<60mm
Cobbles / boulders	0	0
Gravel	0	0
Sand	2	2
Silt	75	75
Clay	23	23

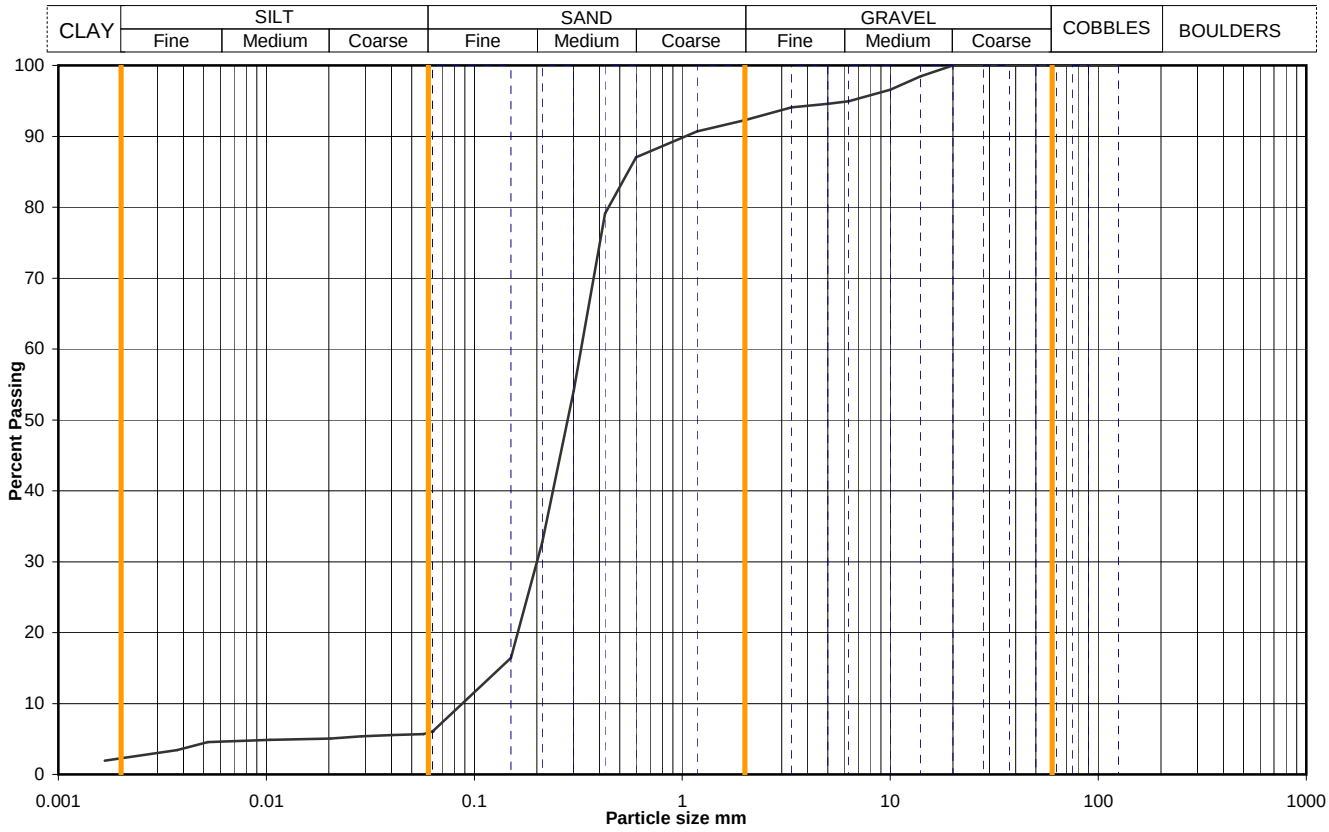
Uniformity Coefficient	**D_{60} / D_{10}**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref				Figure
SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**PSD 58**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	17.55		
			Samp No	50	Type	U
			ID	ESGA0012-10201009200000000913		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	6
90	100	0.0570	6
75	100	0.0403	6
63	100	0.0285	5
50	100	0.0202	5
37.5	100	0.0105	5
28	100	0.0052	5
20	100	0.0037	3
14	98	0.0017	2
10	97		
6.3	95		
5.0	95		
3.35	94		
2.00	92		
1.18	91	Particle density, Mg/m3	
0.600	87		
0.425	79	2.66 measured	
0.300	54	Dry mass of sample, kg	
0.212	33		
0.150	16	6.2	
0.063	6		

Soil description	Grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	8	8
	Sand	86	86
	Silt	4	4
	Clay	2	2

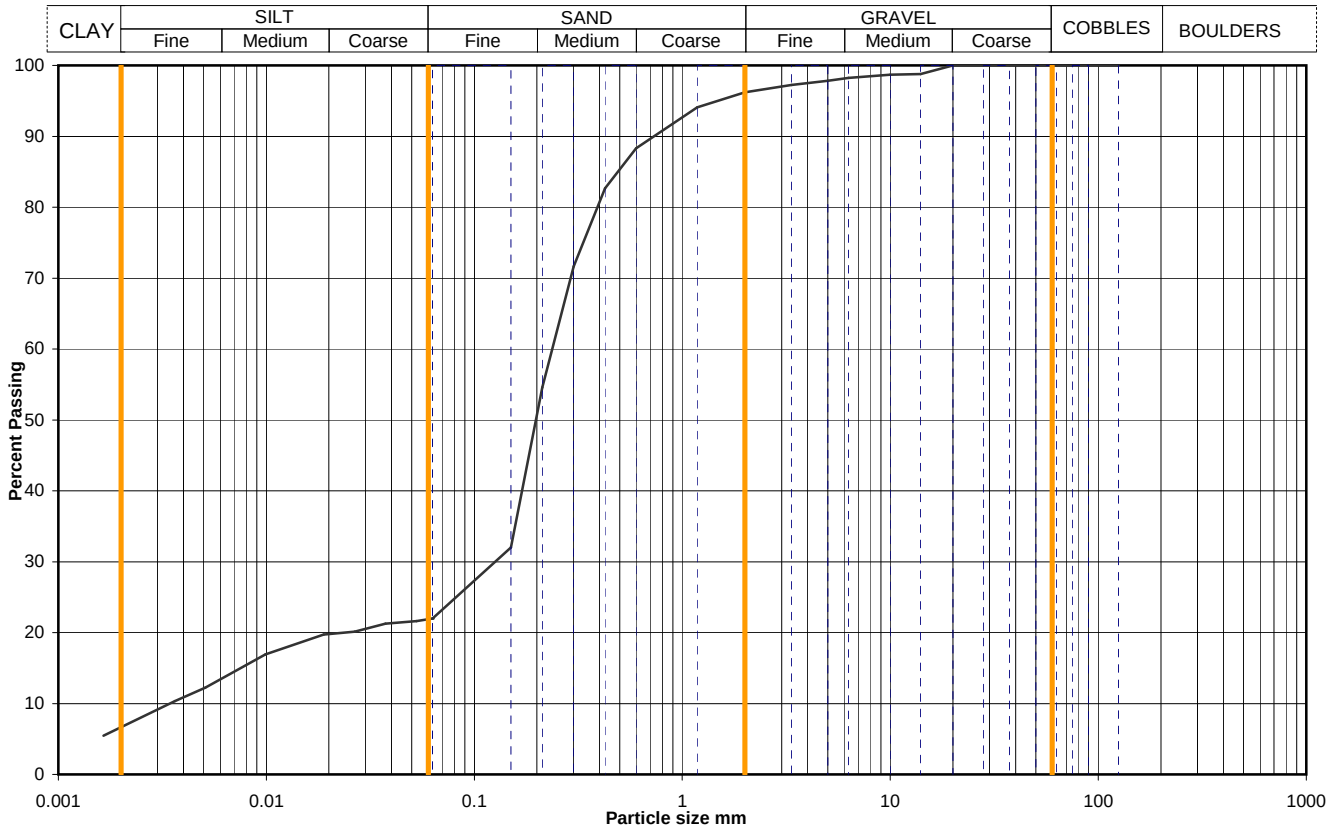
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 59**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	26.00		
			Samp No	73	Type	U
			ID	ESGA0012-10201009270000001132		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	22
90	100	0.0527	22
75	100	0.0373	21
63	100	0.0266	20
50	100	0.0188	20
37.5	100	0.0099	17
28	100	0.0051	12
20	100	0.0036	10
14	99	0.0016	5
10	99		
6.3	98		
5.0	98		
3.35	97		
2.00	96		
1.18	94	Particle density, Mg/m3	
0.600	88		
0.425	83	2.64 measured	
0.300	72	Dry mass of sample, kg	
0.212	55		
0.150	32	6.2	
0.063	22		

Soil description	Grey to brownish grey silty SAND with shell fragments and pockets of very silty clay		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	4	4
	Sand	74	74
	Silt	15	15
	Clay	7	7

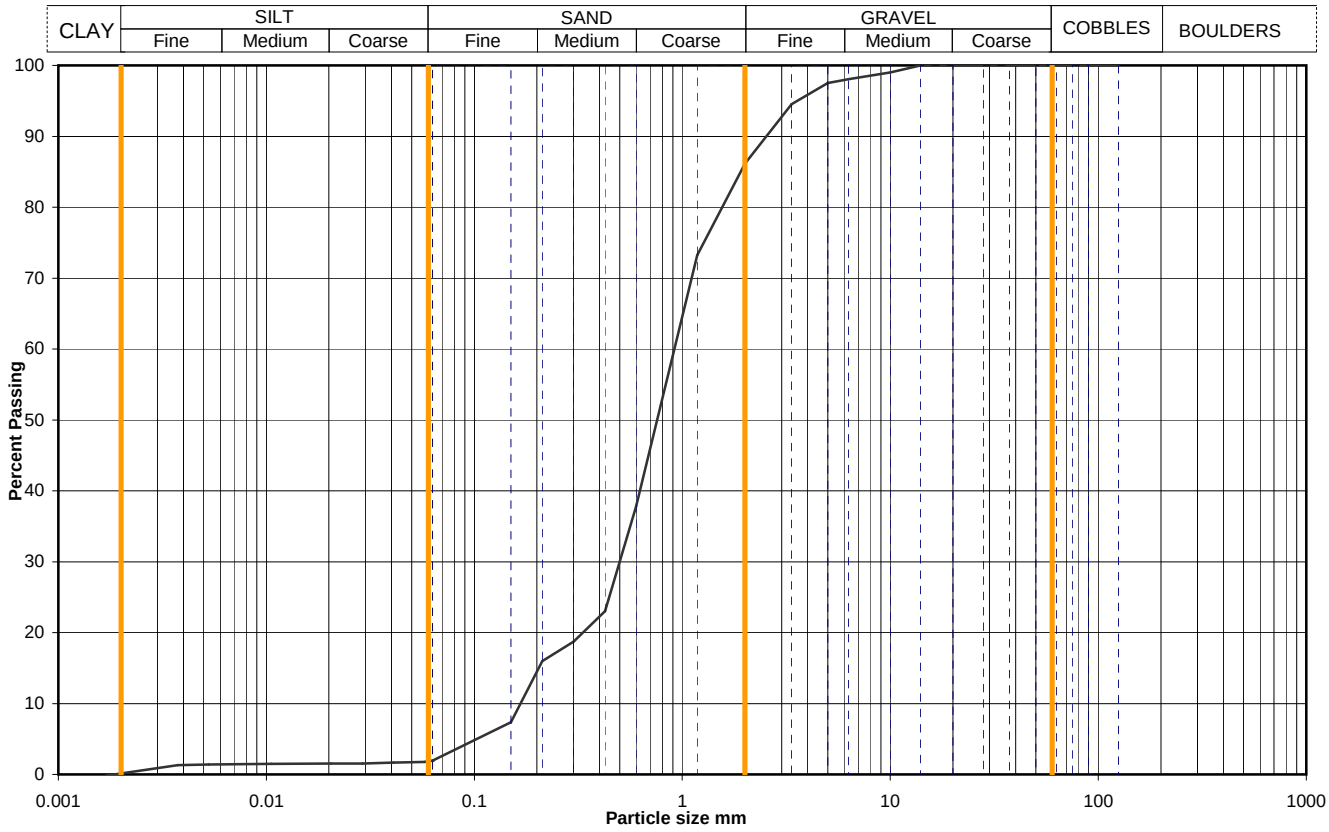
Uniformity Coefficient	D_{60} / D_{10}	69

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 60**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	35.05		
			Samp No	95	Type	U
			ID	ESGA0012-10201009270000001156		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	2
90	100	0.0576	2
75	100	0.0408	2
63	100	0.0289	2
50	100	0.0204	2
37.5	100	0.0106	1
28	100	0.0053	1
20	100	0.0037	1
14	100	0.0017	0
10	99		
6.3	98		
5.0	98		
3.35	95		
2.00	86		
1.18	73	Particle density, Mg/m3	
0.600	38		
0.425	23	2.64 measured	
0.300	19	Dry mass of sample, kg	
0.212	16		
0.150	7	3.2	
0.063	2		

Soil description	Brownish grey SAND with shell fragments.
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377
Remarks	

Sample Proportions *<60mm values to aid description only	Whole	*<60mm
Cobbles / boulders	0	0
Gravel	14	14
Sand	84	84
Silt	2	2
Clay	0	0

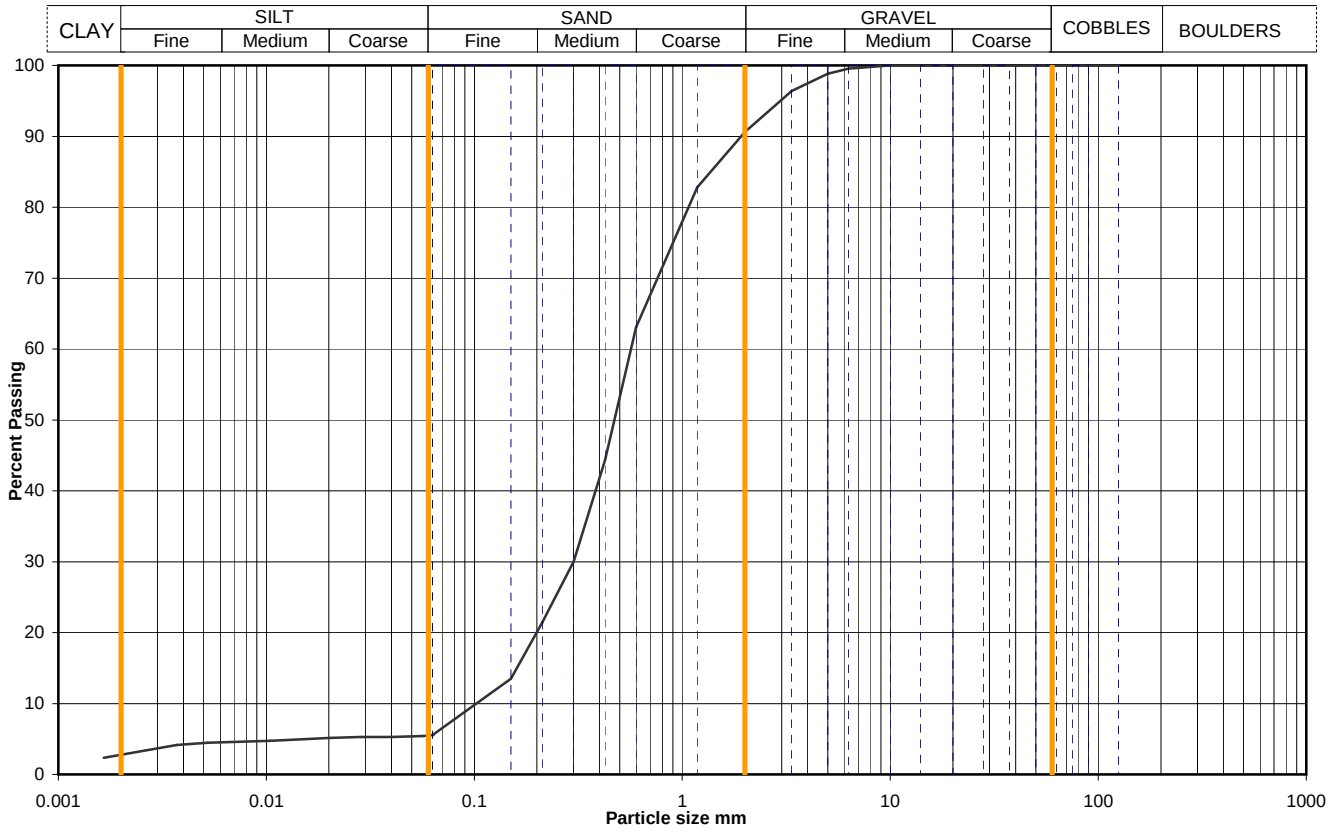
Uniformity Coefficient	D_{60} / D_{10}	6

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 61**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	43.55		
			Samp No	113	Type	U
			ID	ESGA0012-10201010010000001200		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	6
90	100	0.0569	5
75	100	0.0403	5
63	100	0.0285	5
50	100	0.0202	5
37.5	100	0.0104	5
28	100	0.0052	4
20	100	0.0037	4
14	100	0.0017	2
10	100		
6.3	100		
5.0	99		
3.35	96		
2.00	91		
1.18	83	Particle density, Mg/m3	
0.600	63		
0.425	44	2.65 assumed	
0.300	30	Dry mass of sample, kg	
0.212	21		
0.150	14	2.4	
0.063	6		

Soil description	Grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	9	9
	Sand	85	85
	Silt	3	3
	Clay	3	3

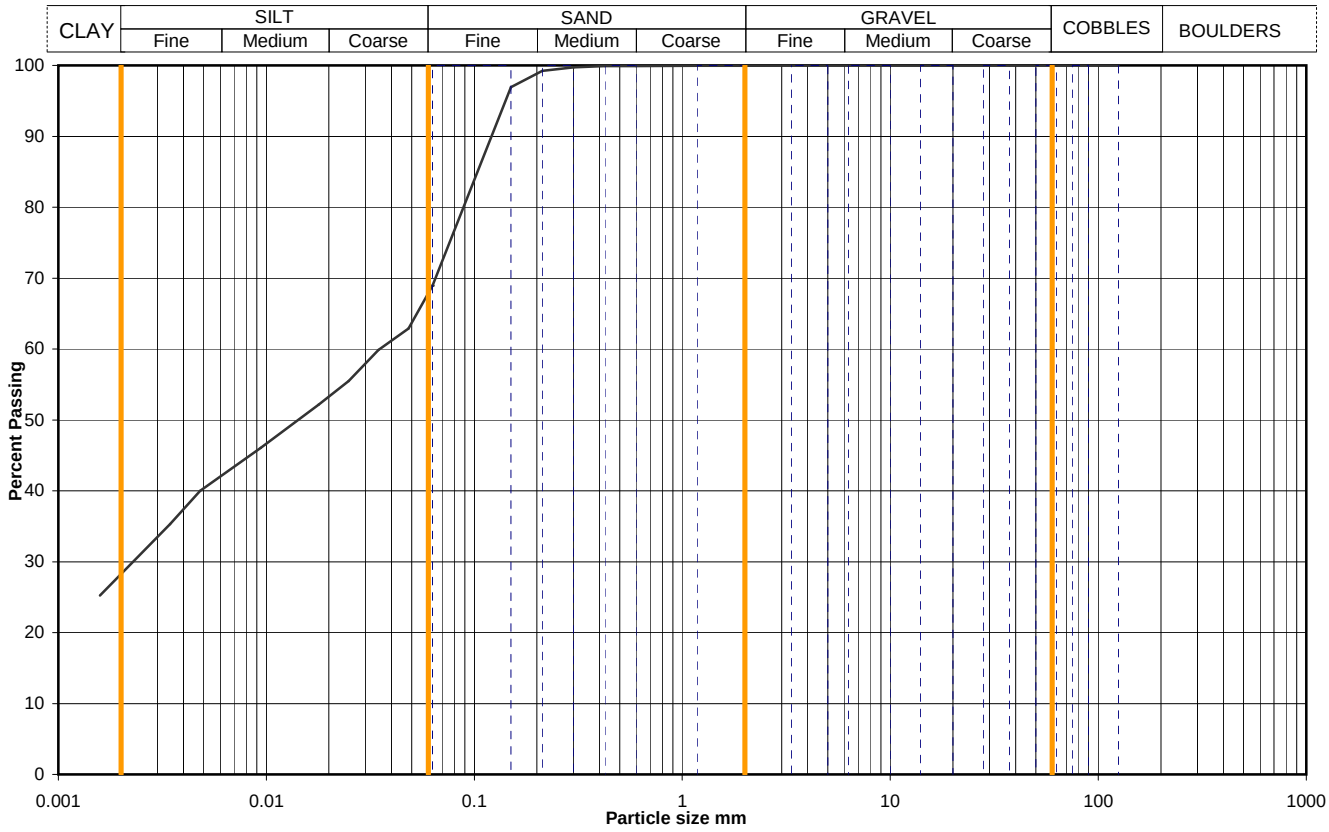
Uniformity Coefficient	D_{60} / D_{10}	6

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 62**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	48.77		
			Samp No	121	Type	CS
			ID	ESGA0012-10201010280000002713		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	69
90	100	0.0483	63
75	100	0.0346	60
63	100	0.0249	55
50	100	0.0178	52
37.5	100	0.0094	46
28	100	0.0048	40
20	100	0.0034	35
14	100	0.0016	25
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100	Particle density, Mg/m3	
0.600	100		
0.425	100	2.65 assumed	
0.300	100	Dry mass of sample, kg	
0.212	99		
0.150	97	0.4	
0.063	69		

Soil description	Very stiff brownish grey fissured slightly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	32	32
	Silt	40	40
	Clay	28	28

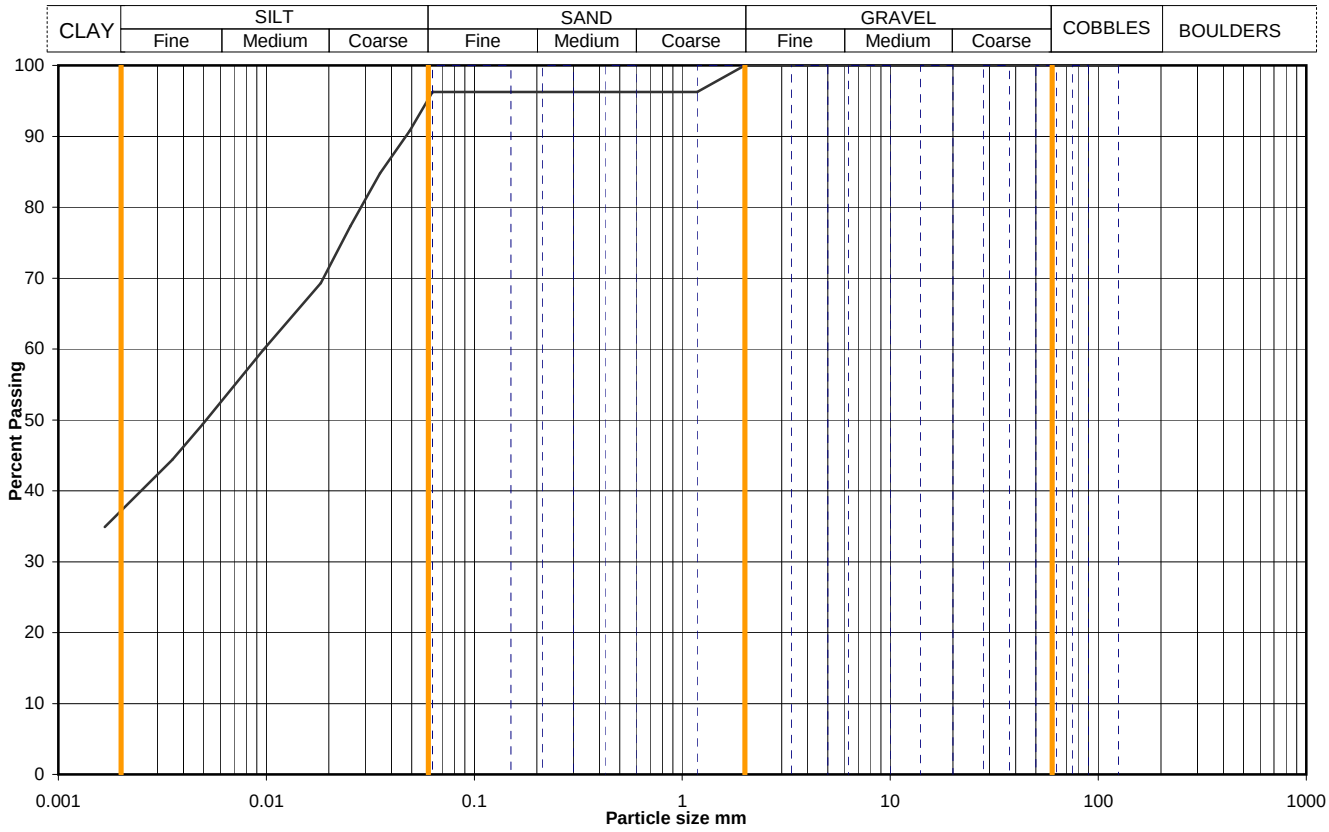
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	Printed:13/05/2011 09:48	**Figure** **PSD 63**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	58.23		
			Samp No	125	Type	CS
			ID	ESGA0012-10201010280000002717		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	96
90	100	0.0489	91
75	100	0.0352	85
63	100	0.0253	77
50	100	0.0183	69
37.5	100	0.0097	60
28	100	0.0049	49
20	100	0.0035	44
14	100	0.0017	35
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	96	Particle density, Mg/m3	
0.600	96		
0.425	96	2.63 measured	
0.300	96	Dry mass of sample, kg	
0.212	96		
0.150	96	0.0	
0.063	96		

Soil description	Very stiff greyish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimention is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	5	5
	Silt	58	58
	Clay	37	37

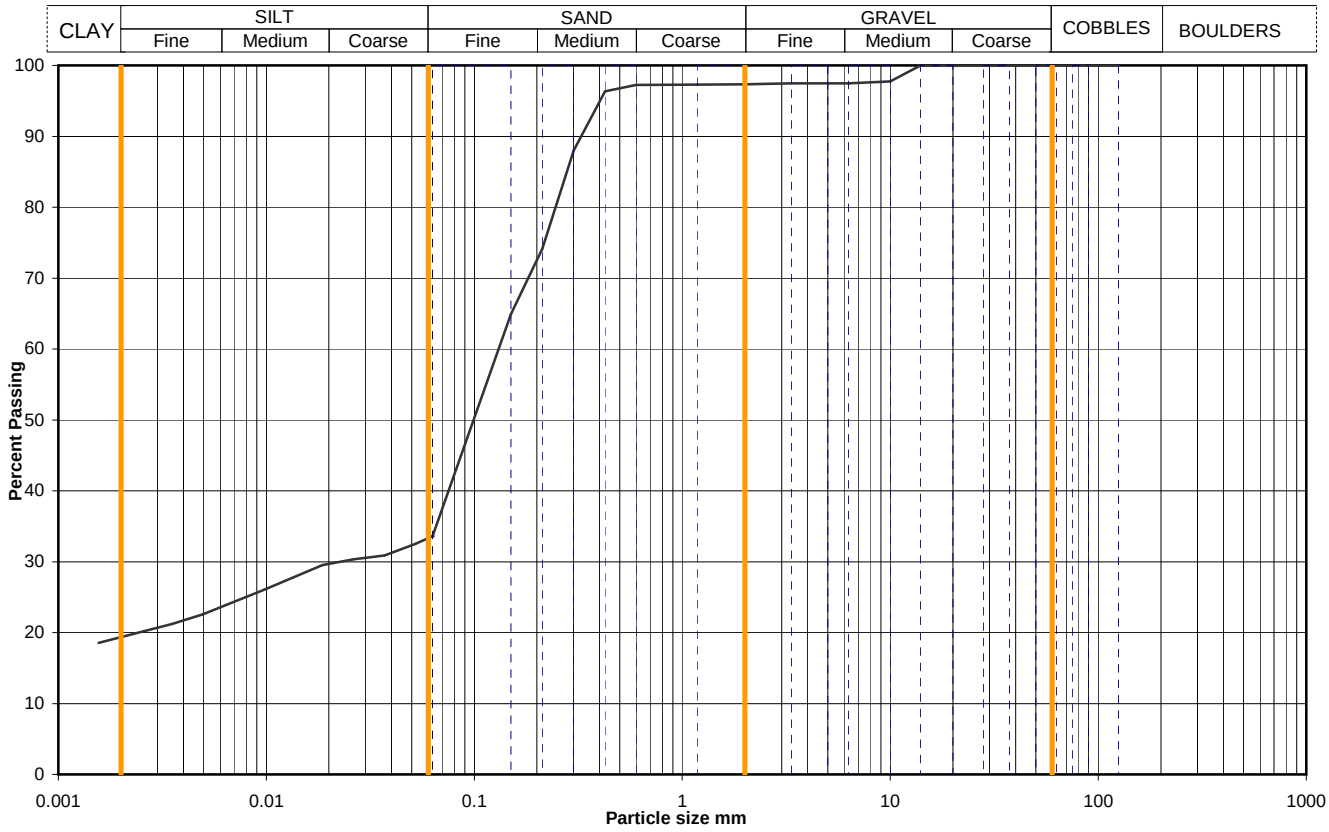
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 64**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	61.32		
			Samp No	126	Type	CS
			ID	ESGA0012-10201010280000002718		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	34
90	100	0.0520	33
75	100	0.0370	31
63	100	0.0262	30
50	100	0.0186	30
37.5	100	0.0098	26
28	100	0.0049	23
20	100	0.0035	21
14	100	0.0016	19
10	98		
6.3	97		
5.0	97		
3.35	97		
2.00	97		
1.18	97	Particle density, Mg/m3	
0.600	97		
0.425	96	2.68 measured	
0.300	88	Dry mass of sample, kg	
0.212	74		
0.150	65	1.5	
0.063	34		

Soil description	Firm brownish grey slightly gravelly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	64	64
	Silt	14	14
	Clay	19	19

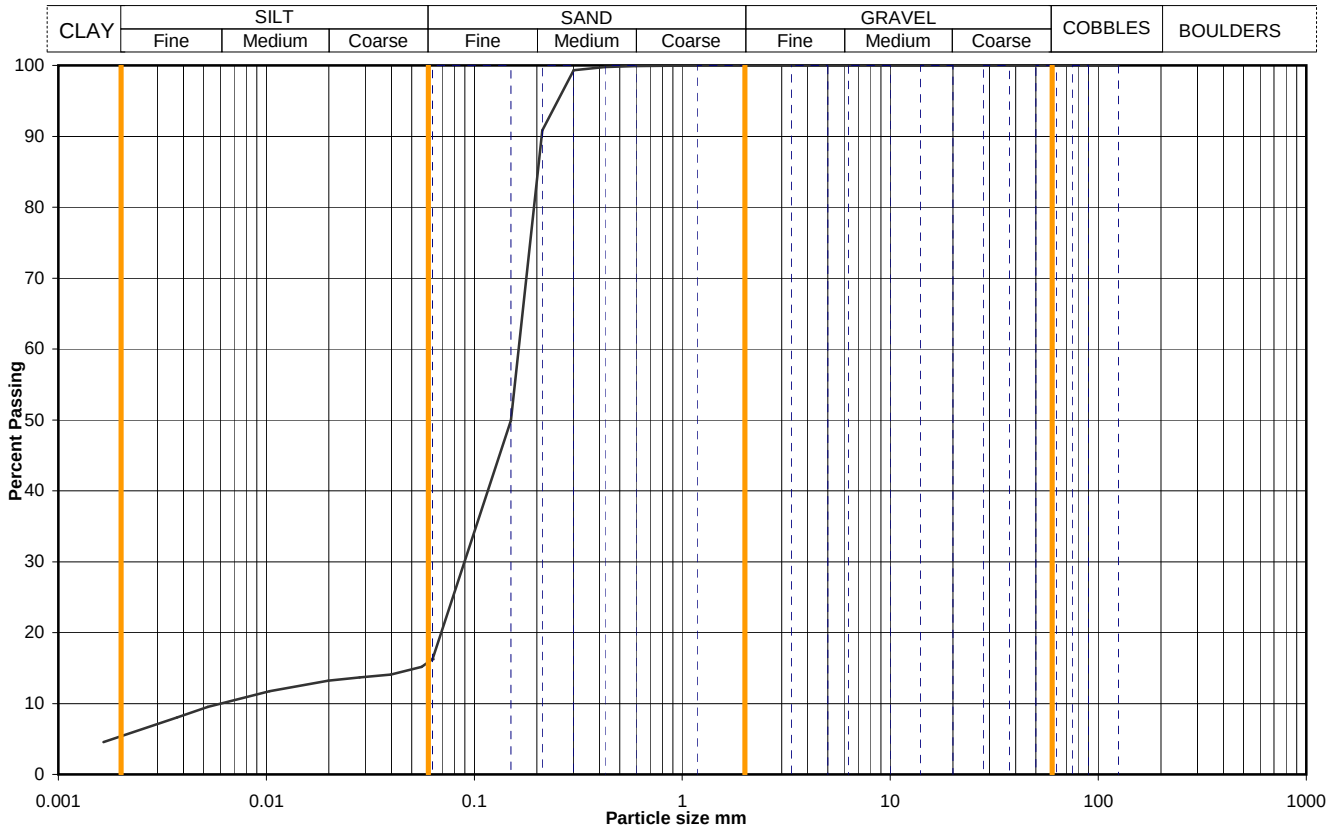
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 65**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	67.41		
			Samp No	128	Type	CS
			ID	ESGA0012-10201010280000002720		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	16
90	100	0.0558	15
75	100	0.0397	14
63	100	0.0281	14
50	100	0.0199	13
37.5	100	0.0104	12
28	100	0.0052	10
20	100	0.0037	8
14	100	0.0016	5
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100	Particle density, Mg/m3	
0.600	100		
0.425	100	2.63 measured	
0.300	99	Dry mass of sample, kg	
0.212	91		
0.150	50	0.1	
0.063	16		

Soil description	Brownish grey clayey SAND.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	84	84
	Silt	11	11
	Clay	5	5

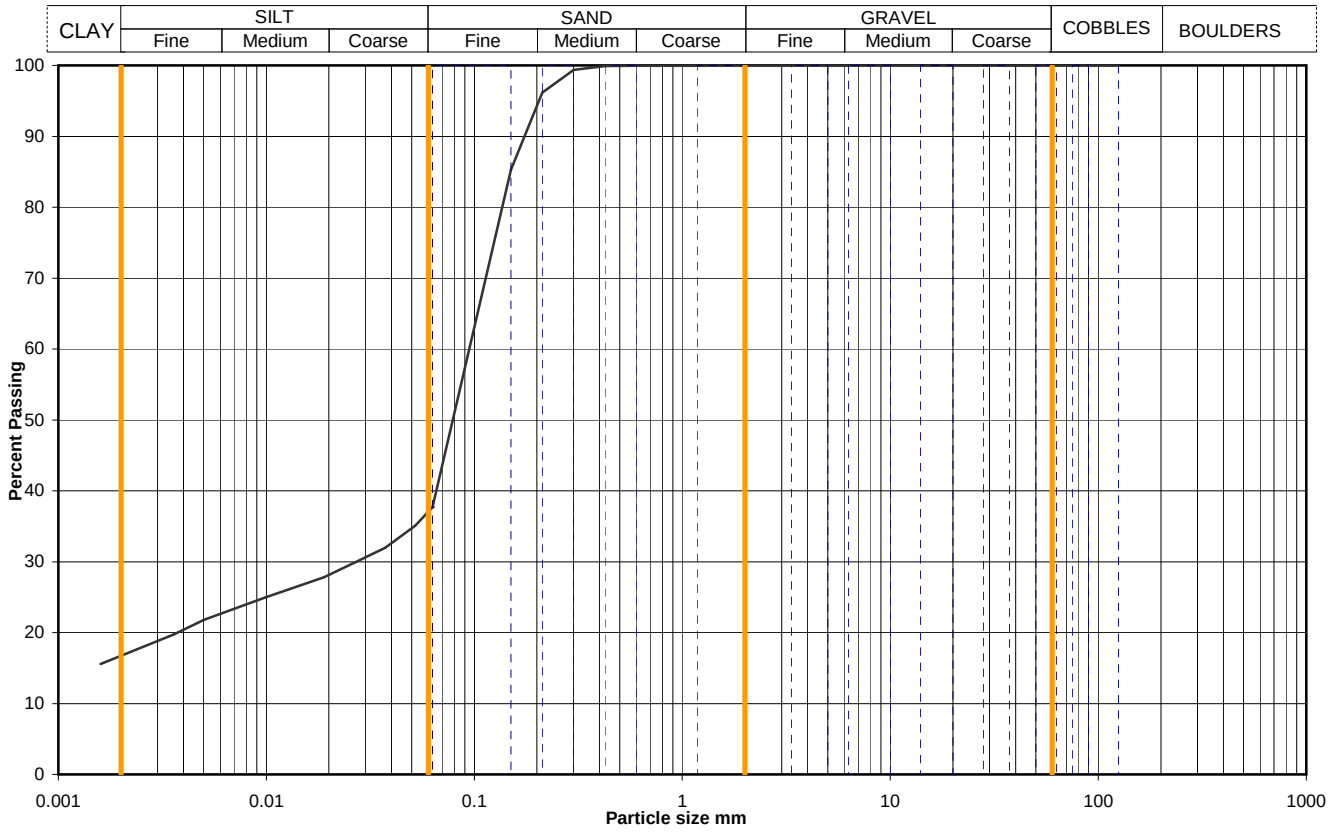
Uniformity Coefficient	D_{60} / D_{10}	27

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 66**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	72.00		
			Samp No	129	Type	CS
			ID	ESGA0012-10201010280000002721		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	38
90	100	0.0519	35
75	100	0.0372	32
63	100	0.0266	30
50	100	0.0190	28
37.5	100	0.0099	25
28	100	0.0050	22
20	100	0.0036	20
14	100	0.0016	16
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100	Particle density, Mg/m3	
0.600	100		
0.425	100	2.65 measured	
0.300	99	Dry mass of sample, kg	
0.212	96		
0.150	85	1.0	
0.063	38		

Soil description	Soft to firm grey and brown sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	63	63
	Silt	20	20
	Clay	17	17

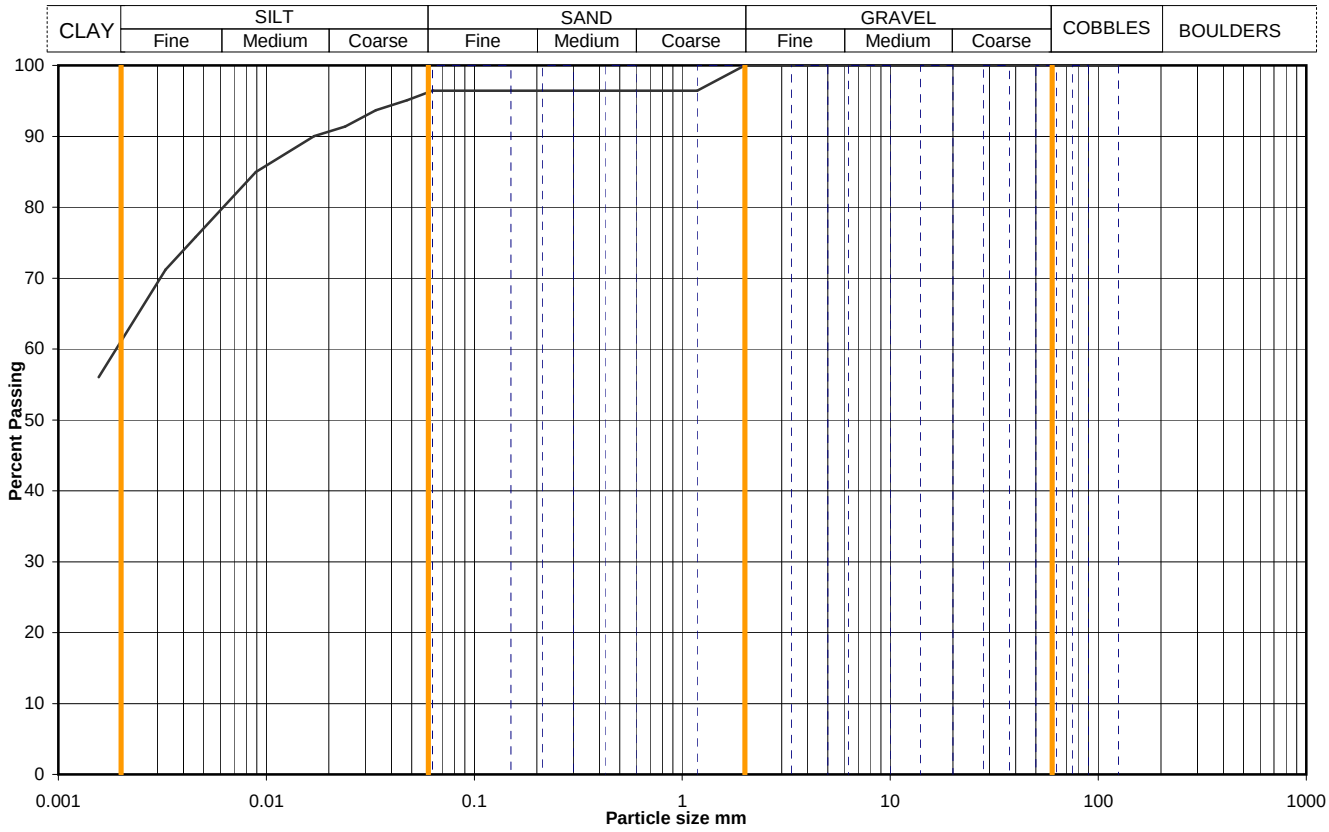
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:48	**Figure** **PSD 67**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	74.60		
			Samp No	130	Type	CS
			ID	ESGA0012-10201010280000002722		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	96
90	100	0.0473	95
75	100	0.0336	94
63	100	0.0239	91
50	100	0.0170	90
37.5	100	0.0089	85
28	100	0.0046	76
20	100	0.0033	71
14	100	0.0016	56
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	96	Particle density, Mg/m3	
0.600	96		
0.425	96	2.65 assumed	
0.300	96	Dry mass of sample, kg	
0.212	96		
0.150	96	0.0	
0.063	96		

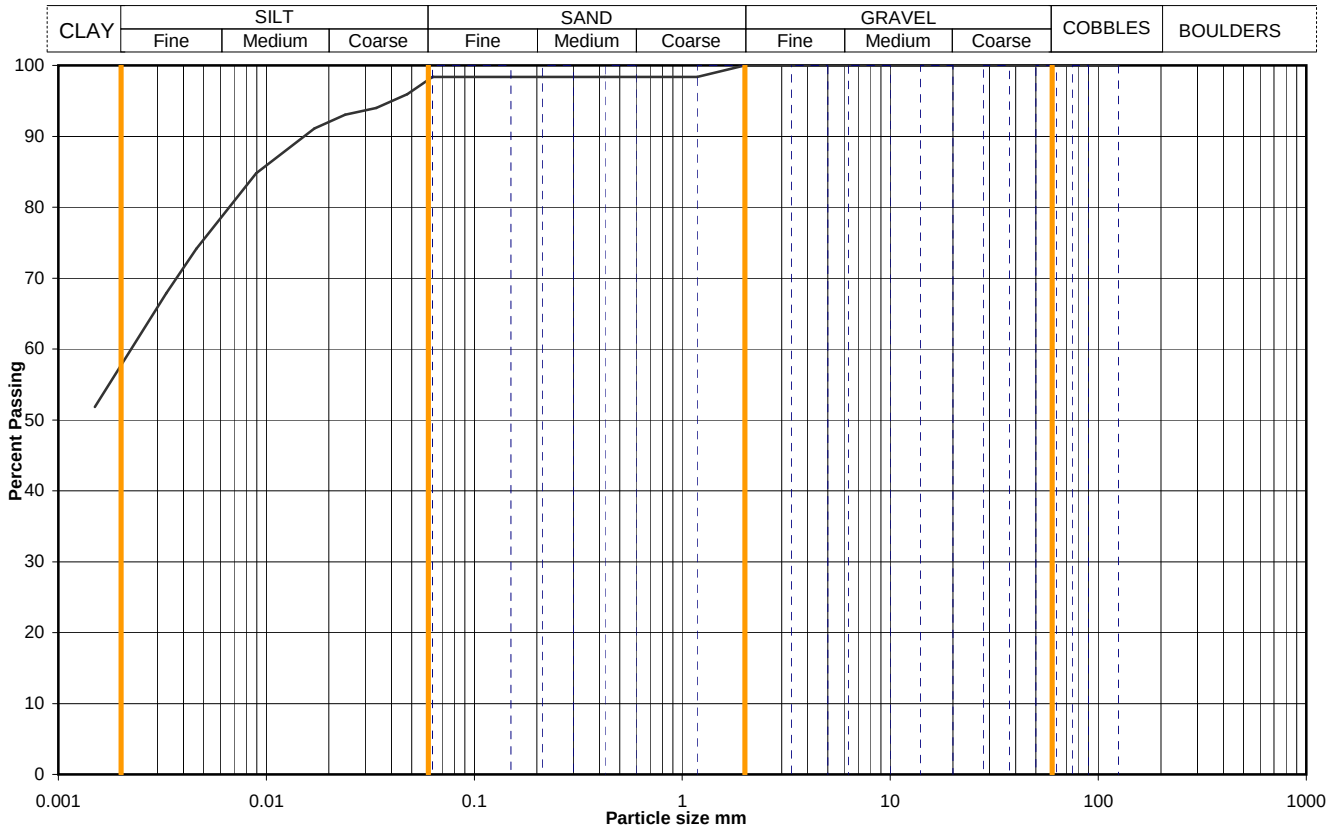
Soil description	Stiff dark grey slightly sandy fissured CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	4	4
	Silt	35	35
	Clay	61	61

Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	78.05		
			Samp No	131	Type	CS
			ID	ESGA0012-10201010280000002723		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	98
90	100	0.0475	96
75	100	0.0338	94
63	100	0.0239	93
50	100	0.0170	91
37.5	100	0.0089	85
28	100	0.0046	74
20	100	0.0033	68
14	100	0.0015	52
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	98	Particle density, Mg/m3	
0.600	98		
0.425	98	2.67 measured	
0.300	98	Dry mass of sample, kg	
0.212	98		
0.150	98	0.0	
0.063	98		

Soil description	Stiff brownish grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	2	2
	Silt	40	40
	Clay	58	58

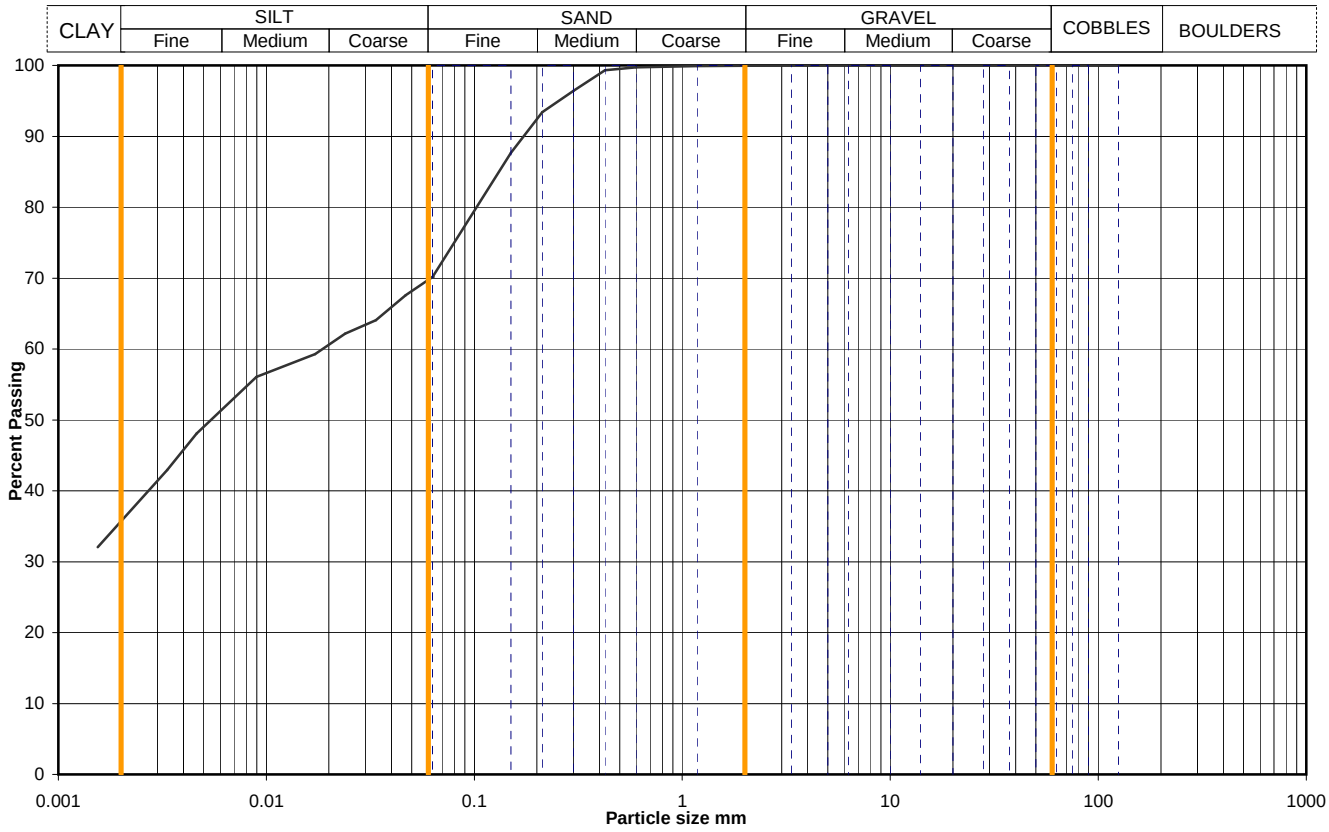
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 69**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	81.12		
			Samp No	132	Type	CS
			ID	ESGA0012-10201010280000002724		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	70
90	100	0.0467	68
75	100	0.0336	64
63	100	0.0239	62
50	100	0.0171	59
37.5	100	0.0090	56
28	100	0.0046	48
20	100	0.0033	43
14	100	0.0015	32
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100	Particle density, Mg/m3	
0.600	100		
0.425	99	2.65 assumed	
0.300	96	Dry mass of sample, kg	
0.212	93		
0.150	88	0.4	
0.063	70		

Soil description	Very stiff brownish grey slightly sandy silty fissured CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	30	30
	Silt	34	34
	Clay	36	36

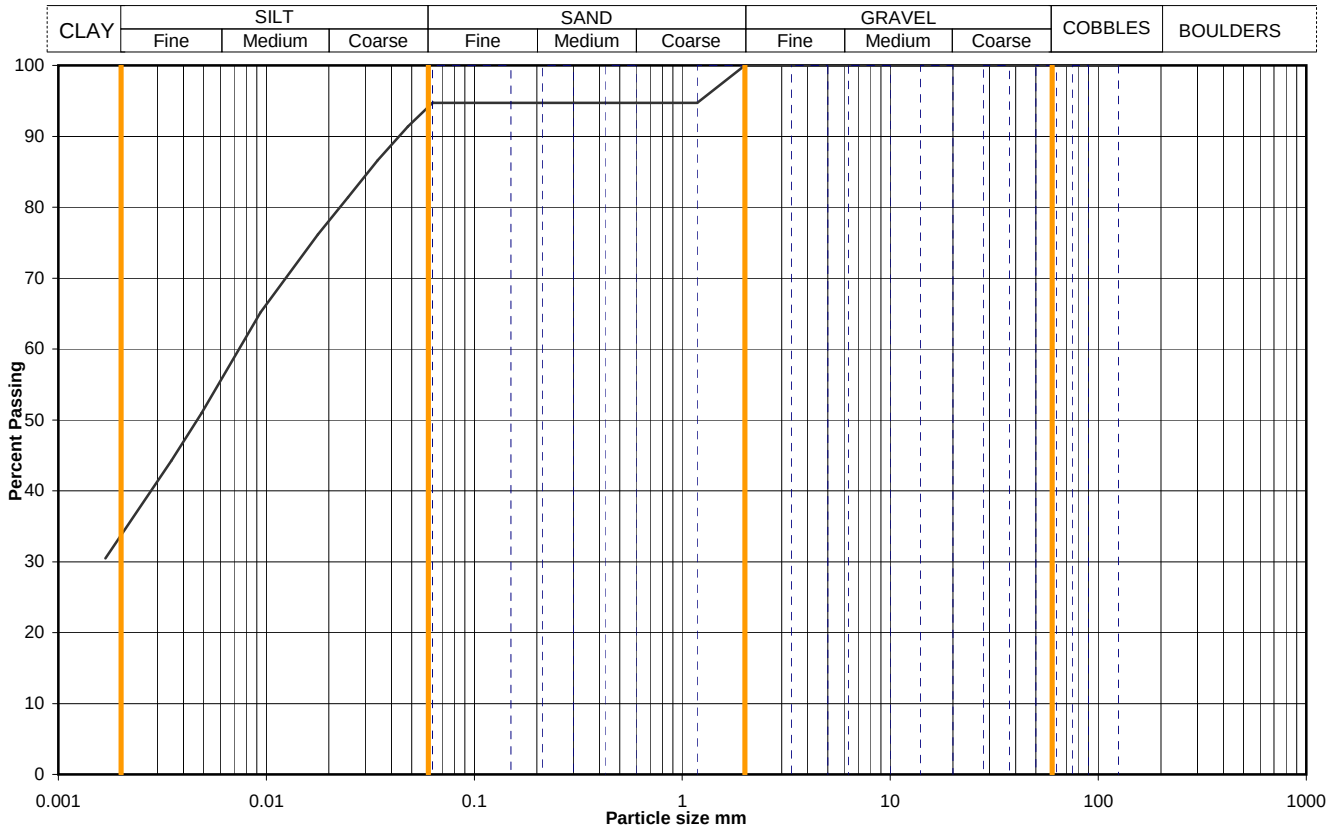
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	Printed:13/05/2011 09:49	**Figure** **PSD 70**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	84.12		
			Samp No	133	Type	CS
			ID	ESGA0012-10201010280000002725		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	95
90	100	0.0480	91
75	100	0.0344	87
63	100	0.0247	81
50	100	0.0177	76
37.5	100	0.0094	65
28	100	0.0049	51
20	100	0.0035	44
14	100	0.0017	30
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	95	Particle density, Mg/m3	
0.600	95		
0.425	95	2.65 assumed	
0.300	95	Dry mass of sample, kg	
0.212	95		
0.150	95	0.0	
0.063	95		

Soil description	Very stiff brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	6	6
	Silt	60	60
	Clay	34	34

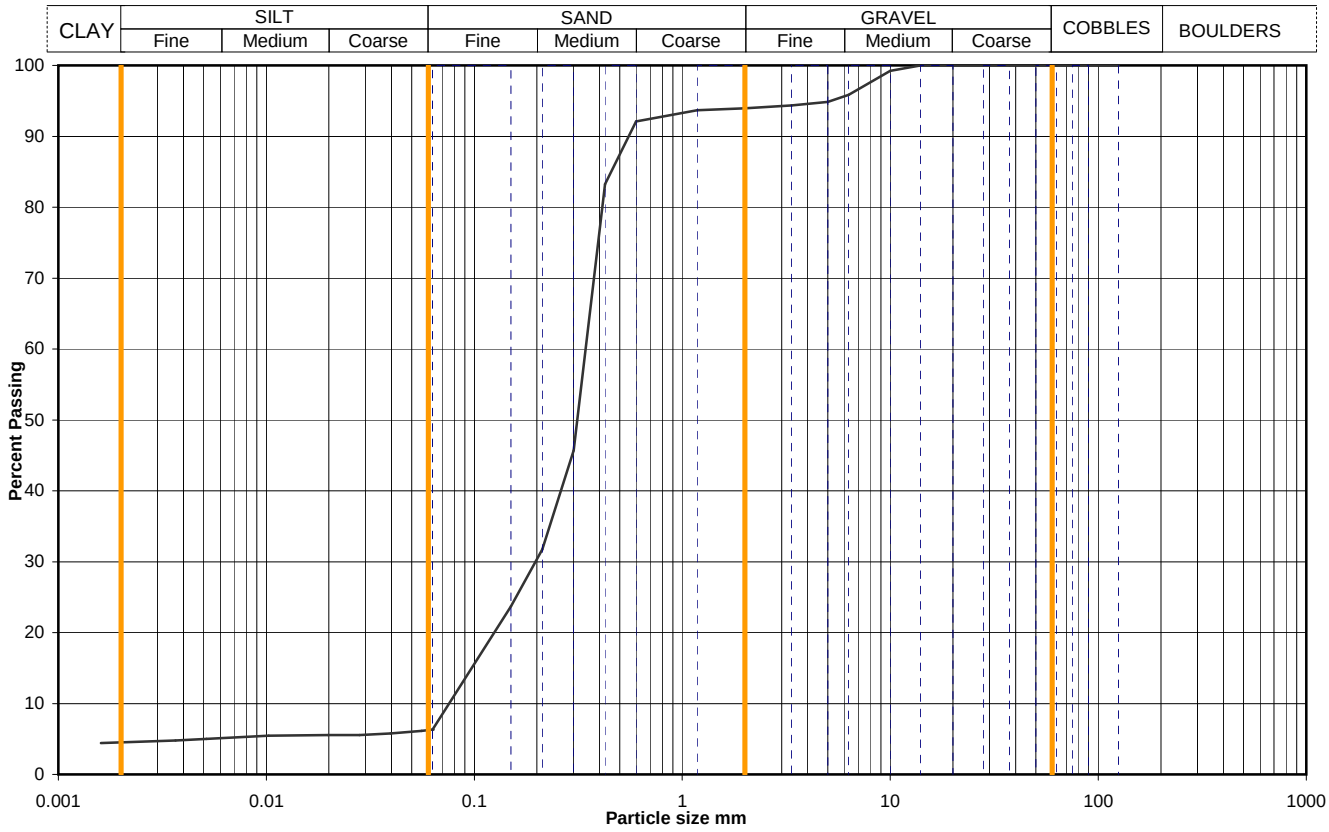
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 71**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_9U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	14.15		
			Samp No	44	Type	U
			ID	ESGA0012-10201010050000001401		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	6
90	100	0.0558	6
75	100	0.0396	6
63	100	0.0281	6
50	100	0.0199	6
37.5	100	0.0103	5
28	100	0.0052	5
20	100	0.0037	5
14	100	0.0016	4
10	99		
6.3	96		
5.0	95		
3.35	94		
2.00	94		
1.18	94	Particle density, Mg/m3	
0.600	92		
0.425	83	2.65 measured	
0.300	46	Dry mass of sample, kg	
0.212	32		
0.150	24	4.8	
0.063	6		

Soil description	Light brown SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	6	6
	Sand	88	88
	Silt	2	2
	Clay	4	4

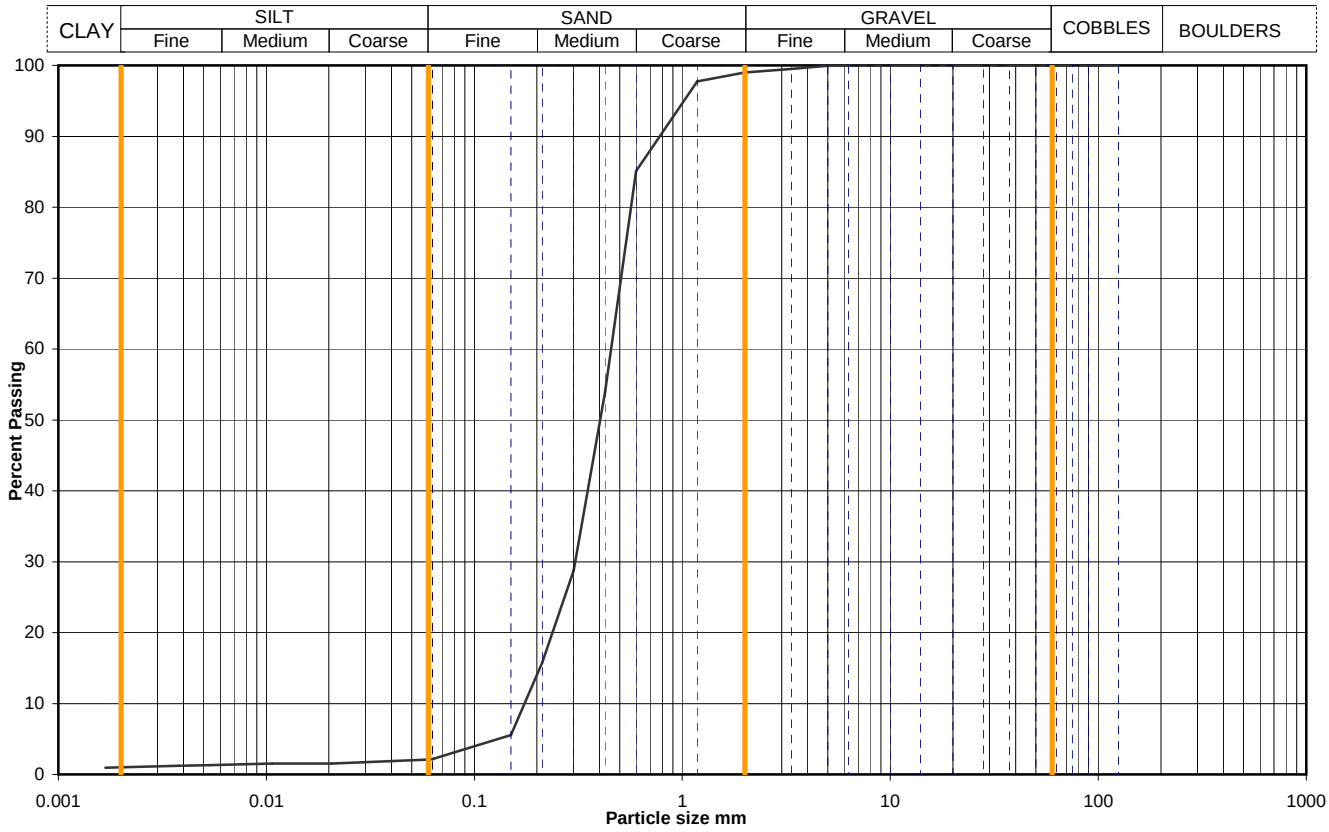
Uniformity Coefficient	D_{60} / D_{10}	5

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 72**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_9U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	23.20		
			Samp No	65	Type	U
			ID	ESGA0012-10201010050000001423		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	2
90	100	0.0581	2
75	100	0.0412	2
63	100	0.0292	2
50	100	0.0207	2
37.5	100	0.0107	2
28	100	0.0054	1
20	100	0.0038	1
14	100	0.0017	1
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	98	Particle density, Mg/m3	
0.600	85		
0.425	54	2.63 measured	
0.300	29	Dry mass of sample, kg	
0.212	16		
0.150	6	5.4	
0.063	2		

Soil description	Reddish brown SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	1	1
	Sand	97	97
	Silt	1	1
	Clay	1	1

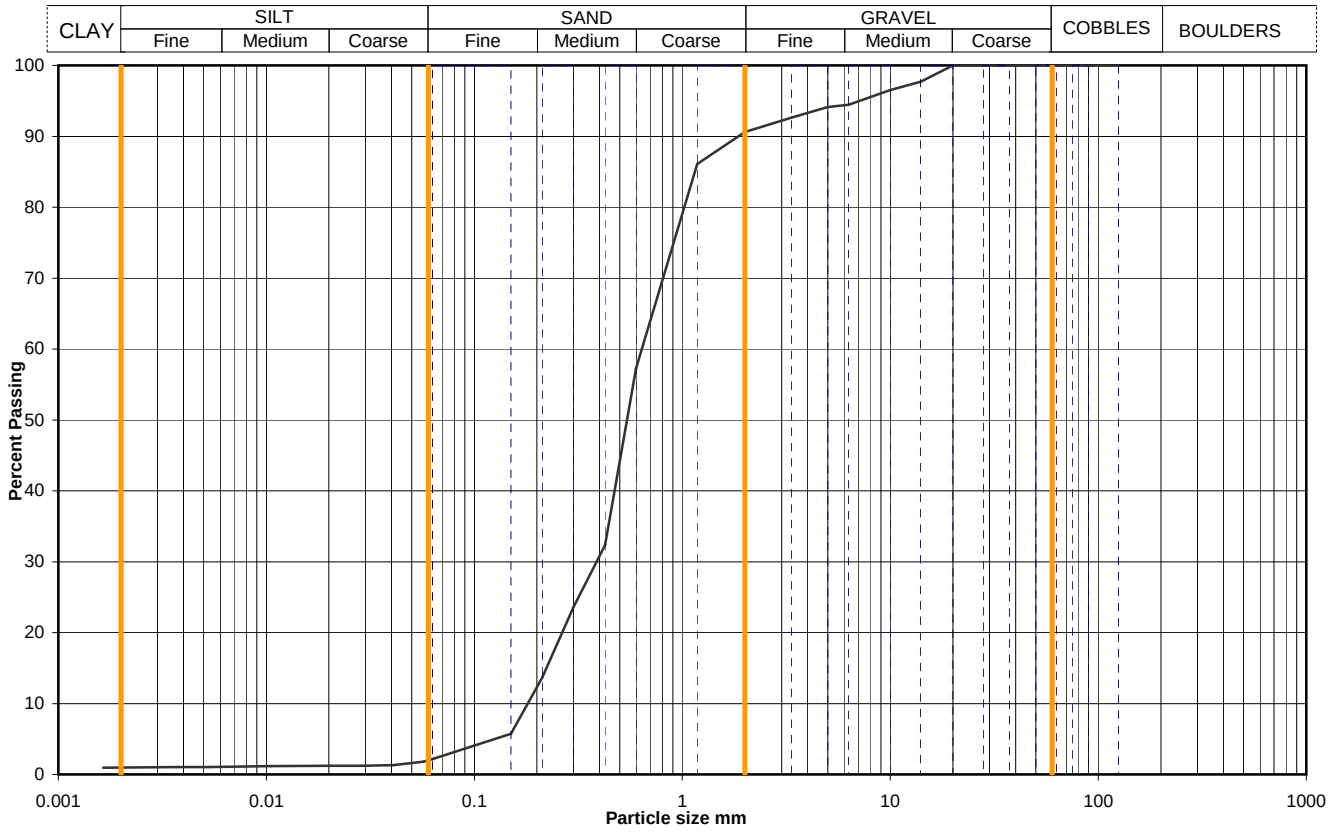
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 73**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_9U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	31.55		
			Samp No	83	Type	U
			ID	ESGA0012-10201010080000001662		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	2
90	100	0.0571	2
75	100	0.0407	1
63	100	0.0288	1
50	100	0.0204	1
37.5	100	0.0105	1
28	100	0.0053	1
20	100	0.0037	1
14	98	0.0016	1
10	97		
6.3	94		
5.0	94		
3.35	93		
2.00	91		
1.18	86	Particle density, Mg/m3	
0.600	57		
0.425	32	2.67 measured	
0.300	24	Dry mass of sample, kg	
0.212	14		
0.150	6	3.4	
0.063	2		

Soil description	Firm to stiff brownish grey SAND with shell fragments.
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377
Remarks	

Sample Proportions *<60mm values to aid description only	Whole	*<60mm
Cobbles / boulders	0	0
Gravel	9	9
Sand	89	89
Silt	1	1
Clay	1	1

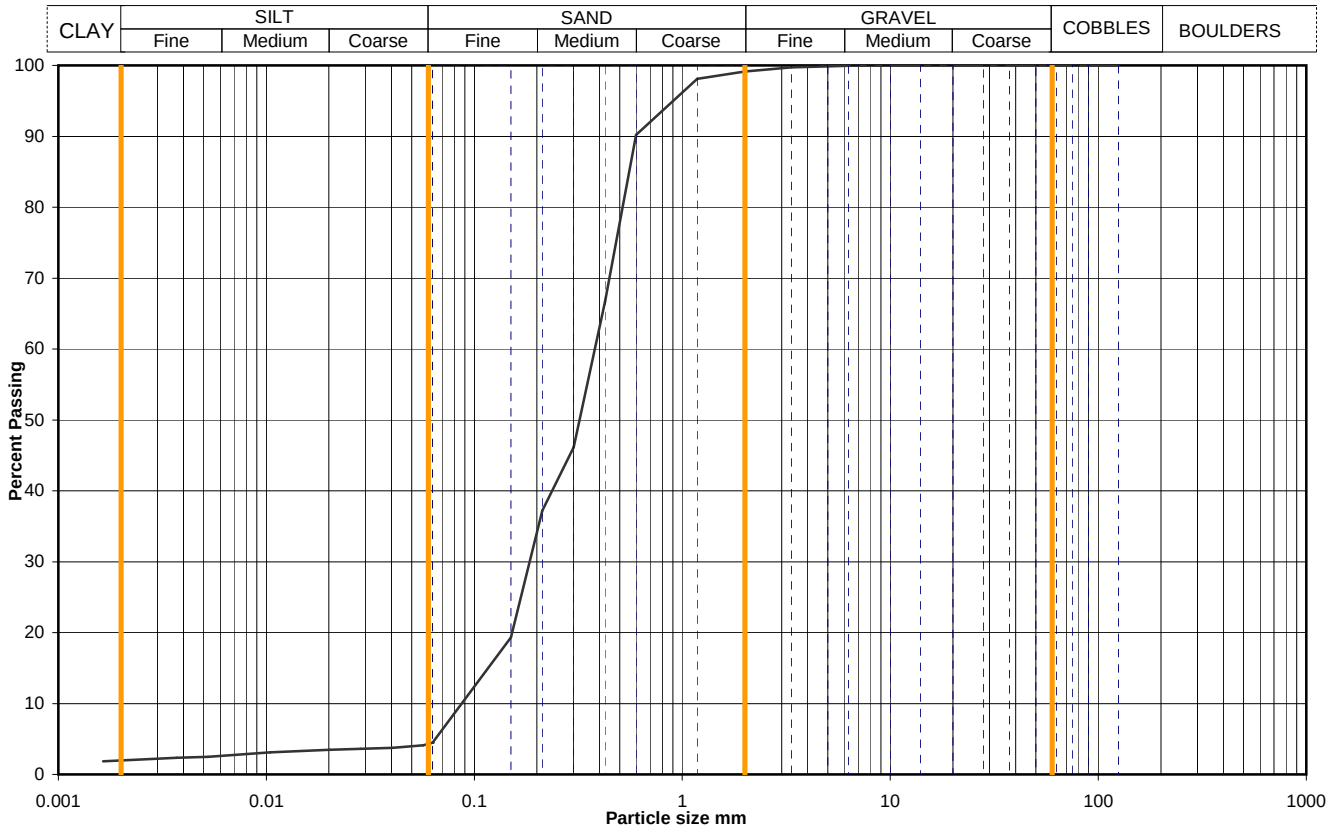
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref			Figure
SLR 2,9 Rev 84 Sept 08	Soil Mechanics	Printed:13/05/2011 09:49	**PSD 74**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_9U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	40.85		
			Samp No	99	Type	U
			ID	ESGA0012-10201010080000001683		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	4
90	100	0.0568	4
75	100	0.0403	4
63	100	0.0285	4
50	100	0.0202	3
37.5	100	0.0104	3
28	100	0.0052	2
20	100	0.0037	2
14	100	0.0016	2
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	99		
1.18	98	Particle density, Mg/m3	
0.600	90		
0.425	67	2.68 measured	
0.300	46	Dry mass of sample, kg	
0.212	37		
0.150	19	2.3	
0.063	4		

Soil description	Stiff to very stiff grey SAND with shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	1	1
	Sand	95	95
	Silt	2	2
	Clay	2	2

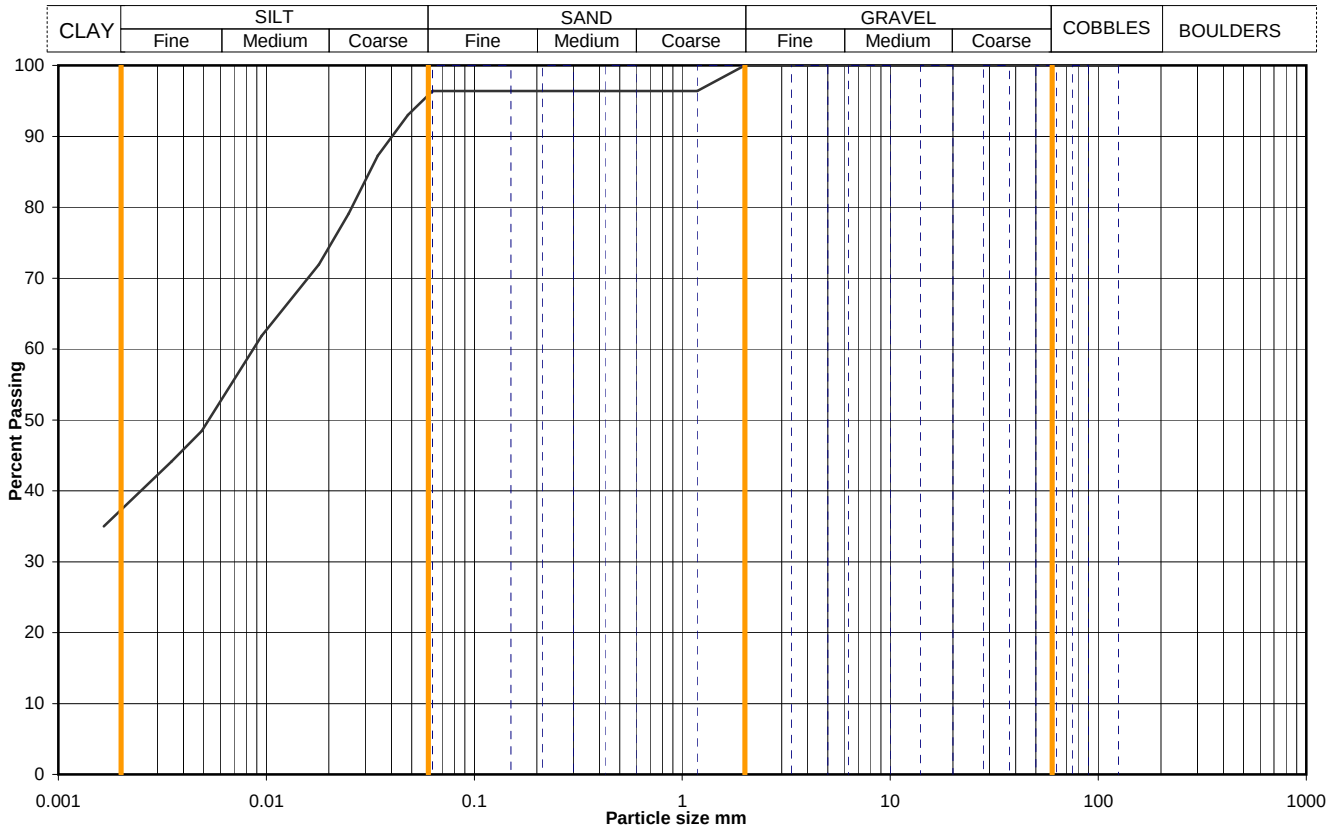
Uniformity Coefficient	D_{60} / D_{10}	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 75**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_10		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	50.45		
			Samp No	20	Type	CS
			ID	ESGA0012-10201011030000002776		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	96
90	100	0.0479	93
75	100	0.0344	87
63	100	0.0249	79
50	100	0.0179	72
37.5	100	0.0095	62
28	100	0.0049	48
20	100	0.0035	44
14	100	0.0017	35
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	96	Particle density, Mg/m3	
0.600	96		
0.425	96	2.65 assumed	
0.300	96	Dry mass of sample, kg	
0.212	96		
0.150	96	0.0	
0.063	96		

Soil description	Very stiff brownish grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks	Sieve: Sedimentation only carried out as instructed, so ignore sieving percentages and sedimentation is only based on <2mm material.		
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	4	4
	Silt	59	59
	Clay	37	37

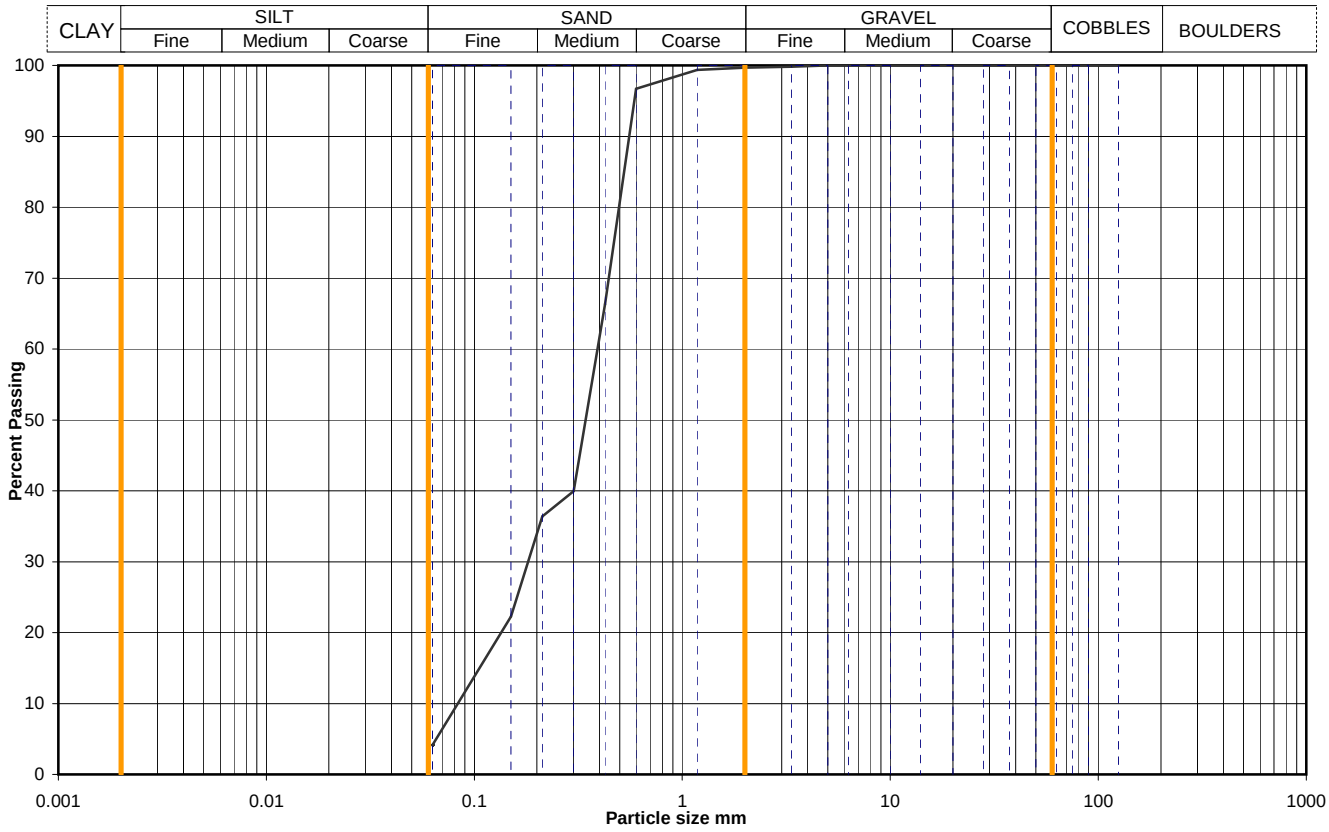
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 76**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_11U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	14.35		
			Samp No	34	Type	U
			ID	ESGA0012-10201010210000002256		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99		
0.600	97		
0.425	66		
0.300	40	Dry mass of sample, kg	
0.212	36		
0.150	22	5.7	
0.063	4		

Soil description	Orangish brown SAND with rare clay pockets.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	96	96
	Silt	silt+clay =	
	Clay	4	4

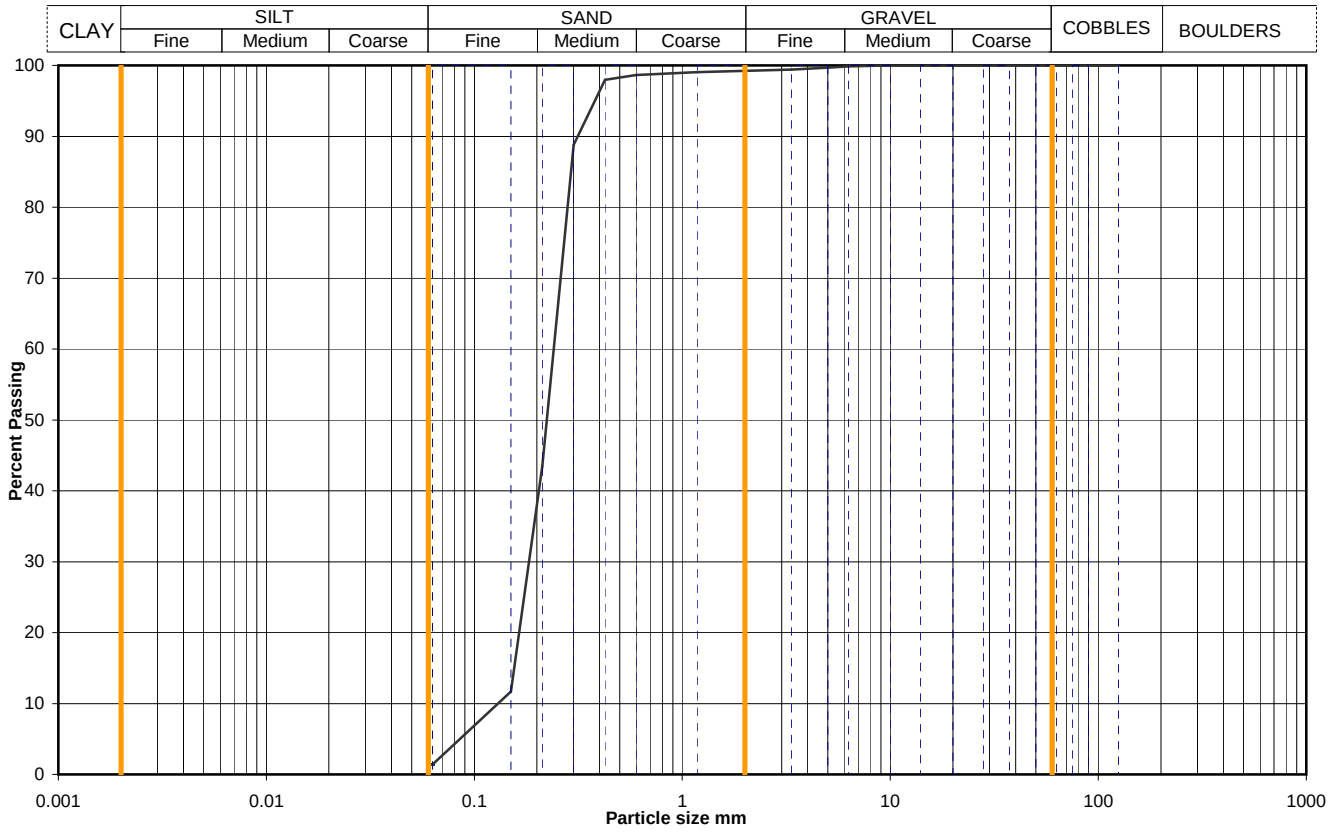
Uniformity Coefficient	D_{60} / D_{10}	5

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 77**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_11U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	23.05		
			Samp No	52	Type	U
			ID	ESGA0012-10201010210000002274		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	99		
0.600	99		
0.425	98		
0.300	89	Dry mass of sample, kg	
0.212	43		
0.150	12	5.4	
0.063	1		

Soil description	Orangish brown SAND.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	1	1
	Sand	98	98
	Silt	silt+clay =	
	Clay	1	1

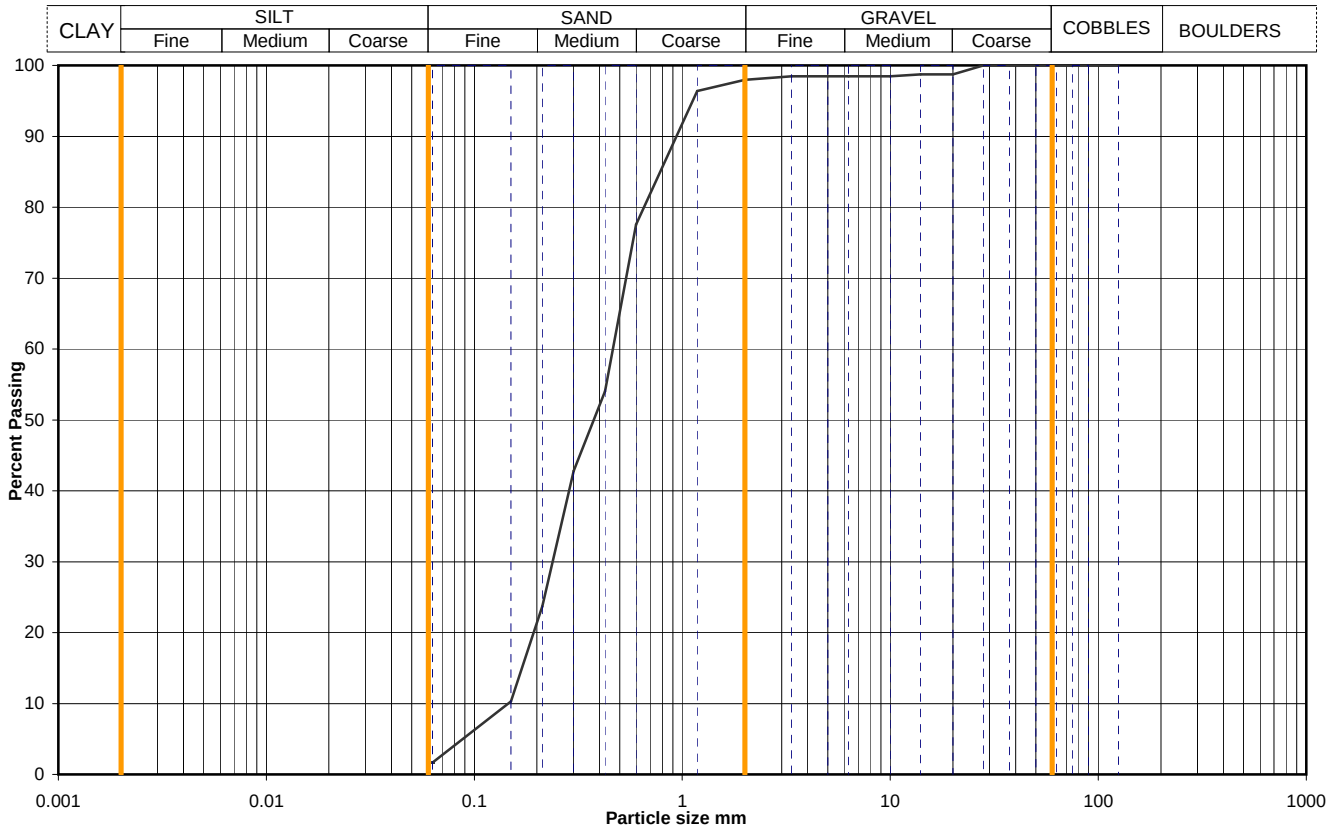
Uniformity Coefficient	D_{60} / D_{10}	2

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 78**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_11U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	31.55		
			Samp No	69	Type	U
			ID	ESGA0012-10201010260000002434		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	99		
10	98		
6.3	98		
5.0	98		
3.35	98		
2.00	98		
1.18	96		
0.600	78		
0.425	54		
0.300	43	Dry mass of sample, kg	
0.212	24		
0.150	10	2.7	
0.063	2		

Soil description	Grey slightly gravelly SAND with occasional shell fragments.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	2	2
	Sand	96	96
	Silt	silt+clay =	
	Clay	2	2

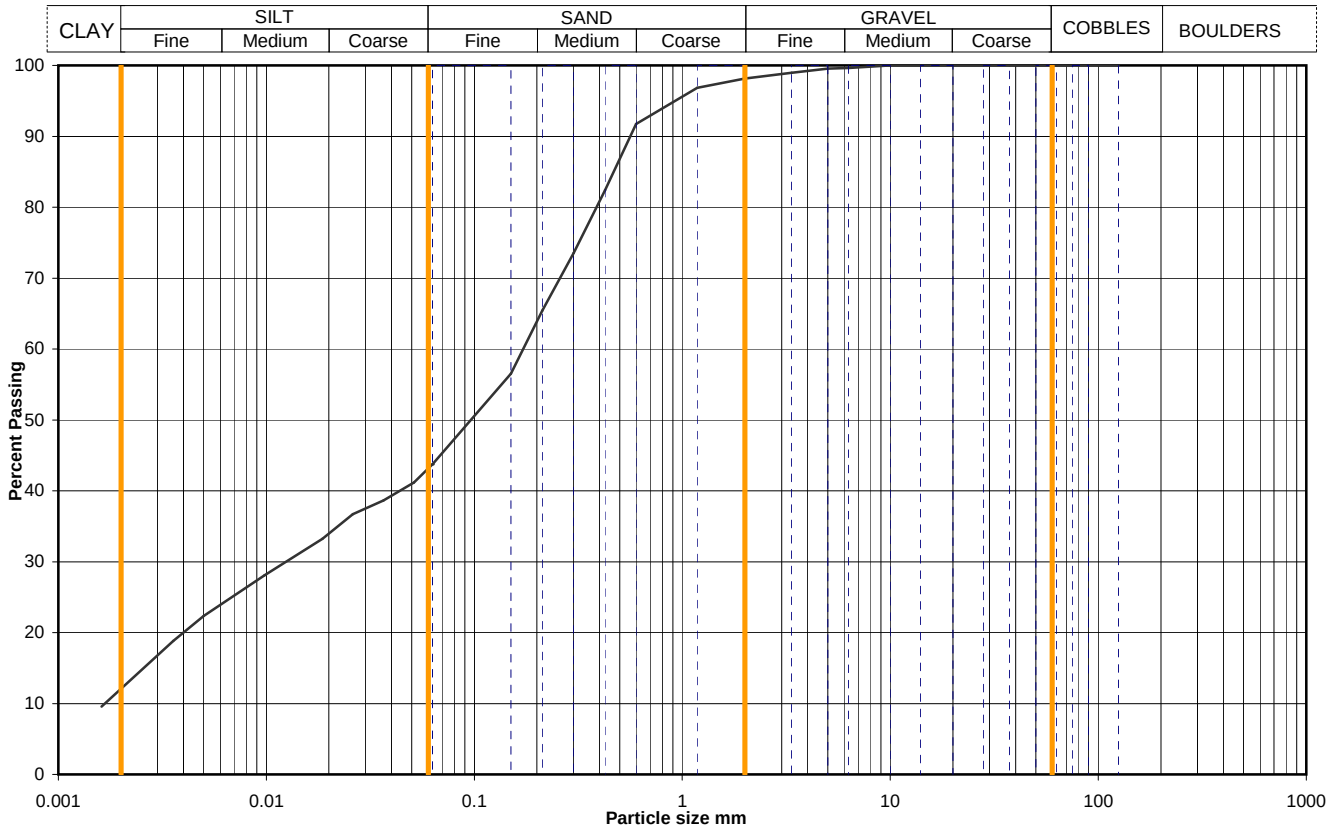
Uniformity Coefficient	D_{60} / D_{10}	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 79**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_11U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	41.55		
			Samp No	88	Type	U
			ID	ESGA0012-10201010260000002461		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	44
90	100	0.0512	41
75	100	0.0366	39
63	100	0.0260	37
50	100	0.0186	33
37.5	100	0.0098	28
28	100	0.0050	22
20	100	0.0036	19
14	100	0.0016	10
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	98		
1.18	97	Particle density, Mg/m3	
0.600	92		
0.425	82	2.70 measured	
0.300	74	Dry mass of sample, kg	
0.212	65		
0.150	57	5.6	
0.063	44		

Soil description	Firm grey sandy silty CLAY with occasional shell fragments.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	2	2
	Sand	55	55
	Silt	31	31
	Clay	12	12

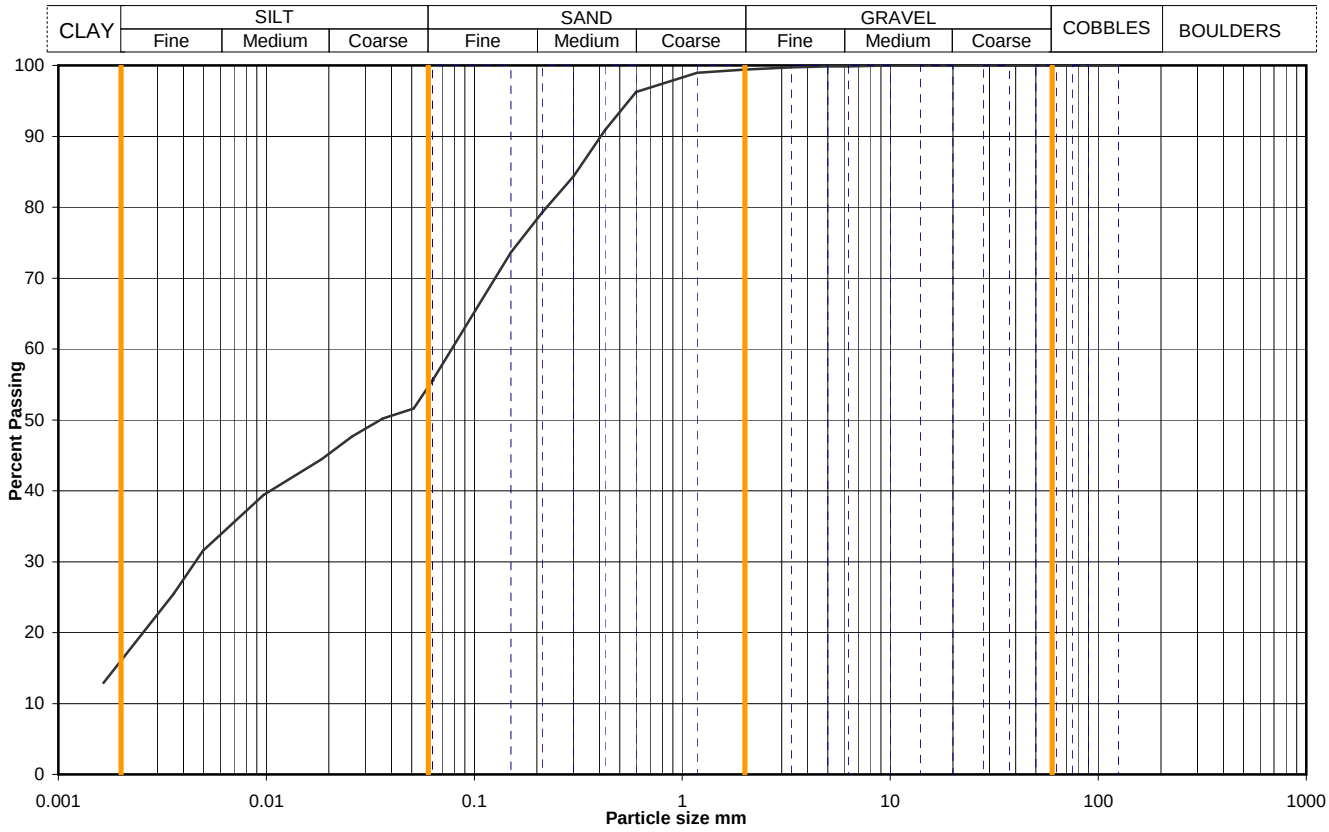
Uniformity Coefficient	D_{60} / D_{10}	103

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 80**

Particle Size Distribution Analysis

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_11U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	42.10		
			Samp No	90	Type	U
			ID	ESGA0012-10201010260000002464		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	56
90	100	0.0511	52
75	100	0.0363	50
63	100	0.0259	48
50	100	0.0185	44
37.5	100	0.0097	39
28	100	0.0050	32
20	100	0.0036	25
14	100	0.0017	13
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	99		
1.18	99	Particle density, Mg/m3	
0.600	96		
0.425	91	2.65 assumed	
0.300	84	Dry mass of sample, kg	
0.212	79		
0.150	74	5.6	
0.063	56		

Soil description	Firm brown sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	1	1
	Sand	45	45
	Silt	38	38
	Clay	16	16

Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 84 Sept 08	Soil Mechanics	UKAS TESTING 1157	Printed:13/05/2011 09:49	**Figure** **PSD 81**

MAXIMUM AND MINIMUM DRY DENSITY - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample				Soil Description	Test spec.	Oversize, as appropriate*			ρ_{dmax}	ρ_{dmin}	Remarks
	No.	Depth (m)		type			>37.5mm	>6.3mm	>2mm			
		from	to				%	%	%	Mg/m^3	Mg/m^3	
CBH 2009_1UA	29	10.80	11.25	U	Brownish grey slightly gravelly SAND with occasional clay pockets.	4.2 , 4.4		13	17	1.82	1.37	
CBH 2009_1UA	31	11.50	11.95	U	Greyish brown SAND with rare shell fragments.	4.2 , 4.4		0	2	1.81	1.45	
CBH 2009_1UA	51	18.50	18.95	U	Stiff to very stiff grey SAND with shell fragments.	4.2 , 4.4	0	0	3	1.67	1.52	
CBH 2009_1UA	72	27.60	28.05	U	Grey SAND with shell fragments.	4.2 , 4.4	0	1	2	1.85	1.47	
CBH 2009_1UA	94	36.70	37.15	U	Firm to stiff brownish grey SAND with shell fragments.	4.2 , 4.4	0	0	5	1.84	1.47	
CBH 2009_2UA	25	10.80	11.25	U	Light brown slightly gravelly SAND.	4.2 , 4.4	0	1	2	1.80	1.47	
CBH 2009_2UA	51	19.90	20.35	U	Grey and light grey slightly gravelly SAND with occasional shell fragments.	4.2 , 4.4	0	0	1	1.69	1.41	
CBH 2009_2UA	69	28.30	28.75	U	Grey SAND with shell fragments.	4.2 , 4.4	0	0	3	1.78	1.51	
CBH 2009_2UA	90	37.40	37.85	U	Grey SAND with shell fragments.	4.2 , 4.4	0	0	3	1.75	1.43	
CBH 2009_4U	46	13.55	14.00	U	Stiff brownish grey SAND with shell fragments.	4.2 , 4.4	0	0	1	1.65	1.45	
CBH 2009_4U	71	22.00	22.45	U	Stiff grey SAND with shell fragments.	4.2 , 4.4	0	2	7	1.84	1.47	
CBH 2009_4U	97	30.50	30.95	U	Brownish grey SAND with shell fragments.	4.2 , 4.4	0	1	4	1.86	1.59	
CBH 2009_4U	111	37.70	38.15	U	Grey SAND with shell fragments.	4.2 , 4.4	0	0	1	1.77	1.49	
CBH 2009_5UB	42	14.60	15.05	U	Greyish brown SAND with shell fragments.	4.2 , 4.4	0	0	2	1.82	1.47	
CBH 2009_5UB	66	23.00	23.45	U	Grey SAND with shell fragments.	4.2 , 4.4	0	3	16	1.91	1.54	
CBH 2009_5UB	81	29.30	29.75	U	Grey SAND with shell fragments.	4.2 , 4.4	0	0	1	1.82	1.52	
CBH 2009_5UB	103	40.30	40.75	U	Grey SAND with occasional shell fragments.	4.2 , 4.4	0	0	4	1.69	1.41	
CBH 2009_6U	44	15.20	15.65	U	Brown SAND with shell fragments.	4.2 , 4.4	0	1	4	1.74	1.41	
CBH 2009_6U	69	23.60	24.05	U	Grey SAND with ocasional silt pockets and shell fragments.	4.2 , 4.4	0	3	7	1.87	1.49	
CBH 2009_6U	94	32.70	33.15	U	Grey SAND with shell fragments.	4.2 , 4.4	0	2	7	1.87	1.52	
CBH 2009_6U	121	41.55	42.25	U	Grey SAND with shell fragments.	4.2 , 4.4	0	1	8	1.77	1.43	
CBH 2009_7U	48	16.60	17.05	U	Greyish brown SAND with occasional shell fragments.	4.2 , 4.4	0	1	2	1.78	1.47	
CBH 2009_7U	74	25.00	25.45	U	Grey SAND with shell fragments.	4.2 , 4.4	0	0	4	1.80	1.49	
CBH 2009_7U	99	34.10	34.55	U	Grey SAND with occasional shell fragments.	4.2 , 4.4	0	0	4	1.80	1.52	
CBH 2009_7U	121	41.90	42.35	U	Greyish brown SAND with occasional shell fragments.	4.2 , 4.4	0	1	8	1.73	1.45	
CBH 2009_8U	50	17.55	18.00	U	Grey SAND with shell fragments.	4.2 , 4.4	0	7	11	1.78	1.45	
CBH 2009_8U	75	26.55	27.00	U	Brownish grey slightly gravelly SAND with occasional clay pockets.	4.2 , 4.4		5	12	1.82	1.49	
CBH 2009_8U	95	35.05	35.50	U	Brownish grey SAND with shell fragments.	4.2 , 4.4	0	1	12	1.84	1.56	
CBH 2009_8U	113	43.55	44.00	U	Grey SAND with shell fragments.	4.2 , 4.4	0	2	13	1.79	1.49	
CBH 2009_9U	44	14.15	14.60	U	Light brown SAND with shell fragments.	4.2 , 4.4	0	3	6	1.93	1.47	
CBH 2009_9U	83	31.55	32.00	U	Firm to stiff brownish grey SAND with shell fragments.	4.2 , 4.4	0	2	5	1.84	1.51	
CBH 2009_9U	99	40.85	41.00	U	Stiff to very stiff grey SAND with shell fragments.	4.2 , 4.4	0	0	2	1.78	1.49	
CBH 2009_11U	34	14.35	14.80	U	Orangish brown SAND with rare clay pockets.	4.2 , 4.4	0	0	2	1.89	1.52	
CBH 2009_11U	52	23.05	23.50	U	Orangish brown SAND.	4.2 , 4.4	0	0	1	1.71	1.41	

Key : Test Spec. BS 1377 : Part 4 : 1990 : clauses :

*oversize material not replaced by smaller particles unless confirmed in remarks

4.4, 4.2 Maximum, minimum dry density of sandy soil
4.5, 4.3 Maximum, minimum dry density of gravelly soil

ρ_{dmax} Maximum dry density
ρ_{dmin} Minimum dry density

MAXIMUM AND MINIMUM DRY DENSITY - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample				Soil Description	Test spec.	Oversize, as appropriate*			ρ_{dmax}	ρ_{dmin}	Remarks
	No.	Depth (m)		type			>37.5mm	>6.3mm	>2mm			
		from	to				%	%	%	Mg/m^3	Mg/m^3	
CBH 2009_11U	69	31.55	32.00	U	Grey slightly gravelly SAND with occasional shell fragments.	4.2 , 4.4	0	0	1	1.74	1.49	

Key :

Test Spec. BS 1377 : Part 4 : 1990 : clauses :

4.4, 4.2 Maximum, minimum dry density of sandy soil

4.5, 4.3 Maximum, minimum dry density of gravelly soil

*oversize material not replaced by smaller particles unless confirmed in remarks

ρ_{dmax} Maximum dry density

ρ_{dmin} Minimum dry density

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS WITHOUT MEASUREMENT OF PORE PRESSURE - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample				Soil Description	Density		*w*	Test type	Dia.	σ_3	At failure / end of stage				Remarks
	No.	Depth (m) from	Depth (m) to	type		bulk Mg/m^3	dry Mg/m^3	%		mm	kPa	Axial strain %	$\sigma_1 - \sigma_3$ kPa	c_u kPa	MODE	
CBH 2009_1	9	47.10	47.50	CS	Stiff grey slightly gravelly silty CLAY.	1.67	1.09	53	UU	103.1	425	17.6	264	132	C	
CBH 2009_1UA	21	8.00	8.45	U	Firm dark brown peaty CLAY.	1.10	0.26	320	UU	101.1	72	6.9	96	48	B	
CBH 2009_2	17	51.80	52.20	CS	Stiff greyish brown slightly sandy CLAY.	1.95	1.44	35	UU	101.6	930	8.9	164	82	B	
CBH 2009_2UA	8	5.00	5.45	U	Firm grey CLAY with organic fibrous clay partings.	1.42	0.71	99	UU	102.4	45	5.9	85	42	B	
CBH 2009_4	9	47.55	47.95	CS	Brownish grey clayey SILT.	1.73	1.20	44	UU	104.1	855	2.0	631	315	B	
CBH 2009_4	13	53.50	53.90	CS	Very stiff greyish brown CLAY.	1.92	1.44	34	UU	103.5	1,700	9.9	329	165	C	
CBH 2009_4U	20	6.00	6.45	U	Firm dark brown fibrous PEAT.	1.11	0.29	290	UU	102.0	108	8.8	81	40	B	
CBH 2009_5	13	46.80	47.20	CS	Stiff greyish brown silty CLAY.	1.81	1.25	44	UU	106.9	1,685	3.0	193	97	C	
CBH 2009_5	14	49.70	50.10	CS	Very stiff brownish grey silty CLAY.	1.68	1.09	55	UU	38.5	895	3.5	691	345	B	
CBH 2009_5	15	52.80	53.20	CS	Stiff greyish brown slightly sandy CLAY.	1.99	1.49	33	UU	92.8	475	7.5	263	132	B	
CBH 2009_5UB	15	5.50	5.95	U	Very soft grey slightly organic slightly sandy CLAY.	1.54	0.89	73	UU	103.7	198	17.3	26	13	C	
CBH 2009_6	12	52.70	53.09	CS	Stiff brownish grey CLAY with occasional silt partings.	1.93	1.47	32	UU	99.6	1,700	4.0	167	83	B	
CBH 2009_6U	24	8.20	8.65	U	Firm black fibrous PEAT.	1.12	0.12	830	UU	99.3	148	5.9	129	64	B	
CBH 2009_7	17	54.35	54.75	CS	Firm to stiff greyish brown fissured CLAY.	1.79	1.26	42	UU	103.5	1,700	19.4	58	29	B	
CBH 2009_7U	24	8.20	8.65	U	Firm pseudo fibrous PEAT.	1.10	0.28	290	UU	101.4	295	11.3	136	68	C	
CBH 2009_8U	124	54.52	54.72	CS	Stiff grey silty CLAY.	1.82	1.27	44	UU	97.4	850	2.5	477	238	B	
CBH 2009_10	21	53.35	53.80	CS	Stiff to very stiff greyish brown slightly sandy CLAY.	1.83	1.30	41	UU	106.9	480	3.0	359	180	B	

General notes: Tests carried out in accordance with BS1377: Part 7: 1990, clause 8 for single stage, clause 9 for multistage tests. Specimens nominally 2:1 height diameter ratio and tested at a rate of strain of 2%/minute, unless annotated otherwise. See individual test reports for further details.

Legend

UU - single stage test (may be in sets of specimens)	σ_3	cell pressure	Mode of failure	P	plastic
UUM - multistage test on a single specimen	$\sigma_1 - \sigma_3$	deviator stress		B	brittle
suffix R - remoulded or recompacted	c_u	undrained shear strength		C	compound

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	1.20-1.65		
			Sample No	3	Type	U
			ID			
			Spec Ref			

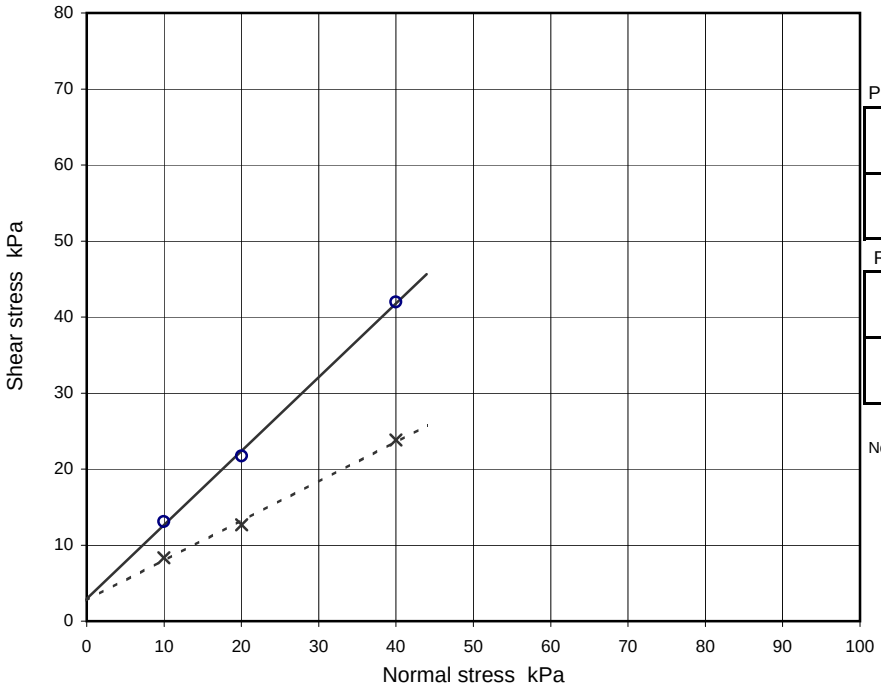
Soil Description	Black and grey slightly silty gravelly SAND.
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.79 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.5	23.5	23.5			
	Bulk Density	Mg/m³	2.12	2.09	2.07			
	Water Content	%	16.5	19.1	17.9			
	Dry density	Mg/m³	1.82	1.75	1.75			
	Voids ratio		0.531	0.512	0.512			
	Degree of Saturation	%	87	99	93			
Consol^n	Consolidation / Normal Stress applied	kPa	**10**	**20**	**40**			
	Change in height during consolidation	mm	-0.002	-0.060	-0.026			
	Voids ratio after consolidation		0.531	0.509	0.510			
Shear see note 1	Voids ratio at end of test		0.590	0.559	0.528			
	Moisture content at end of test	%	20.0	21.1	19.9			
	Saturation at end of test	%	95	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	1.80	2.00	1.60			
	Shear stress	kPa	13.1	21.7	42.0			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	19.00	8.00	17.00			
	Shear stress	kPa	8.3	12.7	23.8			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	3.0	-
Ø '	degrees	44	-

Residual strength, (x)			
c '$_R$	kPa	2.7	-
Ø '$_R$	degrees	27½	-

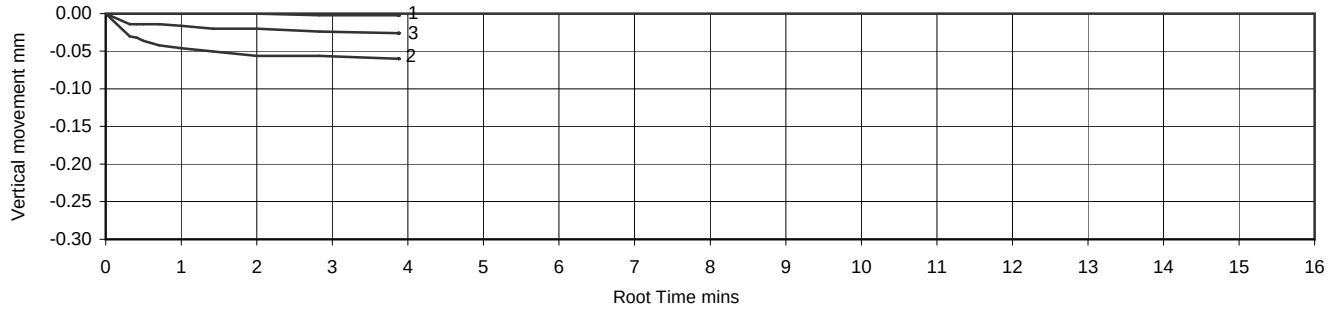
Notes :

1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

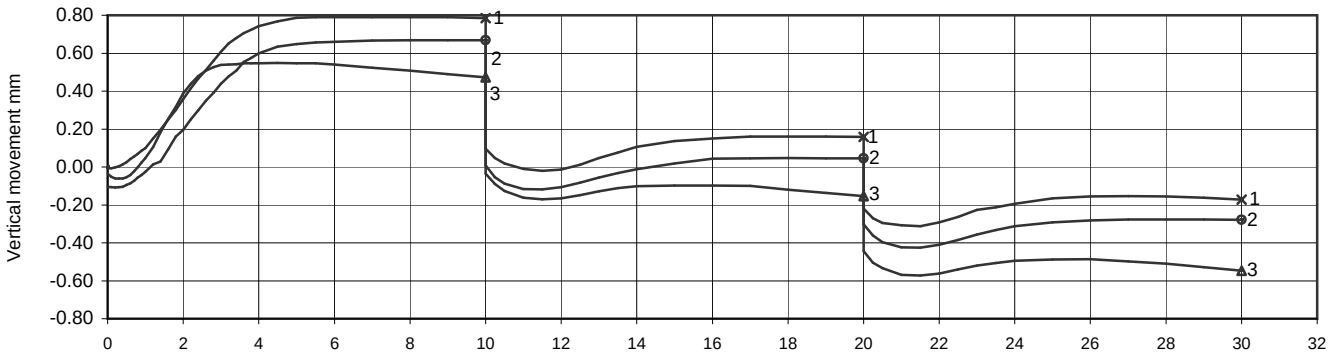
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

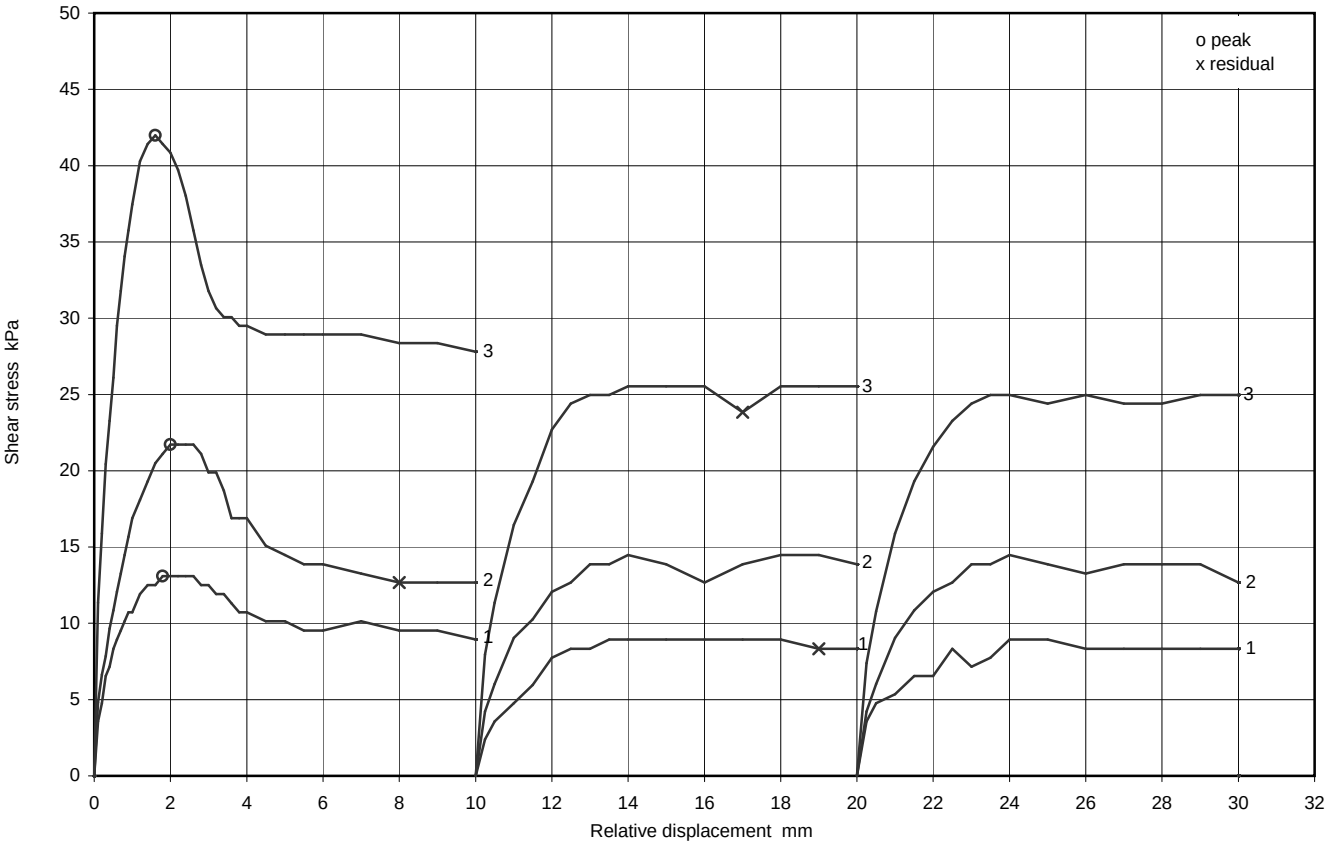
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_1UA	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	1.20-1.65	
			Sample No	3	Type U
			ID		
			Spec Ref		

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 85 Oct 10	Soil Mechanics	Printed:14/02/2011 09:07	**SSB 1** sheet 2 of 2

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	10.10-10.55		
			Sample No	27	Type	U
			ID			
			Spec Ref			

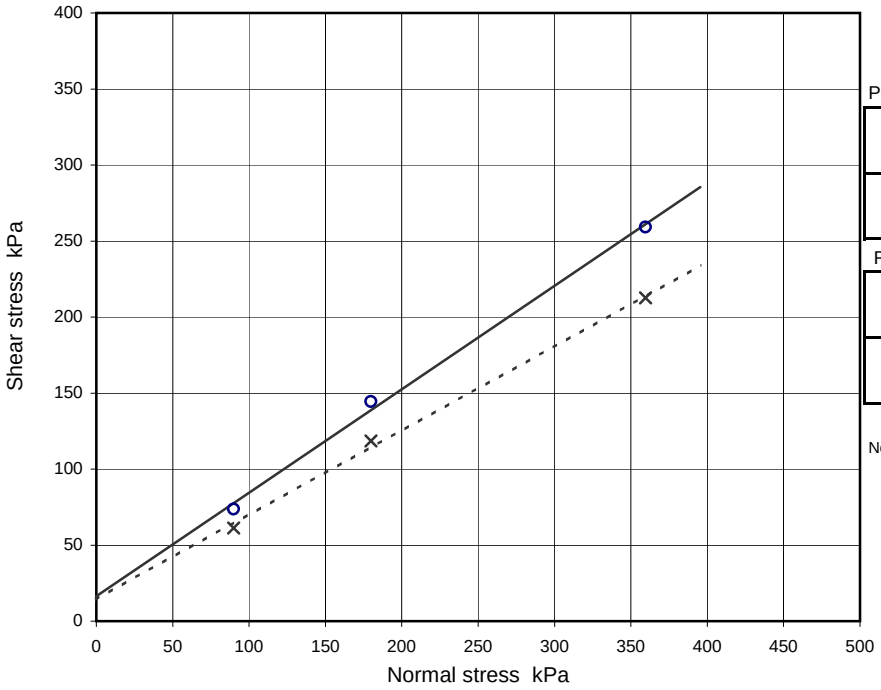
Soil Description	Grey SAND with occasional pockets of greyish brown clay and rare shell fragments and plant remains.
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.68 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.5	23.5	23.5			
	Bulk Density	Mg/m³	2.04	2.07	2.05			
	Water Content	%	21.4	20.7	20.1			
	Dry density	Mg/m³	1.68	1.71	1.70			
	Voids ratio		0.598	0.565	0.574			
	Degree of Saturation	%	96	98	94			
Consol^n	Consolidation / Normal Stress applied	kPa	**90**	**180**	**360**			
	Change in height during consolidation	mm	-0.350	-0.490	-0.814			
	Voids ratio after consolidation		0.574	0.532	0.519			
Shear see note 1	Voids ratio at end of test		0.520	0.528	0.474			
	Moisture content at end of test	%	19.4	19.7	17.7			
	Saturation at end of test	%	100	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	8.00	3.60	2.80			
	Shear stress	kPa	73.7	144.5	259.1			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	29.00	27.00	7.00			
	Shear stress	kPa	61.2	118.6	212.6			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	16	-
Ø '	degrees	34	-

Residual strength, (x)			
c '$_R$	kPa	14	-
Ø '$_R$	degrees	29	-

Notes :

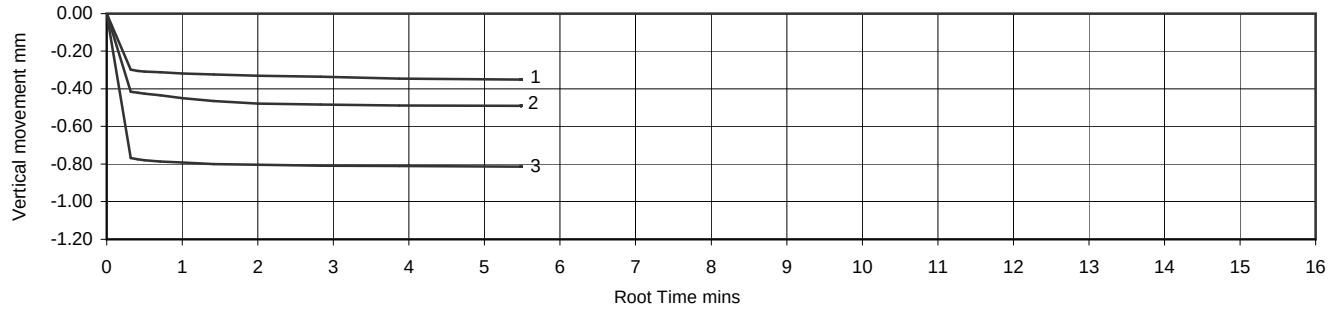
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Box tilting during shear.

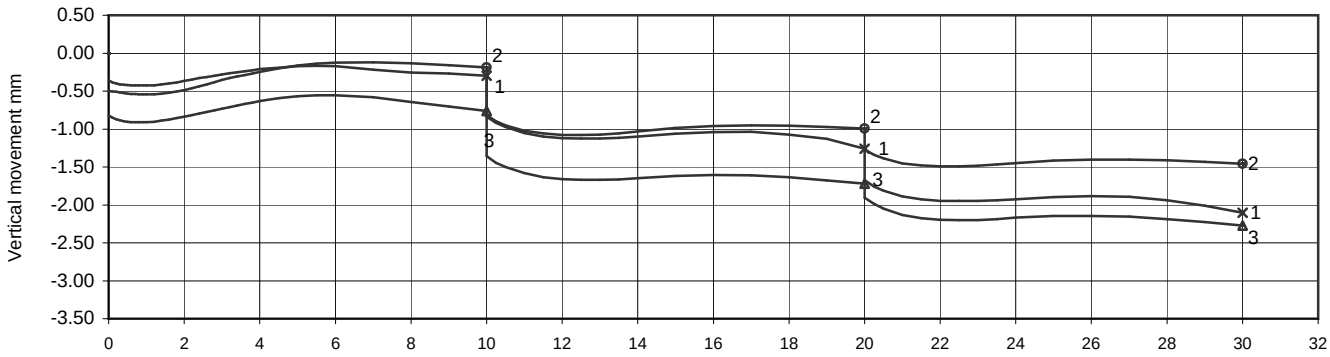
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

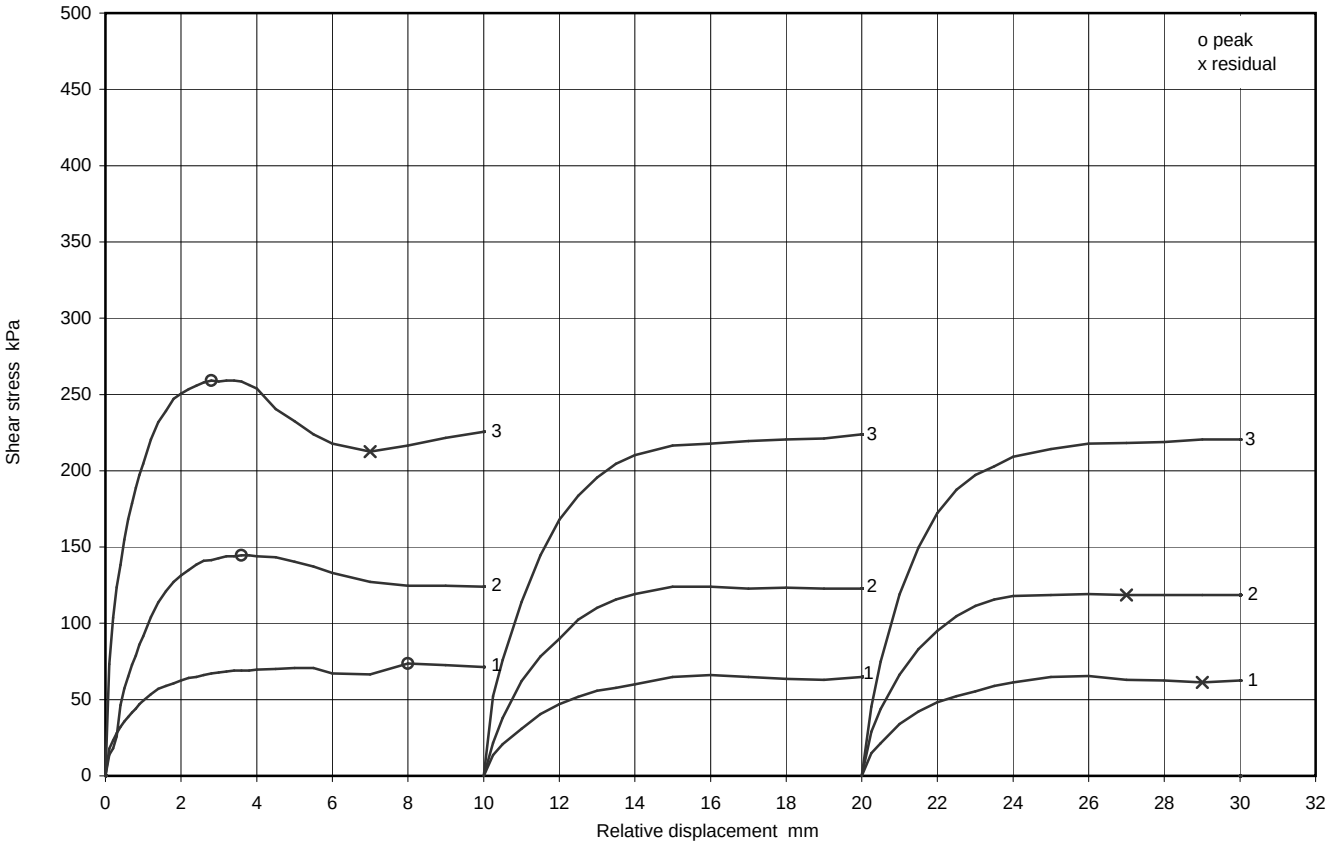
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_1UA	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	10.10-10.55	
			Sample No	27	Type U
			ID		
			Spec Ref		

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 85 Oct 10	Soil Mechanics	Printed:14/02/2011 09:08	**SSB 2** sheet 2 of 2

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_2UA	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	19.90-20.35	
			Sample No	51	Type U
			ID		
			Spec Ref		

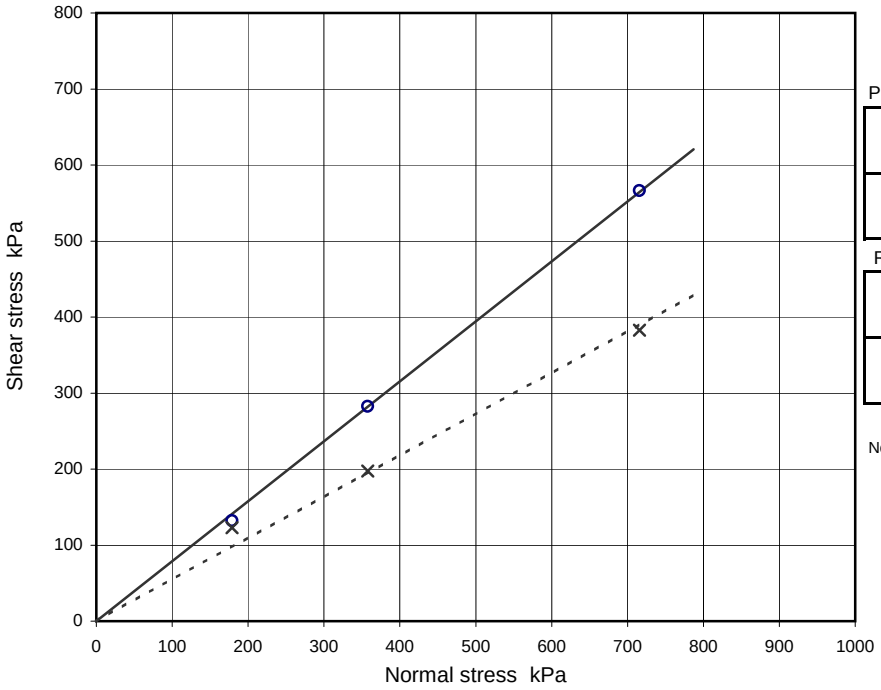
Soil Description	Grey SAND with occasional shell fragments and rare gravel.
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.67 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.6	23.6	23.5			
	Bulk Density	Mg/m³	1.97	2.04	1.94			
	Water Content	%	21.0	18.6	15.2			
	Dry density	Mg/m³	1.63	1.72	1.68			
	Voids ratio		0.641	0.554	0.585			
	Degree of Saturation	%	87	90	70			
Consol^n	Consolidation / Normal Stress applied	kPa	**179**	**358**	**716**			
	Change in height during consolidation	mm	-0.526	-0.450	-0.810			
	Voids ratio after consolidation		0.605	0.524	0.530			
Shear see note 1	Voids ratio at end of test		0.533	0.502	0.361			
	Moisture content at end of test	%	20.0	18.8	13.5			
	Saturation at end of test	%	100	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	3.00	2.80	5.50			
	Shear stress	kPa	132.0	282.5	566.4			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	5.50	20.00	19.00			
	Shear stress	kPa	123.1	197.4	382.7			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	(-9.7)	0.0
Ø '	degrees	(38)	38½

Residual strength, (x)			
c '$_R$	kPa	(31)	0.0
Ø '$_R$	degrees	(26)	28½

Notes :

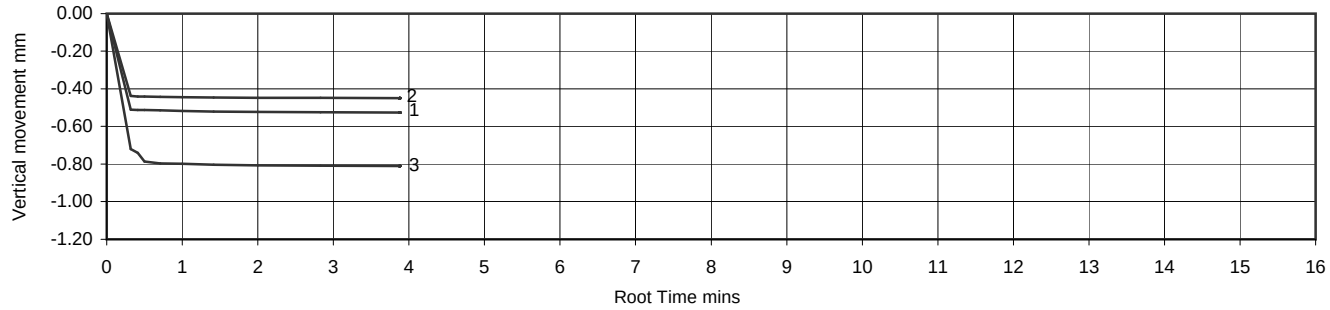
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Box tilting during shear.

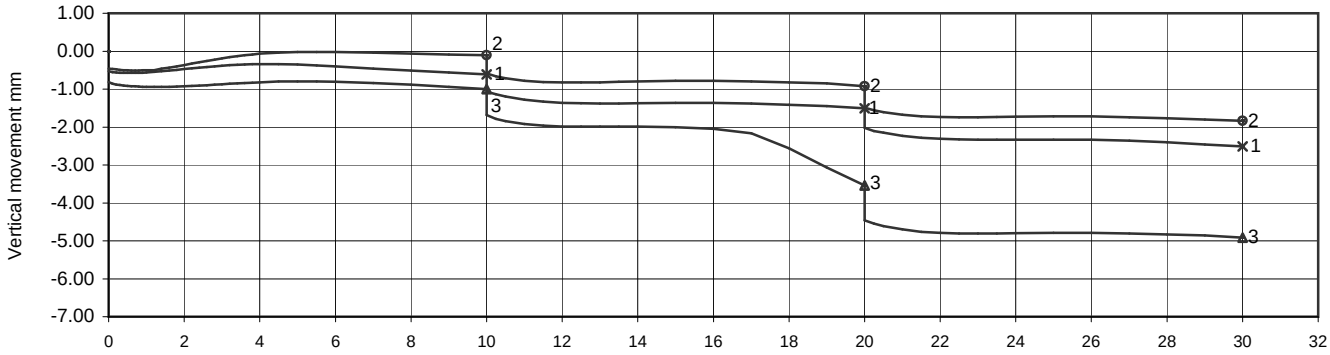
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

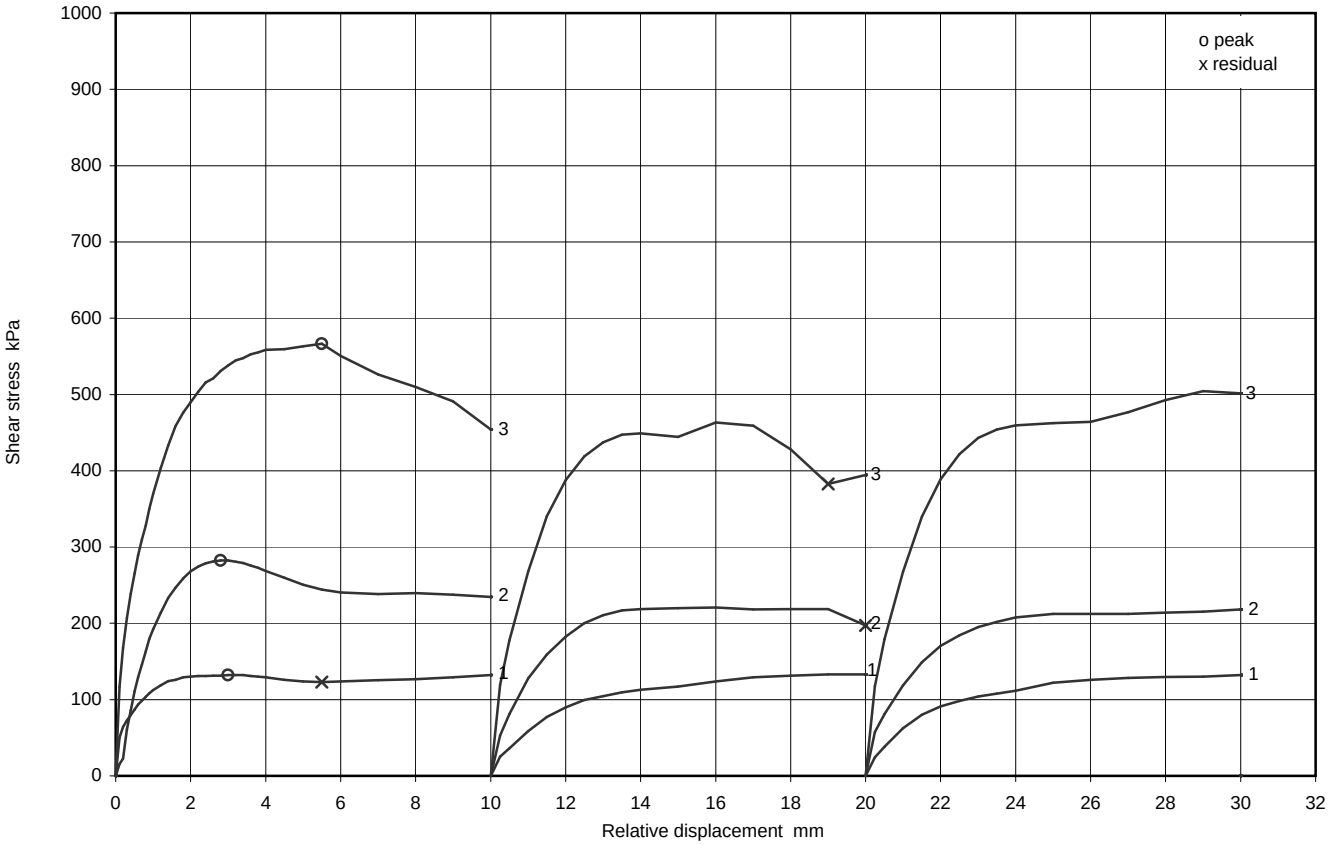
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_2UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	19.90-20.35		
			Sample No	51	Type	U
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 85 Oct 10	Soil Mechanics UKAS TESTING 1157	Printed:14/02/2011 09:09	**SSB 3** sheet 2 of 2

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_2UA	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	28.30-28.75	
			Sample No	69	Type U
			ID		
			Spec Ref		

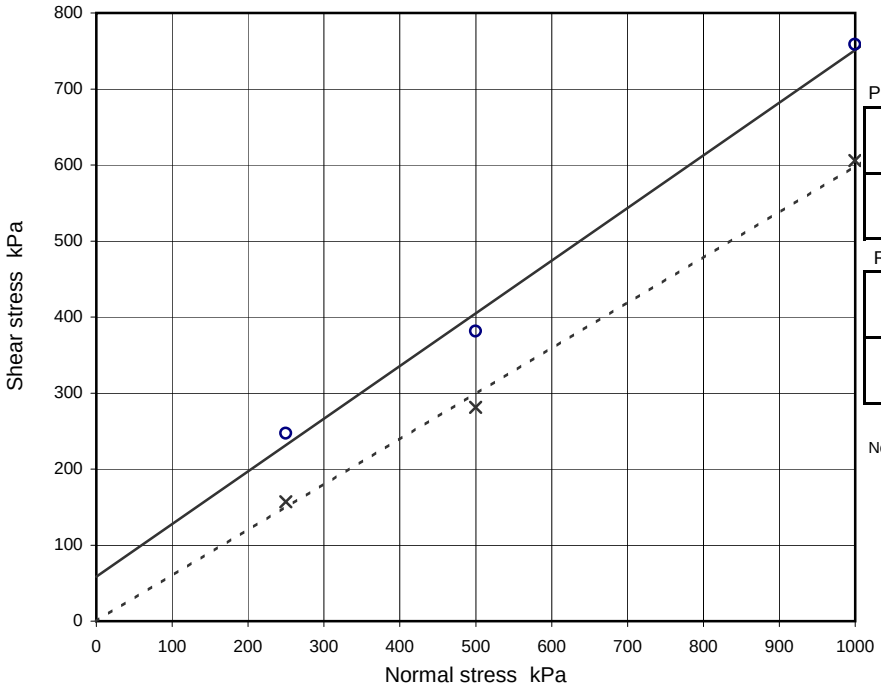
Soil Description	Grey SAND with frequent shell fragments.
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.65 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.6	23.6	23.5			
	Bulk Density	Mg/m³	2.14	2.09	2.07			
	Water Content	%	15.8	14.9	13.1			
	Dry density	Mg/m³	1.85	1.82	1.83			
	Voids ratio		0.436	0.458	0.451			
	Degree of Saturation	%	96	86	77			
Consol^n	Consolidation / Normal Stress applied	kPa	**250**	**500**	**1000**			
	Change in height during consolidation	mm	-0.204	-0.546	-0.638			
	Voids ratio after consolidation		0.424	0.424	0.411			
Shear see note 1	Voids ratio at end of test		0.384	0.338	0.325			
	Moisture content at end of test	%	14.5	12.8	12.3			
	Saturation at end of test	%	100	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	1.80	2.40	2.60			
	Shear stress	kPa	247.0	381.5	758.5			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	20.00	10.00	20.00			
	Shear stress	kPa	156.9	281.2	606.1			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	59	-
Ø '	degrees	34½	-

Residual strength, (x)			
c '$_R$	kPa	(-5.3)	0.0
Ø '$_R$	degrees	(31)	30

Notes :

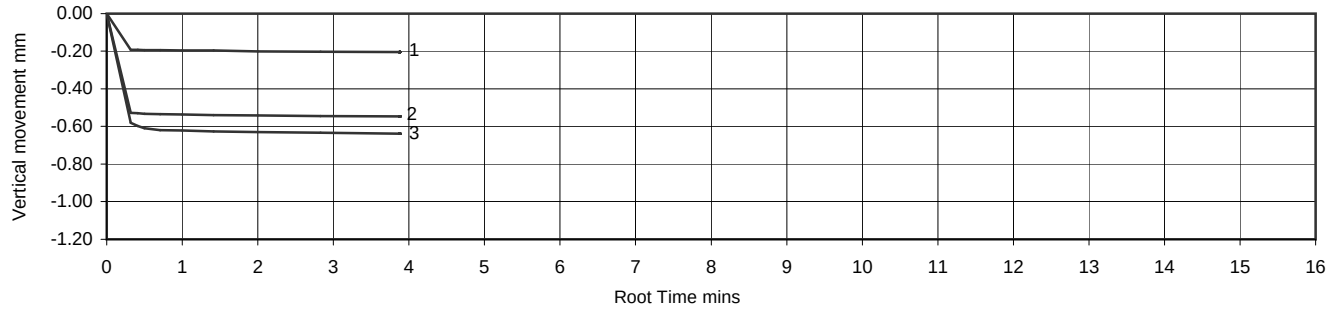
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Box tilting during shear, severe on specimen 1 and 3.

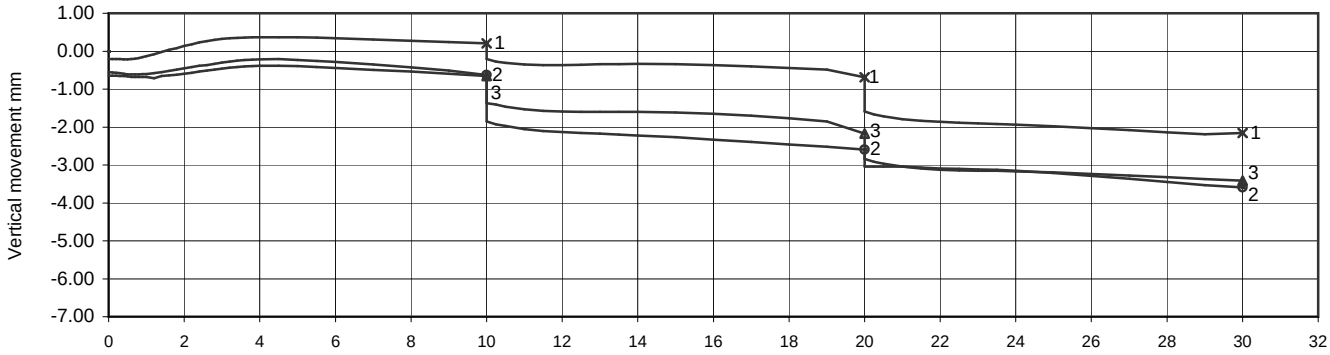
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

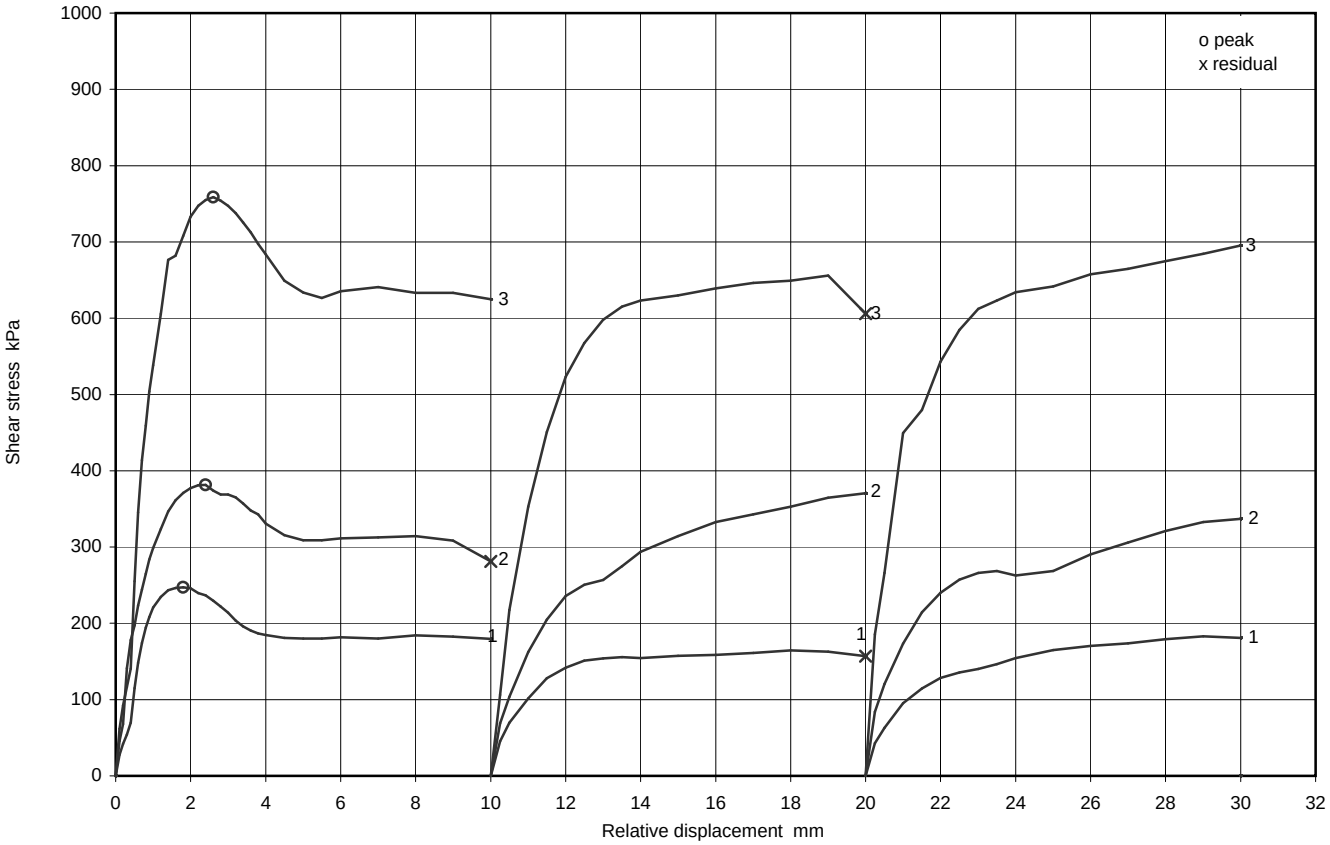
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_2UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	28.30-28.75		
			Sample No	69	Type	U
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 85 Oct 10	Soil Mechanics	Printed:14/02/2011 09:09	**SSB 4** sheet 2 of 2

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_4U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	3.15-3.60	
			Sample No	10	Type U
			ID		
			Spec Ref		

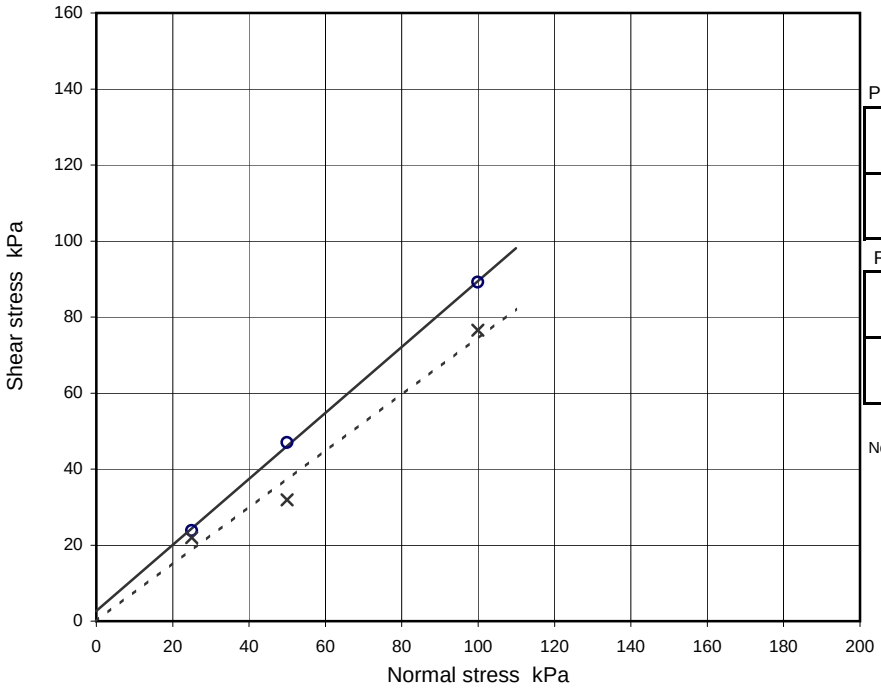
Soil Description	Orangish brown slightly gravelly SAND with occasional shell fragments and clay pockets.
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.64 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.5	23.5	23.5			
	Bulk Density	Mg/m³	1.96	2.00	2.00			
	Water Content	%	17.5	16.5	14.6			
	Dry density	Mg/m³	1.67	1.72	1.74			
	Voids ratio		0.584	0.538	0.514			
	Degree of Saturation	%	79	81	75			
Consol^n	Consolidation / Normal Stress applied	kPa	**25**	**50**	**100**			
	Change in height during consolidation	mm	-0.118	-0.276	-0.226			
	Voids ratio after consolidation		0.576	0.520	0.500			
Shear see note 1	Voids ratio at end of test		0.564	0.539	0.497			
	Moisture content at end of test	%	21.4	20.1	18.0			
	Saturation at end of test	%	100	99	96			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	9.00	2.40	5.50			
	Shear stress	kPa	23.8	47.0	89.2			
Residual values, (x)	No. of reversals		2	2	3			
	Relative displacement	mm	20.00	20.00	40.00			
	Shear stress	kPa	22.0	31.9	76.6			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	2.7	-
Ø '	degrees	40	-

Residual strength, (x)			
c '$_R$	kPa	(-0.3)	0.0
Ø '$_R$	degrees	(36)	36

Notes :

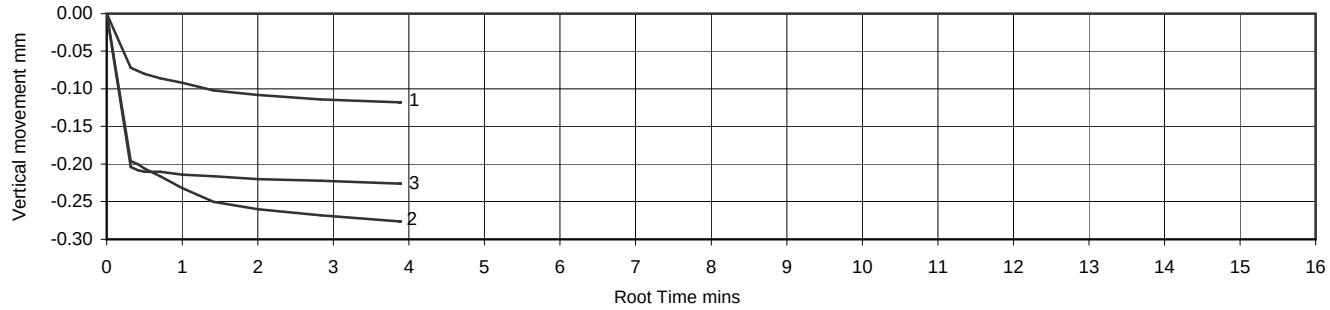
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Box tilted during shear on specimen 1.

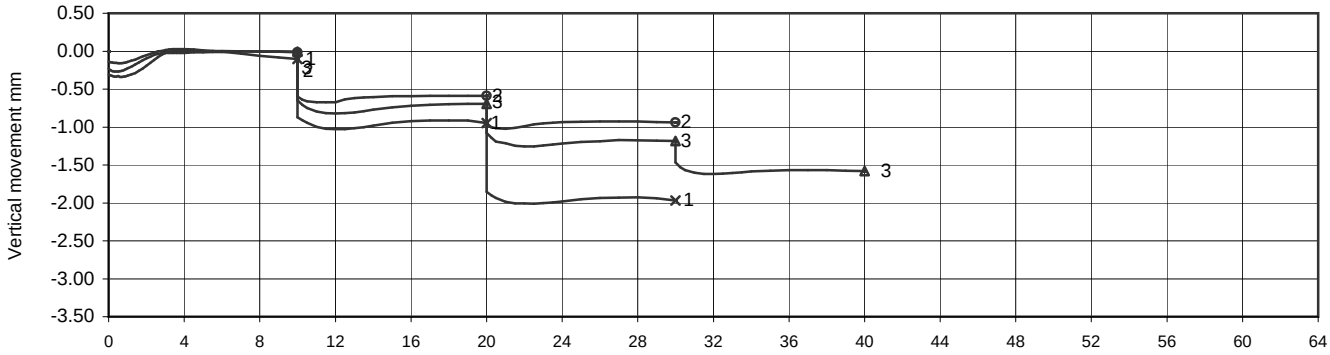
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

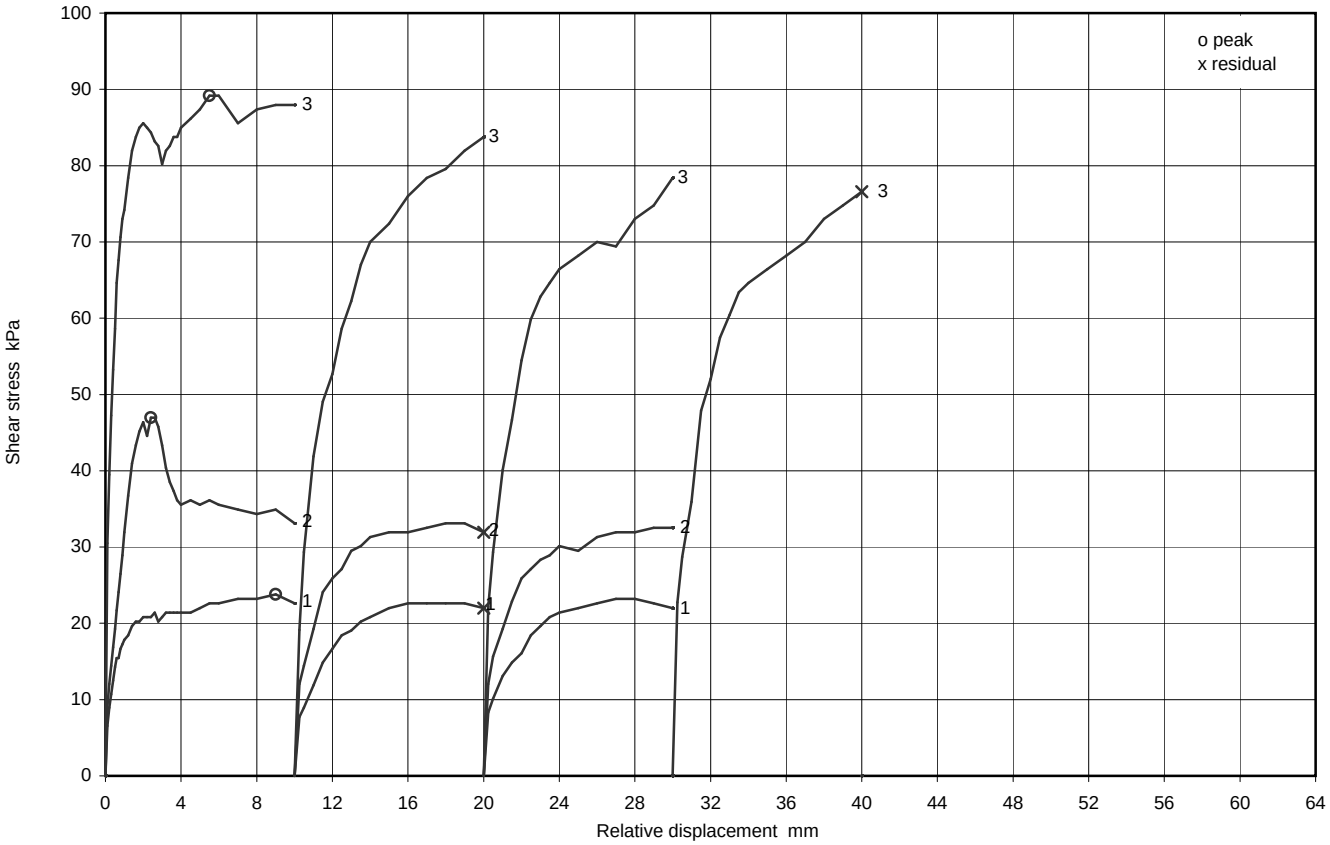
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_4U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	3.15-3.60		
			Sample No	10	Type	U
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 85 Oct 10	Soil Mechanics	Printed:14/02/2011 09:10	**SSB 5** sheet 2 of 2

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_5UB	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	14.60 - 15.05	
			Sample No	42	Type U
			ID		
			Spec Ref		

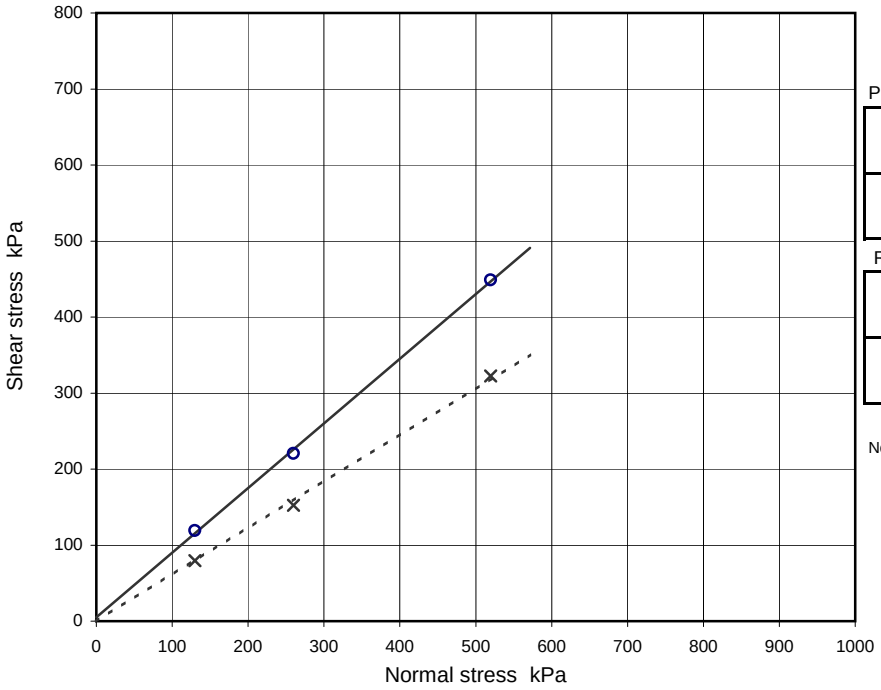
Soil Description	Greyish brown SAND with occasional medium sand to medium gravel sized shell fragments
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.67 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.5	23.5	23.5			
	Bulk Density	Mg/m³	2.06	2.06	2.06			
	Water Content	%	17.1	16.1	17.2			
	Dry density	Mg/m³	1.76	1.77	1.75			
	Voids ratio		0.517	0.506	0.522			
	Degree of Saturation	%	88	85	88			
Consol^n	Consolidation / Normal Stress applied	kPa	**130**	**260**	**520**			
	Change in height during consolidation	mm	-0.182	-0.464	-0.588			
	Voids ratio after consolidation		0.505	0.476	0.484			
Shear see note 1	Voids ratio at end of test		0.445	0.455	0.454			
	Moisture content at end of test	%	16.6	17.0	17.0			
	Saturation at end of test	%	100	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	2.00	2.60	2.20			
	Shear stress	kPa	119.0	220.7	448.7			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	20.00	30.00	18.00			
	Shear stress	kPa	79.7	152.4	322.4			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	5.0	-
Ø '	degrees	40½	-

Residual strength, (x)

c '$_R$	kPa	(-5.3)	0.0
Ø '$_R$	degrees	(32)	31½

Notes :

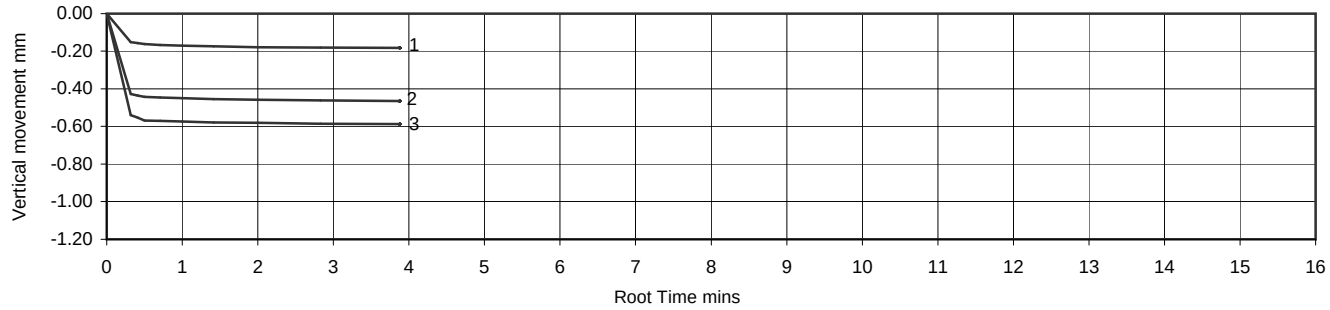
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Severe tilt of box during shear.

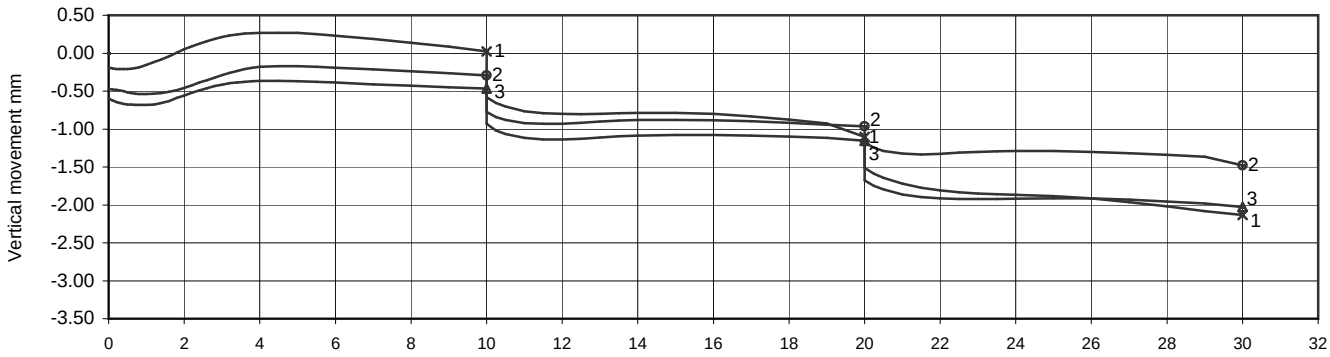
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

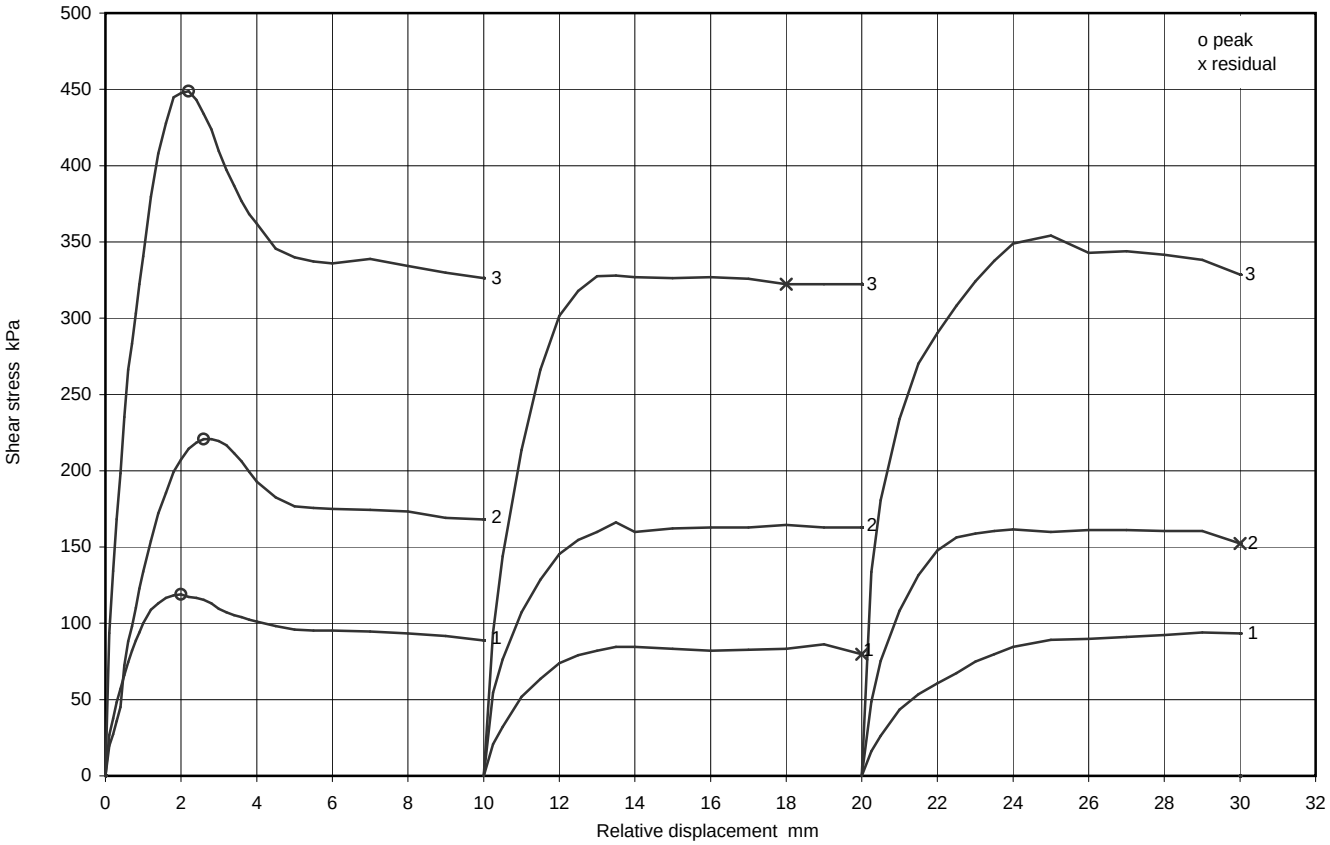
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_5UB		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	14.60 - 15.05		
			Sample No	42	Type	U
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 85 Oct 10	Soil Mechanics	Printed:14/02/2011 09:11	**SSB 6** sheet 2 of 2

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_5UB	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	40.30 - 40.75	
			Sample No	103	Type U
			ID		
			Spec Ref		

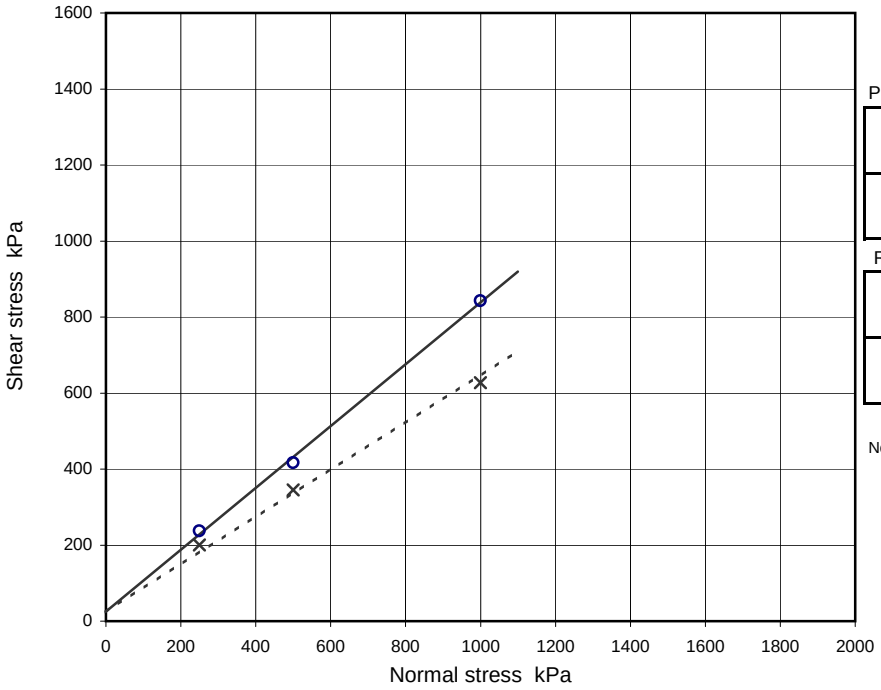
Soil Description	Grey SAND with frequent fine to medium gravel sized shell fragments
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.73 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.5	23.5	23.5			
	Bulk Density	Mg/m³	2.06	2.09	2.04			
	Water Content	%	18.9	16.7	17.7			
	Dry density	Mg/m³	1.73	1.79	1.73			
	Voids ratio		0.577	0.524	0.577			
	Degree of Saturation	%	89	87	84			
Consol^n	Consolidation / Normal Stress applied	kPa	**250**	**500**	**1000**			
	Change in height during consolidation	mm	-0.292	-0.470	-0.538			
	Voids ratio after consolidation		0.557	0.493	0.541			
Shear see note 1	Voids ratio at end of test		0.557	0.451	0.456			
	Moisture content at end of test	%	20.4	16.5	16.7			
	Saturation at end of test	%	100	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	2.60	3.40	2.80			
	Shear stress	kPa	237.9	417.1	843.0			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	6.00	19.00	28.00			
	Shear stress	kPa	200.4	345.3	627.2			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	25	-
Ø '	degrees	39	-

Residual strength, (x)

c '$_R$	kPa	(59)	25
Ø '$_R$	degrees	(29½)	32

Notes :

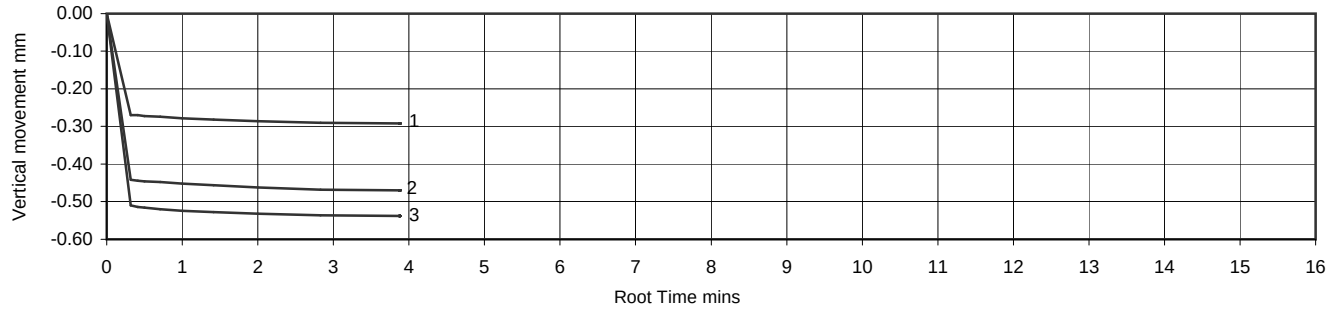
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Box tilting during shear, severe on specimen 3

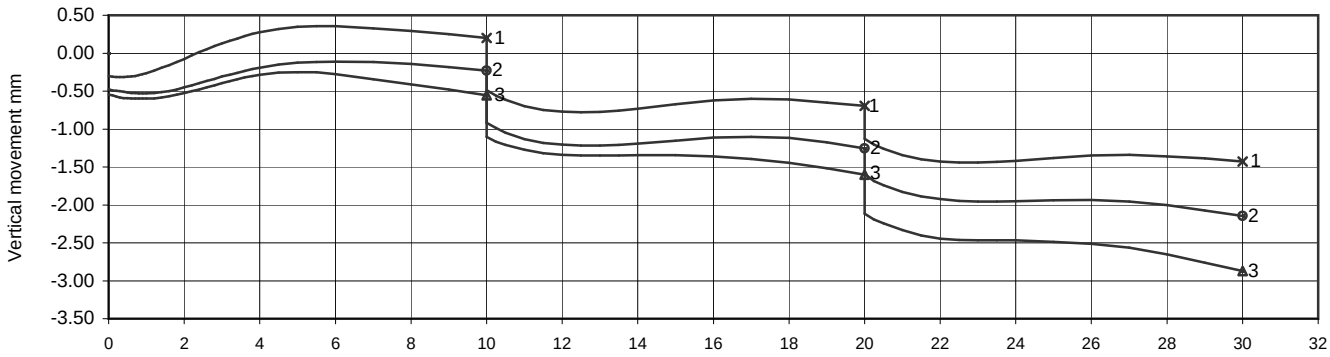
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

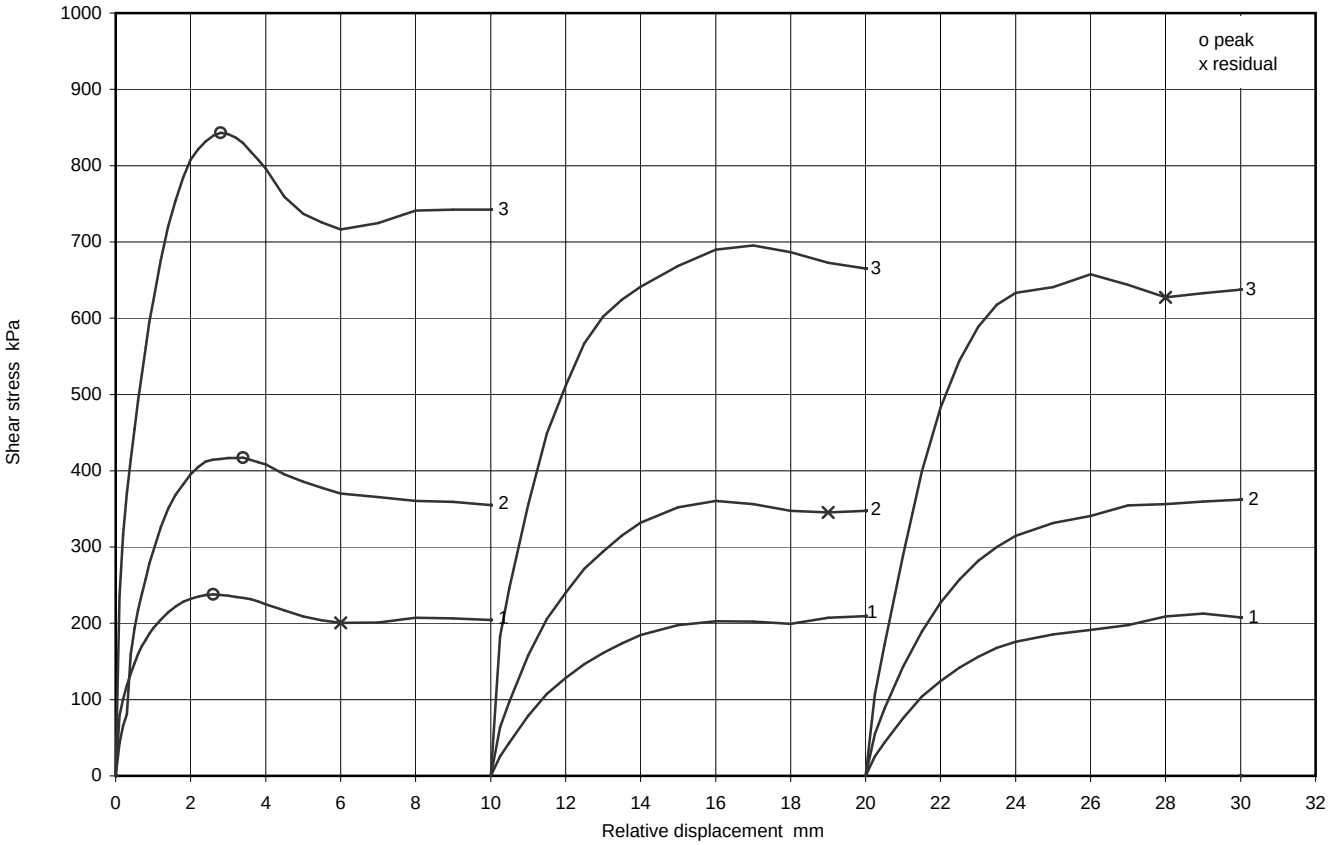
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_5UB		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	40.30 - 40.75		
			Sample No	103	Type	U
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 85 Oct 10	Soil Mechanics	Printed:14/02/2011 09:11	**SSB 7** sheet 2 of 2

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_6U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	23.60 - 24.05	
			Sample No	69	Type U
			ID		
			Spec Ref		

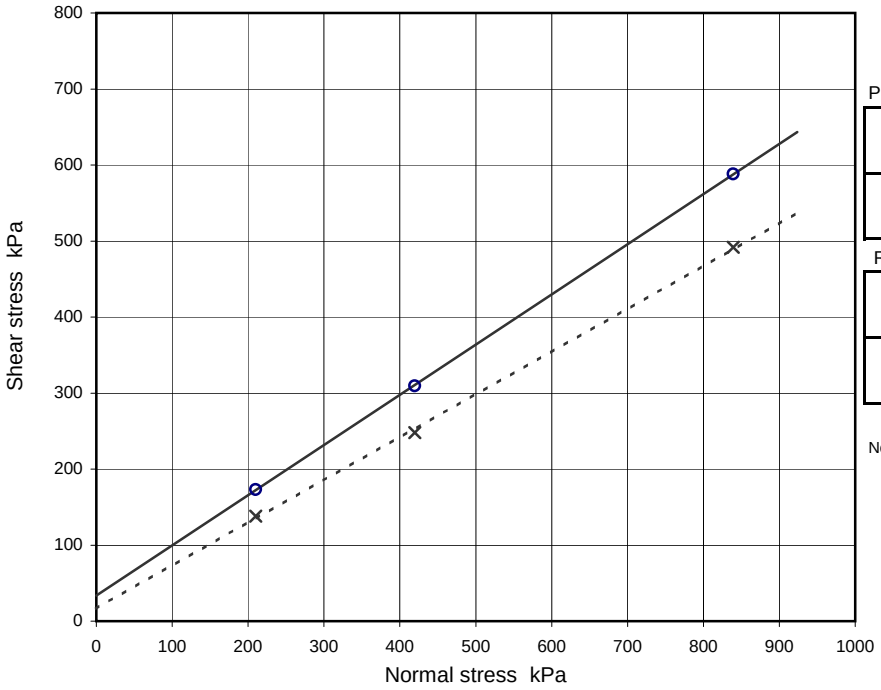
Soil Description	Grey SAND with occasional silt pockets and shell fragments
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.67 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.5	23.5	23.5			
	Bulk Density	Mg/m³	2.13	2.13	2.13			
	Water Content	%	13.4	15.1	16.3			
	Dry density	Mg/m³	1.87	1.86	1.83			
	Voids ratio		0.425	0.439	0.461			
	Degree of Saturation	%	84	92	95			
Consol^n	Consolidation / Normal Stress applied	kPa	**210**	**420**	**840**			
	Change in height during consolidation	mm	-0.374	-1.064	-0.560			
	Voids ratio after consolidation		0.402	0.374	0.426			
Shear see note 1	Voids ratio at end of test		0.346	0.316	0.258			
	Moisture content at end of test	%	13.0	11.8	9.7			
	Saturation at end of test	%	100	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	3.40	2.60	2.80			
	Shear stress	kPa	173.0	309.5	588.3			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	30.00	9.00	5.00			
	Shear stress	kPa	138.1	248.2	492.0			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	34	-
Ø '	degrees	33½	-

Residual strength, (x)			
c'_R	kPa	16	-
$Ø'_R$	degrees	29½	-

Notes :

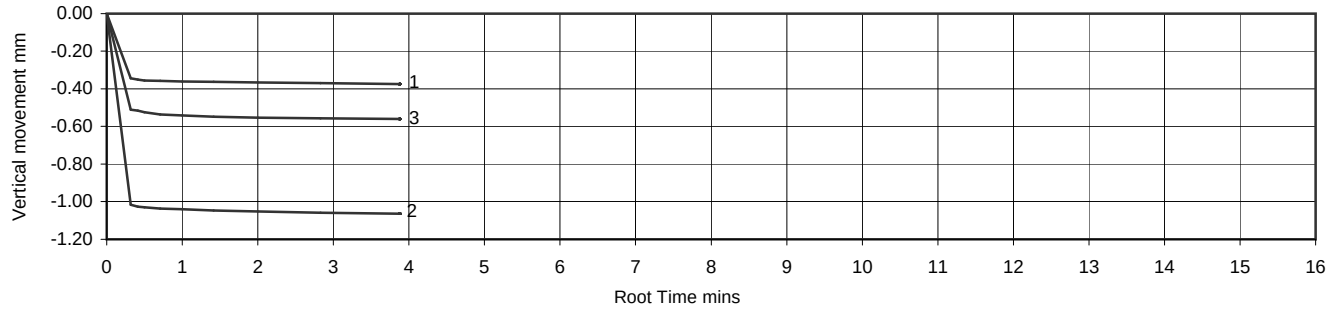
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Box tilted during shear, severe on specimen 1 and 3.

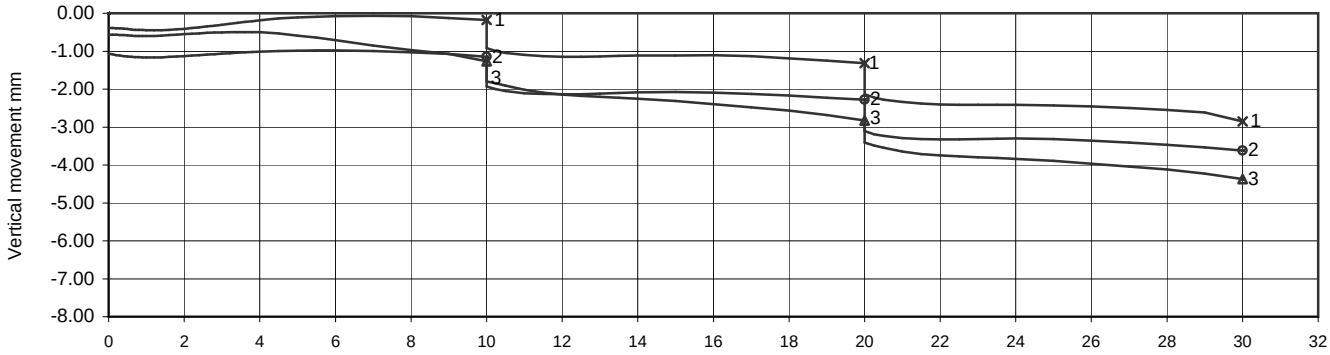
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

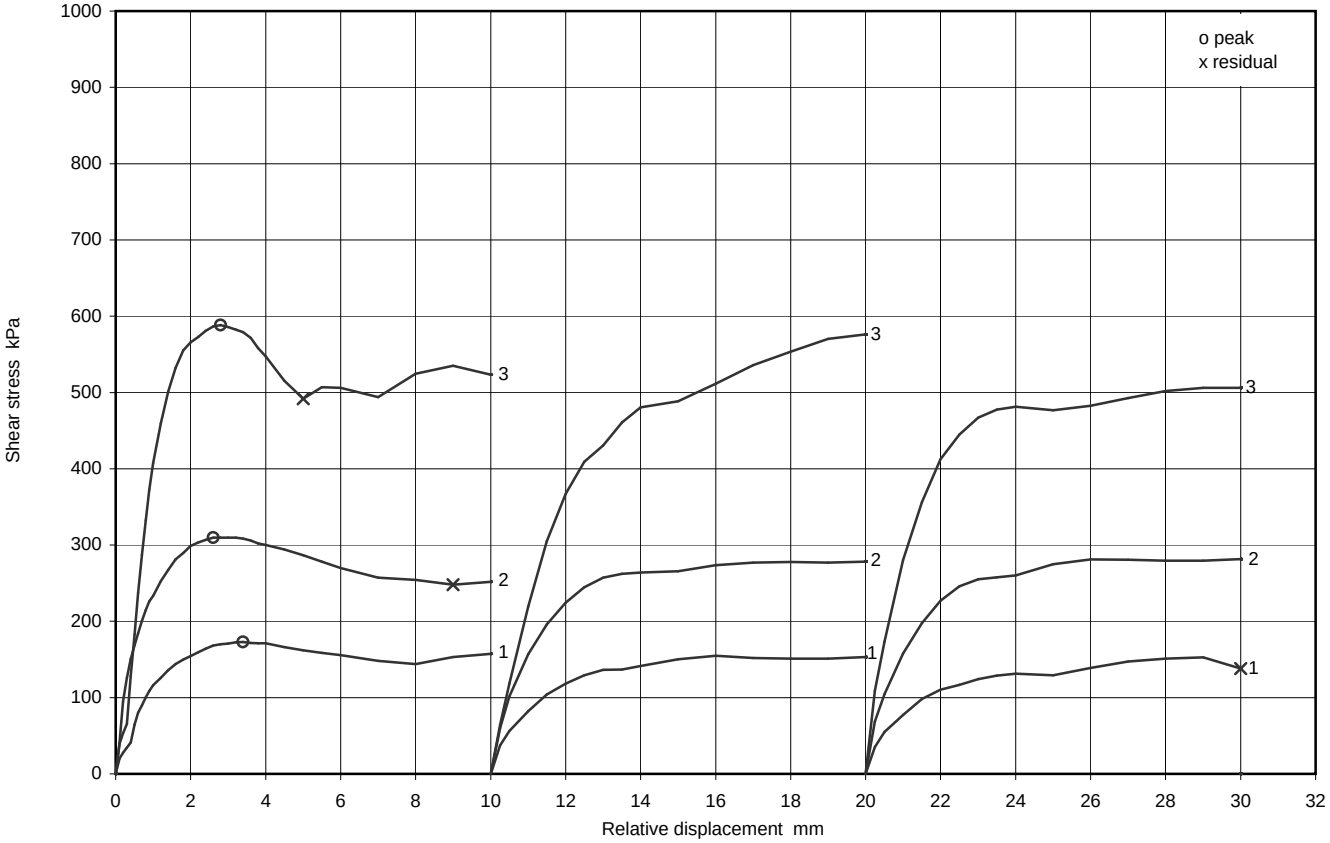
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_6U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	23.60 - 24.05		
			Sample No	69	Type	U
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
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Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_7U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	5.40-5.85	
			Sample No	16	Type U
			ID		
			Spec Ref		

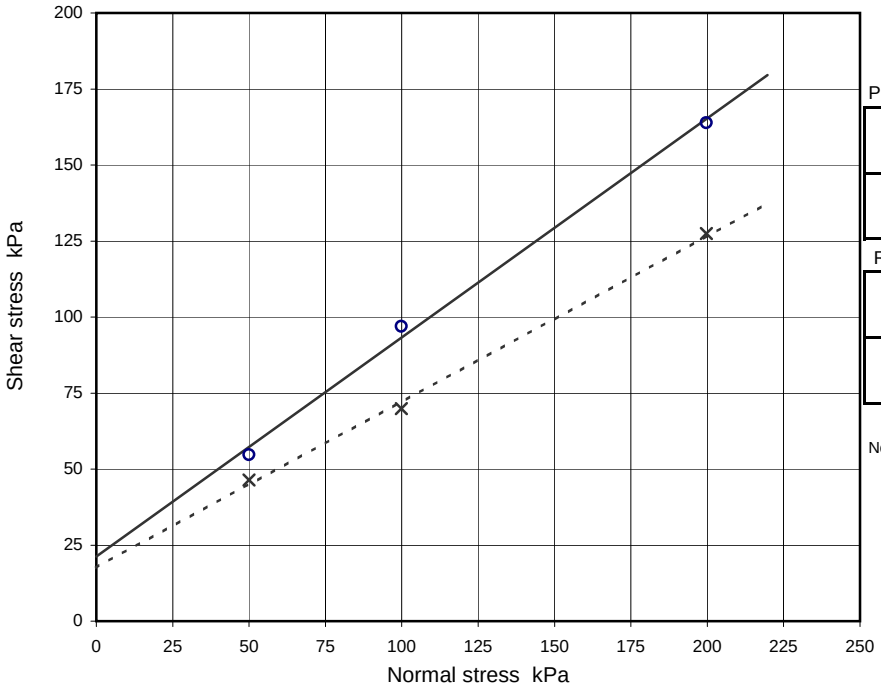
Soil Description	Greyish brown slightly gravelly SAND with occasional clay pockets and rare shell fragments.
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.63 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.5	23.5	23.5			
	Bulk Density	Mg/m³	2.13	2.13	2.13			
	Water Content	%	16.5	16.0	17.2			
	Dry density	Mg/m³	1.83	1.84	1.82			
	Voids ratio		0.440	0.432	0.444			
	Degree of Saturation	%	99	97	102			
Consol^n	Consolidation / Normal Stress applied	kPa	**50**	**100**	**200**			
	Change in height during consolidation	mm	-0.110	-0.168	-0.294			
	Voids ratio after consolidation		0.433	0.422	0.426			
Shear see note 1	Voids ratio at end of test		0.463	0.433	0.429			
	Moisture content at end of test	%	16.9	16.5	16.3			
	Saturation at end of test	%	96	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	2.20	2.20	1.60			
	Shear stress	kPa	54.7	97.0	163.9			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	30.00	30.00	30.00			
	Shear stress	kPa	46.4	69.9	127.4			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	21	-
Ø '	degrees	35	-

Residual strength, (x)			
c '$_R$	kPa	18	-
Ø '$_R$	degrees	28½	-

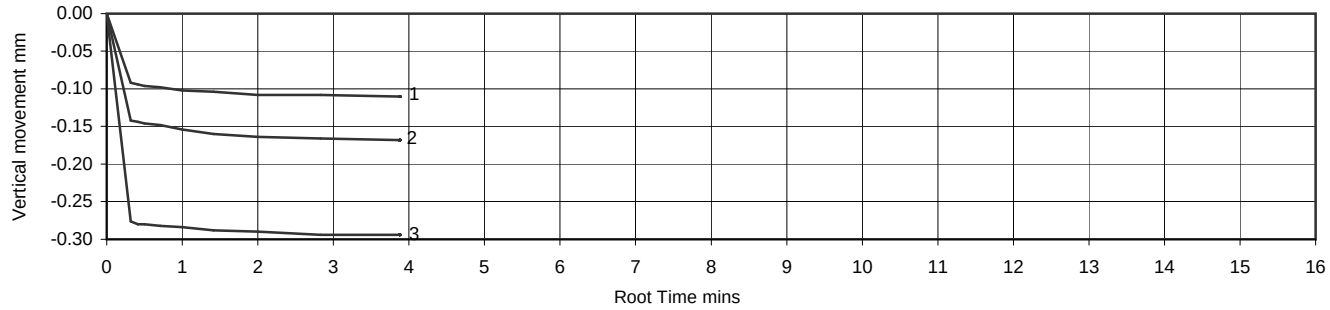
Notes :

1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

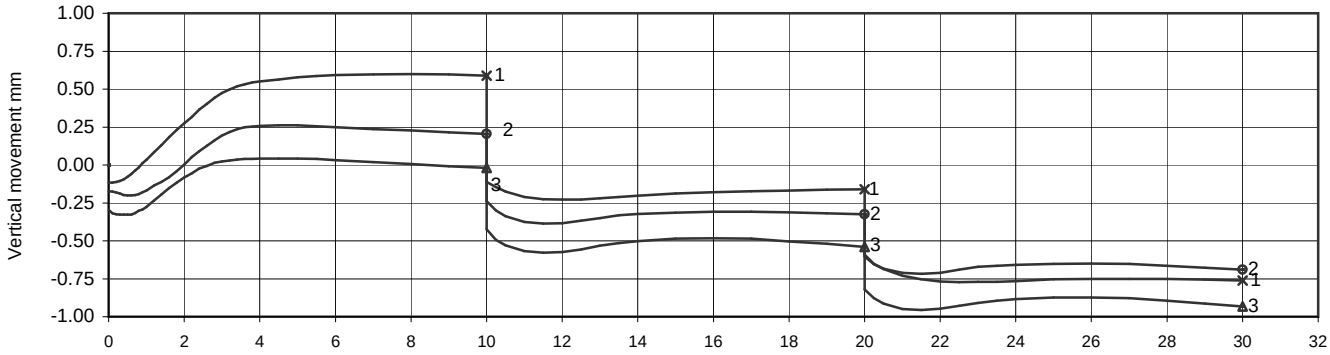
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

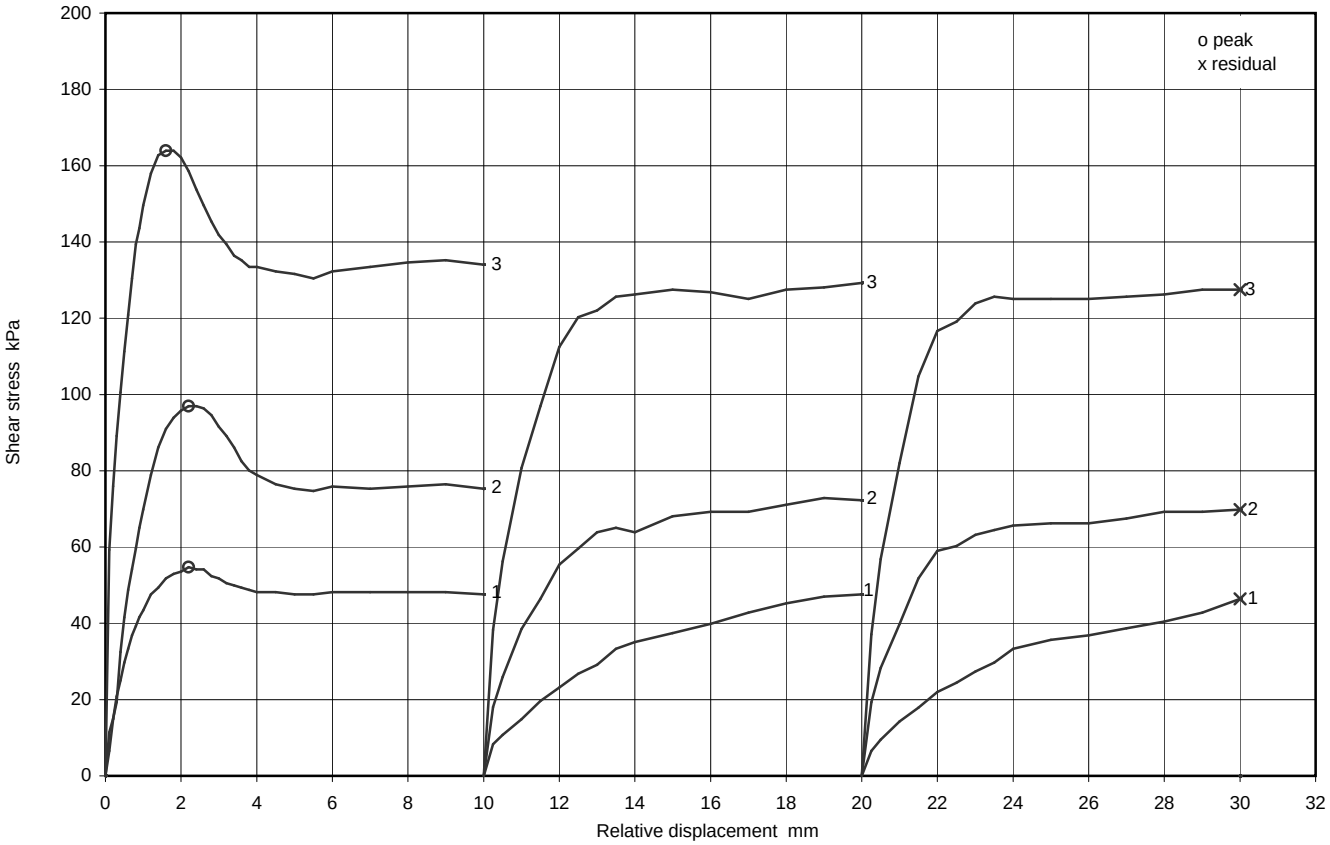
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	5.40-5.85		
			Sample No	16	Type	U
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
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Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_7U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	34.10-34.55	
			Sample No	99	Type U
			ID		
			Spec Ref		

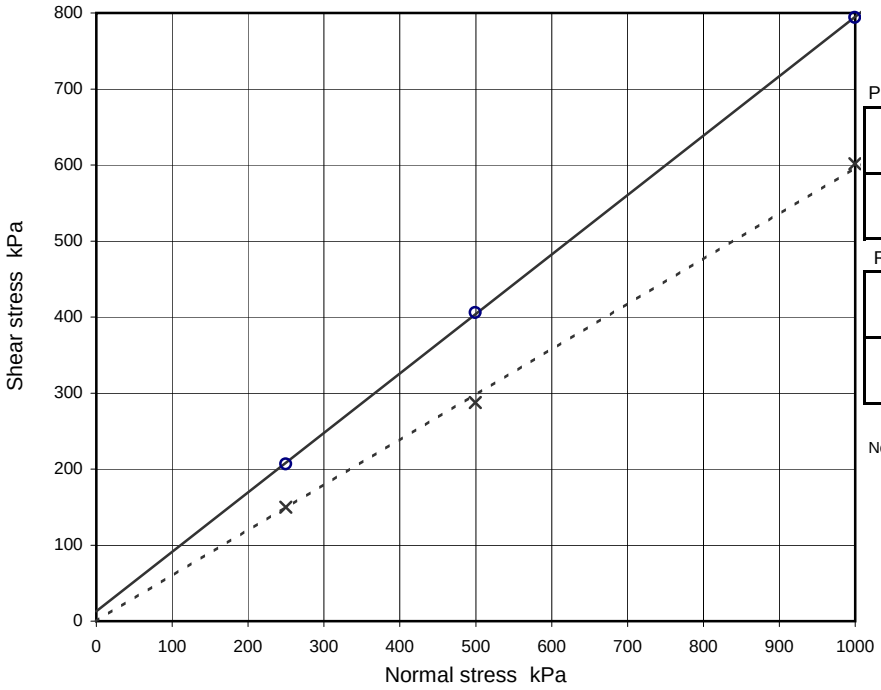
Soil Description	Grey SAND with occasional shell fragments.
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, assumed 2.65 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.6	23.6	23.5			
	Bulk Density	Mg/m³	2.07	2.10	2.10			
	Water Content	%	14.5	14.5	13.5			
	Dry density	Mg/m³	1.81	1.83	1.85			
	Voids ratio		0.468	0.446	0.430			
	Degree of Saturation	%	82	86	83			
Consol^n	Consolidation / Normal Stress applied	kPa	**250**	**500**	**1000**			
	Change in height during consolidation	mm	-0.222	-0.480	-0.606			
	Voids ratio after consolidation		0.454	0.416	0.393			
Shear see note 1	Voids ratio at end of test		0.403	0.347	0.316			
	Moisture content at end of test	%	15.2	13.1	11.9			
	Saturation at end of test	%	100	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	1.80	1.60	2.60			
	Shear stress	kPa	206.9	405.8	793.9			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	20.00	19.00	20.00			
	Shear stress	kPa	149.9	287.6	601.5			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	13	-
Ø '	degrees	38	-

Residual strength, (x)			
c'_R	kPa	(-6.8)	0.0
$Ø'_R$	degrees	(31)	30

Notes :

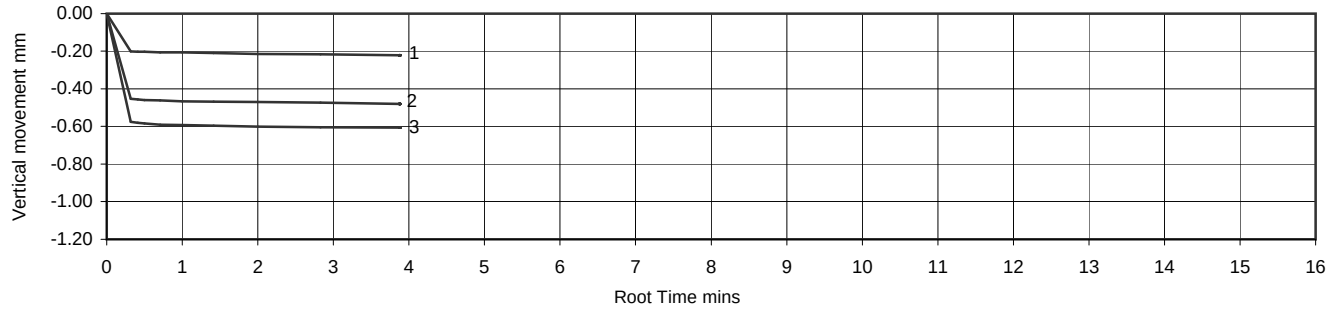
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Box tilted during shear, severe on specimen 3.

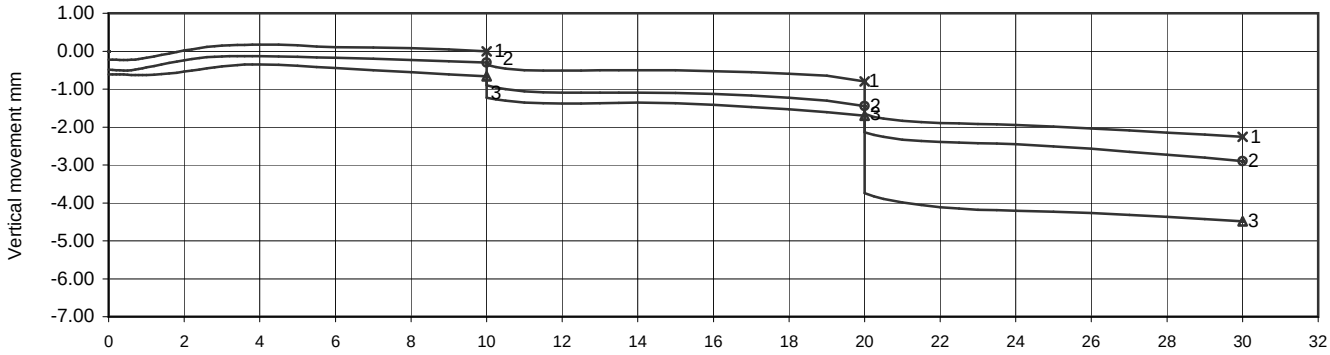
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

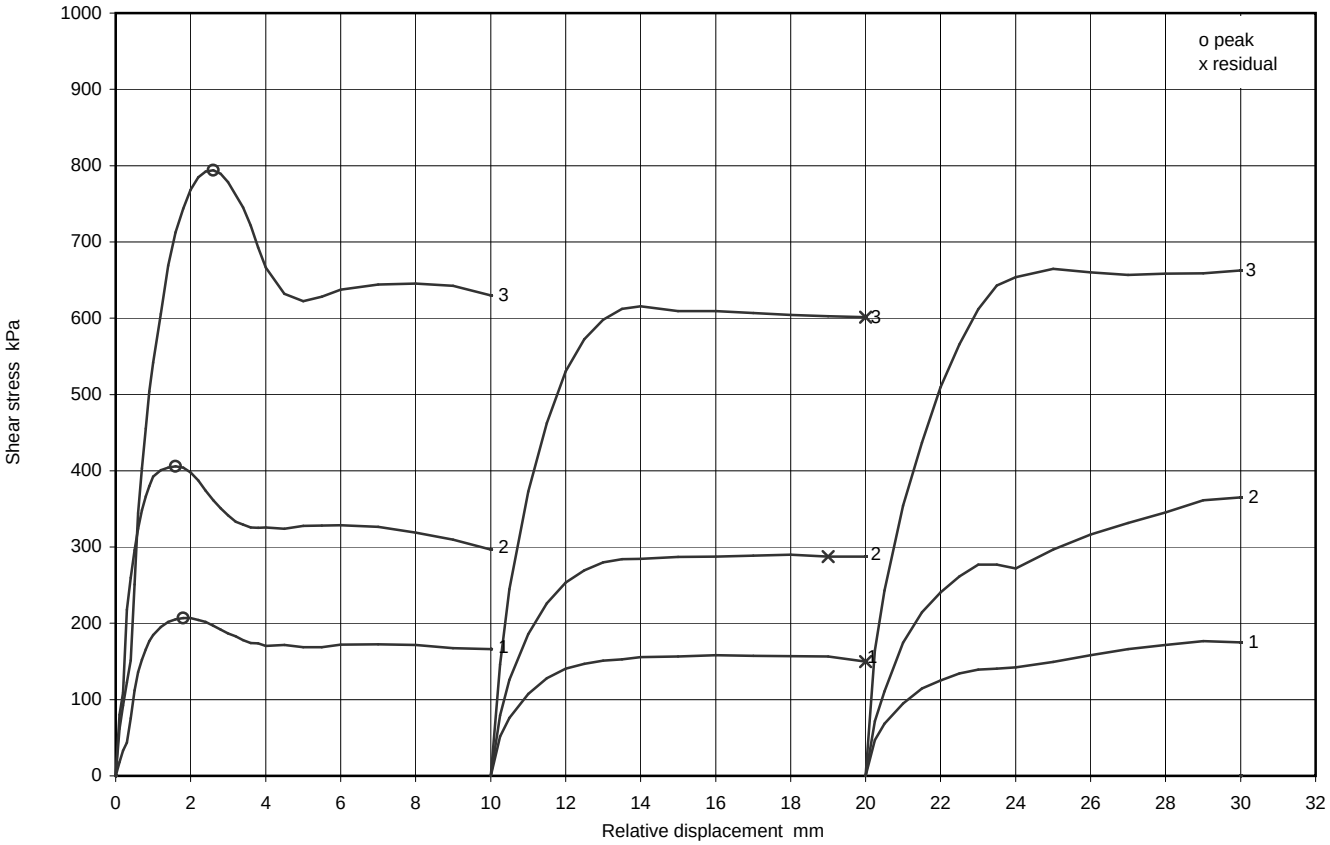
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	34.10-34.55		
			Sample No	99	Type	U
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 85 Oct 10	Soil Mechanics	Printed:14/02/2011 09:13	**SSB 10** sheet 2 of 2

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	43.55 - 44.00	
			Sample No	113	Type U
			ID		
			Spec Ref		

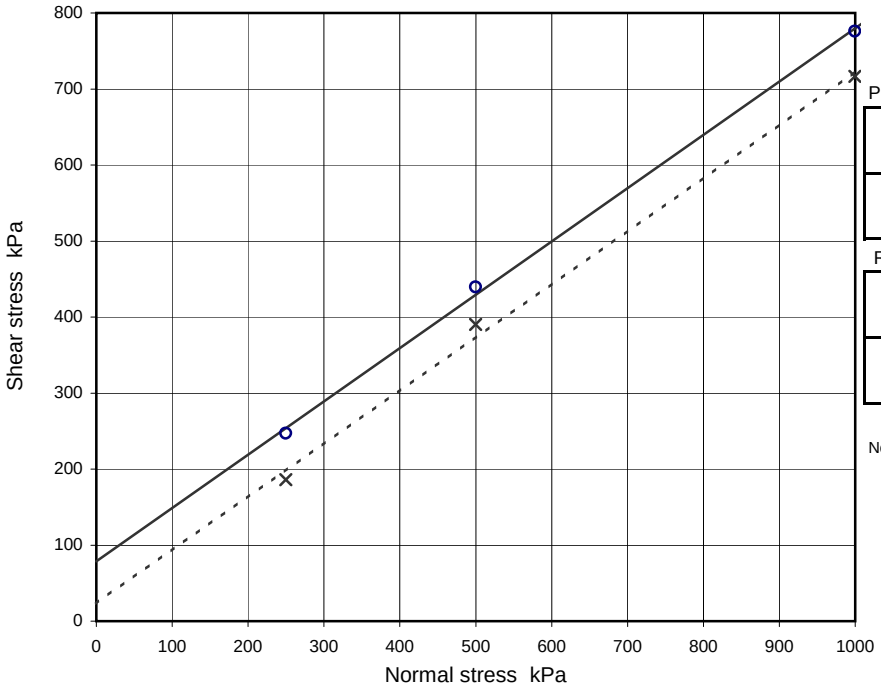
Soil Description	Grey SAND with frequent fine to medium gravel sized shell fragments
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, assumed 2.65 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.5	23.5	23.5			
	Bulk Density	Mg/m³	2.12	2.08	2.04			
	Water Content	%	17.2	17.8	17.6			
	Dry density	Mg/m³	1.81	1.77	1.73			
	Voids ratio		0.467	0.497	0.530			
	Degree of Saturation	%	98	95	88			
Consol^n	Consolidation / Normal Stress applied	kPa	**250**	**500**	**1000**			
	Change in height during consolidation	mm	-0.656	-0.694	-0.740			
	Voids ratio after consolidation		0.426	0.453	0.482			
Shear see note 1	Voids ratio at end of test		0.374	0.363	0.393			
	Moisture content at end of test	%	14.1	13.7	14.8			
	Saturation at end of test	%	100	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	2.60	2.60	3.00			
	Shear stress	kPa	247.1	439.8	776.0			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	9.00	4.50	5.50			
	Shear stress	kPa	186.3	390.4	716.8			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	79	-
Ø '	degrees	35	-

Residual strength, (x)			
c '$_R$	kPa	23	-
Ø '$_R$	degrees	34	-

Notes :

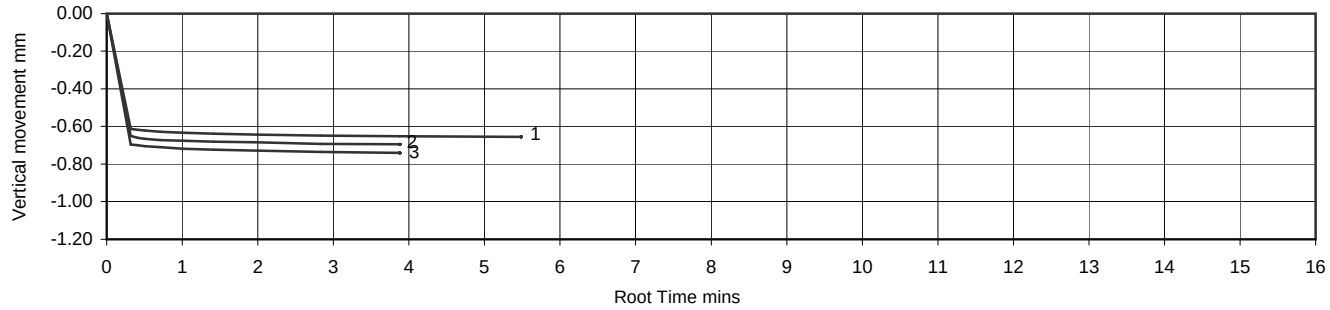
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Box tilted during shear, severe on specimen 1 and 3.

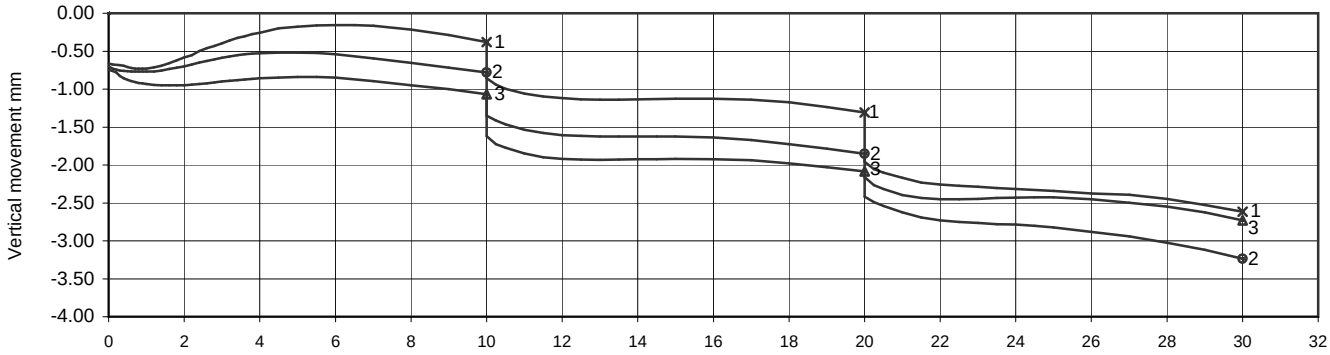
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

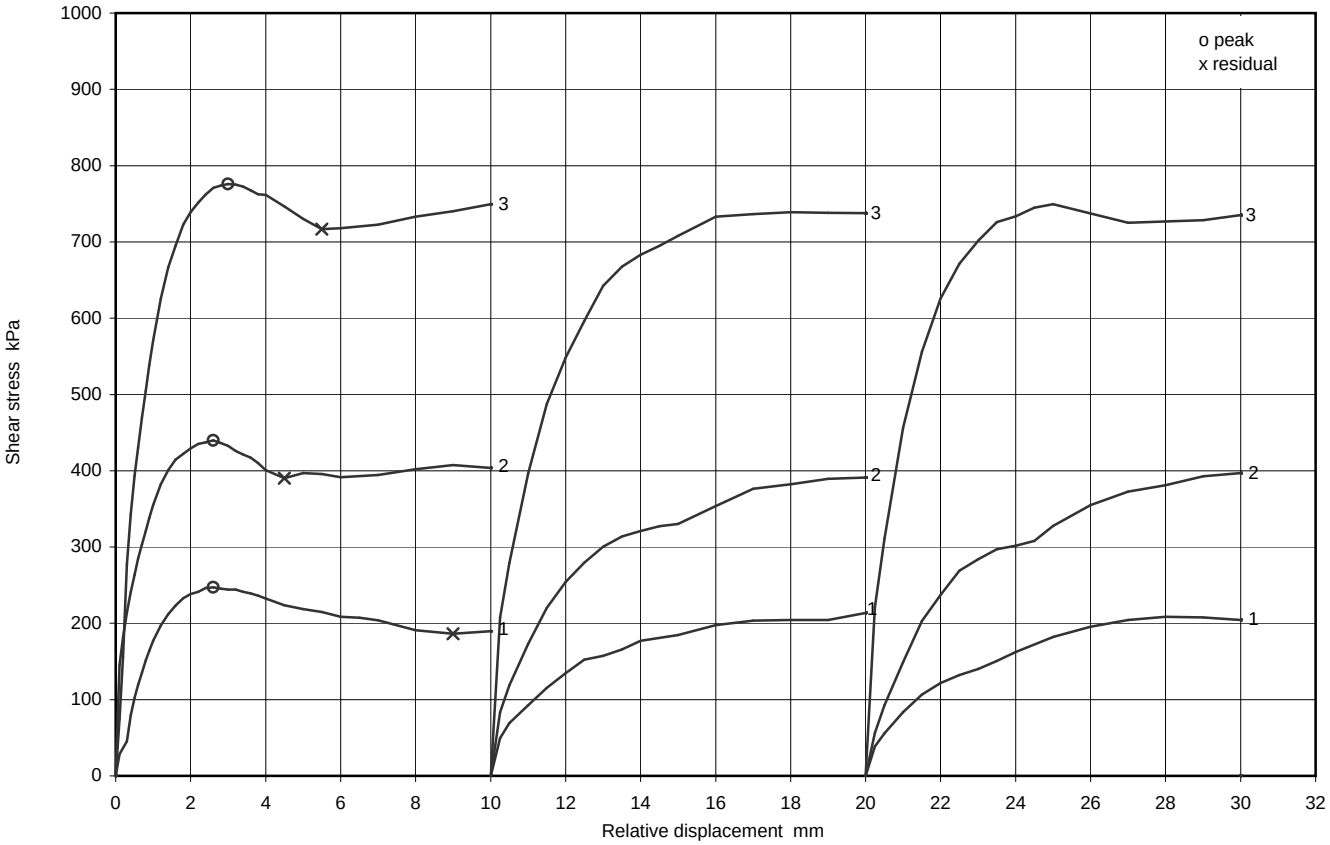
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	43.55 - 44.00	
			Sample No	113	Type U
			ID		
			Spec Ref		

Consolidation stage(s)



Shearing stage(s)





Ref SLR7.4 Rev 85 Oct 10	Soil Mechanics	UKAS TESTING 1157	Printed:14/02/2011 09:14	**Figure** **SSB 11** sheet 2 of 2

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	A0012-10	Sample Details:	Hole No.	CBH2009_9U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	14.15 - 14.60	
			Sample No	44	Type U
			ID		
			Spec Ref		

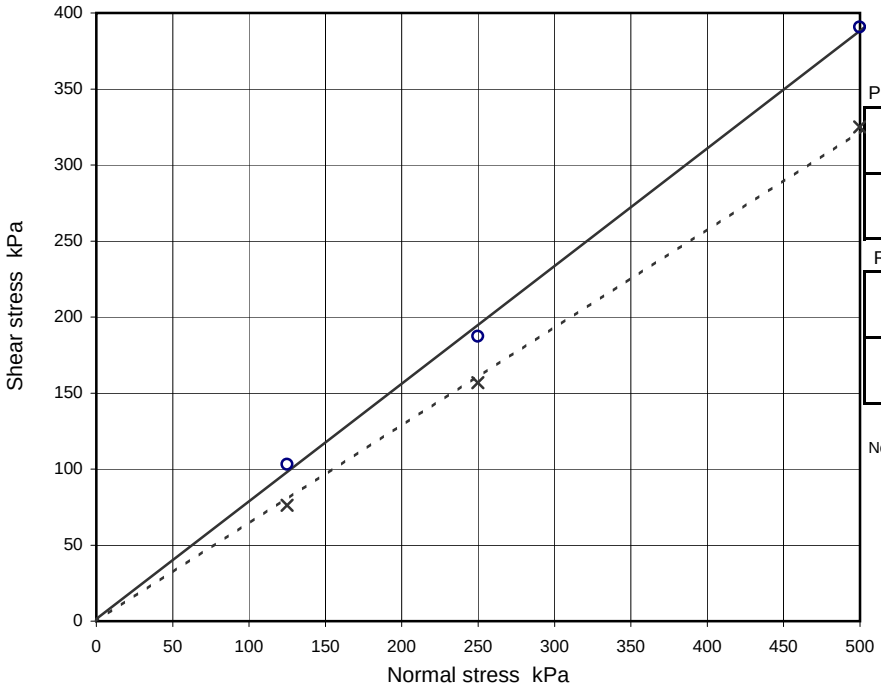
Soil Description	Light brown SAND with shell fragments
Specimen Type /Preparation	UNDISTURBED

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, measured 2.65 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	23.5	23.5	23.5			
	Bulk Density	Mg/m³	2.04	2.00	2.04			
	Water Content	%	19.5	18.6	20.8			
	Dry density	Mg/m³	1.71	1.69	1.69			
	Voids ratio		0.553	0.569	0.567			
	Degree of Saturation	%	93	86	97			
Consol^n	Consolidation / Normal Stress applied	kPa	**125**	**250**	**500**			
	Change in height during consolidation	mm	-0.188	-0.250	-0.550			
	Voids ratio after consolidation		0.541	0.553	0.531			
Shear see note 1	Voids ratio at end of test		0.503	0.468	0.424			
	Moisture content at end of test	%	19.0	17.7	16.0			
	Saturation at end of test	%	100	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.60	0.60	0.60			
	Residual	mm/min	0.60	0.60	0.60			
Peak values, (o)	Relative displacement	mm	1.60	1.80	1.80			
	Shear stress	kPa	103.1	187.4	390.6			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	30.00	20.00	20.00			
	Shear stress	kPa	76.3	156.8	325.0			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	1.5	-
Ø '	degrees	37½	-

Residual strength, (x)			
c '$_R$	kPa	(-7.9)	0.0
Ø '$_R$	degrees	(33½)	32

Notes :

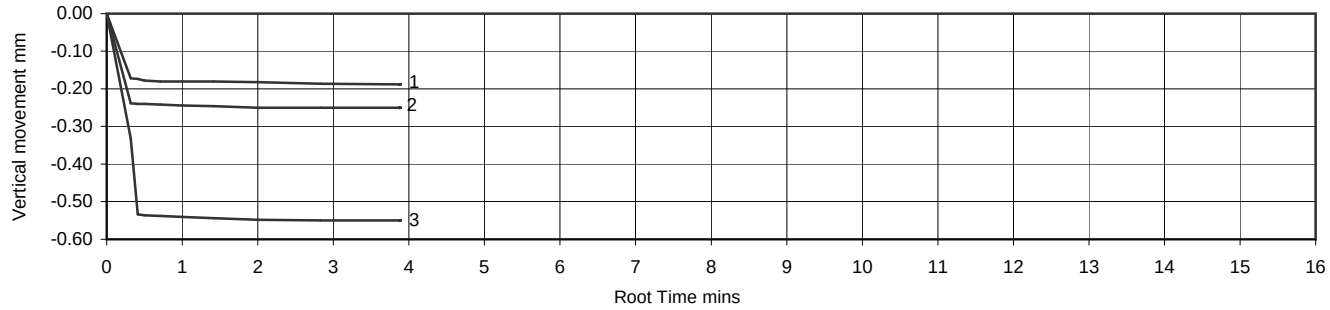
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

2 Box tilted during shear, severe on specimen 2 and 3.

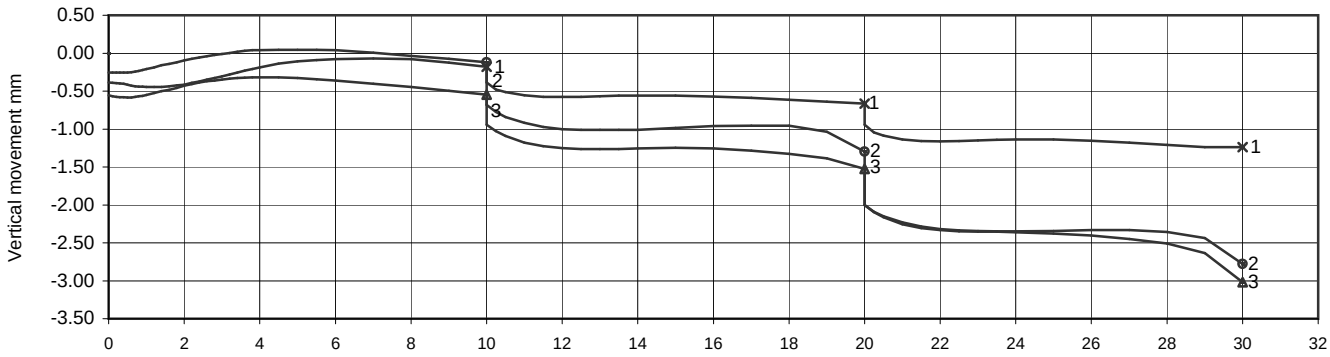
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

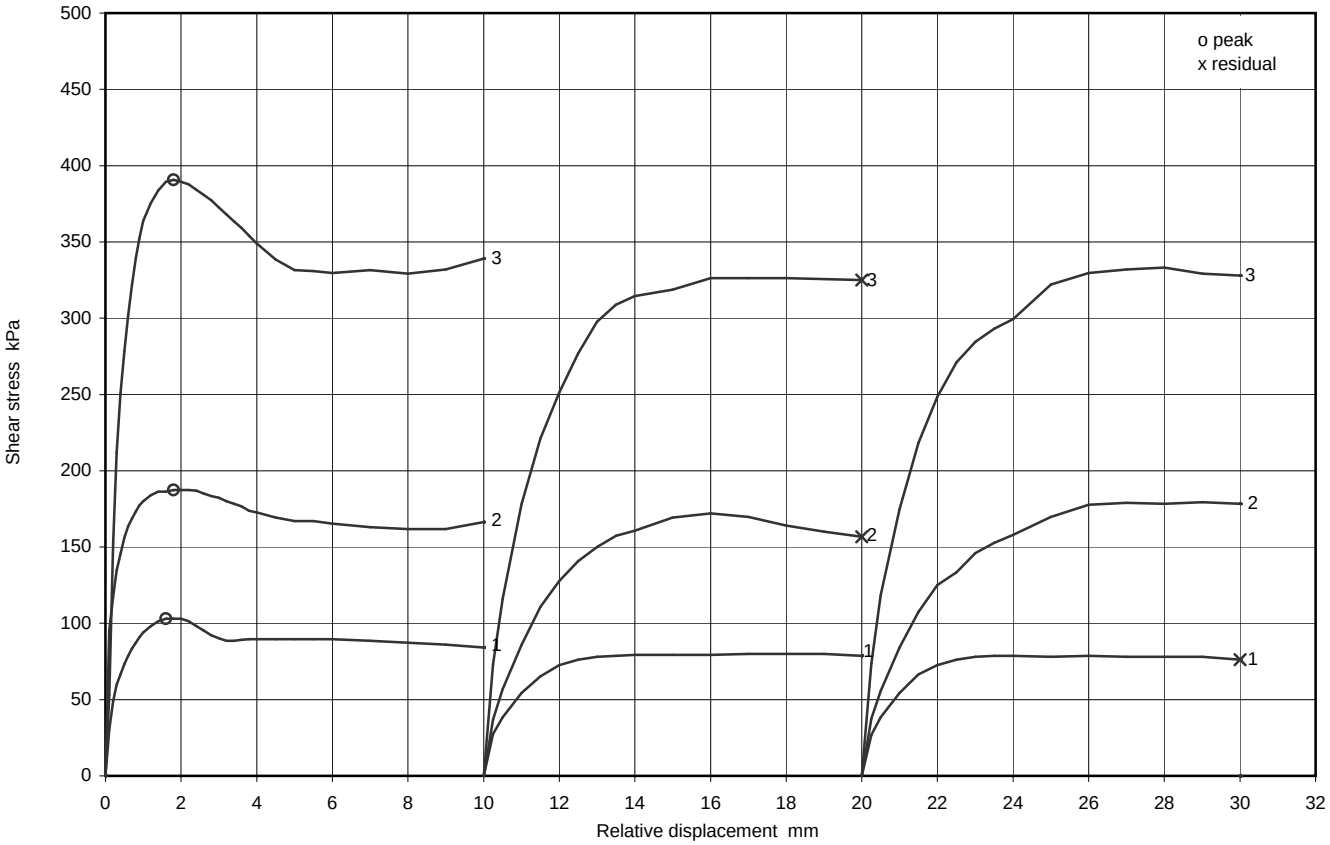
Project No	A0012-10	Sample Details:	Hole No.	CBH2009_9U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	14.15 - 14.60		
			Sample No	44	Type	U
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 85 Oct 10	Soil Mechanics	Printed:14/02/2011 09:14	**SSB 12**
			sheet 2 of 2

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

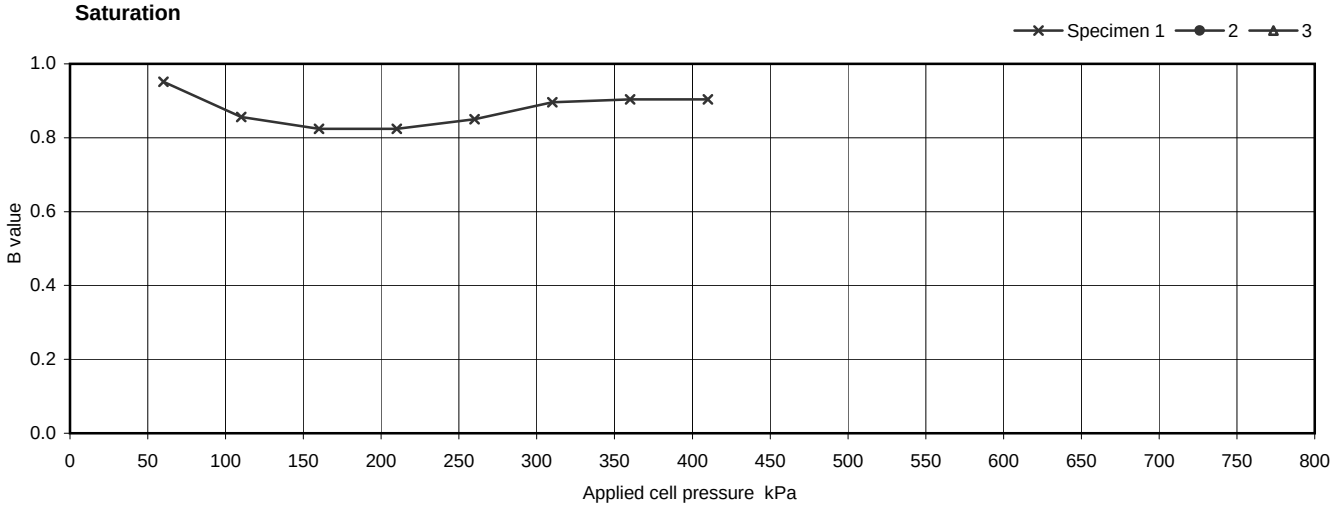
Project No	A0012-10	Sample Details:	Hole No		CBH 2009_1	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		75.24-75.64	
			No	16	Type	CS
			ID			
			Spec Ref			

Specimen Details			1	2	3
Initial	Length	mm	192.6		
	Diameter	mm	95.6		
	Bulk Density	Mg/m³	1.75		
	Water Content	%	43.6		
	Dry density	Mg/m³	1.22		
After consolidation	Length	mm	191.0		
	Diameter	mm	94.8		
	Bulk Density*	Mg/m³	1.79		
	Water Content*	%	43.0		
	Dry density*	Mg/m³	1.25		
After test	Bulk Density*	Mg/m³	1.80		
	Water Content*	%	41.3		
	Dry density*	Mg/m³	1.28		

Soil Description	Stiff brownish grey slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	410		
Final pore water pressure	kPa	350		
Final B Value		0.90		

Saturation

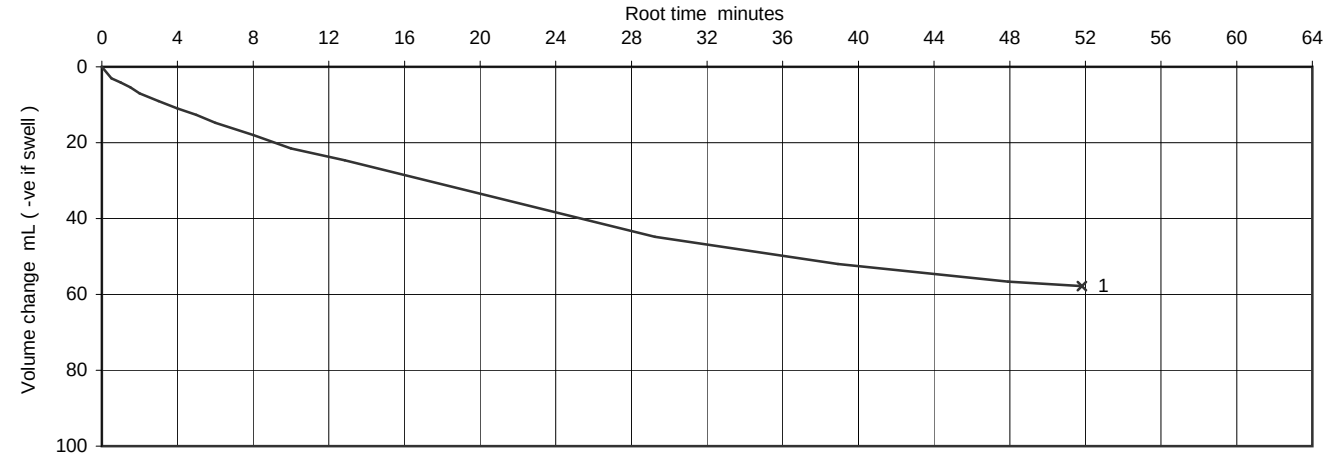


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		650			kPa
	Back Pressure applied		350			kPa
	Effective Pressure		300			kPa
	Pore pressure at start of consolidation		631			kPa
	Pore pressure at end of consolidation		361			kPa
	Pore pressure dissipation at end of consolidation		96			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.32			m^2/year
	Coefficient of Compressibility	M_{vi}	0.15			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	1.5E-11			m/s

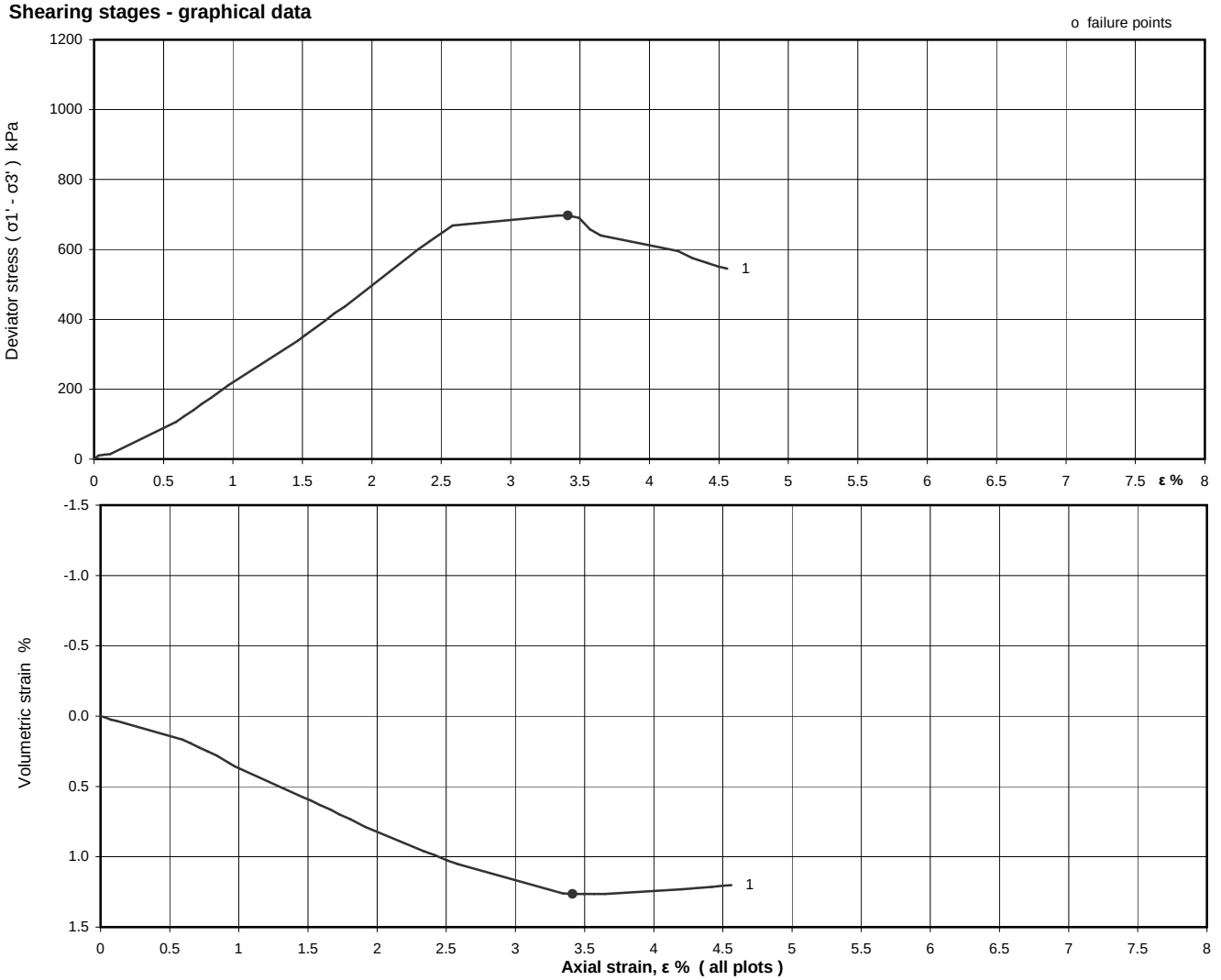
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_1	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		75.24-75.64	
			No	16	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

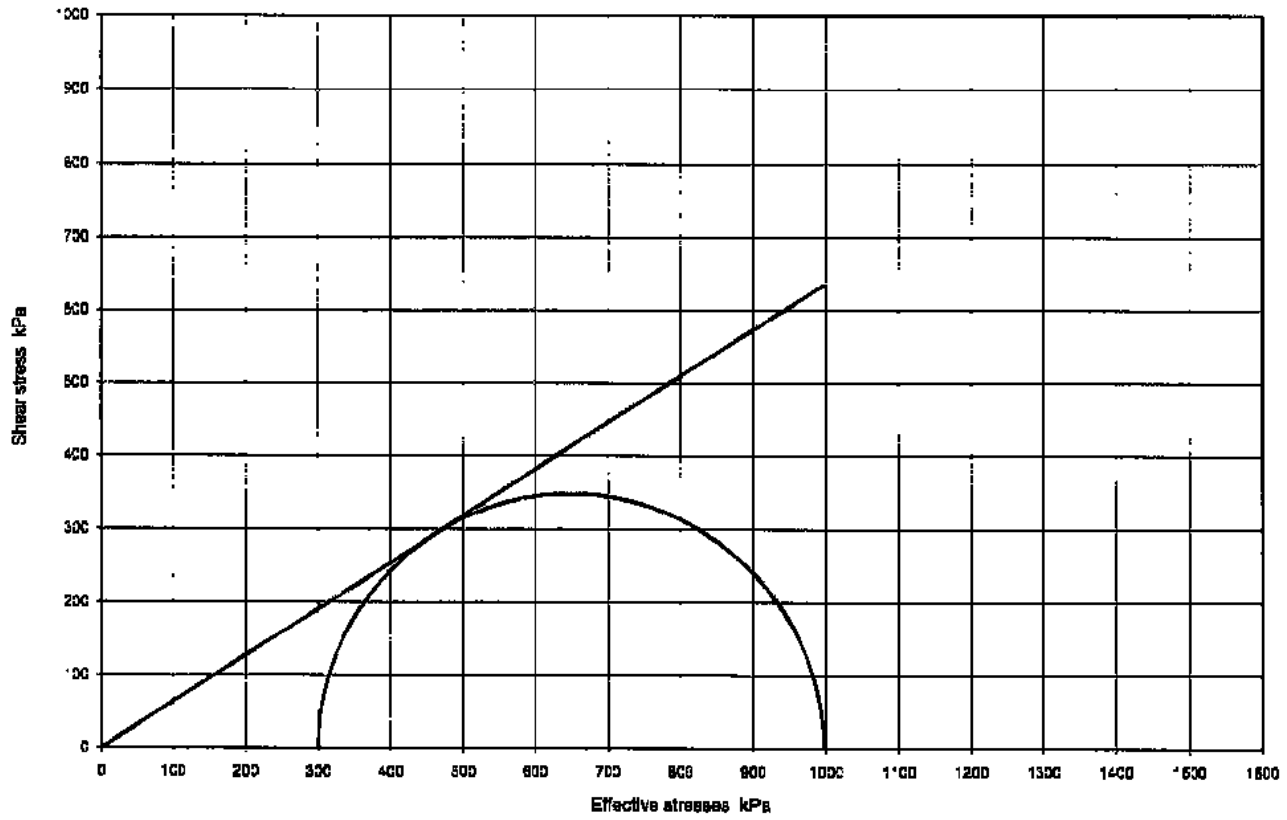


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:28	**CD 1** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	75.24-75.64		
			No	16	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1	
Cell pressure	650	kPa
Initial pwp	350	kPa
Initial σ_3'	300	kPa
Rate of strain	0.04	%/hr

Failure conditions

Criterion	Maximum deviator stress		
Axial strain	3.41		%
$(\sigma_1' - \sigma_3')_f$	696.9		kPa
Volumetric strain	1.26		%
$\sigma_3'_f$	300		kPa
$\sigma_1'_f$	997		kPa
Time to failure	65.3		hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	32.5

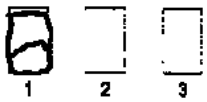
Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure



Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:28	CD 1 sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

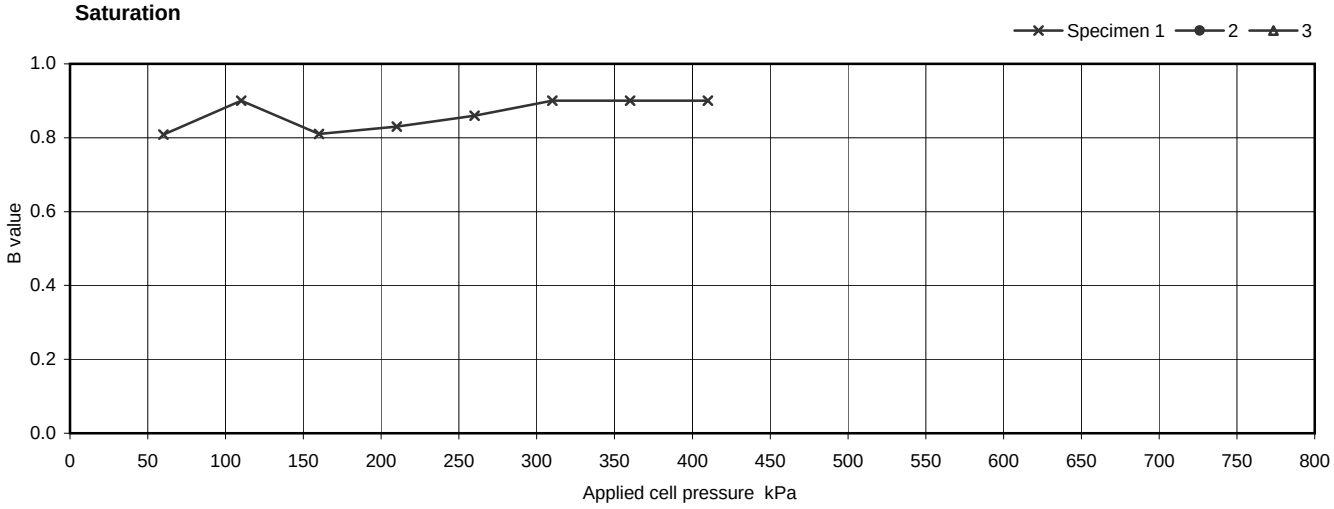
Project No	A0012-10	Sample Details:	Hole No		CBH 2009_1	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		80.10-80.50	
			No	17	Type	CS
			ID			
			Spec Ref			

Specimen Details			1	2	3
Initial	Length	mm	193.7		
	Diameter	mm	93.8		
	Bulk Density	Mg/m³	1.87		
	Water Content	%	34.1		
	Dry density	Mg/m³	1.39		
After consolidation	Length	mm	192.2		
	Diameter	mm	93.1		
	Bulk Density*	Mg/m³	1.90		
	Water Content*	%	33.2		
	Dry density*	Mg/m³	1.42		
After test	Bulk Density*	Mg/m³	1.91		
	Water Content*	%	32.0		
	Dry density*	Mg/m³	1.45		

Soil Description	Very stiff brown silty CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	410		
Final pore water pressure	kPa	350		
Final B Value		0.90		

Saturation

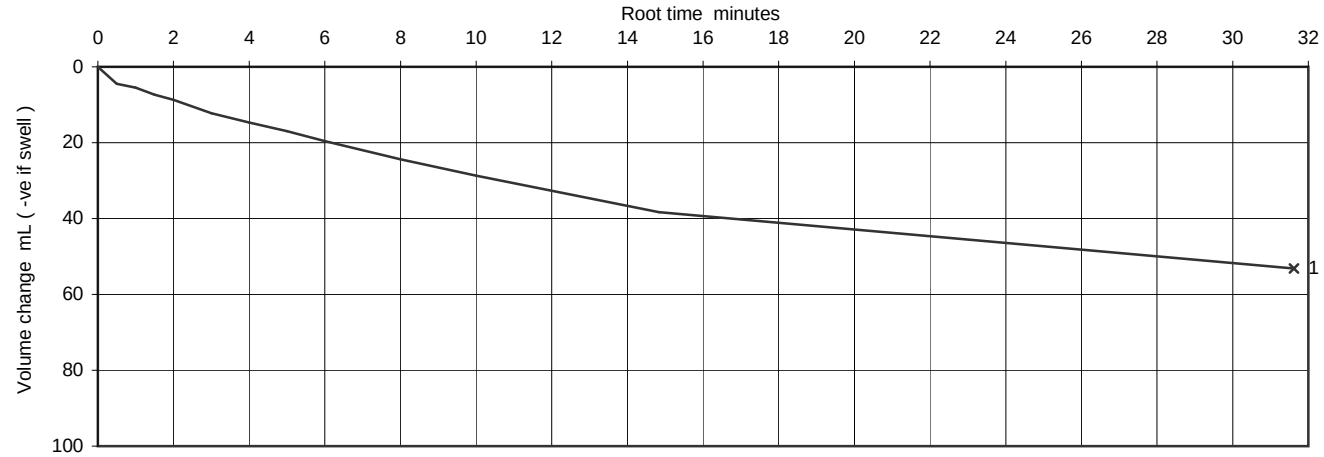


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		670			kPa
	Back Pressure applied		350			kPa
	Effective Pressure		320			kPa
	Pore pressure at start of consolidation		650			kPa
	Pore pressure at end of consolidation		362			kPa
	Pore pressure dissipation at end of consolidation		96			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.59			m^2/year
	Coefficient of Compressibility	M_{vi}	0.14			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	2.5E-11			m/s

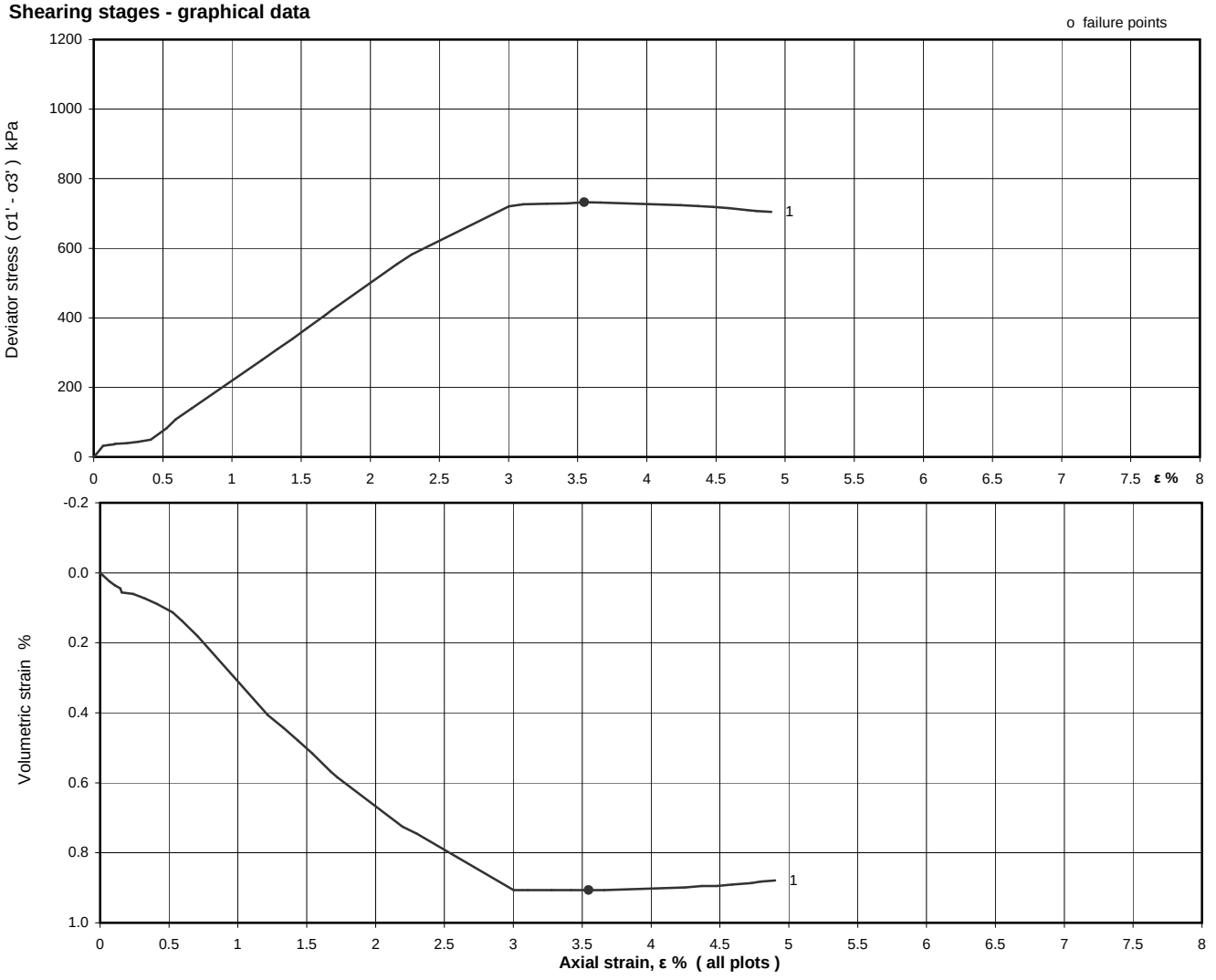
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_1	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		80.10-80.50	
			No	17	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

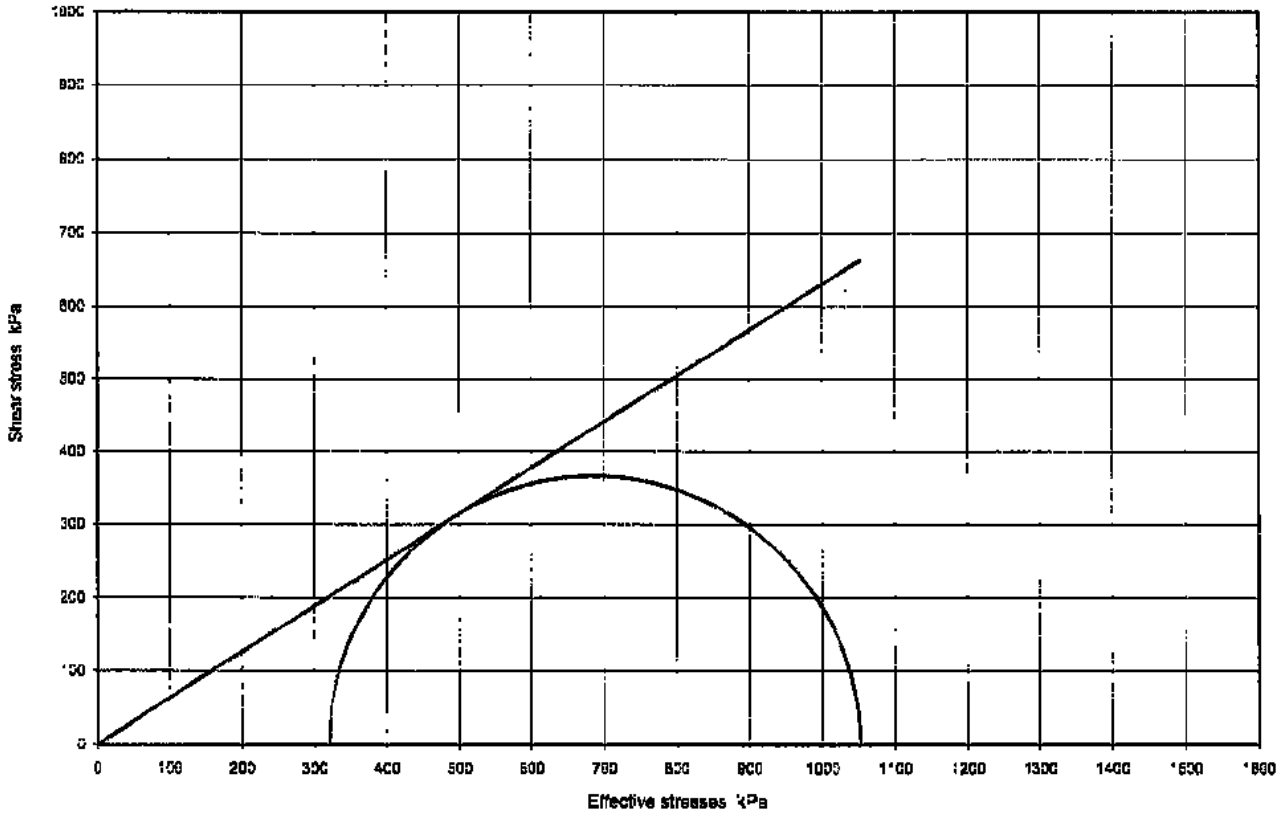


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:30	**CD 2** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_1	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		80.10-80.50	
			No	17	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1	
Cell pressure	670	kPa
Initial pwp	350	kPa
Initial σ_3'	320	kPa
Rate of strain	0.07	%/hr

Failure conditions

Criterion	Maximum deviator stress	
Axial strain	3.55	%
$(\sigma_1' - \sigma_3')_f$	731.9	kPa
Volumetric strain	0.91	%
$\sigma_3'_f$	320	kPa
$\sigma_1'_f$	1052	kPa
Time to failure	50.7	hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	32.2

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

1 2 3

Ref			Figure
SLR8.2 Rev 65 Jan 10	Soil Mechanics	Printed:14/02/2011 09:30	CD 2 sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

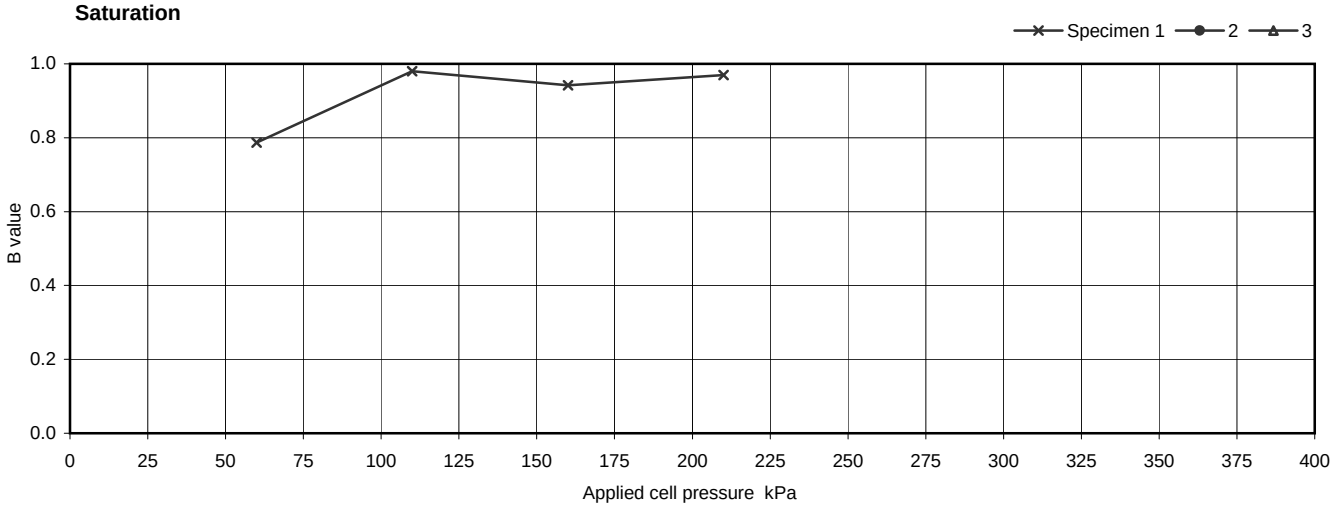
Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	43.40-43.80	
			No	15	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	204.3		
	Diameter	mm	102.6		
	Bulk Density	Mg/m³	1.81		
	Water Content	%	42.7		
	Dry density	Mg/m³	1.27		
After consolidation	Length	mm	200.0		
	Diameter	mm	100.4		
	Bulk Density*	Mg/m³	1.85		
	Water Content*	%	36.7		
	Dry density*	Mg/m³	1.35		
After test	Bulk Density*	Mg/m³	1.87		
	Water Content*	%	35.0		
	Dry density*	Mg/m³	1.39		

Soil Description	Firm to stiff brownish grey slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	210		
Final pore water pressure	kPa	150		
Final B Value		0.97		

Saturation

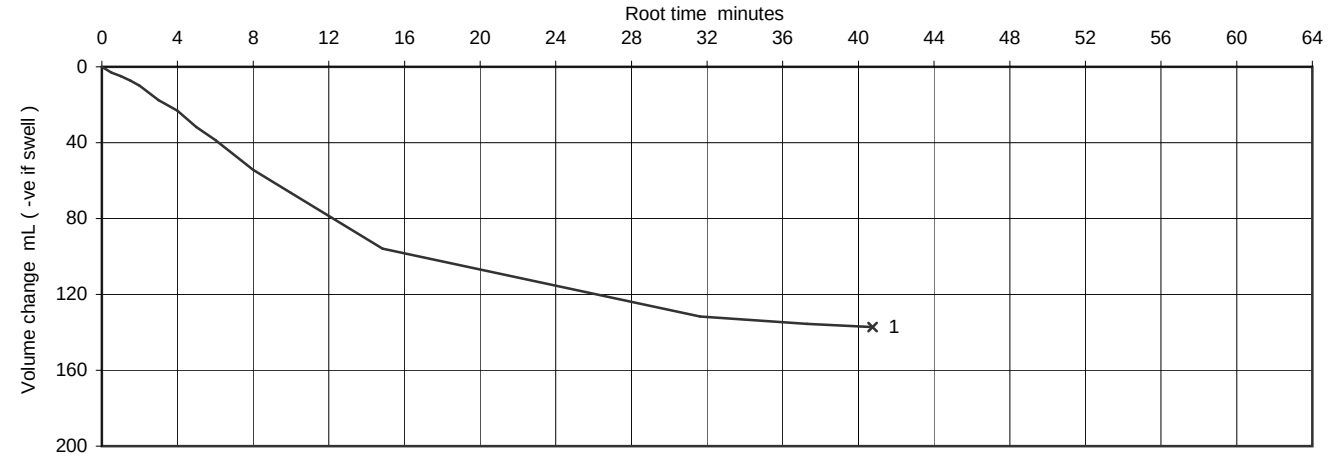


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		655			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		355			kPa
	Pore pressure at start of consolidation		637			kPa
	Pore pressure at end of consolidation		316			kPa
	Pore pressure dissipation at end of consolidation		95			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.66			m^2/year
	Coefficient of Compressibility	M_{vi}	0.25			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	5.0E-11			m/s

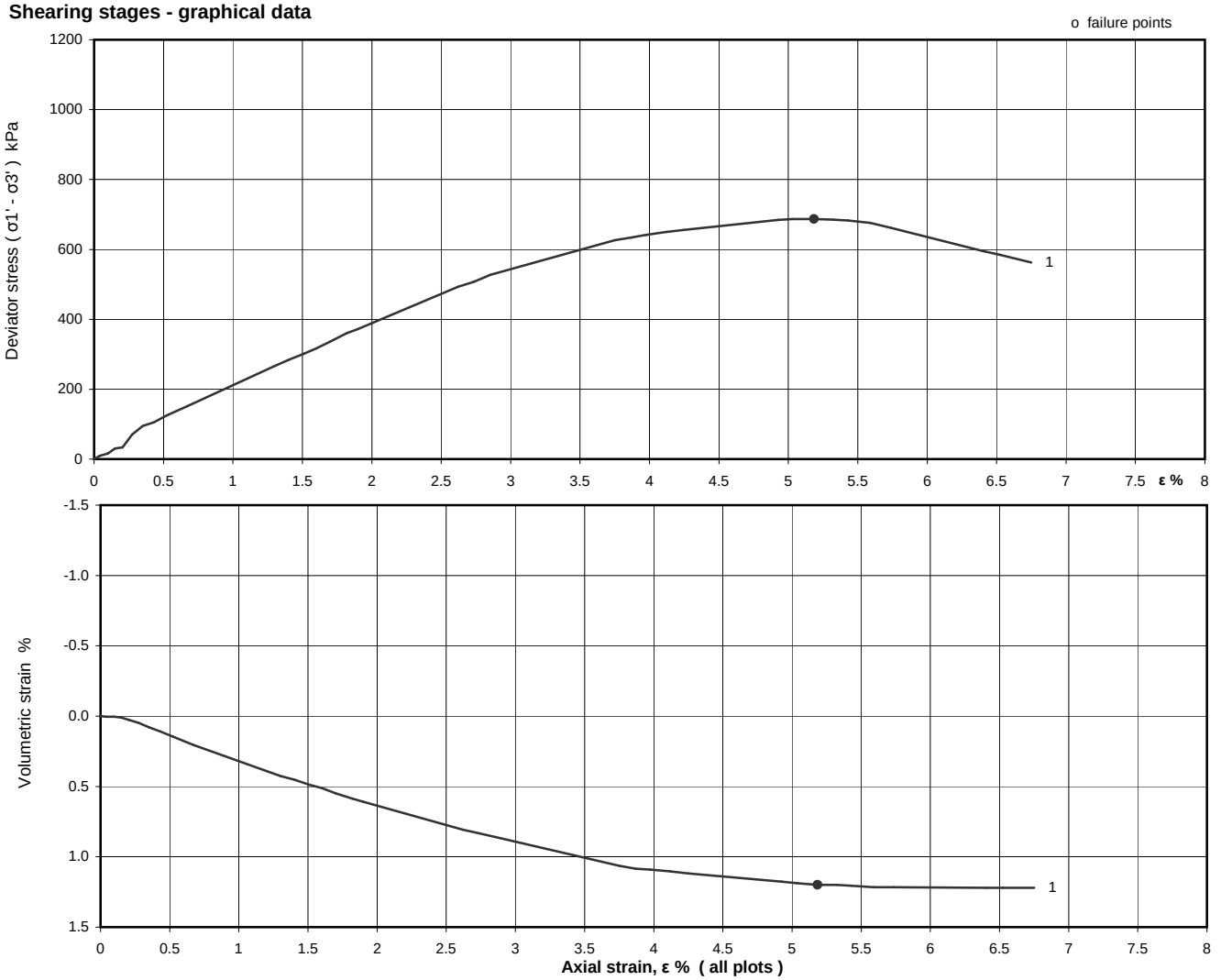
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		43.40-43.80	
			No	15	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data



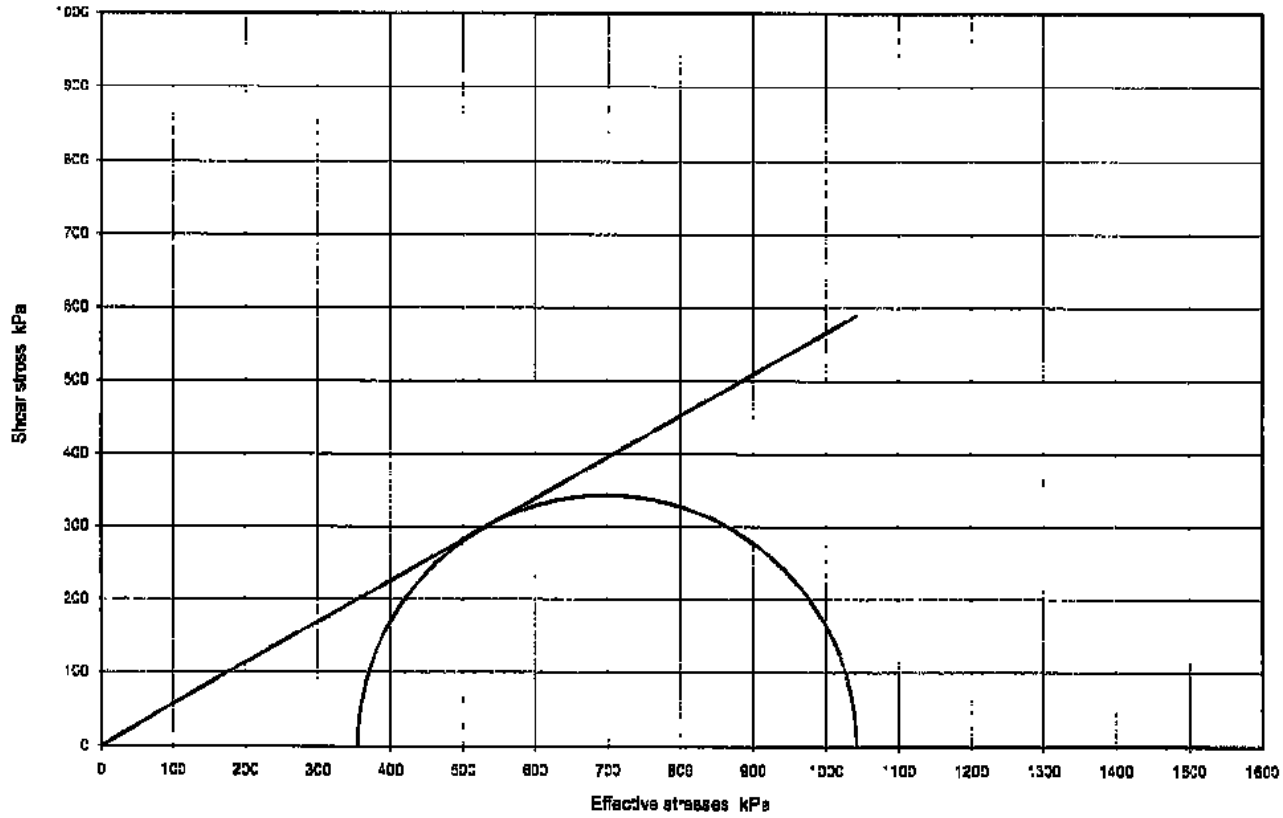
Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:31	**CD 3** sheet 2 of 3

UKAS TESTING 1157

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		43.40-43.80	
			No	15	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen				
Cell pressure	655			kPa
Initial pwp	300			kPa
Initial σ_3'	355			kPa
Rate of strain	0.06			%/hr

Failure conditions

Criterion	Maximum deviator stress			
Axial strain	5.18			%
$(\sigma_1' - \sigma_3')_f$	687.2			kPa
Volumetric strain	1.20			%
$\sigma_3'_f$	355			kPa
$\sigma_1'_f$	1042			kPa
Time to failure	86.4			hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	28.5

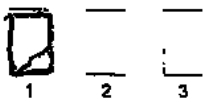
Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure



Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:31	CD 3 sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

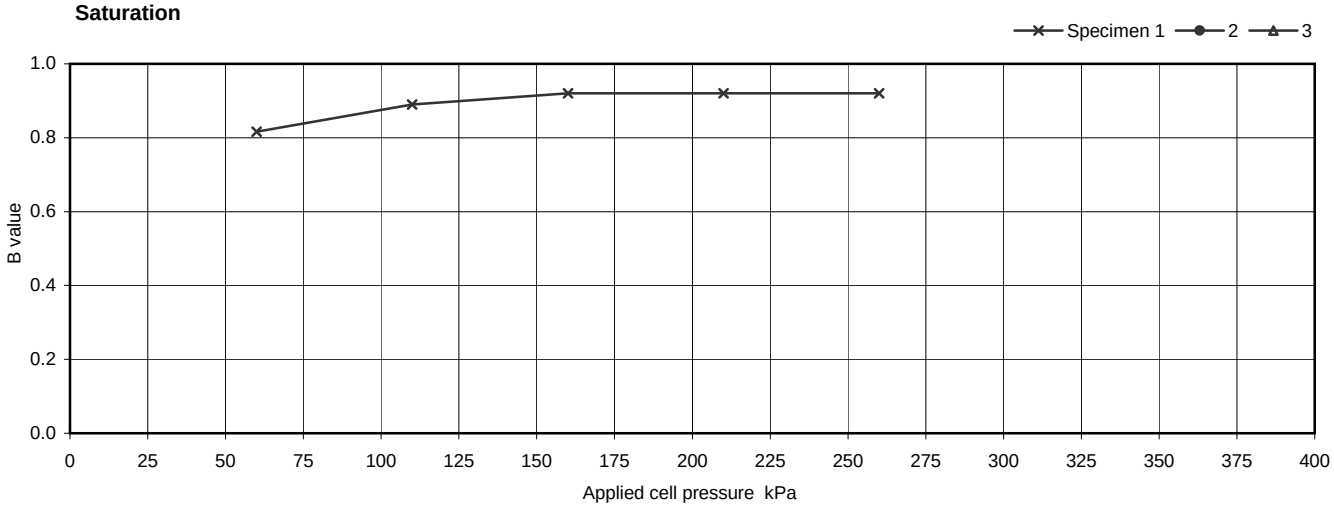
Project No	A0012-10	Sample Details:	Hole No		CBH 2009_2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		49.75-50.15	
			No	16	Type	CS
			ID			
			Spec Ref			

Specimen Details			1	2	3
Initial	Length	mm	183.9		
	Diameter	mm	97.4		
	Bulk Density	Mg/m³	1.76		
	Water Content	%	46.8		
	Dry density	Mg/m³	1.20		
After consolidation	Length	mm	183.5		
	Diameter	mm	97.2		
	Bulk Density*	Mg/m³	1.76		
	Water Content*	%	45.9		
	Dry density*	Mg/m³	1.21		
After test	Bulk Density*	Mg/m³	1.77		
	Water Content*	%	44.6		
	Dry density*	Mg/m³	1.22		

Soil Description	Stiff brownish grey slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	260		
Final pore water pressure	kPa	200		
Final B Value		0.92		

Saturation

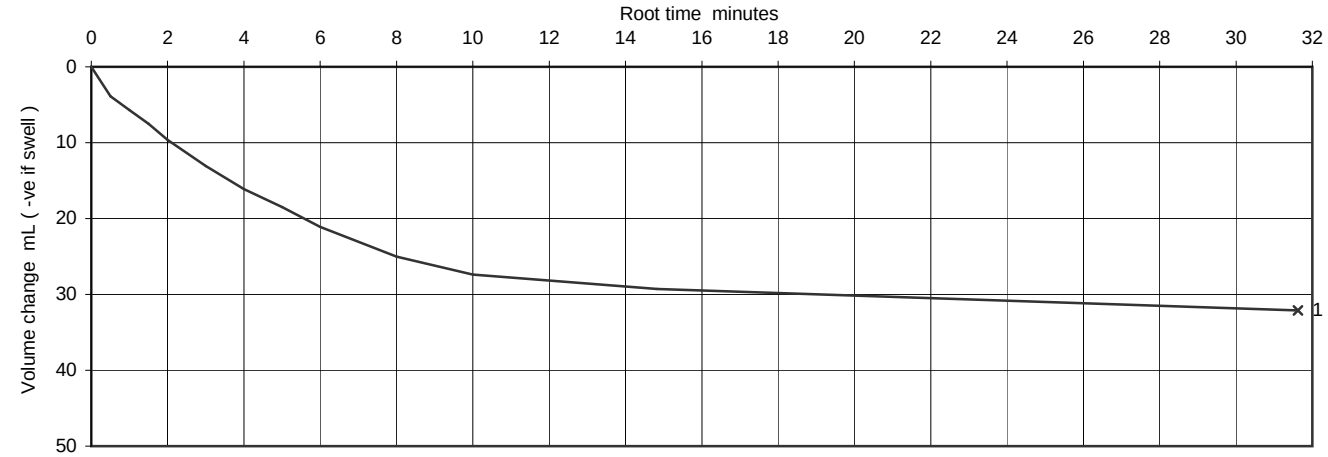


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		500			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		200			kPa
	Pore pressure at start of consolidation		479			kPa
	Pore pressure at end of consolidation		300			kPa
	Pore pressure dissipation at end of consolidation		100			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	3.23			m^2/year
	Coefficient of Compressibility	M_{vi}	0.13			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	1.3E-10			m/s

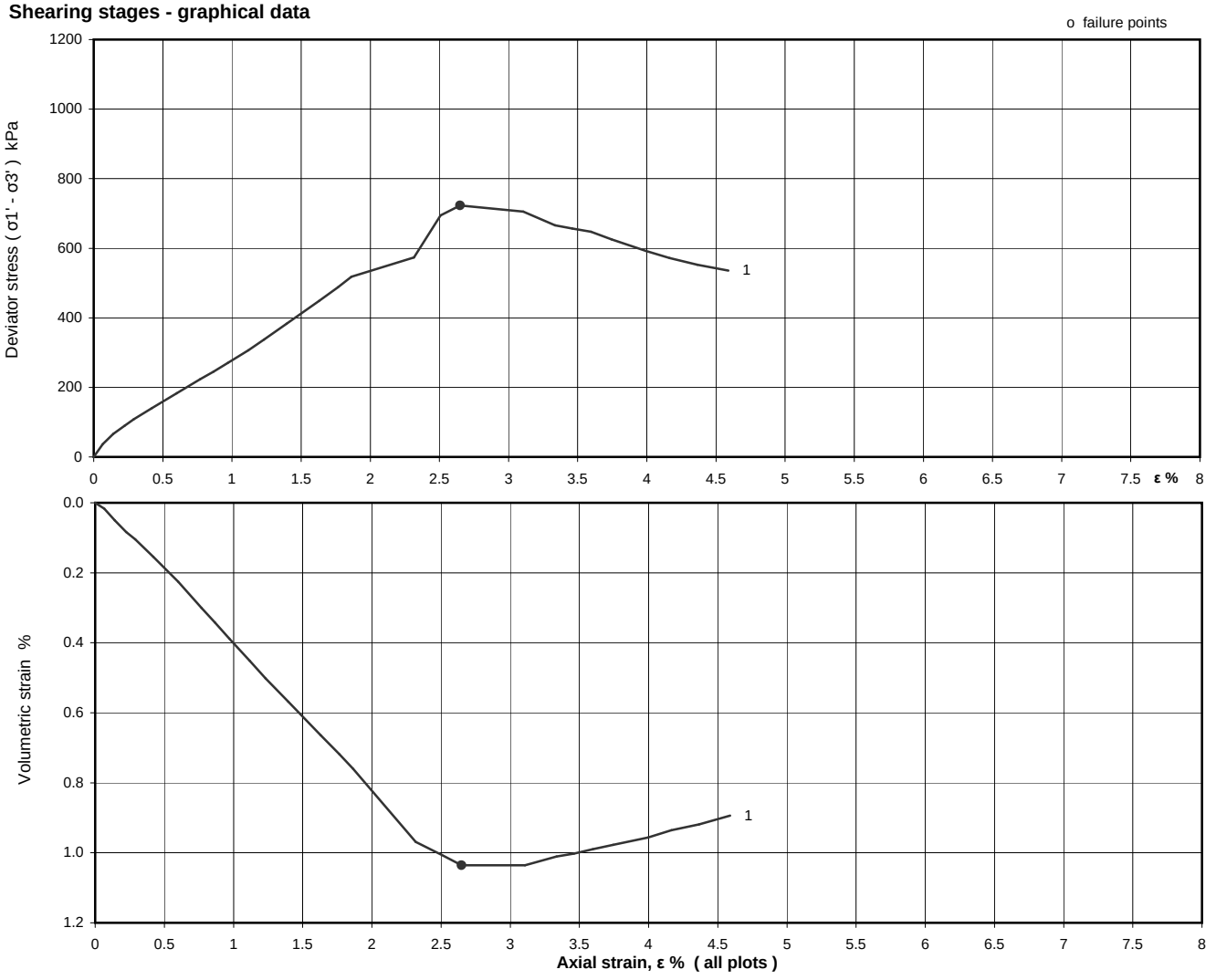
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		49.75-50.15	
			No	16	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

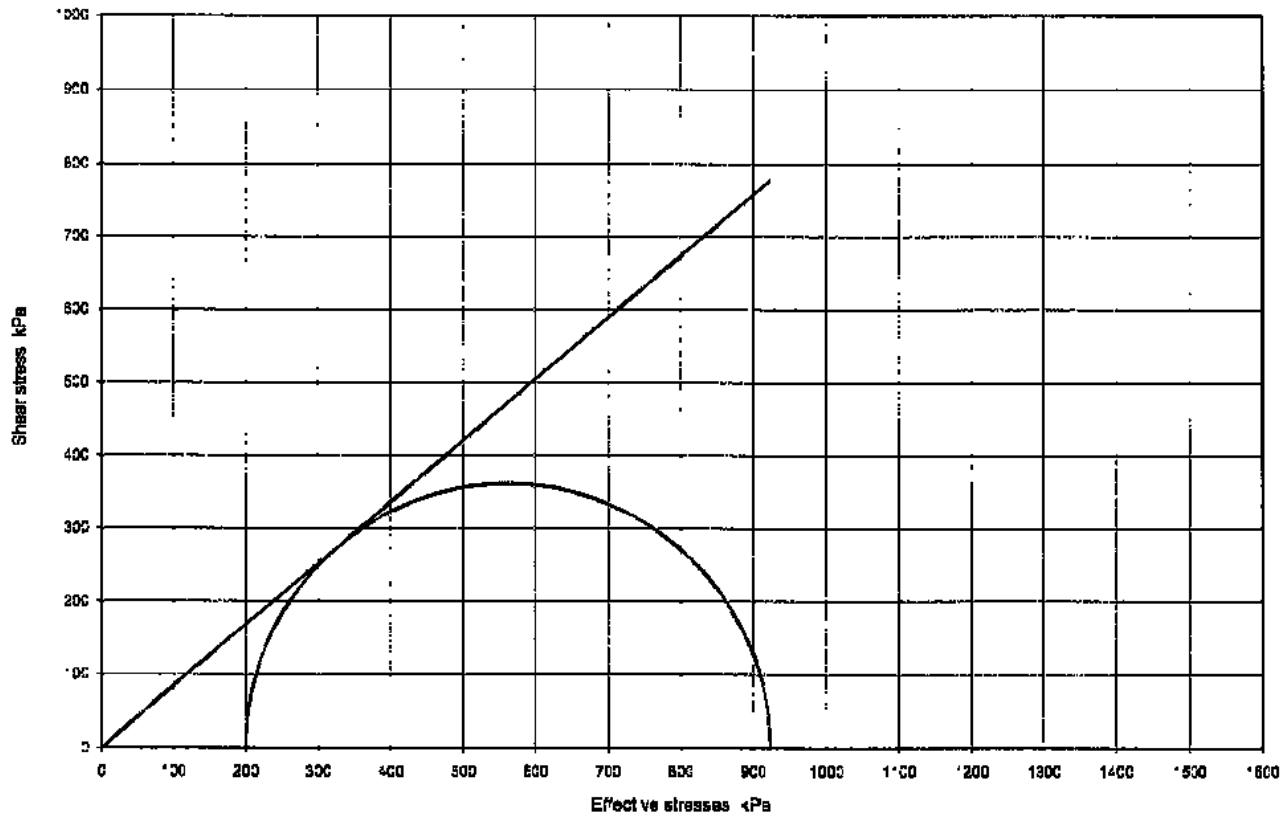


Ref SLR8.2 Rev 85 Jan 10	Soil Mechanics	UKAS TESTING 1157	Printed:14/02/2011 09:33	**Figure** **CD 4** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		49.75-50.15	
			No	16	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1			
Cell pressure	500			kPa
Initial pwp	300			kPa
Initial σ_3'	200			kPa
Rate of strain	0.32			%/hr

Failure conditions

Criterion	Maximum deviator stress		
Axial strain	2.65		%
$(\sigma_1' - \sigma_3')_f$	723.2		kPa
Volumetric strain	1.04		%
$\sigma_3'_f$	200		kPa
$\sigma_1'_f$	923		kPa
Time to failure	8.3		hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	40.1

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

1 2 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

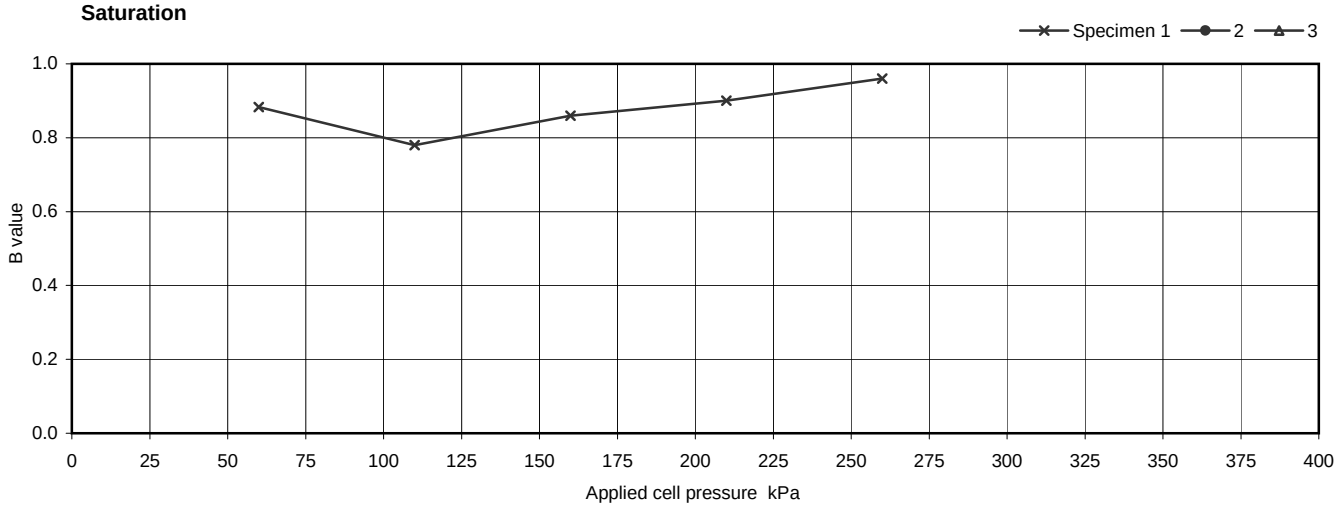
Project No	A0012-10	Sample Details:	Hole No	CBH 2009-2	
Project Name	SIZEWELL		Depth (m BGL)	54.80-55.20	
			No	18	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	204.0		
	Diameter	mm	100.0		
	Bulk Density	Mg/m³	1.94		
	Water Content	%	33.1		
	Dry density	Mg/m³	1.46		
After consolidation	Length	mm	201.2		
	Diameter	mm	98.6		
	Bulk Density*	Mg/m³	1.97		
	Water Content*	%	29.4		
	Dry density*	Mg/m³	1.52		
After test	Bulk Density*	Mg/m³	1.98		
	Water Content*	%	28.4		
	Dry density*	Mg/m³	1.54		

Soil Description	Firm to stiff brownish grey slightly gravelly slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	210		
Final pore water pressure	kPa	200		
Final B Value		0.96		

Saturation

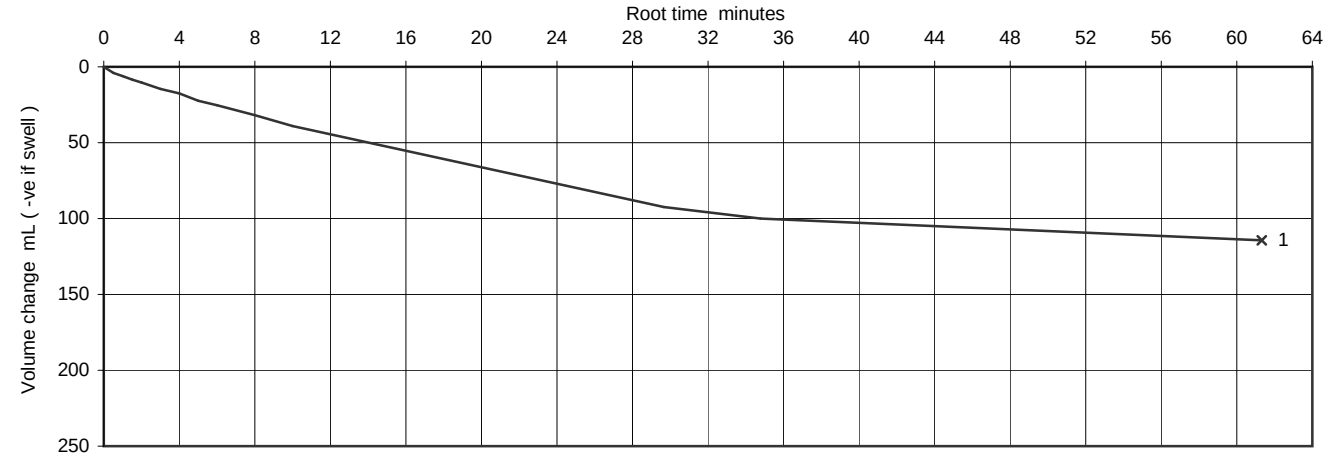


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		520			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		220			kPa
	Pore pressure at start of consolidation		505			kPa
	Pore pressure at end of consolidation		301			kPa
	Pore pressure dissipation at end of consolidation		100			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.29			m^2/year
	Coefficient of Compressibility	M_{vi}	0.12			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	1.1E-11			m/s

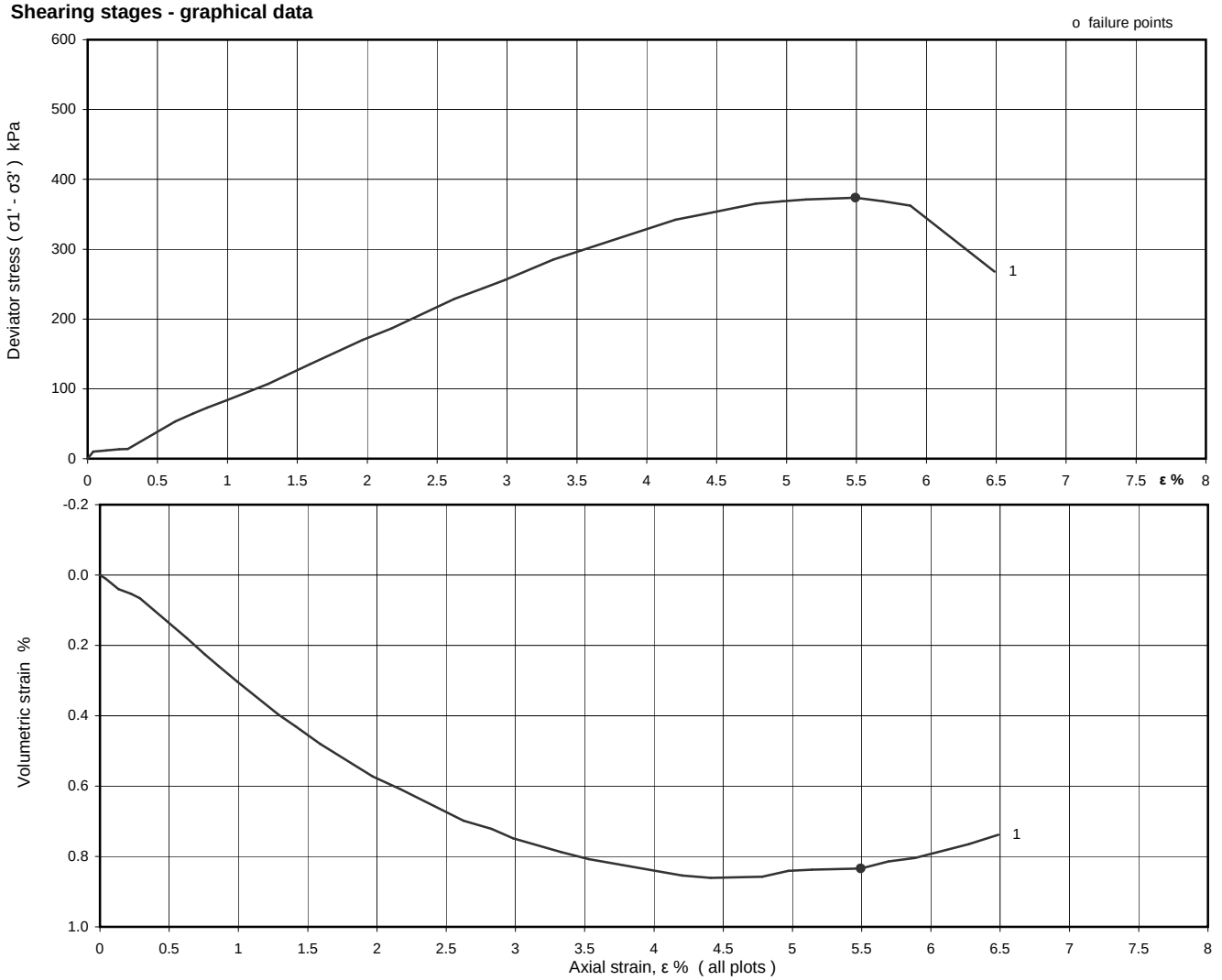
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009-2	
Project Name	SIZEWELL		Depth (m BGL)		54.80-55.20	
			No	18	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data



Ref			Figure
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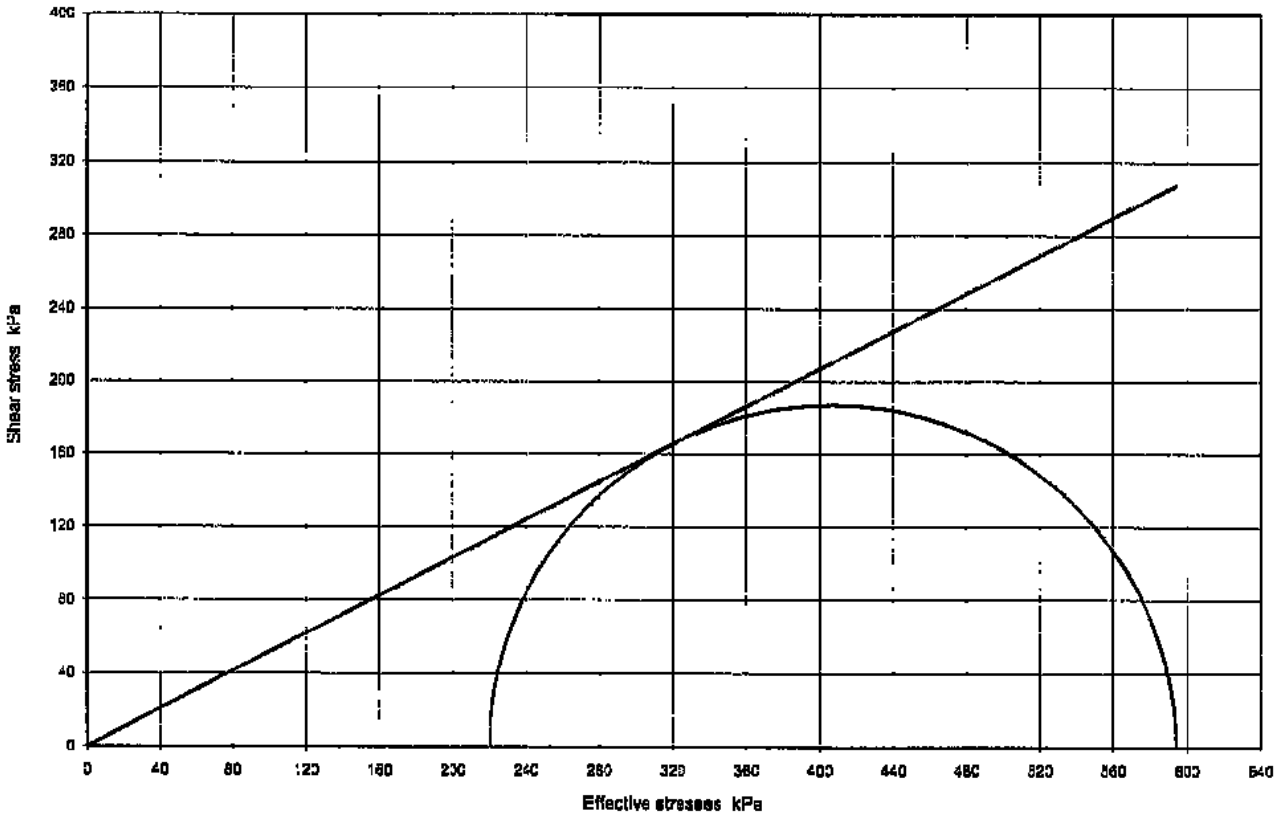
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No	CBH 2009-2		
Project Name	SIZEWELL		Depth (m BGL)	54.80-55.20		
			No	18	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1	
Cell pressure	520	kPa
Initial pwp	300	kPa
Initial σ_3'	220	kPa
Rate of strain	0.03	%/hr

Failure conditions

Criterion	Maximum deviator stress		
Axial strain	5.49		%
$(\sigma_1' - \sigma_3')_f$	373.8		kPa
Volumetric strain	0.83		%
$\sigma_3'_f$	220		kPa
$\sigma_1'_f$	594		kPa
Time to failure	183.1		hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	27.3

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed: 14/02/2011 09:37	CD 5 sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

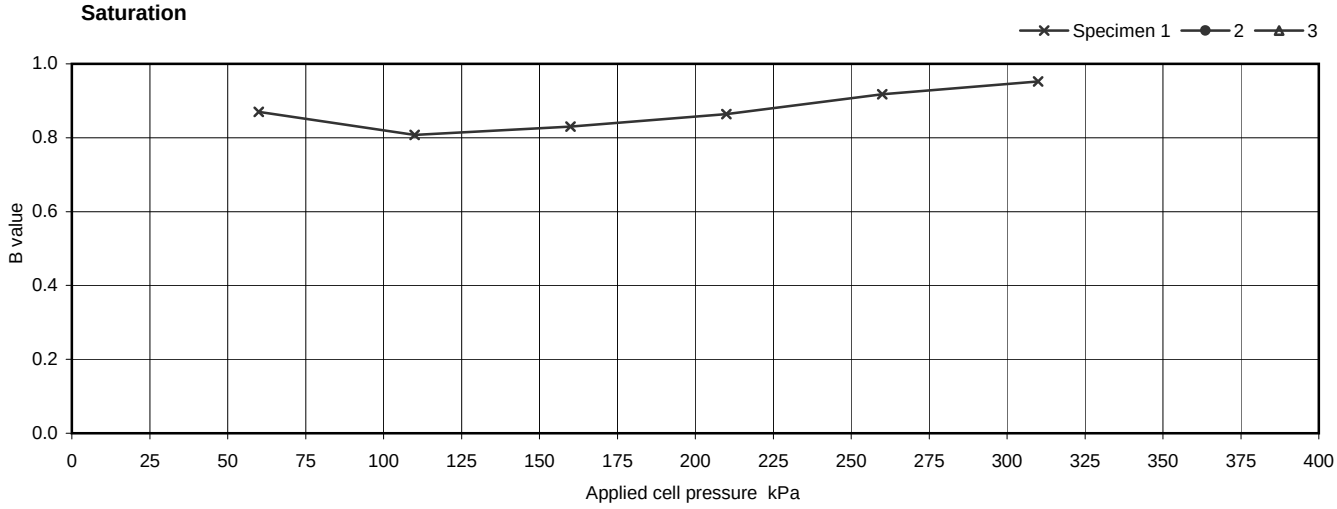
Project No	A0012-10	Sample Details:	Hole No	CBH 2009-2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	74.00 - 74.40	
			No	24	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	204.1		
	Diameter	mm	104.6		
	Bulk Density	Mg/m³	1.74		
	Water Content	%	46.0		
	Dry density	Mg/m³	1.19		
After consolidation	Length	mm	198.7		
	Diameter	mm	101.8		
	Bulk Density*	Mg/m³	1.81		
	Water Content*	%	40.0		
	Dry density*	Mg/m³	1.30		
After test	Bulk Density*	Mg/m³	1.82		
	Water Content*	%	39.5		
	Dry density*	Mg/m³	1.30		

Soil Description	Stiff greyish brown CLAY becoming dark brownish grey slightly sandy CLAY at base with localised softening
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	310		
Final pore water pressure	kPa	250		
Final B Value		0.95		

Saturation

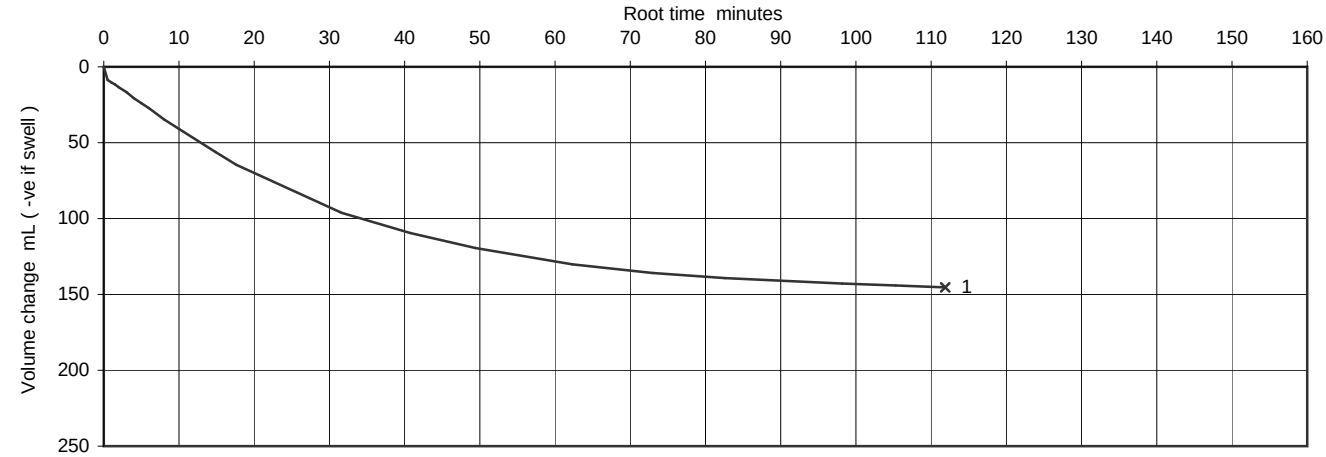


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		890			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		590			kPa
	Pore pressure at start of consolidation		865			kPa
	Pore pressure at end of consolidation		330			kPa
	Pore pressure dissipation at end of consolidation		95			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.19			m^2/year
	Coefficient of Compressibility	M_{vi}	0.15			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	8.9E-12			m/s

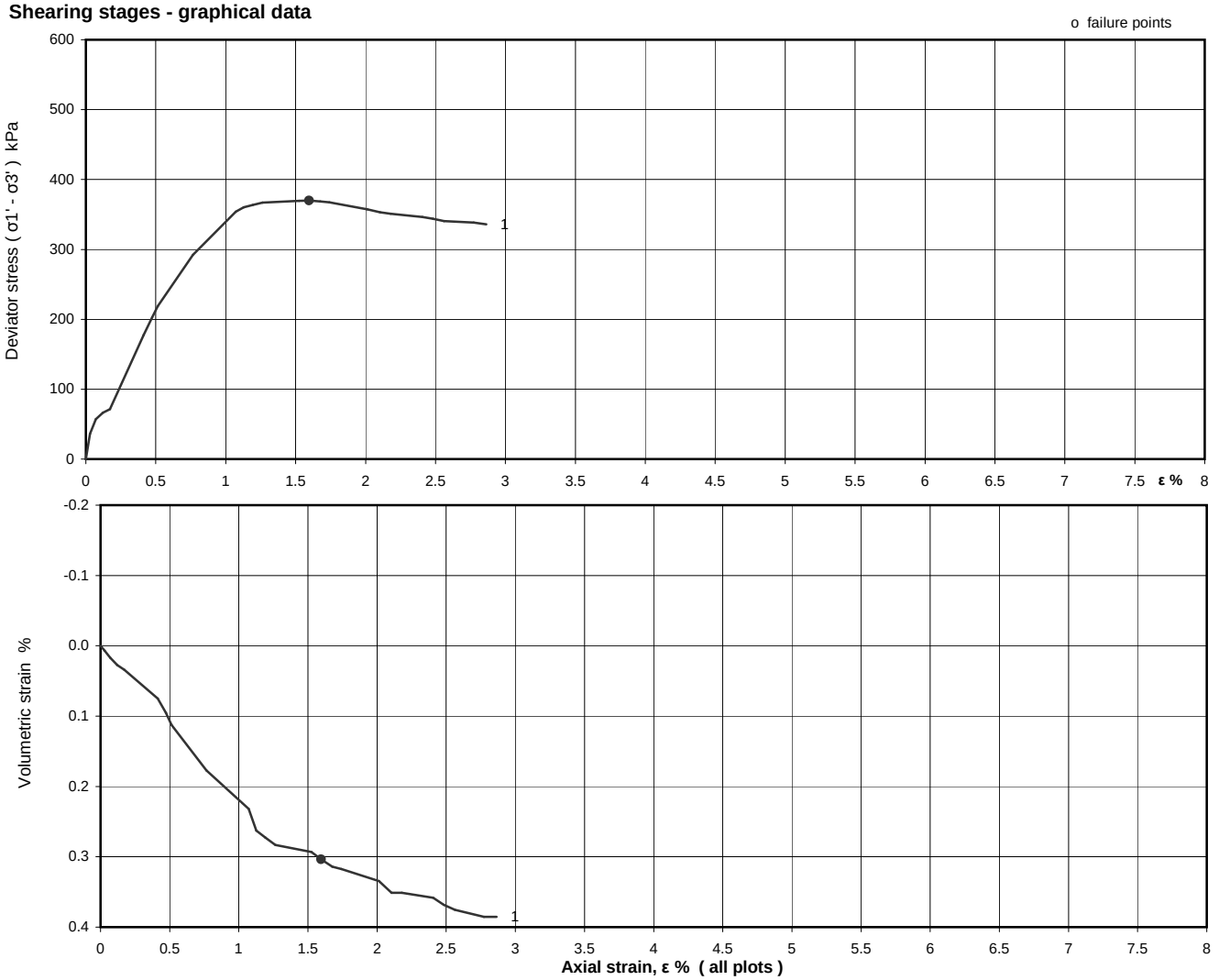
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009-2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		74.00 - 74.40	
			No	24	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

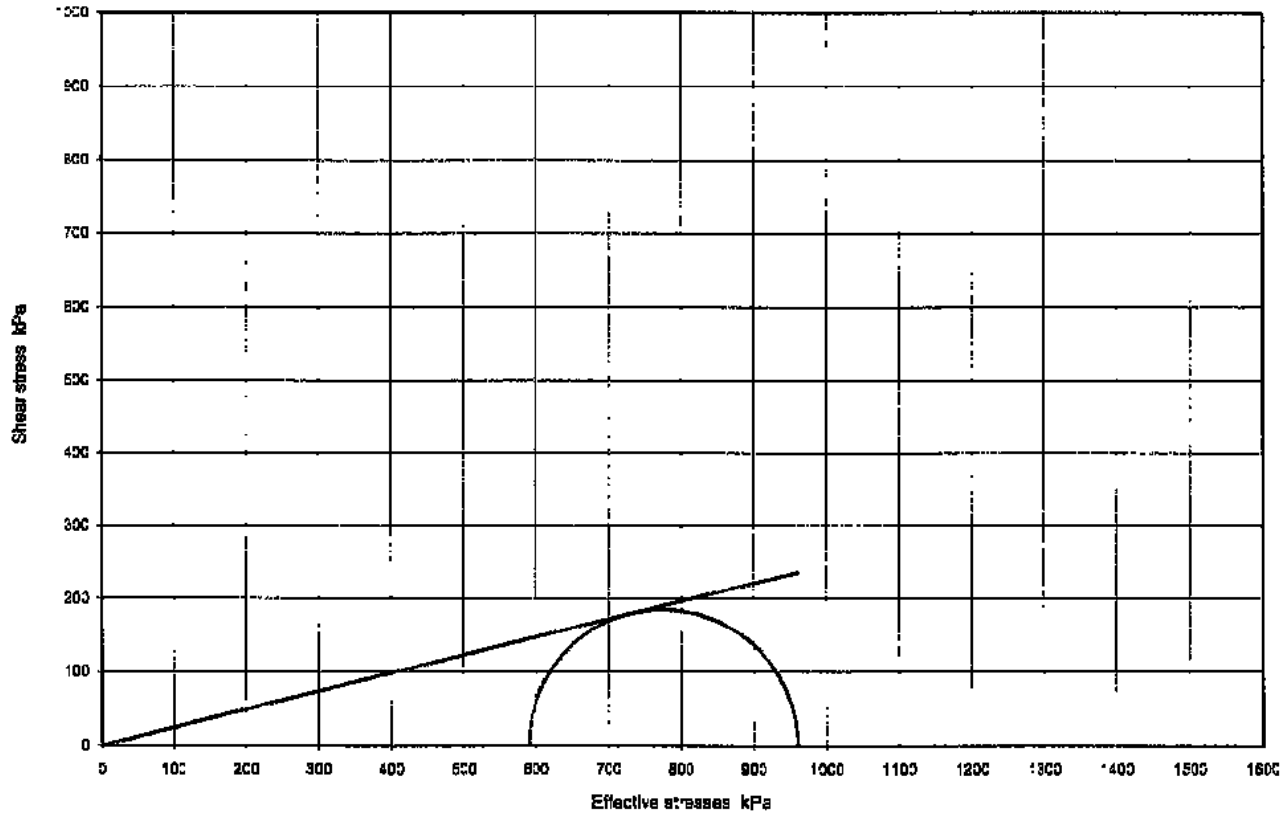


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:39	**CD 6** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009-2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		74.00 - 74.40	
			No	24	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1		
Cell pressure	880		kPa
Initial pwp	300		kPa
Initial σ_3'	580		kPa
Rate of strain	0.02		%/hr

Failure conditions

Criterion	Maximum deviator stress		
Axial strain	7.60		%
$(\sigma_1' - \sigma_3')_f$	370.0		kPa
Volumetric strain	0.30		%
$\sigma_3'_f$	580		kPa
$\sigma_1'_f$	950		kPa
Time to failure	106.4		hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	13.8

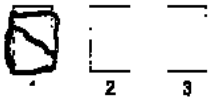
Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.8 mm thick rubber membrane(s)

Mode of failure



Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

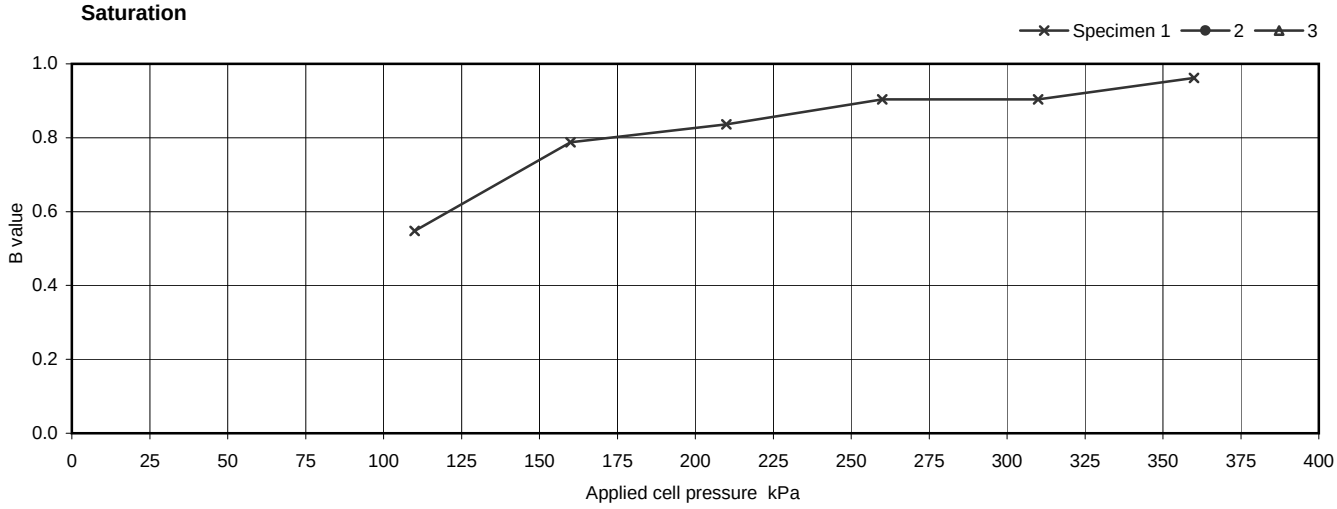
Project No	A0012-10	Sample Details:	Hole No	CBH 2009-2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	77.10-77.50	
			No	25	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	194.2		
	Diameter	mm	106.7		
	Bulk Density	Mg/m³	1.69		
	Water Content	%	45.3		
	Dry density	Mg/m³	1.16		
After consolidation	Length	mm	187.2		
	Diameter	mm	102.8		
	Bulk Density*	Mg/m³	1.82		
	Water Content*	%	39.5		
	Dry density*	Mg/m³	1.30		
After test	Bulk Density*	Mg/m³	1.83		
	Water Content*	%	38.7		
	Dry density*	Mg/m³	1.32		

Soil Description	Stiff greyish brown slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	360		
Final pore water pressure	kPa	300		
Final B Value		0.96		

Saturation

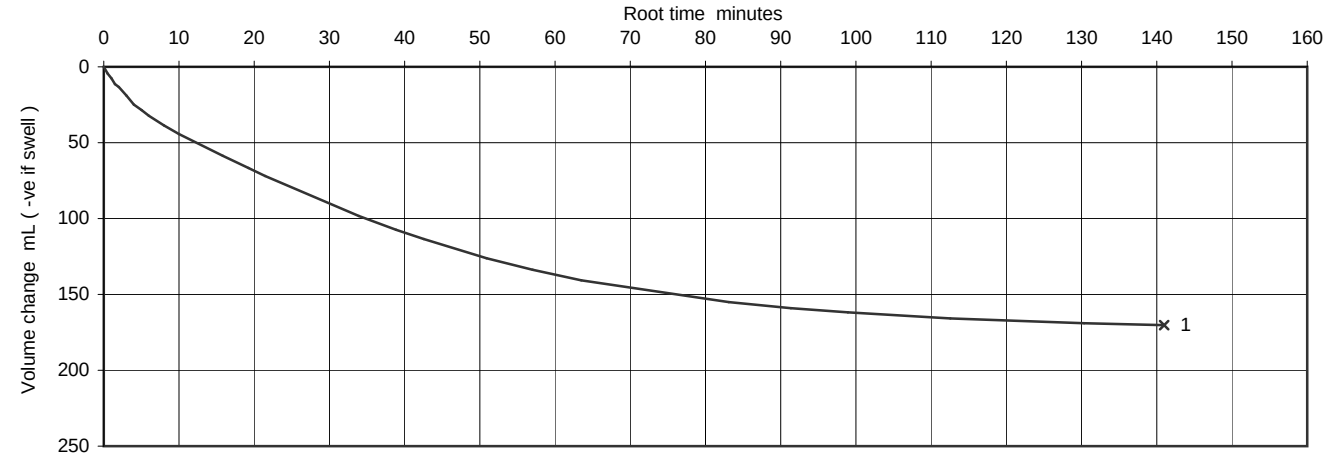


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		1555			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		1255			kPa
	Pore pressure at start of consolidation		1508			kPa
	Pore pressure at end of consolidation		363			kPa
	Pore pressure dissipation at end of consolidation		95			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.24			m^2/year
	Coefficient of Compressibility	M_{vi}	0.09			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	6.5E-12			m/s

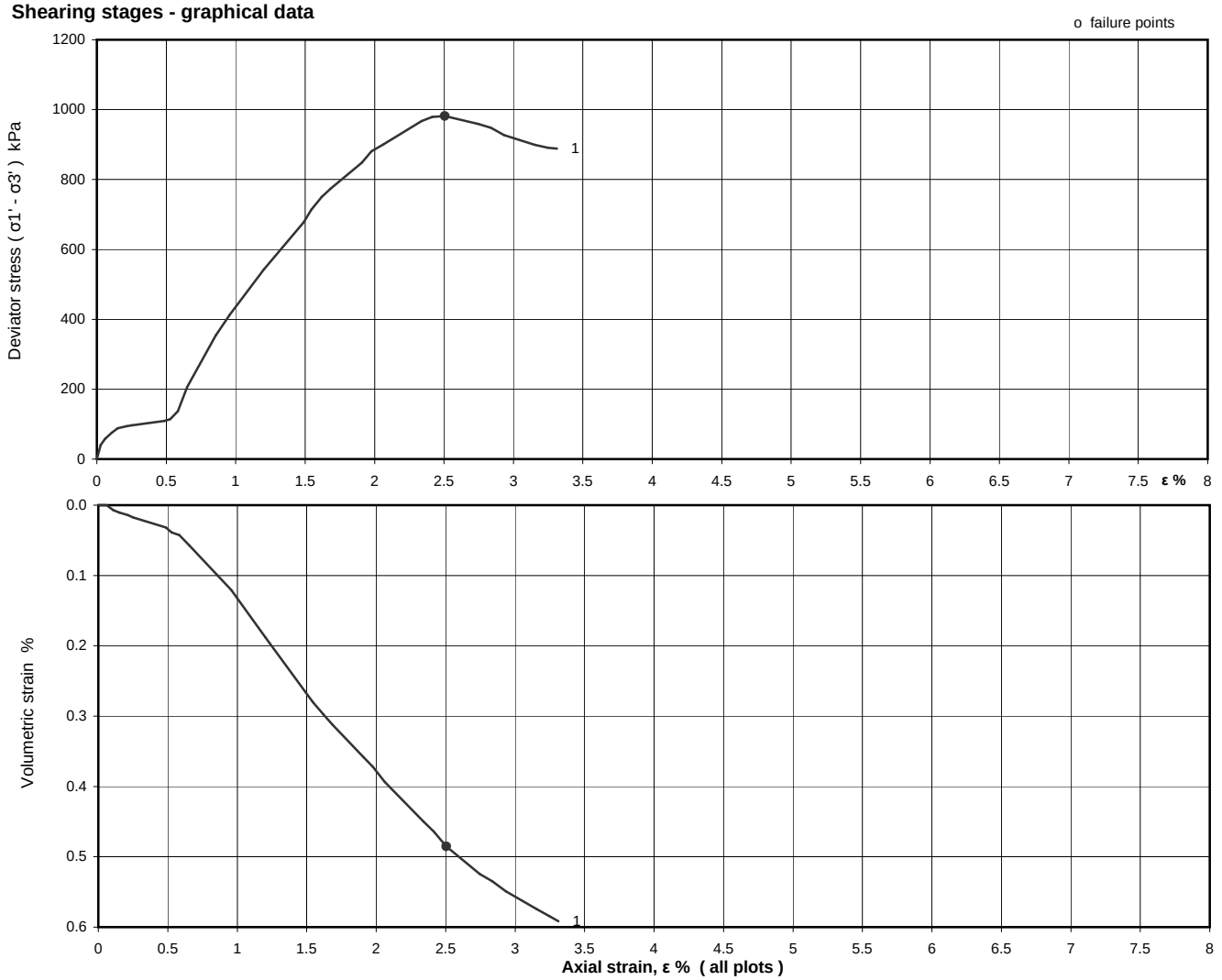
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009-2	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		77.10-77.50	
			No	25	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

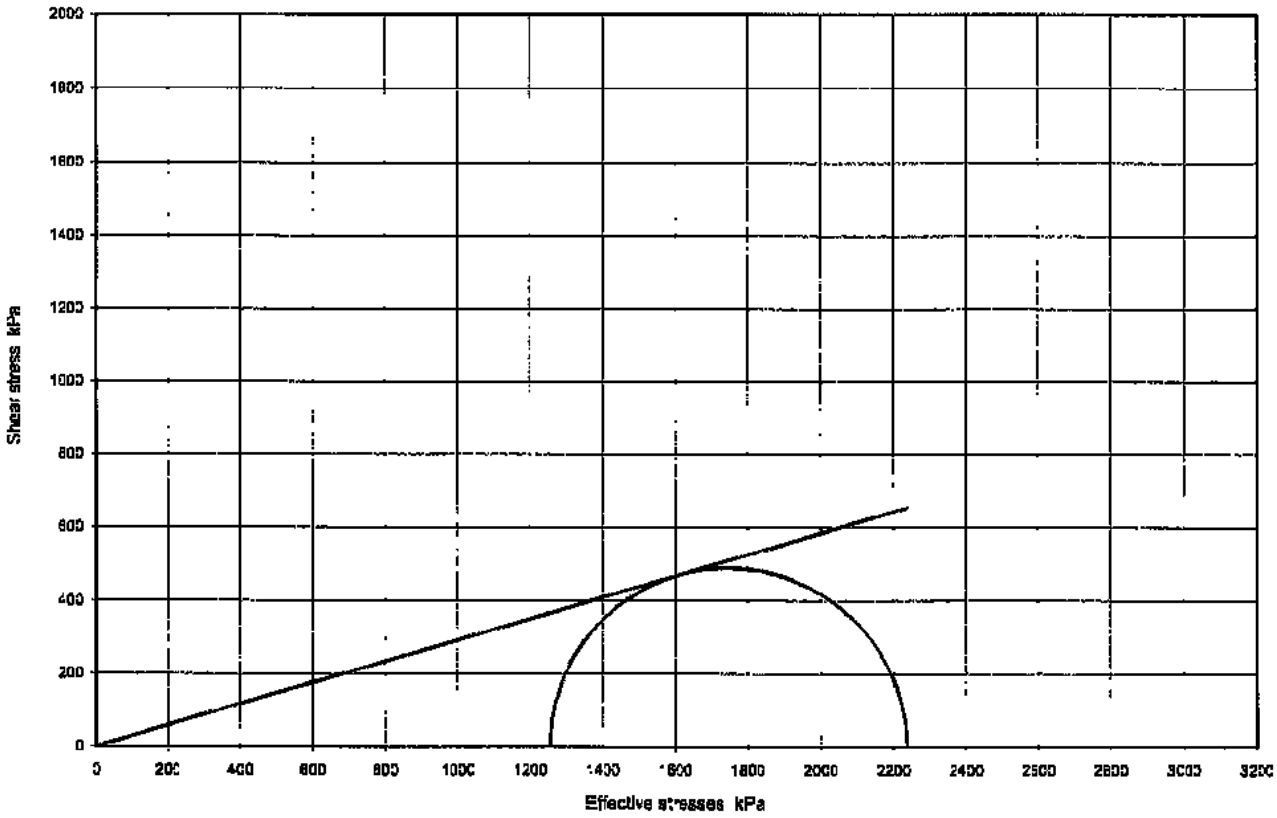


Ref SLR8.2 Rev 85 Jan 10	Soil Mechanics	UKAS TESTING 1157	Printed:14/02/2011 09:41	**Figure** **CD 7** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A00*2-*0	Sample Details:	Hole No	CBH 2009-2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	77.10-77.50		
			No	25	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1		
Cell pressure	1655		kPa
Initial pwp	330		kPa
Initial σ_3'	1255		kPa
Rate of strain	0.02		%/hr

Failure conditions

Criterion	Maximum deviator stress		
Axial strain	2.51		%
$(\sigma_1' - \sigma_3')_f$	981.4		kPa
Volumetric strain	0.49		%
$\sigma_3'_f$	1255		kPa
$\sigma_1'_f$	2236		kPa
Time to failure	167.0		hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	16.3

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.9 mm thick rubber membrane(s)

Mode of failure

1 2 3

Ref SLR8.2 Rev 85 Jan 10	Soil Mechanics		Printed: 4/02/2011 09:41	Figure CD 7 sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

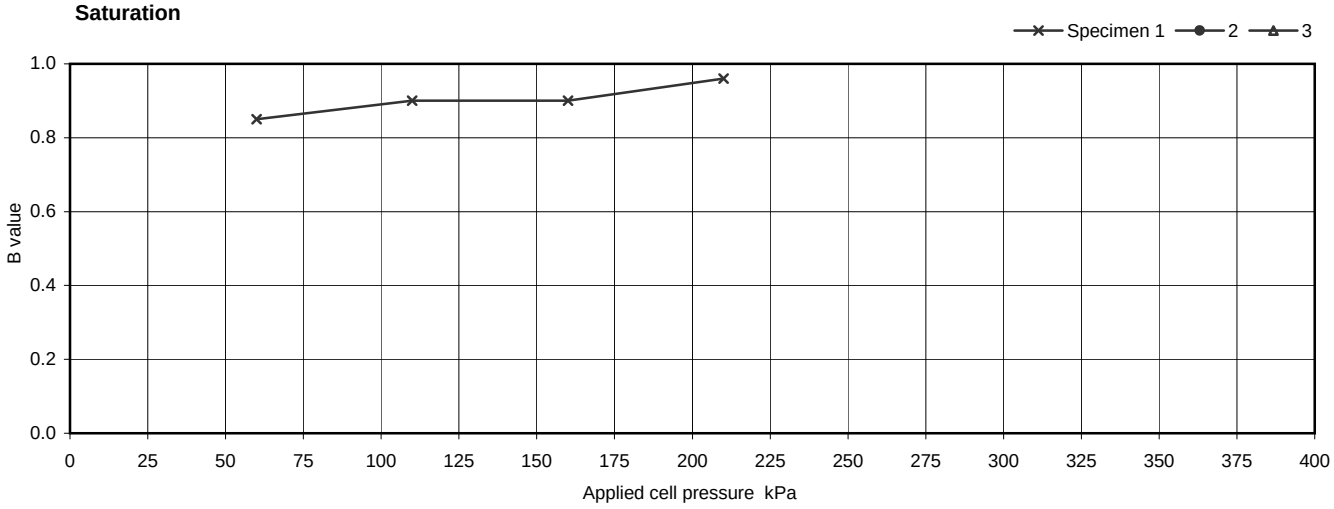
Project No	A0012-10	Sample Details:	Hole No	CBH 2009_4	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	50.30 - 50.75	
			No	12	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	188.9		
	Diameter	mm	103.6		
	Bulk Density	Mg/m³	1.74		
	Water Content	%	49.5		
	Dry density	Mg/m³	1.17		
After consolidation	Length	mm	187.0		
	Diameter	mm	102.6		
	Bulk Density*	Mg/m³	1.75		
	Water Content*	%	45.4		
	Dry density*	Mg/m³	1.20		
After test	Bulk Density*	Mg/m³	1.78		
	Water Content*	%	41.9		
	Dry density*	Mg/m³	1.26		

Soil Description	Stiff brownish grey slightly gravelly silty CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	210		
Final pore water pressure	kPa	150		
Final B Value		0.96		

Saturation

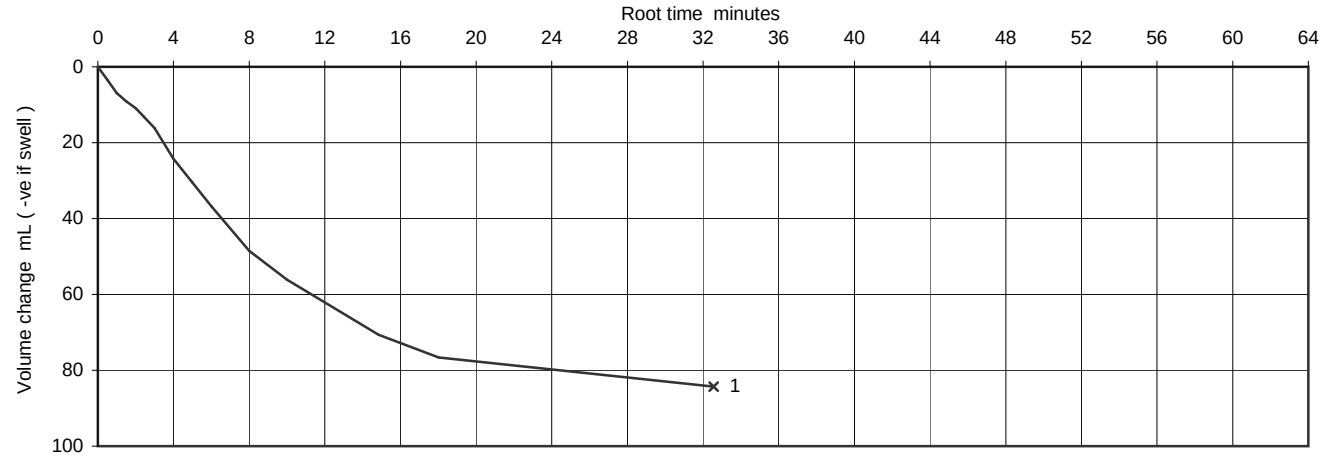


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		1125			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		825			kPa
	Pore pressure at start of consolidation		1104			kPa
	Pore pressure at end of consolidation		300			kPa
	Pore pressure dissipation at end of consolidation		100			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	1.43			m^2/year
	Coefficient of Compressibility	M_{vi}	0.06			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	2.9E-11			m/s

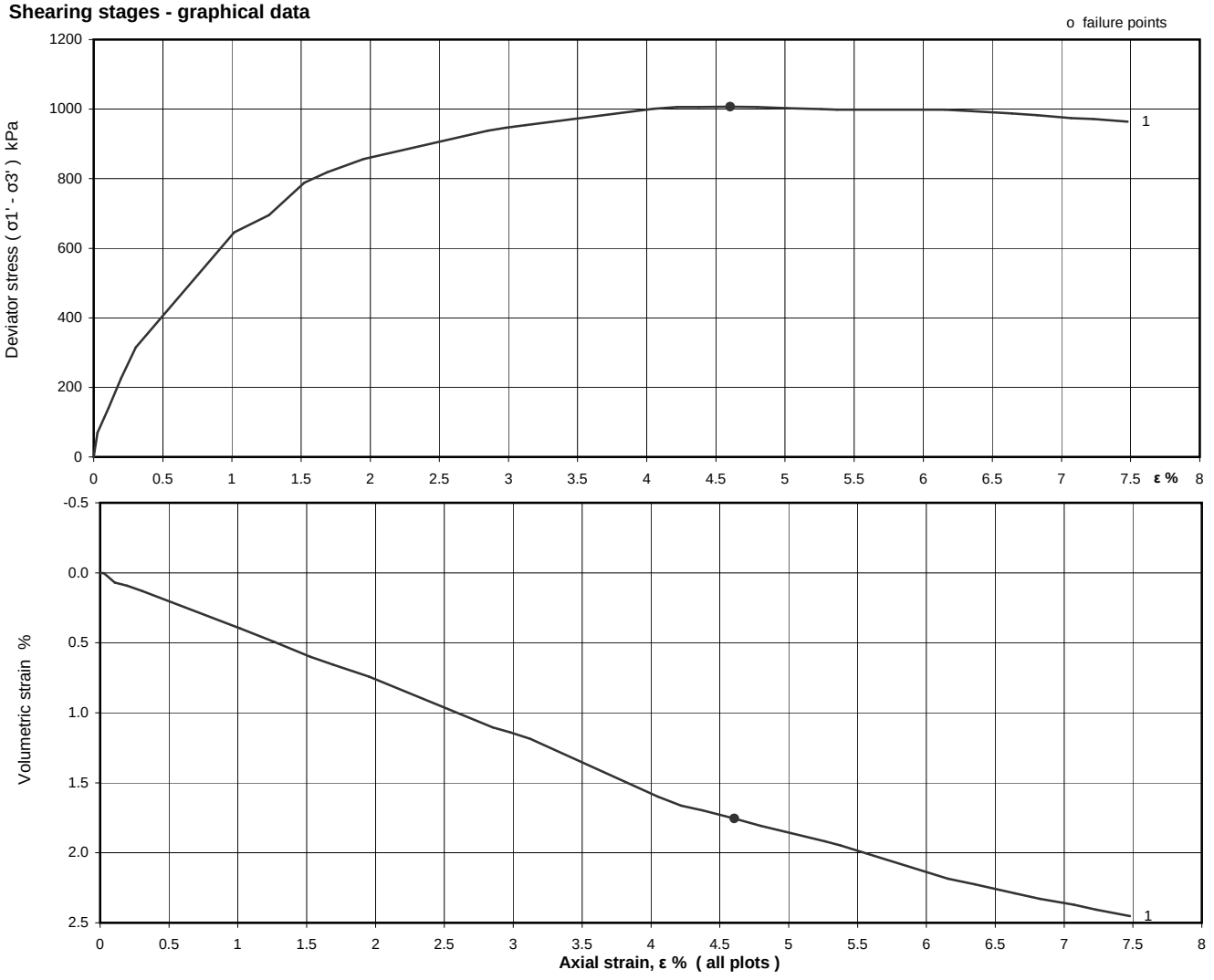
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_4	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		50.30 - 50.75	
			No	12	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

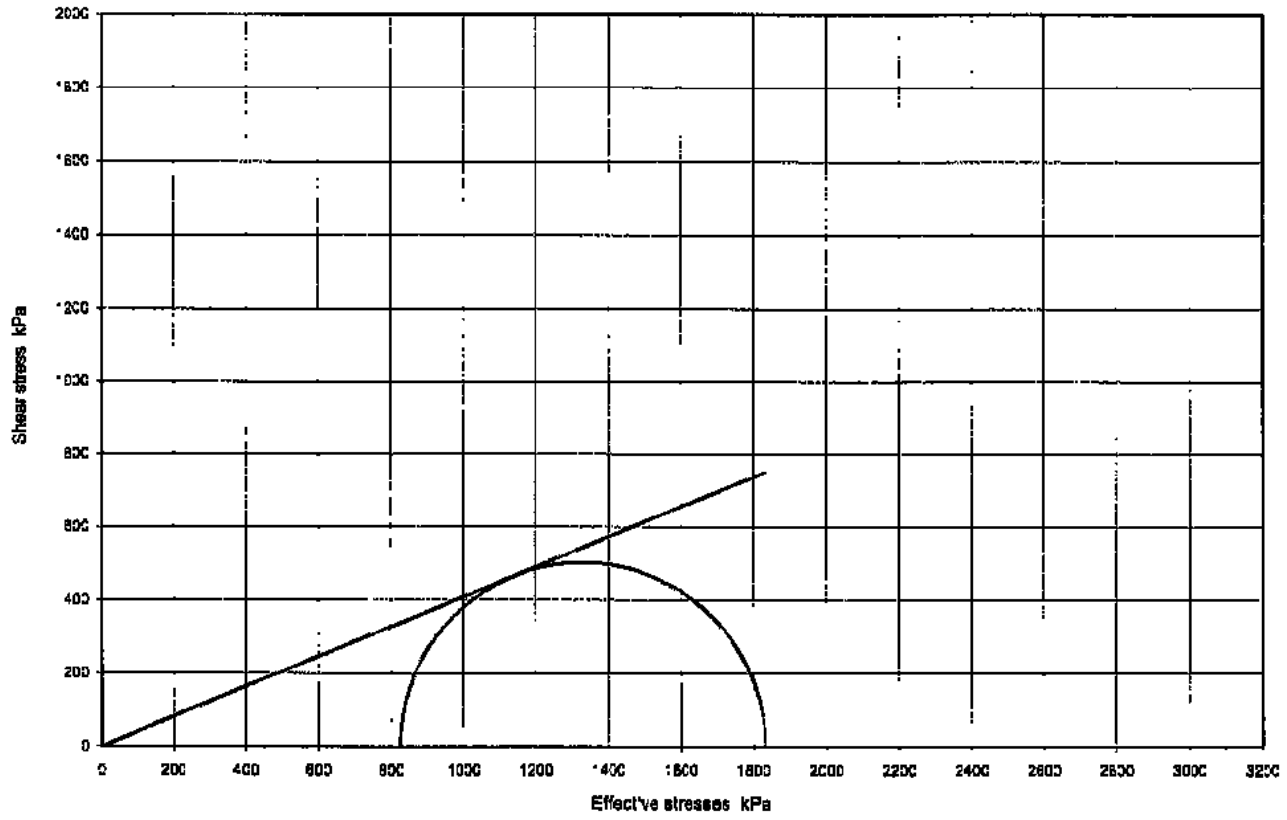


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:42	**CD 8** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	AC012-10	Sample Details:	Hole No		CBH 2009_4	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		50.30 - 50.75	
			No	12	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1	
Cell pressure	1425	kPa
Initial pwp	300	kPa
Initial σ_3'	825	kPa
Rate of strain	0.12	%/hr

Failure conditions

Criterion	Maximum deviator stress	
Axial strain	4.8*	%
$(\sigma_1' - \sigma_3')_f$	1007.0	kPa
Volumetric strain	1.76	%
$\sigma_3'_f$	825	kPa
$\sigma_1'_f$	1832	kPa
Time to failure	38.4	hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	22.3

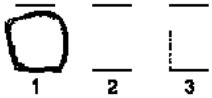
Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure



Ref			Figure
SLR8.2 Rev B5 Jan 10	Soil Mechanics	Printed:14/02/2011 09:42	CD 8 sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

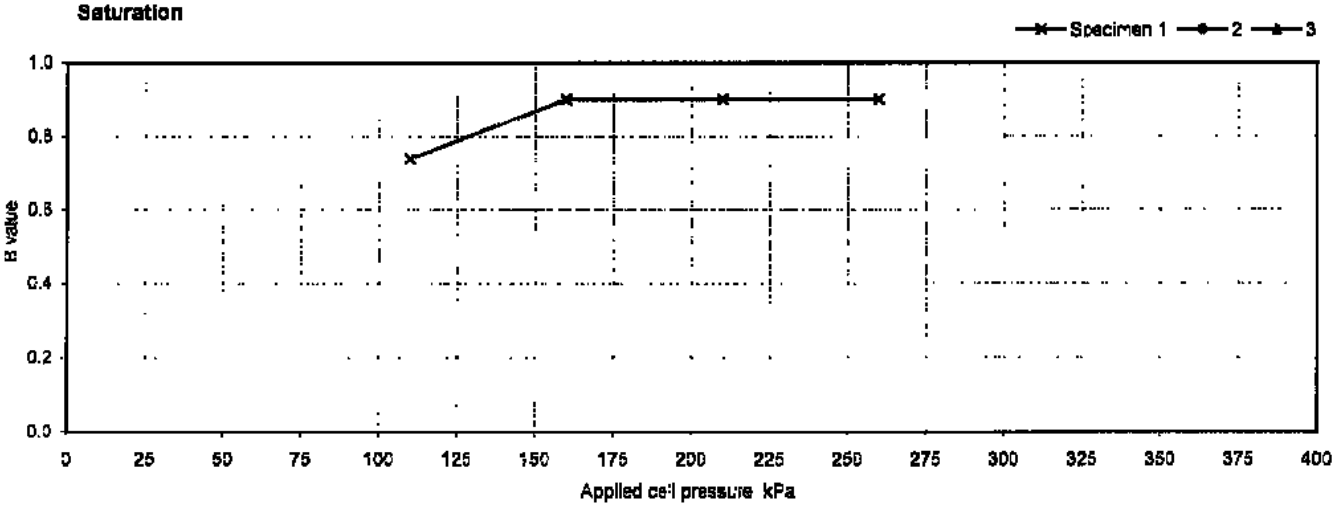
Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	43.80-44.20	
			No	12	Type CS
			ID		
			Spec Ref		

	Specimen Details		1	2	3
Initial	Length	mm	203.9		
	Diameter	mm	103.1		
	Bulk Density	Mg/m³	1.78		
	Water Content	%	46.4		
	Dry density	Mg/m³	1.18		
After consolidation	Length	mm	197.4		
	Diameter	mm	99.8		
	Bulk Density*	Mg/m³	1.81		
	Water Content*	%	39.0		
	Dry density*	Mg/m³	1.30		
After test	Bulk Density*	Mg/m³	1.79		
	Water Content*	%	41.0		
	Dry density*	Mg/m³	1.27		

Soil Description	Stiff to very stiff greyish brown slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation: increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	260
Final pore water pressure	kPa	200
Final B Value		0.90

Saturation



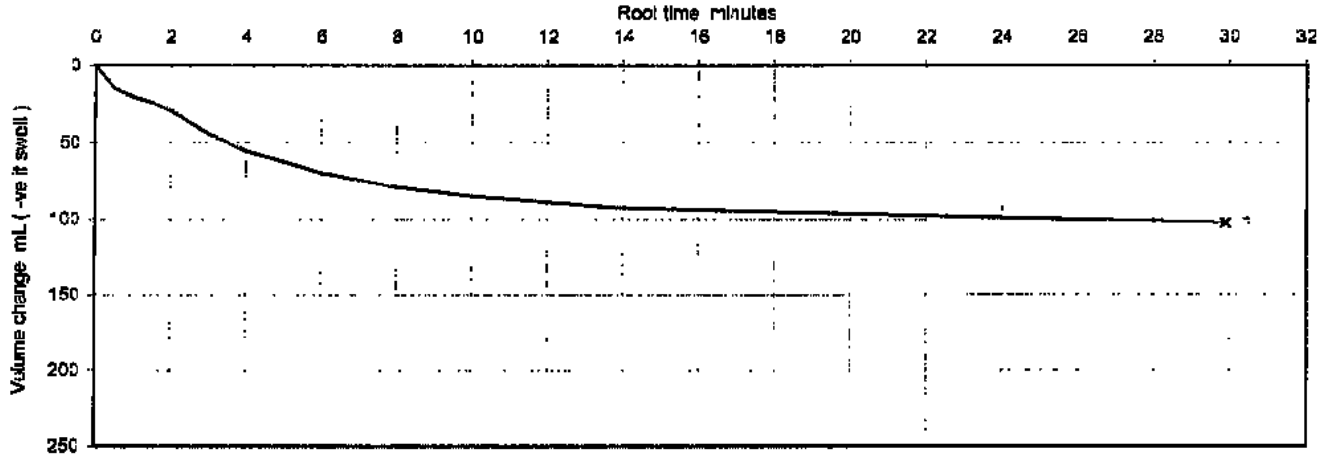
	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
Consolidation Details see sheet 2 for plots	Cell Pressure applied		1000			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		700			kPa
	Pore pressure at start of consolidation		979			kPa
	Pore pressure at end of consolidation		320			kPa
	Pore pressure dissipation at end of consolidation		97			%
Consolidation parameters (see note to BS1377 : pt 8, clause 8.3.4)	Coefficient of Consolidation	C_v	3.24			m^2/year
	Coefficient of Compressibility	M_v	0.09			m^2/MN
	Coefficient of Permeability (calculated)	k_v	9.5E-11			m/s

Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:25/02/2011 09:24	CD 9 sheet 1 of 3

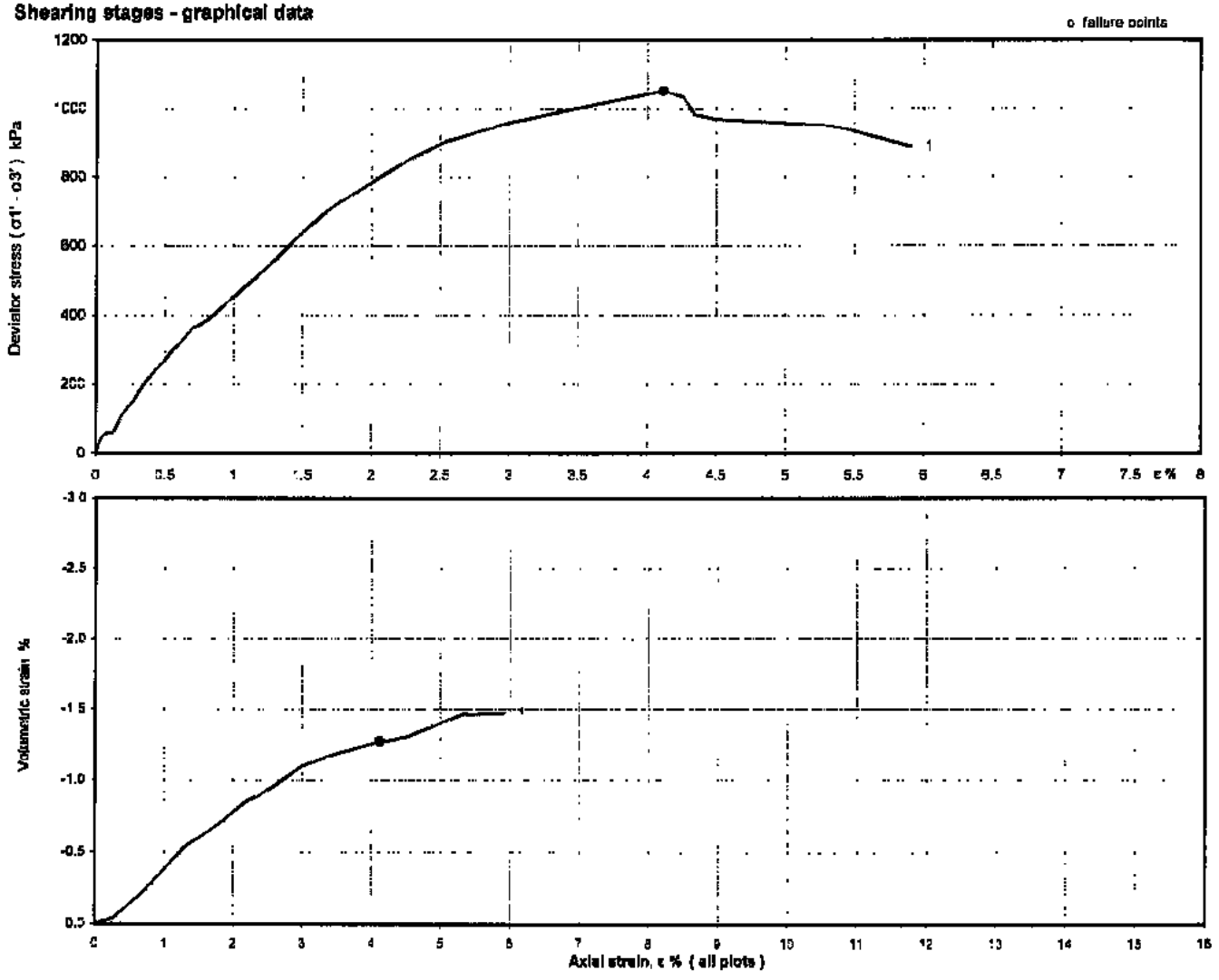
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_5	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		43.80-44.20	
			No	12	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

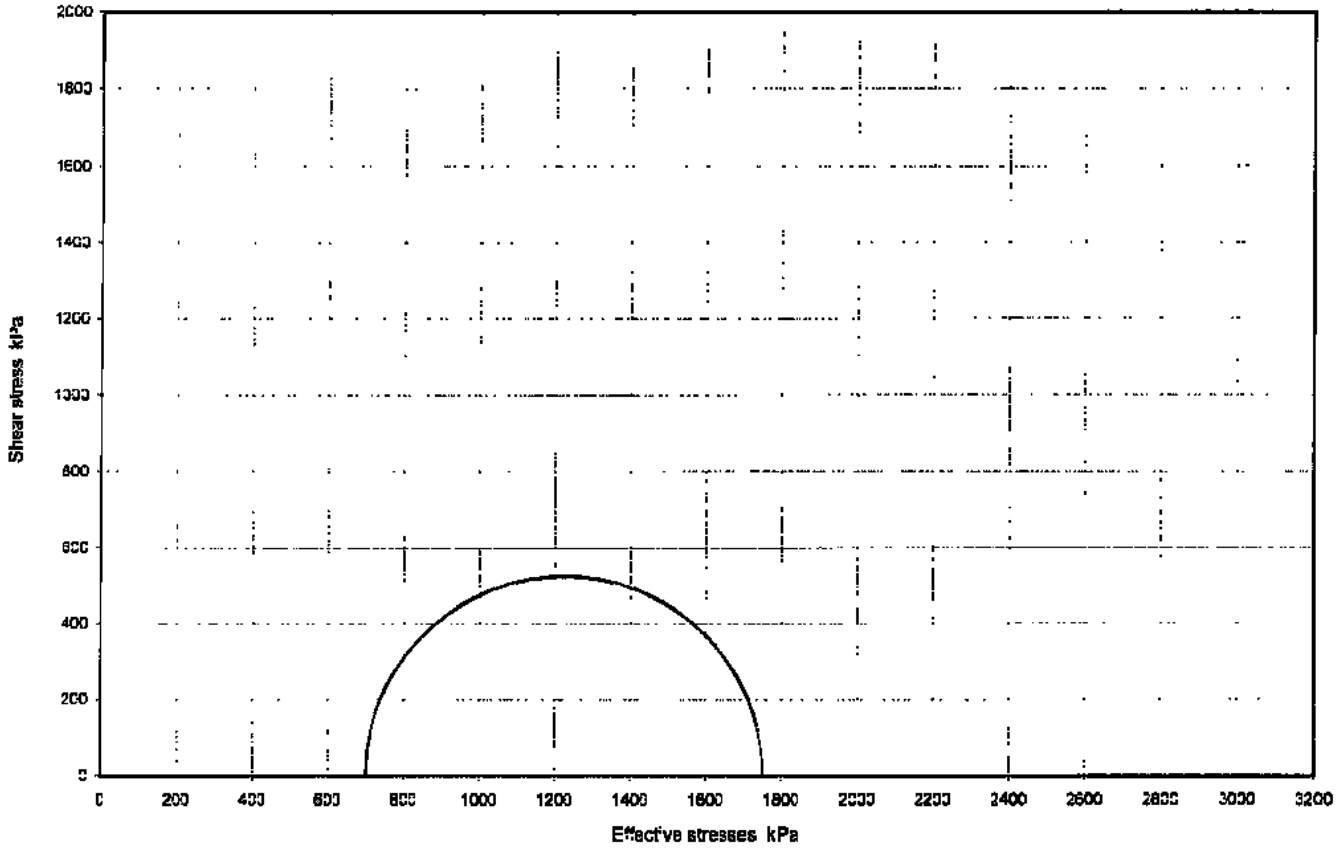


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:25/02/2011 09:24	CD 9 sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_5	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		43.80-44.20	
			No	12	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1	
Cell pressure	1000	kPa
Initial pwp	300	kPa
Initial σ_3'	700	kPa
Rate of strain	0.32	%/hr

Failure conditions

Criterion	Maximum deviator stress	
Axial strain	4.12	%
$(\sigma_1' - \sigma_3')_f$	1051.0	kPa
Volumetric strain		%
$\sigma_3'_f$	700	kPa
$\sigma_1'_f$	1751	kPa
Time to failure	12.9	hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	25.4

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

1 2 3

Ref			Figure
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Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

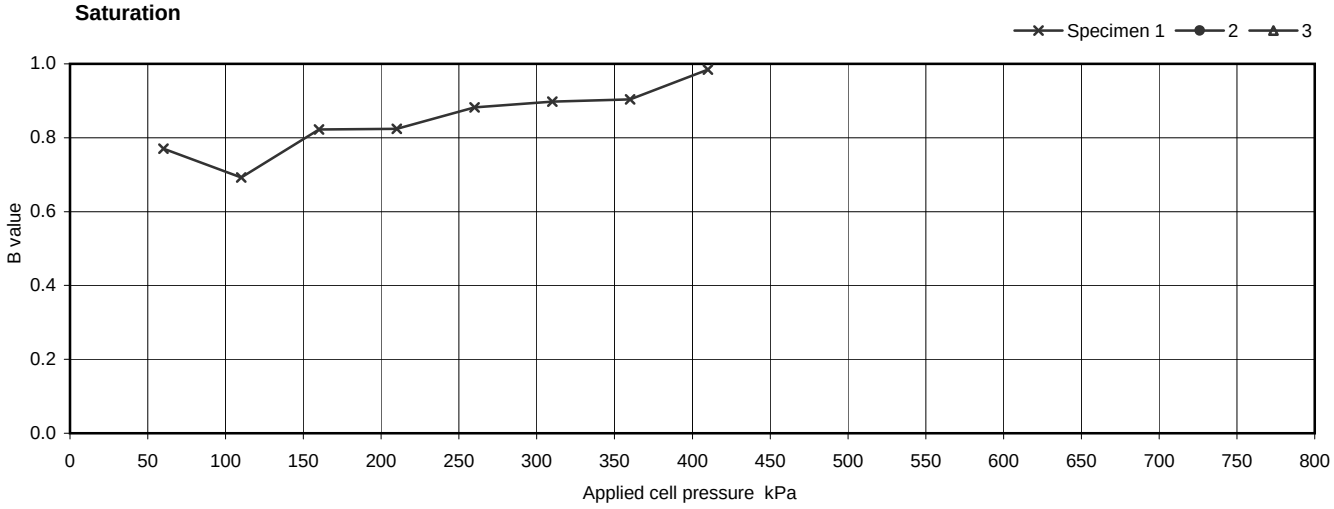
Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	43.00--43.40	
			No	9	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	193.2		
	Diameter	mm	95.2		
	Bulk Density	Mg/m³	1.83		
	Water Content	%	40.9		
	Dry density	Mg/m³	1.30		
After consolidation	Length	mm	193.0		
	Diameter	mm	95.1		
	Bulk Density*	Mg/m³	1.82		
	Water Content*	%	39.7		
	Dry density*	Mg/m³	1.30		
After test	Bulk Density*	Mg/m³	1.83		
	Water Content*	%	38.6		
	Dry density*	Mg/m³	1.32		

Soil Description	Stiff brownish grey slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	410		
Final pore water pressure	kPa	350		
Final B Value		0.98		

Saturation

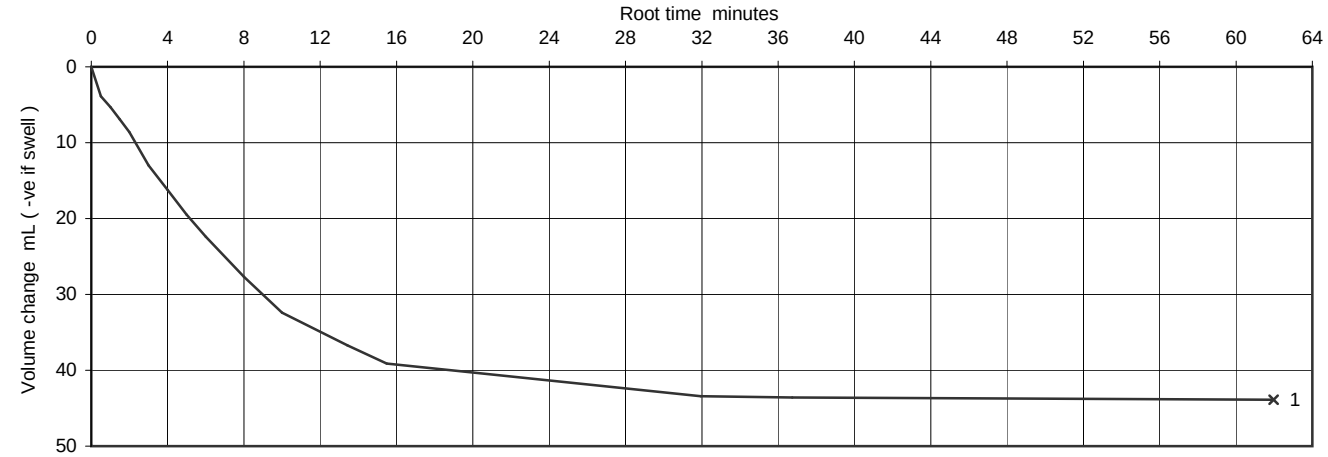


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		520			kPa
	Back Pressure applied		350			kPa
	Effective Pressure		170			kPa
	Pore pressure at start of consolidation		502			kPa
	Pore pressure at end of consolidation		350			kPa
	Pore pressure dissipation at end of consolidation		100			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	1.59			m^2/year
	Coefficient of Compressibility	M_{vi}	0.04			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	2.0E-11			m/s

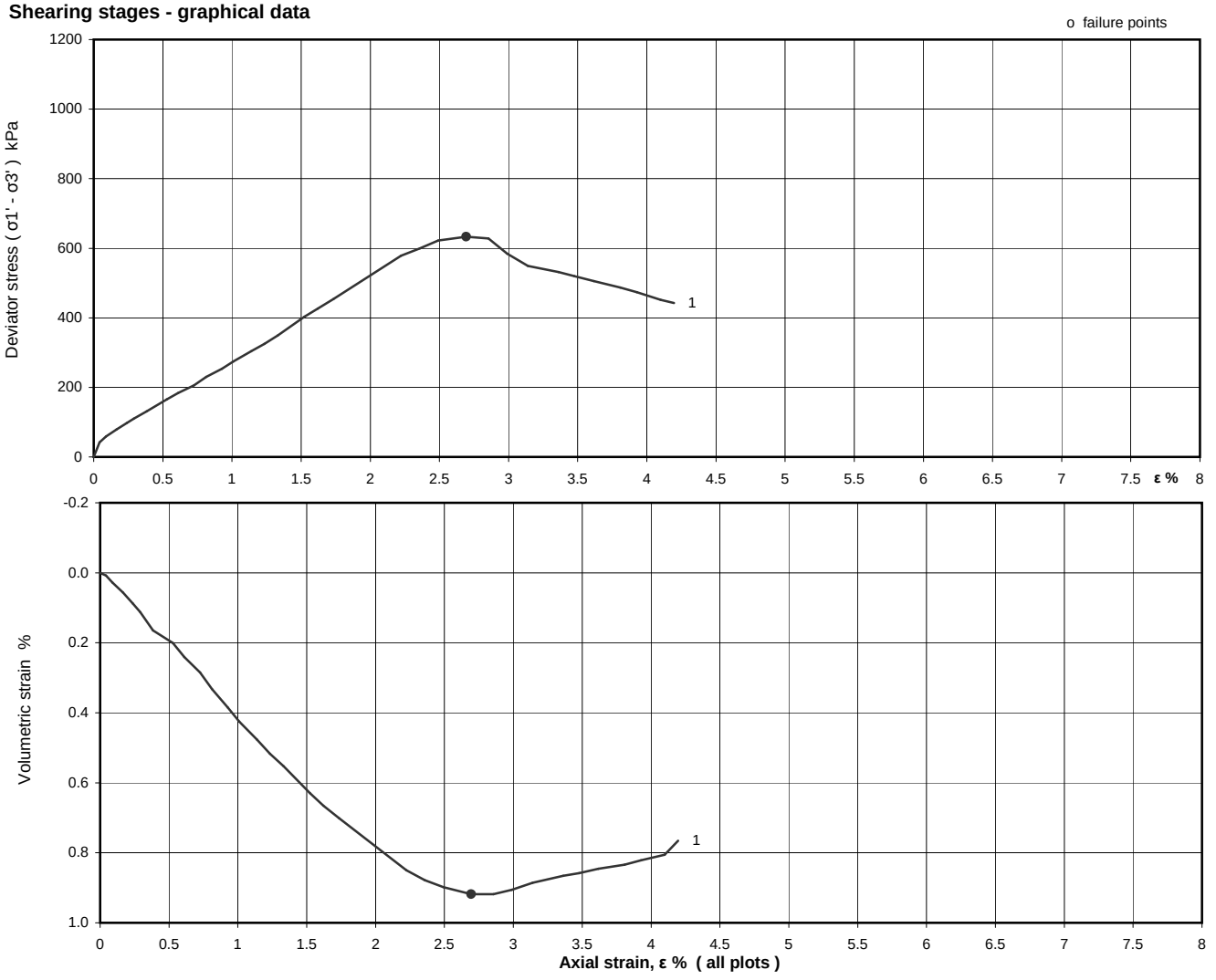
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	43.00--43.40		
			No	9	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

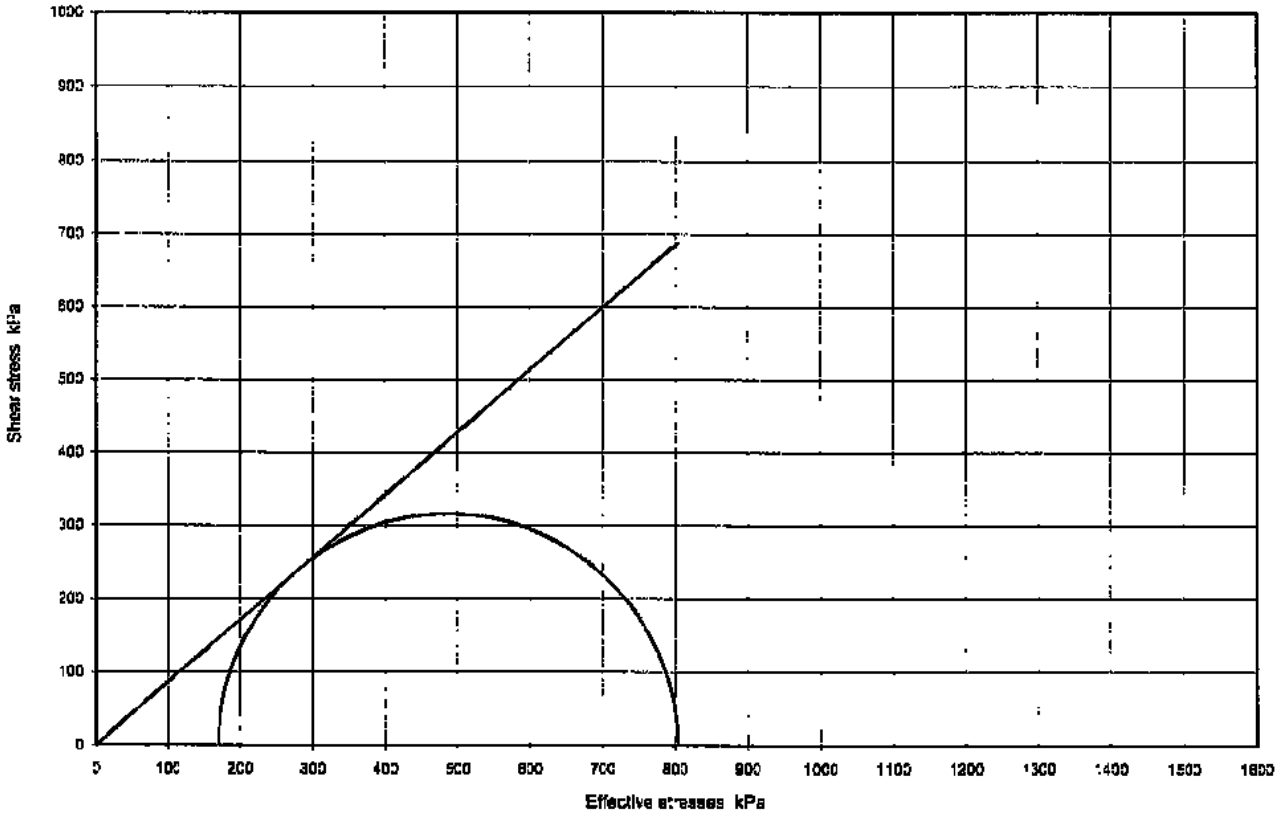


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:44	**CD 10** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A00*2-10	Sample Details:	Hole No		CBH 2009_6	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		43.00--43.40	
			No	9	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen			
Cell pressure	520		kPa
Initial pwp	350		kPa
Initial σ_3'	170		kPa
Rate of strain	0.19		%/hr

Failure conditions

Criterion	Maximum deviator stress	
Axial strain	2.69	%
$(\sigma_1' - \sigma_3')_f$	633.2	kPa
Volumetric strain	0.92	%
$\sigma_3'_f$	170	kPa
$\sigma_1'_f$	803	kPa
Time to failure	15.0	hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	40.6

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

1 2 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

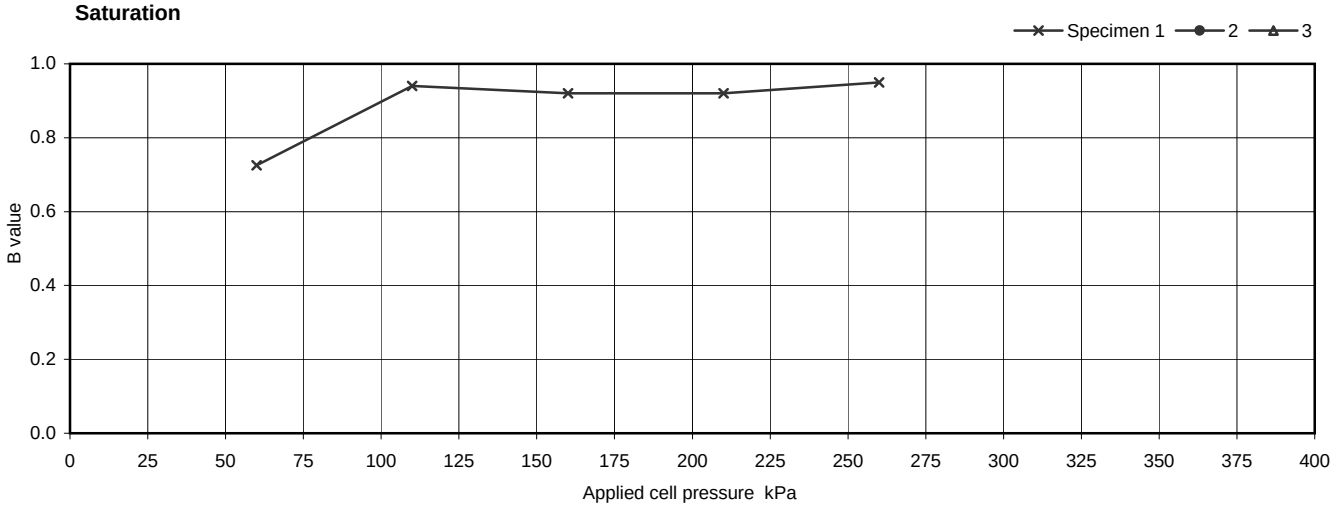
Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	45.42-45.76	
			No	10	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	193.5		
	Diameter	mm	94.3		
	Bulk Density	Mg/m³	1.83		
	Water Content	%	42.9		
	Dry density	Mg/m³	1.28		
After consolidation	Length	mm	192.2		
	Diameter	mm	93.7		
	Bulk Density*	Mg/m³	1.82		
	Water Content*	%	39.4		
	Dry density*	Mg/m³	1.31		
After test	Bulk Density*	Mg/m³	1.84		
	Water Content*	%	38.3		
	Dry density*	Mg/m³	1.33		

Soil Description	Firm to stiff greyish brown CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	260		
Final pore water pressure	kPa	200		
Final B Value		0.95		

Saturation

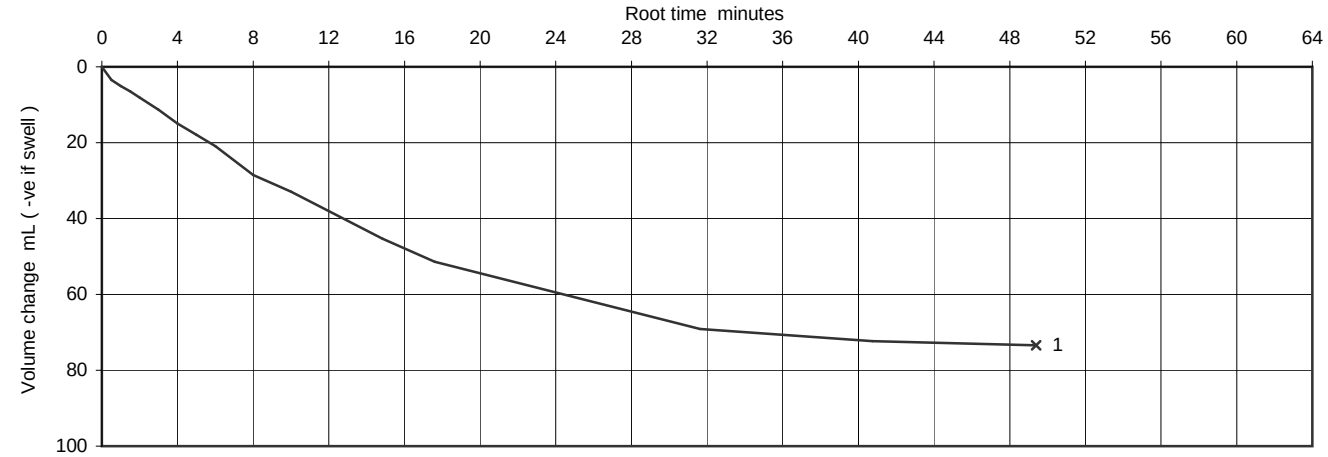


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		665			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		365			kPa
	Pore pressure at start of consolidation		343			kPa
	Pore pressure at end of consolidation		300			kPa
	Pore pressure dissipation at end of consolidation		100			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.42			m^2/year
	Coefficient of Compressibility	M_{vi}	0.15			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	2.0E-11			m/s

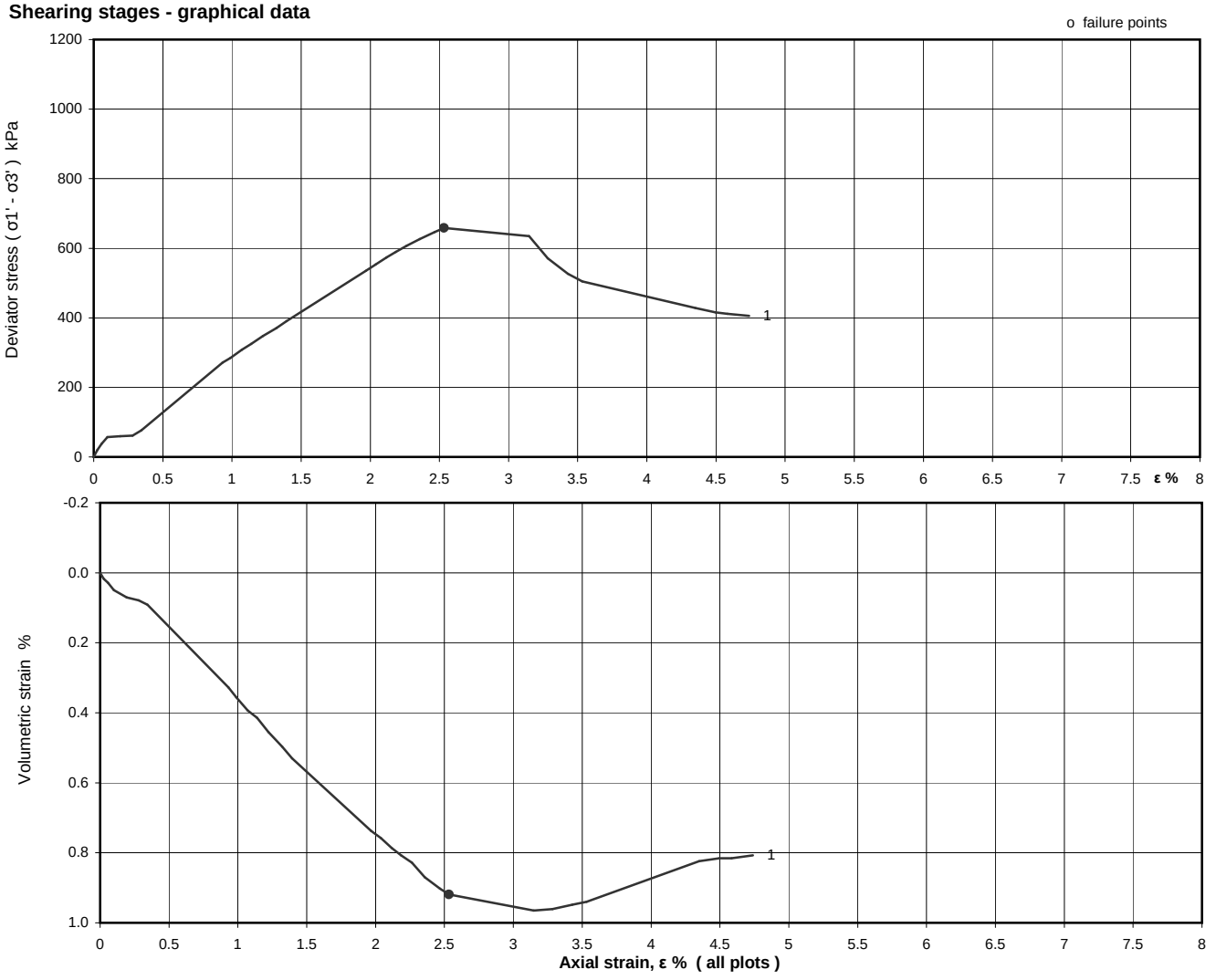
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_6	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		45.42-45.76	
			No	10	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

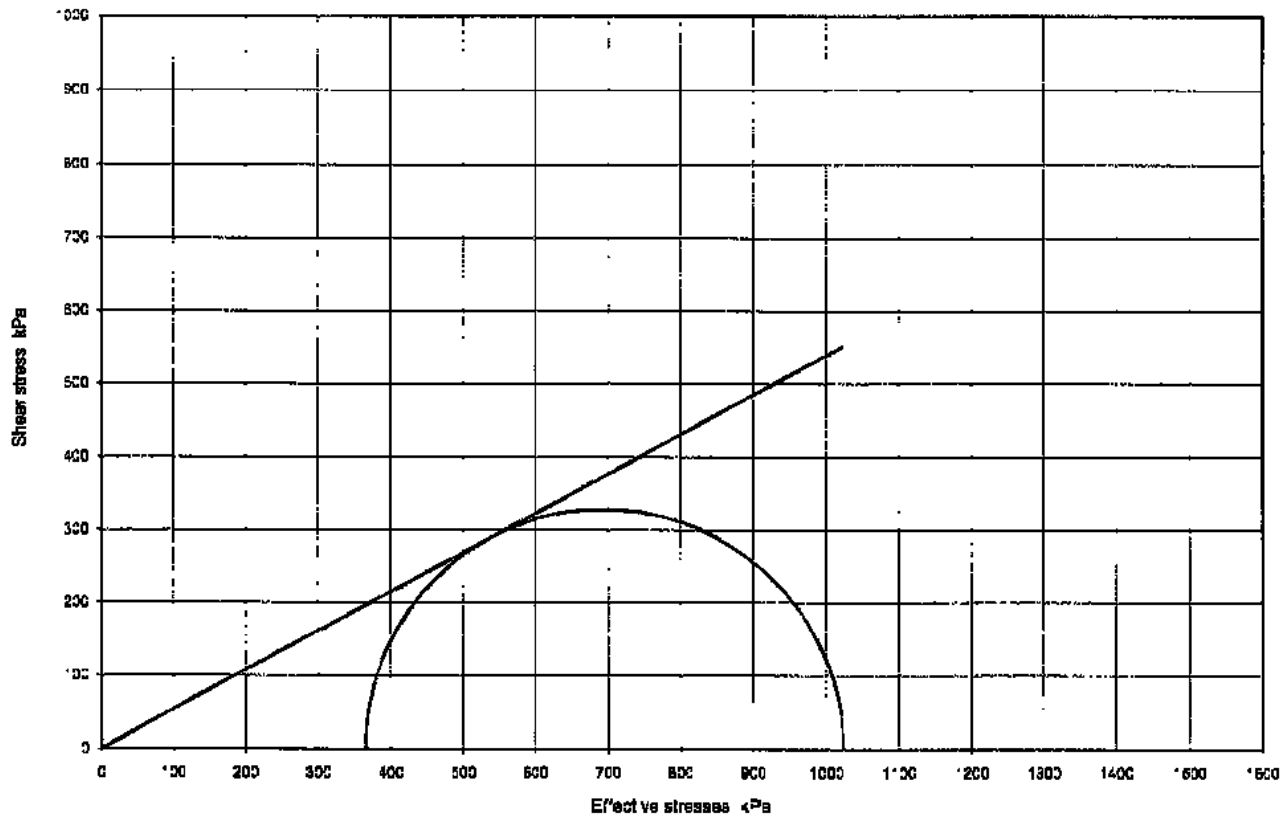


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:46	**CD 11** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_6	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		45.42-45.76	
			No	10	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1	
Cell pressure	665	kPa
Initial pwp	300	kPa
Initial σ_3'	365	kPa
Rate of strain	0.05	%/hr

Failure conditions

Criterion	Maximum deviator stress	
Axial strain	2.53	%
$(\sigma_1' - \sigma_3')_f$	658.3	kPa
Volumetric strain	0.92	%
$\sigma_3'_f$	365	kPa
$\sigma_1'_f$	1023	kPa
Time to failure	50.7	hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	28.3

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

1 2 3

Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:46	CD 11 sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

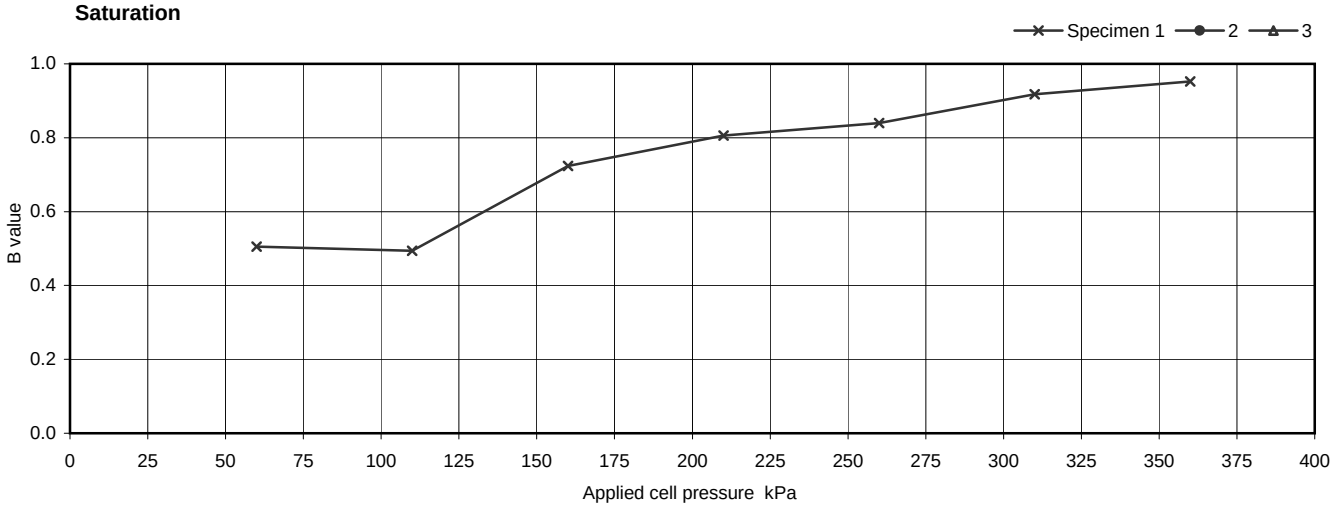
Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	51.36-51.56	
			No	122	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	75.4		
	Diameter	mm	38.4		
	Bulk Density	Mg/m³	1.75		
	Water Content	%	48.0		
	Dry density	Mg/m³	1.18		
After consolidation	Length	mm	75.2		
	Diameter	mm	38.3		
	Bulk Density*	Mg/m³	1.75		
	Water Content*	%	46.8		
	Dry density*	Mg/m³	1.19		
After test	Bulk Density*	Mg/m³	1.76		
	Water Content*	%	45.7		
	Dry density*	Mg/m³	1.21		

Soil Description	Stiff to very stiff brownish grey slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	360		
Final pore water pressure	kPa	300		
Final B Value		0.95		

Saturation

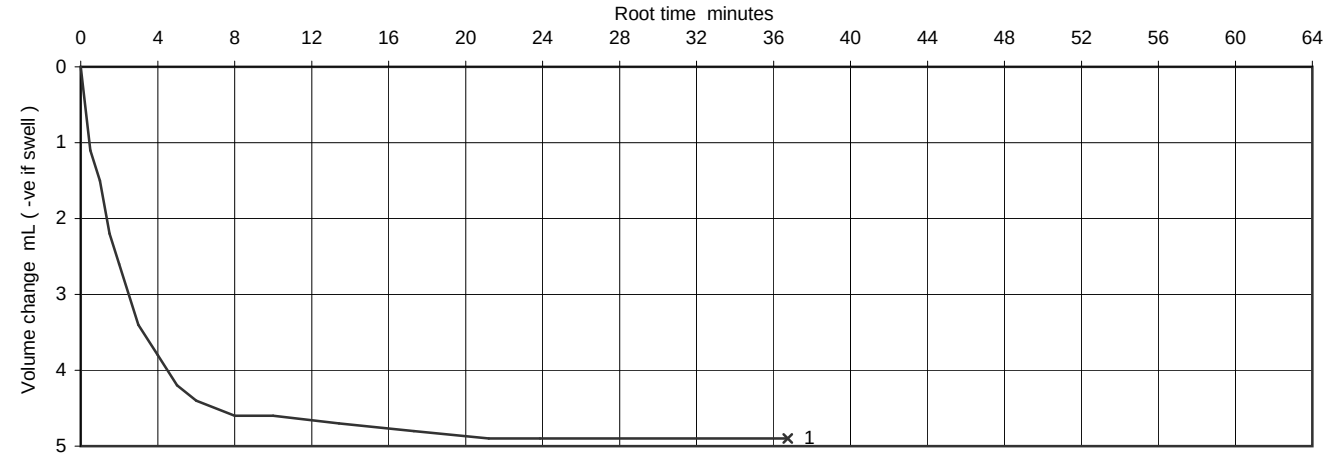


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		710			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		410			kPa
	Pore pressure at start of consolidation		691			kPa
	Pore pressure at end of consolidation		300			kPa
	Pore pressure dissipation at end of consolidation		100			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	1.74			m^2/year
	Coefficient of Compressibility	M_{vi}	0.14			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	7.4E-11			m/s

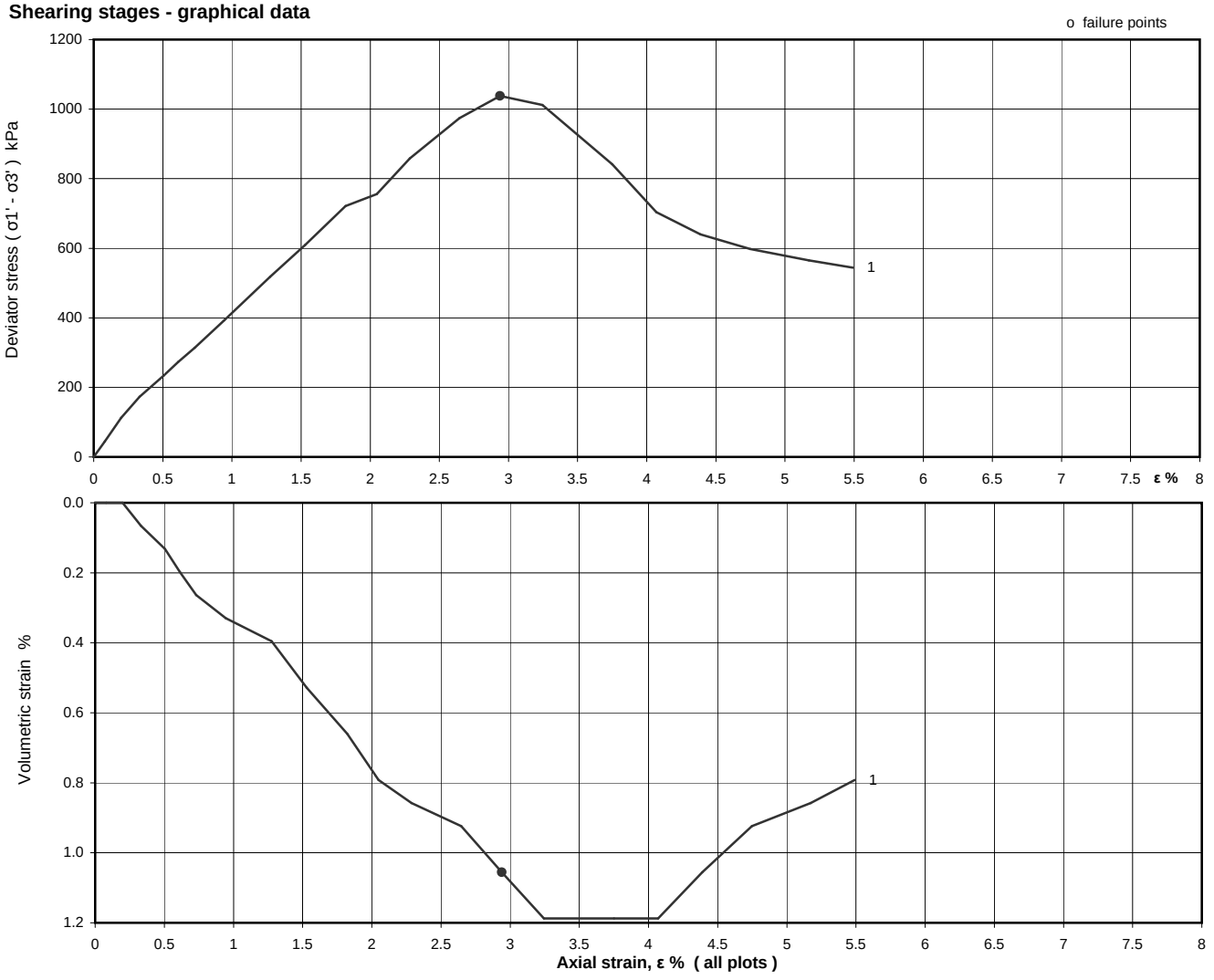
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		51.36-51.56	
			No	122	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

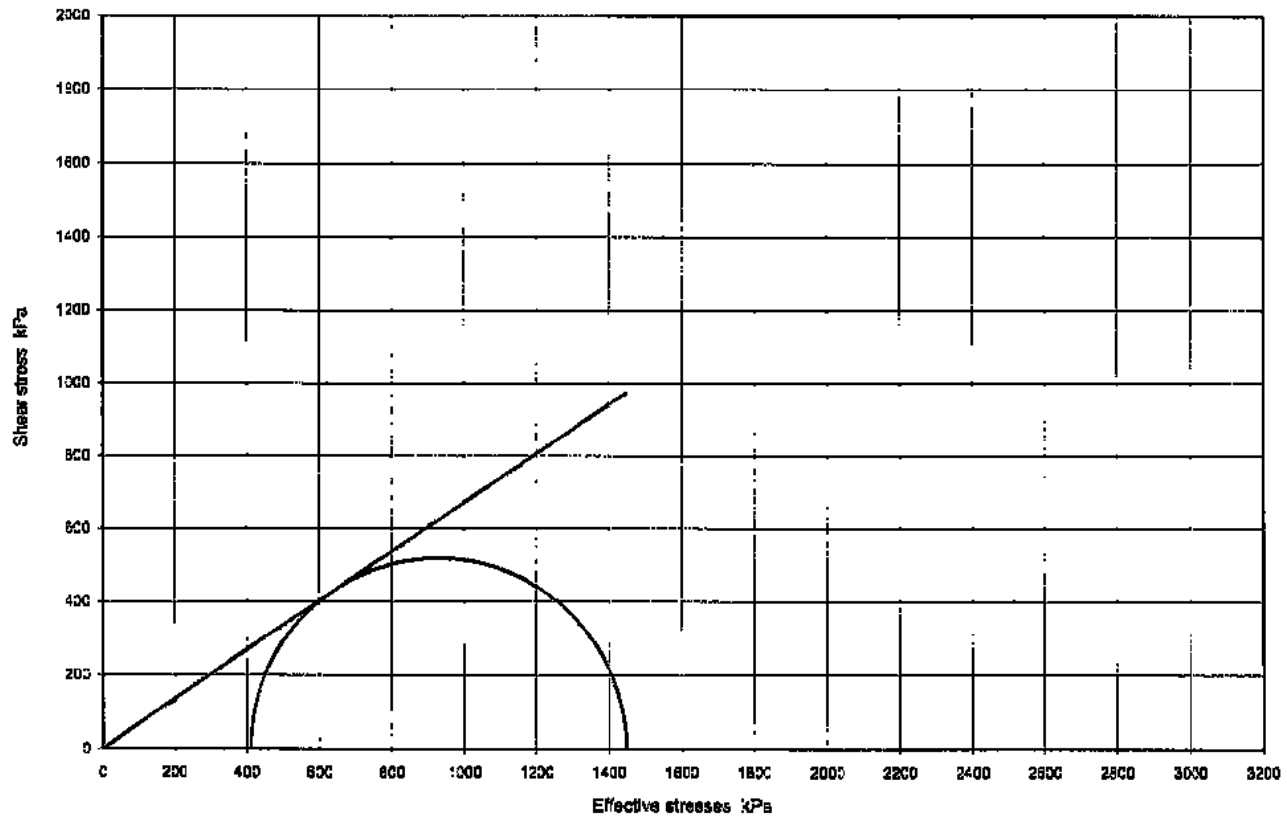


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:14/02/2011 09:48	**CD 12** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	51.36-51.56		
			No	122	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1	
Cell pressure	710	kPa
Initial pwp	300	kPa
Initial σ_3'	410	kPa
Rate of strain	1.16	%/hr

Failure conditions

Criterion	Maximum deviator stress			
Axial strain	2.94			%
$(\sigma_1' - \sigma_3')_f$	1037.6			kPa
Volumetric strain	1.06			%
$\sigma_3'_f$	410			kPa
$\sigma_1'_f$	1448			kPa
Time to failure	2.5			hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	34.0

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.3 mm thick rubber membrane(s)

Mode of failure

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

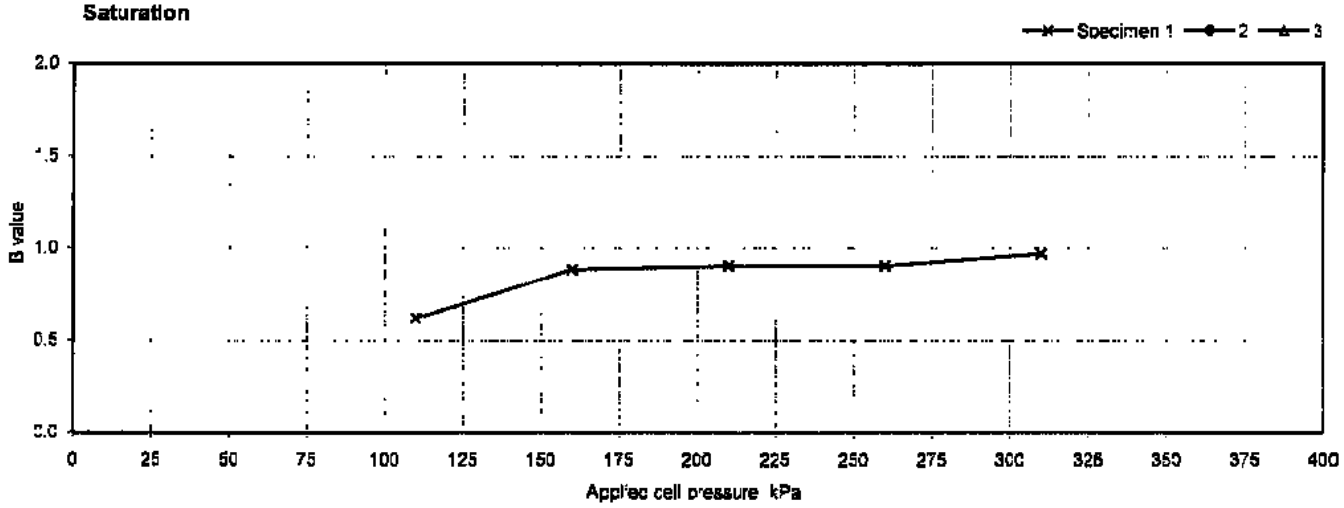
Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	58.23-58.72	
			No	125	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	203.6		
	Diameter	mm	102.5		
	Bulk Density	Mg/m³	1.91		
	Water Content	%	31.4		
	Dry density	Mg/m³	1.45		
After consolidation	Length	mm	201.0		
	Diameter	mm	101.2		
	Bulk Density*	Mg/m³	1.95		
	Water Content*	%	29.2		
	Dry density*	Mg/m³	1.51		
After test	Bulk Density*	Mg/m³	1.98		
	Water Content*	%	28.4		
	Dry density*	Mg/m³	1.53		

Soil Description	Stiff to very stiff greyish brown CLAY with rare sand.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation: Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	
Final B Value		0.97

Saturation



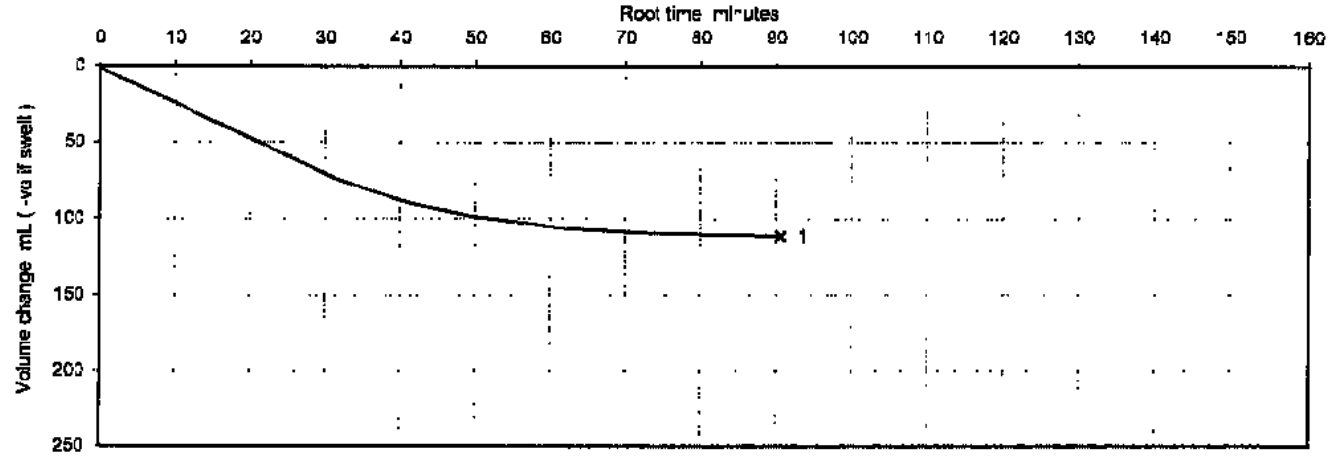
	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
Consolidation Details see sheet 2 for plots	Cell Pressure applied		765			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		465			kPa
	Pore pressure at start of consolidation		748			kPa
	Pore pressure at end of consolidation		310			kPa
	Pore pressure dissipation at end of consolidation		98			%
Consolidation parameters (see note to BS 1377 pt 8, clause 6.3.4)	Coefficient of Consolidation	C_v	0.10			m^2/year
	Coefficient of Compressibility	M_v	0.15			m^2/MN
	Coefficient of Permeability (calculated)	k_v	4.6E-12			m/s

Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:15/03/2011 10:32	CD 13 sheet 1 of 3

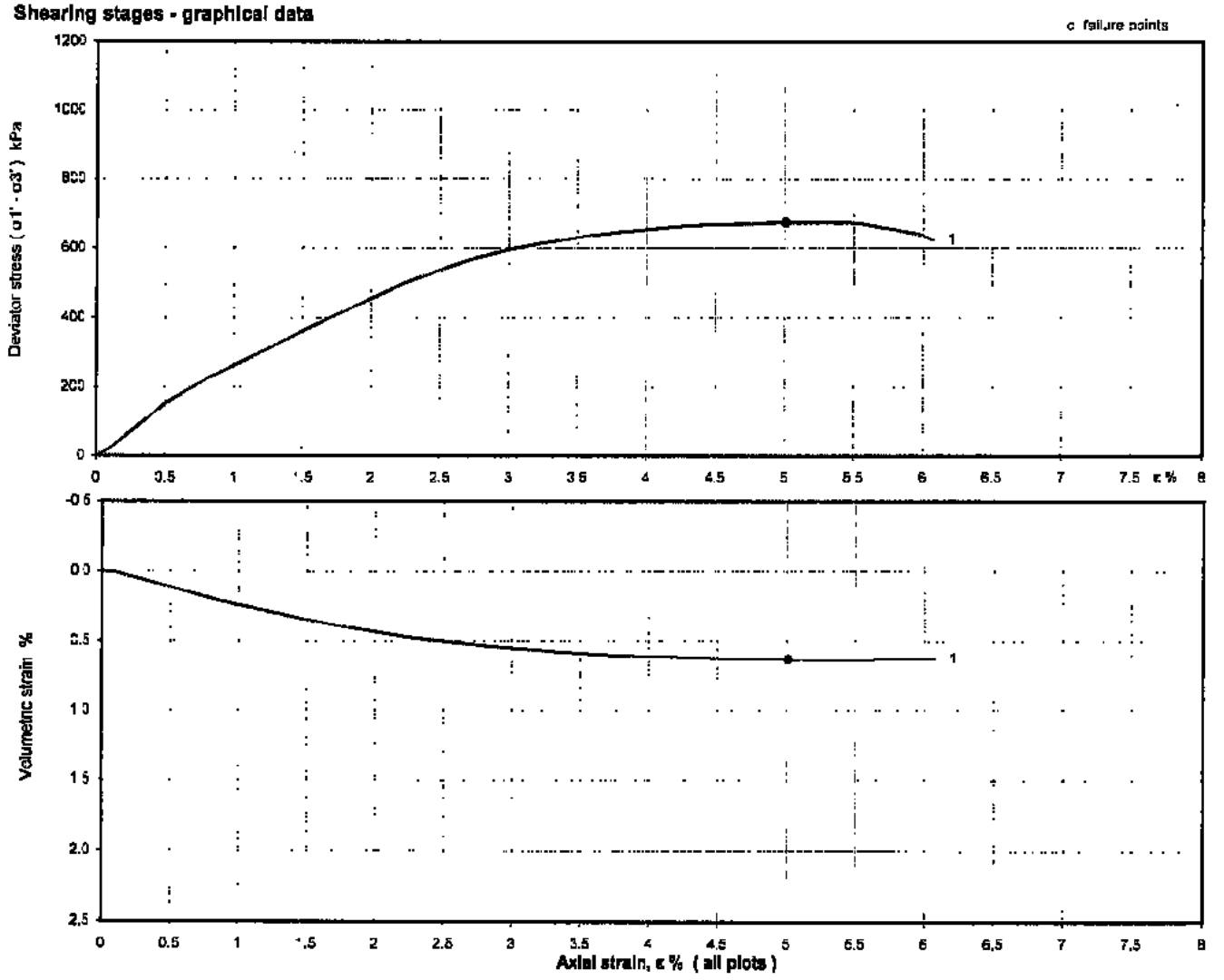
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		58.23-58.72	
			No	125	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

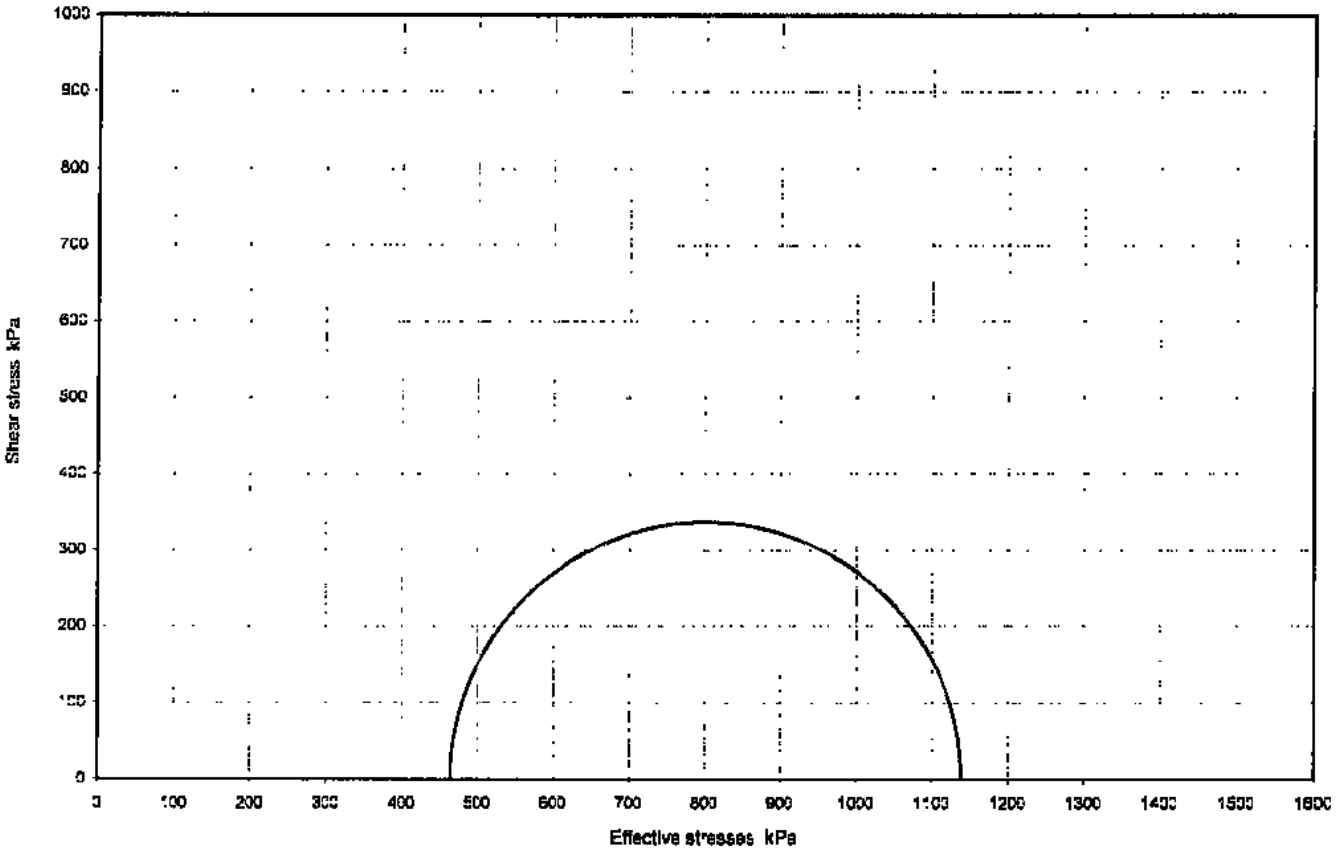


Ref SLR8.2 Rev 85 Jan 10	Soil Mechanics	1157	Printed:15/03/2011 10:32	Figure **CD 13** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	AC012-10	Sample Details:	Hole No		CBH 2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		58.23-58.72	
			No	125	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1	
Cell pressure	765	kPa
Initial pwp	300	kPa
Initial σ_3'	465	kPa
Rate of strain	0.01	%/hr

Failure conditions

Criterion	Maximum deviator stress	
Axial strain	5.01	%
$(\sigma_1' - \sigma_3')_f$	673.6	kPa
Volumetric strain	0.63	%
$\sigma_3'_f$	465	kPa
$\sigma_1'_f$	1139	kPa
Time to failure	501.0	hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	24.8

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics 1137	Printed: 15/03/2011 10:32	CD 13 sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

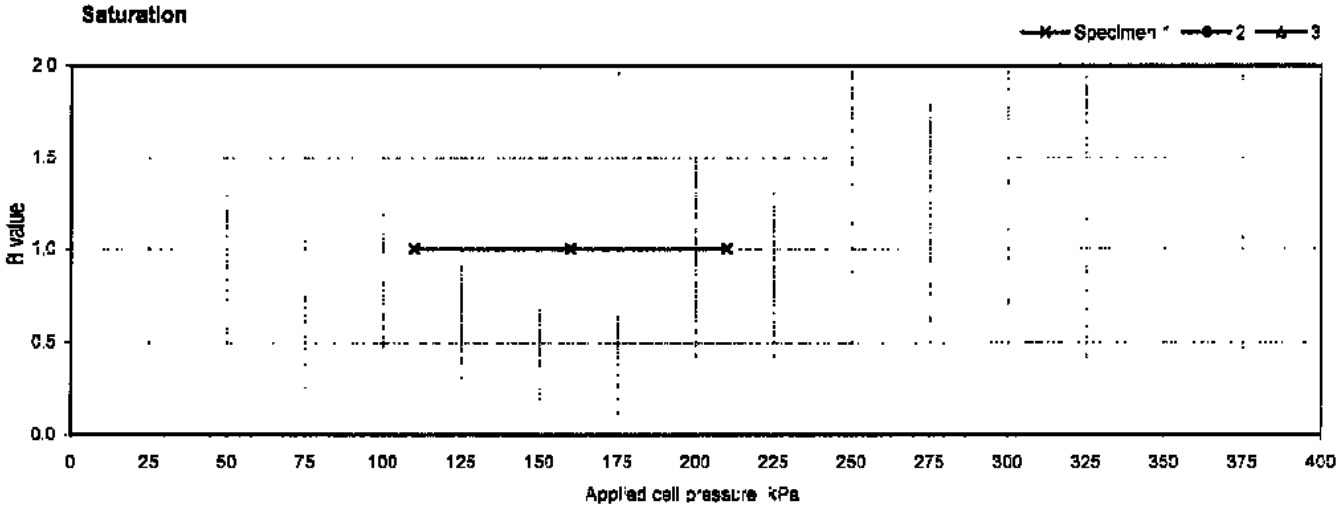
Project No	A0012-10	Sample Details:	Hole No		CBH 2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		61.32-61.72	
			No	126	Type	CS
			ID			
			Spec Ref			

	Specimen Details		1	2	3
Initial	Length	mm	202.8		
	Diameter	mm	104.4		
	Bulk Density	Mg/m³	2.03		
	Water Content	%	32.5		
	Dry density	Mg/m³	1.53		
After consolidation	Length	mm	201.5		
	Diameter	mm	103.8		
	Bulk Density*	Mg/m³	1.97		
	Water Content*	%	28.3		
	Dry density*	Mg/m³	1.56		
After test	Bulk Density*	Mg/m³	2.01		
	Water Content*	%	24.3		
	Dry density*	Mg/m³	1.62		

Soil Description	Firm brownish grey slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation: Increments of cell pressure only
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	210
Final pore water pressure	kPa	
Final B Value		1.00

Saturation

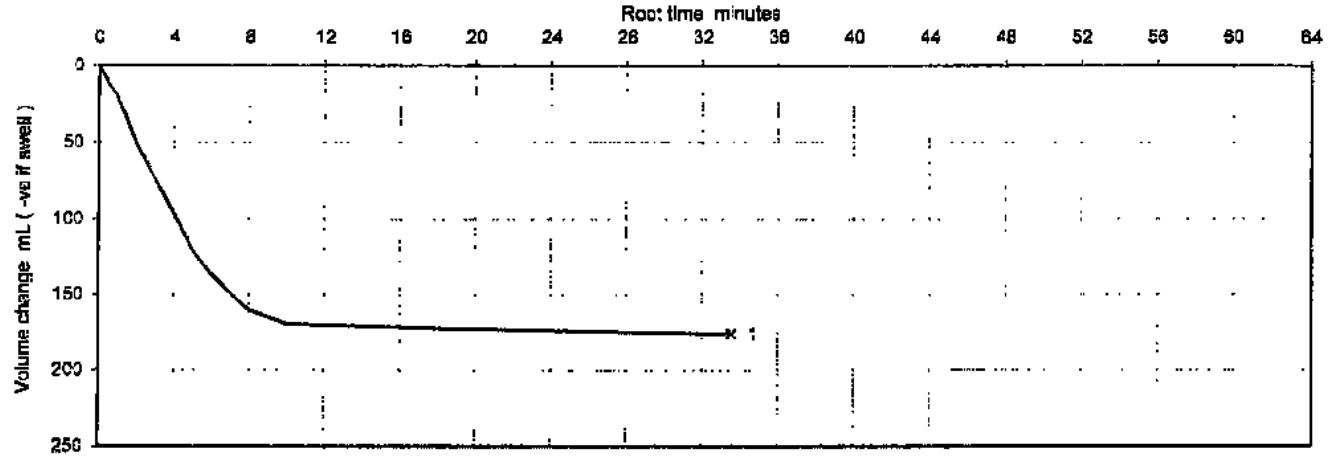


	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
Consolidation Details see sheet 2 for plots	Cell Pressure applied		1280			kPa
	Back Pressure applied		350			kPa
	Effective Pressure		980			kPa
	Pore pressure at start of consolidation		1265			kPa
	Pore pressure at end of consolidation		300			kPa
	Pore pressure dissipation at end of consolidation		100			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_v	4.42			m^2/year
	Coefficient of Compressibility	M_v	0.10			m^2/MN
	Coefficient of Permeability (calculated)	k_v	1.3E-10			m/s

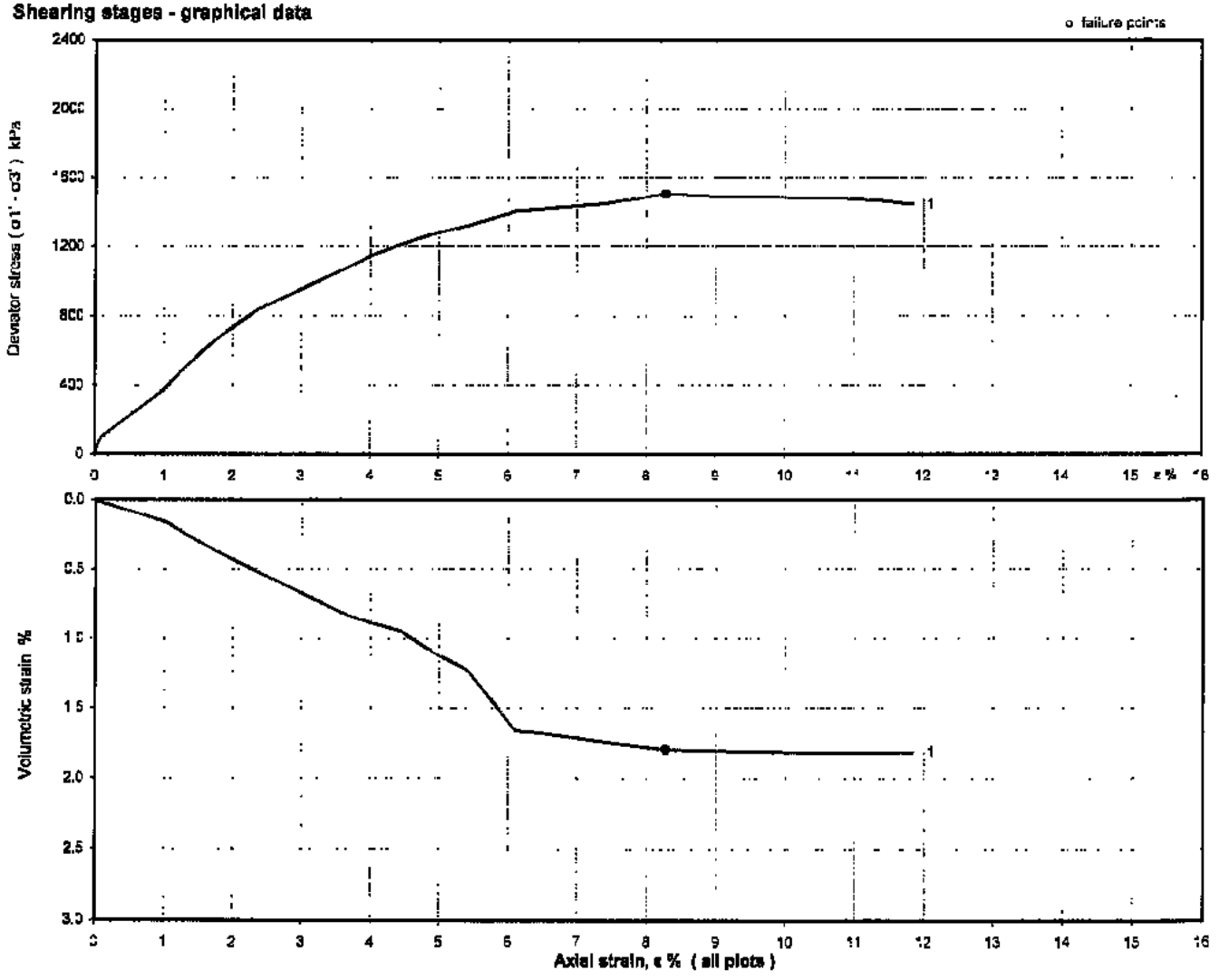
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		61.32-61.72	
			No	126	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

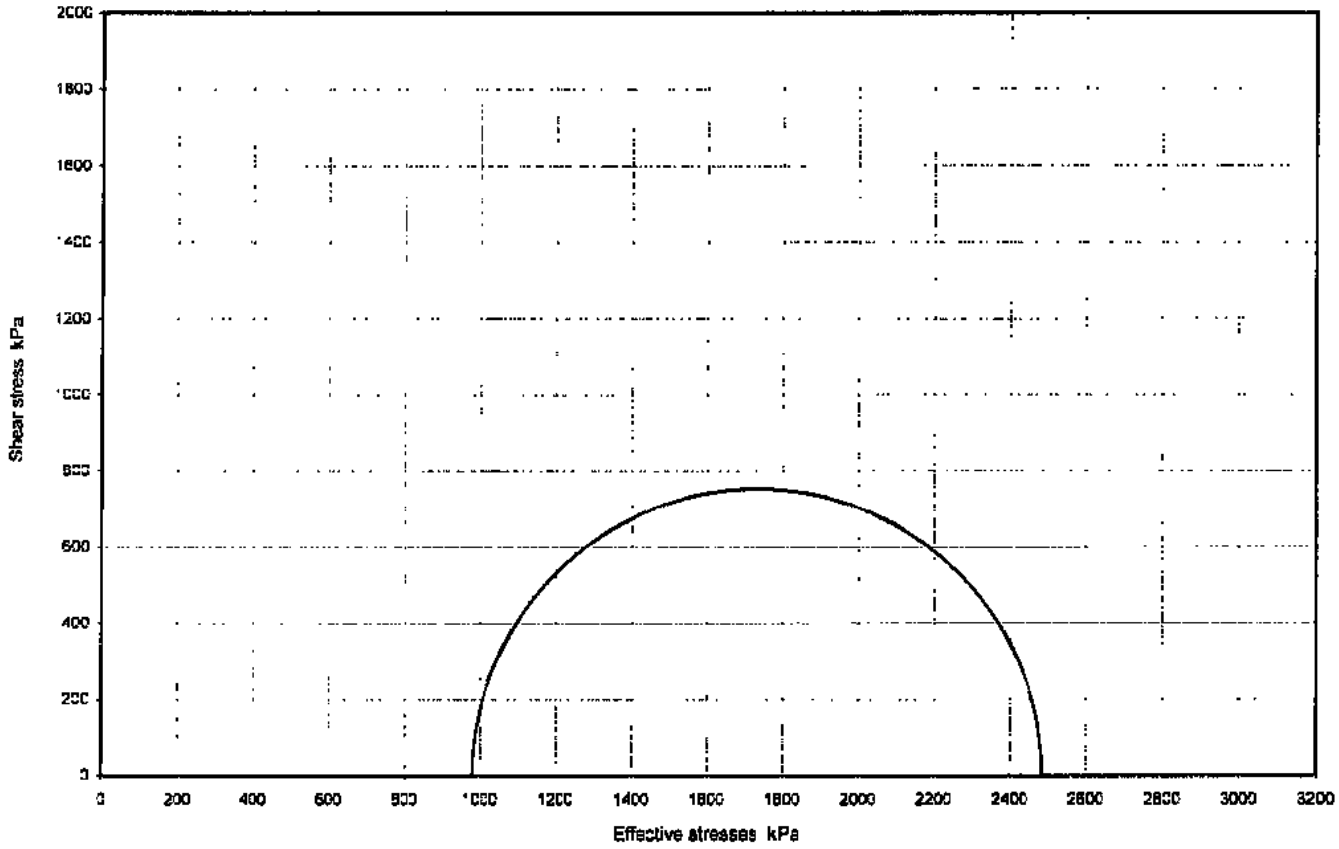


Ref			Figure
SLR8.2 Rev 65 Jan 10	Soil Mechanics	Printed:02/03/2011 13:50	CD 14 sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		61.32-61.72	
			No	126	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	4	
Cell pressure	1280	kPa
Initial pwp	300	kPa
Initial σ_3'	980	kPa
Rate of strain	0.38	%/hr

Failure conditions

Criterion	Maximum deviator stress	
Axial strain	8.28	%
$(\sigma_1' - \sigma_3')_f$	1504.3	kPa
Volumetric strain	1.80	%
σ_{3f}'	980	kPa
σ_{1f}'	2484	kPa
Time to failure	21.8	hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	25.7

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

1 2 3

Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:02/03/2011 13:50	**CD 14** sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

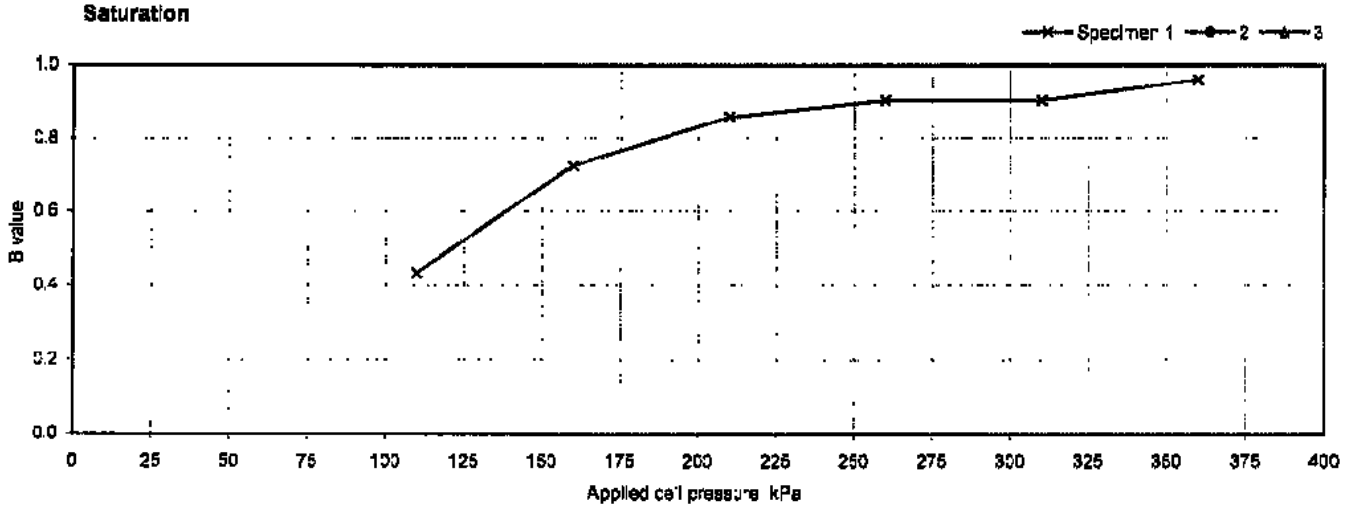
Project No	A0012-10	Sample Details:	Hole No		CBH2009_8U
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		84.12-84.60
			No	133	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	193.3		
	Diameter	mm	95.2		
	Bulk Density	Mg/m³	1.93		
	Water Content	%	31.7		
	Dry density	Mg/m³	1.46		
After consolidation	Length	mm	192.7		
	Diameter	mm	94.6		
	Bulk Density*	Mg/m³	1.92		
	Water Content*	%	30.0		
	Dry density*	Mg/m³	1.48		
After test	Bulk Density*	Mg/m³	1.93		
	Water Content*	%	29.5		
	Dry density*	Mg/m³	1.49		

Soil Description	Very stiff greyish brown CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation: Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	360
Final pore water pressure	kPa	300
Final B Value		0.96

Saturation



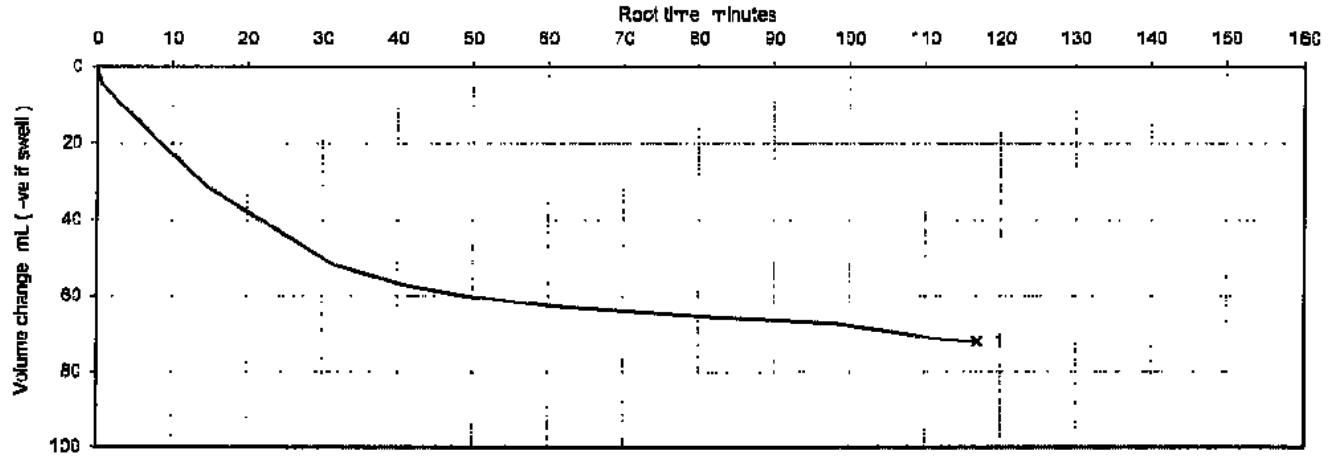
Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end	
	Specimen No		1 2 3	
	Cell Pressure applied		1650	kPa
	Back Pressure applied		300	kPa
	Effective Pressure		1350	kPa
	Pore pressure at start of consolidation		1584	kPa
	Pore pressure at end of consolidation		350	kPa
	Pore pressure dissipation at end of consolidation		96	%
Consolidation parameters (see note to BS1377 : pt 8: clause 8.3.4)	Coefficient of Consolidation	C_v	0.17	m^2/year
	Coefficient of Compressibility	M_v	0.04	m^2/MN
	Coefficient of Permeability (calculated)	k_v	2.1E-12	m/s

Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:09/03/2011 09:07	CD 15 sheet 1 of 3

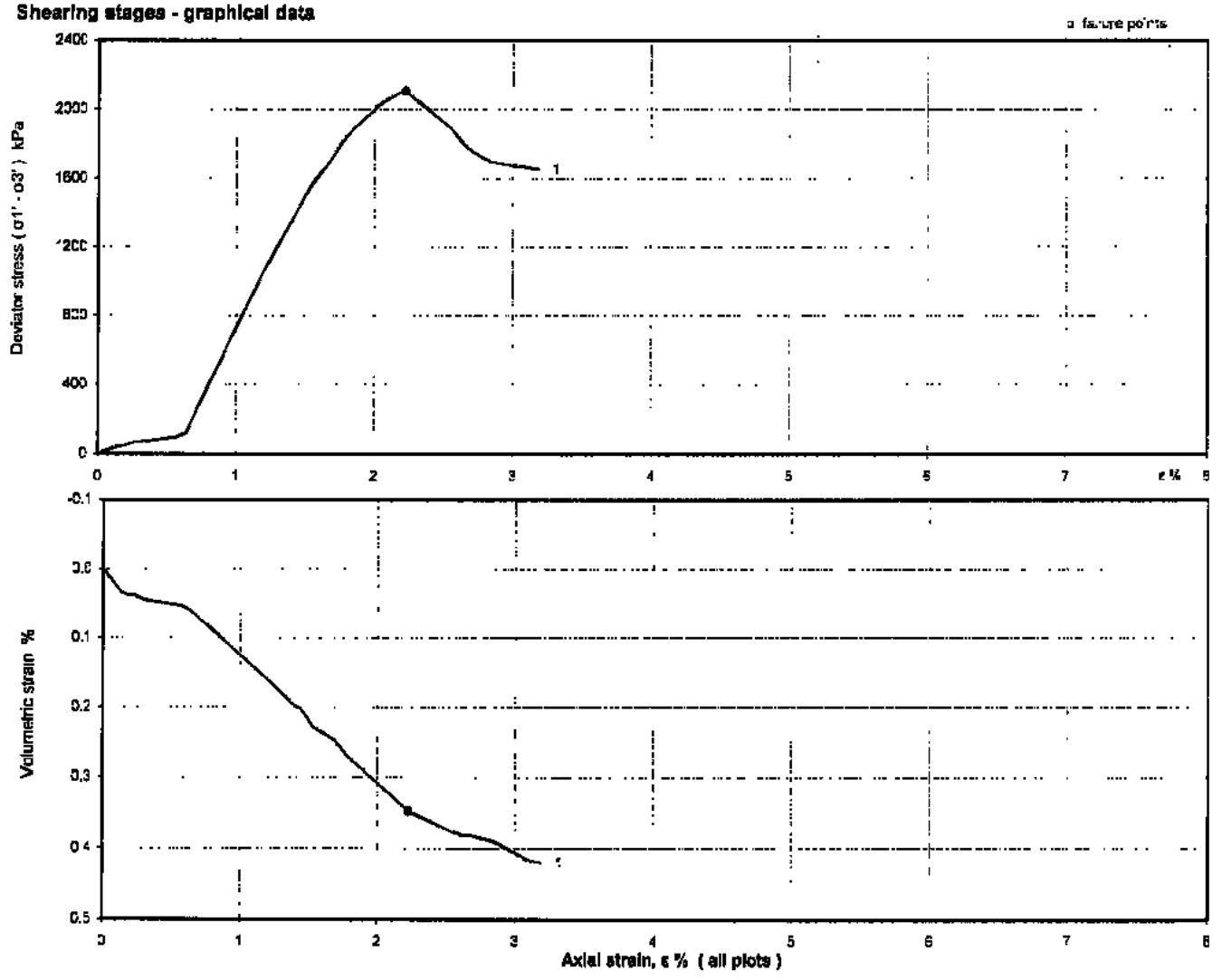
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		84.12-84.60	
			No	133	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

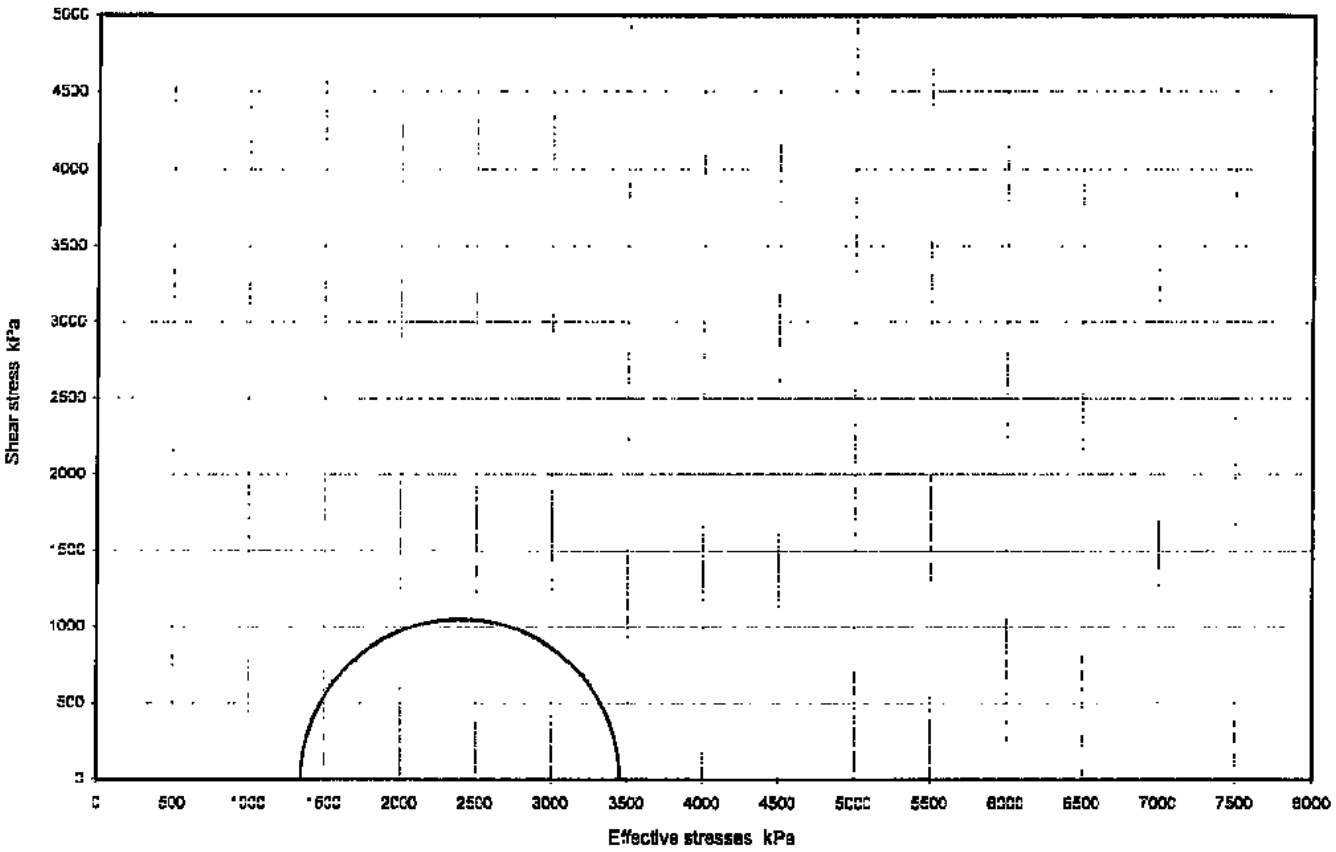


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:09/03/2011 09:07	CD 15 sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH2009_8U	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		84.12-84.60	
			No	133	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1	
Cell pressure	1650	kPa
Initial pwp	300	kPa
Initial σ_3'	1350	kPa
Rate of strain	0.02	%/hr

Failure conditions

Criterion	Maximum deviator stress	
Axial strain	2.22	%
$(\sigma_1 - \sigma_3')$	2104.2	kPa
Volumetric strain	0.35	%
σ_3'	1350	kPa
σ_1'	3454	kPa
Time to failure	111.0	hrs

Shear Strength Parameters

Linear regression

c'	kPa	not assessed
Ø'	degrees	not assessed

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:09/03/2011 09:07	CD 15 sheet 3 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

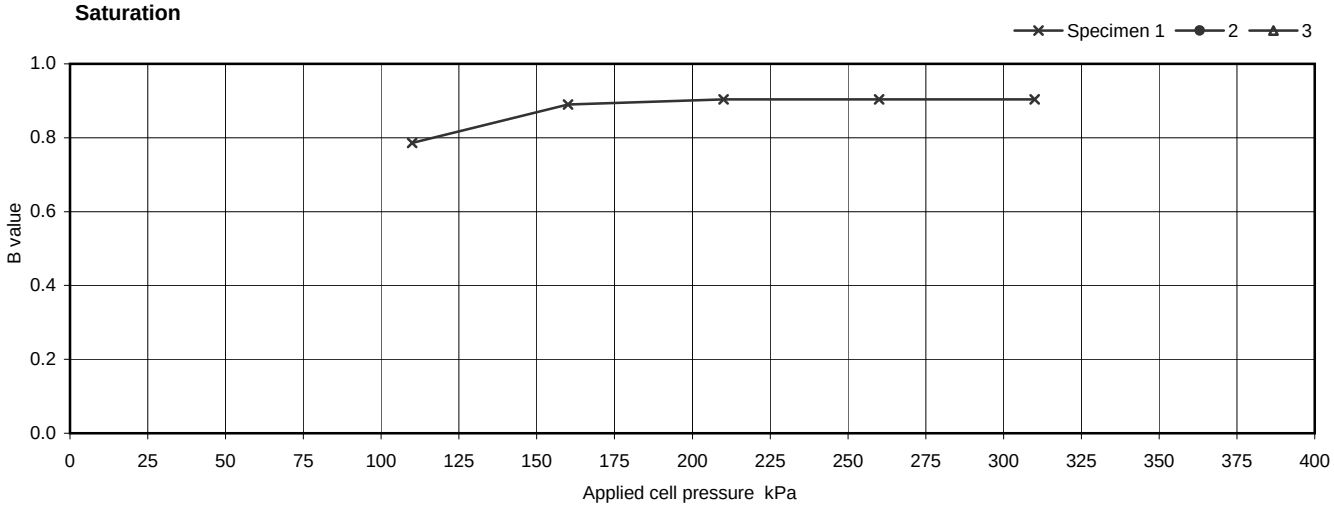
Project No	A0012-10	Sample Details:	Hole No	CBH 2009_10	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	50.45-50.90	
			No	20	Type CS
			ID		
			Spec Ref		

Specimen Details			1	2	3
Initial	Length	mm	203.9		
	Diameter	mm	106.8		
	Bulk Density	Mg/m³	1.79		
	Water Content	%	45.7		
	Dry density	Mg/m³	1.23		
After consolidation	Length	mm	204.0		
	Diameter	mm	106.9		
	Bulk Density*	Mg/m³	1.77		
	Water Content*	%	44.3		
	Dry density*	Mg/m³	1.23		
After test	Bulk Density*	Mg/m³	1.78		
	Water Content*	%	43.2		
	Dry density*	Mg/m³	1.25		

Soil Description	Stiff to very stiff brownish grey slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation		
		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	310		
Final pore water pressure	kPa	250		
Final B Value		0.90		

Saturation

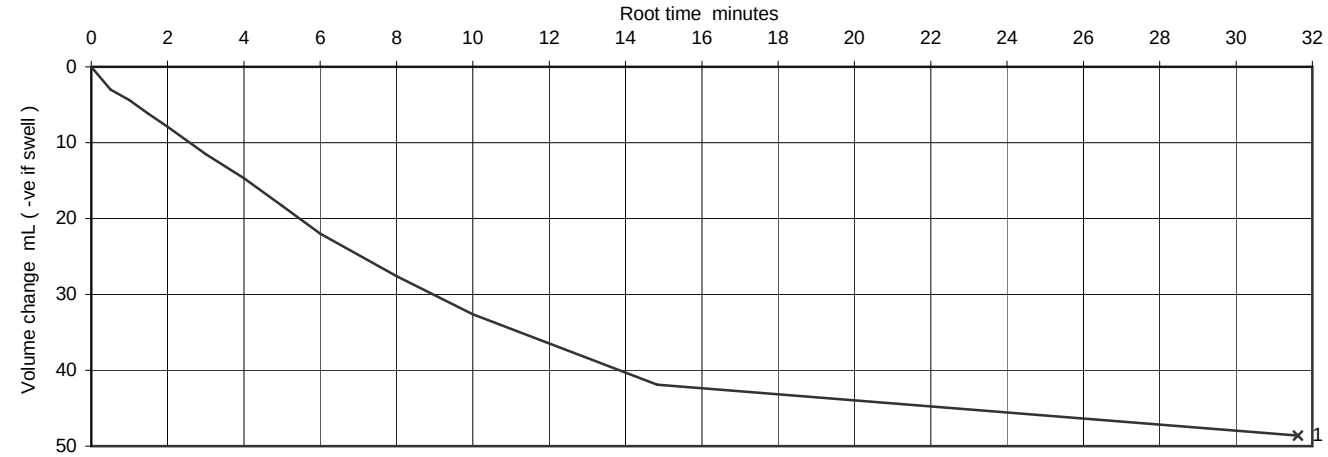


Consolidation Details see sheet 2 for plots	Drainage Conditions		From radial boundary and one end			
	Specimen No.		1	2	3	
	Cell Pressure applied		500			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		200			kPa
	Pore pressure at start of consolidation		479			kPa
	Pore pressure at end of consolidation		302			kPa
	Pore pressure dissipation at end of consolidation		99			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	1.40			m^2/year
	Coefficient of Compressibility	M_{vi}	0.15			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	6.3E-11			m/s

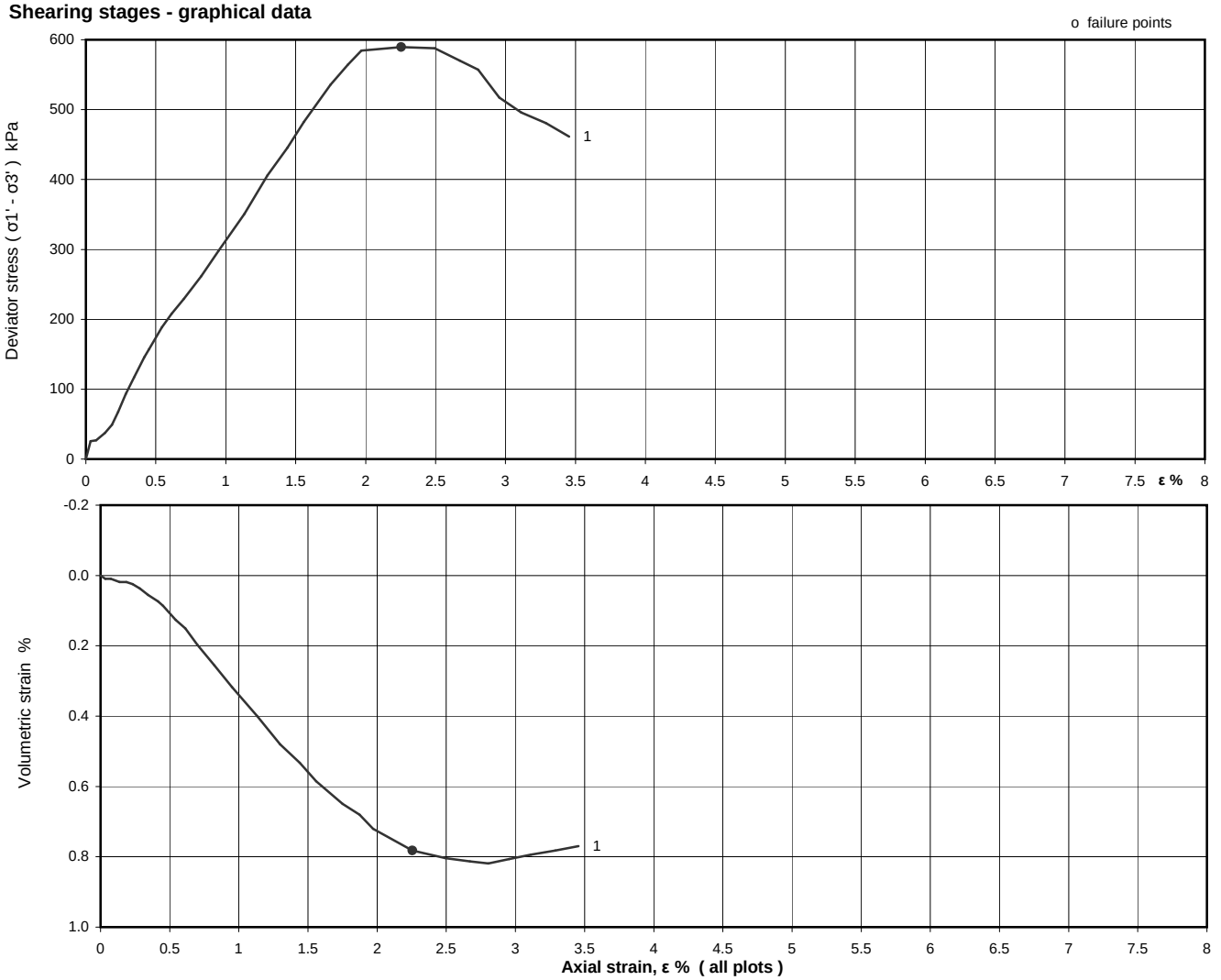
Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No		CBH 2009_10	
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)		50.45-50.90	
			No	20	Type	CS
			ID			
			Spec Ref			

Consolidation



Shearing stages - graphical data

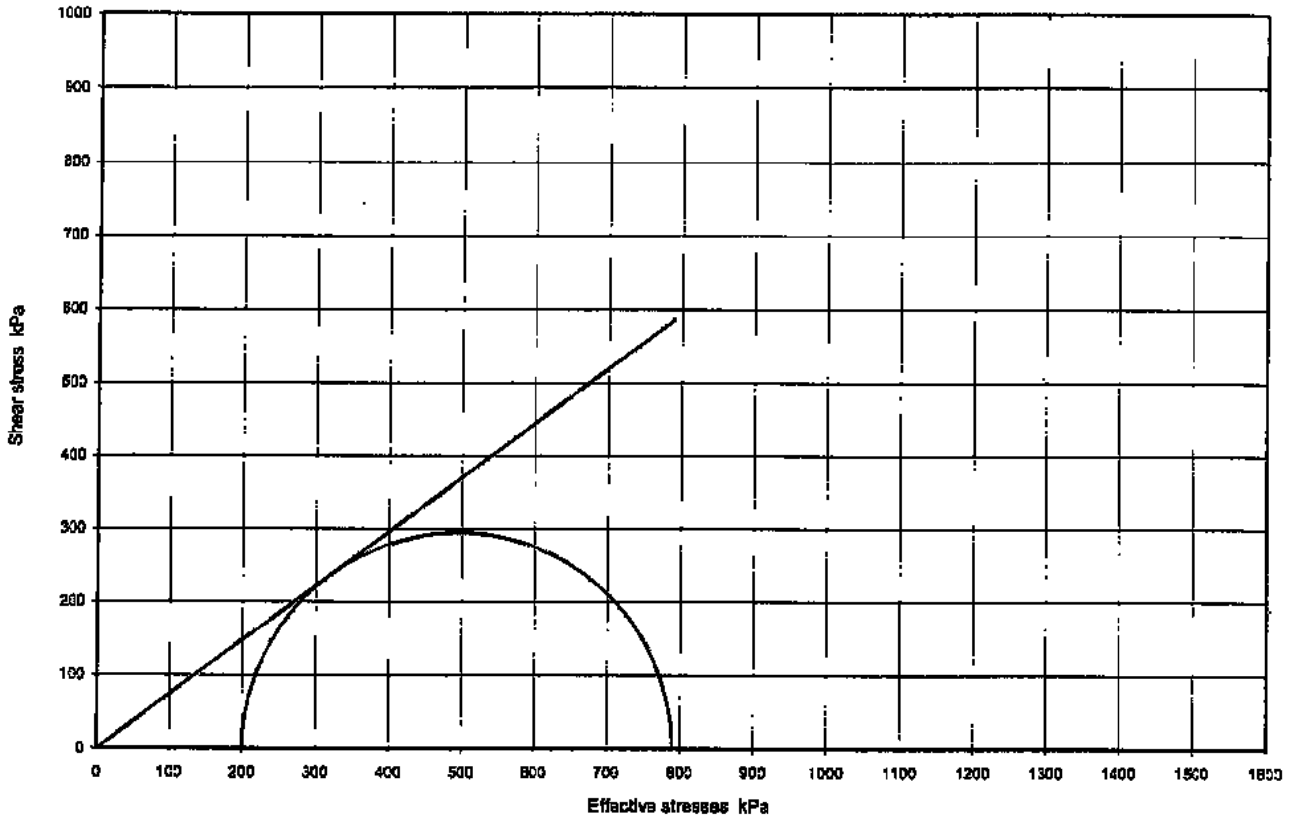


Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:18/02/2011 09:01	**CD 16** sheet 2 of 3

Consolidated Drained Triaxial Compression test with Measurement of Volume Change
(BS1377 : Part 8 : 1990)

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_10		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	50.45-50.90		
			No	20	Type	CS
			ID			
			Spec Ref			

Mohr Circles



Compression stages

Specimen	1		
Cell pressure	500		kPa
Initial pwp	300		kPa
Initial σ_3'	200		kPa
Rate of strain	0.36		%/hr

Failure conditions

Criterion	Maximum deviator stress		
Axial strain	2.25		%
$(\sigma_1' - \sigma_3')_f$	589.3		kPa
Volumetric strain	0.78		%
$\sigma_3'_f$	200		kPa
$\sigma_1'_f$	789		kPa
Time to failure	6.3		hrs

Shear Strength Parameters

Linear regression

c'	kPa	0.0
Ø'	degrees	36.6

Manual re-assessment

c'	kPa	-
Ø'	degrees	-

Notes :

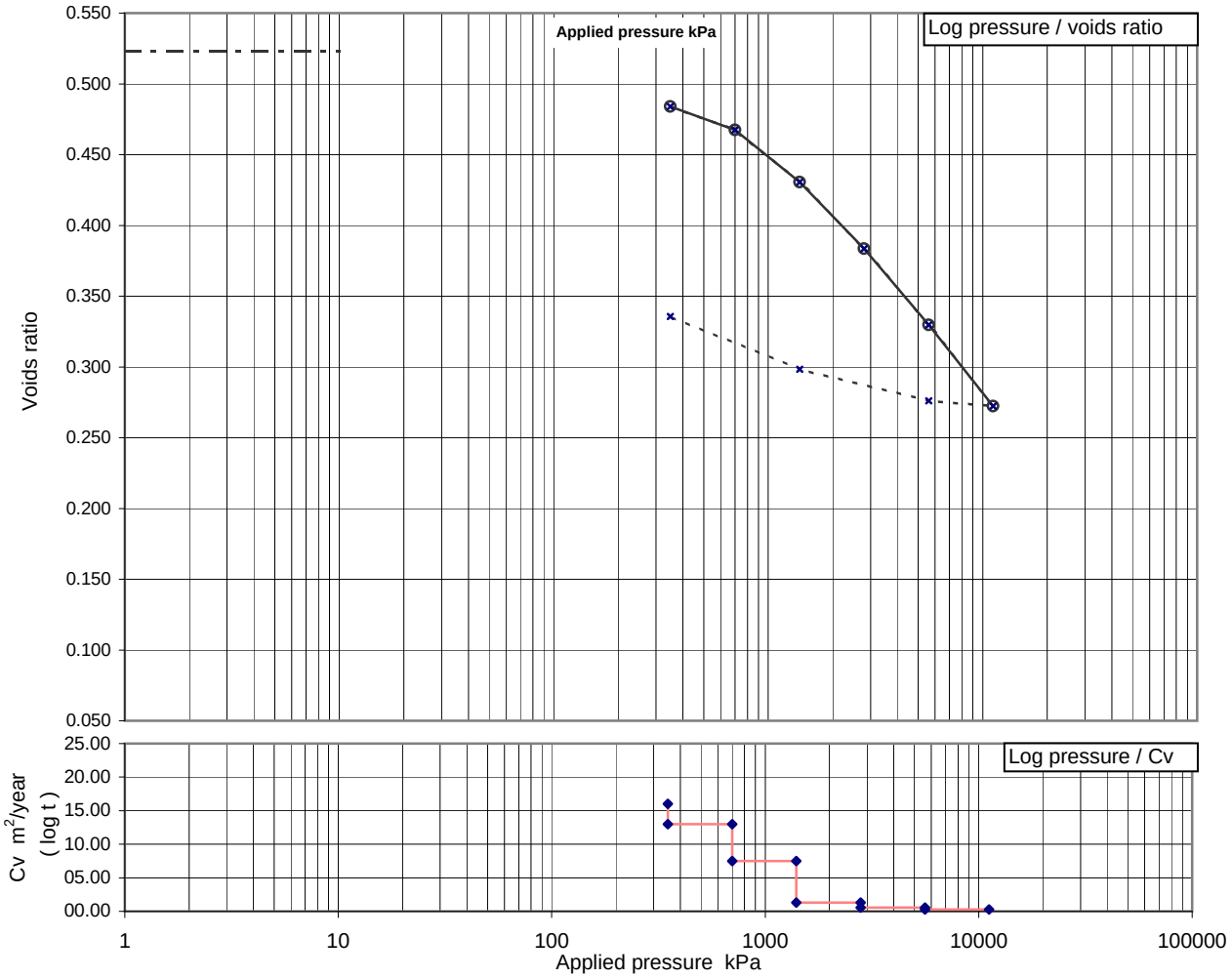
Deviator stresses corrected for area change, vertical side drains and 0.45 mm thick rubber membrane(s)

Mode of failure

Ref			Figure
SLR8.2 Rev 85 Jan 10	Soil Mechanics	Printed:18/02/2011 09:01	CD 16 sheet 3 of 3

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	68.75		
			Samp No	15	Type	CS
			ID	ESGA0012-10201010080000001883		
			Spec Ref			



Soil description	Stiff brown mottled grey slightly sandy CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	48	Plastic limit %	18

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	50.01		mm
Height	19.92	17.47	mm
Voids ratio	0.523	0.336	
Moisture content	19	13	%
Bulk density	2.07	2.25	Mg/m^3
Dry density	1.74	1.98	Mg/m^3
Saturation	95	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

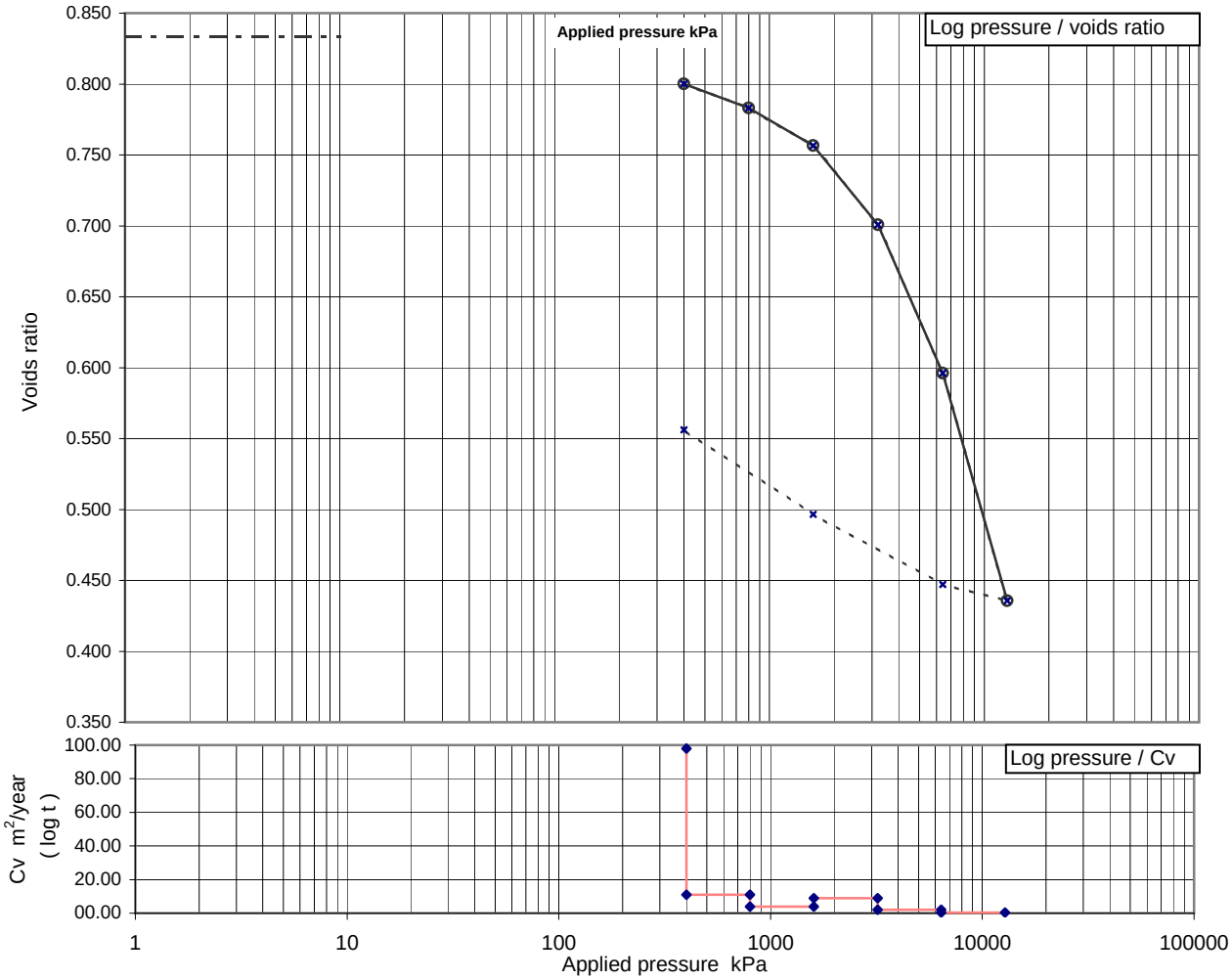
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	0.5230				
350	0.4840	0.073	16	46	
700	0.4675	0.032	13	16	
1400	0.4305	0.036	7.5	8.3	
2800	0.3835	0.023	1.3	1.4	
5600	0.3297	0.014	0.54	0.6	
11200	0.2723	0.008	0.3	0.33	
5600	0.2760	0.001	-	-	
1400	0.2983	0.004	-	-	
350	0.3357	0.027	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	80.10		
			Samp No	17	Type	CS
			ID	ESGA0012-10201010080000001885		
			Spec Ref			



Soil description	Very stiff brown silty CLAY.
Preparation	Undisturbed
Index properties (if available)	Liquid limit % 96 Plastic limit % 31

Specimen details	Initial	Final	
Particle density	2.66	measured	Mg/m^3
Diameter	50.06		mm
Height	20.02	16.99	mm
Voids ratio	0.834	0.556	
Moisture content	31	22	%
Bulk density	1.90	2.08	Mg/m^3
Dry density	1.45	1.71	Mg/m^3
Saturation	98	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

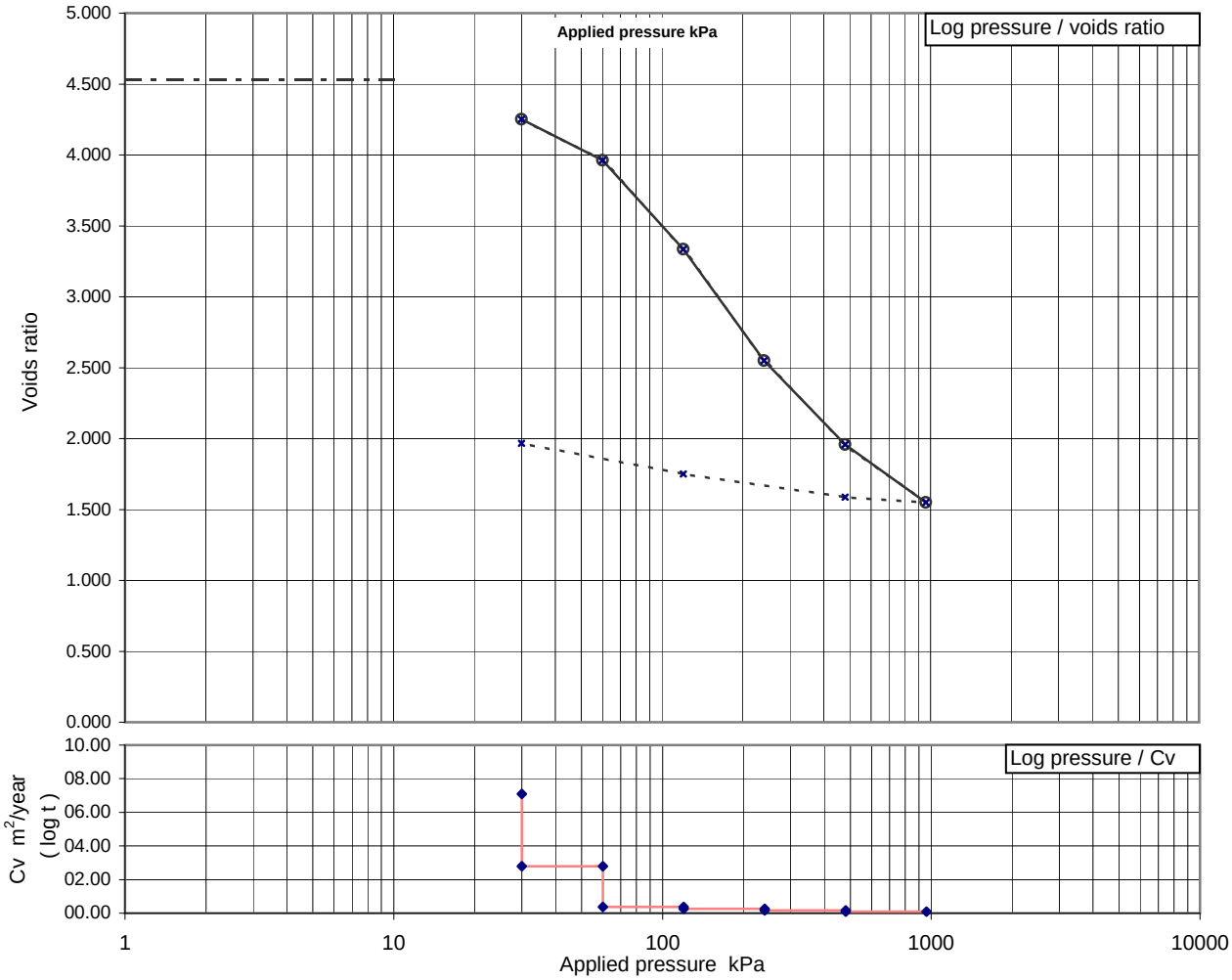
Notes :

Specimen taken 35 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	0.8337				
400	0.8001	0.046	98	105	
800	0.7830	0.024	11	11	
1600	0.7567	0.018	3.9	4.2	
3200	0.7009	0.020	8.9	9.5	
6400	0.5962	0.019	2	2.1	
12800	0.4357	0.016	0.38	0.42	
6400	0.4471	0.001	-	-	
1600	0.4965	0.007	-	-	
400	0.5563	0.033	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	5.90		
			Samp No	15	Type	U
			ID	ESGA0012-10201010080000001742		
			Spec Ref			



Soil description	Soft to firm brownish grey slightly organic slightly sandy fibrous CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	223	Plastic limit %	101

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	69.96		mm
Height	18.93	10.16	mm
Voids ratio	4.528	1.968	
Moisture content	159	72	%
Bulk density	1.24	1.54	Mg/m^3
Dry density	0.48	0.89	Mg/m^3
Saturation	93	97	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

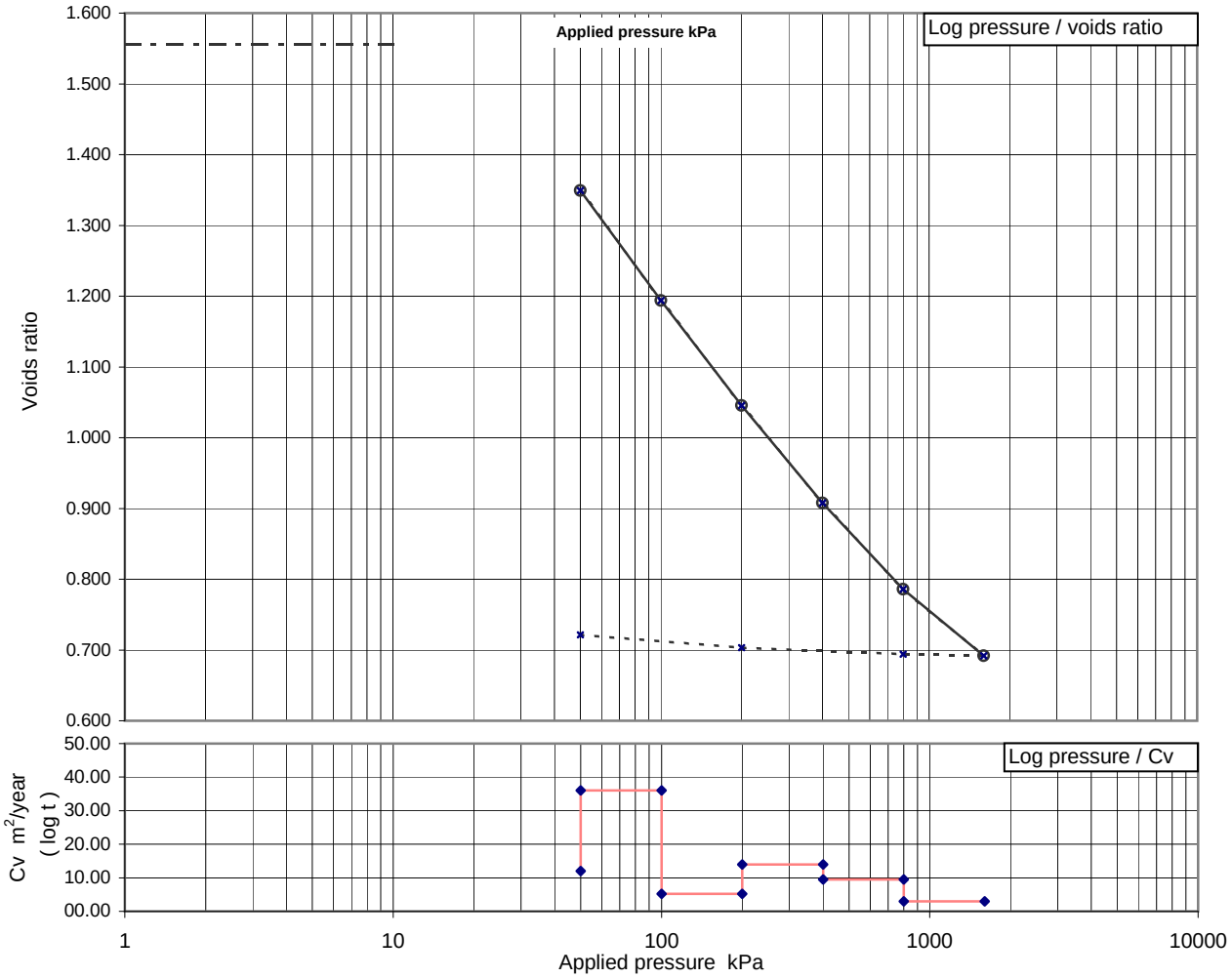
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	4.5279				
30	4.2513	1.668	7.1	7.6	
60	3.9627	1.832	2.8	2.5	
120	3.3355	2.106	0.38	0.41	
240	2.5498	1.510	0.26	0.28	
480	1.9580	0.695	0.16	0.17	
960	1.5488	0.288	0.09	0.1	
480	1.5871	0.031	-	-	
120	1.7506	0.176	-	-	
30	1.9677	0.877	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_1UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	9.40		
			Samp No	25	Type	U
			ID	ESGA0012-10201010080000001752		
			Spec Ref			



Soil description	Greyish black peaty gravelly SAND.
Preparation	Undisturbed
Index properties (if available)	Liquid limit % 32 Plastic limit % NP

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m³
Diameter	69.93		mm
Height	19.03	12.82	mm
Voids ratio	1.556	0.722	
Moisture content	48	27	%
Bulk density	1.53	1.95	Mg/m³
Dry density	1.04	1.54	Mg/m³
Saturation	81	99	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

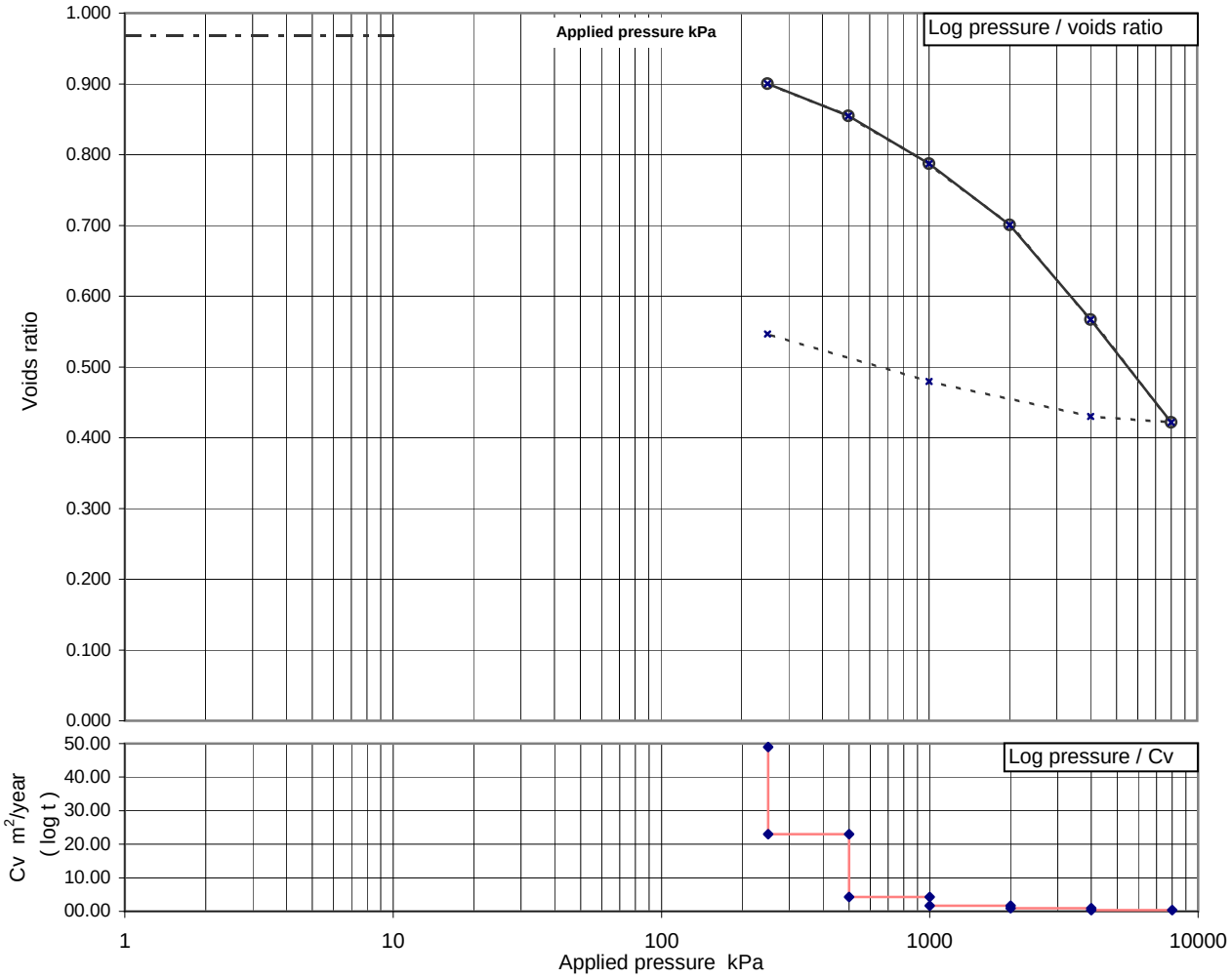
Notes :

Specimen taken 150 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	1.5556				
50	1.3494	1.613	12	13	
100	1.1939	1.324	36	28	
200	1.0456	0.676	5.2	6.3	
400	0.9078	0.337	14	14	
800	0.7857	0.160	9.5	10	
1600	0.6917	0.066	3	3.2	
800	0.6938	0.002	-	-	
200	0.7032	0.009	-	-	
50	0.7216	0.072	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	51.80		
			Samp No	17	Type	CS
			ID	ESGA0012-10201008240000000381		
			Spec Ref			



Soil description: Stiff greyish brown slightly sandy CLAY.

Preparation: Undisturbed

Index properties (if available): Liquid limit % 78; Plastic limit % 26

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m³
Diameter	50.02		mm
Height	19.96	15.67	mm
Voids ratio	0.969	0.546	
Moisture content	35	22	%
Bulk density	1.82	2.08	Mg/m³
Dry density	1.35	1.71	Mg/m³
Saturation	95	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

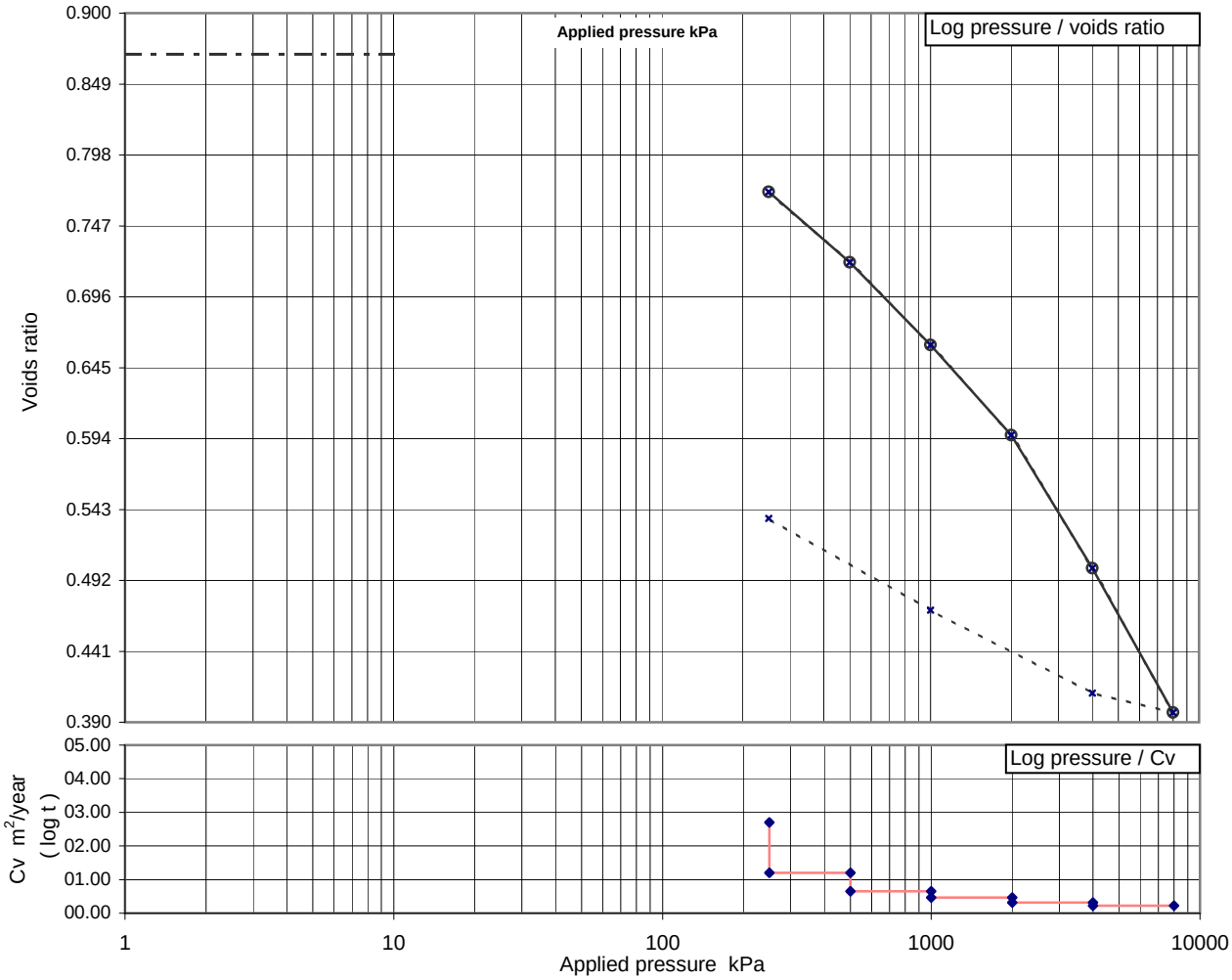
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	0.9688				
250	0.9001	0.140	49	52	
500	0.8550	0.095	23	25	
1000	0.7872	0.073	4.3	7.9	
2000	0.7005	0.049	1.7	2.2	
4000	0.5668	0.039	0.94	0.81	
8000	0.4215	0.023	0.41	0.47	
4000	0.4298	0.001	-	-	
1000	0.4796	0.012	-	-	
250	0.5464	0.060	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	54.80		
			Samp No	18	Type	CS
			ID	ESGA0012-10201008240000000382		
			Spec Ref			



Soil description	Firm to stiff brownish grey slightly sandy CLAY.
Preparation	Undisturbed
Index properties (if available)	Liquid limit % 75 Plastic limit % 26

Specimen details	Initial	Final	
Particle density	2.62	measured	Mg/m³
Diameter	50.05		mm
Height	19.90	16.34	mm
Voids ratio	0.871	0.537	
Moisture content	32	22	%
Bulk density	1.85	2.07	Mg/m³
Dry density	1.40	1.71	Mg/m³
Saturation	97	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

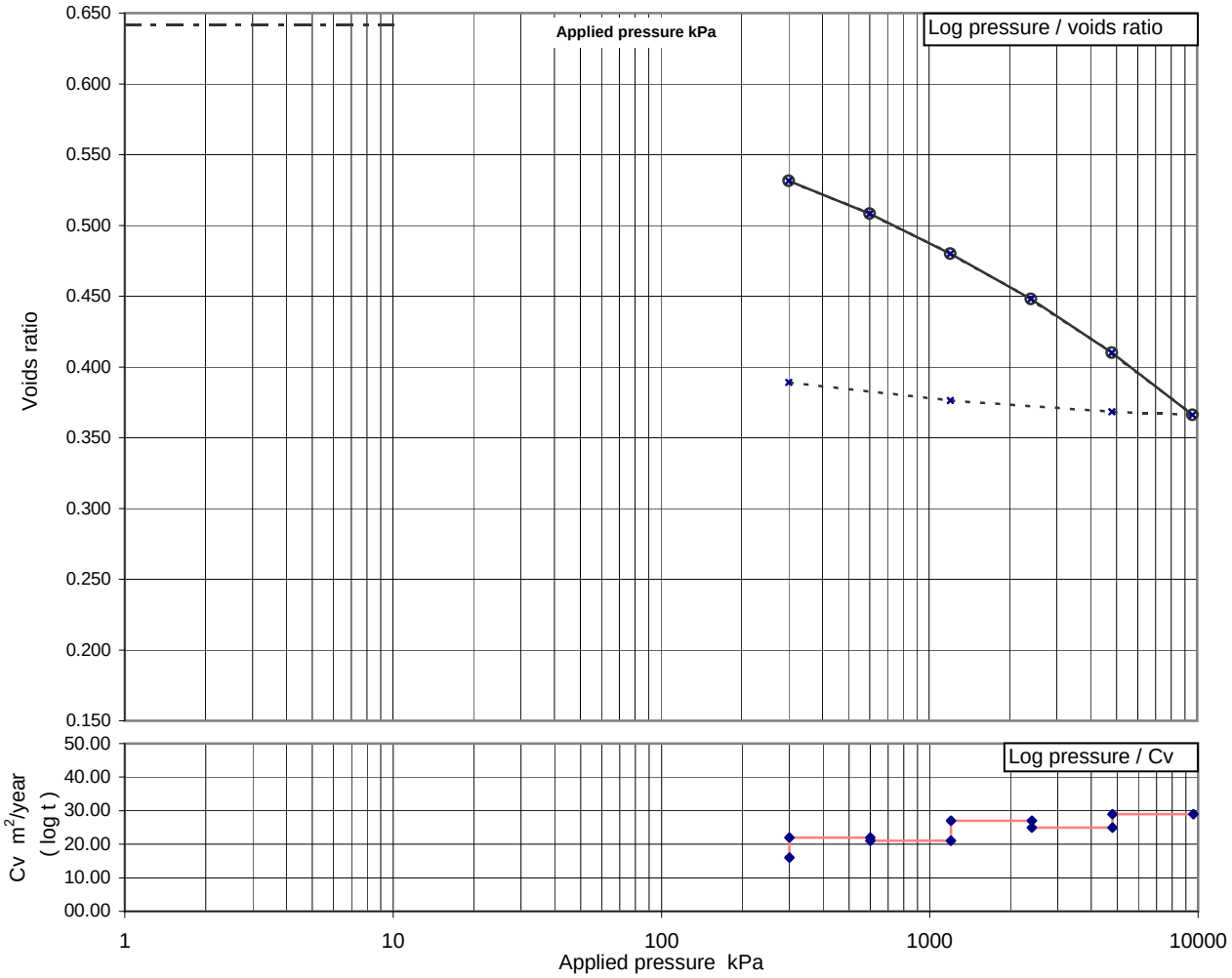
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	0.8707				
250	0.7715	0.212	2.7	3	
500	0.7208	0.114	1.2	1.4	
1000	0.6613	0.069	0.65	0.68	
2000	0.5965	0.039	0.47	0.53	
4000	0.5009	0.030	0.32	0.34	
8000	0.3970	0.017	0.22	0.26	
4000	0.4110	0.003	-	-	
1000	0.4706	0.014	-	-	
250	0.5365	0.060	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	58.50		
			Samp No	20	Type	CS
			ID	ESGA0012-10201008240000000383		
			Spec Ref			



Soil description: Soft brownish grey slightly sandy silty CLAY.

Preparation: Undisturbed

Index properties (if available): Liquid limit % 32 | Plastic limit % 21

Specimen details	Initial	Final	
Particle density	2.63	measured	Mg/m³
Diameter	50.06		mm
Height	20.12	17.03	mm
Voids ratio	0.642	0.389	
Moisture content	26	16	%
Bulk density	2.01	2.19	Mg/m³
Dry density	1.60	1.89	Mg/m³
Saturation	105	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

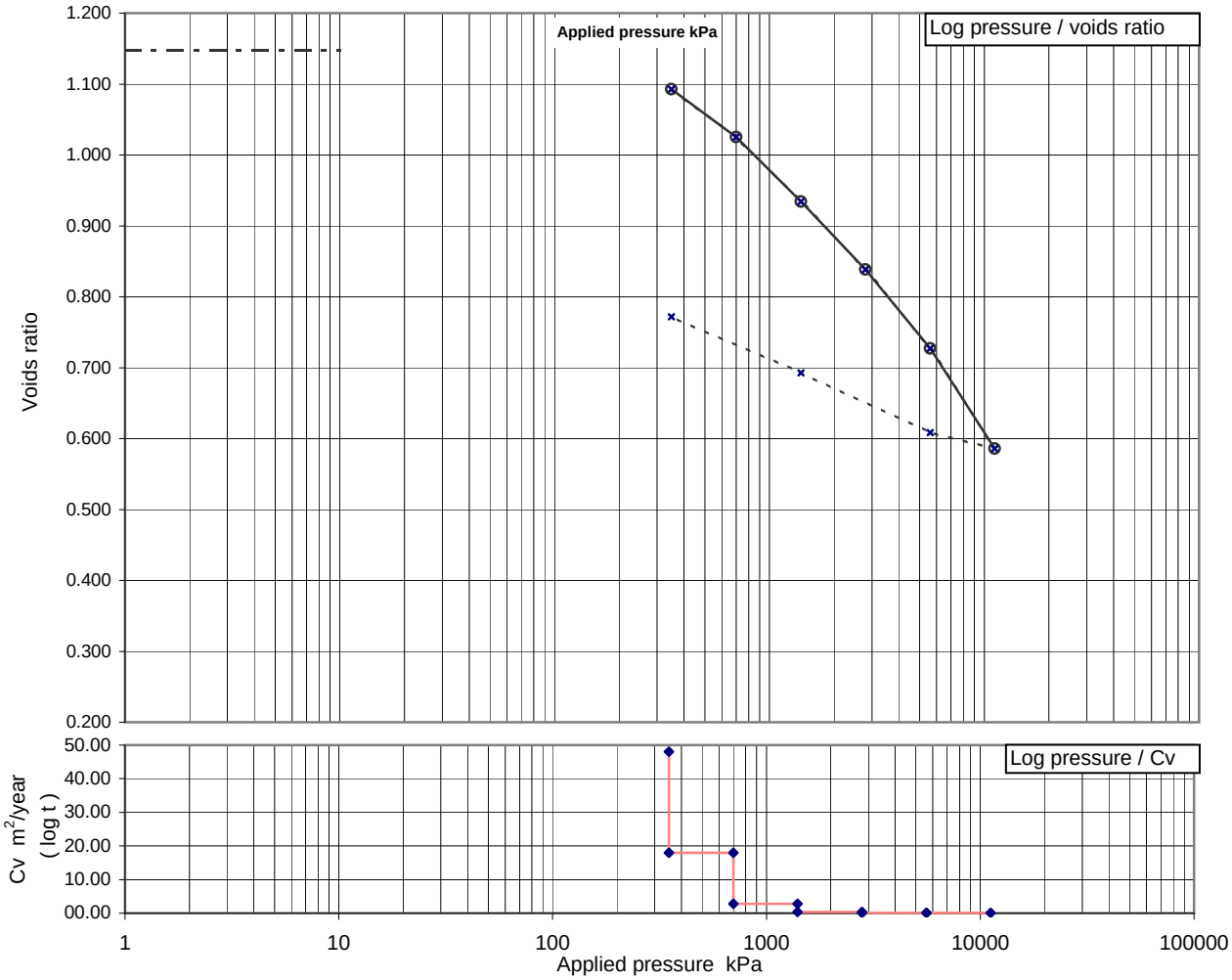
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	0.6416				
300	0.5315	0.223	16	17	
600	0.5084	0.050	22	24	
1200	0.4801	0.031	21	19	
2400	0.4480	0.018	27	29	
4800	0.4101	0.011	25	27	
9600	0.3662	0.006	29	24	
4800	0.3684	0.000	-	-	
1200	0.3764	0.002	-	-	
300	0.3892	0.010	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	74.00		
			Samp No	24	Type	CS
			ID	ESGA0012-10201008240000000387		
			Spec Ref			



Soil description	Firm to stiff dark grey slightly sandy CLAY.
Preparation	Undisturbed
Index properties (if available)	Liquid limit % 102 Plastic limit % 40

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	49.97		mm
Height	19.90	16.41	mm
Voids ratio	1.148	0.772	
Moisture content	42	31	%
Bulk density	1.75	1.95	Mg/m^3
Dry density	1.23	1.50	Mg/m^3
Saturation	96	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

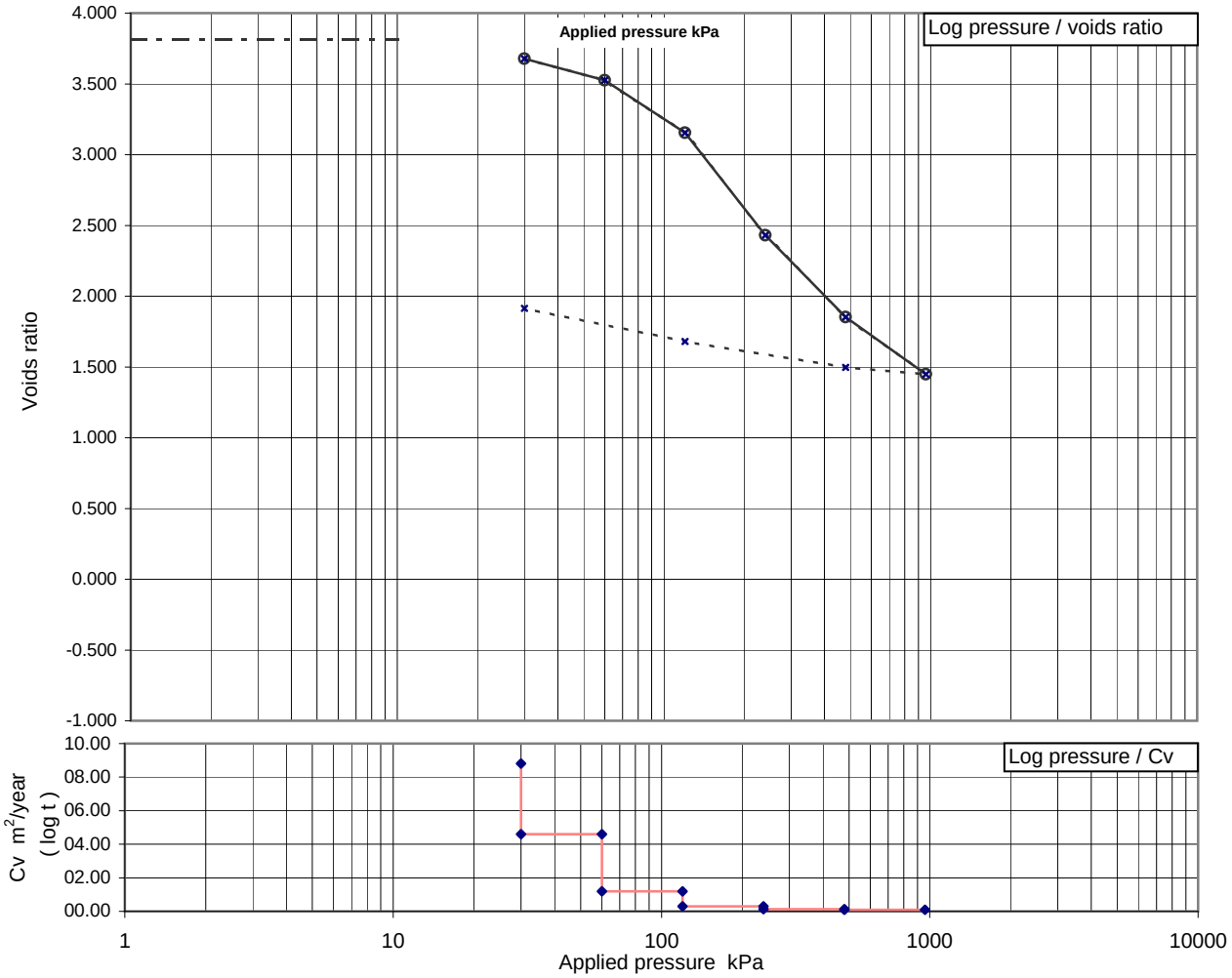
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	1.1478				
350	1.0928	0.073	48	51	
700	1.0251	0.092	18	19	
1400	0.9344	0.064	2.8	2.8	
2800	0.8383	0.035	0.4	0.42	
5600	0.7270	0.022	0.13	0.14	
11200	0.5859	0.015	0.05	0.05	
5600	0.6085	0.003	-	-	
1400	0.6926	0.012	-	-	
350	0.7719	0.045	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_2UA		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	5.00		
			Samp No	8	Type	U
			ID	ESGA0012-10201010190000002151		
			Spec Ref			



Soil description	Firm grey CLAY with organic fibrous clay partings.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	143	Plastic limit %	54

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	69.95		mm
Height	18.98	11.48	mm
Voids ratio	3.817	1.914	
Moisture content	136	72	%
Bulk density	1.30	1.57	Mg/m^3
Dry density	0.55	0.91	Mg/m^3
Saturation	95	100	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

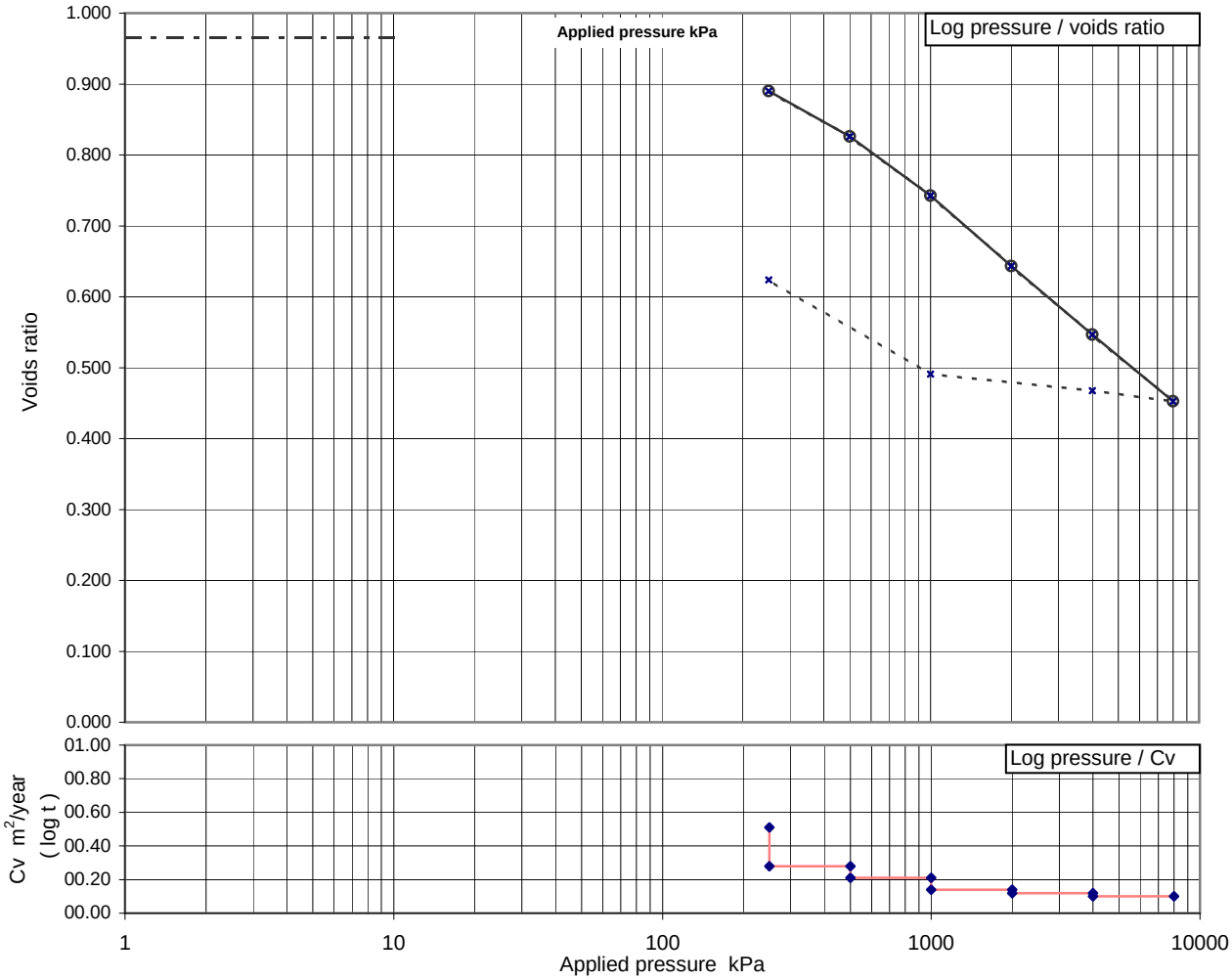
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	3.8171				
30	3.6788	0.957	8.8	9.6	
60	3.5245	1.100	4.6	5.6	
120	3.1551	1.360	1.2	1.3	
240	2.4312	1.452	0.29	0.3	
480	1.8522	0.703	0.13	0.14	
960	1.4486	0.295	0.09	0.09	
480	1.4958	0.040	-	-	
120	1.6804	0.205	-	-	
30	1.9141	0.969	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	46.80		
			Samp No	13	Type	CS
			ID	ESGA0012-10201007230000000017		
			Spec Ref			



Soil description	Stiff greyish brown silty CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	86	Plastic limit %	28

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	50.06		mm
Height	20.02	16.54	mm
Voids ratio	0.966	0.624	
Moisture content	38	25	%
Bulk density	1.86	2.04	Mg/m^3
Dry density	1.35	1.63	Mg/m^3
Saturation	105	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

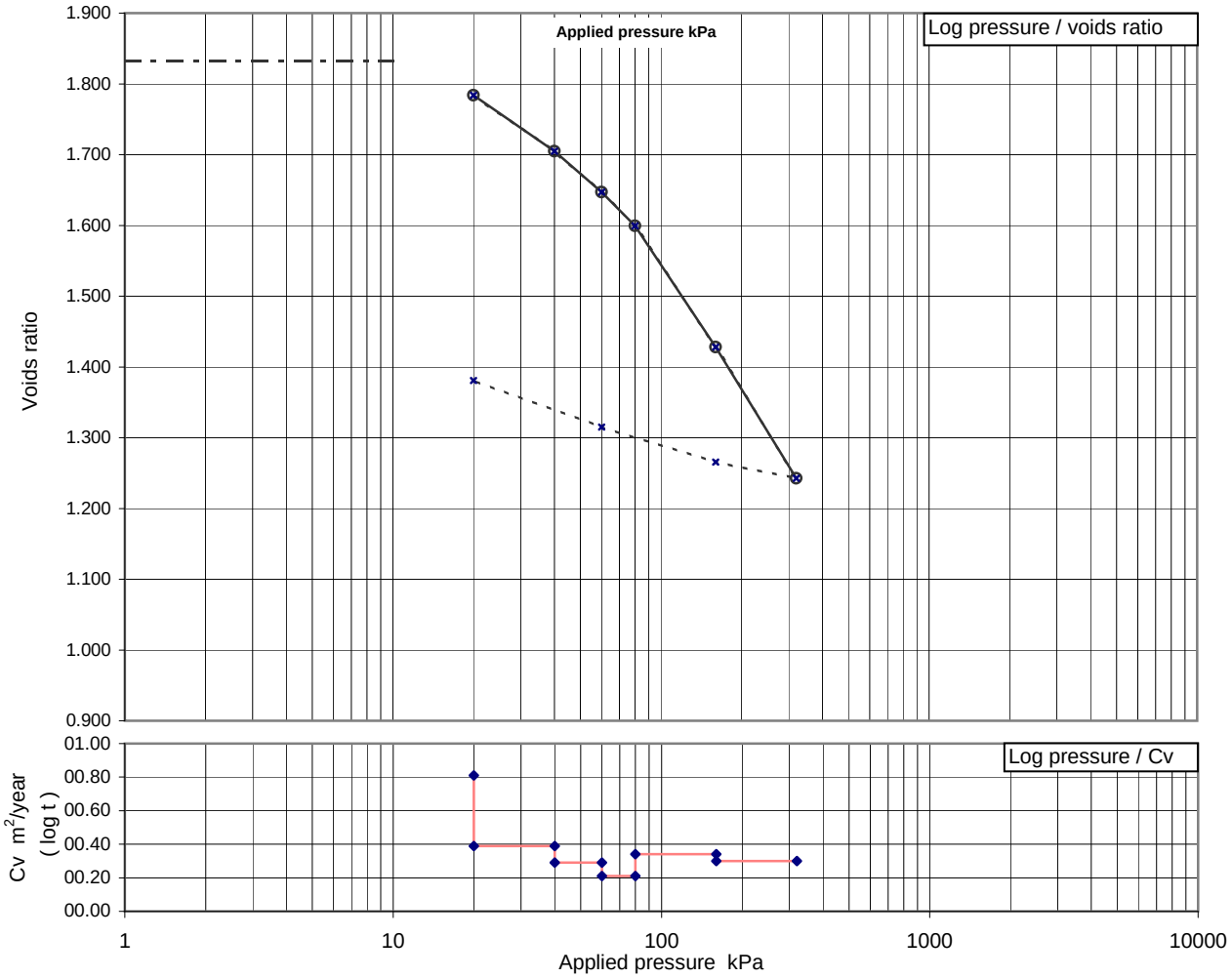
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	0.9656				
250	0.8902	0.153	0.51	0.51	
500	0.8261	0.136	0.28	0.3	
1000	0.7427	0.091	0.21	0.22	
2000	0.6434	0.057	0.14	0.15	
4000	0.5464	0.030	0.12	0.13	
8000	0.4526	0.015	0.1	0.1	
4000	0.4678	0.003	-	-	
1000	0.4909	0.005	-	-	
250	0.6237	0.119	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_5UB		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	4.10		
			Samp No	10	Type	U
			ID	ESGA0012-10201010010000001228		
			Spec Ref			



Soil description	Soft brownish grey slightly organic slightly sandy CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	98	Plastic limit %	39

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	69.94		mm
Height	18.94	15.91	mm
Voids ratio	1.833	1.381	
Moisture content	71	55	%
Bulk density	1.60	1.72	Mg/m^3
Dry density	0.94	1.11	Mg/m^3
Saturation	103	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

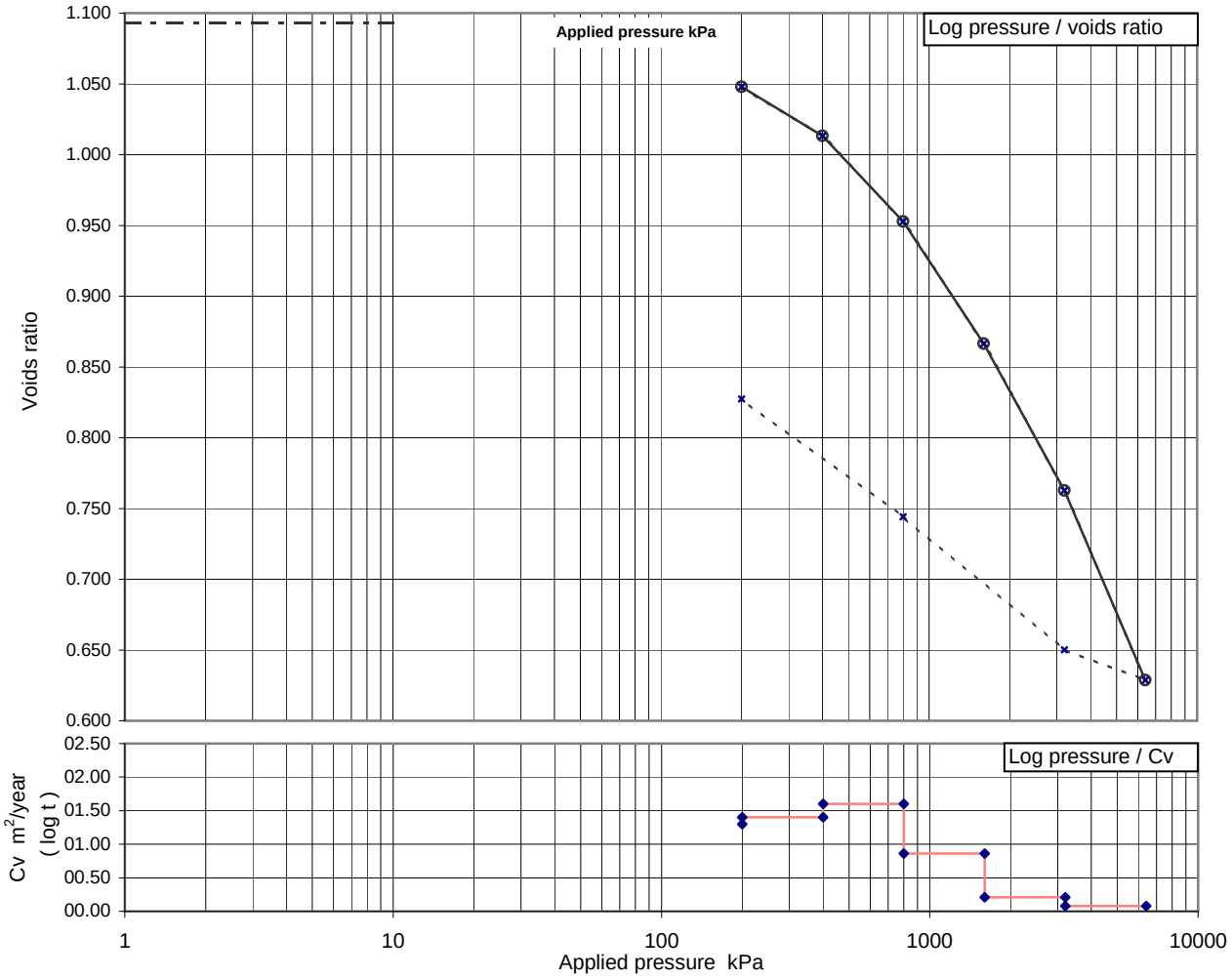
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	1.8329				
20	1.7838	0.866	0.81	0.85	
40	1.7049	1.416	0.39	0.42	
60	1.6470	1.070	0.29	0.3	
80	1.5992	0.904	0.21	0.23	
160	1.4282	0.822	0.34	0.36	
320	1.2428	0.477	0.3	0.31	
160	1.2657	0.064	-	-	
60	1.3152	0.219	-	-	
20	1.3806	0.706	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	43.00		
			Samp No	9	Type	CS
			ID	ESGA0012-10201007230000000028		
			Spec Ref			



Soil description: Stiff brownish grey slightly sandy CLAY.

Preparation: Undisturbed

Index properties (if available): Liquid limit % 101 | Plastic limit % 37

Specimen details	Initial	Final	
Particle density	2.70	assumed	Mg/m³
Diameter	50.07		mm
Height	19.95	17.41	mm
Voids ratio	1.093	0.827	
Moisture content	41	32	%
Bulk density	1.81	1.95	Mg/m³
Dry density	1.29	1.48	Mg/m³
Saturation	100	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

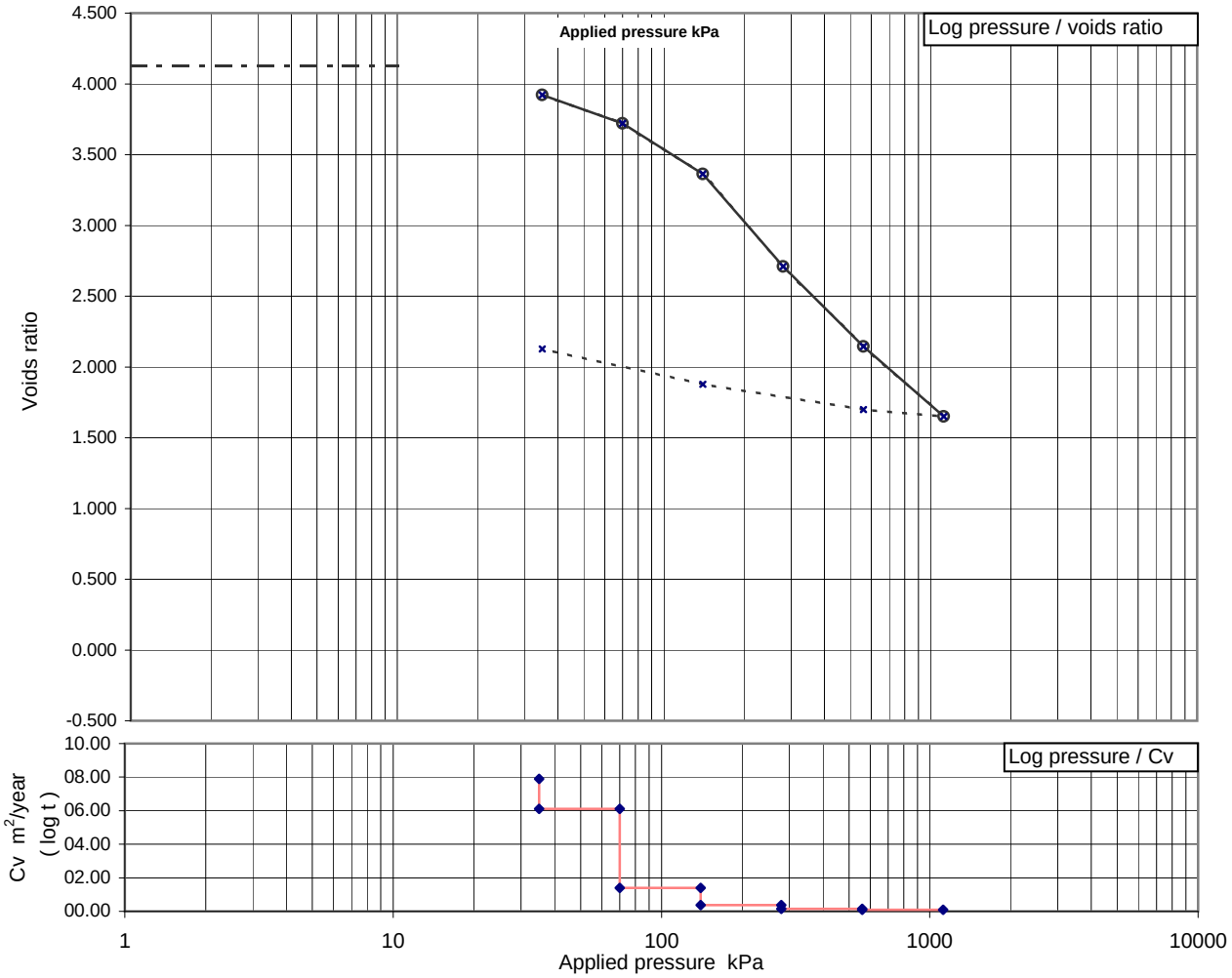
Notes :

Specimen taken 40 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	1.0934				
200	1.0479	0.109	1.3	1.4	
400	1.0132	0.085	1.4	1.5	
800	0.9528	0.075	1.6	1.8	
1600	0.8664	0.055	0.86	0.89	
3200	0.7627	0.035	0.21	0.23	
6400	0.6288	0.024	0.08	0.08	
3200	0.6502	0.004	-	-	
800	0.7442	0.024	-	-	
200	0.8273	0.079	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_6U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	6.80		
			Samp No	20	Type	U
			ID	ESGA0012-10201010050000001504		
			Spec Ref			



Soil description	Firm brownish grey clayey fibrous PEAT.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	167	Plastic limit %	96

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	69.93		mm
Height	18.98	11.57	mm
Voids ratio	4.130	2.126	
Moisture content	137	77	%
Bulk density	1.22	1.50	Mg/m^3
Dry density	0.52	0.85	Mg/m^3
Saturation	88	97	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

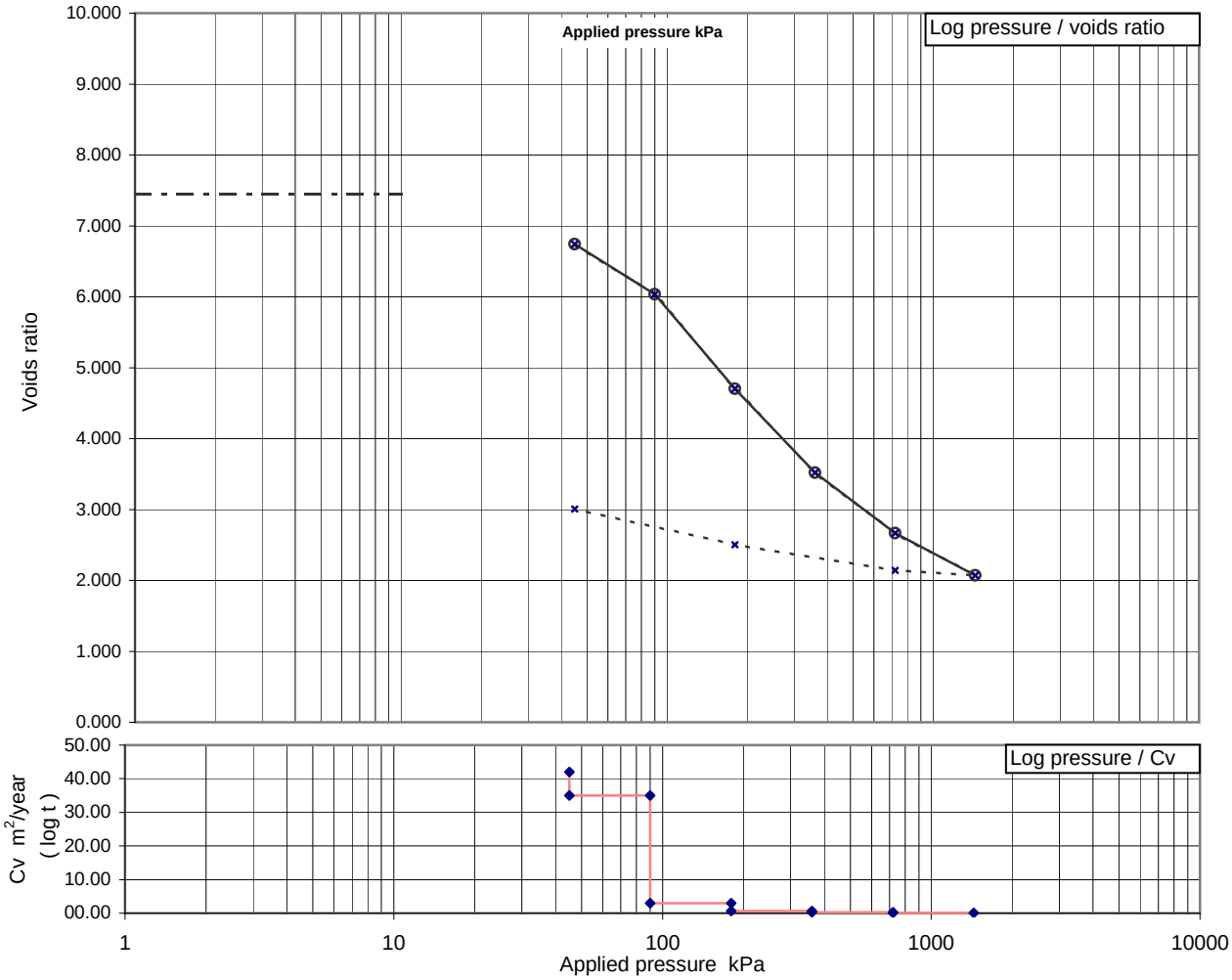
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	4.1302				
35	3.9208	1.166	7.9	8.4	
70	3.7205	1.163	6.1	6.4	
140	3.3638	1.080	1.4	1.4	
280	2.7105	1.069	0.37	0.4	
560	2.1446	0.545	0.15	0.16	
1120	1.6503	0.281	0.09	0.09	
560	1.6987	0.033	-	-	
140	1.8784	0.159	-	-	
35	2.1262	0.820	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_7U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	8.20		
			Samp No	24	Type	U
			ID	ESGA0012-10201010260000002500		
			Spec Ref			



Soil description: Firm pseudo fibrous PEAT.

Preparation: Undisturbed

Index properties (if available): Liquid limit % 498 | Plastic limit % NP

Specimen details	Initial	Final	
Particle density	1.85	assumed	Mg/m³
Diameter	69.93		mm
Height	19.23	9.12	mm
Voids ratio	7.451	3.008	
Moisture content	371	163	%
Bulk density	1.03	1.21	Mg/m³
Dry density	0.22	0.46	Mg/m³
Saturation	92	100	%
Average temperature for test	22		°C

Swelling pressure: not measured kPa

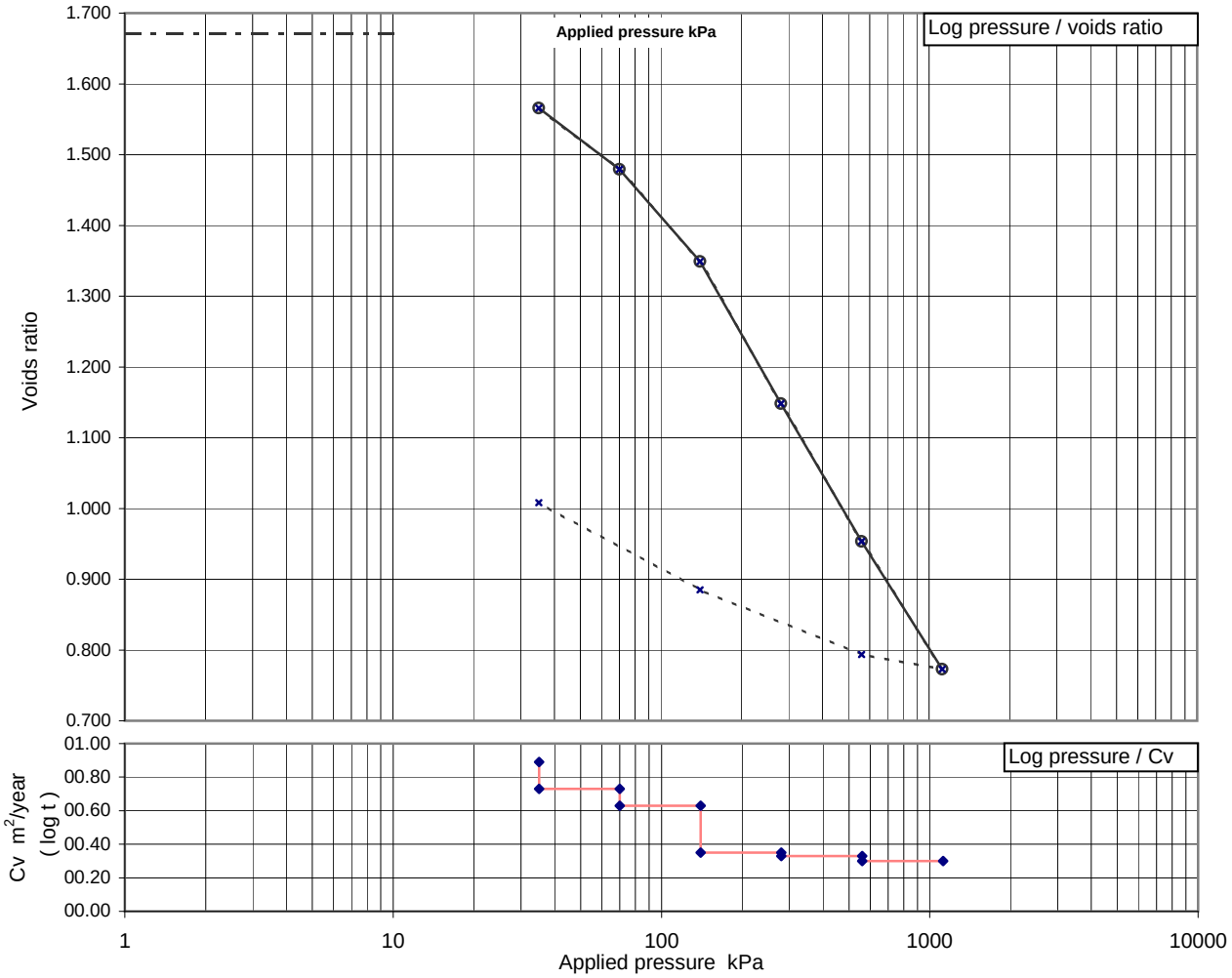
Notes :

Specimen taken 70 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	7.4511				
45	6.7432	1.861	42	59	
90	6.0375	2.025	35	33	
180	4.7012	2.110	3	3.3	
360	3.5192	1.152	0.64	0.69	
720	2.6667	0.524	0.26	0.28	
1440	2.0726	0.225	0.06	0.06	
720	2.1416	0.031	-	-	
180	2.5033	0.213	-	-	
45	3.0077	1.067	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	6.65		
			Samp No	10	Type	U
			ID	ESGA0012-10201009200000000874		
			Spec Ref			



Soil description	Soft grey slightly organic slightly sandy CLAY with occasional rootlets.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	79	Plastic limit %	37

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	69.93		mm
Height	19.03	14.31	mm
Voids ratio	1.670	1.008	
Moisture content	65	40	%
Bulk density	1.64	1.85	Mg/m^3
Dry density	0.99	1.32	Mg/m^3
Saturation	104	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

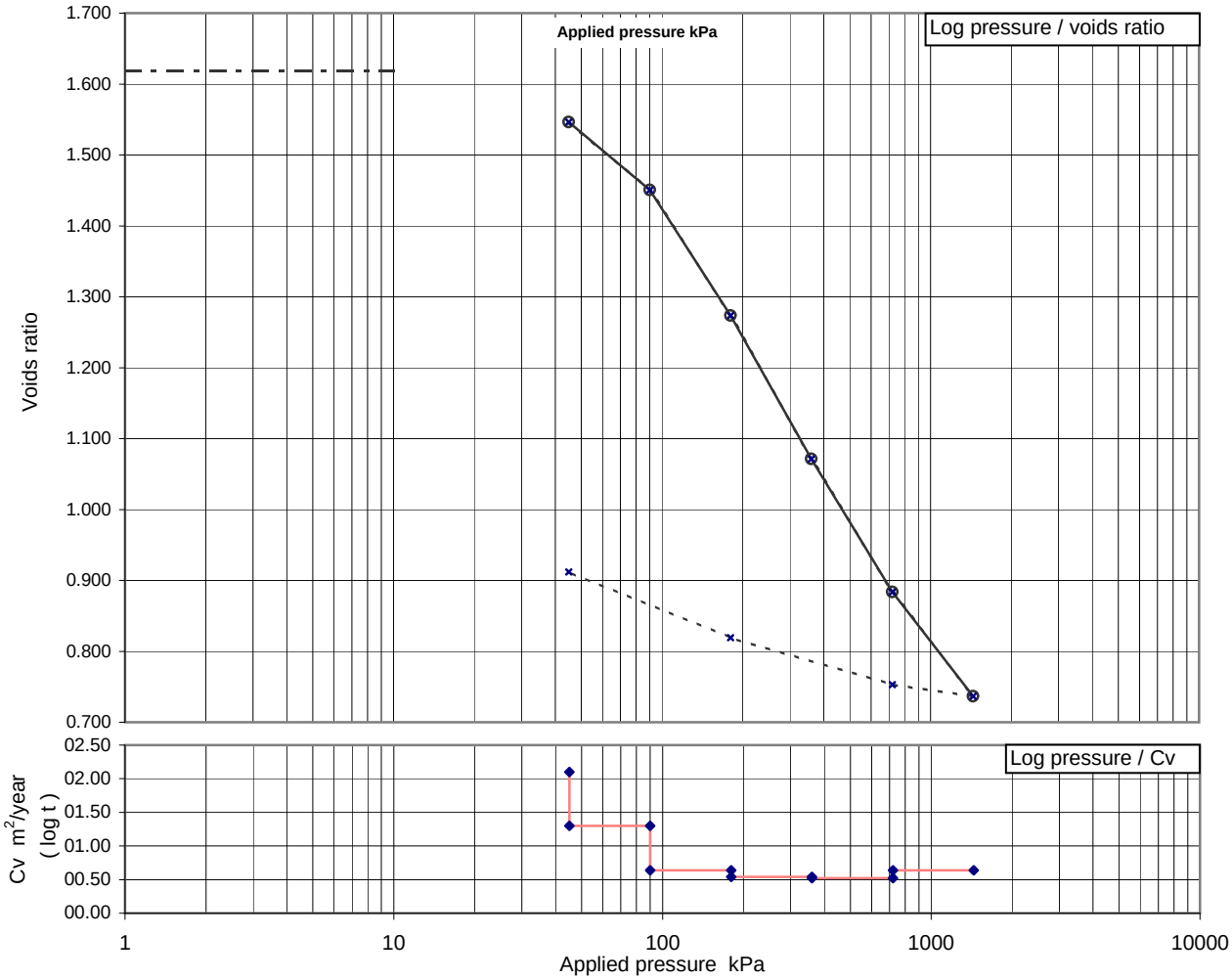
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	1.6705				
35	1.5659	1.119	0.89	0.95	
70	1.4792	0.966	0.73	0.81	
140	1.3491	0.750	0.63	0.68	
280	1.1482	0.611	0.35	0.38	
560	0.9534	0.324	0.33	0.36	
1120	0.7728	0.165	0.3	0.33	
560	0.7936	0.021	-	-	
140	0.8849	0.121	-	-	
35	1.0080	0.622	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	8.20		
			Samp No	17	Type	U
			ID	ESGA0012-10201009200000000880		
			Spec Ref			



Soil description: Soft to firm grey slightly sandy CLAY.

Preparation: Undisturbed

Index properties (if available): Liquid limit % 84 | Plastic limit % 32

Specimen details	Initial	Final	
Particle density	2.64	measured	Mg/m³
Diameter	69.97		mm
Height	18.95	13.83	mm
Voids ratio	1.619	0.912	
Moisture content	64	36	%
Bulk density	1.65	1.88	Mg/m³
Dry density	1.01	1.38	Mg/m³
Saturation	104	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

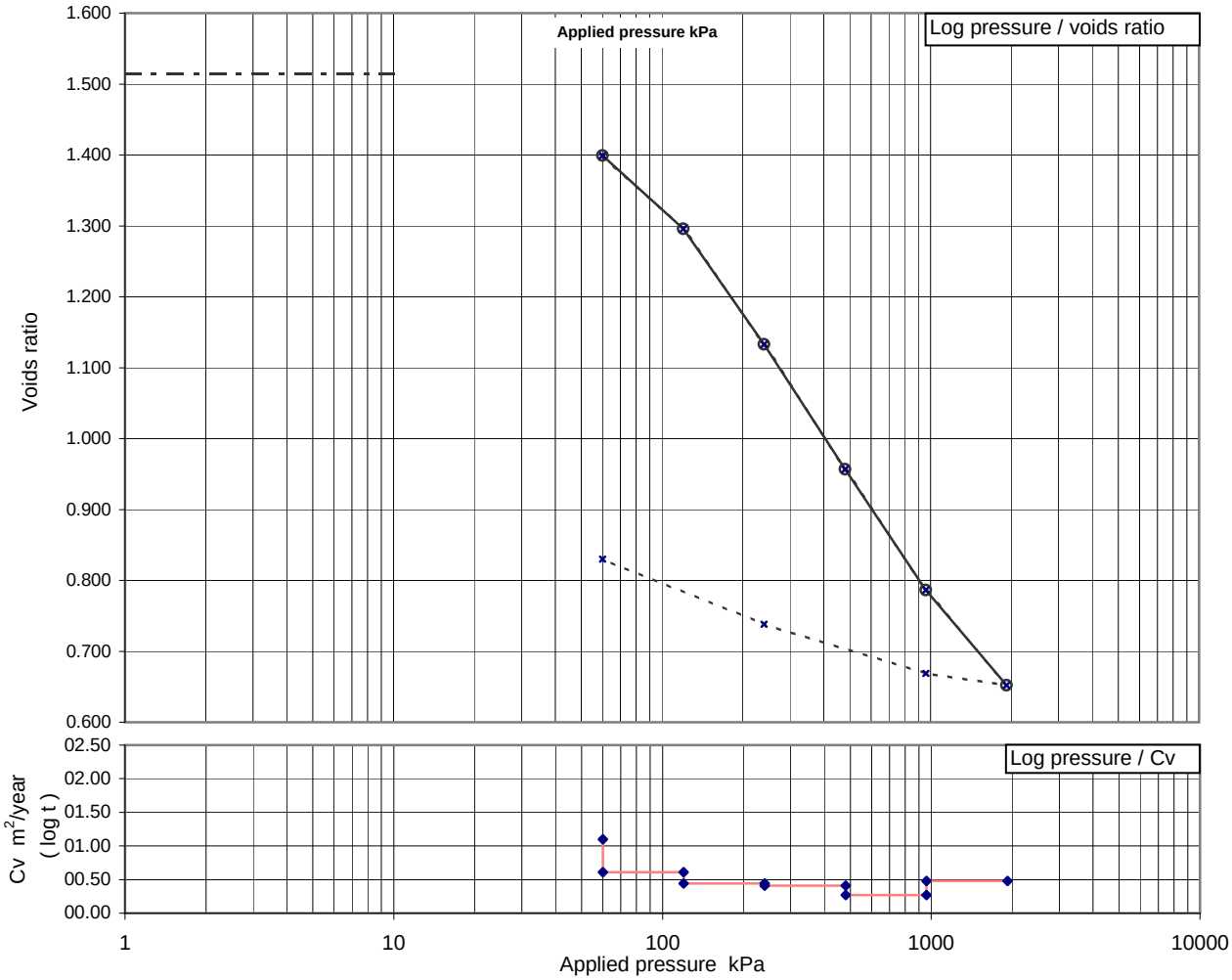
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	1.6194				
45	1.5462	0.621	2.1	2.3	
90	1.4504	0.836	1.3	1.3	
180	1.2734	0.802	0.64	0.7	
360	1.0713	0.494	0.54	0.59	
720	0.8835	0.252	0.52	0.82	
1440	0.7368	0.108	0.64	0.7	
720	0.7529	0.013	-	-	
180	0.8191	0.070	-	-	
45	0.9119	0.378	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	11.10		
			Samp No	27	Type	U
			ID	ESGA0012-10201009200000000890		
			Spec Ref			



Soil description	Soft to firm dark grey slightly sandy organic CLAY with rare plant remains.
Preparation	Undisturbed
Index properties (if available)	Liquid limit % 86 Plastic limit % 35

Specimen details	Initial	Final	
Particle density	2.61	measured	Mg/m³
Diameter	69.95		mm
Height	18.98	13.81	mm
Voids ratio	1.514	0.830	
Moisture content	60	33	%
Bulk density	1.66	1.90	Mg/m³
Dry density	1.04	1.43	Mg/m³
Saturation	103	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

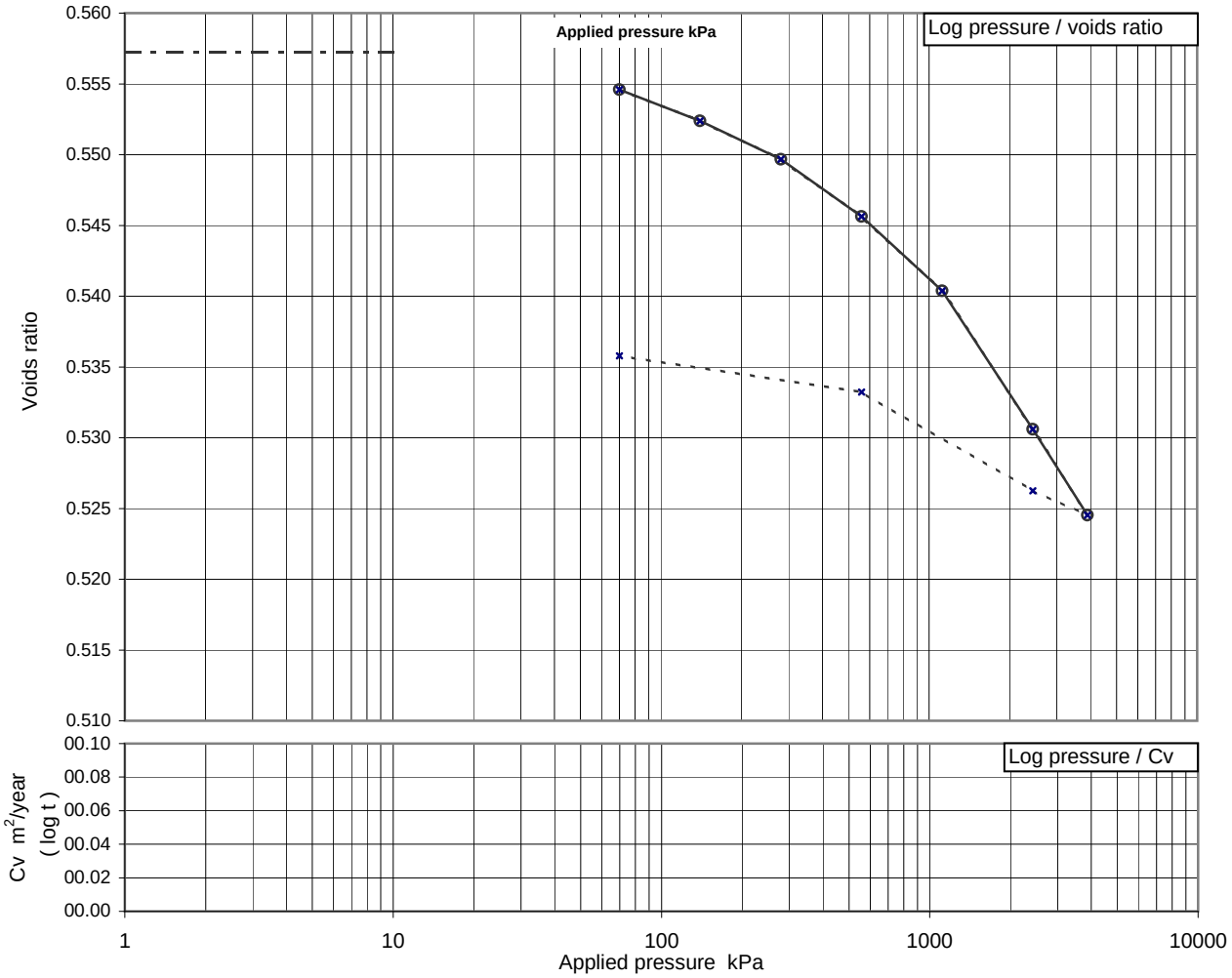
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	1.5145				
60	1.3992	0.764	1.1	1.2	
120	1.2959	0.717	0.61	0.67	
240	1.1329	0.592	0.44	0.47	
480	0.9568	0.344	0.41	0.42	
960	0.7863	0.182	0.27	0.58	
1920	0.6522	0.078	0.48	0.5	
960	0.6690	0.011	-	-	
240	0.7382	0.058	-	-	
60	0.8299	0.293	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	12.75		
			Samp No	33	Type	U
			ID	ESGA0012-10201009200000000896		
			Spec Ref			



Soil description	Brownish grey slightly organic SAND.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	21	Plastic limit %	NP

	Initial	Final	
Specimen details			
Particle density	2.65	assumed	Mg/m^3
Diameter	69.96		mm
Height	18.95	18.69	mm
Voids ratio	0.557	0.536	
Moisture content	20	19	%
Bulk density	2.04	2.06	Mg/m^3
Dry density	1.70	1.73	Mg/m^3
Saturation	95	96	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

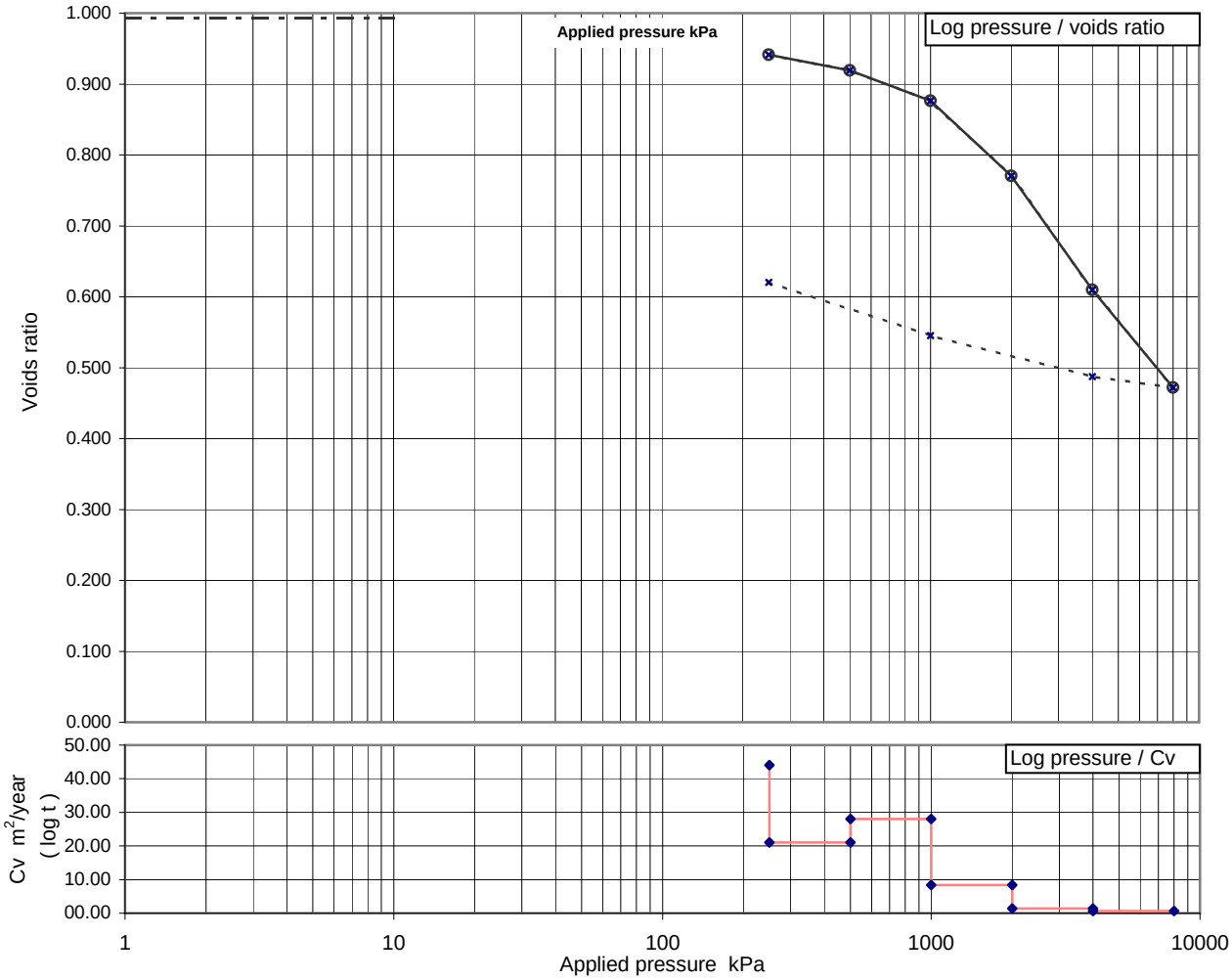
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	0.5572				
70	0.5546	0.024	-	-	
140	0.5524	0.020	-	-	
280	0.5497	0.012	-	-	
560	0.5456	0.009	-	-	
1120	0.5404	0.006	-	-	
2440	0.5306	0.005	-	-	
3900	0.5245	0.003	-	-	
2440	0.5262	0.001	-	-	
560	0.5332	0.002	-	-	
70	0.5358	0.003	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	48.77		
			Samp No	121	Type	CS
			ID	ESGA0012-10201010280000002713		
			Spec Ref			



Soil description	Very stiff brownish grey fissured slightly sandy silty CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	88	Plastic limit %	29

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	69.91		mm
Height	19.04	15.48	mm
Voids ratio	0.993	0.620	
Moisture content	37	25	%
Bulk density	1.82	2.04	Mg/m^3
Dry density	1.33	1.64	Mg/m^3
Saturation	99	105	%
Average temperature for test	22		°C

Swelling pressure: not measured kPa

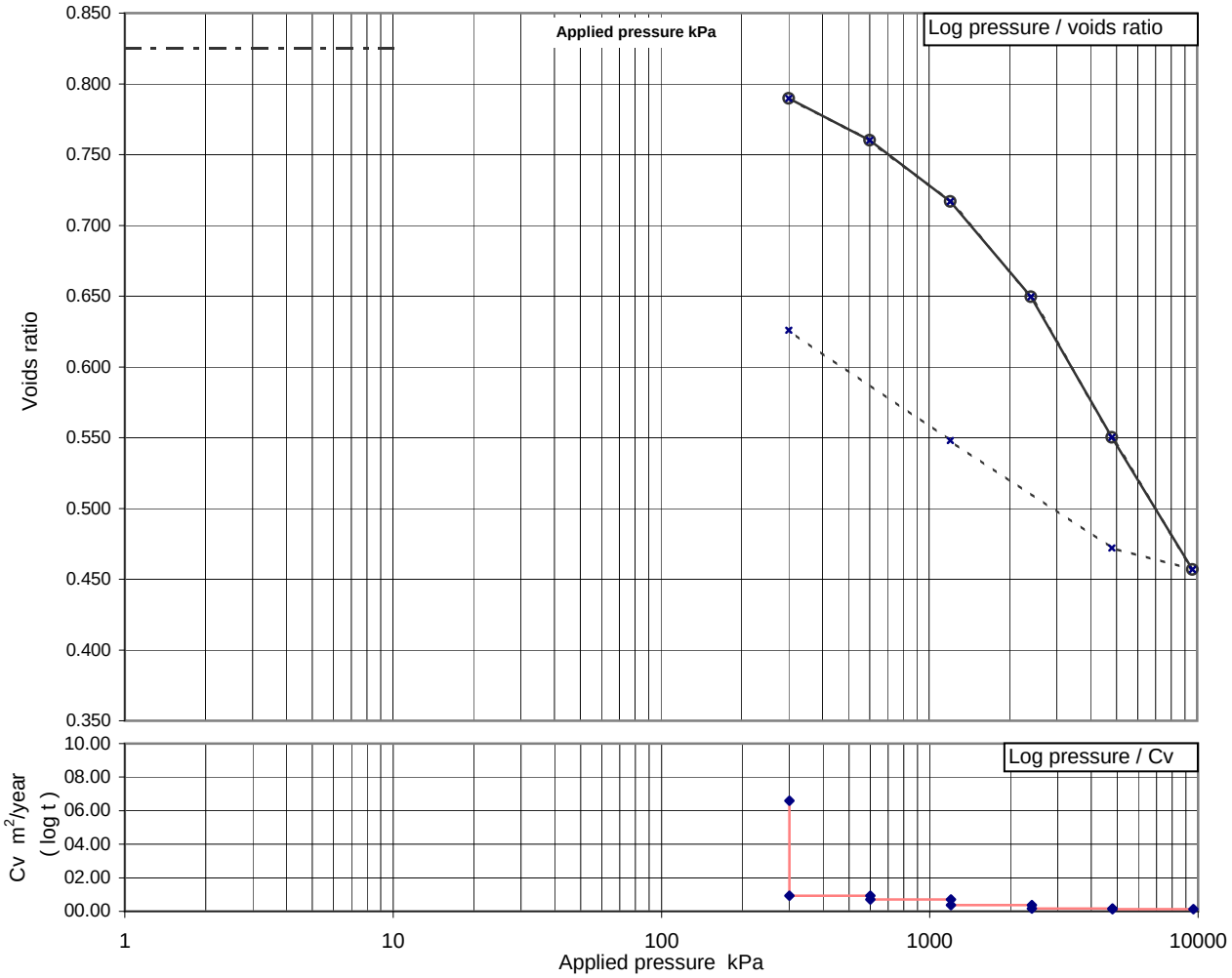
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	0.9927				
250	0.9414	0.103	44	31	
500	0.9192	0.046	21	24	
1000	0.8763	0.045	28	30	
2000	0.7705	0.056	8.4	9	
4000	0.6098	0.045	1.4	1.5	
8000	0.4721	0.021	0.61	0.66	
4000	0.4874	0.003	-	-	
1000	0.5451	0.013	-	-	
250	0.6202	0.065	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	58.23		
			Samp No	125	Type	CS
			ID	ESGA0012-10201010280000002717		
			Spec Ref			



Soil description	Very stiff greyish brown slightly sandy CLAY.				
Preparation	Undisturbed				
Index properties (if available)	Liquid limit %	84	Plastic limit %	31	

Specimen details	Initial	Final	
Particle density	2.63	measured	Mg/m^3
Diameter	50.06		mm
Height	20.01	17.83	mm
Voids ratio	0.825	0.626	
Moisture content	33	25	%
Bulk density	1.92	2.02	Mg/m^3
Dry density	1.44	1.62	Mg/m^3
Saturation	105	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

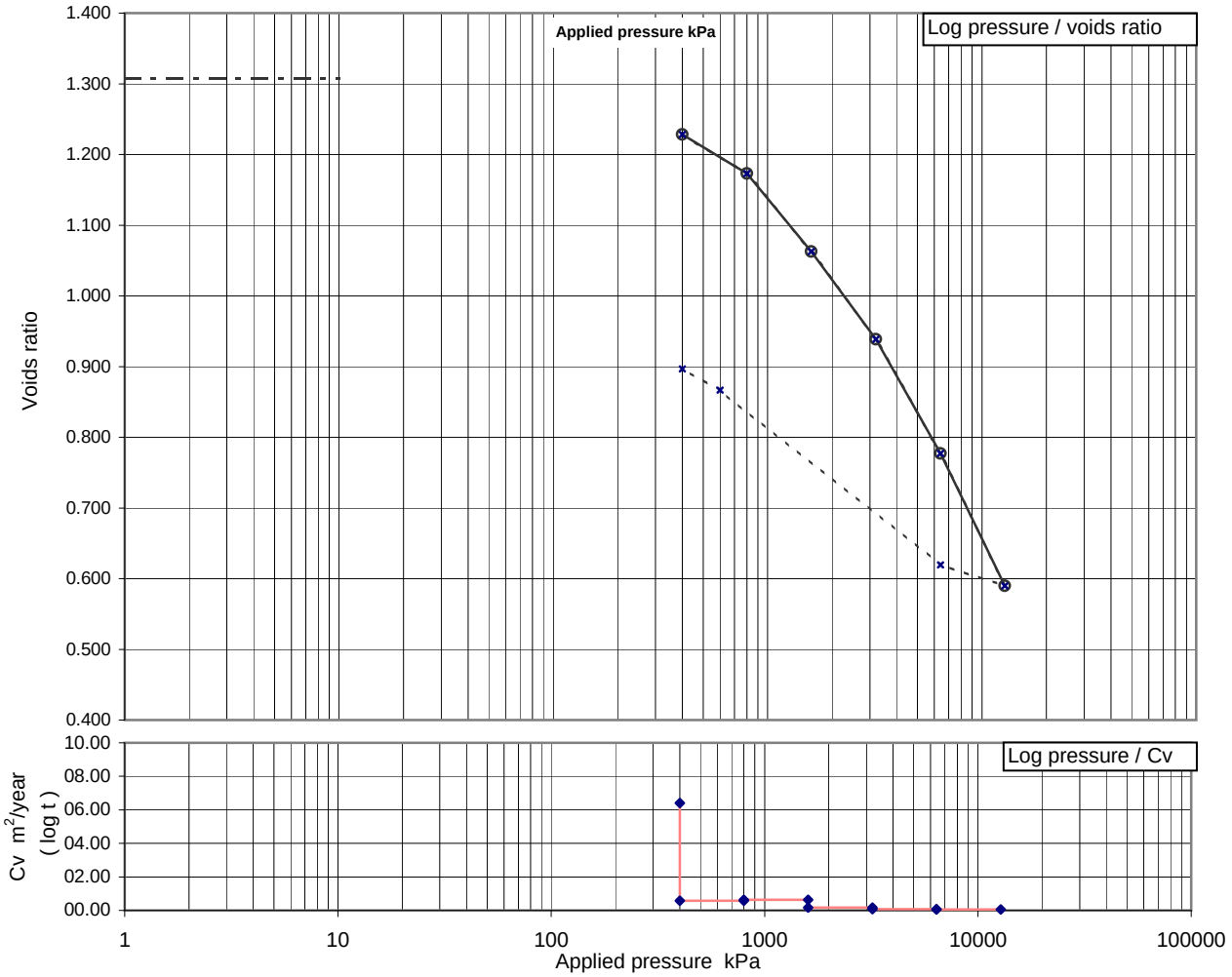
Notes :

Specimen taken 5 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	0.8249				
300	0.7898	0.064	6.6	6.8	
600	0.7601	0.055	0.93	1	
1200	0.7169	0.041	0.71	0.76	
2400	0.6496	0.033	0.37	0.4	
4800	0.5503	0.025	0.16	0.17	
9600	0.4568	0.013	0.13	0.14	
4800	0.4721	0.002	-	-	
1200	0.5480	0.014	-	-	
300	0.6259	0.056	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	78.05		
			Samp No	131	Type	CS
			ID	ESGA0012-10201010280000002723		
			Spec Ref			



Soil description	Stiff brownish grey slightly sandy CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	138	Plastic limit %	43

Specimen details	Initial	Final	
Particle density	2.67	measured	Mg/m³
Diameter	50.02		mm
Height	19.96	16.41	mm
Voids ratio	1.307	0.897	
Moisture content	48	35	%
Bulk density	1.72	1.90	Mg/m³
Dry density	1.16	1.41	Mg/m³
Saturation	99	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

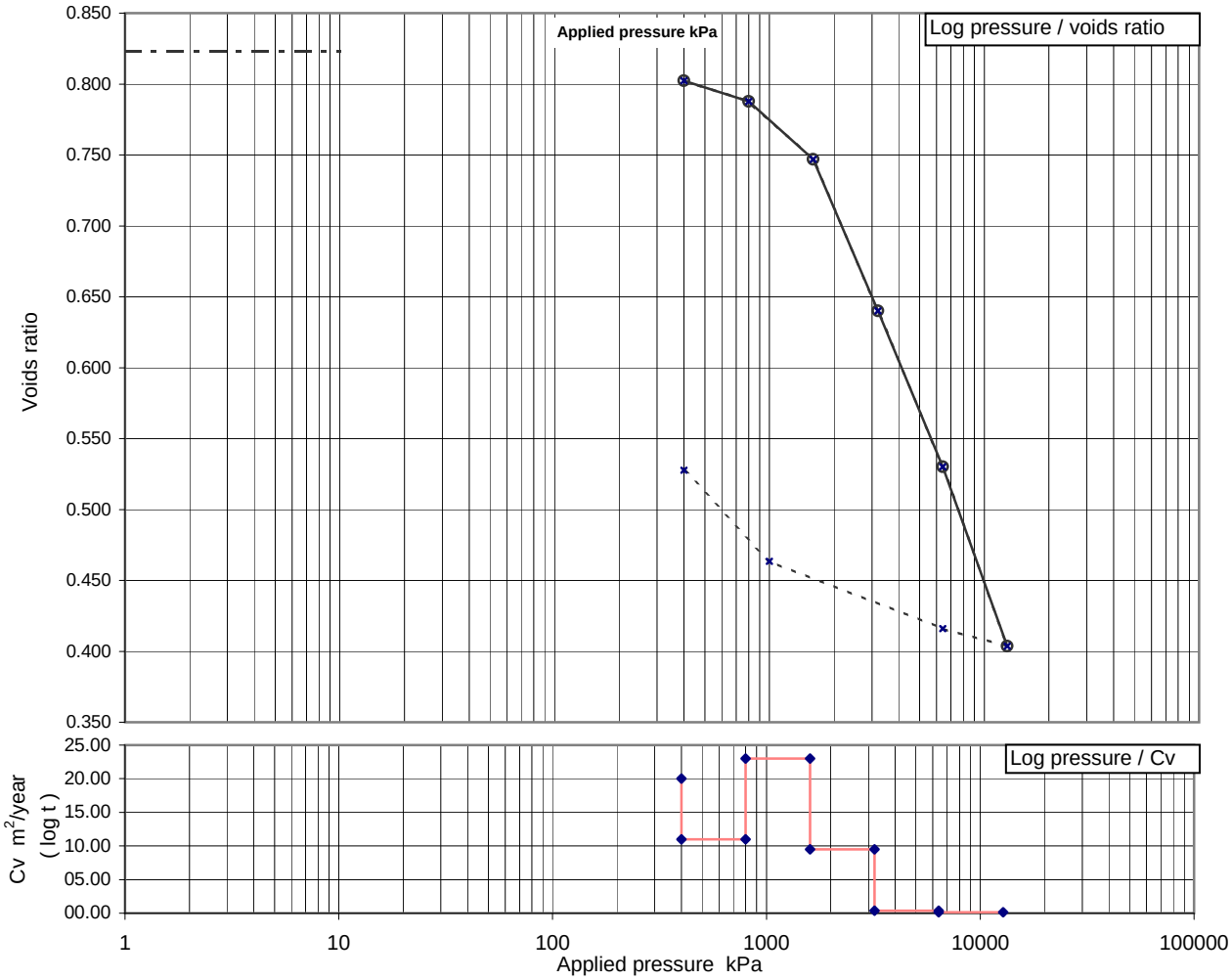
Notes :

Specimen taken 6 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	1.3066				
400	1.2280	0.085	6.4	7	
800	1.1730	0.062	0.57	0.59	
1600	1.0627	0.063	0.63	0.67	
3200	0.9386	0.038	0.17	0.18	
6400	0.7770	0.026	0.08	0.09	
12800	0.5897	0.016	0.05	0.06	
6400	0.6194	0.003	-	-	
600	0.8668	0.026	-	-	
400	0.8968	0.080	-	-	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	A0012-10	Sample Details:	Hole No	CBH 2009_8U		
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BGL)	84.12		
			Samp No	133	Type	CS
			ID	ESGA0012-10201010280000002725		
			Spec Ref			



Soil description	Very stiff brown slightly sandy CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	98	Plastic limit %	31

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	50.05		mm
Height	19.90	16.67	mm
Voids ratio	0.823	0.528	
Moisture content	29	21	%
Bulk density	1.87	2.10	Mg/m^3
Dry density	1.45	1.73	Mg/m^3
Saturation	92	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	0.8230				
400	0.8022	0.028	20	21	
800	0.7878	0.020	11	12	
1600	0.7468	0.029	23	25	
3200	0.6401	0.038	9.5	8.9	
6400	0.5301	0.021	0.39	0.4	
12800	0.4038	0.013	0.14	0.15	
6400	0.4159	0.001	-	-	
1000	0.4635	0.006	-	-	
400	0.5277	0.073	-	-	

FALLING HEAD PERMEABILITY TEST - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

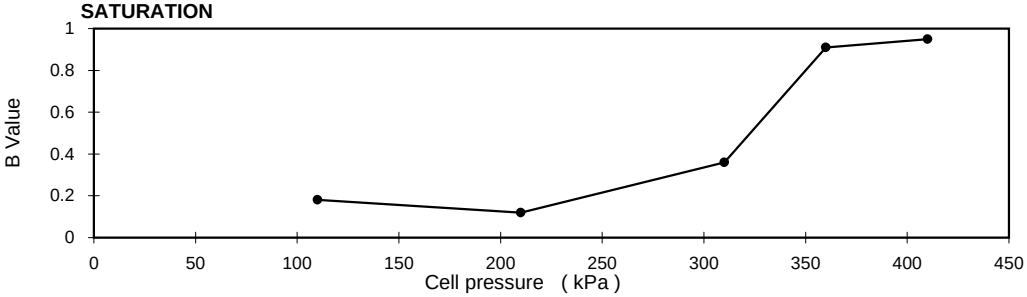
Hole No.	Sample				Soil Description	Initial Specimen details		Falling Head Permeability	Remarks Preparation details
	No.	Depth (m)		type		Moisture Content	Bulk density		
		from	to			%	Mg/m^3	m/s	
CBH2009_1UA	31	11.50	11.95	U	Greyish brown SAND with rare shell fragments.	16	1.90	**8.3E-05**	
CBH2009_1UA	103	40.20	40.65	U	Grey SAND with rare shell fragments.	22	1.97	**3.2E-05**	
CBH2009_2UA	37	15.00	15.45	U	Dark grey silty SAND with rare shell fragments.	20	1.99	**4.4E-05**	
CBH2009_2UA	98	40.20	40.65	U	Dark grey silty SAND with rare shell fragments.	19	2.01	**1.1E-04**	
CBH2009_4U	73	22.65	23.10	U	Greyish brown SAND with rare shell fragments.	17	2.04	**8.8E-05**	
CBH2009_5UB	73	25.80	26.25	U	Grey SAND with frequent shell fragments.	16	1.97	**9.5E-05**	
CBH2009_6U	84	29.20	29.65	U	Grey SAND with rare shell fragments.	18	2.16	**8.7E-05**	
CBH2009_7U	95	32.70	33.15	U	Dark grey silty SAND with rare to frequent shell fragments.	18	2.00	**1.0E-04**	
CBH2009_8U	97	36.05	36.50	U	Greyish brown SAND with frequent shell fragments.	15	2.05	**2.6E-05**	
CBH2009_8U	130	74.60	75.22	CS	Stiff dark grey fissured CLAY.	41	1.93	**1.5E-09**	

Notes : Test Specification :

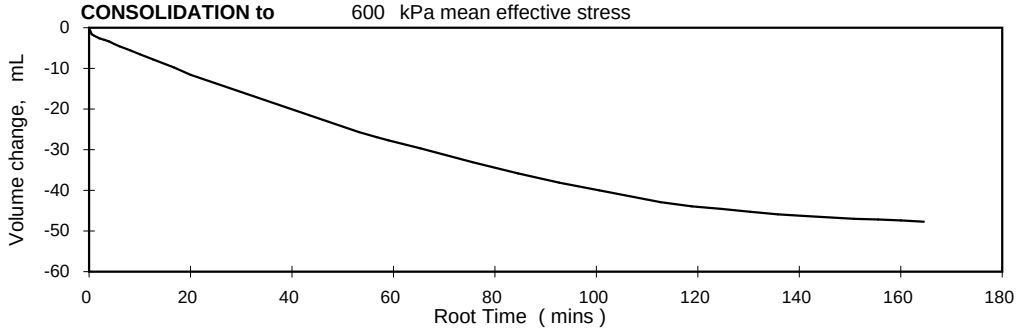
In house method IHM 1 based on K.H. Head "Manual of soil laboratory testing" volume 2 section 10

Permeabilities lower than 1.0E-10 m/s or greater than 1.0E-04 m/s may be outside the appropriate range for this testing method.

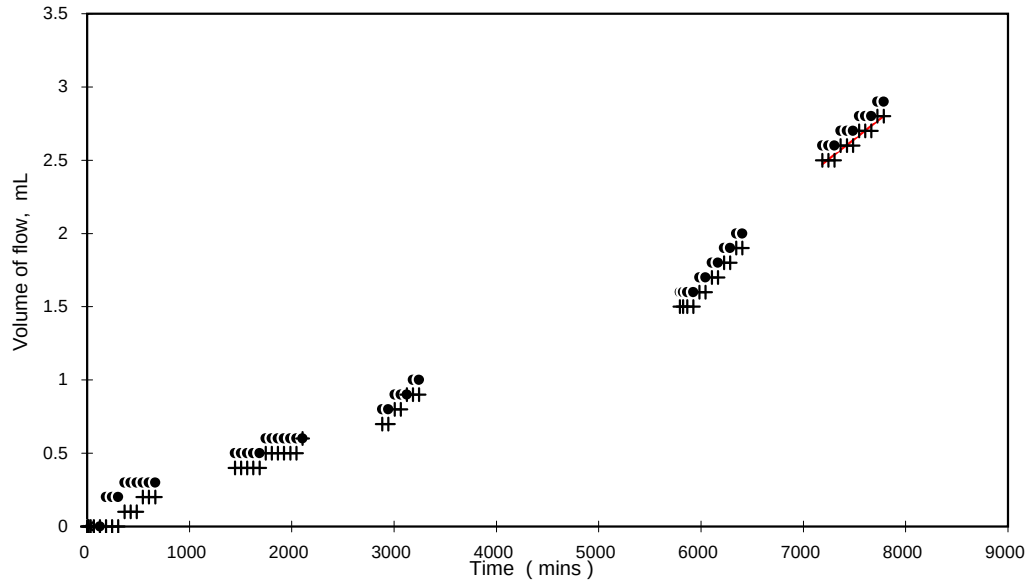
SATURATION



CONSOLIDATION to 600 kPa mean effective stress



PERMEABILITY (• flow inwards, + flow outwards)



SAMPLE DETAILS				PERMEABILITY STAGE		
Soil description				Cell Pressure	955	kPa
Stiff bronwish grey very thinly laminated CLAY with silt partings on laminae.				Top Pressure	295	kPa
				Base Pressure	415	kPa
	Initial	Final		Mean Effective Stress	600	kPa
Diameter	100.57	-	mm	Differential Pressure	120	kPa
Length	100.50	-	mm	Mean rate of flow	0.0005	ml/min
Bulk density	2.06	2.09	Mg/m³	Temperature during test	22	°C
Moisture content	24.2	22.2	%			
Dry Density	1.66	1.71	Mg/m³	**PERMEABILITY , kv** (at 20°C)	**-12** **9.0 x 10**	**m/s**

Notes :

1 UNDISTURBED specimen used.

2 Specimen saturated by incremental back pressure. Final B value =0.95.

3 Differential pressure increased to 120kPa after 5925 minutes due to insufficient flow.

UKAS 1157 Soil Mechanics

SLR 6.6 , Rev. 2, Nov 98

DETERMINATION OF PERMEABILITY IN A TRIAXIAL CELL

(BS1377:Part 6, 1990, Test 6 - Constant Head test)

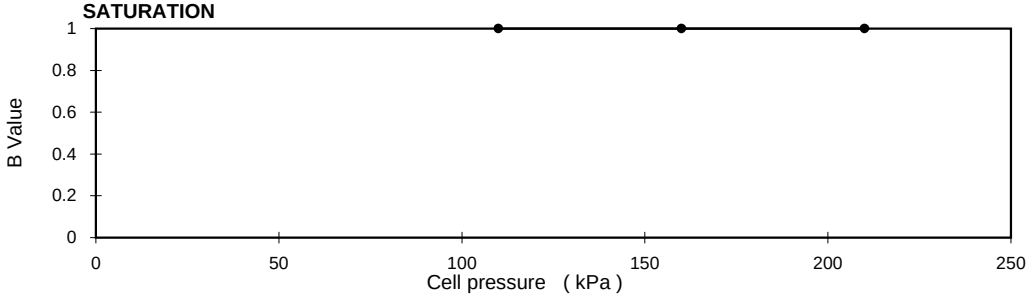
Borehole No. **CBH 2009-2**
Sample No. **CS21**
Depth **61.75-62.15** m

Location: **ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL**

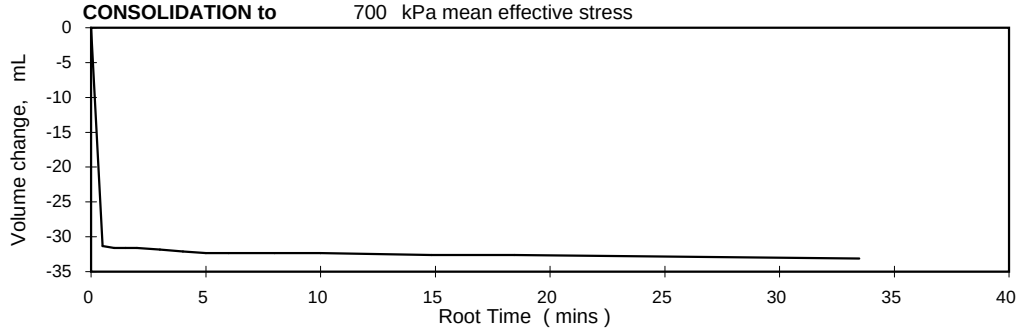
Loc. No. **A0012-10**

Fig.No. **TXLP 1**

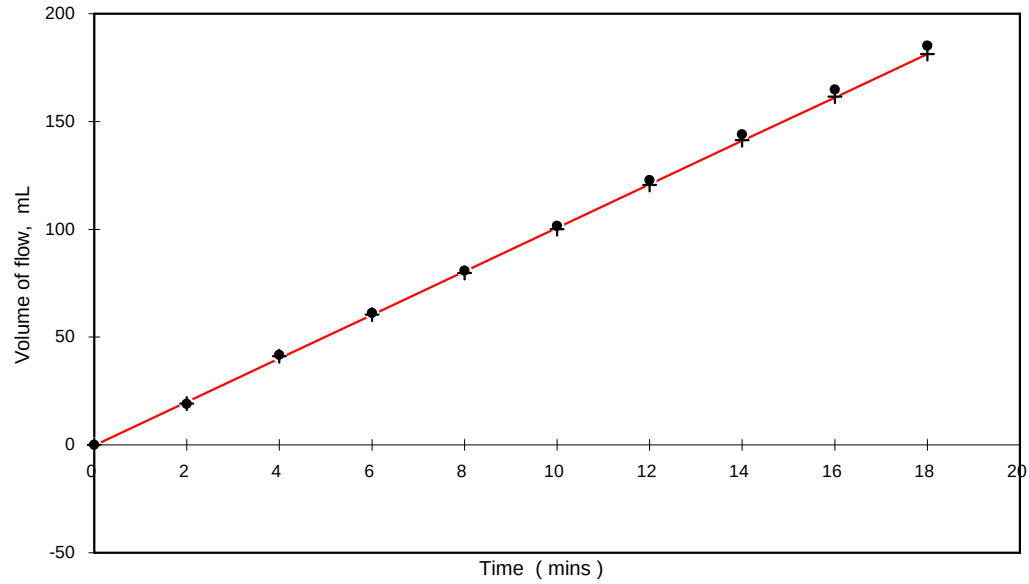
SATURATION



CONSOLIDATION to 700 kPa mean effective stress



PERMEABILITY (• flow inwards, + flow outwards)



SAMPLE DETAILS				PERMEABILITY STAGE		
Soil description				Cell Pressure	1005	kPa
Light greyish brown SAND.				Top Pressure	300	kPa
				Base Pressure	310	kPa
	Initial	Final		Mean Effective Stress	700	kPa
Diameter	99.81	-	mm	Differential Pressure	10	kPa
Length	100.96	-	mm	Mean rate of flow	10.09	ml/min
Bulk density	1.97	2.01	Mg/m³	Temperature during test	22	°C
Moisture content	26.4	23.5	%			
Dry Density	1.56	1.63	Mg/m³	**PERMEABILITY , kv** (at 20°C)	**2.0 x 10^{-6}**	**m/s**

Notes :

1 UNDISTURBED specimen used.

2 Specimen saturated at constant moisture content. Final B value =1.00.

UKAS 1157 Soil Mechanics

SLR 6.6 , Rev. 2, Nov 98

DETERMINATION OF PERMEABILITY IN A TRIAXIAL CELL

(BS1377:Part 6, 1990, Test 6 - Constant Head test)

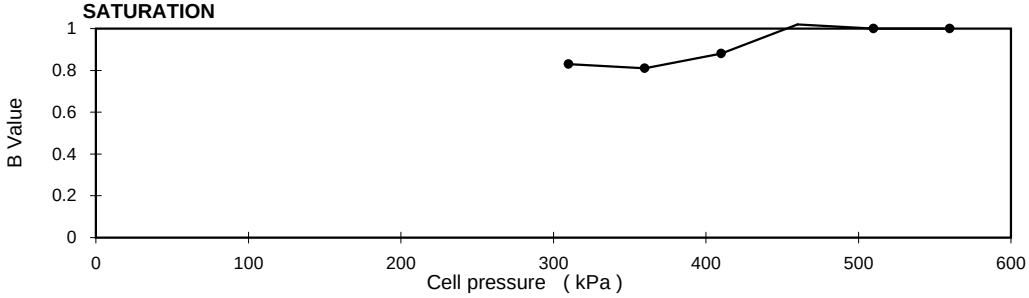
Borehole No. **CBH 2009-2**
Sample No. **CS23**
Depth **70.90-71.30** m

Location: **ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE**

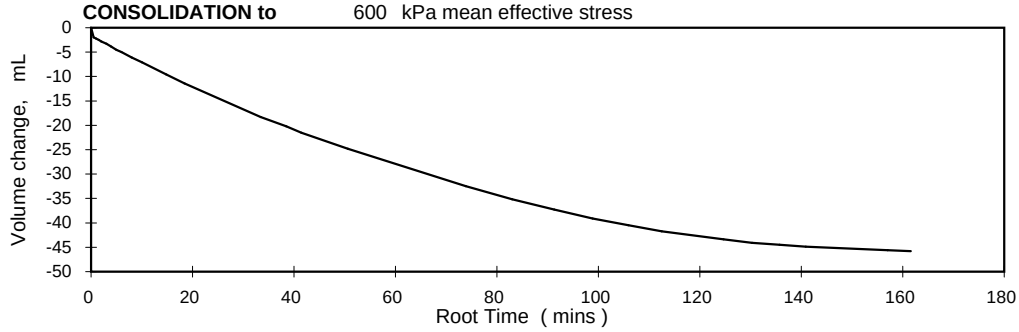
Loc. No. **A0012-10**

Fig.No. **TXLP 2**

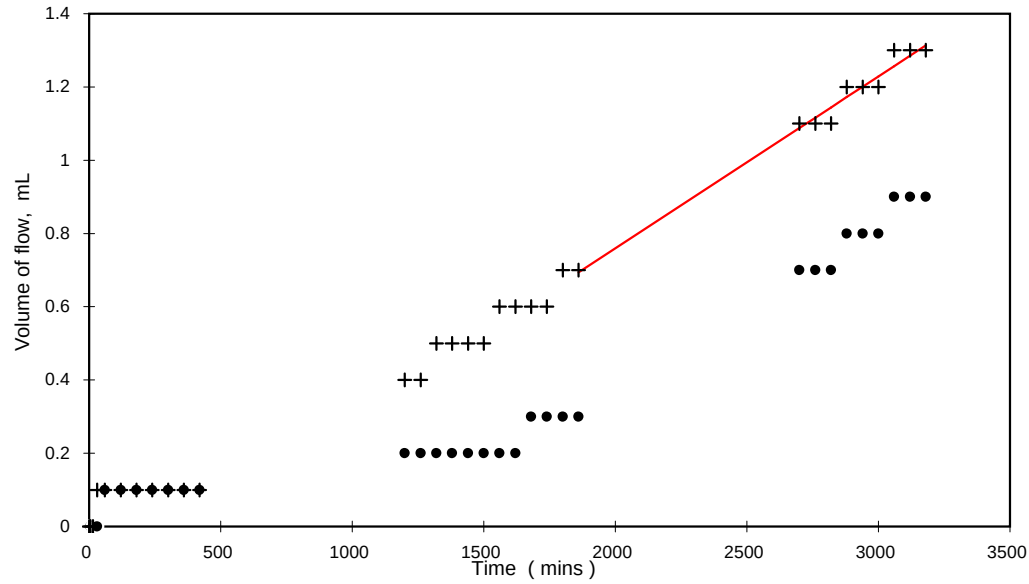
SATURATION



CONSOLIDATION to 600 kPa mean effective stress



PERMEABILITY (• flow inwards, + flow outwards)



SAMPLE DETAILS			
Soil description			
Very stiff greyish brown CLAY.			
	Initial	Final	
Diameter	101.16	-	mm
Length	100.55	-	mm
Bulk density	1.95	1.98	Mg/m³
Moisture content	31.1	28.8	%
Dry Density	1.49	1.54	Mg/m³

PERMEABILITY STAGE		
Cell Pressure	1105	kPa
Top Pressure	445	kPa
Base Pressure	565	kPa
Mean Effective Stress	600	kPa
Differential Pressure	120	kPa
Mean rate of flow	0.0005	ml/min
Temperature during test	22	°C
PERMEABILITY , kv (at 20°C)	**7.7 x 10^{-12}**	**m/s**

Notes :

1 UNDISTURBED specimen used.

2 Specimen saturated by incremental back pressure. Final B value =1.00.

3 Differential pressure increased to 120kPa after 1860 minutes due to insufficient flow.

UKAS 1157 Soil Mechanics

SLR 6.6 , Rev. 2, Nov 98

DETERMINATION OF PERMEABILITY IN A TRIAXIAL CELL

(BS1377:Part 6, 1990, Test 6 - Constant Head test)

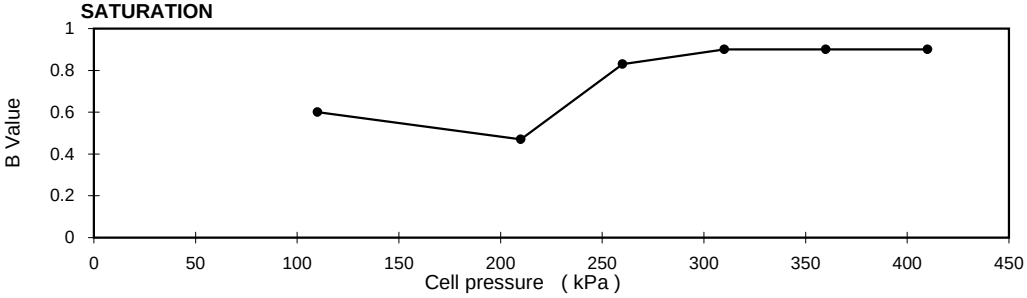
Borehole No. **CBH 2009-8U**
Sample No. **CS125**
Depth **58.23-58.72** m

Location: **ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL**

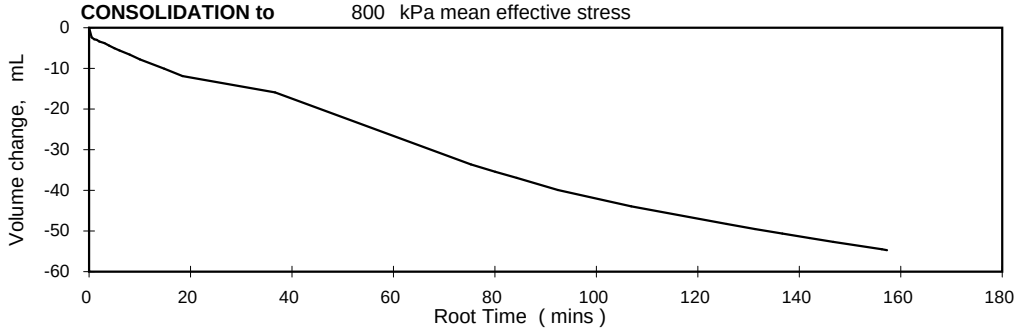
Loc. No. **A0012-10**

Fig.No. **TXLP 3**

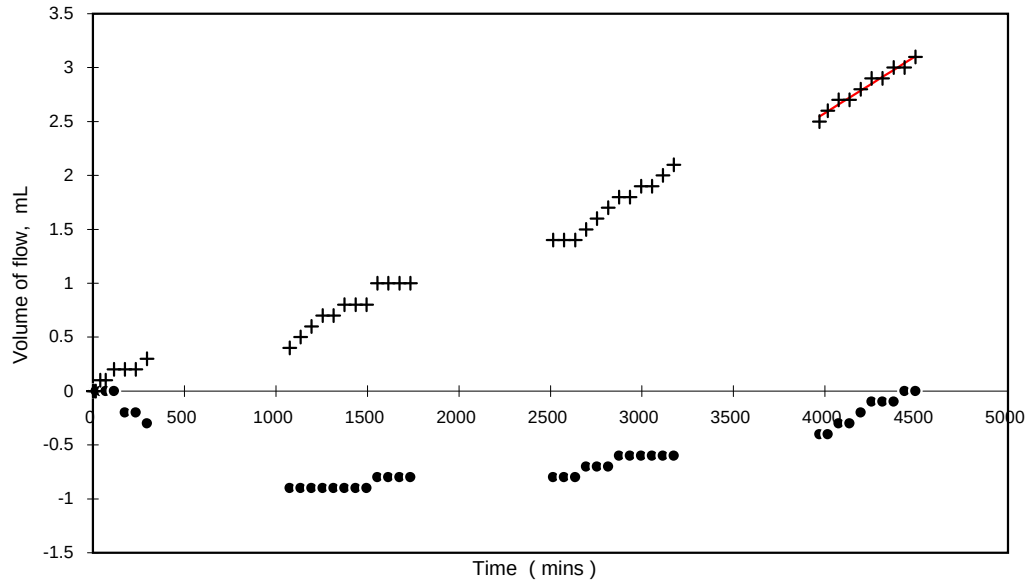
SATURATION



CONSOLIDATION to 800 kPa mean effective stress



PERMEABILITY (• flow inwards, + flow outwards)



SAMPLE DETAILS			
Soil description			
Stiff to very stiff brownish grey slightly sandy CLAY.			
	Initial	Final	
Diameter	102.74	-	mm
Length	101.38	-	mm
Bulk density	1.81	1.82	Mg/m³
Moisture content	43.6	39.7	%
Dry Density	1.26	1.30	Mg/m³

PERMEABILITY STAGE		
Cell Pressure	1155	kPa
Top Pressure	295	kPa
Base Pressure	415	kPa
Mean Effective Stress	800	kPa
Differential Pressure	120	kPa
Mean rate of flow	0.0011	ml/min
Temperature during test	22	°C
PERMEABILITY , kv (at 20°C)	**1.7 x 10^{-11}**	**m/s**

Notes :

1 UNDISTURBED specimen used.

2 Specimen saturated by incremental back pressure. Final B value =0.96.

3 Differential pressure increased to 160kPa after 3970 minutes due to insufficient flow.

UKAS 1157

Soil Mechanics

SLR 6.6 , Rev. 2, Nov 98

DETERMINATION OF PERMEABILITY IN A TRIAXIAL CELL

(BS1377:Part 6, 1990, Test 6 - Constant Head test)

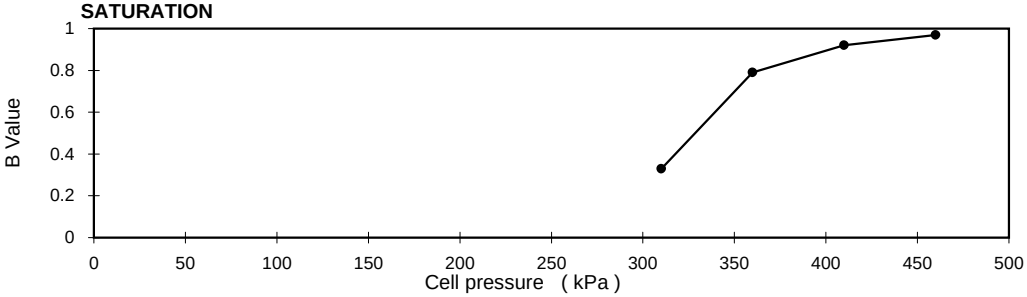
Borehole No. **CBH 2009-8U**

Sample No. **CS132**

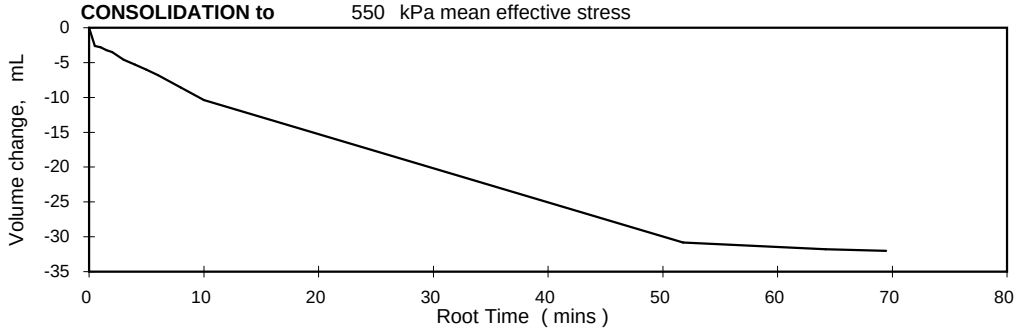
Depth **81.12-81.60** m

Location	Loc. No.	Fig.No.
ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE	**A0012-10**	**TXLP 4**

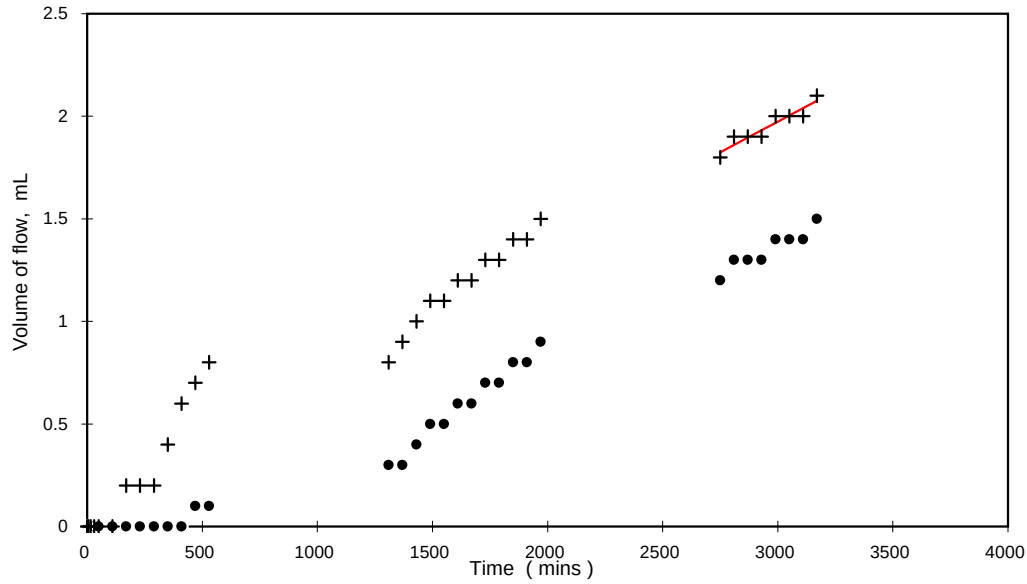
SATURATION



CONSOLIDATION to 550 kPa mean effective stress



PERMEABILITY (• flow inwards, + flow outwards)



SAMPLE DETAILS			
Soil description			
Stiff to very stiff greyish brown slightly sandy CLAY.			
	Initial	Final	
Diameter	106.80	-	mm
Length	100.52	-	mm
Bulk density	1.76	1.77	Mg/m³
Moisture content	48.3	46.7	%
Dry Density	1.19	1.21	Mg/m³

PERMEABILITY STAGE		
Cell Pressure	955	kPa
Top Pressure	390	kPa
Base Pressure	420	kPa
Mean Effective Stress	550	kPa
Differential Pressure	30	kPa
Mean rate of flow	0.0006	ml/min
Temperature during test	22	°C
PERMEABILITY , kv (at 20°C)	**3.5 x 10^{-11}**	**m/s**

Notes :

1 UNDISTURBED specimen used.

2 Specimen saturated by incremental back pressure. Final B value =0.97.

3 Differential pressure increased to 40kPa after 1310 minutes due to insufficient flow.

UKAS 1157 Soil Mechanics

SLR 6.6 , Rev. 2, Nov 98

DETERMINATION OF PERMEABILITY IN A TRIAXIAL CELL

(BS1377:Part 6, 1990, Test 6 - Constant Head test)

Borehole No. **CBH 2009-10**
Sample No. **CS21**
Depth **53.35-53.80** m

Location: **ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL**

Loc. No. **A0012-10**

Fig.No. **TXLP 5**

CHEMICAL TESTS - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample			type	Soil Description	Org	LOI	pH	Sulphate as SO_4				SD1 options		CO_2	Chloride, Cl		<2 mm	Remarks
	No.	Depth (m)							Preparation/test *	2:1 water sol.	ground water	acid sol.	TS	Mg mg/L NO_3 mg/L NH_4		water sol.	acid sol.		
		from	to			%	%			g/L	g/L	%	%		%	%	%	%	
CBH 2009_1UA	3	1.20	1.65	U	Black brown and grey silty SAND with occasional shell fragments.	0.3												96	
CBH 2009_1UA	15	5.90	6.35	U	Soft to firm brownish grey slightly organic slightly sandy fibrous CLAY.	22.8												100	
CBH 2009_1UA	25	9.40	9.85	U	Greyish black peaty gravelly SAND.	4.6		5.7	1+3	0.56					0.35			97	
CBH 2009_1UA	27	10.10	10.55	U	Grey slightly gravelly SAND with occasional clay pockets.			6.9	1+3	0.24					1.2			97	
CBH 2009_1UA	114	45.10	45.55	U	Soft to firm greyish brown very sandy CLAY with rare shell fragments.			7.6	1+3	0.68					8.1			100	
CBH 2009_2U	7	1.90	2.53	U	Greyish brown slightly clayey gravelly SAND with 1 cobble.	0.3		7.8	1+3	0.13					1.2			82	
CBH 2009_2UA	8	5.00	5.45	U	Firm grey CLAY with organic fibrous clay partings.	18.7												100	
CBH 2009_2UA	12	6.40	6.85	U	Black clayey PEAT.													100	Material out of range for organic test..
CBH 2009_2UA	51	19.90	20.35	U	Grey and light grey slightly gravelly SAND with occasional shell			7.6	1+3	0.05					0.82			98	
CBH 2009_2UA	69	28.30	28.75	U	Grey SAND with shell fragments.			7.7	1+3	0.07					1.9			97	
CBH 2009_4U	10	3.15	3.60	U	Orangish brown slightly gravelly SAND with occasional shell fragments	0.1												97	
CBH 2009_4U	14	4.45	4.90	U	Orangish brown gravelly SAND.	0.4												89	
CBH 2009_4U	18	5.40	5.85	U	Firm black spongy fibrous PEAT.													100	Material out of range for organic test.
CBH 2009_5UA	5	1.80	2.25	U	Brownish grey slightly gravelly silty SAND.	0.4												96	
CBH 2009_5UB	5	2.70	3.15	U	Firm to stiff brownish grey slightly sandy very gravelly CLAY with	1.8												92	
CBH 2009_5UB	7	3.40	3.85	U	Brownish grey organic SAND with frequent rootlets.	1.2												97	
CBH 2009_5UB	10	4.10	4.55	U	Soft brownish grey slightly organic slightly sandy CLAY.	6.0		7.2	1+3	1.13					3.3			100	
CBH 2009_5UB	42	14.60	15.05	U	Greyish brown SAND with shell fragments.			7.3	1+3	0.06					1.5			97	
CBH 2009_5UB	103	40.30	40.75	U	Grey SAND with occasional shell fragments.			7.3	1+3	0.31					11			95	

BS 1377 : definitive method unless stated :

Org Organic matter content (s-sulphides, c-chlorides identified)

LOI Mass loss on ignition at 440°C

CO_2 Carbonate content (rapid titration)

Cl Chloride content

* Sulphate tests preparation / test methods :

1. BS 1377:Part 3:1990:clause 5.3
2. BS 1377:Part 3:1990:clause 5.4
3. BS 1377:Part 3:1990:clause 5.5
4. TRL447 - 1 water soluble sulphate
5. TRL447 - 2 acid soluble sulphate
6. BR279 - groundwater sulphate

< 2mm material passing 2mm sieve

BRE Special Digest SD1, dependent options :

TS Total Sulphur to BR279 / EN ISO15178

Mg Soluble Magnesium to BR279, colorimetric

NO3 Soluble Nitrate to BR279, colorimetric

NH_4 qualitative

CHEMICAL TESTS - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	Org %	LOI %	pH	Sulphate as SO_4 Preparation/test *	Sulphate as SO_4 2:1 water sol. g/L	Sulphate as SO_4 ground water g/L	Sulphate as SO_4 acid sol. %	SD1 options TS %	SD1 options Mg mg/L NO_3 mg/L NH_4	CO_2 %	Chloride, Cl water sol. %	Chloride, Cl acid sol. %	<2 mm %	Remarks
CBH 2009_6U	8	2.60	3.05	U	Greyish brown silty gravelly SAND.	0.1												95	
CBH 2009_6U	10	3.30	3.75	U	Light yellowish brown slightly gravelly SAND with occasional pockets of	0.1												99	
CBH 2009_6U	12	4.00	4.45	U	Yellowish brown silty SAND.			7.0	1+3	0.20					0.18			99	
CBH 2009_6U	20	6.80	7.25	U	Firm brownish grey clayey fibrous PEAT.	22.0												100	
CBH 2009_6U	22	7.50	7.95	U	Dark brown and dark grey peaty CLAY with abundant plant remains.	27.3												100	
CBH 2009_6U	69	23.60	24.05	U	Grey SAND with ocasional silt pockets and shell fragments.			7.1	1+3	0.13					1.7			93	
CBH 2009_7U	10	3.30	3.75	U	Greyish brown slightly organic slightly gravelly SAND with rare rootlets.	0.3												98	
CBH 2009_7U	16	5.40	5.85	U	Greyish brown slightly gravelly SAND with occasional clay pockets	0.3												95	
CBH 2009_7U	24	8.20	8.65	U	Firm pseudo fibrous PEAT.	27.7												100	
CBH 2009_7U	99	34.10	34.55	U	Grey SAND with occasional shell fragments.			7.5	1+3	0.16					4			96	
CBH 2009_8U	4	2.80	3.25	U	Light brownish grey slightly gravelly SAND.	0.1												87	
CBH 2009_8U	9	6.20	6.65	U	Soft to firm greyish brown slightly organic CLAY with occasional rootlets.	8.2												100	
CBH 2009_8U	10	6.65	7.10	U	Soft grey slightly organic slightly sandy CLAY with occasional rootlets.	6.0		6.7	1+3	2.26					1.8			100	
CBH 2009_8U	17	8.20	8.65	U	Soft to firm grey slightly sandy CLAY.	3.3												100	
CBH 2009_8U	21	9.35	9.80	U	Soft grey slightly organic CLAY.	5.2												100	
CBH 2009_8U	25	10.55	11.00	U	Soft to firm greyish brown slightly organic CLAY.	9.2												100	
CBH 2009_8U	27	11.10	11.55	U	Soft to firm dark grey slightly sandy organic CLAY with rare plant	5.2												100	
CBH 2009_8U	33	12.75	13.20	U	Brownish grey slightly organic SAND.	0.4												100	
CBH 2009_8U	35	13.00	13.45	U	Light grey slightly organic SAND.	1.1												100	

BS 1377 : definitive method unless stated :

Org Organic matter content (s-sulphides, c-chlorides identified)

LOI Mass loss on ignition at 440°C

CO_2 Carbonate content (rapid titration)

Cl Chloride content

* Sulphate tests preparation / test methods :

1. BS 1377:Part 3:1990:clause 5.3
2. BS 1377:Part 3:1990:clause 5.4
3. BS 1377:Part 3:1990:clause 5.5
4. TRL447 - 1 water soluble sulphate
5. TRL447 - 2 acid soluble sulphate
6. BR279 - groundwater sulphate

< 2mm material passing 2mm sieve

BRE Special Digest SD1, dependent options :

TS Total Sulphur to BR279 / EN ISO15178

Mg Soluble Magnesium to BR279, colorimetric

NO3 Soluble Nitrate to BR279, colorimetric

NH_4 qualitative

CHEMICAL TESTS - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample				Soil Description	Org	LOI	pH	Sulphate as SO_4				SD1 options		CO_2	Chloride, Cl		<2 mm	Remarks
	No.	Depth (m) from	Depth (m) to	type		%	%		Preparation/test *	2:1 water sol. g/L	ground water g/L	acid sol. %	TS %	Mg mg/L NO_3 mg/L NH_4	%	water sol. %	acid sol. %	%	
CBH 2009_8U	113	43.55	44.00	U	Grey SAND with shell fragments.			7.0	1+3	0.26					8.2			91	
CBH 2009_8U	128	67.41	67.69	CS	Brownish grey clayey SAND.			8.4	1+3	0.30					2.1			100	
CBH 2009_8U	131	78.05	78.50	CS	Stiff brownish grey slightly sandy CLAY.			8.3	1+3	0.41					2.1			100	
CBH 2009_9U	44	14.15	14.60	U	Light brown SAND with shell fragments.			6.9	1+3	0.04					1.2			94	
CBH 2009_9U	130	54.55	55.00	U	Firm to stiff grey silty CLAY.			6.7	1+3	1.27					3			100	
CBH 2009_10	20	50.45	50.90	CS	Very stiff brownish grey slightly sandy CLAY.			7.0	1+3	2.04					2.1			100	

BS 1377 : definitive method unless stated :

Org Organic matter content (s-sulphides, c-chlorides identified)

LOI Mass loss on ignition at 440°C

CO_2 Carbonate content (rapid titration)

Cl Chloride content

* Sulphate tests preparation / test methods :

1. BS 1377:Part 3:1990:clause 5.3
2. BS 1377:Part 3:1990:clause 5.4
3. BS 1377:Part 3:1990:clause 5.5
4. TRL447 - 1 water soluble sulphate
5. TRL447 - 2 acid soluble sulphate
6. BR279 - groundwater sulphate

< 2mm material passing 2mm sieve

BRE Special Digest SD1, dependent options :

TS Total Sulphur to BR279 / EN ISO15178

Mg Soluble Magnesium to BR279, colorimetric

NO3 Soluble Nitrate to BR279, colorimetric

NH_4 qualitative

Methylene Blue Value Results

Soil Mechanics

Hole ID	Sample No	Sample Type	Sample Top Depth	Sample Base Depth	Methylene blue value, g/kg
CBH 2009_1	9	CS	47.10	47.50	87.95
CBH 2009_1	15	CS	68.75	69.20	49.67
CBH 2009_1	18	CS	84.35	84.75	108.55
CBH 2009_1UA	15	U	5.90	6.35	31.46
CBH 2009_1UA	25	U	9.40	9.85	31.46
CBH 2009_1UA	114	U	45.10	45.55	78.69
CBH 2009_1UA	118	U	46.50	46.95	70.49
CBH 2009_2	16	CS	49.75	50.15	79.47
CBH 2009_2	18	CS	54.80	55.20	59.2
CBH 2009_2	20	CS	58.50	58.90	24.27
CBH 2009_2	21	CS	61.75	62.15	31.46
CBH 2009_2	22	CS	65.10	65.50	2.68
CBH 2009_2	23	CS	70.90	71.30	1.69
CBH 2009_2	24	CS	74.00	74.40	69.08
CBH 2009_2	25	CS	77.10	77.50	99.34
CBH 2009_2	26	CS	80.20	80.60	88.52
CBH 2009_2UA	8	U	5.00	5.45	40.13
CBH 2009_4	8	CS	44.15	44.50	65.79
CBH 2009_4	11	CS	48.00	48.20	31.46
CBH 2009_4	13	CS	53.50	53.90	74.26
CBH 2009_5	14	CS	49.70	50.10	76.16
CBH 2009_5UB	10	U	4.10	4.55	44.56
CBH 2009_6	12	CS	52.70	53.09	72.37
CBH 2009_6U	20	U	6.80	7.25	39.87
CBH 2009_7	15	CS	48.40	48.80	74.75
CBH 2009_7	16	CS	51.60	51.95	71.2
CBH 2009_7U	24	U	8.20	8.65	19
CBH 2009_8U	10	U	6.65	7.10	39.47
CBH 2009_8U	17	U	8.20	8.65	36.07
CBH 2009_8U	27	U	11.10	11.55	45.9
CBH 2009_8U	33	U	12.75	13.20	2.49
CBH 2009_8U	122	CS	51.36	51.56	70.49
CBH 2009_8U	123	CS	51.69	51.81	10.69
CBH 2009_8U	125	CS	58.23	58.72	57.95
CBH 2009_8U	128	CS	67.41	67.69	8.5
CBH 2009_8U	129	CS	72.00	72.10	23.33
CBH 2009_8U	130	CS	74.60	75.22	103.33
CBH 2009_8U	131	CS	78.05	78.50	116.13
CBH 2009_8U	132	CS	81.12	81.60	65.36
CBH 2009_8U	133	CS	84.12	84.60	81.97

ANALYTICAL SERVICES LABORATORY

University of Greenwich
School of Science
Central Avenue, Chatham Maritime
Kent ME4 4TB

DOCUMENT:	asl/work/49b
DOCUMENT TITLE:	TEST REPORT
ISSUE DATE:	28 MAY 08
ISSUE NO.:	01
ISSUED BY:	DSW

Customer:
Environmental Scientifics Group
ESG House, Bretby Business Park, Ashby Road, Burton Upon Trent, DE15 0YZ.

Report Number: ESG11-001

COVER SHEET

Material	Date received:	Project No.
Natural materials (10): chalks, sands, clays	Date of test:	Q11003

Analysis required	Test method(s) / procedure(s) used
Mineral identification and quantification	XRD

Abnormalities or departures from standard conditions

None

Additional information

Report released by: …… Print Name: Dr Ian Slipper

Position: …….

Report Issue Date: ……..

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Report Number: ESG11-001

ANALYTICAL RESULTS

Instrumentation

All samples were analyzed on a Bruker AXS D8 Advance X-ray diffractometer using 2.2kW Cu anode X-ray tube producing Cu K alpha radiation at 40kV and 40mA. A Goebel mirror was used to produce a parallel bean of X-rays and remove Cu K beta radiation. A fast position sensitive LynxEye detector was used with a 3 degree opening, Lynx Iris at 6.5mm and a counting time of 0.4 seconds per 0.02 degree step. A knife edge was used to remove high backgrounds at low 2-theta values. All samples were rotated at 15 rev/min for increased homogeneity and peak resolution.

Sample Preparation

Subsamples were taken for clay separation (<2µm fraction) by centrifugation and oriented tile preparation.
Four sample preparations were used to determine the clay species: 1) air dried, 2) glycolated (overnight at 60°C in a desiccator containing ethylene glycol, 3) heated to 400°C for 4 hours, 4) heated to 550°C for 4 hours. Each oriented clay tile preparation was run from 2-40 degrees 2-theta with a 0.6mm exit slit.
Subsamples were taken were for random powder whole rock preparation. Oven dried at 60°C, crushed, subsampled, and finely ground before placing into specimen holders.
Random powder whole rock samples were run from 2-70 degrees 2-theta with a 0.2mm exit slit.

Interpretation

Qualitative interpretation was carried out Bruker AXS EVA v.16 software and the ICDD (International Centre for Diffraction Data) PDF-2 (Powder Diffraction File) release 2008 database. Quantitative assessment of random powder whole rock samples was carried out using Bruker AXS Topas v.4 software, a Rietveld refinement method. Semi-Quantitative assessment of the <2µm clay fraction was carried out using a modified version of the USGS (United States Geological Survey) Open File Report 01-041 method of integrating areas under the glycolated curve.

Results

Whole rock diffractograms with qualitative interpretations are given in Appendix A. Where necessary an increased scaling is given in a separate diffractogram to show smaller peaks.

Clay fraction oriented mount diffractograms are given in Appendix B with interpretive annotations.

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Report Number: ESG11-001

A quantitative assessment of the <2um clay fraction proportions is given in Appendix C.

A quantitative table is given in Appendix D that combines the Rietveld analysis of all phases identified together with the clay proportion data.

Attached:
Appendix - A-whole rock qualitative.doc
Appendix - B-oriented Clay fraction.doc
Appendix - C-clay fraction quantitative.doc
Appendix - D-synoptic data table.doc

End of Report

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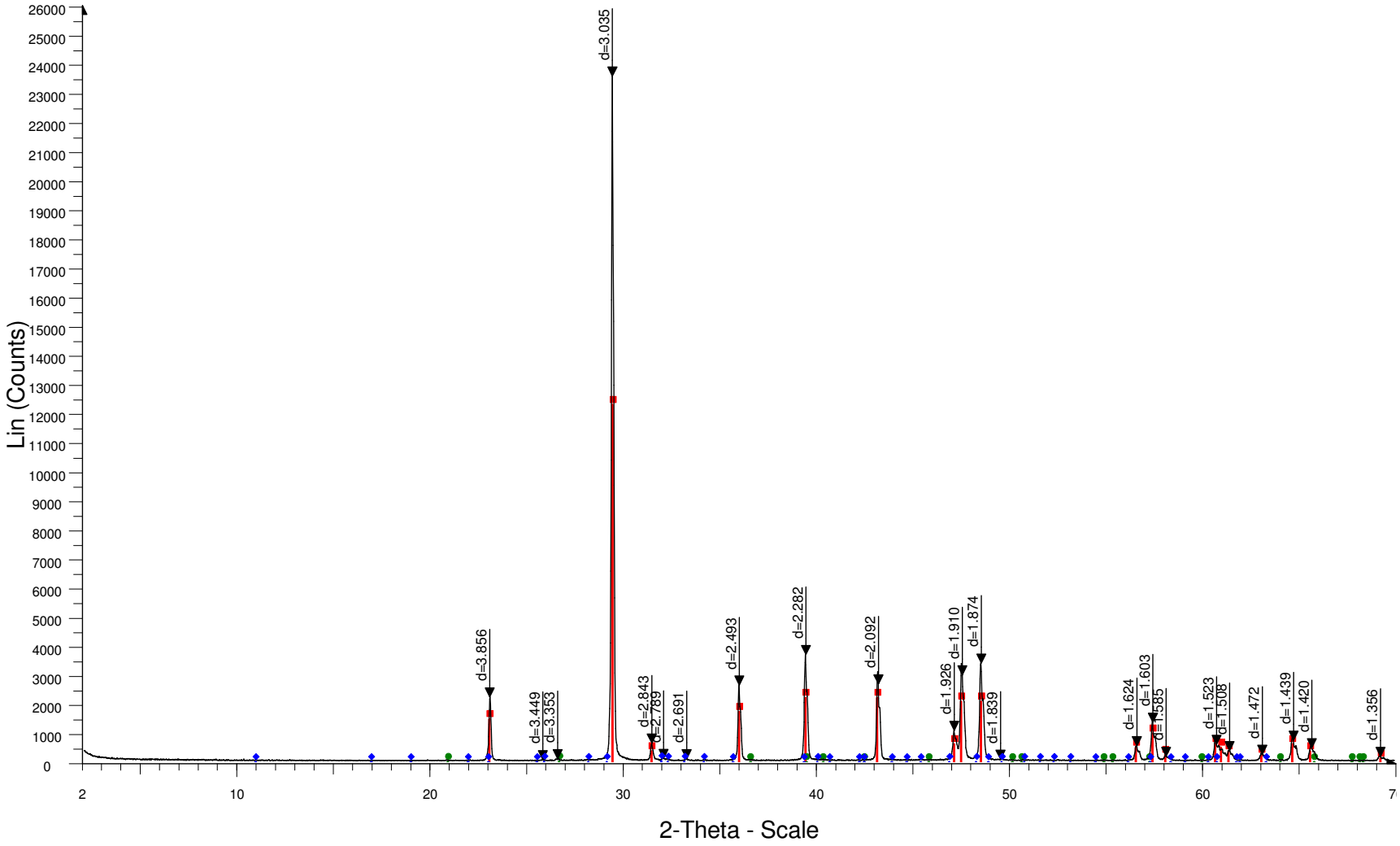
CBM2009-2 CS29 93.35-93.65 whole rock



P11 014 11 0255 wr - Step: 0.02 ° - Step time: 70.4 s

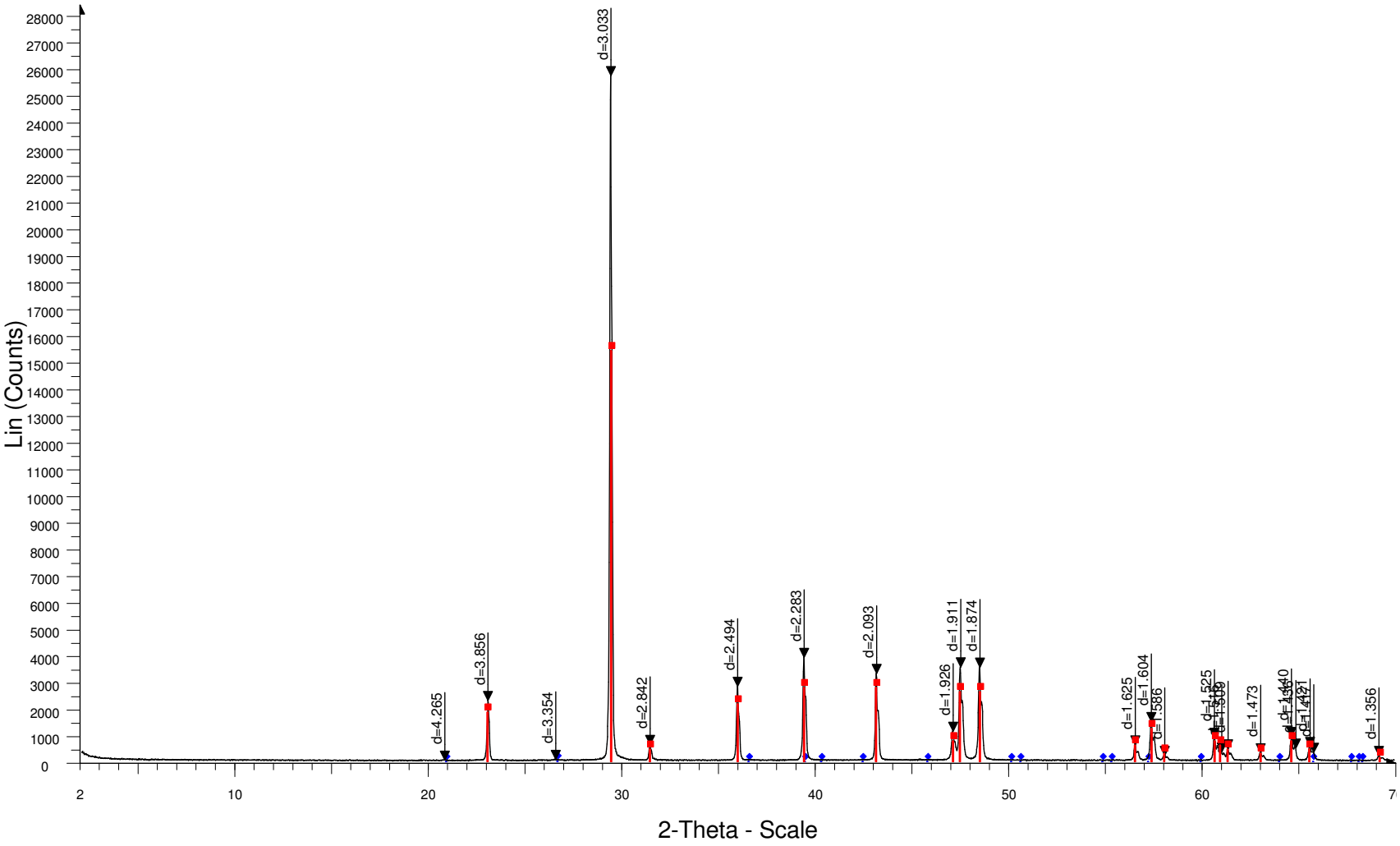
Operations: Import

Calcite, syn - CaCO3 - Rhombo.H.axes - a 4.98900 - b 4.98900 - c 17.06200 - alpha 90.000 - beta 90.000 - gamma 120.000

Fluorapatite, syn - Ca5(PO4)3F - Hexagonal - a 9.36840 - b 9.36840 - c 6.88410 - alpha 90.000 - beta 90.000 - gamma 120.000

Quartz, syn - SiO2 - Hexagonal - a 4.91344 - b 4.91344 - c 5.40524 - alpha 90.000 - beta 90.000 - gamma 120.000

CBM2009-2 CS34 110.50-110.90 whole rock



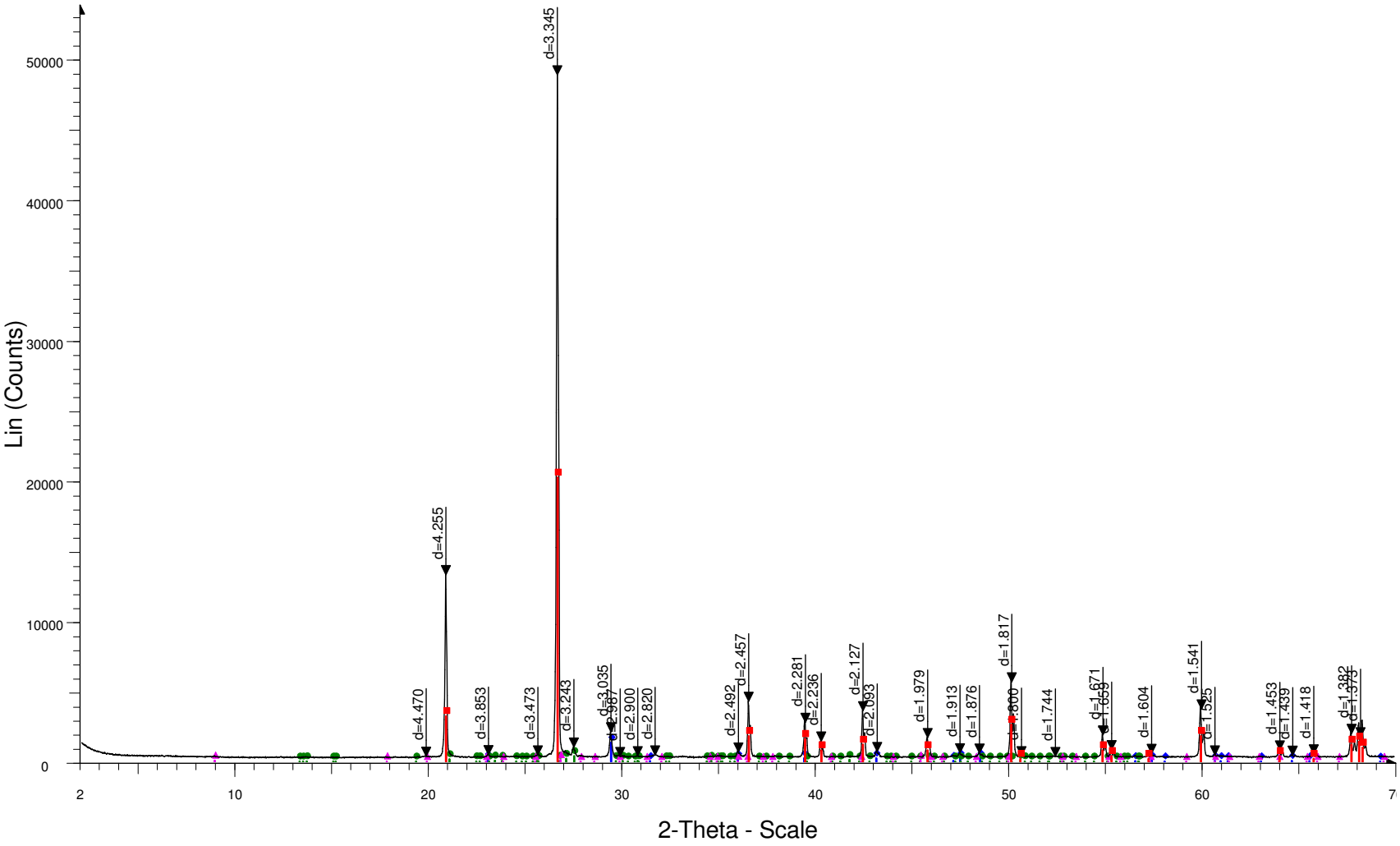
P11 014 11 0256 wr - Step: 0.02 ° - Step time: 70.4 s

Operations: Import

Calcite, syn - CaCO3 - Rhombo.H.axes - a 4.98900 - b 4.98900 - c 17.06200 - alpha 90.000 - beta 90.000 - gamma 120.000

Quartz, syn - SiO2 - Hexagonal - a 4.91344 - b 4.91344 - c 5.40524 - alpha 90.000 - beta 90.000 - gamma 120.000

CBH2009-5UB U5 2.70-3.15



P11 014 11 0257 wr - Step: 0.02 ° - Step time: 70.4 s

Operations: Import

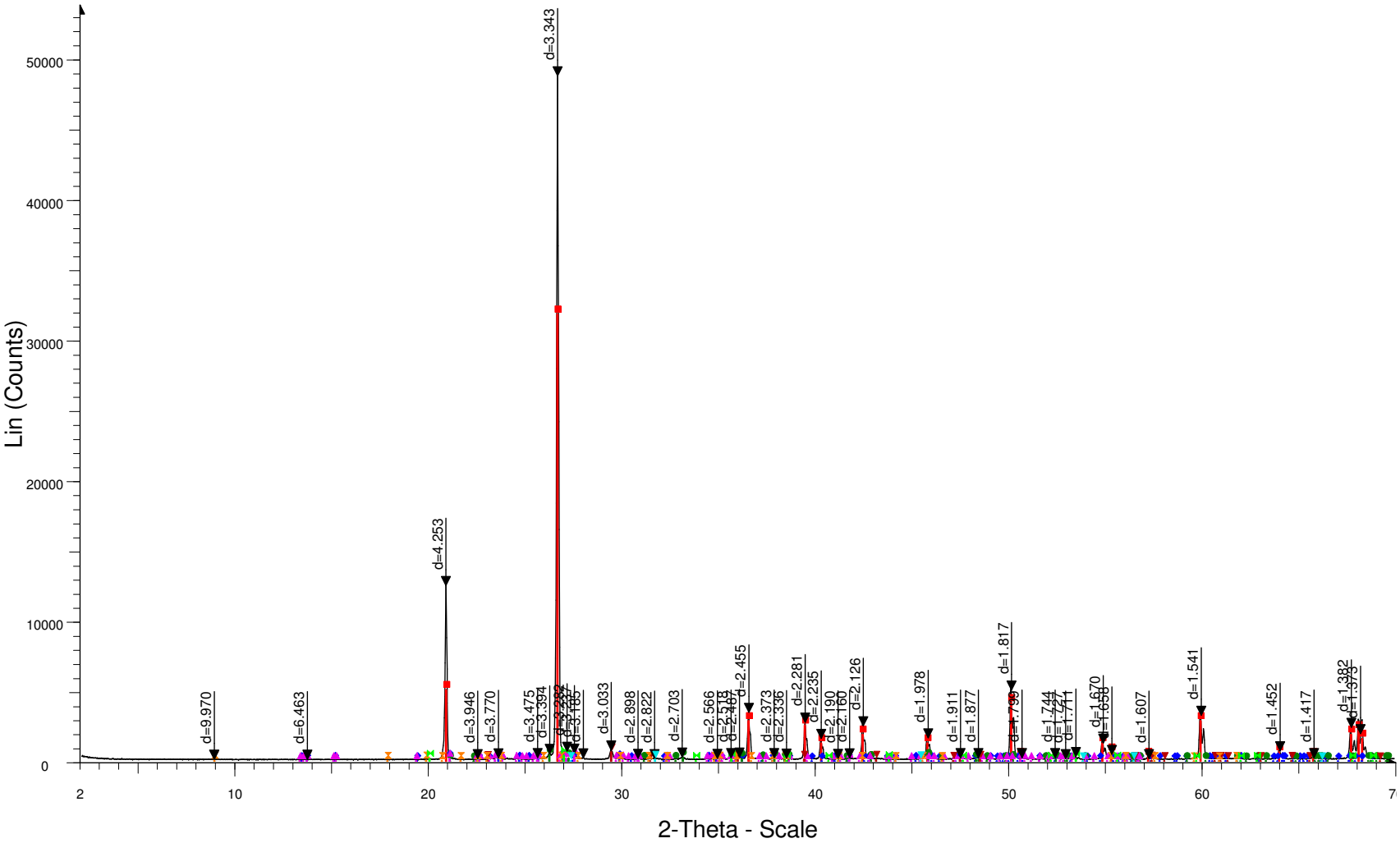
Quartz, syn - SiO2 - Hexagonal - a 4.91344 - b 4.91344 - c 5.40524 - alpha 90.000 - beta 90.000 - gamma 120.000

Calcite, syn - CaCO3 - Rhombo.H.axes - a 4.98900 - b 4.98900 - c 17.06200 - alpha 90.000 - beta 90.000 - gamma 120.000

Microcline, intermediate - KAlSi3O8 - Triclinic - a 8.56000 - b 12.97000 - c 7.21000 - alpha 90.300 - beta 116.100 - gamma 89.000

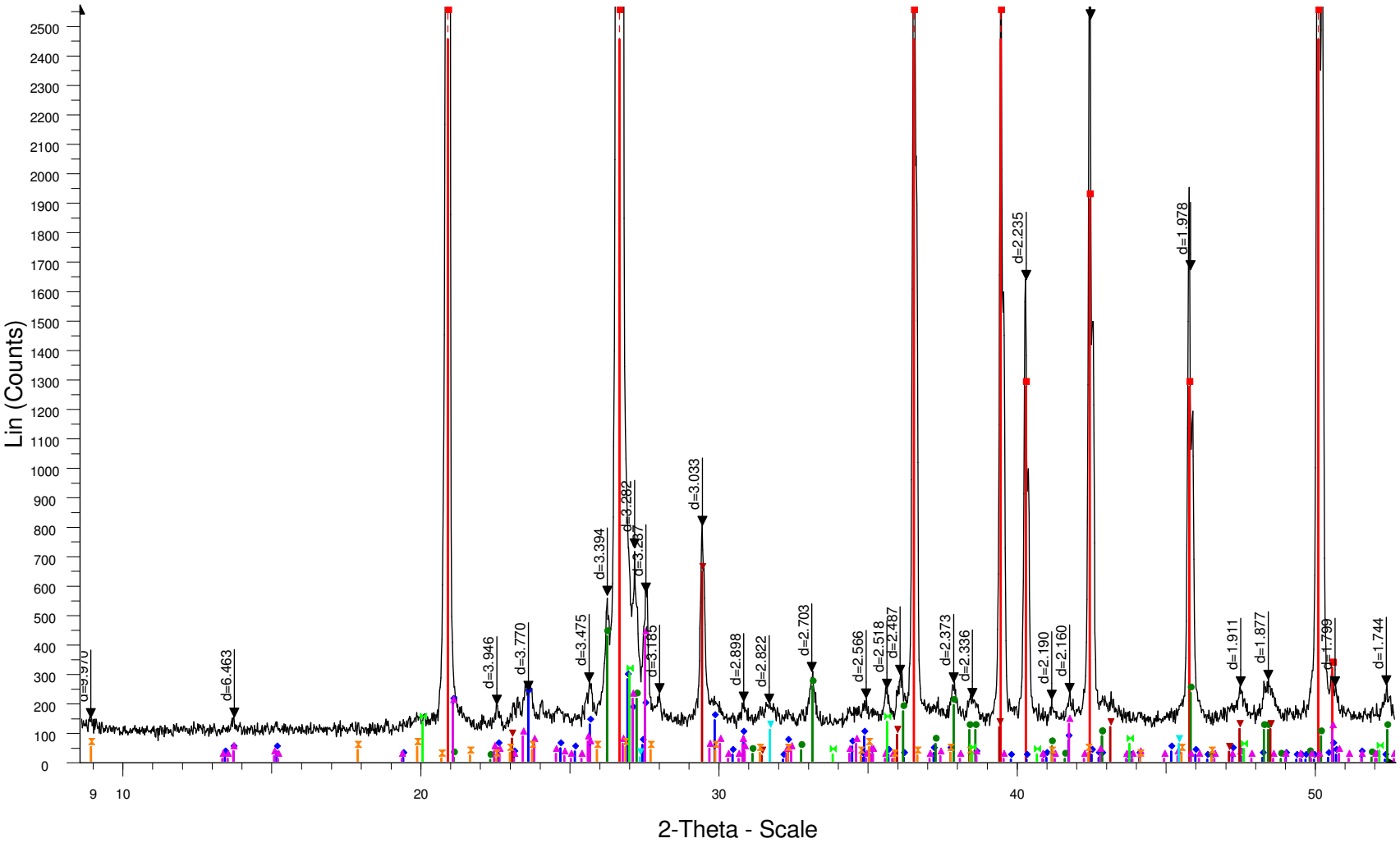
Muscovite-2M1 - KAl2(Si,Al)4O10(OH)2 - Monoclinic - a 5.20260 - b 9.04180 - c 20.05890 - alpha 90.000 - beta 95.831 - gamma 90.000

CBH2009-2UA U51 19.9-20.35



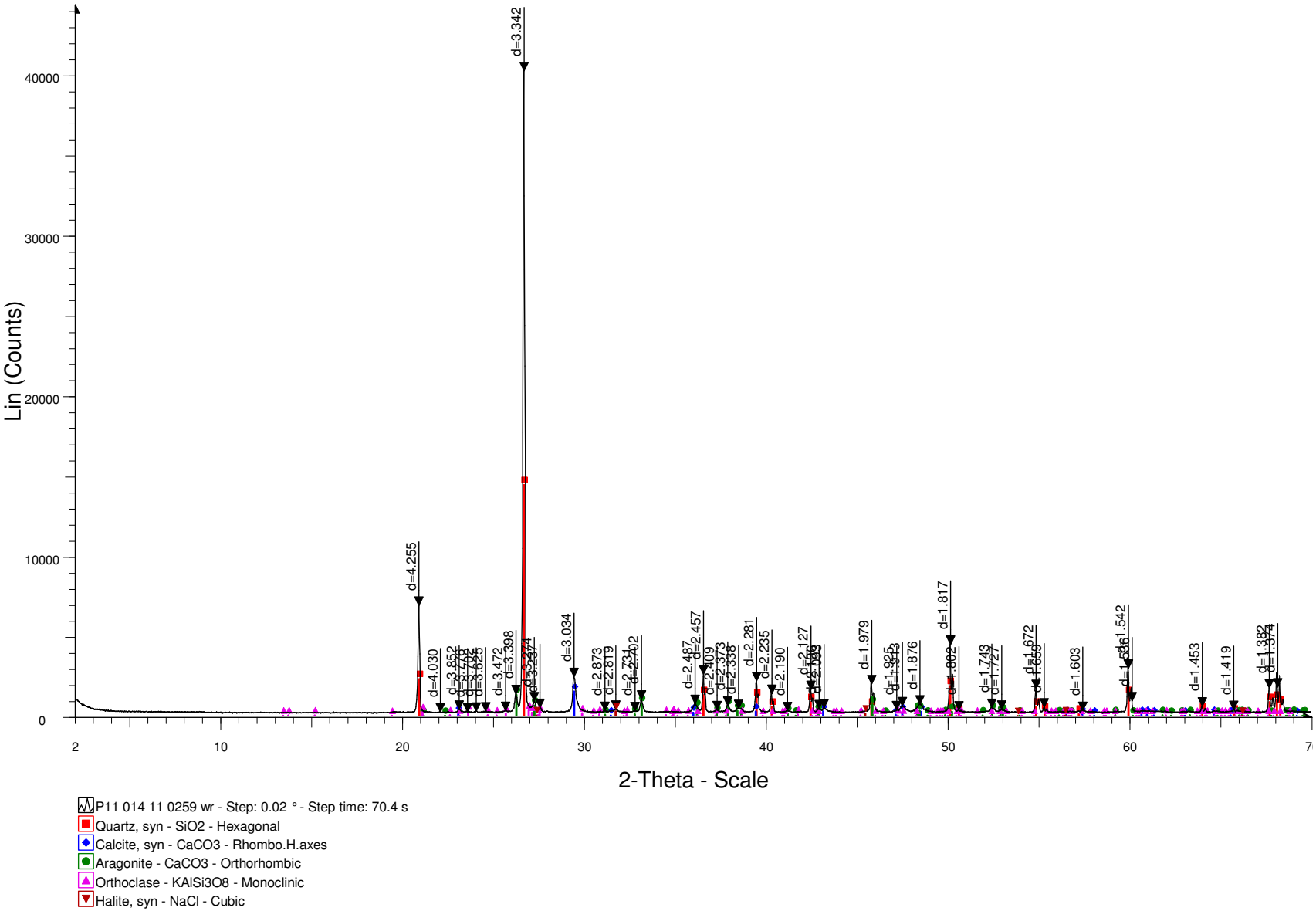
P11 014 11 0258 wr - Step: 0.02 ° - Step time: 70.4 s
Operations: Import
Quartz, syn - SiO2 - Hexagonal - a 4.91344 - b 4.91344 - c 5.40524 - alpha 90.000 - beta 90.000 -
Orthoclase - KAlSi3O8 - Monoclinic - a 8.55600 - b 12.98000 - c 7.20500 - alpha 90.000 - beta 11
Aragonite - CaCO3 - Orthorhombic - a 4.96230 - b 7.96800 - c 5.74390 - alpha 90.000 - beta 90.0
Microcline, intermediate - KAlSi3O8 - Triclinic - a 8.56000 - b 12.97000 - c 7.21000 - alpha 90.300
Calcite, syn - CaCO3 - Rhombo.H.axes - a 4.98900 - b 4.98900 - c 17.06200 - alpha 90.000 - bet
Illite - KAl2Si3AlO10(OH)2 - Monoclinic - a 5.18000 - b 9.02000 - c 20.04000 - alpha 90.000 - beta
Zircon - ZrSiO4 - Tetragonal - a 6.60400 - b 6.60400 - c 5.97900 - alpha 90.000 - beta 90.000 - ga
Halite, syn - NaCl - Cubic - a 5.64020 - b 5.64020 - c 5.64020 - alpha 90.000 - beta 90.000 - gam

CBH2009-2UA U51 19.9-20.35

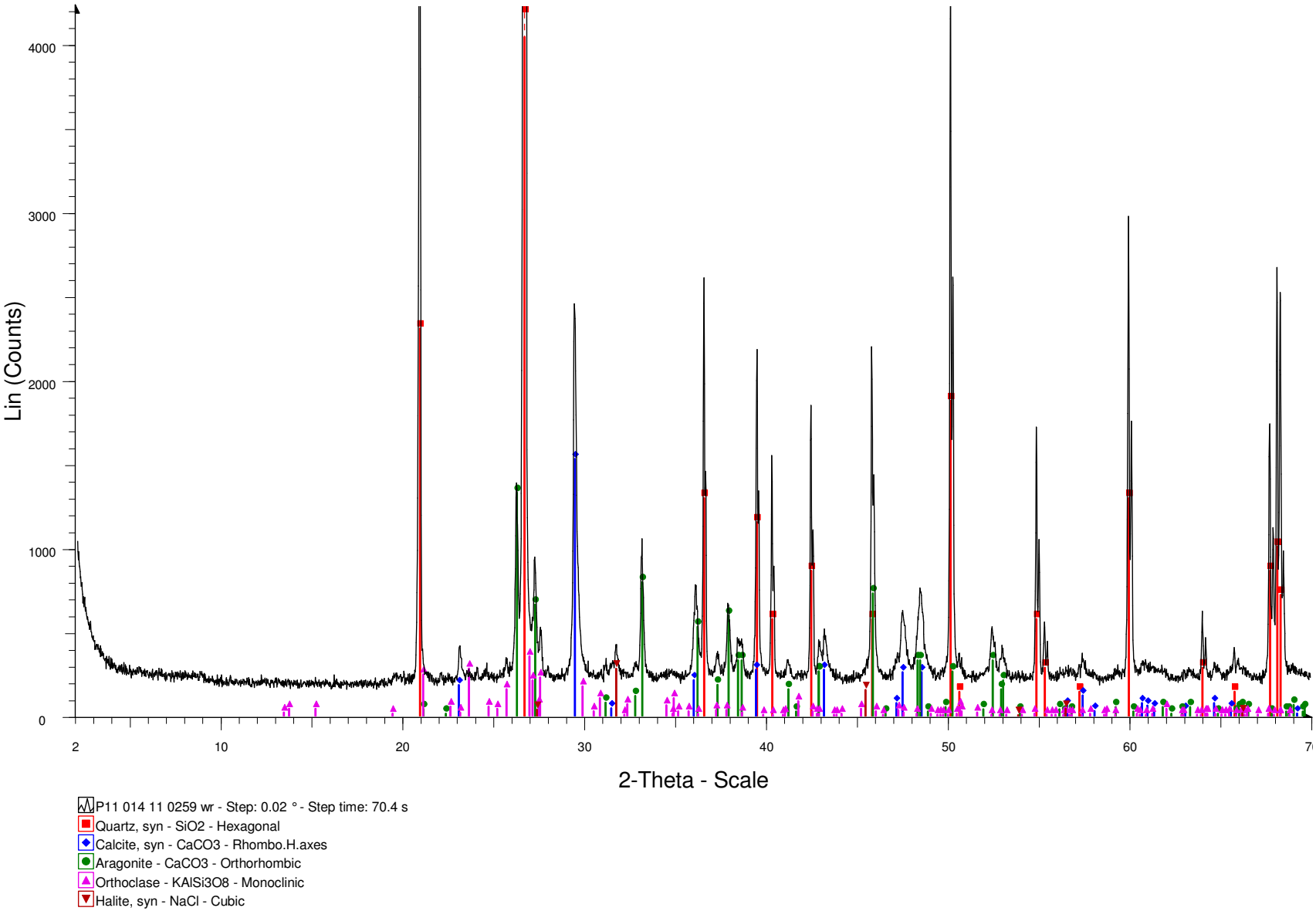


P11 014 11 0258 wr - Step: 0.02 ° - Step time: 70.4 s
Operations: Import
Quartz, syn - SiO2 - Hexagonal - a 4.91344 - b 4.91344 - c 5.40524 - alpha 90.000 - beta 90.000 -
Orthoclase - KAlSi3O8 - Monoclinic - a 8.55600 - b 12.98000 - c 7.20500 - alpha 90.000 - beta 11
Aragonite - CaCO3 - Orthorhombic - a 4.96230 - b 7.96800 - c 5.74390 - alpha 90.000 - beta 90.0
Microcline, intermediate - KAlSi3O8 - Triclinic - a 8.56000 - b 12.97000 - c 7.21000 - alpha 90.300
Calcite, syn - CaCO3 - Rhombo.H.axes - a 4.98900 - b 4.98900 - c 17.06200 - alpha 90.000 - bet
Illite - KAl2Si3AlO10(OH)2 - Monoclinic - a 5.18000 - b 9.02000 - c 20.04000 - alpha 90.000 - beta
Zircon - ZrSiO4 - Tetragonal - a 6.60400 - b 6.60400 - c 5.97900 - alpha 90.000 - beta 90.000 - ga
Halite, syn - NaCl - Cubic - a 5.64020 - b 5.64020 - c 5.64020 - alpha 90.000 - beta 90.000 - gam

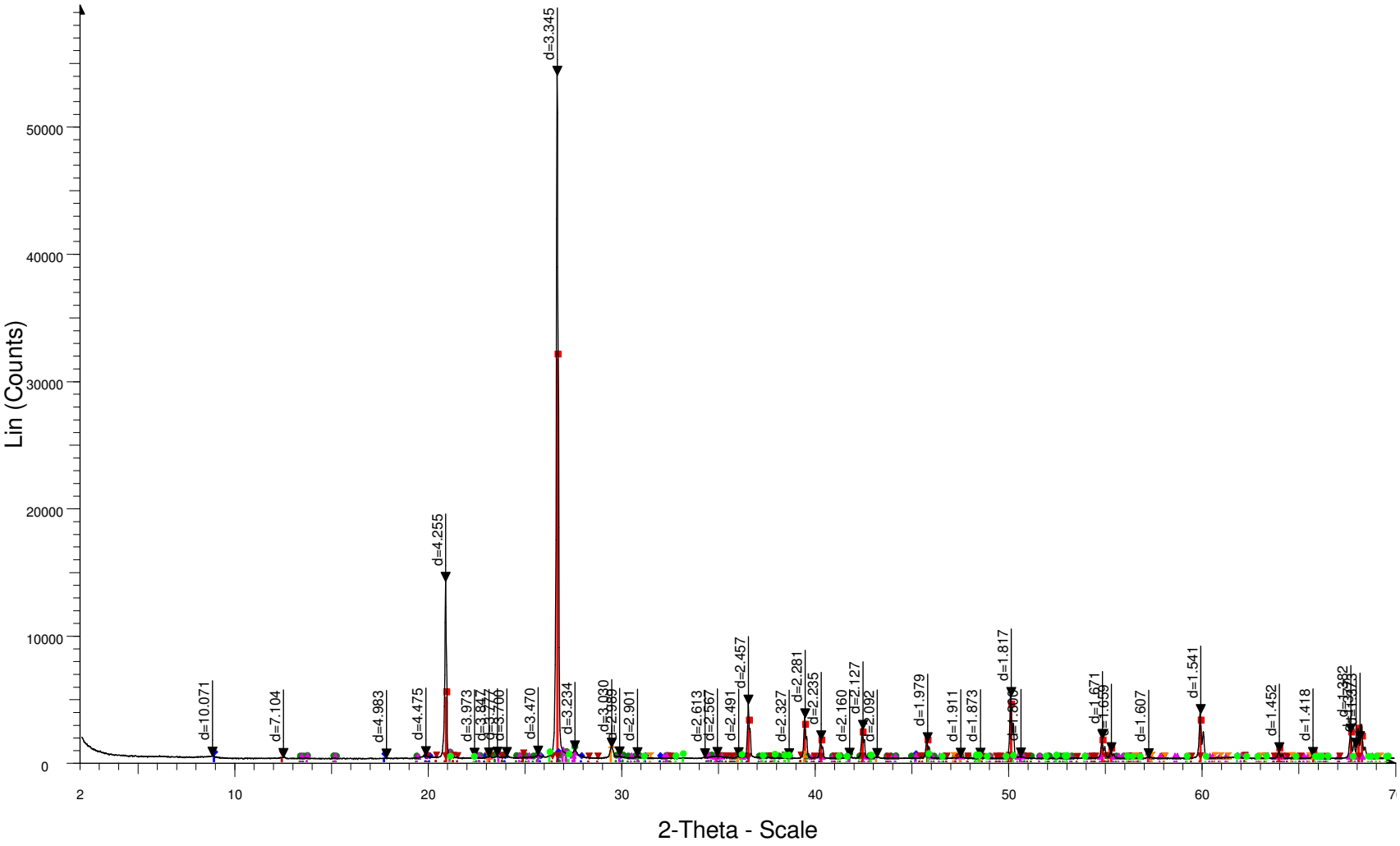
CBH2009-7U U99 34.1-34.55



CBH2009-7U U99 34.1-34.55



CBH2009-8U CS128 67.41-67.69



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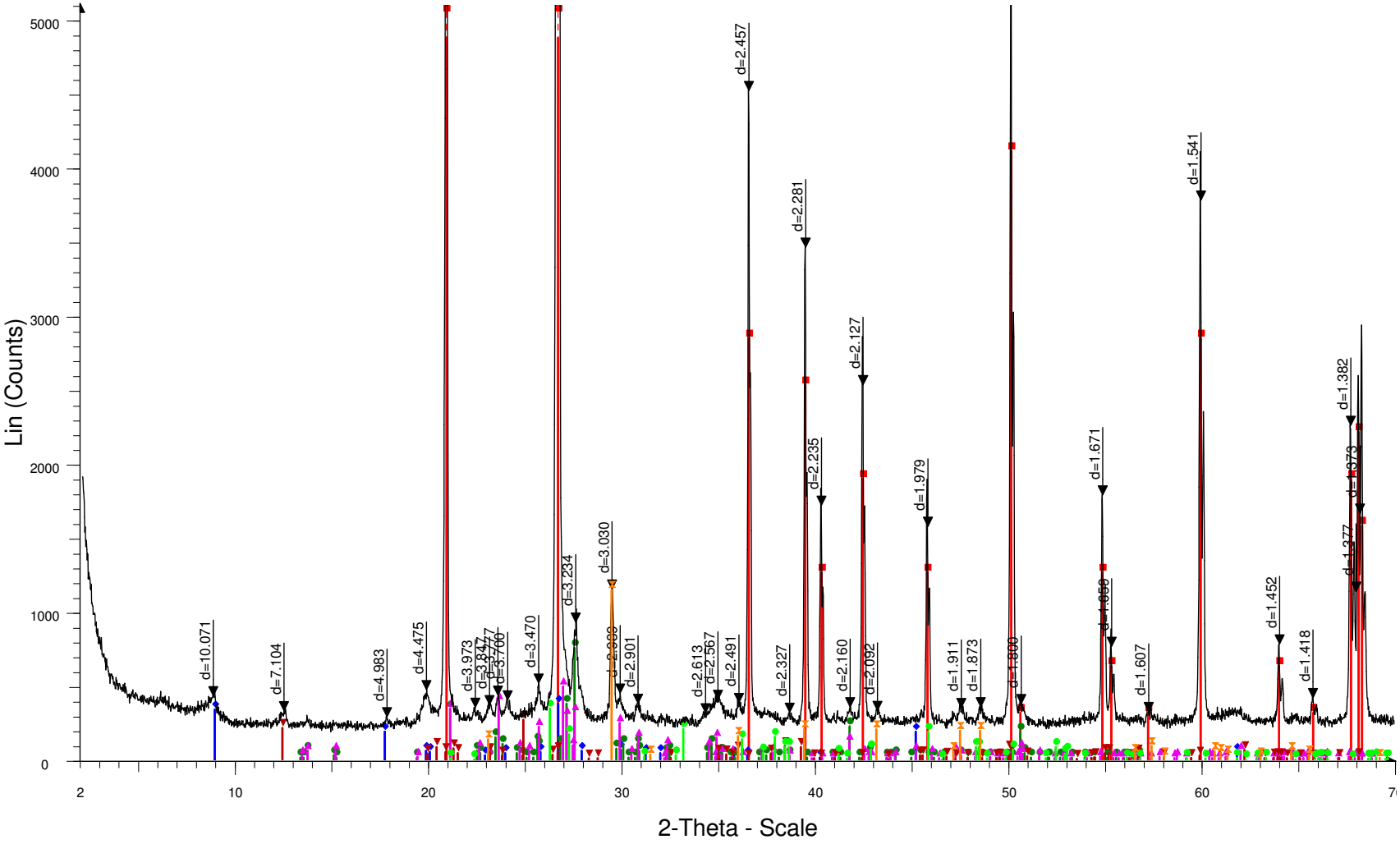
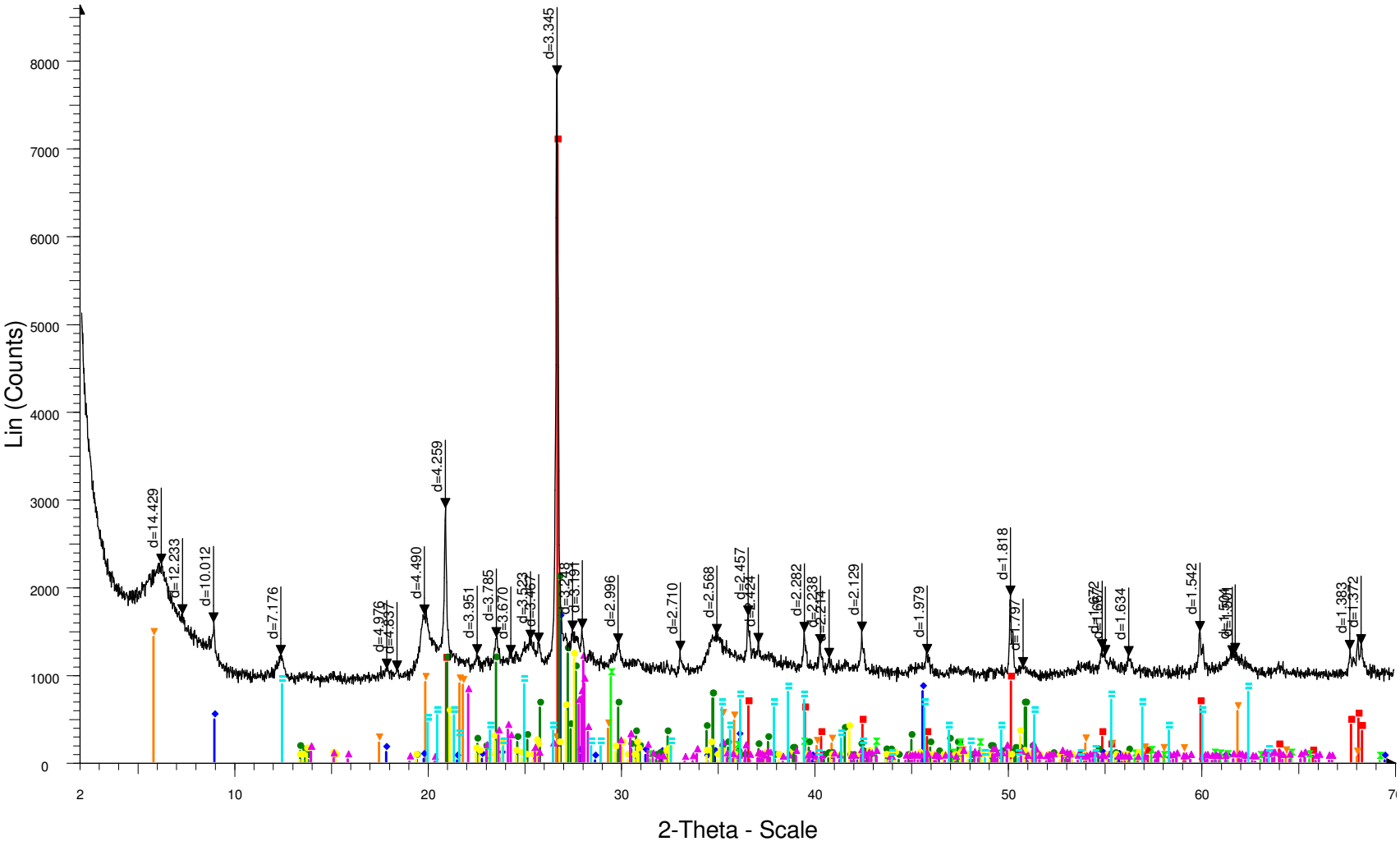
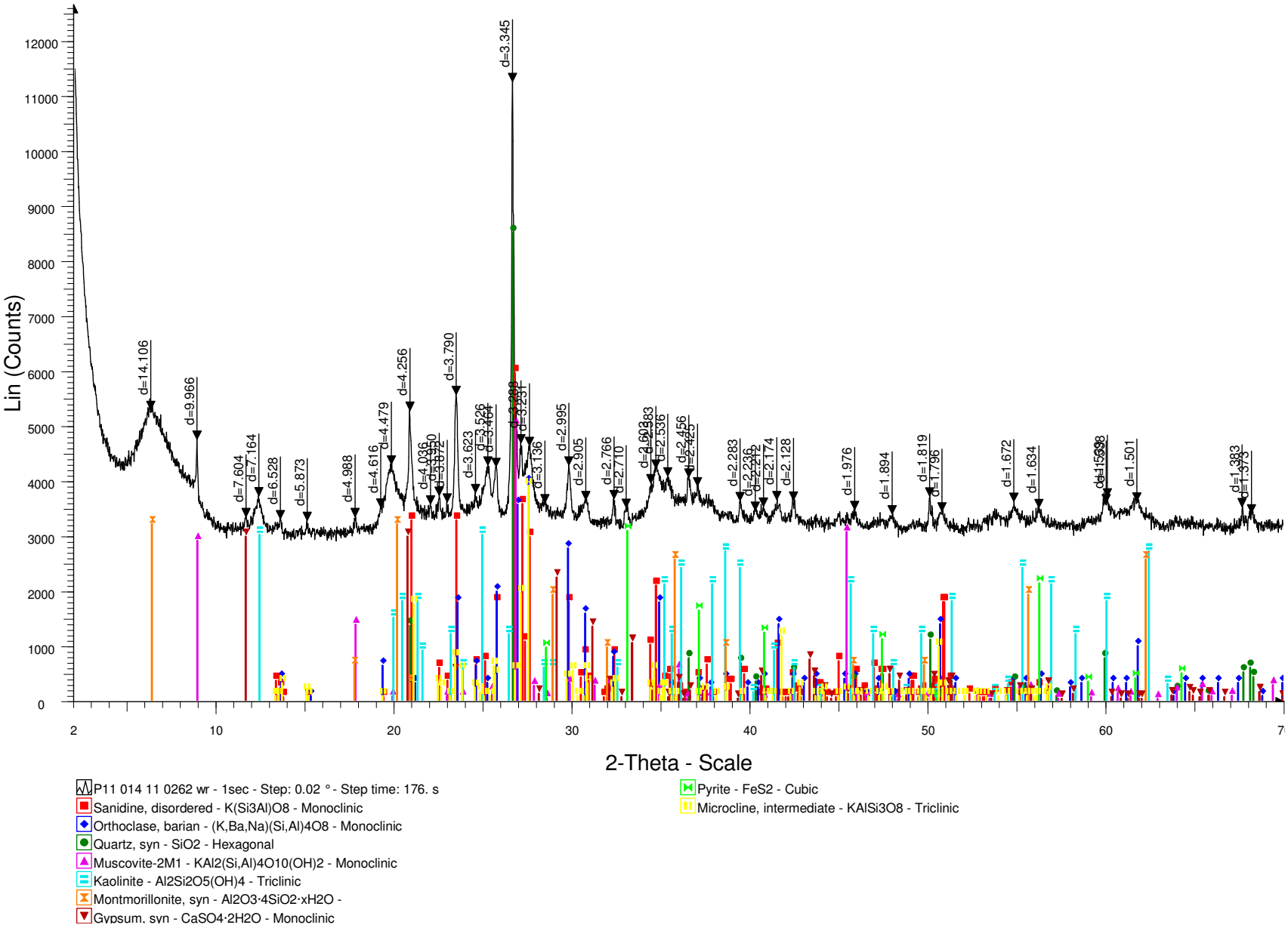
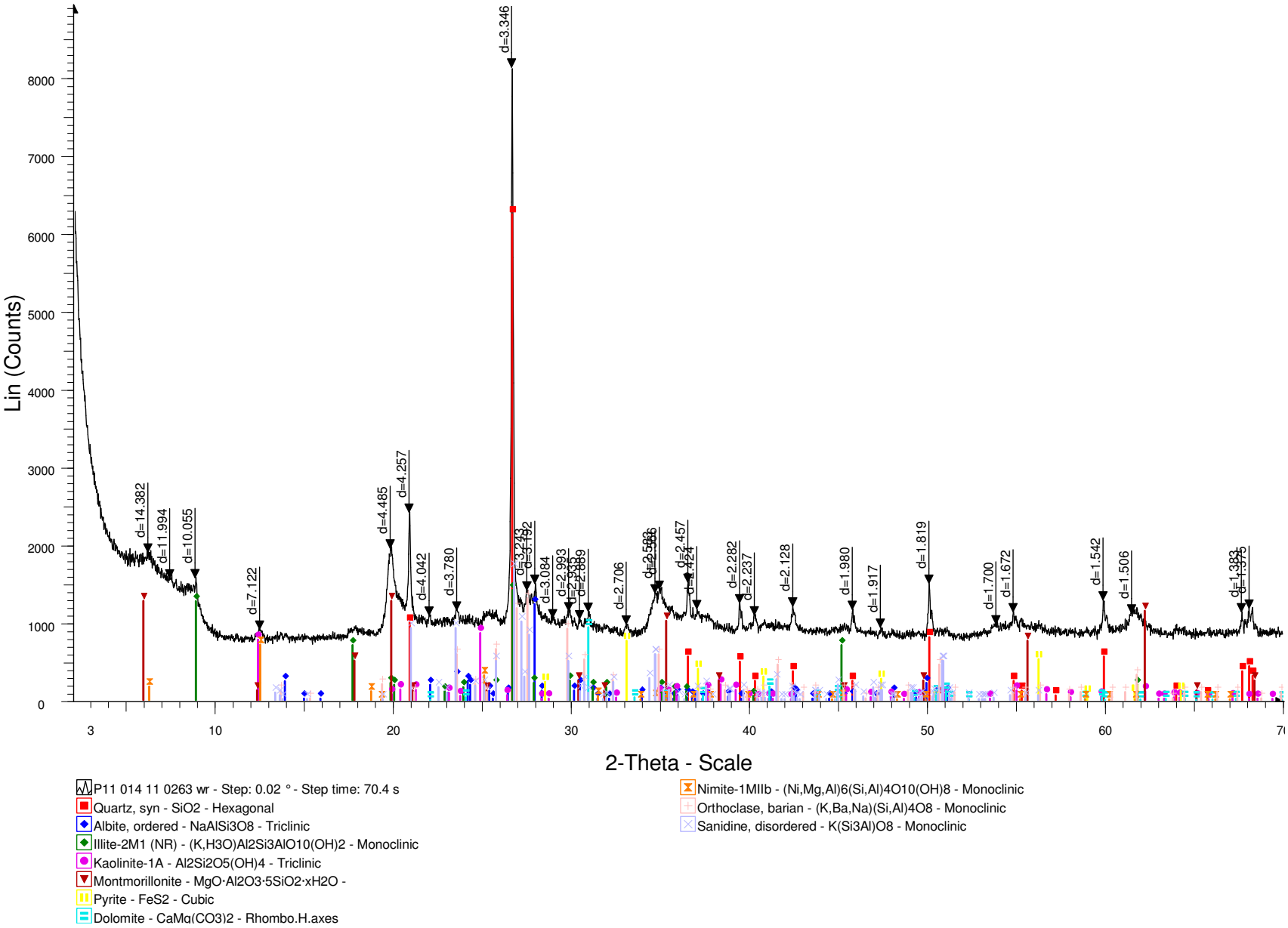


CBH2009-11U U128 56.10-56.50



CBH2009-8U CS121 48.77-49.32

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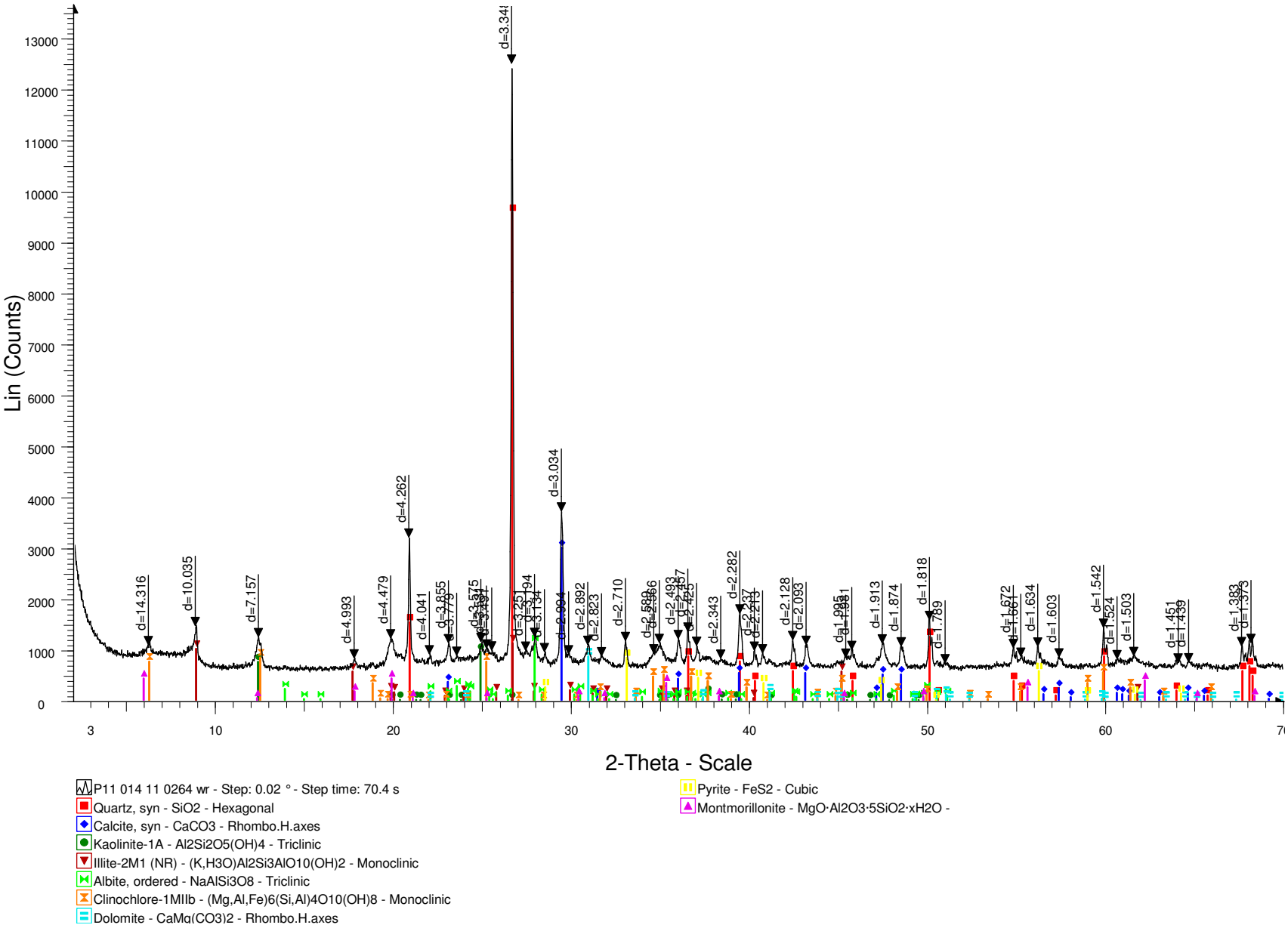
d=10.055
d=7.122
d=4.485
d=4.257
d=4.042
d=3.780
d=3.346
d=3.243
d=3.192
d=3.084
d=2.993
d=2.935
d=2.889
d=2.706
d=2.583
d=2.566
d=2.457
d=2.424
d=2.282
d=2.237
d=2.128
d=1.980
d=1.917
d=1.819
d=1.700
d=1.672
d=1.542
d=1.506
d=1.383
d=1.373
P11 014 11 0263 wr - Step: 0.02 ° - Step time: 70.4 s
Quartz, syn - SiO2 - Hexagonal
Albite, ordered - NaAlSi3O8 - Triclinic
Illite-2M1 (NR) - (K,H3O)Al2Si3AlO10(OH)2 - Monoclinic
Kaolinite-1A - Al2Si2O5(OH)4 - Triclinic
Montmorillonite - MgO·Al2O3·5SiO2·xH2O -
Pyrite - FeS2 - Cubic
Dolomite - CaMg(CO3)2 - Rhombo.H.axes
Nimite-1MIIb - (Ni,Mg,Al)6(Si,Al)4O10(OH)8 - Monoclinic
Orthoclase, barian - (K,Ba,Na)(Si,Al)4O8 - Monoclinic
Sanidine, disordered - K(Si3Al)O8 - Monoclinic

CBH2009-U8 U17 8.20-8.65



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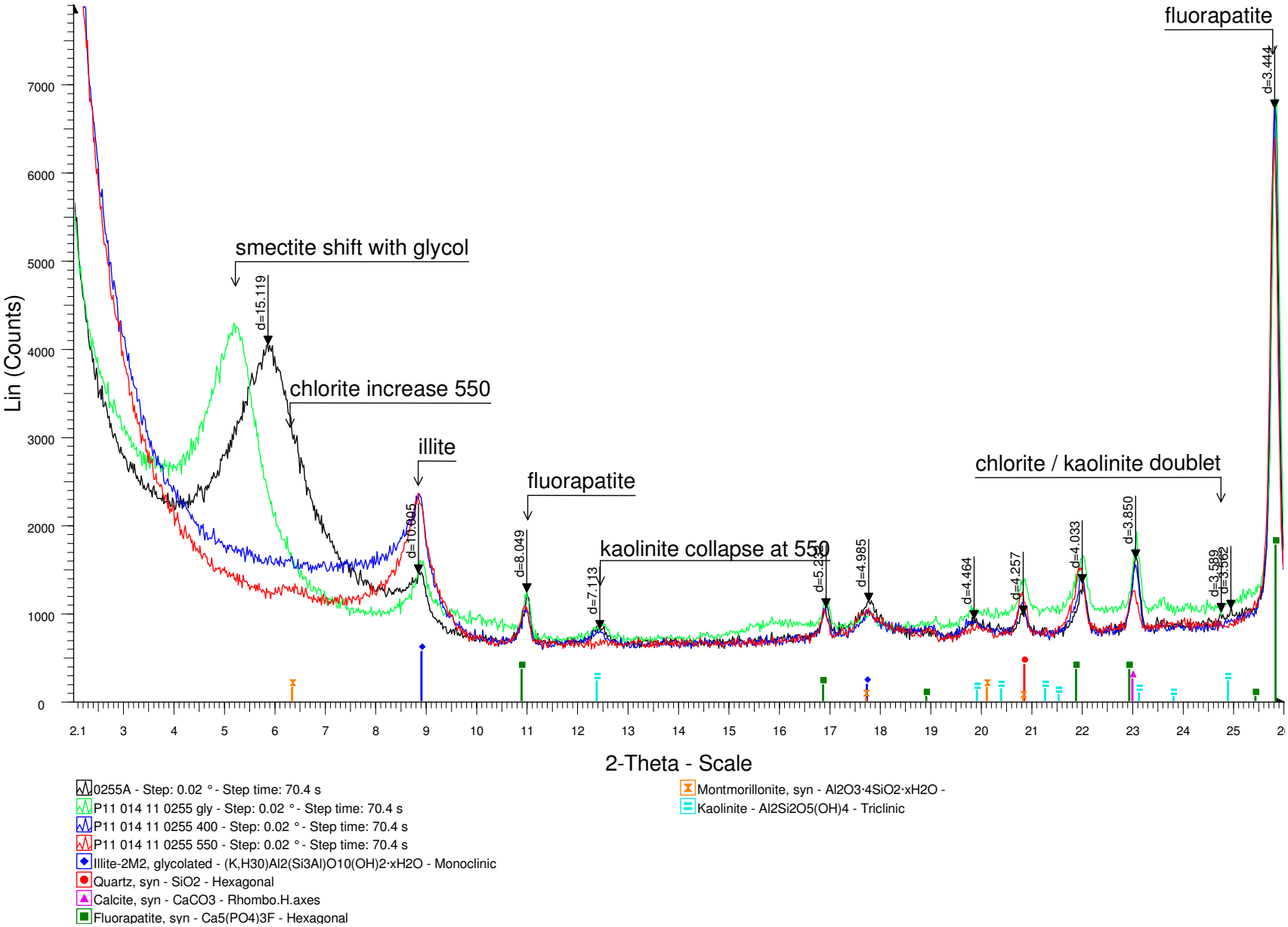

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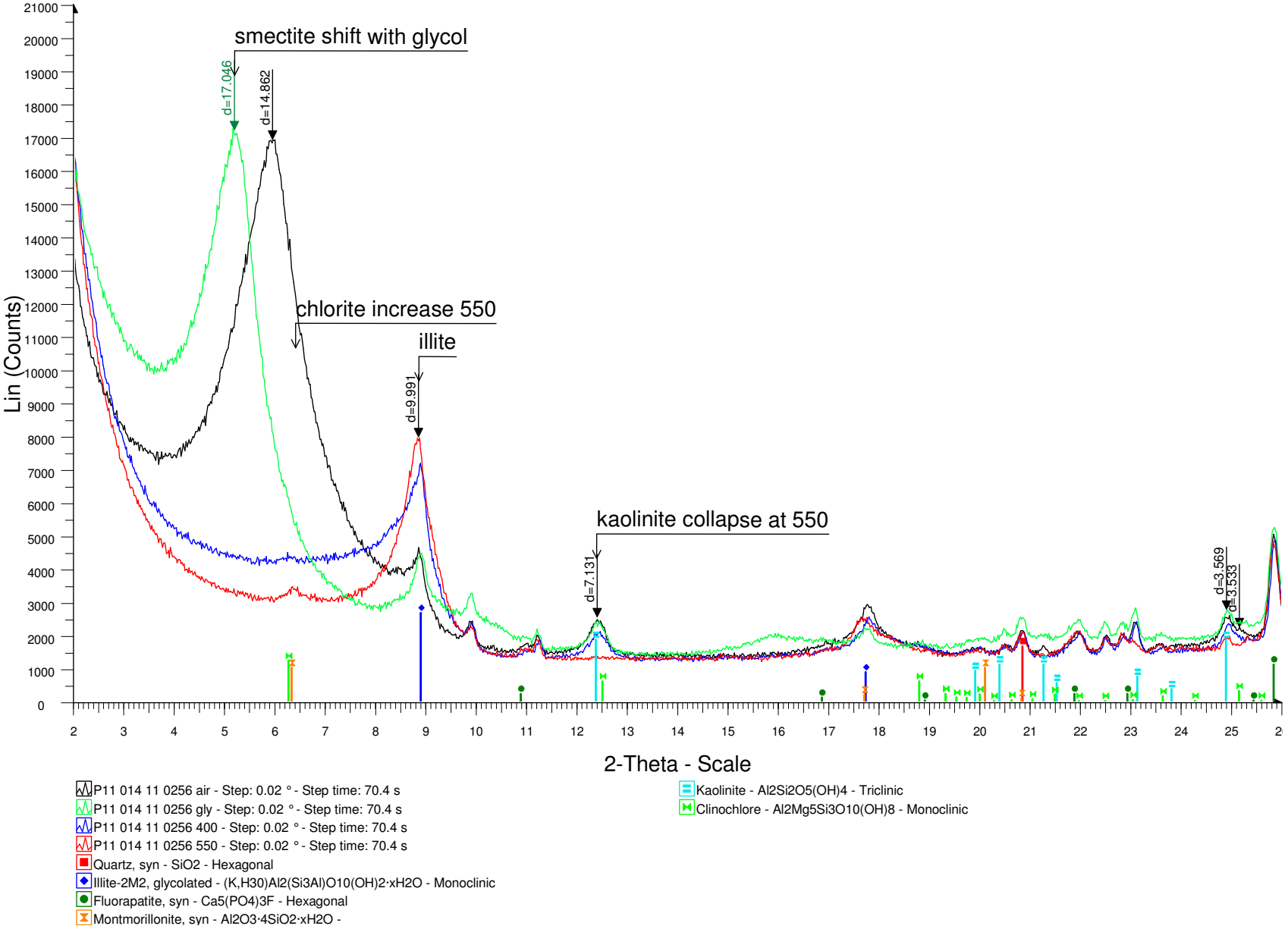

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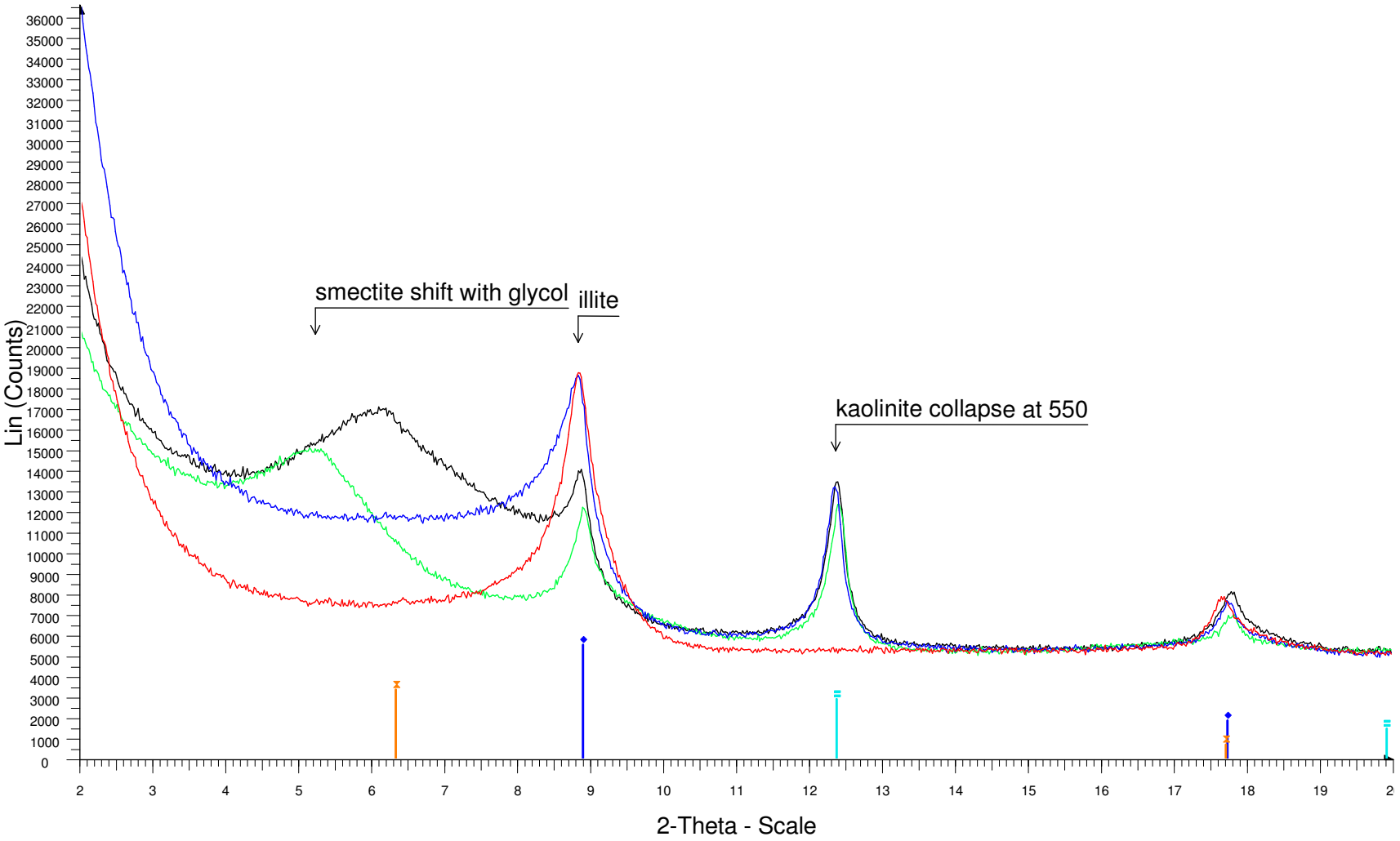
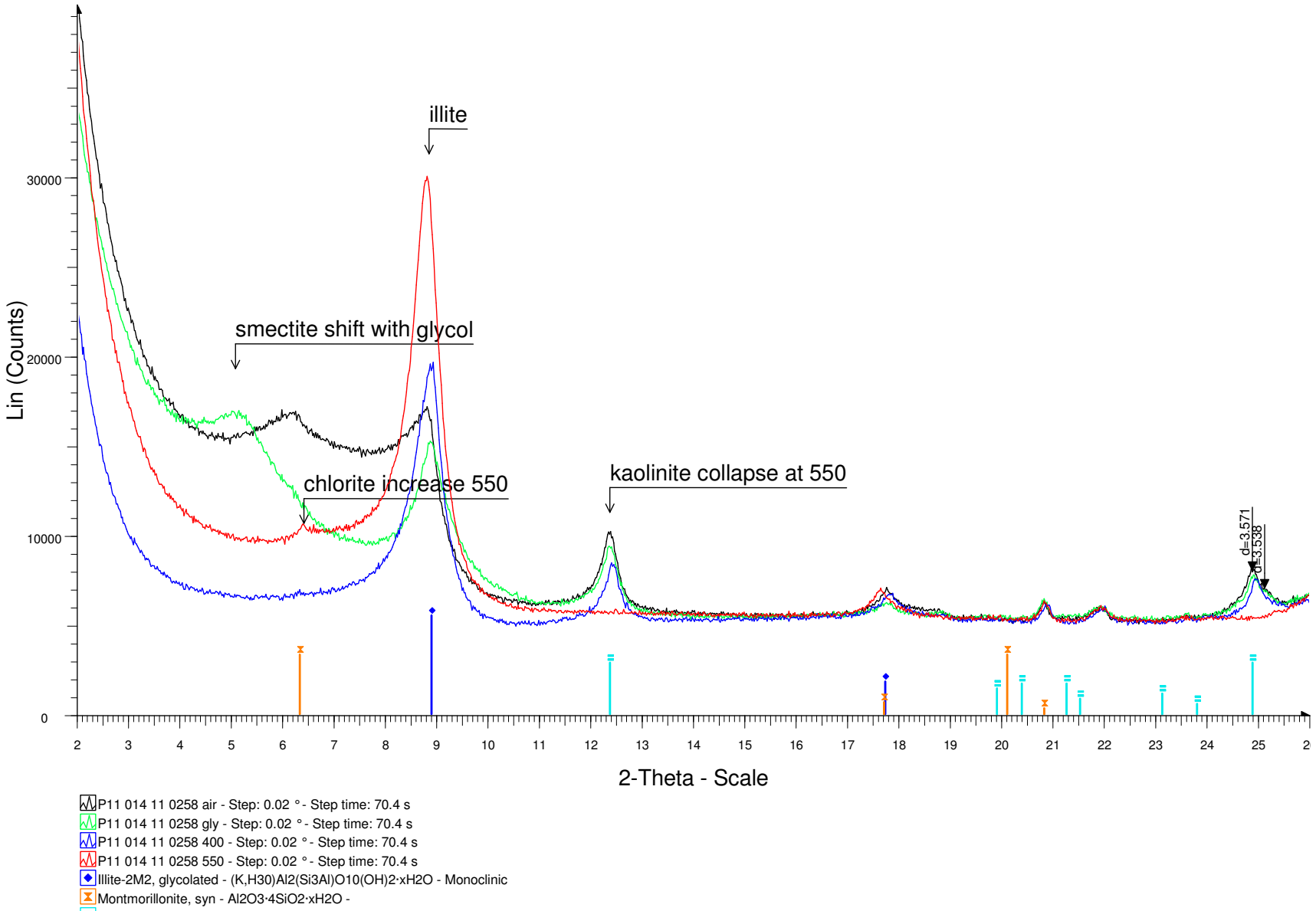
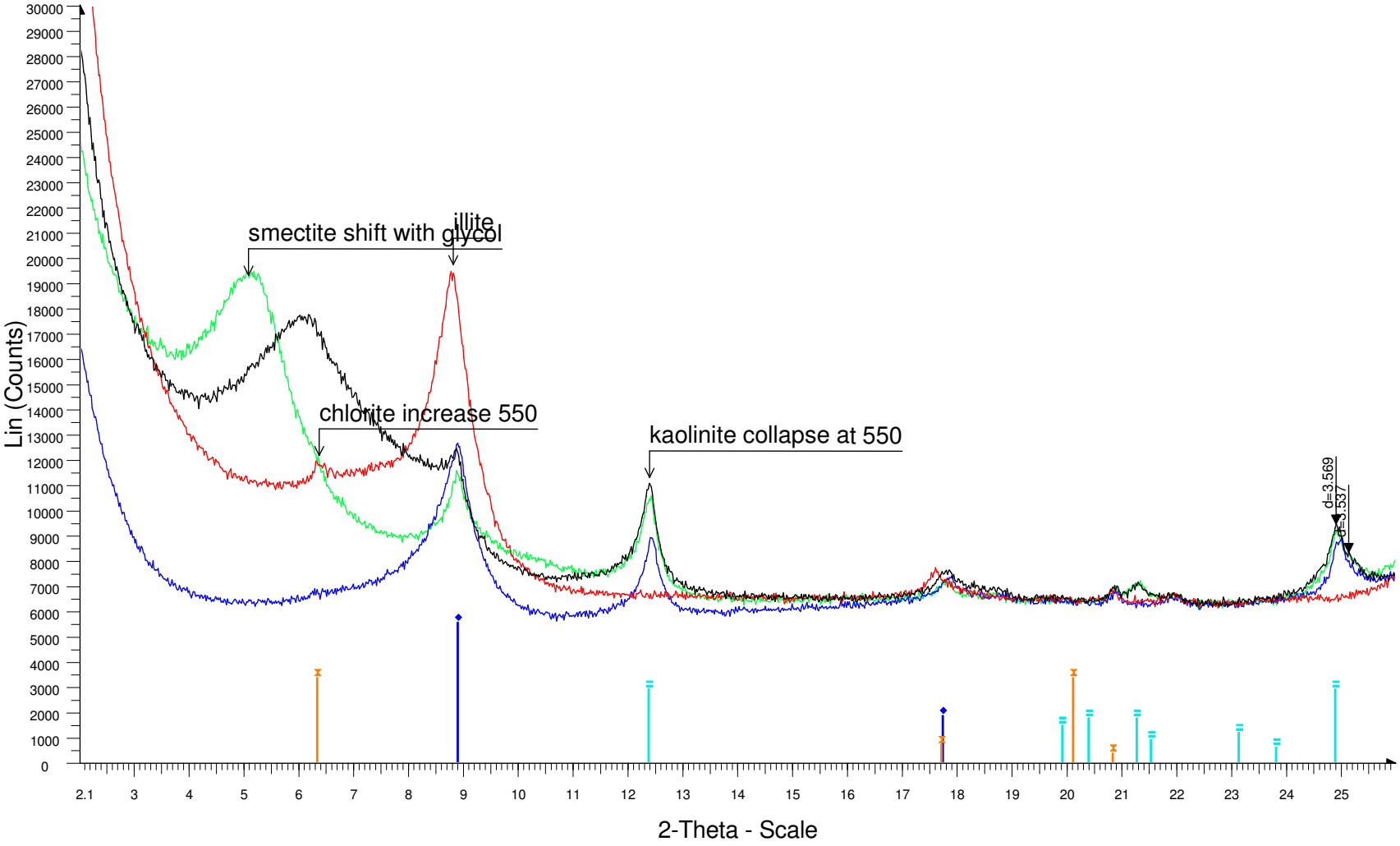


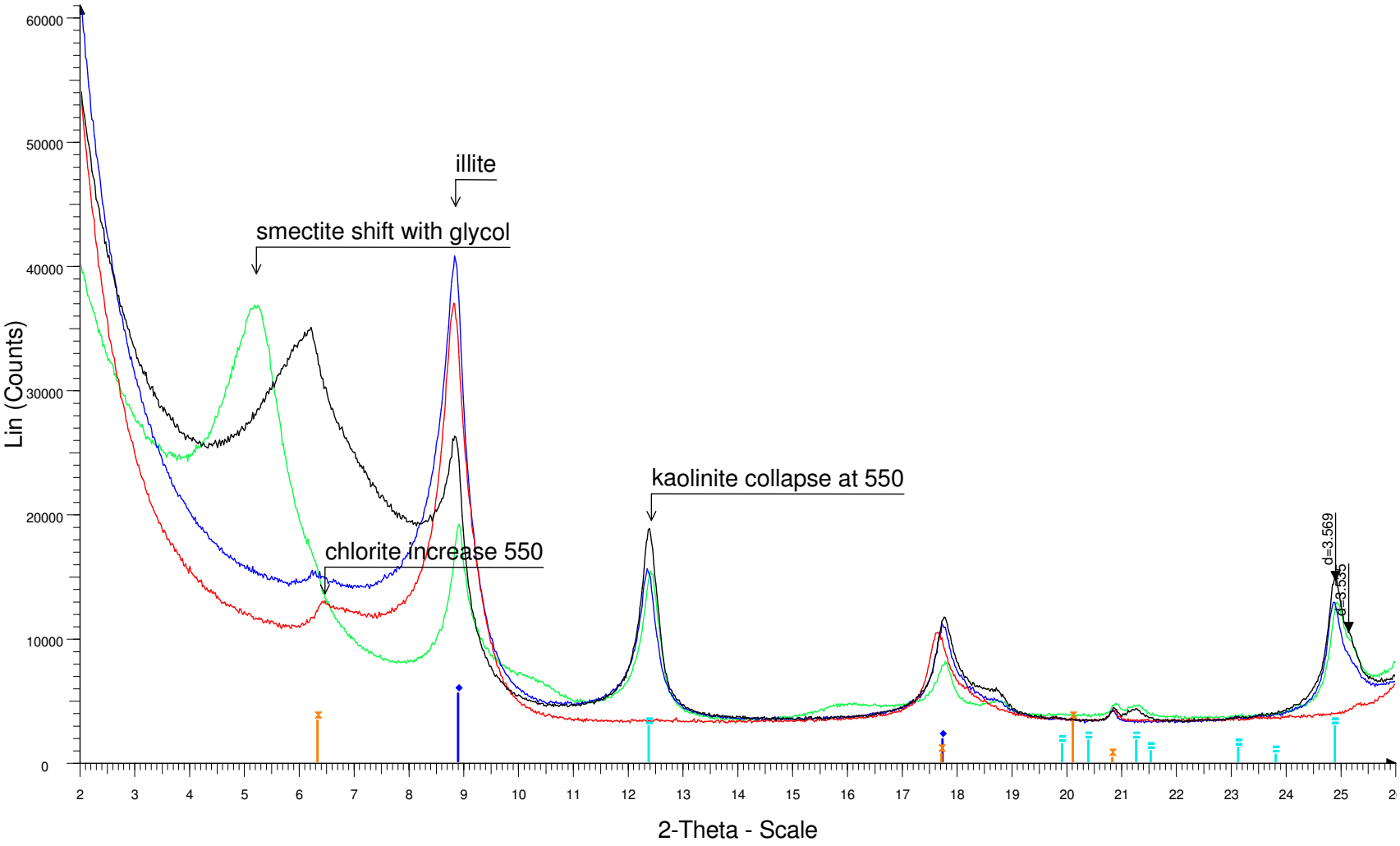
CBH2009-2UA U51 19.9-20.35



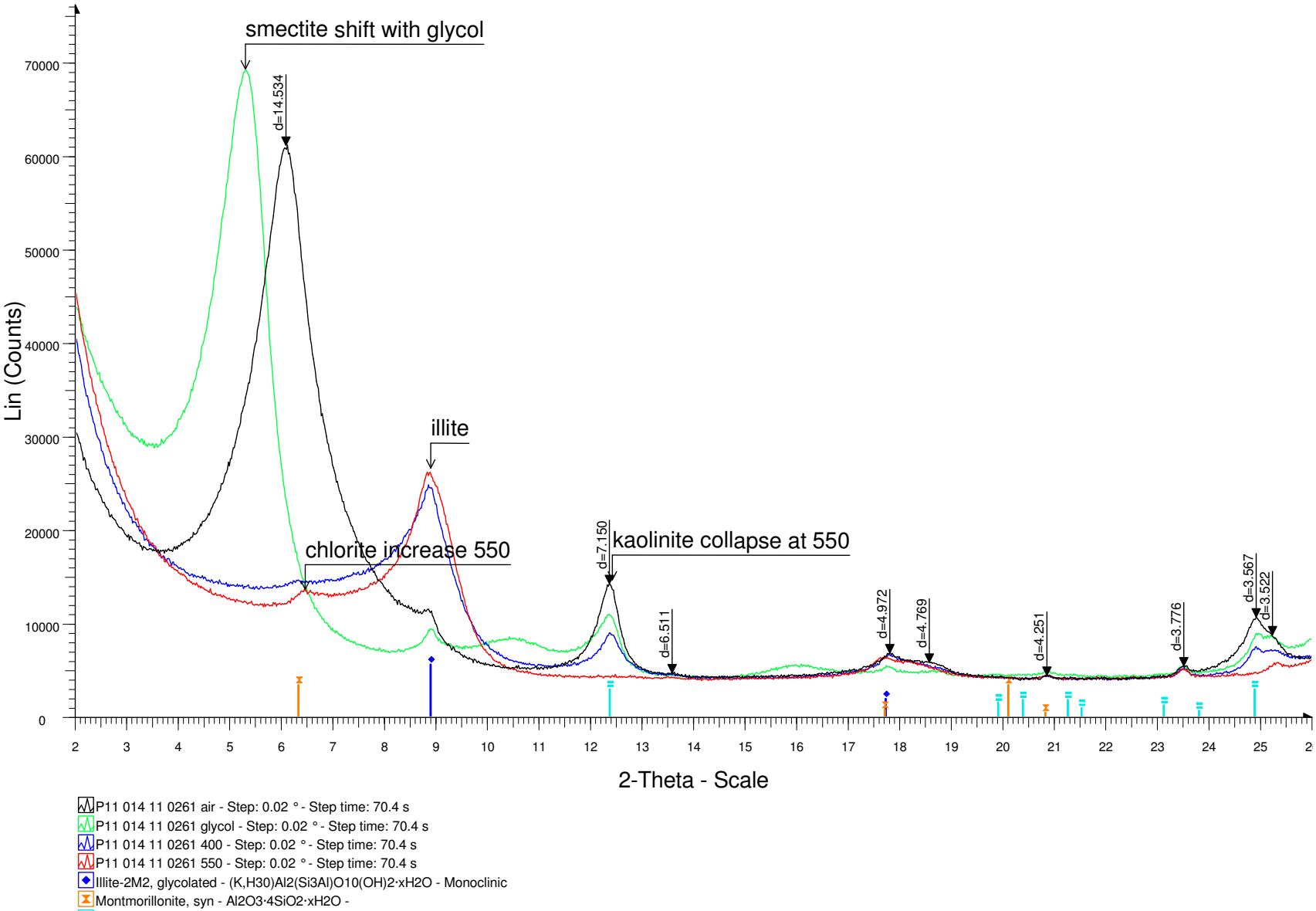
CBH2009-7U U99 34.1-34.55



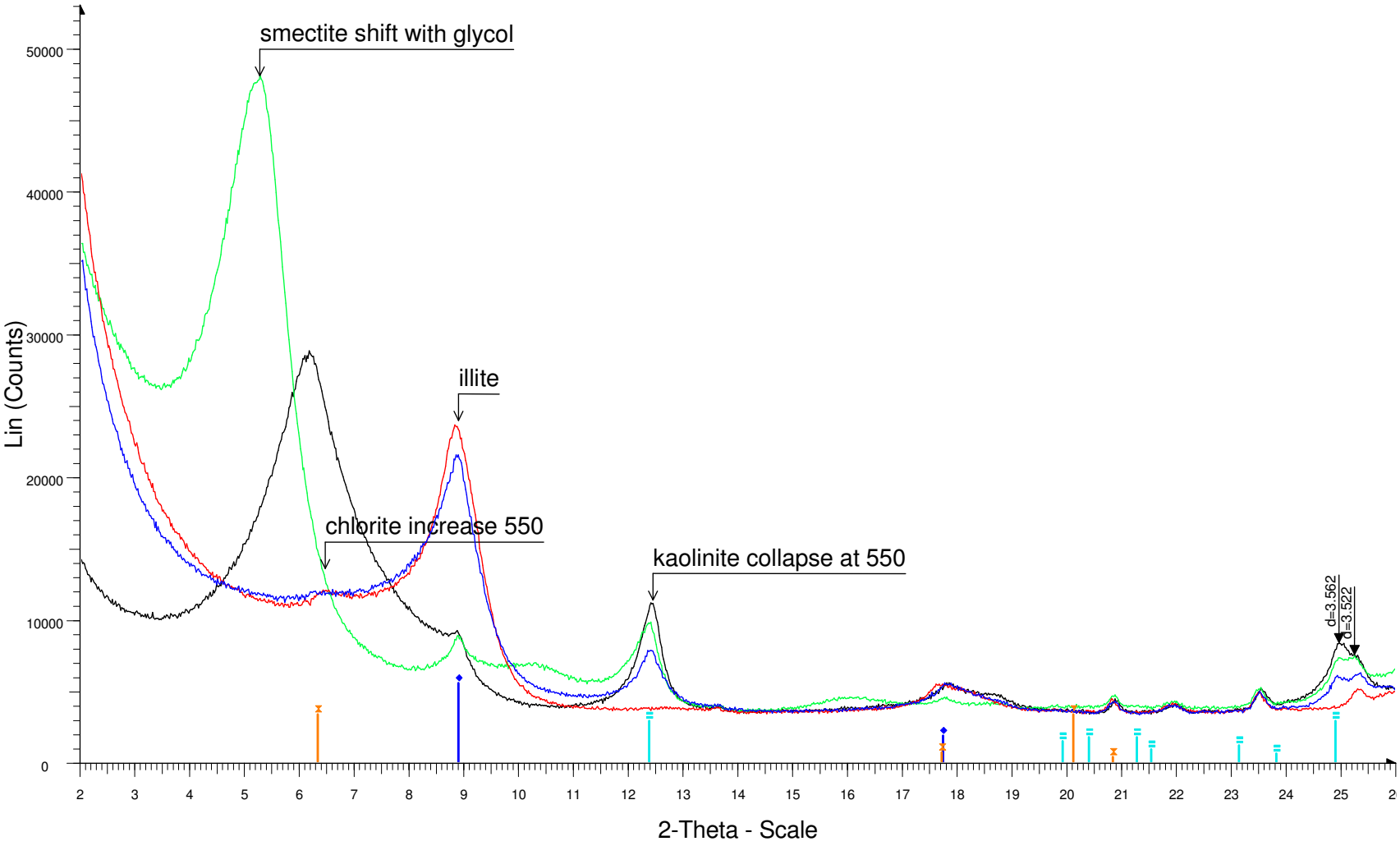
CBH2009-8U CS128 67.41-67.69



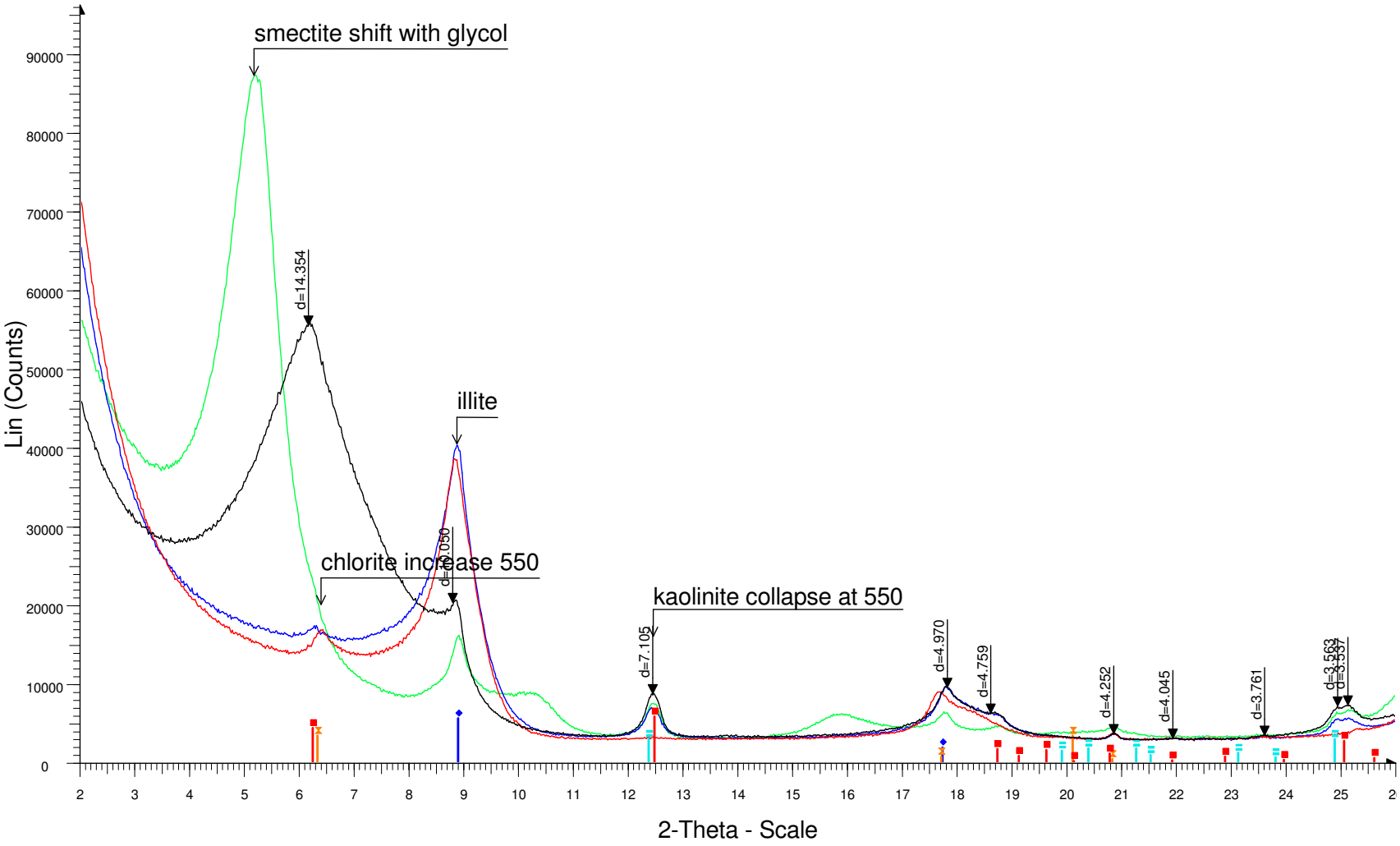
CBH2009-11U U128 56.10-56.50



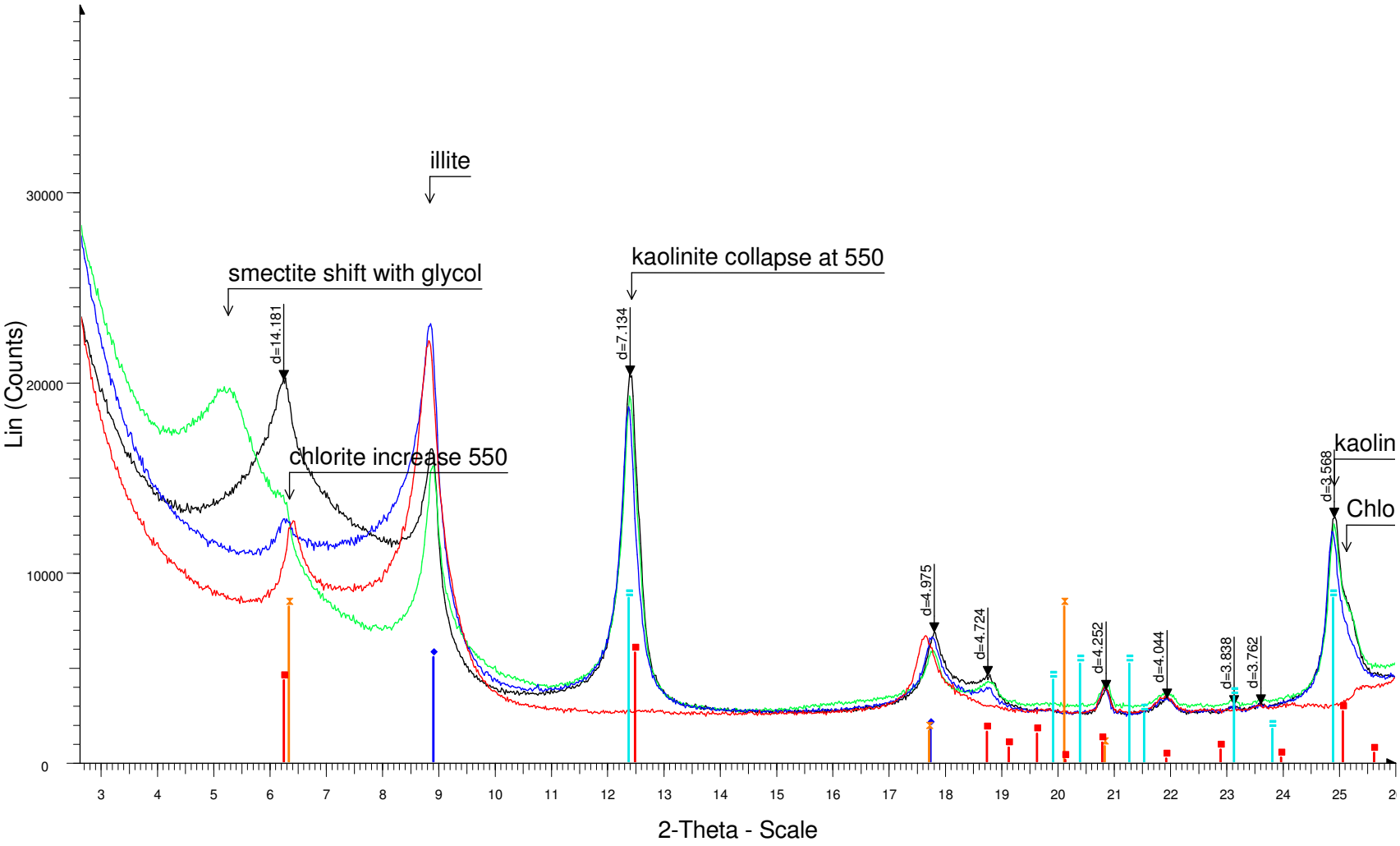
CBH2009-8U CS121 48.77-49.32



CBH2009-8U CS131 78.05-78.50



A0012-10 CBH2009-U8 U17



Clay Fraction proportions

	Sample Name	d (Obs. Max) Angstrom	Net Area Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0255 gly	17.005	49.03	smectite peak area	49.03	**75**	**% smectite**
illite 001	P11 014 11 0255 gly	9.936	3.602	4x illite peak area	14.408	**22**	**% illite**
kaolinite 001	P11 014 11 0255 gly	7.074	0.973	2x kaolinite peak area	1.946	**3**	**% kaolinite**
kaolinite 002	not measurable		0				
chlorite 004	not measurable		0				
				total	65.384		

	Sample Name	d (Obs. Max) Angstrom	Net Area Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0256 gly	17.017	240.9	smectite peak area	240.9	**82**	**% smectite**
illite 001	P11 014 11 0256 gly	9.935	10.6	4x illite peak area	42.4	**15**	**% illite**
kaolinite 001	P11 014 11 0256 gly	7.122	4.487	2x kaolinite peak area	8.974	3	(chlorite/kaolinite)
kaolinite 002	P11 014 11 0256 gly	3.567	1.643	0.78		**2**	**% kaolinte**
chlorite 004	P11 014 11 0256 gly	3.531	0.451	0.22		**1**	**% chlorite**
			2.094	total	292.274		

	Sample Name	d (Obs. Max) Angstrom	Net Area Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0257 gly	16.813	94.85	smectite peak area	94.85	**27**	**% smectite**
illite 001	P11 014 11 0257 gly	9.928	45.12	4x illite peak area	180.48	**51**	**% illite**
kaolinite 001	P11 014 11 0257 gly	7.131	40.91	2x kaolinite peak area	81.82	**23**	**% kaolinite**
				total	357.15		
kaolinite 002							
chlorite 004	not measurable						

	Sample Name	d (Obs. Max)	Net Area				
		Angstrom	Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0258 gly	16.763	98.3	smectite peak area	98.3	**20**	**% smectite**
illite 001	P11 014 11 0258 gly	9.948	87.92	4x illite peak area	351.68	**70**	**% illite**
kaolinite 001	P11 014 11 0258 gly	7.144	26.85	2x kaolinite peak area	53.7	11	(chlorite/kaolinite)
		d value	Intensity	total	503.68		
		Angstrom	Count				
kaolinite 002		3.567	1781	0.70		**8**	**% kaolinite**
chlorite 004		3.53	746	0.30		**3**	**% chlorite**
			2527				

	Sample Name	d (Obs. Max)	Net Area				
		Angstrom	Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0259 glycol	16.825	173.7	smectite peak area	173.7	**53**	**% smectite**
illite 001	P11 014 11 0259 glycol	9.948	24.34	4x illite peak area	97.36	**30**	**% illite**
kaolinite 001	P11 014 11 0259 glycol	7.138	27.19	2x kaolinite peak area	54.38	17	(chlorite/kaolinite)
		d value	Intensity	total	325.44		
		Angstrom	Count				
kaolinite 002		3.567	2375	0.70		**12**	**% kaolinite**
chlorite 004		3.53	998	0.30		**5**	**% chlorite**
			3373				

	Sample Name	d (Obs. Max)	Net Area				
		Angstrom	Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0260 glycol	16.984	410.3	smectite peak area	410.3	**45**	**% smectite**
illite 001	P11 014 11 0260 glycol	9.929	87.62	4x illite peak area	350.48	**39**	**% illite**
kaolinite 001	P11 014 11 0260 glycol	7.124	73.89	2x kaolinite peak area	147.78	16	(chlorite/kaolinite)
		d value	Intensity	total	908.56		
		Angstrom	Count				
kaolinite 002		3.567	7938	0.64		**10**	**% kaolinite**
chlorite 004		3.53	4458	0.36		**6**	**% chlorite**
			12396				

	Sample Name	d (Obs. Max)	Net Area				
		Angstrom	Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0261 glycol	16.721	962.1	smectite peak area	962.1	**87**	**% smectite**
illite 001	P11 014 11 0261 glycol	9.933	13.39	4x illite peak area	53.56	**5**	**% illite**
kaolinite 001	P11 014 11 0261 glycol	7.153	43.74	2x kaolinite peak area	87.48	8	(chlorite/kaolinite)
		d value	Intensity	total	1103.14		
		Angstrom	Count				
kaolinite 002		3.567	3326	0.57		**5**	**% kaolinite**
chlorite 004		3.53	2479	0.43		**3**	**% chlorite**
			5805				

	Sample Name	d (Obs. Max)	Net Area				
		Angstrom	Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0262 glycol	16.763	708.3	smectite peak area	708.3	**80**	**% smectite**
illite 001	P11 014 11 0262 glycol	9.945	21.95	4x illite peak area	87.8	**10**	**% illite**
kaolinite 001	P11 014 11 0262 glycol	7.129	45.78	2x kaolinite peak area	91.56	10	(chlorite/kaolinite)
		d value	Intensity	total	887.66		
		Angstrom	Count				
kaolinite 002		3.562	2510	0.53		**5**	**% kaolinite**
chlorite 004		3.529	2203	0.47		**5**	**% chlorite**
			4713				

.79

	Sample Name	d (Obs. Max)	Net Area				
		Angstrom	Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0263 glycol	17.066	1205.9	smectite peak area	1205.9	**79**	**% smectite**
illite 001	P11 014 11 0263 glycol	9.932	65.7	4x illite peak area	262.8	**17**	**% illite**
kaolinite 001	P11 014 11 0263 glycol	7.097	24.35	2x kaolinite peak area	48.7	3	(chlorite/kaolinite)
		d value	Intensity	total	1517.4		
		Angstrom	Count				
kaolinite 002		3.563	1789	0.50		**2**	**% kaolinite**
chlorite 004		3.533	1789	0.50		**2**	**% chlorite**

	3578

	Sample Name	d (Obs. Max)	Net Area				
		Angstrom	Cps x 2-Theta °			normalised	
smectite 001	P11 014 11 0264 glycol	16.519	152.6	smectite peak area	152.6	**23**	**% smectite**
illite 001	P11 014 11 0264 glycol	9.951	74.52	4x illite peak area	298.08	**45**	**% illite**
kaolinite 001	P11 014 11 0264 glycol	7.134	106.5	2x kaolinite peak area	213	32	(chlorite/kaolinite)
		d value	Intensity	total	663.68		
		Angstrom	Count				
kaolinite 002		3.563	8785	0.64		**20**	**% kaolinite**
chlorite 004		3.533	4970	0.36		**12**	**% chlorite**
			13755				

Mineral %

our number	sample number	quartz	calcite	aragonite	microcline	orthoclase	sanidine	albite	zircon	halite	fluorapatite	pyrite	gypsum	dolomite	smectite	illite	kaolinite	chlorite
P11 014 11 0255	CBM2009-2 CS29 93.35-93.65	<1	99								<1				<1	<1	<1	
P11 014 11 0256	CBM2009-2 CS34 110.50-110.90	<1	99								<1				<1	<1	<1	<1
P11 014 11 0257	CBH2009-5UB U5 2.70-3.15	86	6		6										<1	2	<1	
P11 014 11 0258	CBH2009-2UA U51 19.9-20.35	89	2	3	2	3			<1	<1					<1	<1	<1	
P11 014 11 0259	CBH2009-7U U99 34.1-34.55	71	11	15		2				<1					<1	<1	<1	<1
P11 014 11 0260	CBH2009-8U CS128 67.41-67.69	83	2	1	7	1									2	2	<1	<1
P11 014 11 0261	CBH2009-11U U128 56.10-56.50	16	<1		2	3	5	5							60	4	4	<1
P11 014 11 0262	CBH2009-8U CS121 48.77-49.32	8			10	2	3					<1	3		58	7	4	4
P11 014 11 0263	CBH2009-8U CS131 78.05-78.50	10				12	2	1				<1		3	57	12	1	1
P11 014 11 0264	A0012-10 CBH2009-U8 U17	20	10					3				2		1	15	29	12	7

CONSOLIDATED CYCLIC TRIAXIAL TEST (STRAIN CONTROLLED)

GENERAL

Consolidated cyclic triaxial tests with pore water pressure measurement are typically performed on specimens with a height to diameter ratio of approximately 2:1. Where possible, specimens are tested at full size. The test is undertaken to investigate the effect of cyclic loading on the shear behaviour of the soil. Cyclic loading may be applied under drained or undrained conditions. Tests are performed to an in-house method, based closely on the procedures given in ASTM D 3999-91 and ASTM D 5311-92.

The specimen set-up and testing procedures are essentially similar to the static triaxial test, except that the axial strain is applied cyclically, generally at a frequency of between 0.1 and 1.0 Hertz. Typically, the number of cycles to failure is determined for an applied cyclic strain amplitude.

The following is a brief outline of the procedures employed for strain controlled consolidated cyclic triaxial tests on undisturbed or re-compacted soil specimens.

Pre-test triaxial cell checks, including flushing of the drainage and pore pressure measurement systems, are undertaken in accordance with Fugro GeoConsulting Testing Procedure L-T-023.

TEST PROCEDURE

(i) **Specimen Preparation, Saturation and Consolidation –** For an anisotropically consolidated cyclic triaxial test the specimen is mounted, saturated and consolidated as for a standard consolidated triaxial test, according to the procedures given in Fugro GeoConsulting Test Method L-M-302 (for an undisturbed specimen) or L-M-302a (for a reconstituted specimen). For an isotropically consolidated cyclic triaxial test the same procedures are followed, except that no anisotropic consolidation stage is required.

Where measurement of axial and/or radial strain using local transducers is required, these are mounted on the test specimen according to the procedures described in Fugro GeoConsulting Test Method L-M-127.

(ii) **Cyclic Pre-Shearing Stage (drained) –** Where cyclic pre-shearing of a reconstituted specimen is required to model densification under small magnitude cyclic loading, this is applied to the specimen after completion of the consolidation stage. The drainage lines are left open and a small cyclic shear stress (τ_{cy}) is applied to the specimen for up to 200 loading cycles. Measurements of load, volume change and axial displacement are recorded automatically throughout pre-shearing via the logging system.

(iii) **Cyclic Loading Stage (undrained) –** On completion of the consolidation (or pre-shearing) stage, the drainage lines are closed and a combination of initial average shear stress (τ_{av}) and cyclic shear strain (γ_{cy}) is applied to the specimen.

Where required, a static axial stress (τ_{av}) is applied to the specimen prior to the application of cyclic strain. This average axial stress is applied undrained and left to equalise for a period of time

representative of the in-situ loading conditions (nominally 1 hour), as defined by Andersen et al. (1988).

A sinusoidal cyclic shear strain (γ_{cy}) of specified amplitude is then applied to the specimen. The cyclic loading is normally applied at a frequency of 0.1 Hz (a load period of 10 seconds) unless otherwise specified. Frequencies ranging from 0.01 to 2 Hz are available (load periods from 100 to 0.2 seconds).

Measurements of load, pore-water pressure and displacement are recorded automatically throughout the test via the logging system. Cyclic loading is typically ceased when one of several agreed failure criteria are reached.

(iv) **Undrained Shearing –** Following termination of the cyclic loading stage the specimen may be sheared statically to determine the post-cyclic undrained shear strength as indicated in Figure 1. The cyclic stage is stopped at the initial shear stress (τ_0) and the specimen is sheared at an appropriate strain rate, in the range 0.001 – 10 %/hour, such as to allow an equalised pore-water pressure response throughout the specimen.

Measurements of load, pore-water pressure, volume change (drained test) and displacement are recorded automatically throughout the test via the logging system. Manual checks are also made by technicians. The test is normally terminated when an axial strain of 20% has been reached.

(v) **End of Test –** On completion of the cyclic loading or shearing stage (where required) the confining pressure is reduced to atmospheric pressure and the cell fluid is drained. The specimen is removed from the cell and a sketch of the failure shape is made. The specimen is then photographed, split and described and weighed and dried so that the final moisture content and bulk and dry densities may be determined. Any unusual specimen conditions potentially affecting interpretation of the test data are carefully noted.

DEFINITIONS

The initial shear stress after consolidation (τ_o). is defined as:

$$\tau_0 = \frac{\sigma'_{ac} - \sigma'_{rc}}{2} \qquad (1)$$

where, σ'_{ac} and σ'_{rc} are the axial and radial effective consolidation stresses, respectively.

The average shear stress (τ_a) is the value about which the cyclic shear stress is applied and is defined as:

$$\tau_a = \tau_0 + \Delta\tau_a \qquad (2)$$

where, $\Delta\tau_a$ is the undrained static increase in shear stress applied to the specimen prior to the application of cyclic stress.

The cyclic shear stress (τ_{cy}) or cyclic shear strain (γ_{cy}) are defined as one half of the amplitude of the total change over one load cycle.

The maximum shear stress during cycling (τ_{max}) is defined as:

$$\tau_{\max} = \tau_a + \tau_{cv} \quad (3)$$

The minimum shear stress during cycling (τ_{min}) is defined as:

$$\tau_{\min} = \tau_a - \tau_{cv} \quad (4)$$

PRESENTATION OF RESULTS

The test data is processed using in-house developed software in general accordance with the specifications given in ASTM D 3999-91 and ASTM D 5311-92. The following results may be presented, depending on project requirements:

Consolidation Phase:
Graph of root time (mins$^{0.5}$) versus consolidated volume change (%)

Cyclic Shearing Phase:
Any of the following graphs are available for presentation:

Graph of number of loading cycles (N) versus deviator stress (kPa)
Graph of number of loading cycles (N) versus pore-water pressure ratio (%)
Graph of number of loading cycles (N) versus excess pore-water pressure (kPa)
Graph of number of loading cycles (N) versus axial or shear strain (%)
Graph of axial strain (%) versus deviator stress (kPa)
Graph of p' (kPa) versus q (kPa) or s' (kPa) versus t (kPa)
Graph of σ_r' (kPa) versus shear stress (kPa)
Graph of G (MPa) versus shear strain (%)
Graph of λ (%) versus shear strain (%)

Post-Cyclic Static Shearing Phase:
Graph of axial strain (%) versus deviator stress (kPa)
Graph of axial strain (%) versus excess pore-water pressure (kPa)
Graph of p' (kPa) versus q (kPa) or s' (kPa) versus t (kPa)

where:

σ_v'	=	effective axial stress
σ_r'	=	effective radial stress
q	=	deviator stress = (σ_v'-σ_r')
t	=	shear stress = 0.5(σ_v'-σ_r')

p'	=	effective mean normal stress (triaxial) = $^1/_3(\sigma_v'+2\sigma_r')$
s'	=	effective mean normal stress (plane-strain) = $0.5(\sigma_v'+\sigma_r')$
G	=	undrained shear modulus
λ	=	undrained damping ratio

ACCURACY OF MEASUREMENTS

Pore-water pressure	± 1 kPa
Displacement	± 0.01 mm
Load	± 1.0 N
Volume change	± 0.05 ml
Weight	± 0.01 g
Dimensions	± 0.01 mm
Time	± 0.5 s

REFERENCES

ANDERSEN, K.H., KLEVEN, A. and HEIEN, D., 1988. Cyclic soil data for design of gravity structures. *American Society of Civil Engineers, Proceedings,* **114** (5), May 1988, pp. 517-539.

ASTM D 3999-91, 2003. *Standard Test Method for the Determination of the Modulus and Damping Properties of Soils Using the Cyclic Triaxial Apparatus*. American Society for the Testing of Materials.

ASTM D 5311-92, 2004. *Standard Test Method for Load Controlled Cyclic Triaxial Strength of Soil.* American Society for the Testing of Materials.

Cyclic Triaxial Method Statement

Soil Mechanics

Consolidated Undrained Triaxial Compression Test with Cyclic loading

Tests were carried out on six samples of rotary core from borehole CBH2009_8U, three from the London Clay between 56 m and 60 m and three from the Lower London Tertiaries Clay between 83 m and 84 m. The tests were performed by Fugro GeoConsulting Ltd in accordance with their Method Statement reference L-M-306a using parameters specified by Ceidre. The selected samples were re-cored to produce test specimens 70 mm diameter and 140 mm long in order to optimise the amount of intact material available.

It should be noted that the parameters defined for cyclic strain and the resultant stresses are at the limits of measurement uncertainty for the equipment. Despite modifications to alleviate this, a number of difficulties were encountered mostly relating to the post cyclic phase. These are described below and the reports have been annotated accordingly.

In order to measure very small strains it is necessary to attach the internal precision transducers using pins through the rubber membrane which are then sealed with a rubber compound. These seals are difficult to maintain as the callipers move at higher post cyclic strains especially at relatively high cell pressure. Leakage of water from the triaxial cell into the sample was observed in the two tests at 83.38 m and 83.90 m resulting in early termination of the post cyclic phase.

In an attempt to improve the resolution of stress measurement and control of the cyclic excitation, the standard 10kN load cell was replaced with a 1kN load cell for the test on the specimen from 83.71 m. Unfortunately the subsequent deviator stress exceeded the capacity of the load cell and failure could not be achieved in the post cyclic phase.

During the cyclic phase of the test on the specimen from 56.32 m the suction top cap (essential for negative stress/strain cycles) apparently lost adhesion with the sample, resulting in a significant bedding error which invalidated the data retrieved for the cyclic part of the test. Unfortunately this was not visible during testing and could only be diagnosed after completion of the test.

By assuming the material to be elastic and isotropic (as indicated by Ceidre) the Young's Modulus, E, values derived from the cyclic phase of the tests have been converted to Shear Modulus, G, using the relationship $G = E / 2(1+\nu)$ in which Poisson's Ratio, ν, is assumed to be 0.3. These moduli are presented in Figure 24 of the interpretative report together with those obtained from the Resonant Column and In situ test.

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

VISUAL DESCRIPTION
Very hard dark brown very sandy CLAY with fine to coarse gravel.

GENERAL	
Date test started	07/04/2011
Type of sample	Undisturbed
Specimen orientation	Vertical
Type of drains fitted	Radial & one end

INITIAL		
Diameter	(mm)	70.1
Length	(mm)	142.2
Moisture content	(%)	43.4
Bulk density	(Mg/m³)	1.79
Dry density	(Mg/m³)	1.25
Voids ratio		1.169
Degree of saturation	(%)	100

SATURATION		
Pressure increments applied	(kPa)	100
Differential pressure used	(kPa)	N/A
Pore pressure on completion	(kPa)	869
Cell pressure on completion	(kPa)	1062
B value achieved		1.00
Initial effective stress	(kPa)	193

TESTING PROCEDURES USED	
Specimen Set-up	As per test specification FUGRO in-house testing procedure
Saturation	As per test specification FUGRO in-house testing procedure
Consolidation - Isotropic Consolidation - Anisotropic	As per test specification FUGRO in-house testing procedure
Shearing	As per test specification FUGRO in-house testing procedure
Note: FUGRO in-house testing procedures are available on request	

LOCAL GAUGES USED	
	Local Axial LVDT (x2)

Borehole	CBH2009-8U
Sample	C5135
Depth (m)	56.15

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

CONSOLIDATION : ISOTROPIC		
Cell pressure	(kPa)	1062
Back pressure	(kPa)	500
Effective radial pressure	(kPa)	562
Pore pressure on completion	(kPa)	508
Pore pressure dissipation	(%)	98
Moisture content	(%)	41.9
Bulk density	(Mg/m³)	1.80
Dry density	(Mg/m³)	1.27
Voids ratio		1.129
Degree of saturation	(%)	100
Volumetric strain (from water flow)	(%)	1.84
Local volumetric strain	(%)	0.77
Cvi	(m²/year)	-
Mvi	(m²/MN)	-
Permeability	(m/s)	-

CYCLIC SUMMARY			
Frequency	(Hz)	0.1	
No. applied cycles	(-)	13	
At Cycle 10		EXTERNAL	LOCAL
Strain	(%)	0.0198	0.0099
Young's Modulus, E	(MPa)	217	405
Damping ratio, D	(%)	0.7	12.0

Borehole	CBH2009-8U
Sample	C5135
Depth (m)	56.15

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

SHEARING		
Initial pore pressure	(kPa)	509
Initial effective stress p_0'	(kPa)	53
Rate of strain	(%/hour)	0.20
Initial deviator stress	(kPa)	0
At peak deviator stress		
Deviator stress	(kPa)	794
Undrained shear strength	(kPa)	397
Membrane correction applied	(kPa)	0
Drain correction applied	(kPa)	0
External axial strain	(%)	1.33
Local axial strain	(%)	0.92
Excess pore pressure (mid-height)	(kPa)	340
Horizontal effective stress	(kPa)	-287
Vertical effective stress	(kPa)	507
Principal effective stress ratio		-1.8

LOCAL STRAIN PARAMETERS		
At 0.01% local axial strain		
Deviator stress		38
External axial strain		0.02
Excess pore pressure (mid-height)		10
Principal effective stress ratio		1.9
Local Secant modulus $E_{u(local)}$	(MPa)	349.8
normalised w.r.t p_0'		6564.1
normalised w.r.t c_u		880.9
At 0.1% local axial strain		
Deviator stress		192
External axial strain		0.13
Excess pore pressure (mid-height)		83
Principal effective stress ratio		-5.5
Local Secant modulus $E_{u(local)}$	(MPa)	194.5
normalised w.r.t p_0'		3650.1
normalised w.r.t c_u		489.9
Degree of non-linearity during shear L		0.56

FINAL CONDITIONS		
Moisture content	(%)	41.9
Bulk density	(Mg/m^3)	1.80
Dry density	(Mg/m^3)	1.27

Borehole	CBH2009-8U
Sample	C5135
Depth (m)	56.15

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

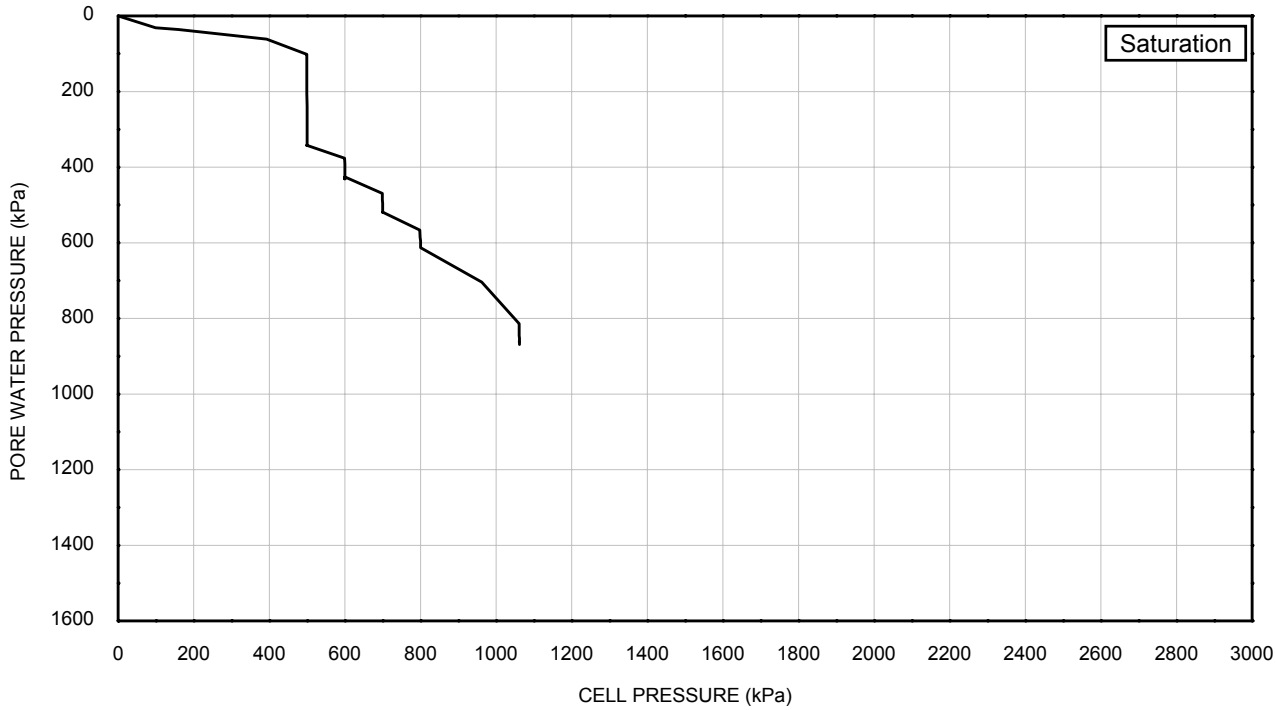
Approved by:

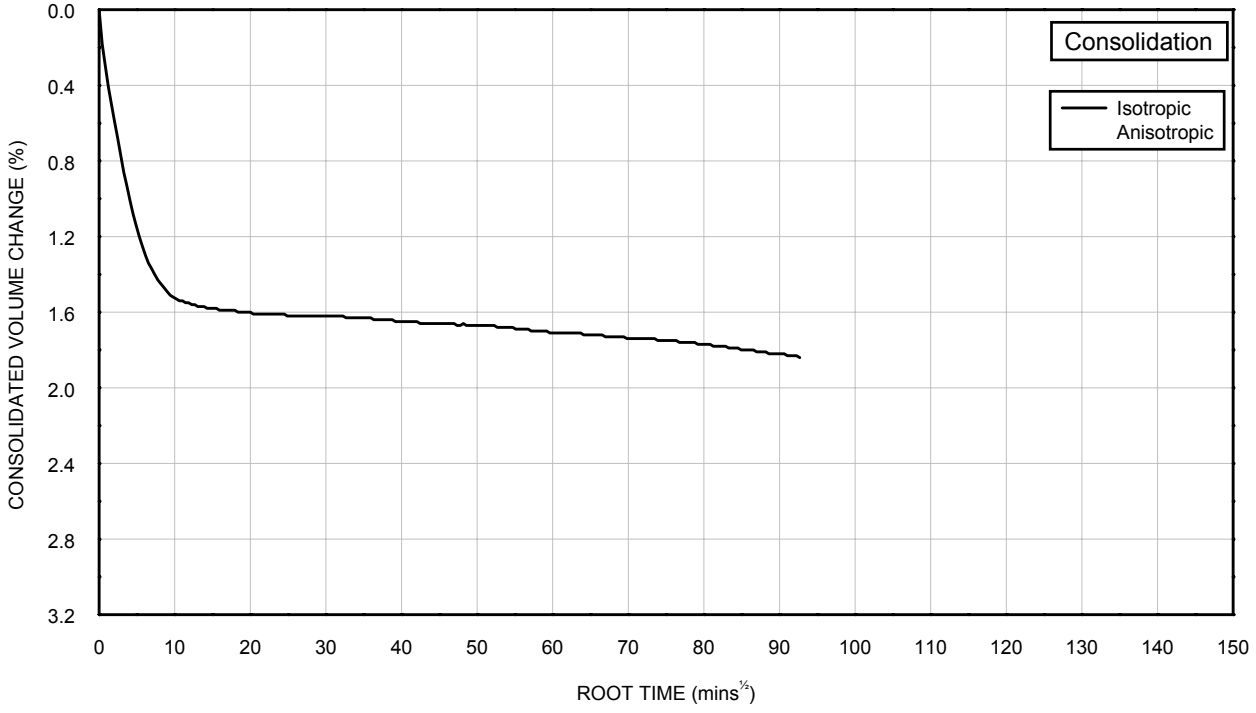
VISUAL DESCRIPTION
Very hard dark brown very sandy CLAY with fine to coarse gravel.

SPECIMEN PHOTOGRAPHS

Borehole	CBH2009-8U
Sample	C5135
Depth (m)	56.15

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

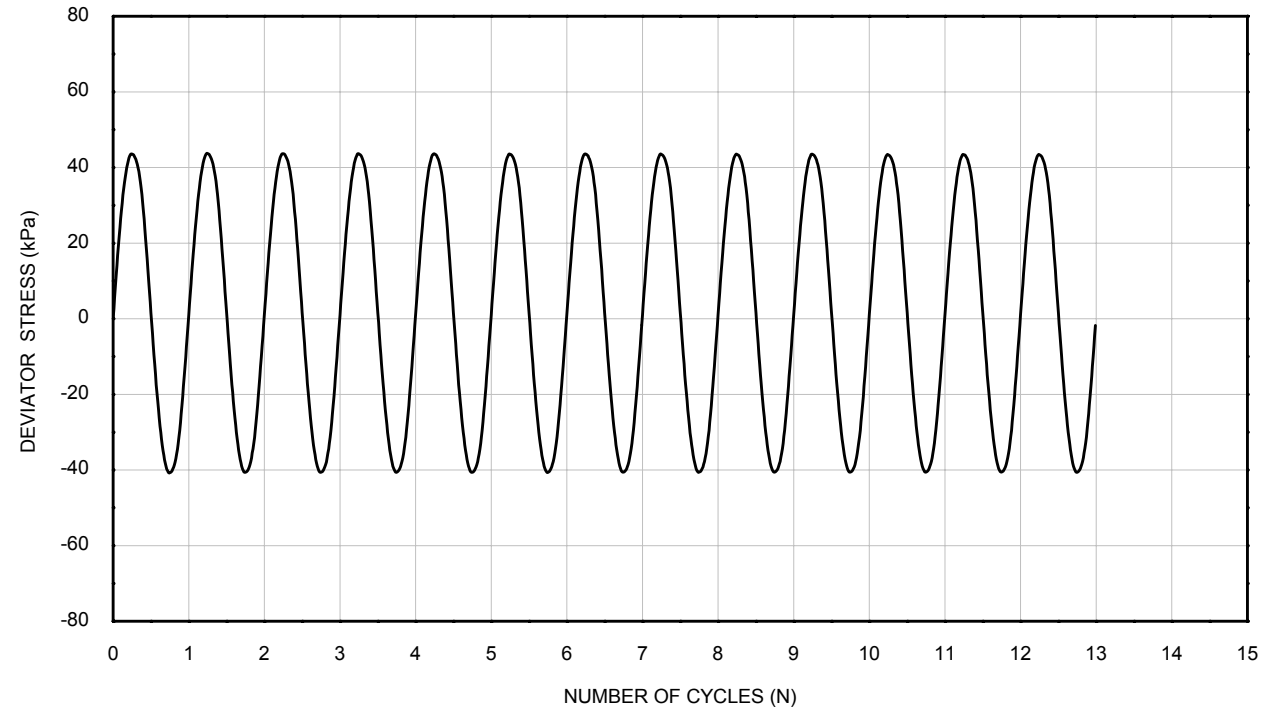


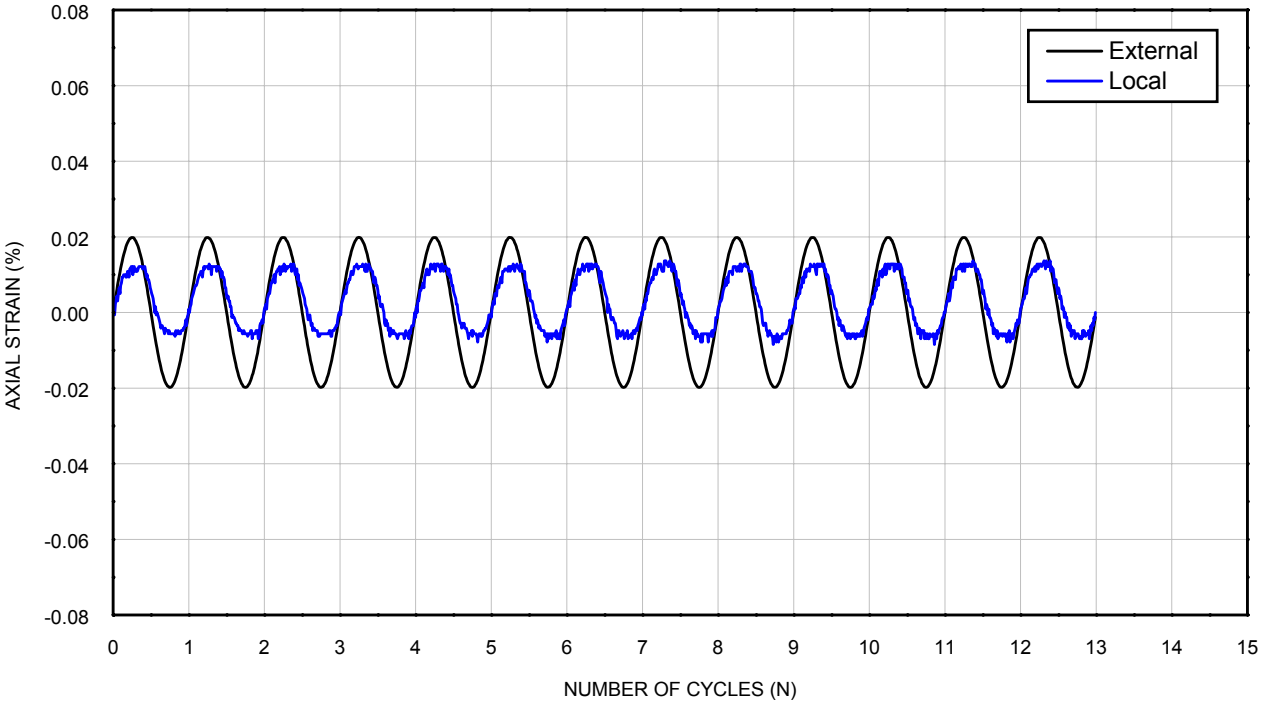


σ_{rc}'	:	562	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	562	kPa	Sample	: C5135
Nominal τ_{av}	:	--	kPa	Depth (m)	: 56.15
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

Checked by: Date:
Approved by: Date:

CYCLIC TRIAXIAL TEST
SATURATION AND CONSOLIDATION

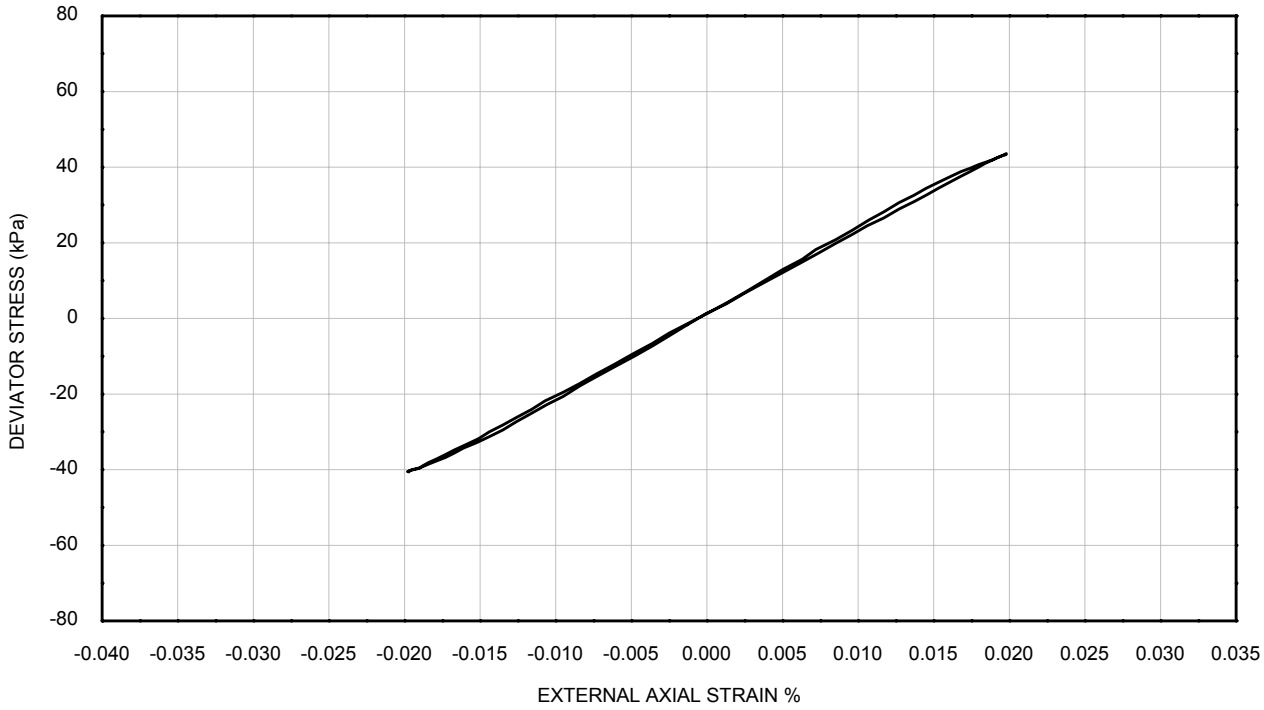


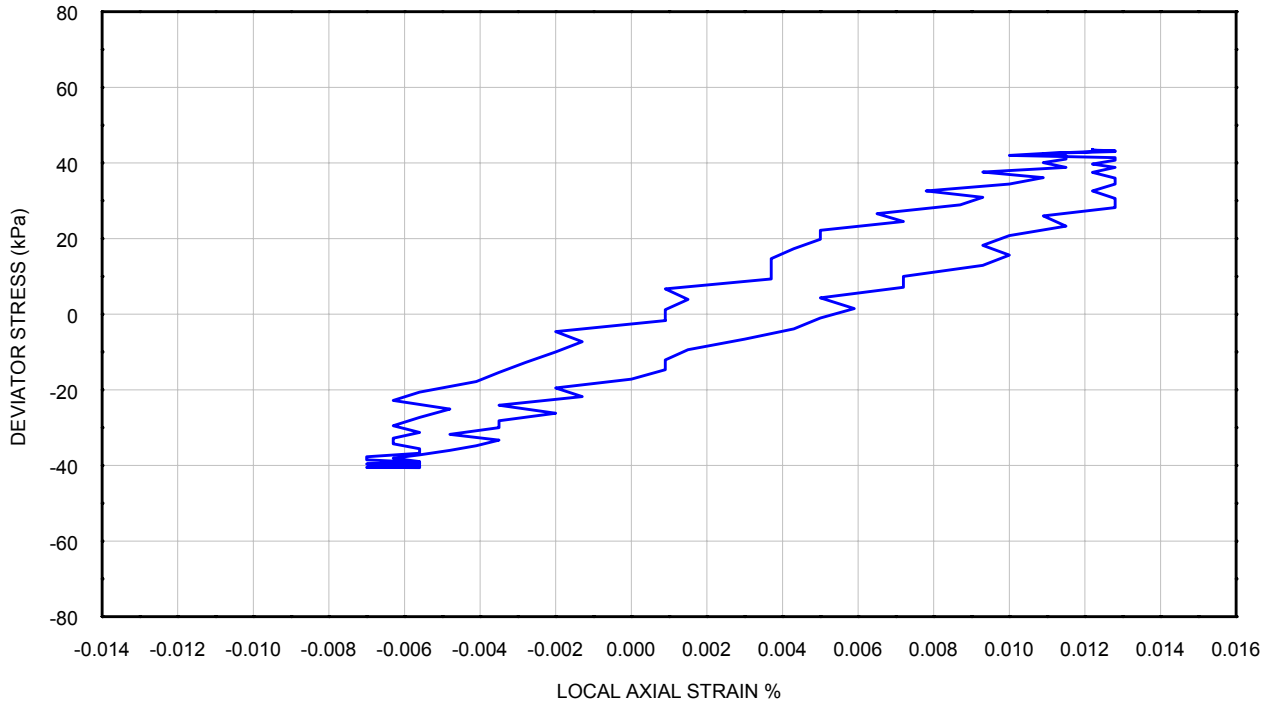


σ_{rc}'	:	562	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	562	kPa	Sample	: C5135
Nominal τ_{av}	:	--	kPa	Depth (m)	: 56.15
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

Checked by: Date:
Approved by: Date:

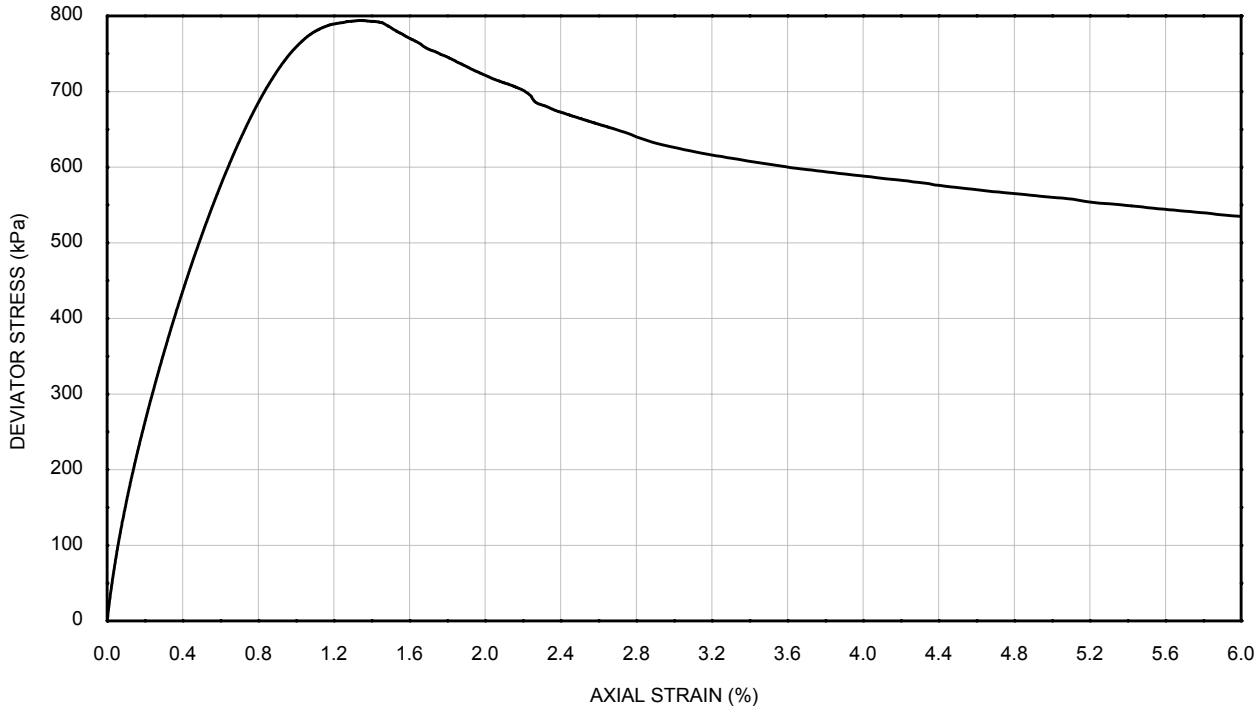
CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE

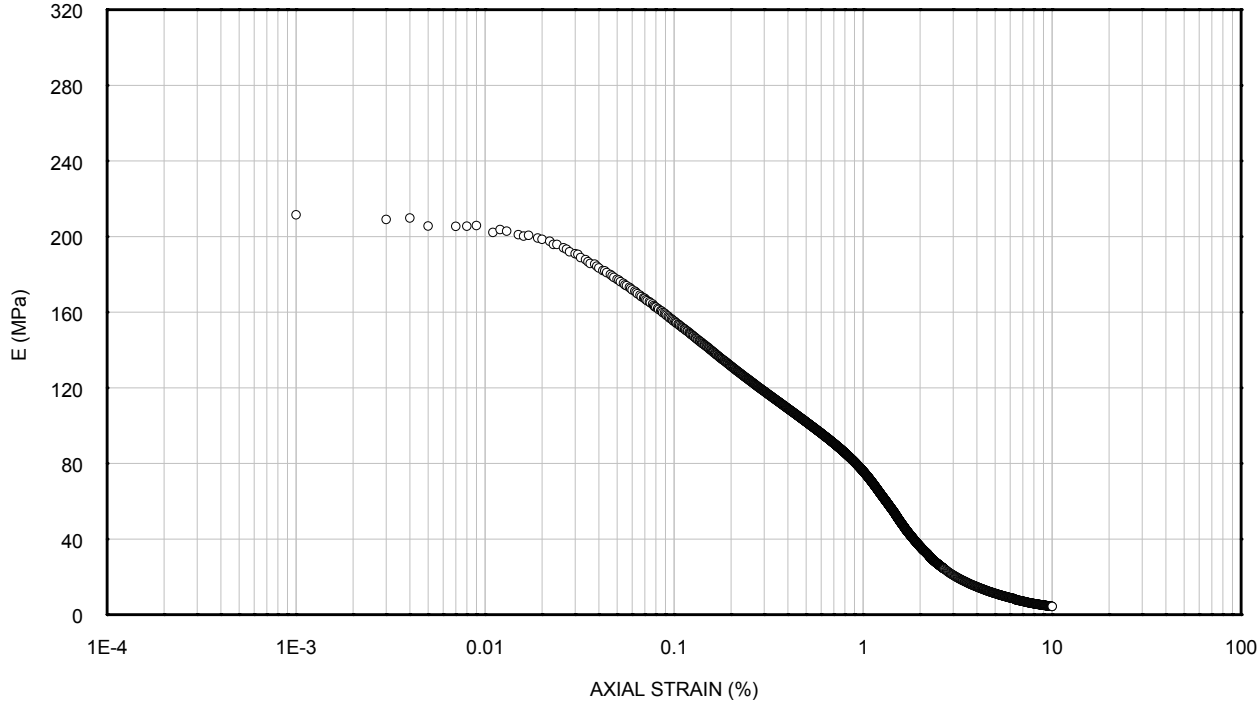




σ_{rc}'	:	562	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	562	kPa	Sample	: C5135
Nominal τ_{av}	:	--	kPa	Depth (m)	: 56.15
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE





σ_{rc}'	:	562	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	562	kPa	Sample	: C5135
Nominal τ_{av}	:	--	kPa	Depth (m)	: 56.15
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

CYCLIC TRIAXIAL TEST
POST CYCLIC STATIC LOADING STAGE

Date: 00/01/1900
Drawn by: 0
Template Issue: WAL_ADV_CAU_i1
Date:
Checked by:
Date:
Approved by:

VISUAL DESCRIPTION
Hard dark brownish grey fissured CLAY (Fissures are vertical and angular)

GENERAL	
Date test started	11/04/2011
Type of sample	Undisturbed
Specimen orientation	Vertical
Type of drains fitted	Radial & one end

INITIAL		
Diameter	(mm)	70.3
Length	(mm)	142.1
Moisture content	(%)	28.5
Bulk density	(Mg/m³)	1.93
Dry density	(Mg/m³)	1.50
Voids ratio		0.798
Degree of saturation	(%)	96

SATURATION		
Pressure increments applied	(kPa)	100
Differential pressure used	(kPa)	N/A
Pore pressure on completion	(kPa)	1437
Cell pressure on completion	(kPa)	1637
B value achieved		1.00
Initial effective stress	(kPa)	200

TESTING PROCEDURES USED	
Specimen Set-up	As per test specification FUGRO in-house testing procedure
Saturation	As per test specification FUGRO in-house testing procedure
Consolidation - Isotropic Consolidation - Anisotropic	As per test specification FUGRO in-house testing procedure
Shearing	As per test specification FUGRO in-house testing procedure
Note: FUGRO in-house testing procedures are available on request	

LOCAL GAUGES USED	
	Local Axial LVDT (x2)

Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.71

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

CONSOLIDATION : ISOTROPIC		
Cell pressure	(kPa)	1637
Back pressure	(kPa)	800
Effective radial pressure	(kPa)	837
Pore pressure on completion	(kPa)	803
Pore pressure dissipation	(%)	100
Moisture content	(%)	26.1
Bulk density	(Mg/m³)	1.96
Dry density	(Mg/m³)	1.56
Voids ratio		0.734
Degree of saturation	(%)	96
Volumetric strain (from water flow)	(%)	3.60
Local volumetric strain	(%)	0.92
Cvi	(m²/year)	-
Mvi	(m²/MN)	-
Permeability	(m/s)	-

CYCLIC SUMMARY			
Frequency	(Hz)	0.1	
No. applied cycles	(-)	13	
At Cycle 10		EXTERNAL	LOCAL
Strain	(%)	0.0095	0.0052
Young's Modulus, E	(MPa)	329	608
Damping ratio, D	(%)	1.0	2.7

Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.71

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

SHEARING*		
Initial pore pressure	(kPa)	806
Initial effective stress p_0'	(kPa)	31
Rate of strain	(%/hour)	0.20
Initial deviator stress	(kPa)	0
At peak deviator stress		
Deviator stress	(kPa)	390
Undrained shear strength	(kPa)	195
Membrane correction applied	(kPa)	0.0
Drain correction applied	(kPa)	0
External axial strain	(%)	0.18
Local axial strain	(%)	0.12
Excess pore pressure (mid-height)	(kPa)	176
Horizontal effective stress	(kPa)	-146
Vertical effective stress	(kPa)	245
Principal effective stress ratio		-1.7

LOCAL STRAIN PARAMETERS		
At 0.01% local axial strain		
Deviator stress		93
External axial strain		0.03
Excess pore pressure (mid-height)		28
Principal effective stress ratio		39.9
Local Secant modulus $E_{u(local)}$	(MPa)	912.1
normalised w.r.t p_0'		29856.6
normalised w.r.t c_u		4673.6
At 0.1% local axial strain		
Deviator stress		351
External axial strain		0.16
Excess pore pressure (mid-height)		155
Principal effective stress ratio		-1.8
Local Secant modulus $E_{u(local)}$	(MPa)	352.2
normalised w.r.t p_0'		11529.5
normalised w.r.t c_u		1804.8
Degree of non-linearity during shear L		0.39

* Maximum capacity of the load cell was reached. Shear stage terminated.

FINAL CONDITIONS		
Moisture content	(%)	26.1
Bulk density	(Mg/m^3)	1.96
Dry density	(Mg/m^3)	1.56

Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.71

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Checked by: Date:

Approved by: Date:

VISUAL DESCRIPTION
Hard dark brownish grey fissured CLAY (Fissures are vertical and angular)

SPECIMEN PHOTOGRAPHS
Post test photograph was not possible.

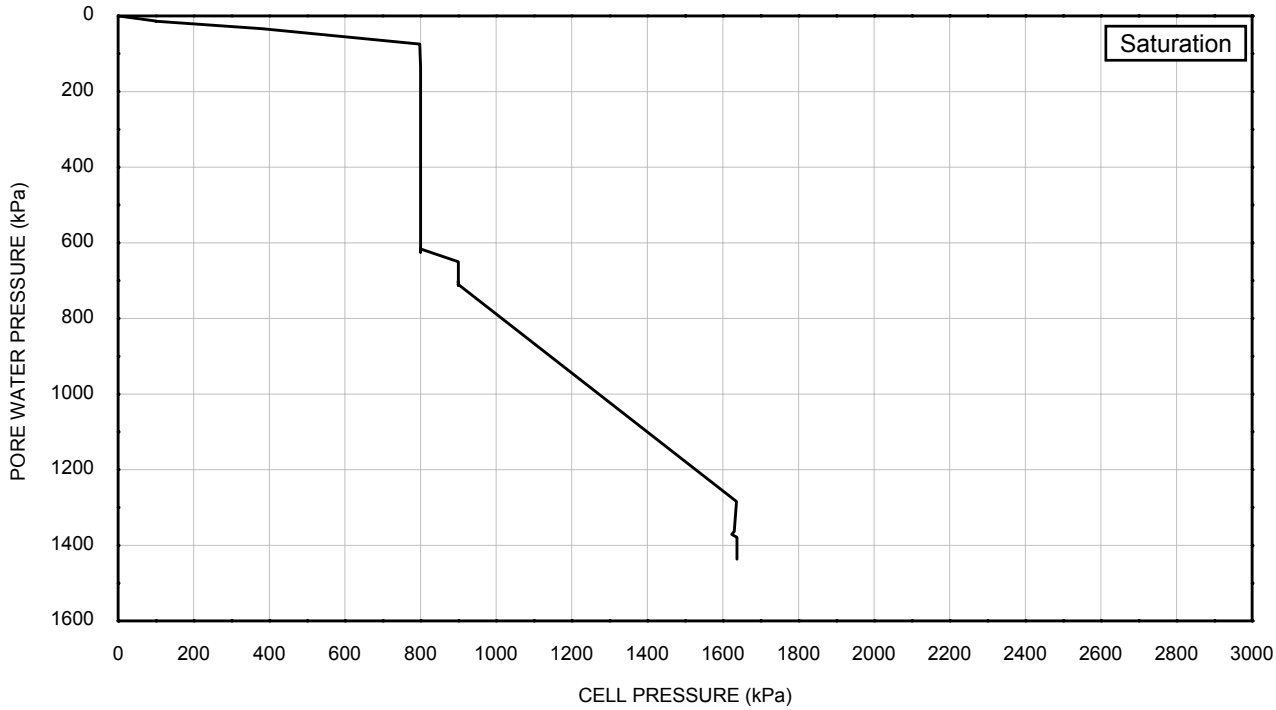
Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.71

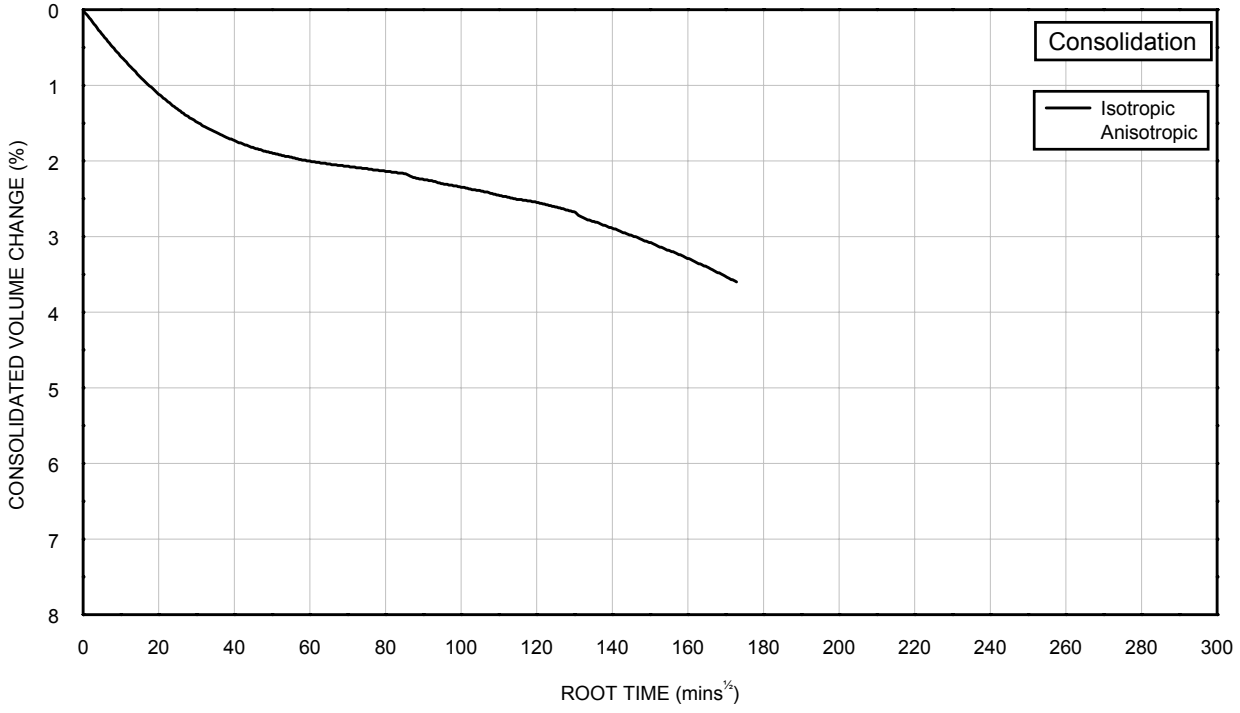
ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Drawn by: 0 Date: 00/01/1900

Template Issue: 3

File Name : J21016 / CTX2_CBH2009-8U_C5140.OPJ



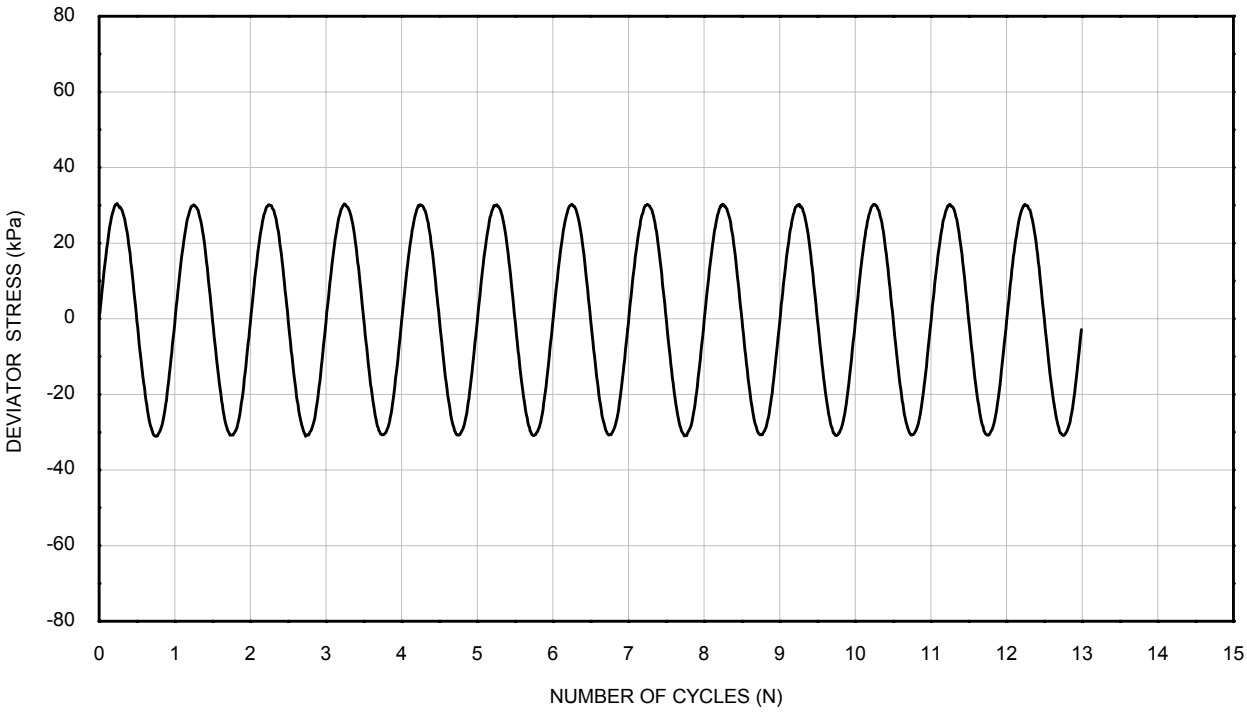


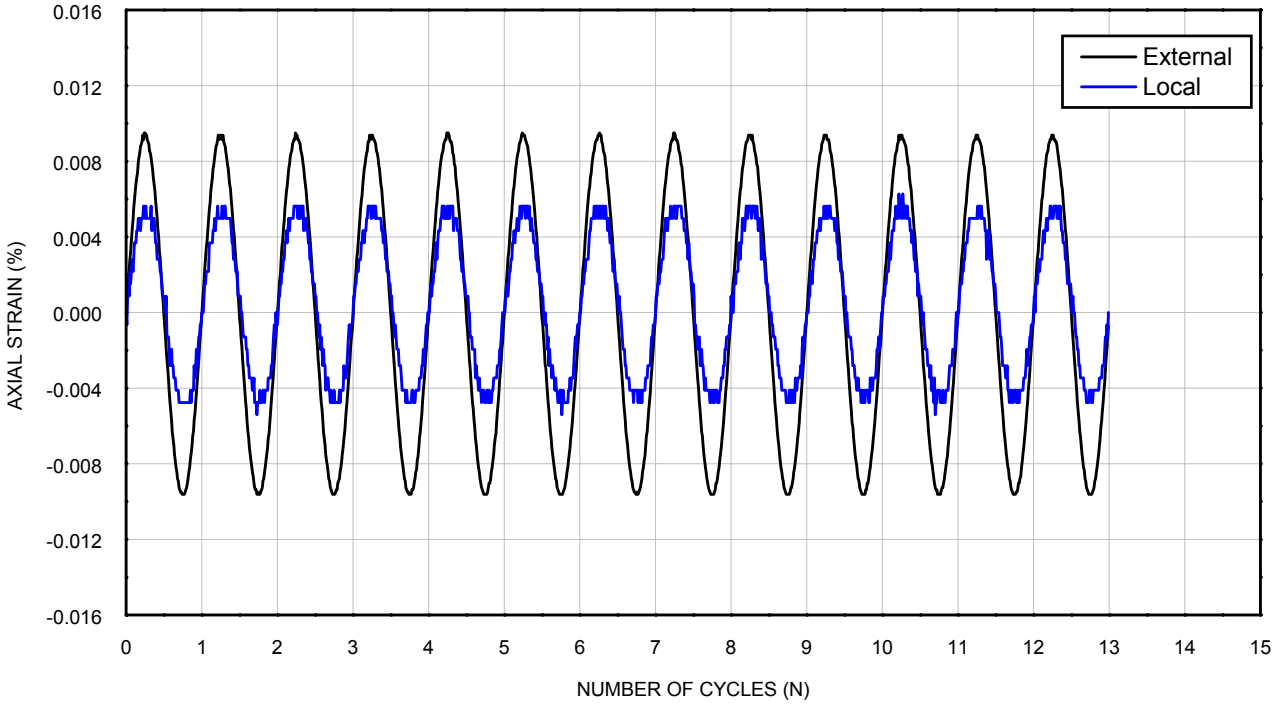
σ_{rc}'	:	837	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	837	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.71
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

Checked by: Date:

Approved by: Date:

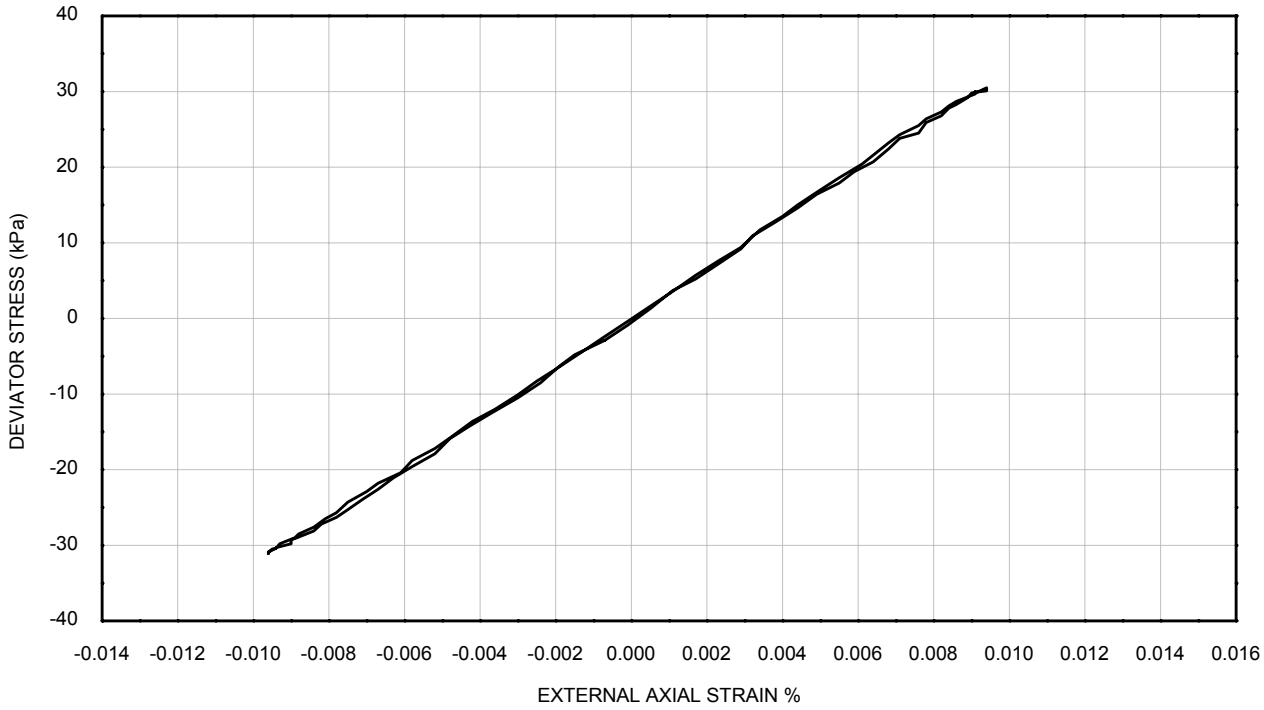
CYCLIC TRIAXIAL TEST
SATURATION AND CONSOLIDATION

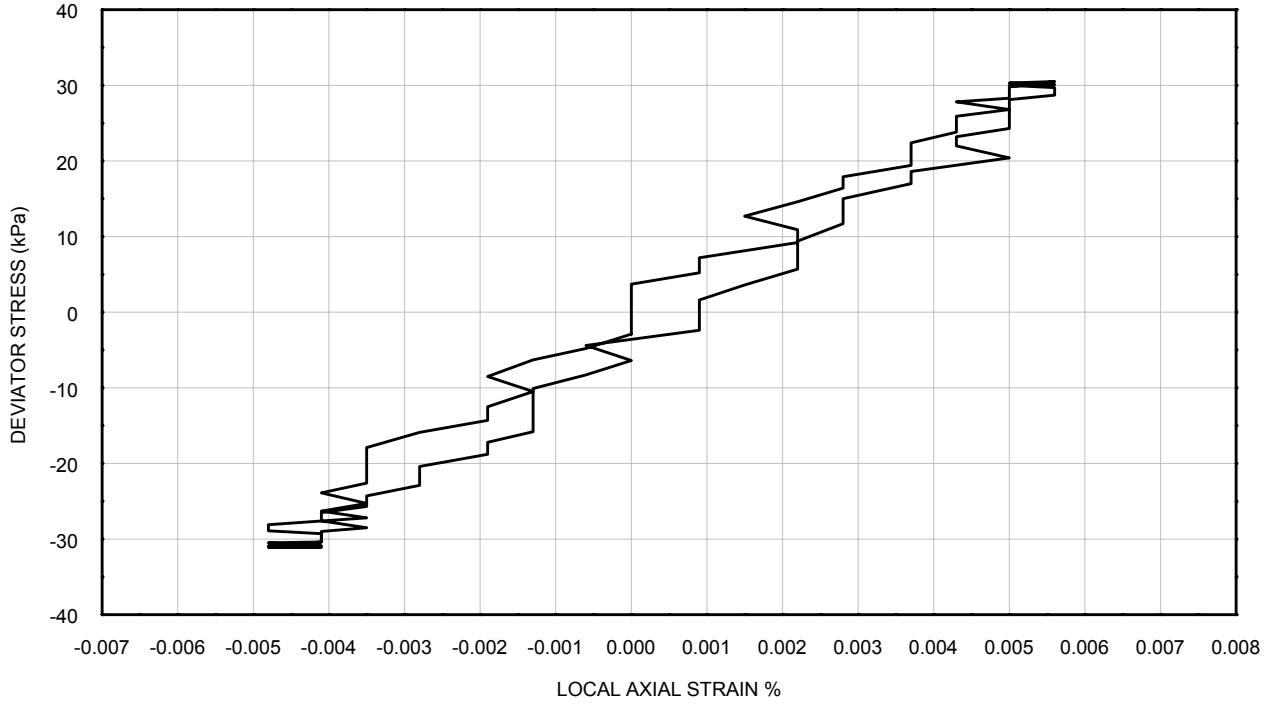




σ_{rc}'	:	837	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	837	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.71
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

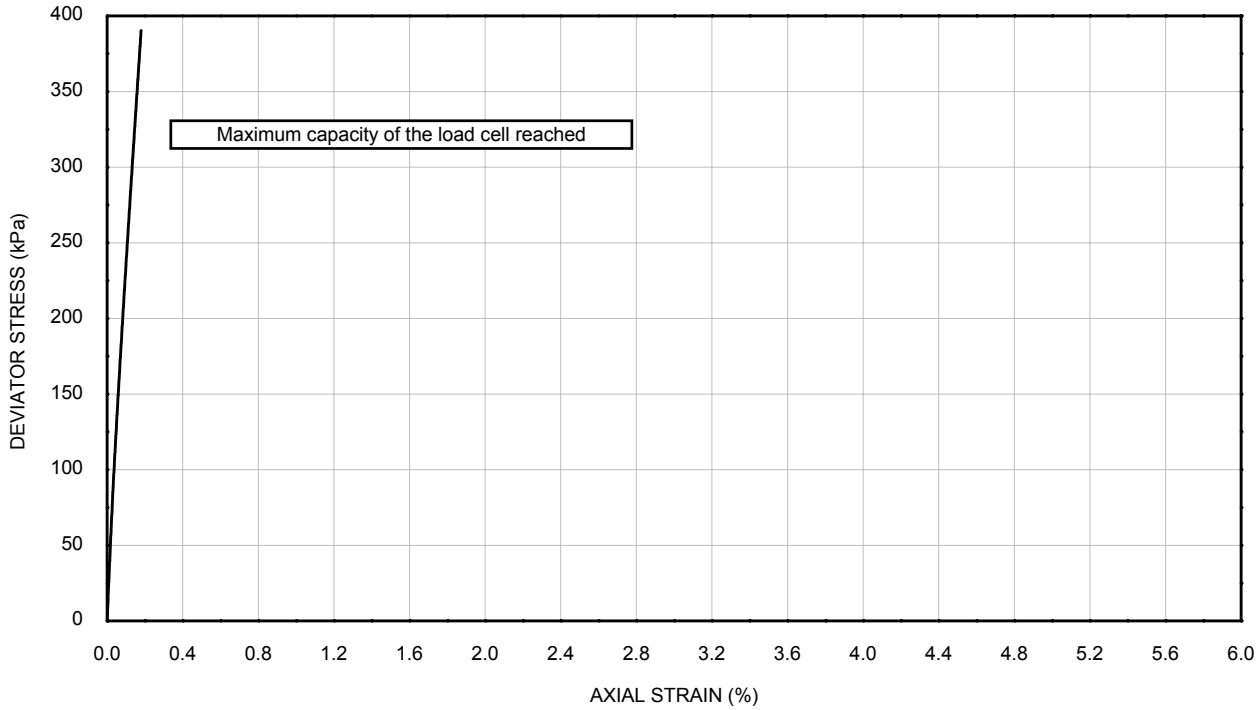
CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE

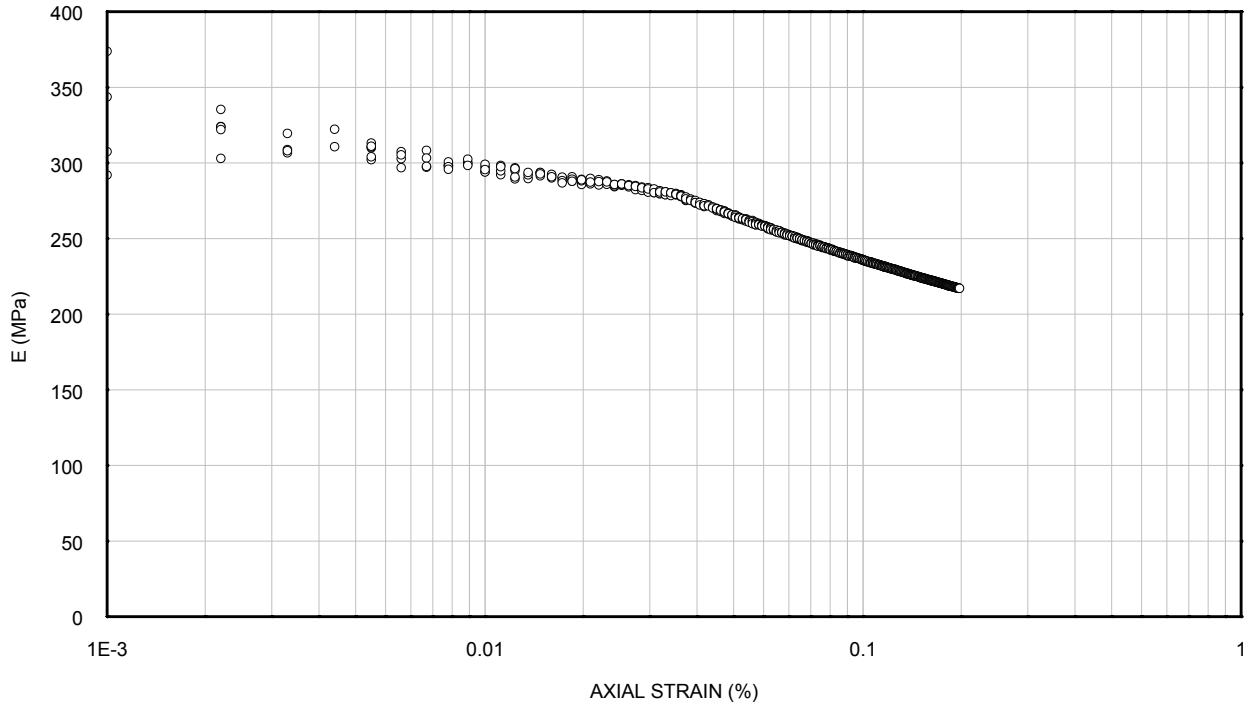




σ_{rc}'	:	837	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	837	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.71
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE





σ_{rc}'	:	837	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	837	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.71
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

CYCLIC TRIAXIAL TEST
POST CYCLIC STATIC LOADING STAGE

Date: 00/01/1900
Drawn by: 0
Template Issue: WAL_ADV_CAU_i1
Date:
Checked by:
Date:
Approved by:

VISUAL DESCRIPTION
Very stiff dark greyish brown fissured CLAY, with traces of light brown silt lenses.

GENERAL	
Date test started	07/04/2011
Type of sample	Undisturbed
Specimen orientation	Vertical
Type of drains fitted	Radial & one end

INITIAL		
Diameter	(mm)	70.4
Length	(mm)	142.1
Moisture content	(%)	28
Bulk density	(Mg/m³)	1.96
Dry density	(Mg/m³)	1.53
Voids ratio		0.765
Degree of saturation	(%)	99

SATURATION		
Pressure increments applied	(kPa)	100
Differential pressure used	(kPa)	N/A
Pore pressure on completion	(kPa)	1027
Cell pressure on completion	(kPa)	1396
B value achieved		1
Initial effective stress	(kPa)	369

TESTING PROCEDURES USED	
Specimen Set-up	As per test specification FUGRO in-house testing procedure
Saturation	As per test specification FUGRO in-house testing procedure
Consolidation - Isotropic Consolidation - Anisotropic	As per test specification FUGRO in-house testing procedure
Shearing	As per test specification FUGRO in-house testing procedure
Note: FUGRO in-house testing procedures are available on request	

LOCAL GAUGES USED	
	Local Axial LVDT (x2)

Borehole	CBH2009-8U
Sample	C5138
Depth (m)	59.55

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

CONSOLIDATION : ISOTROPIC		
Cell pressure	(kPa)	1396
Back pressure	(kPa)	800
Effective radial pressure	(kPa)	596
Pore pressure on completion	(kPa)	803
Pore pressure dissipation	(%)	99
Moisture content	(%)	27
Bulk density	(Mg/m³)	1.97
Dry density	(Mg/m³)	1.55
Voids ratio		0.743
Degree of saturation	(%)	99
Volumetric strain (from water flow)	(%)	1.21
Local volumetric strain	(%)	0.50
Cvi	(m²/year)	-
Mvi	(m²/MN)	-
Permeability	(m/s)	-

CYCLIC SUMMARY			
Frequency	(Hz)	0.1	
No. applied cycles	(-)	13	
At Cycle 10		EXTERNAL	LOCAL
Strain	(%)	0.0057	0.0038
Young's Modulus, E	(MPa)	156	232
Damping ratio, D	(%)	4.9	1.4

Borehole	CBH2009-8U
Sample	C5138
Depth (m)	59.55

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

SHEARING		
Initial pore pressure	(kPa)	806
Initial effective stress p_0'	(kPa)	-210
Rate of strain	(%/hour)	0.20
Initial deviator stress	(kPa)	0
At peak deviator stress		
Deviator stress	(kPa)	375
Undrained shear strength	(kPa)	187
Membrane correction applied	(kPa)	0
Drain correction applied	(kPa)	0
External axial strain	(%)	2.30
Local axial strain	(%)	1.83
Excess pore pressure (mid-height)	(kPa)	210
Horizontal effective stress	(kPa)	-419
Vertical effective stress	(kPa)	-45
Principal effective stress ratio		0.1

LOCAL STRAIN PARAMETERS		
At 0.01% local axial strain		
Deviator stress		33
External axial strain		0.02
Excess pore pressure (mid-height)		12
Principal effective stress ratio		0.9
Local Secant modulus $E_{u(local)}$	(MPa)	318.7
normalised w.r.t p_0'		-1520.7
normalised w.r.t c_u		1700.8
At 0.1% local axial strain		
Deviator stress		106
External axial strain		0.13
Excess pore pressure (mid-height)		59
Principal effective stress ratio		0.6
Local Secant modulus $E_{u(local)}$	(MPa)	106.0
normalised w.r.t p_0'		-505.8
normalised w.r.t c_u		565.7
Degree of non-linearity during shear L		0.33

FINAL CONDITIONS		
Moisture content	(%)	27.2
Bulk density	(Mg/m^3)	1.97
Dry density	(Mg/m^3)	1.55

Borehole	CBH2009-8U
Sample	C5138
Depth (m)	59.55

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

VISUAL DESCRIPTION
Very stiff dark greyish brown fissured CLAY, with traces of light brown silt lenses.

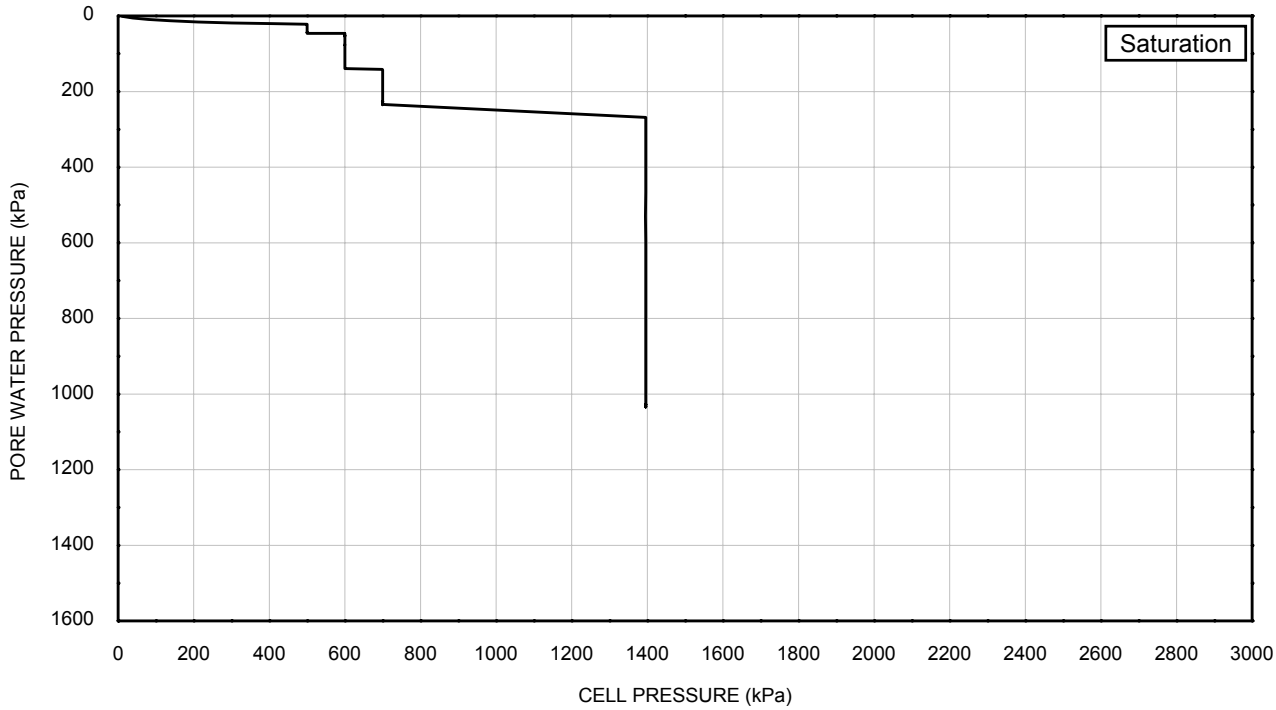
SPECIMEN PHOTOGRAPHS

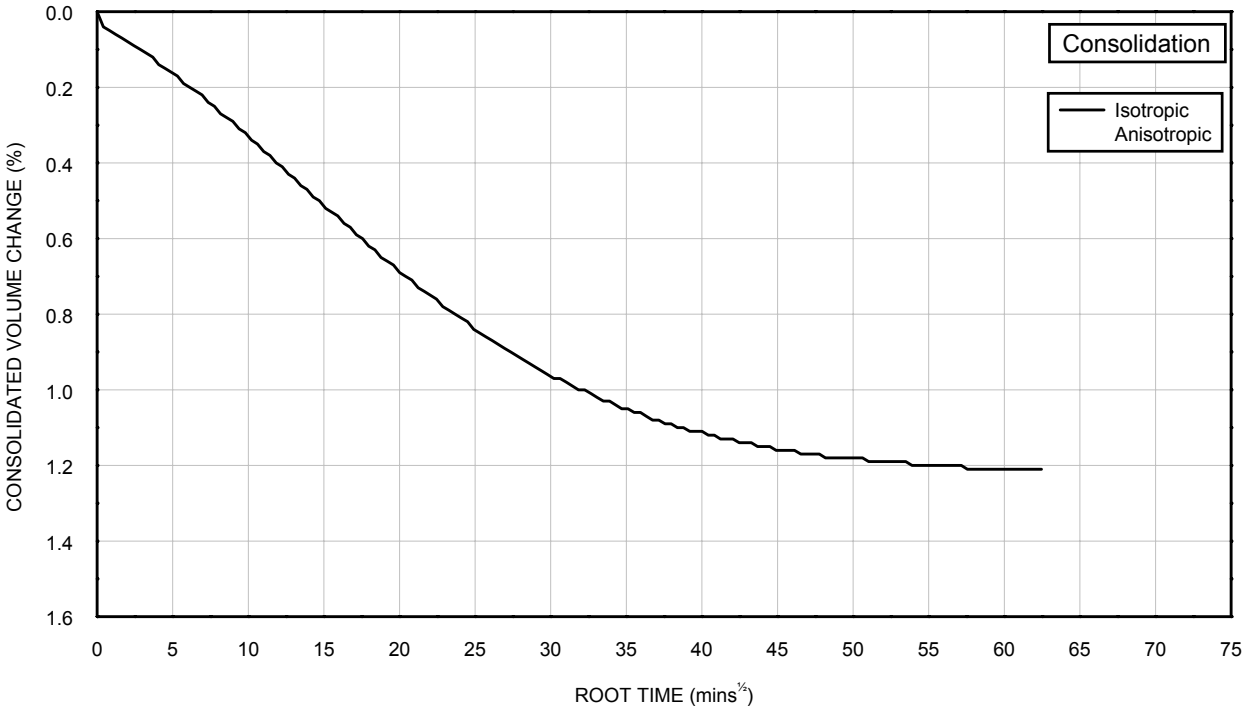
Borehole	CBH2009-8U
Sample	C5138
Depth (m)	59.55

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Drawn by: 0 Date: 00/01/1900

Template Issue: 3 File Name : J21016 / CTX3_CBH2009-8U_C5138.OPJ



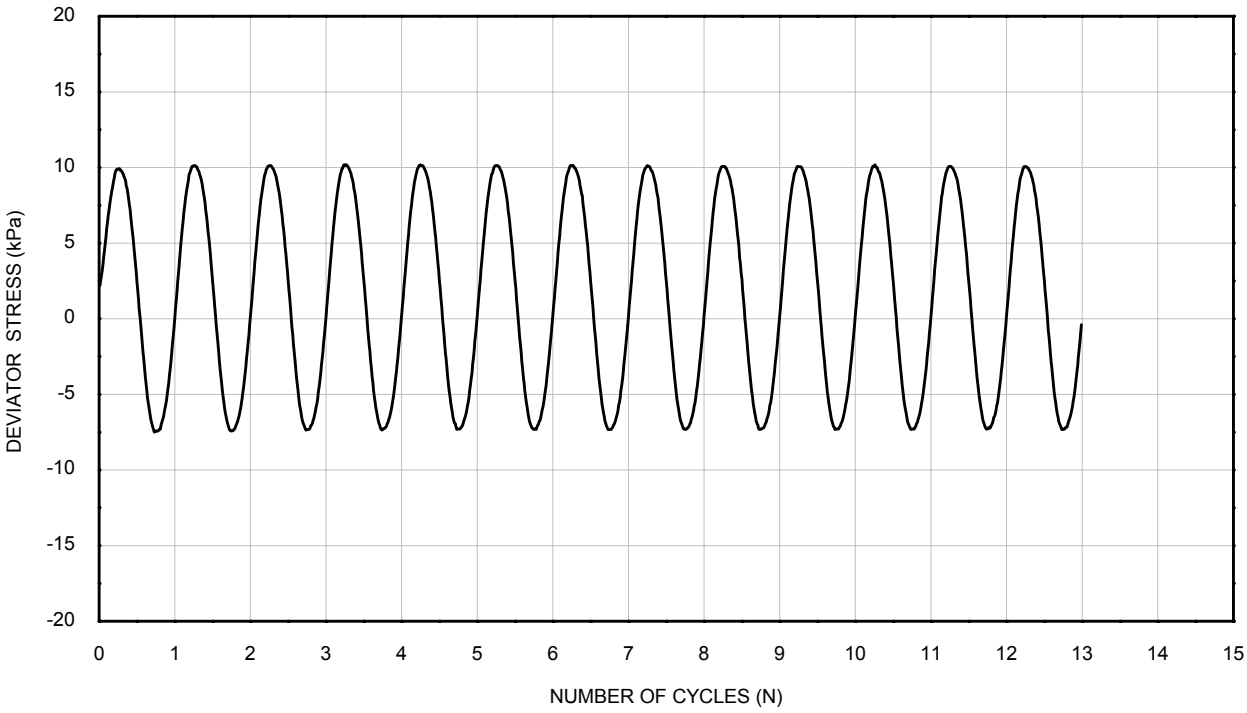


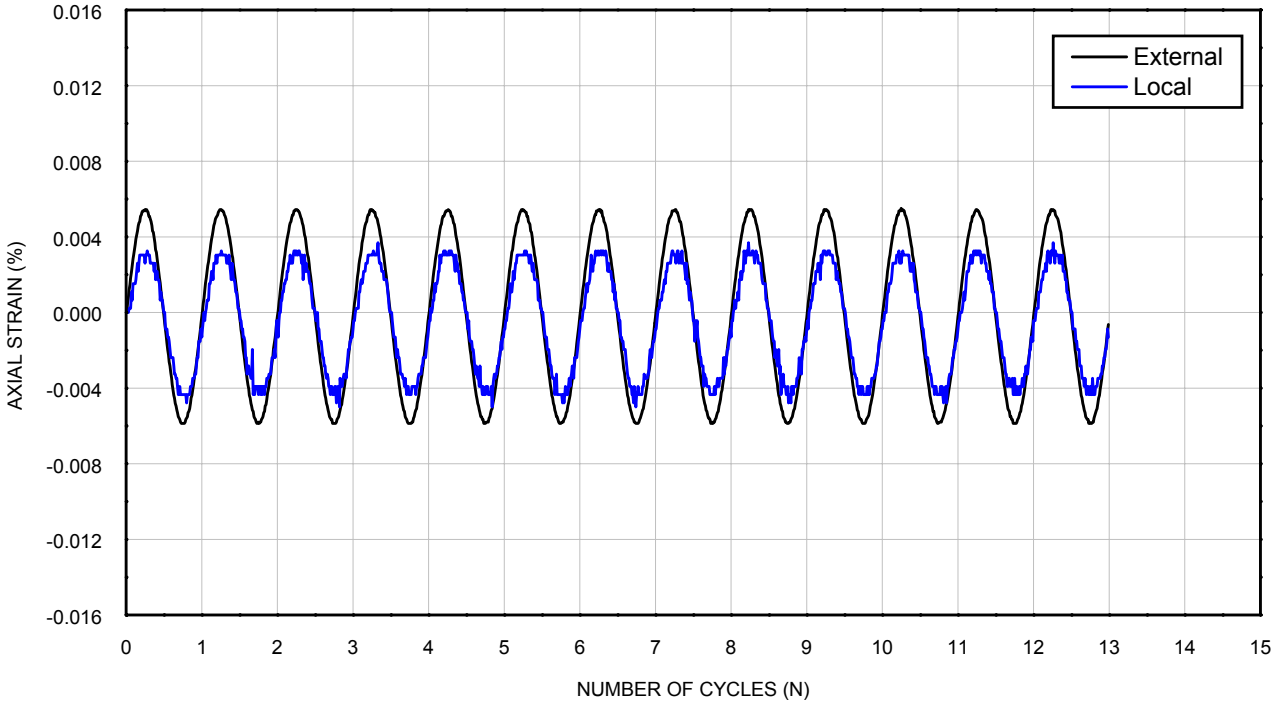
σ_{rc}'	:	596	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	596	kPa	Sample	: C5138
Nominal τ_{av}	:	--	kPa	Depth (m)	: 59.55
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

Checked by: Date:

Approved by: Date:

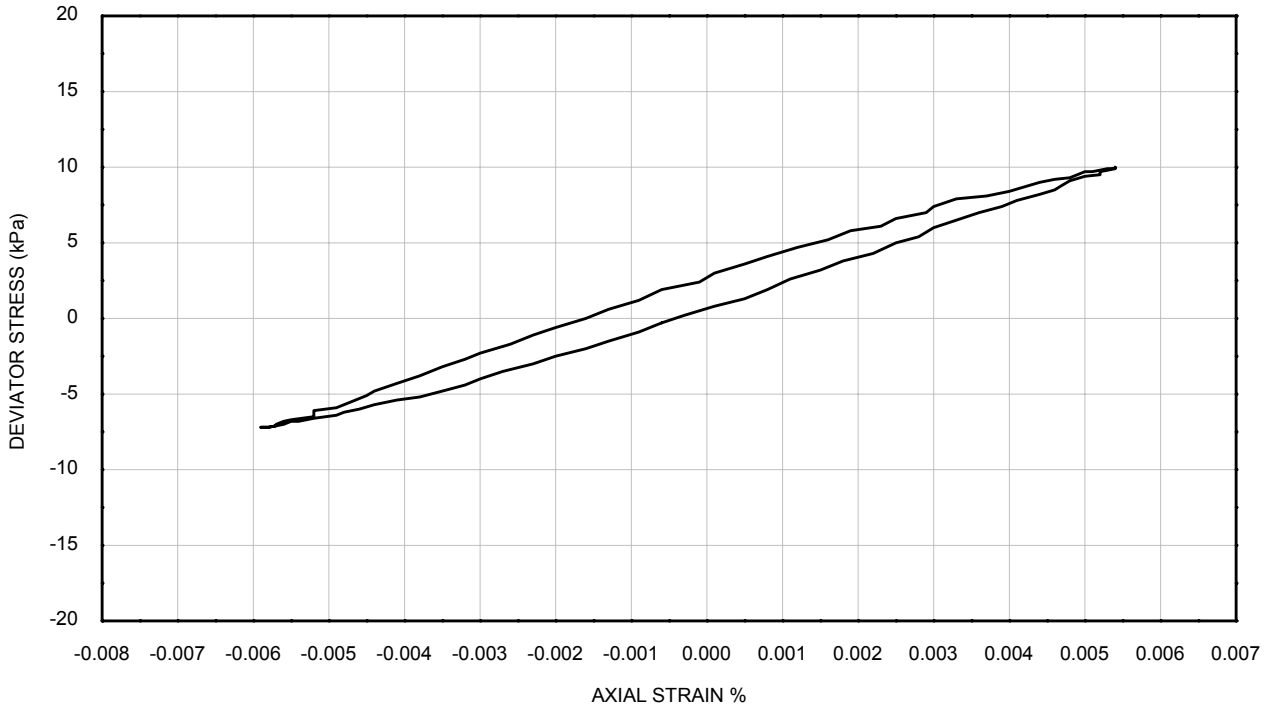
CYCLIC TRIAXIAL TEST
SATURATION AND CONSOLIDATION

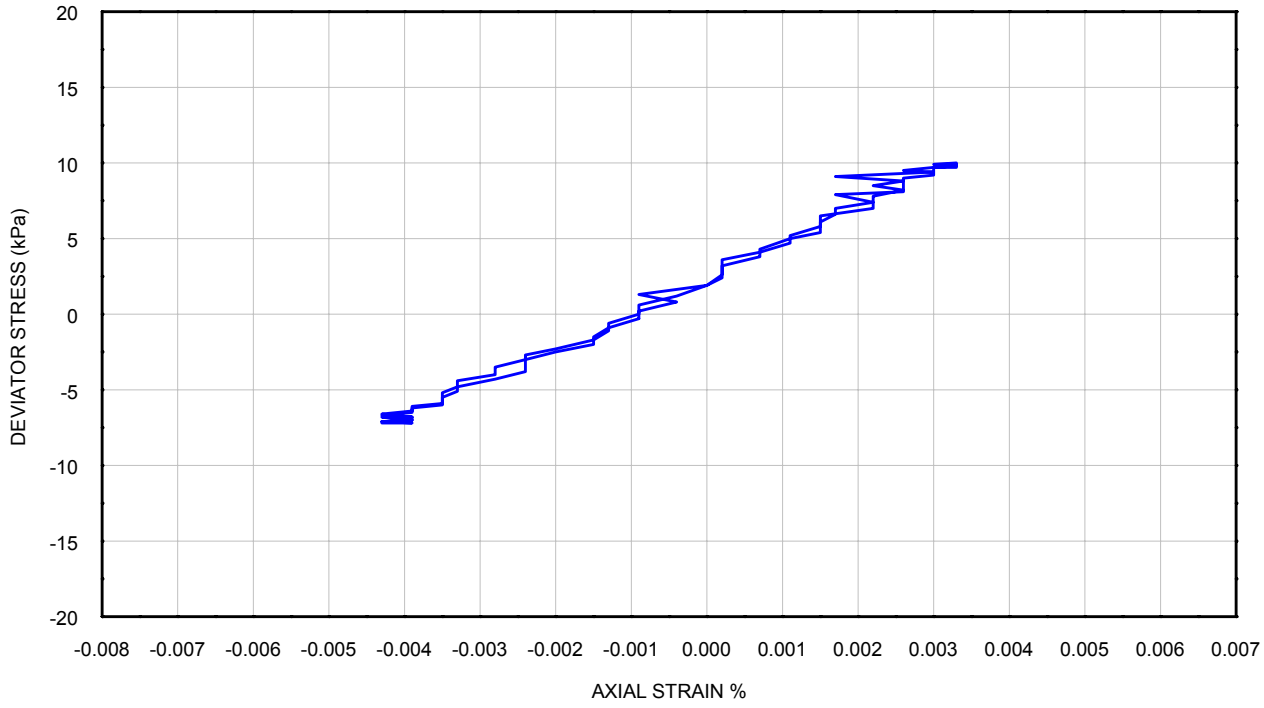




σ_{rc}'	:	596	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	596	kPa	Sample	: C5138
Nominal τ_{av}	:	--	kPa	Depth (m)	: 59.55
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

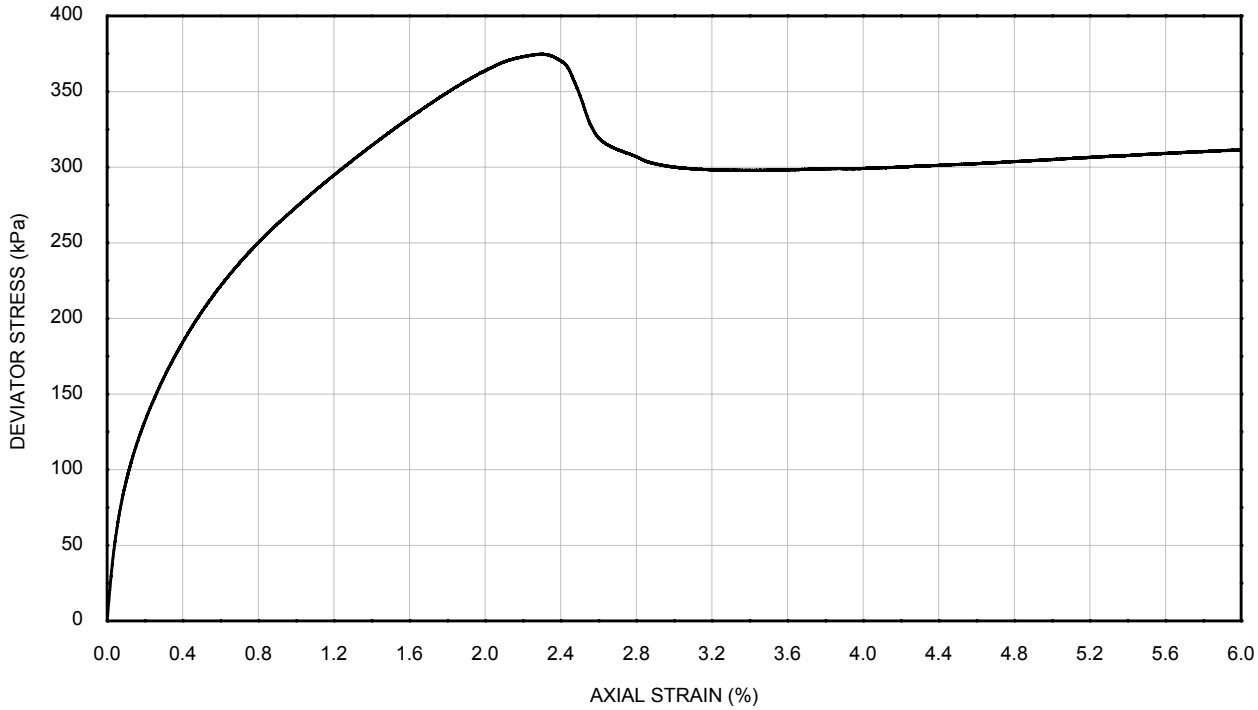
CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE

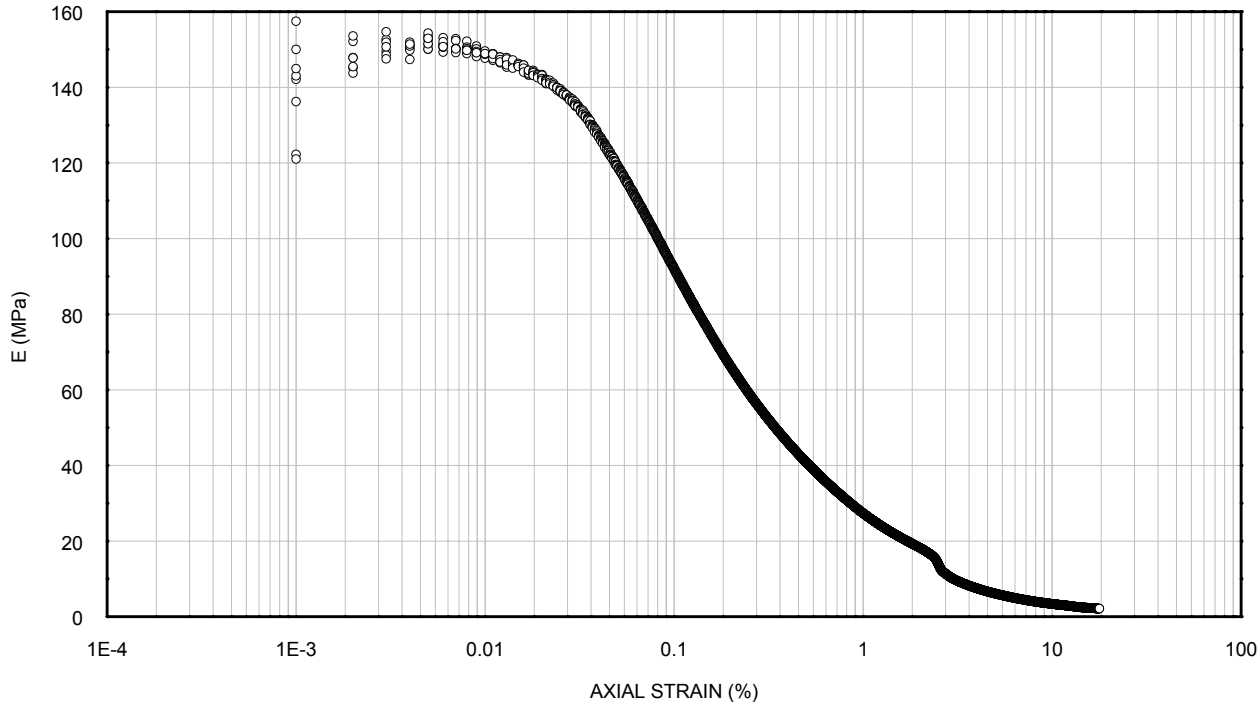




σ_{rc}'	:	596	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	596	kPa	Sample	: C5138
Nominal τ_{av}	:	--	kPa	Depth (m)	: 59.55
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE





σ_{rc}'	: 596	kPa	Borehole	:	CBH2009-8U
σ_{vc}'	: 596	kPa	Sample	:	C5138
Nominal τ_{av}	: --	kPa	Depth (m)	:	59.55
Nominal τ_{cy}	: --	kPa			
Frequency	: 0.1	Hz			

CYCLIC TRIAXIAL TEST
POST CYCLIC STATIC LOADING STAGE

Date: 00/01/1900
Drawn by: 0
Template Issue: WAL_ADV_CAU_i1
Date:
Checked by:
Date:
Approved by:

VISUAL DESCRIPTION
Hard dark brownish grey fissured silty CLAY with brown staining along fissures, and black staining occuring uniformilly (fissures are both vertical and angular).

GENERAL	
Date test started	05/05/2011
Type of sample	Undisturbed
Specimen orientation	Vertical
Type of drains fitted	Radial & one end

INITIAL		
Diameter	(mm)	70.4
Length	(mm)	142.1
Moisture content	(%)	54
Bulk density	(Mg/m³)	1.79
Dry density	(Mg/m³)	1.16
Voids ratio		1.326
Degree of saturation	(%)	100

SATURATION		
Pressure increments applied	(kPa)	100
Differential pressure used	(kPa)	N/A
Pore pressure on completion	(kPa)	974
Cell pressure on completion	(kPa)	1063
B value achieved		0.99
Initial effective stress	(kPa)	89

TESTING PROCEDURES USED	
Specimen Set-up	As per test specification FUGRO in-house testing procedure
Saturation	As per test specification FUGRO in-house testing procedure
Consolidation - Isotropic Consolidation - Anisotropic	As per test specification FUGRO in-house testing procedure
Shearing	As per test specification FUGRO in-house testing procedure
Note: FUGRO in-house testing procedures are available on request	

LOCAL GAUGES USED	
	Local Axial LVDT (x2)

Borehole	CBH2009-8U
Sample	C5135
Depth (m)	56.32

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

CONSOLIDATION : ISOTROPIC		
Cell pressure	(kPa)	1063
Back pressure	(kPa)	500
Effective radial pressure	(kPa)	563
Pore pressure on completion	(kPa)	504
Pore pressure dissipation	(%)	99
Moisture content	(%)	51
Bulk density	(Mg/m³)	1.81
Dry density	(Mg/m³)	1.20
Voids ratio		1.245
Degree of saturation	(%)	100
Volumetric strain (from water flow)	(%)	3.50
Local volumetric strain	(%)	0.94
Cvi	(m²/year)	-
Mvi	(m²/MN)	-
Permeability	(m/s)	-

CYCLIC SUMMARY*			
Frequency	(Hz)	0.1	
No. applied cycles	(-)	13	
At Cycle 10		EXTERNAL	LOCAL
Strain	(%)	-	-
Young's Modulus, E	(MPa)	-	-
Damping ratio, D	(%)	-	-

* Suction type top cap uncoupled during cyclic loading.

Borehole	CBH2009-8U
Sample	C5135
Depth (m)	56.32

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

SHEARING #		
Initial pore pressure	(kPa)	506
Initial effective stress p_0'	(kPa)	57
Rate of strain	(%/hour)	0.20
Initial deviator stress	(kPa)	0
At peak deviator stress		
Deviator stress	(kPa)	865
Undrained shear strength	(kPa)	432
Membrane correction applied	(kPa)	0
Drain correction applied	(kPa)	0
External axial strain	(%)	1.48
Local axial strain	(%)	0.87
Excess pore pressure (mid-height)	(kPa)	355
Horizontal effective stress	(kPa)	-299
Vertical effective stress	(kPa)	566
Principal effective stress ratio		-1.9

LOCAL STRAIN PARAMETERS		
At 0.01% local axial strain		
Deviator stress		62
External axial strain		0.24
Excess pore pressure (mid-height)		33
Principal effective stress ratio		3.6
Local Secant modulus $E_{u(local)}$	(MPa)	601.5
normalised w.r.t p_0'		10644.7
normalised w.r.t c_u		1391.4
At 0.1% local axial strain		
Deviator stress		270
External axial strain		0.57
Excess pore pressure (mid-height)		140
Principal effective stress ratio		-2.2
Local Secant modulus $E_{u(local)}$	(MPa)	270.9
normalised w.r.t p_0'		4794.5
normalised w.r.t c_u		626.7
Degree of non-linearity during shear L		0.45

Suction type top cap uncoupled during cyclic loading. Bedding error evident during shear stage.

FINAL CONDITIONS		
Moisture content	(%)	50.9
Bulk density	(Mg/m^3)	1.81
Dry density	(Mg/m^3)	1.20

Borehole	CBH2009-8U
Sample	C5135
Depth (m)	56.32

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Checked by: Date:

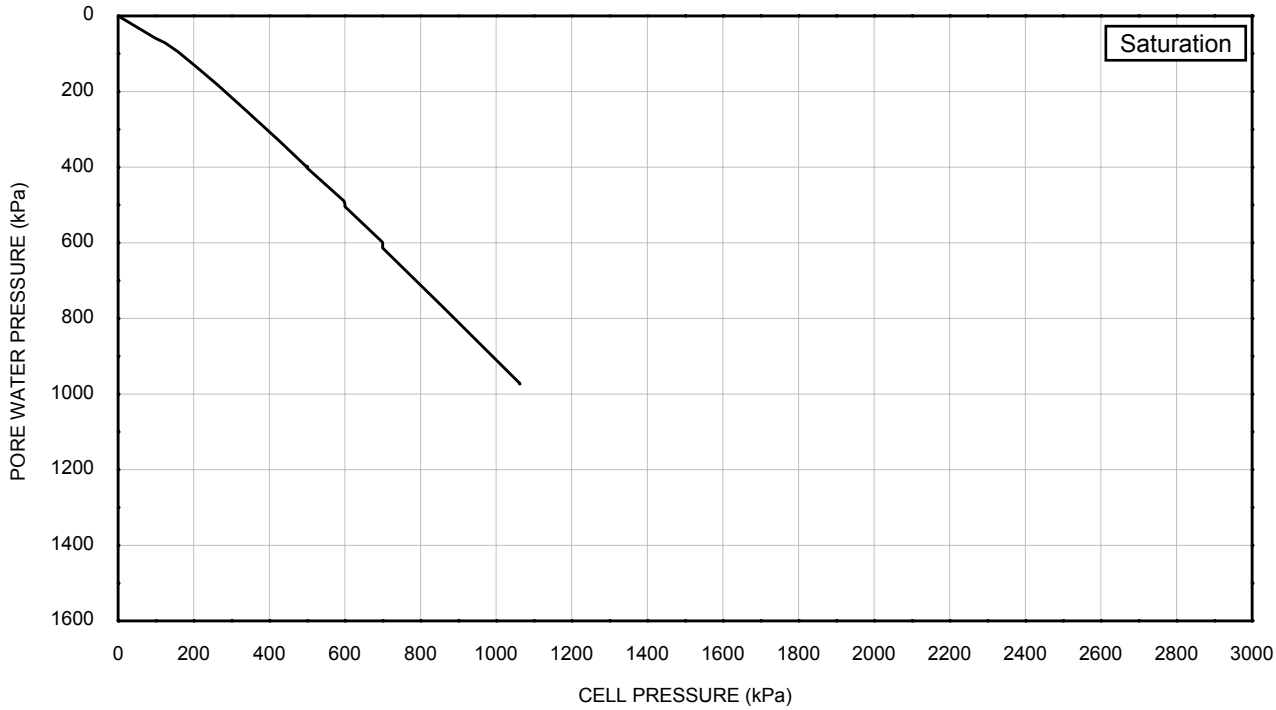
Approved by: Date:

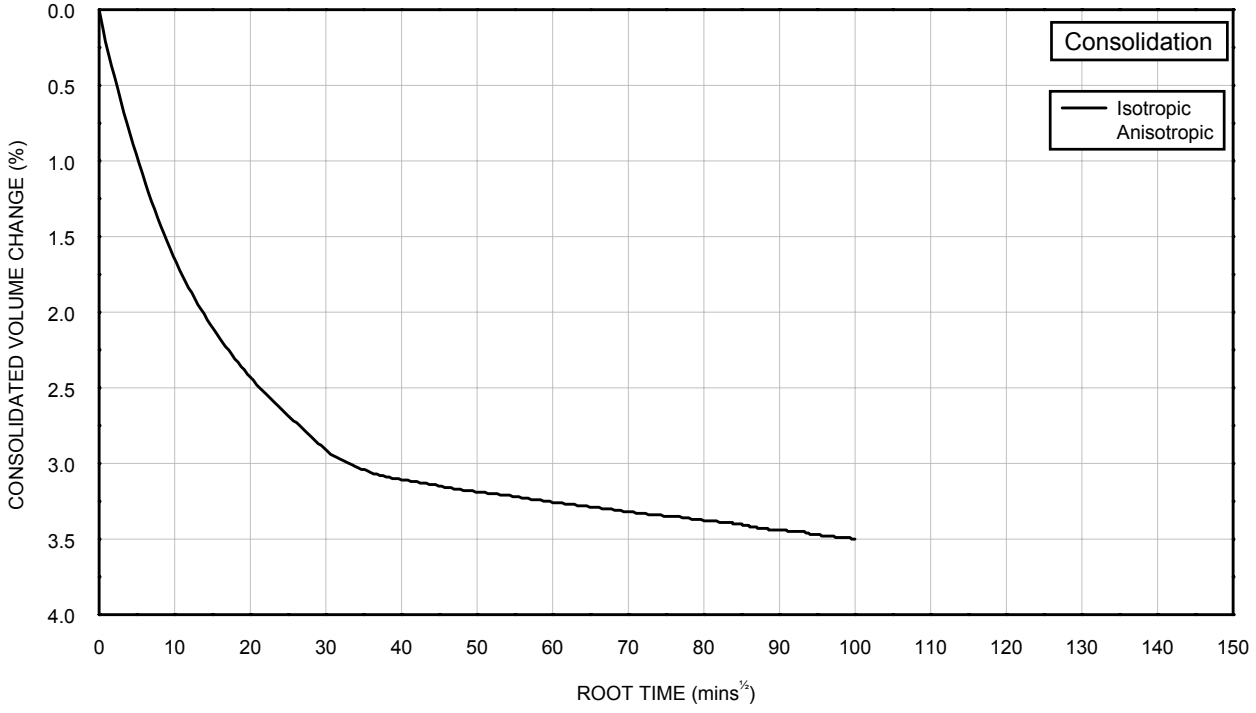
VISUAL DESCRIPTION
Hard dark brownish grey fissured silty CLAY with brown staining along fissures, and black staining occuring uniformilly (fissures are both vertical and angular).

SPECIMEN PHOTOGRAPHS
Post test photograph was not possible.

Borehole	CBH2009-8U
Sample	C5135
Depth (m)	56.32

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN



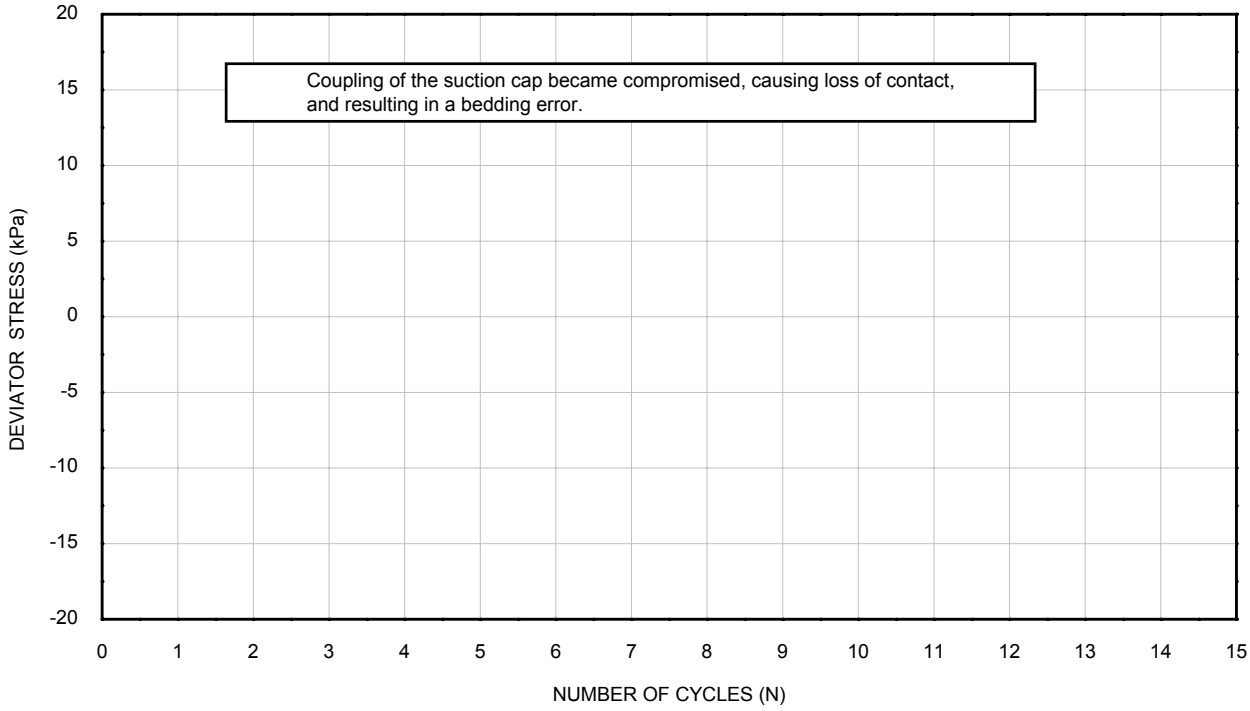


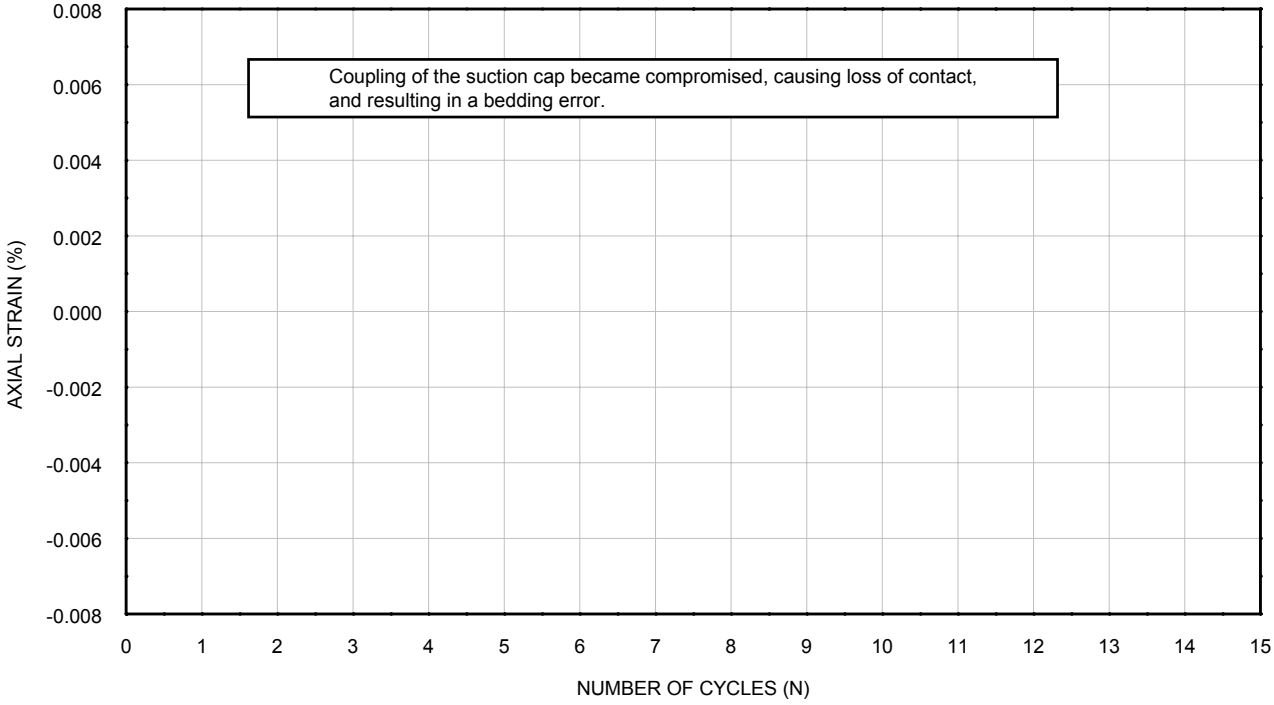
σ_{rc}'	:	563	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	563	kPa	Sample	: C5135
Nominal τ_{av}	:	--	kPa	Depth (m)	: 56.32
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

Checked by: Date:
Approved by: Date:

CYCLIC TRIAXIAL TEST
SATURATION AND CONSOLIDATION

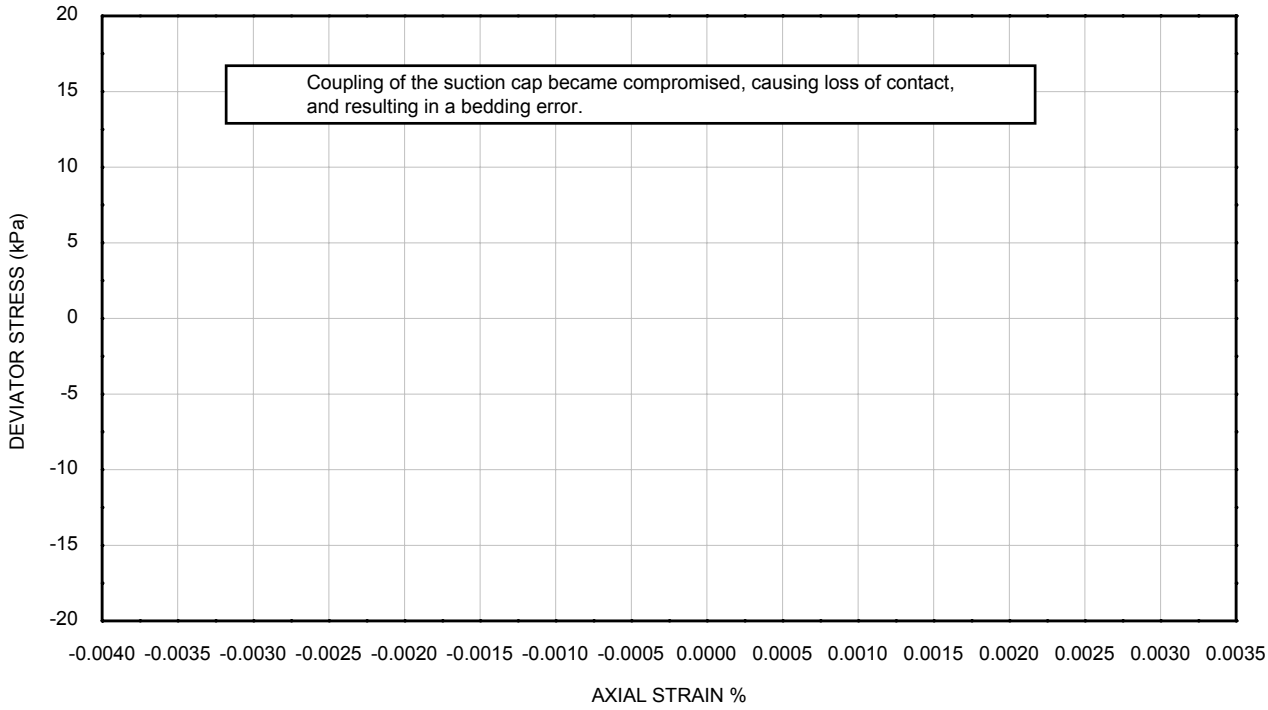
Drawn by: 0 Date: 00/01/1900
Template Issue: 3
File Name : J21016 / CTX4_CBH2009-8U_C5135.OPJ
Checked by: Date:
Approved by: Date:

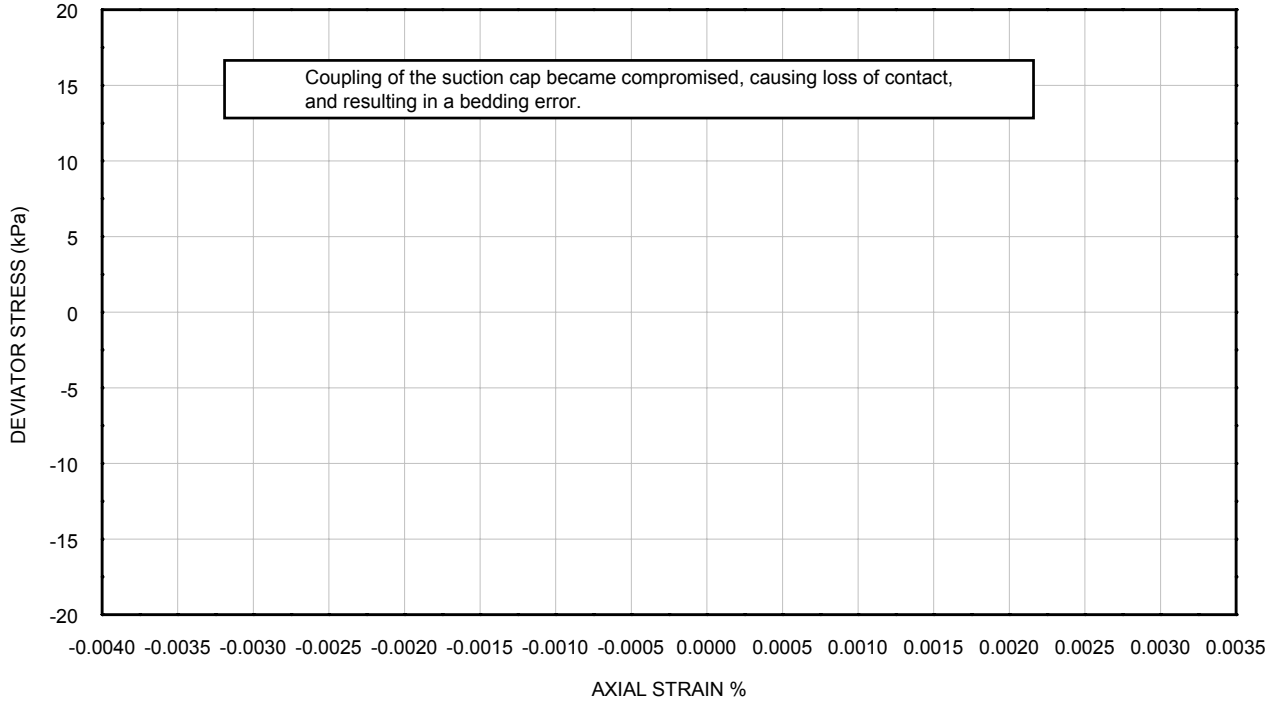




σ_{rc}'	:	563	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	563	kPa	Sample	: C5135
Nominal τ_{av}	:	--	kPa	Depth (m)	: 56.32
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

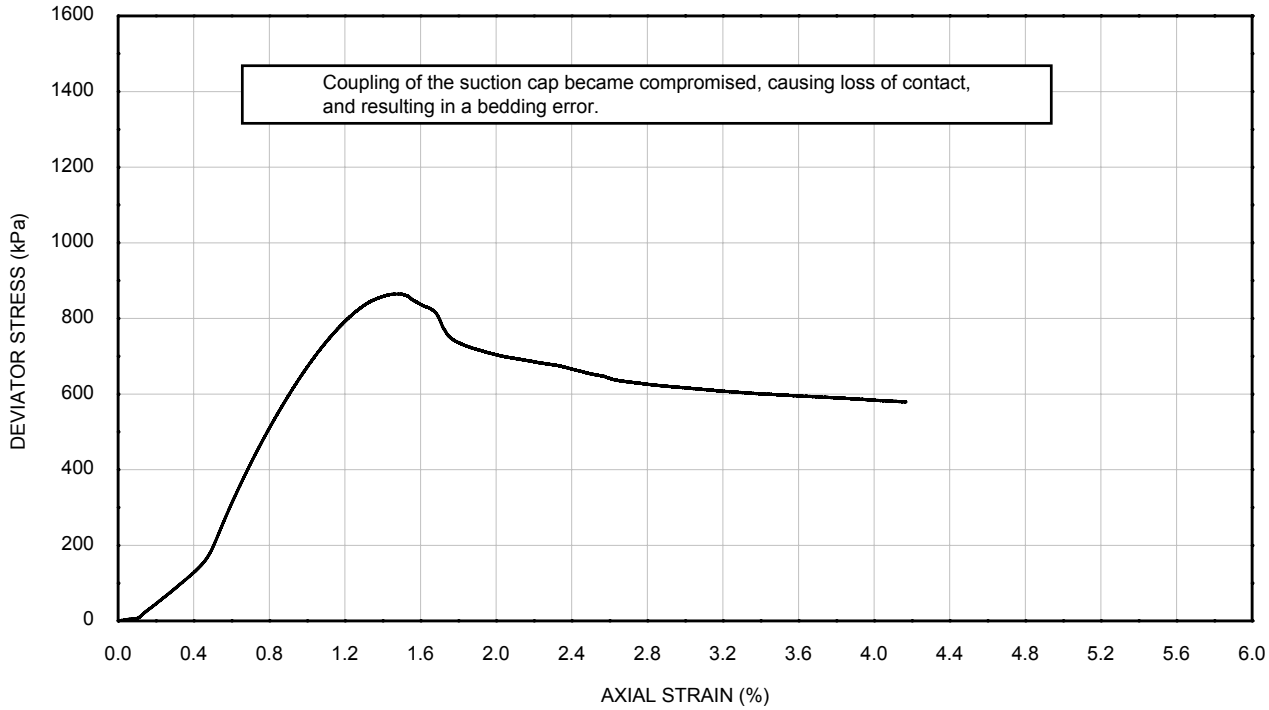
CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE

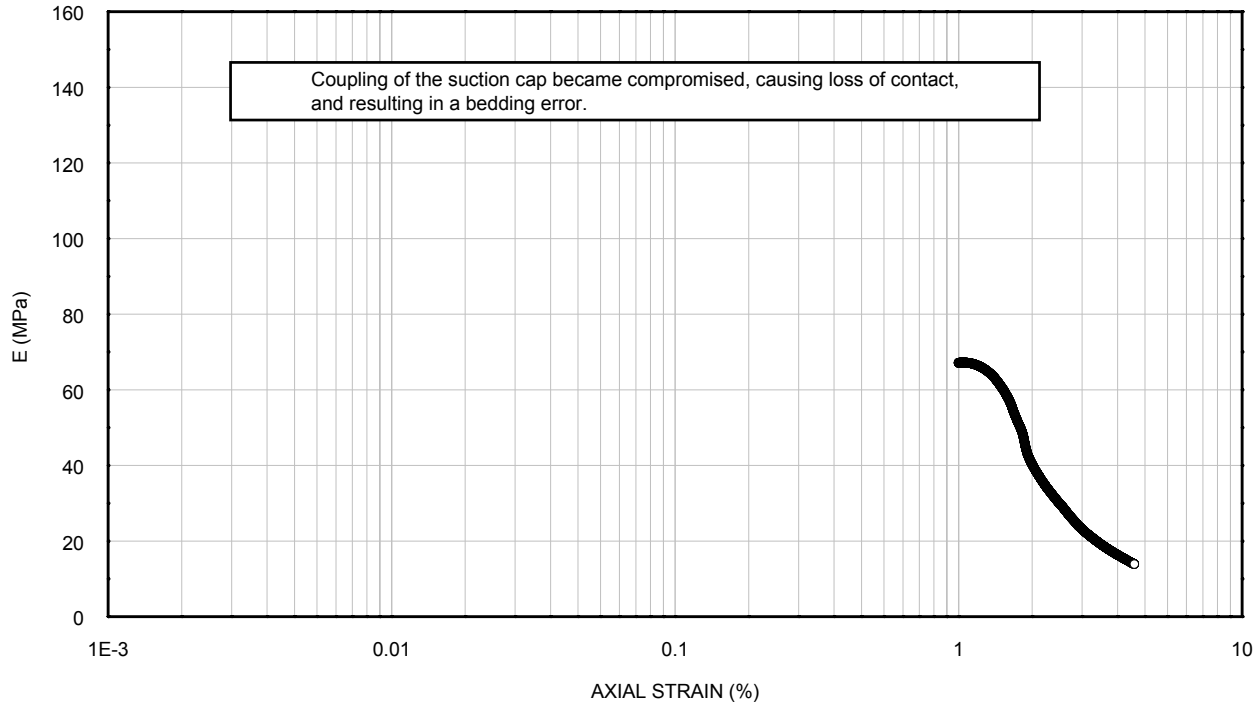




σ_{rc}'	:	563 kPa	Borehole	:	CBH2009-8U
σ_{vc}'	:	563 kPa	Sample	:	C5135
Nominal τ_{av}	:	-- kPa	Depth (m)	:	56.32
Nominal τ_{cy}	:	-- kPa			
Frequency	:	0.1 Hz			

CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE





σ_{rc}'	:	563	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	563	kPa	Sample	: C5135
Nominal τ_{av}	:	--	kPa	Depth (m)	: 56.32
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

CYCLIC TRIAXIAL TEST
POST CYCLIC STATIC LOADING STAGE

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

VISUAL DESCRIPTION
Hard dark brownish grey fissured CLAY (fissures are angular and vertical)

GENERAL	
Date test started	10/05/2011
Type of sample	Undisturbed
Specimen orientation	Vertical
Type of drains fitted	Radial & one end

INITIAL		
Diameter	(mm)	71.2
Length	(mm)	139.7
Moisture content	(%)	31.3
Bulk density	(Mg/m³)	1.90
Dry density	(Mg/m³)	1.45
Voids ratio		0.865
Degree of saturation	(%)	98

SATURATION		
Pressure increments applied	(kPa)	100
Differential pressure used	(kPa)	N/A
Pore pressure on completion	(kPa)	1203
Cell pressure on completion	(kPa)	1639
B value achieved		1.00
Initial effective stress	(kPa)	436

TESTING PROCEDURES USED	
Specimen Set-up	As per test specification FUGRO in-house testing procedure
Saturation	As per test specification FUGRO in-house testing procedure
Consolidation - Isotropic Consolidation - Anisotropic	As per test specification FUGRO in-house testing procedure
Shearing	As per test specification FUGRO in-house testing procedure
Note: FUGRO in-house testing procedures are available on request	

LOCAL GAUGES USED	
	Local Axial LVDT (x2)

Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.90

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

CONSOLIDATION : ISOTROPIC		
Cell pressure	(kPa)	1639
Back pressure	(kPa)	800
Effective radial pressure	(kPa)	839
Pore pressure on completion	(kPa)	810
Pore pressure dissipation	(%)	98
Moisture content	(%)	30.3
Bulk density	(Mg/m³)	1.91
Dry density	(Mg/m³)	1.47
Voids ratio		0.839
Degree of saturation	(%)	97
Volumetric strain (from water flow)	(%)	1.42
Local volumetric strain	(%)	0.40
Cvi	(m²/year)	-
Mvi	(m²/MN)	-
Permeability	(m/s)	-

CYCLIC SUMMARY			
Frequency	(Hz)	0.1	
No. applied cycles	(-)	13	
At Cycle 10		EXTERNAL	LOCAL
Strain	(%)	0.0231	0.0149
Young's Modulus, E	(MPa)	289	439
Damping ratio, D	(%)	1.1	1.6

Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.90

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

SHEARING*		
Initial pore pressure	(kPa)	812
Initial effective stress p_0'	(kPa)	27
Rate of strain	(%/hour)	0.20
Initial deviator stress	(kPa)	0
At peak deviator stress		
Deviator stress	(kPa)	1134
Undrained shear strength	(kPa)	567
Membrane correction applied	(kPa)	0.1
Drain correction applied	(kPa)	0
External axial strain	(%)	0.74
Local axial strain	(%)	
Excess pore pressure (mid-height)	(kPa)	515
Horizontal effective stress	(kPa)	-488
Vertical effective stress	(kPa)	646
Principal effective stress ratio		-1.3

LOCAL STRAIN PARAMETERS		
At 0.01% local axial strain		
Deviator stress		51
External axial strain		0.02
Excess pore pressure (mid-height)		21
Principal effective stress ratio		8.9
Local Secant modulus $E_{u(local)}$	(MPa)	489.0
normalised w.r.t p_0'		18075.0
normalised w.r.t c_u		862.6
At 0.1% local axial strain		
Deviator stress		343
External axial strain		0.16
Excess pore pressure (mid-height)		175
Principal effective stress ratio		-1.3
Local Secant modulus $E_{u(local)}$	(MPa)	347.7
normalised w.r.t p_0'		12849.4
normalised w.r.t c_u		613.2
Degree of non-linearity during shear L		0.71

* System error caused an early termination of the static shear stage.

FINAL CONDITIONS		
Moisture content	(%)	30.3
Bulk density	(Mg/m^3)	1.91
Dry density	(Mg/m^3)	1.47

Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.90

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Checked by: Date:

Approved by: Date:

VISUAL DESCRIPTION
Hard dark brownish grey fissured CLAY (fissures are angular and vertical)

SPECIMEN PHOTOGRAPHS
Post test photograph was not possible.

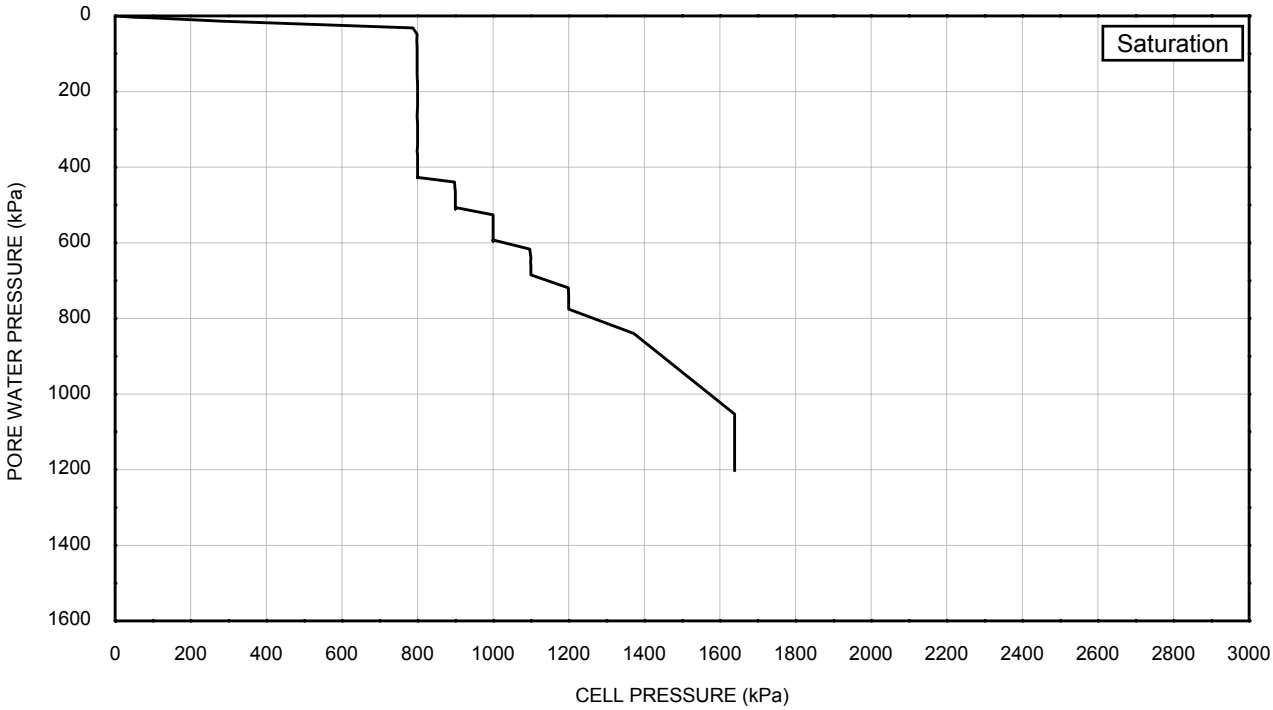
Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.90

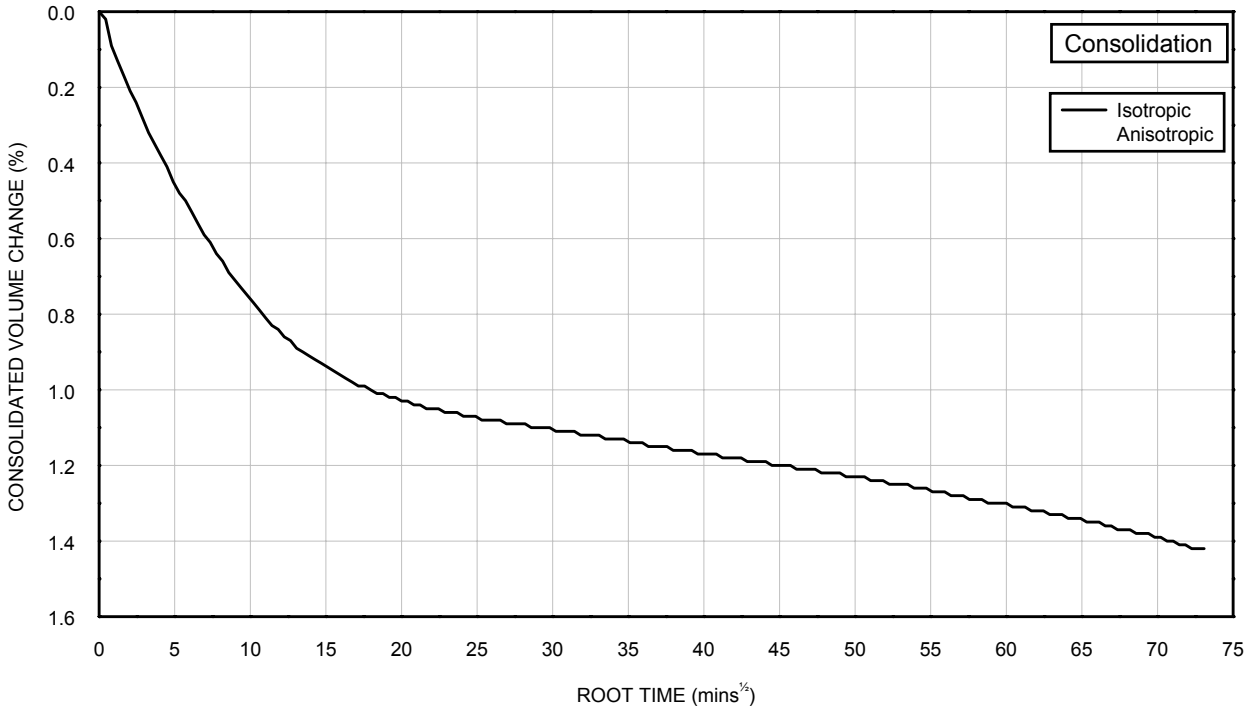
ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Drawn by: PH Date: 11/07/2011

Template Issue: 3

File Name : J21016 / CBH2009-8U_C5140_CTX5.OPJ



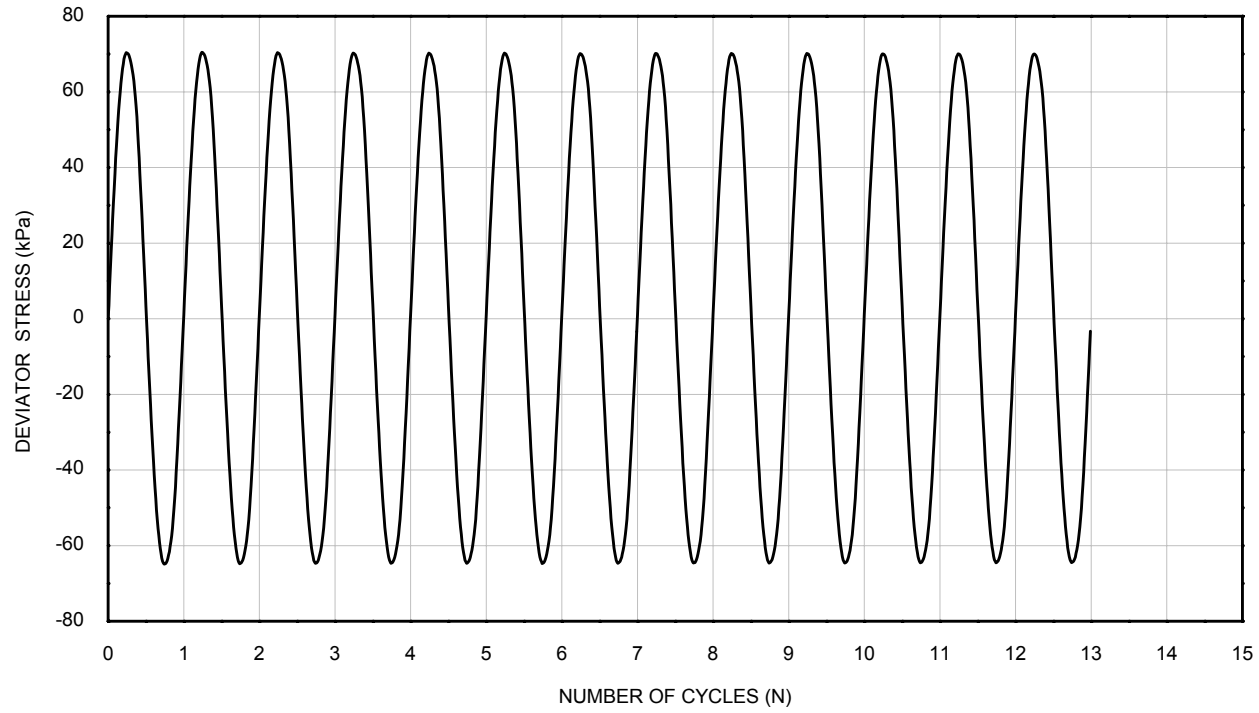


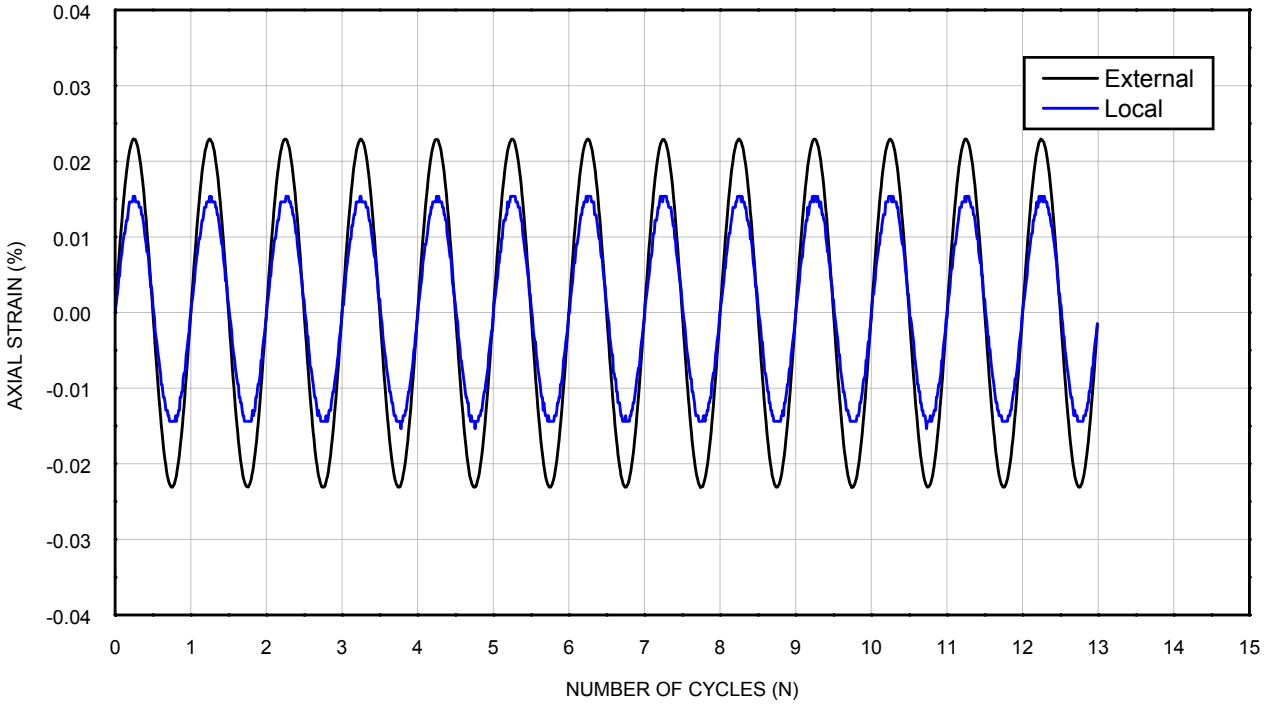
σ_{rc}'	:	839	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	839	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.90
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

Checked by: Date:

Approved by: Date:

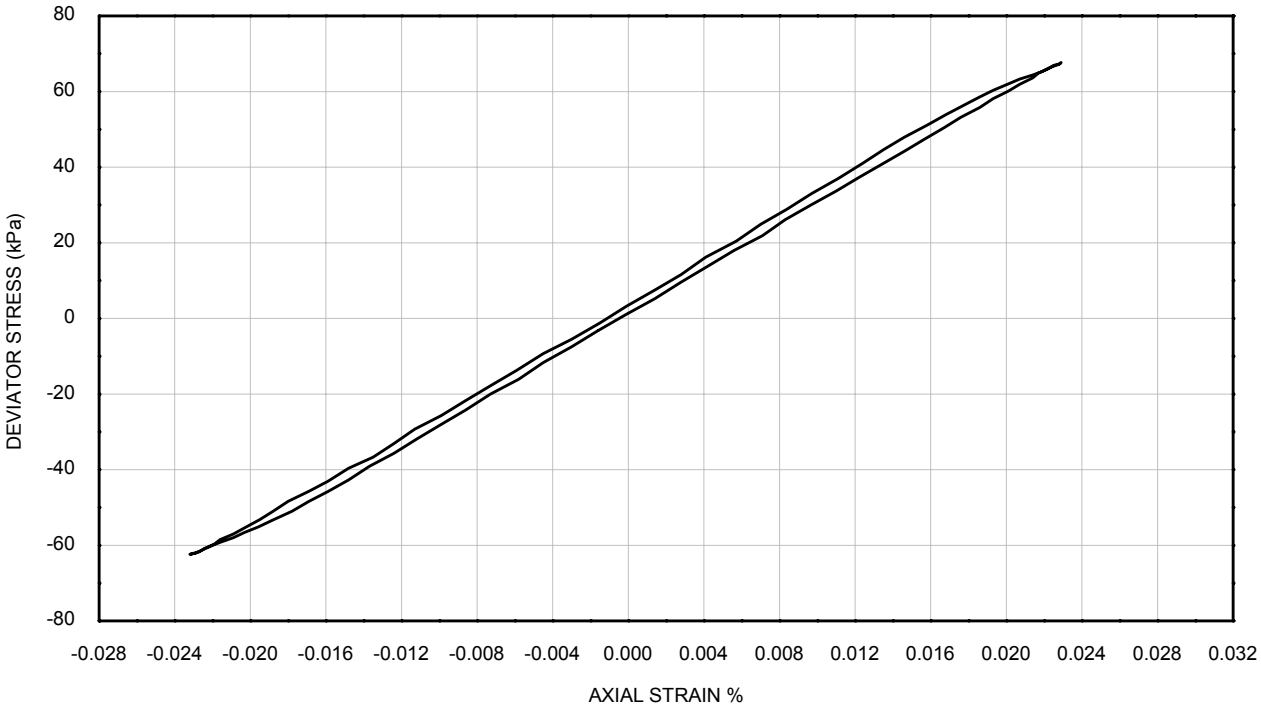
CYCLIC TRIAXIAL TEST
SATURATION AND CONSOLIDATION

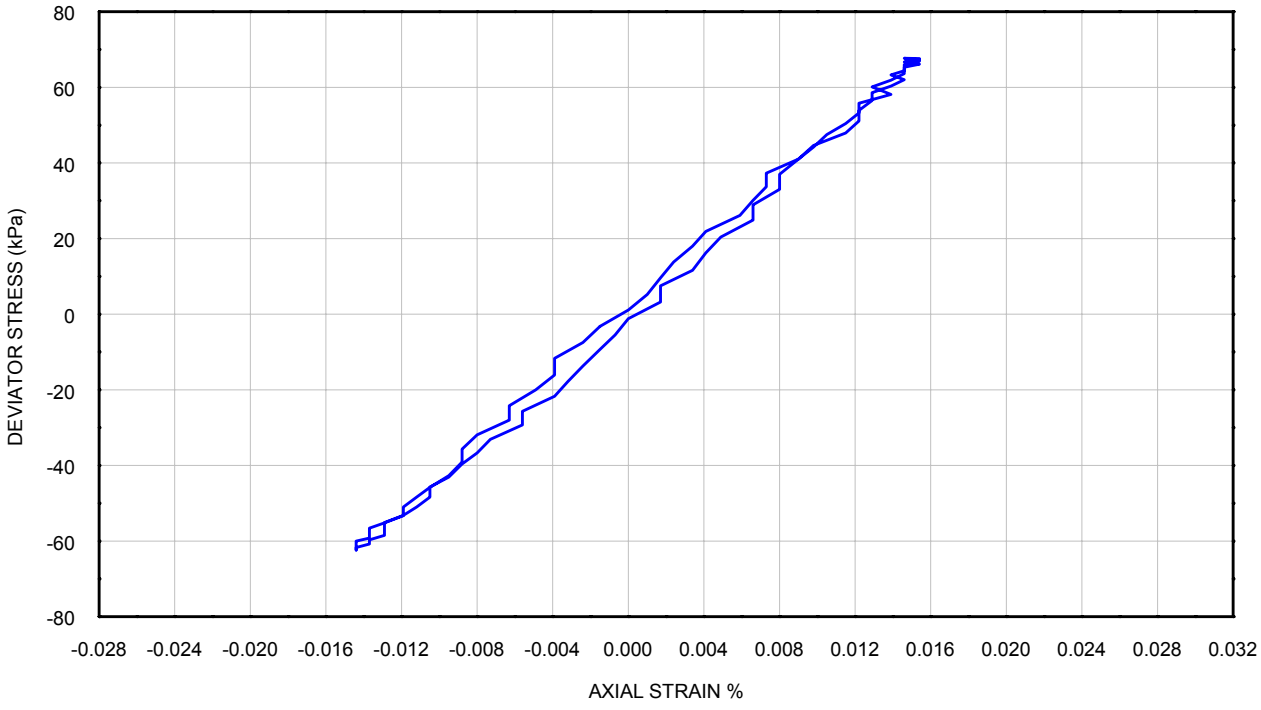




σ_{rc}'	:	839	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	839	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.90
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE

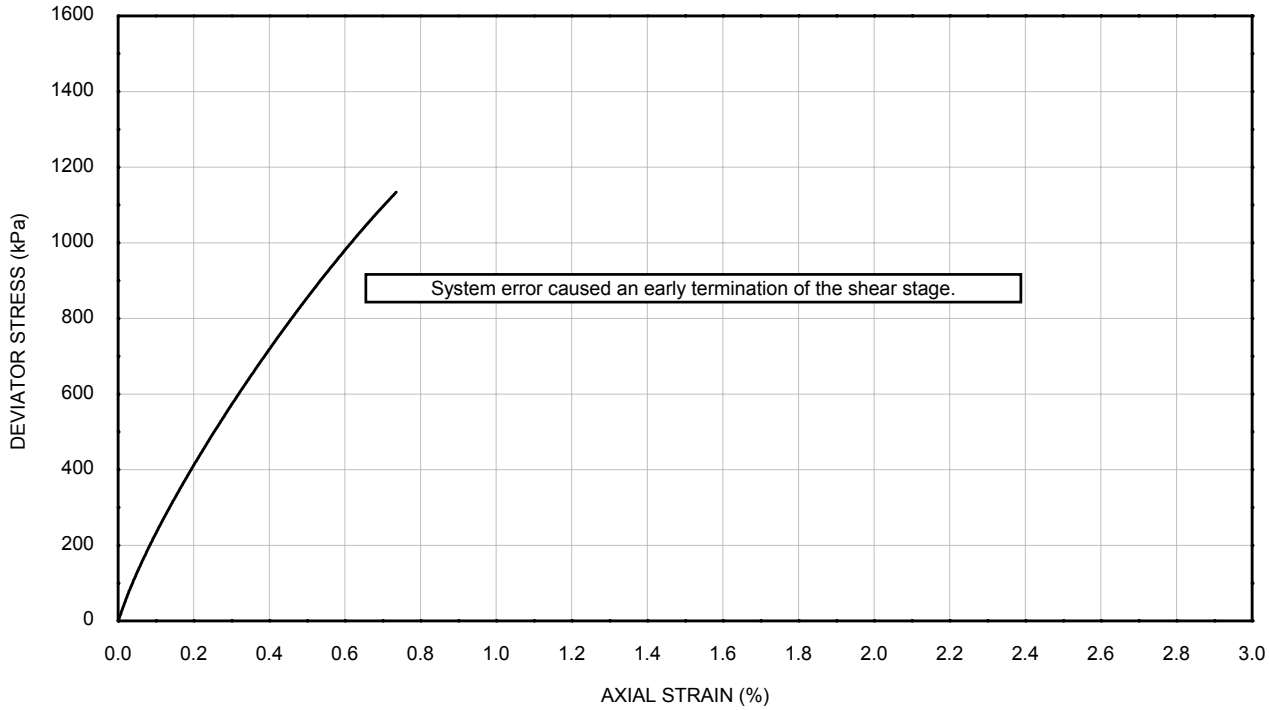


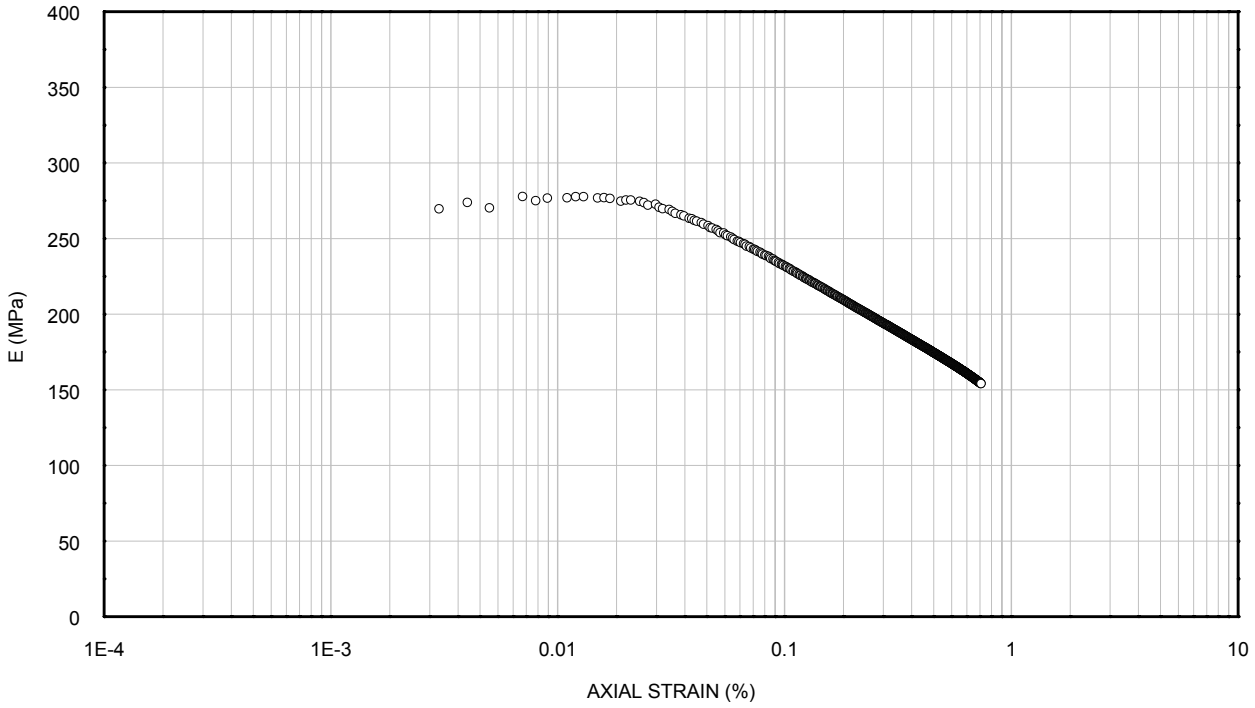


σ_{rc}'	:	839	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	839	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.90
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

Checked by: Date:
Approved by: Date:

CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE





σ_{rc}'	:	839	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	839	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.90
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

CYCLIC TRIAXIAL TEST
POST CYCLIC STATIC LOADING STAGE

Date: 00/01/1900
Drawn by: 0
Template Issue: WAL_ADV_CAU_i1
Date:
Checked by:
Date:
Approved by:

VISUAL DESCRIPTION
Very hard fissured dark greyish brown mottled dark green CLAY.

GENERAL	
Date test started	27/05/2011
Type of sample	Undisturbed
Specimen orientation	Vertical
Type of drains fitted	Radial & one end

INITIAL		
Diameter	(mm)	71.1
Length	(mm)	139.8
Moisture content	(%)	27.1
Bulk density	(Mg/m³)	1.89
Dry density	(Mg/m³)	1.49
Voids ratio		0.815
Degree of saturation	(%)	90

SATURATION		
Pressure increments applied	(kPa)	100
Differential pressure used	(kPa)	N/A
Pore pressure on completion	(kPa)	1339
Cell pressure on completion	(kPa)	1634
B value achieved		1.00
Initial effective stress	(kPa)	295

TESTING PROCEDURES USED	
Specimen Set-up	As per test specification FUGRO in-house testing procedure
Saturation	As per test specification FUGRO in-house testing procedure
Consolidation - Isotropic Consolidation - Anisotropic	As per test specification FUGRO in-house testing procedure
Shearing	As per test specification FUGRO in-house testing procedure
Note: FUGRO in-house testing procedures are available on request	

LOCAL GAUGES USED	
	Local Axial LVDT (x2)

Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.38

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

CONSOLIDATION : ISOTROPIC		
Cell pressure	(kPa)	1634
Back pressure	(kPa)	800
Effective radial pressure	(kPa)	834
Pore pressure on completion	(kPa)	801
Pore pressure dissipation	(%)	100
Moisture content	(%)	25.9
Bulk density	(Mg/m³)	1.91
Dry density	(Mg/m³)	1.52
Voids ratio		0.782
Degree of saturation	(%)	89
Volumetric strain (from water flow)	(%)	1.83
Local volumetric strain	(%)	0.83
Cvi	(m²/year)	-
Mvi	(m²/MN)	-
Permeability	(m/s)	-

CYCLIC SUMMARY			
Frequency	(Hz)	0.1	
No. applied cycles	(-)	13	
At Cycle 10		EXTERNAL	LOCAL
Strain	(%)	0.0029	0.0015
Young's Modulus, E	(MPa)	236	557
Damping ratio, D	(%)	4.5	3.3

Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.38

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Date:

Checked by:

Date:

Approved by:

SHEARING*		
Initial pore pressure	(kPa)	815
Initial effective stress p_0'	(kPa)	19
Rate of strain	(%/hour)	0.20
Initial deviator stress	(kPa)	0
At peak deviator stress		
Deviator stress	(kPa)	145
Undrained shear strength	(kPa)	72
Membrane correction applied	(kPa)	0
Drain correction applied	(kPa)	0
External axial strain	(%)	0.05
Local axial strain	(%)	
Excess pore pressure (mid-height)	(kPa)	84
Horizontal effective stress	(kPa)	-65
Vertical effective stress	(kPa)	80
Principal effective stress ratio		-1.2

LOCAL STRAIN PARAMETERS		
At 0.01% local axial strain		
Deviator stress		53
External axial strain		0.02
Excess pore pressure (mid-height)		28
Principal effective stress ratio		-5.0
Local Secant modulus $E_{u(local)}$	(MPa)	500.4
normalised w.r.t p_0'		25715.9
normalised w.r.t c_u		6922.4
At 0.1% local axial strain		
Deviator stress		145
External axial strain		0.05
Excess pore pressure (mid-height)		84
Principal effective stress ratio		-1.2
Local Secant modulus $E_{u(local)}$	(MPa)	441.5
normalised w.r.t p_0'		22692.1
normalised w.r.t c_u		6108.4
Degree of non-linearity during shear L		0.88

* System error caused an early termination of the static shear stage.

FINAL CONDITIONS		
Moisture content	(%)	25.9
Bulk density	(Mg/m^3)	1.91
Dry density	(Mg/m^3)	1.52

Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.38

ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Date: 00/01/1900

Drawn by: 0

Template Issue: WAL_ADV_CAU_i1

Checked by: Date:

Approved by: Date:

VISUAL DESCRIPTION
Very hard fissured dark greyish brown mottled dark green CLAY.

SPECIMEN PHOTOGRAPHS
Post test photograph was not possible.

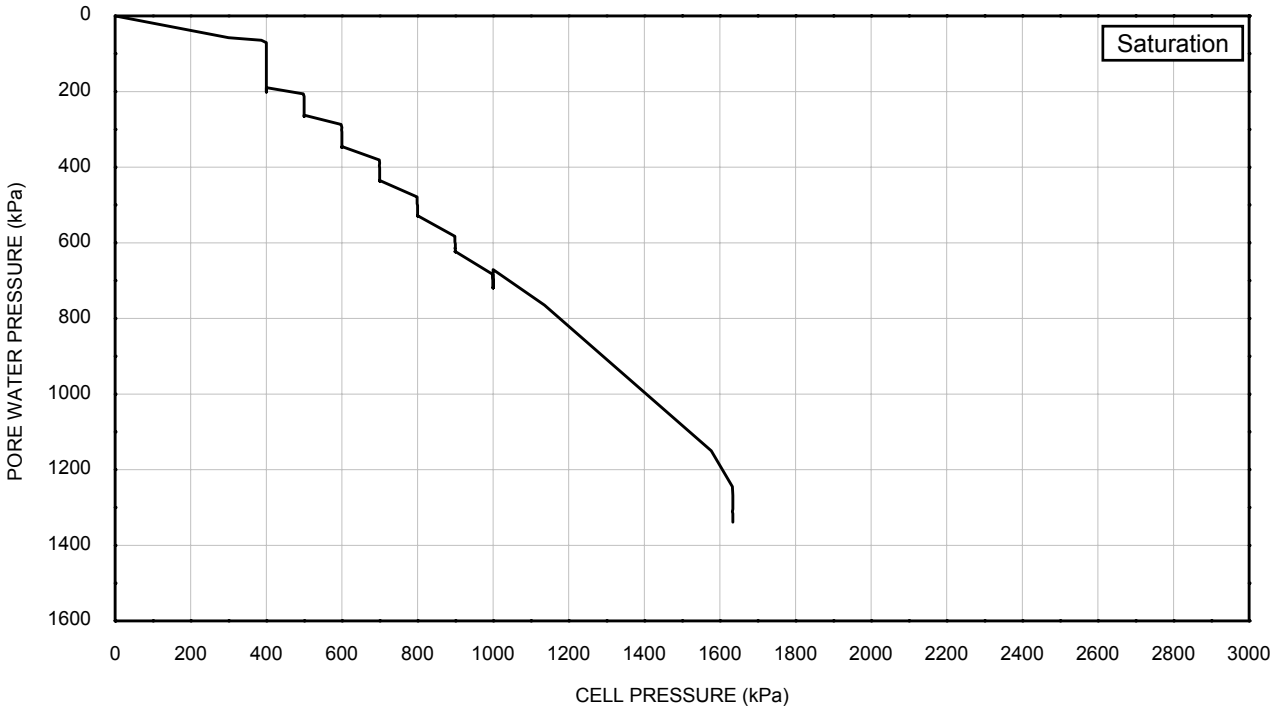
Borehole	CBH2009-8U
Sample	C5140
Depth (m)	83.38

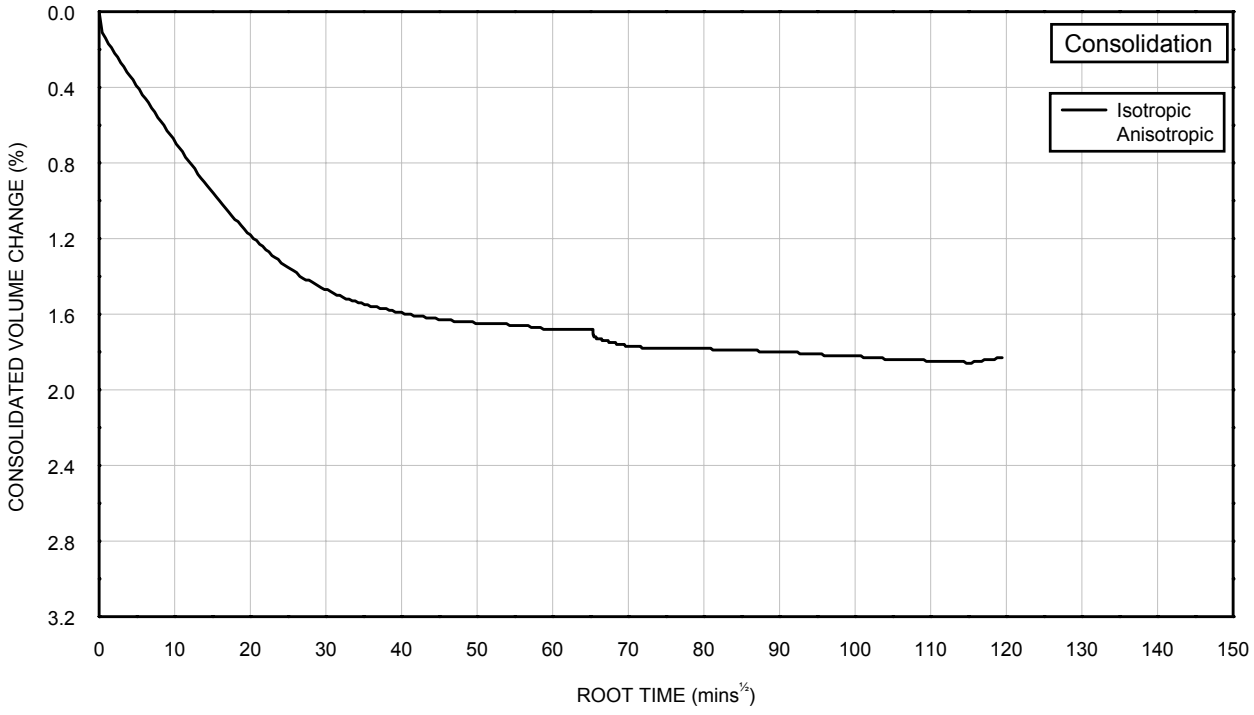
ISOTROPICALLY CONSOLIDATED UNDRAINED CYCLIC TRIAXIAL TEST : SINGLE SPECIMEN

Drawn by: PH Date: 11/07/2011

Template Issue: 3

File Name : J21016 / CBH2009-8U_C5139_CTX6.OPJ



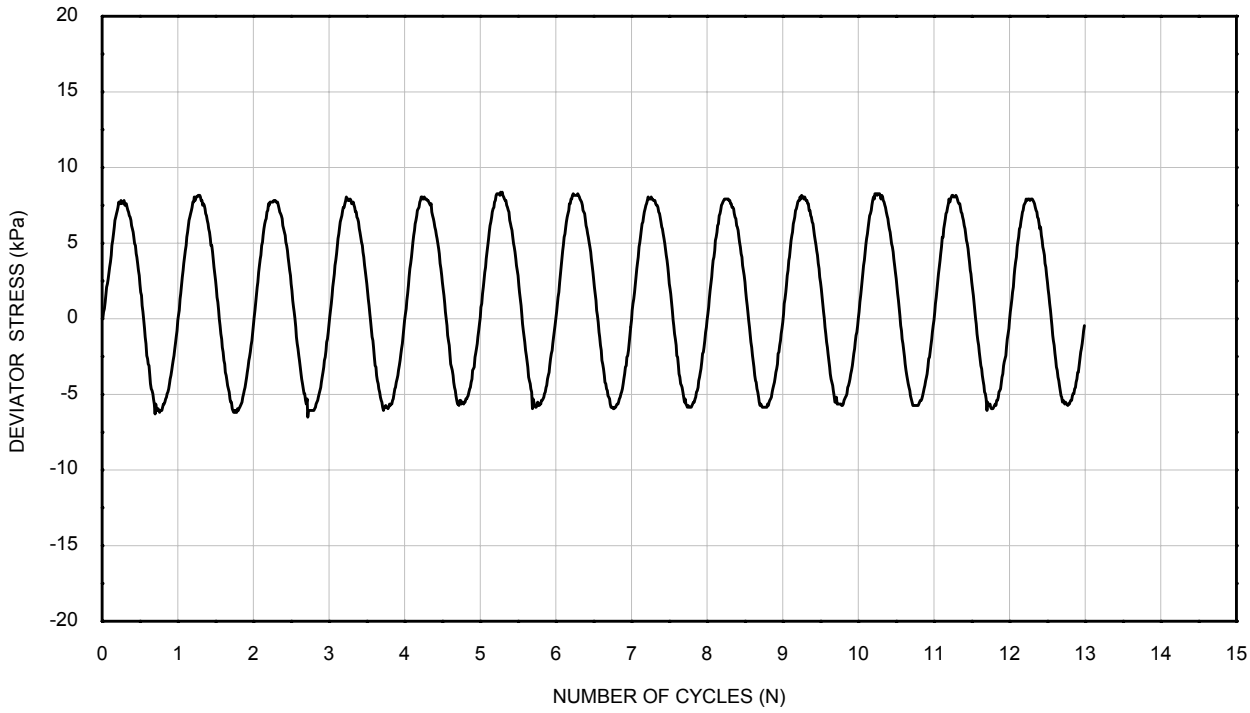


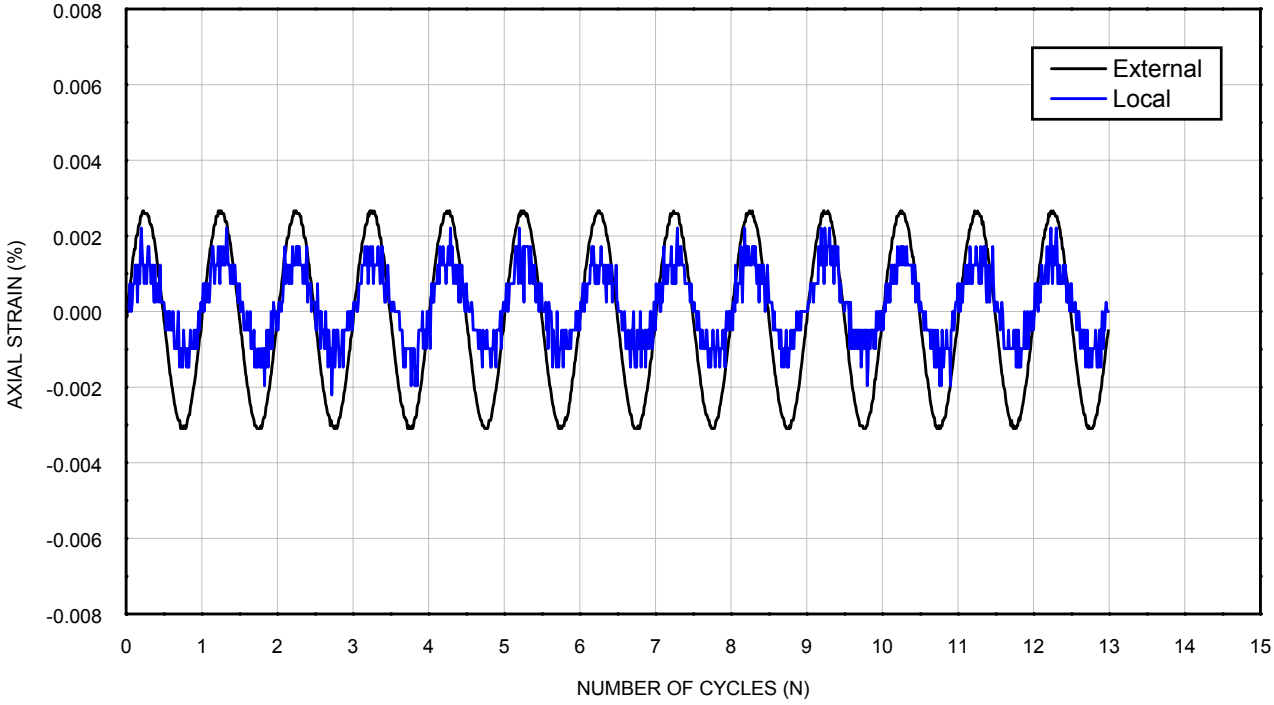
σ_{rc}'	:	834	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	834	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.38
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

Checked by: Date:

Approved by: Date:

CYCLIC TRIAXIAL TEST
SATURATION AND CONSOLIDATION

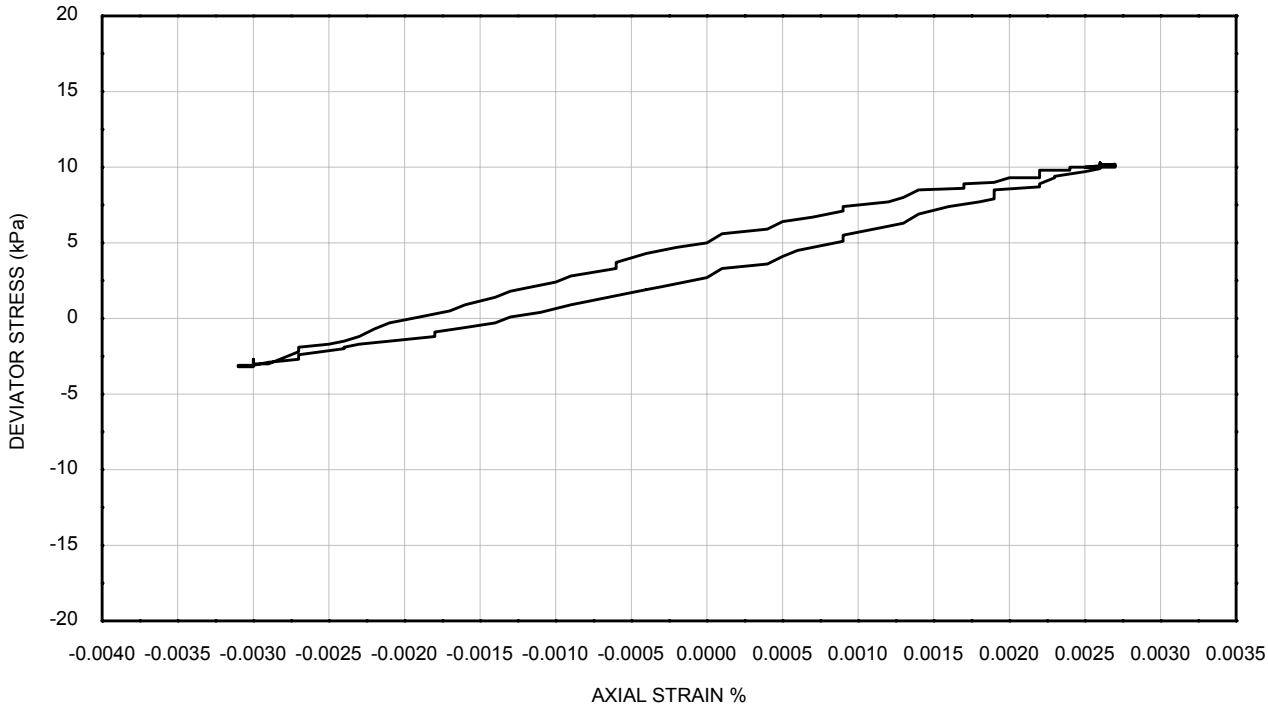


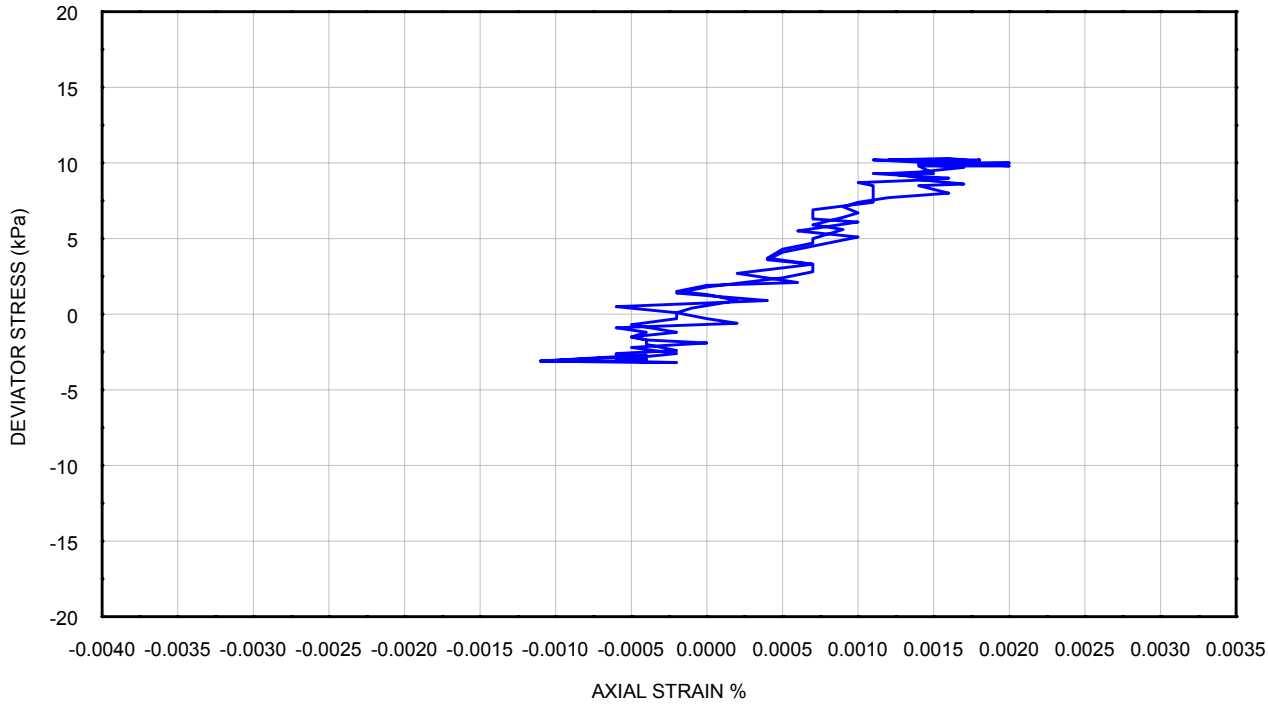


σ_{rc}'	:	834	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	834	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.38
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

Checked by: Date:
Approved by: Date:

CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE





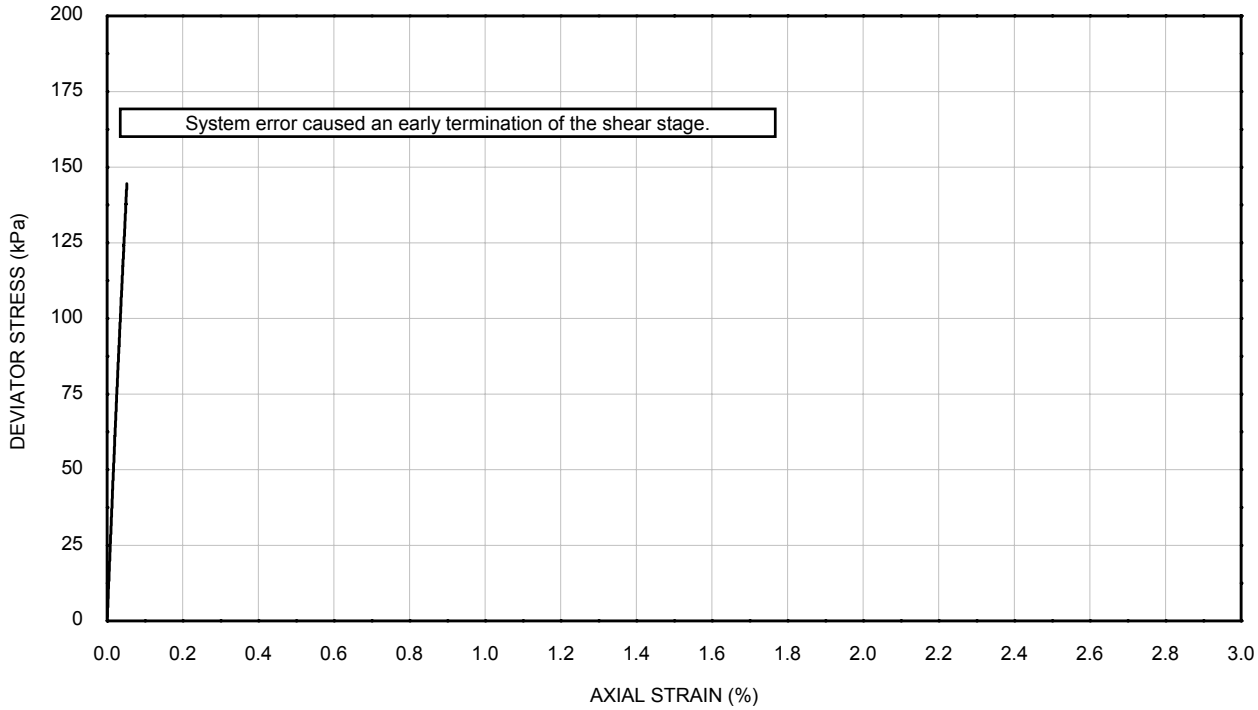
σ_{rc}'	:	834	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	834	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.38
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

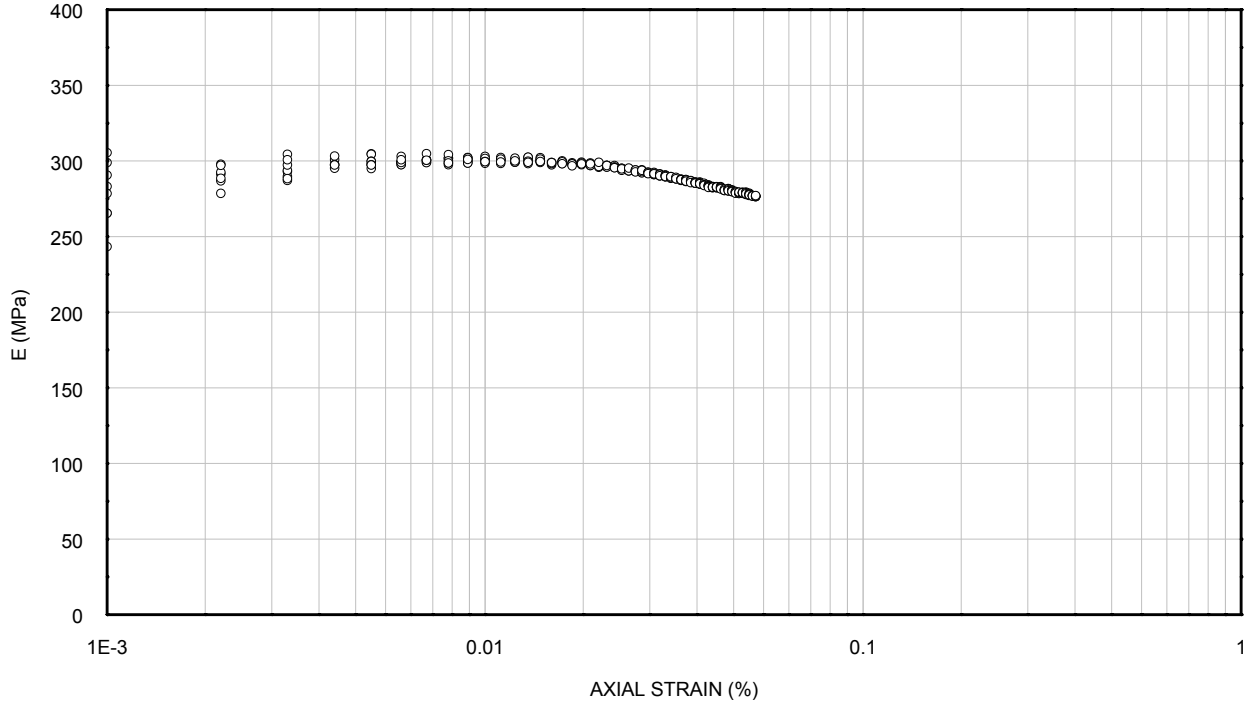
CYCLIC TRIAXIAL TEST
CYCLIC LOADING STAGE

Drawn by: PH Date: 11/07/2011

Template Issue: 3

File Name : J21016 / CBH2009-8U_C5139_CTX6.OPJ





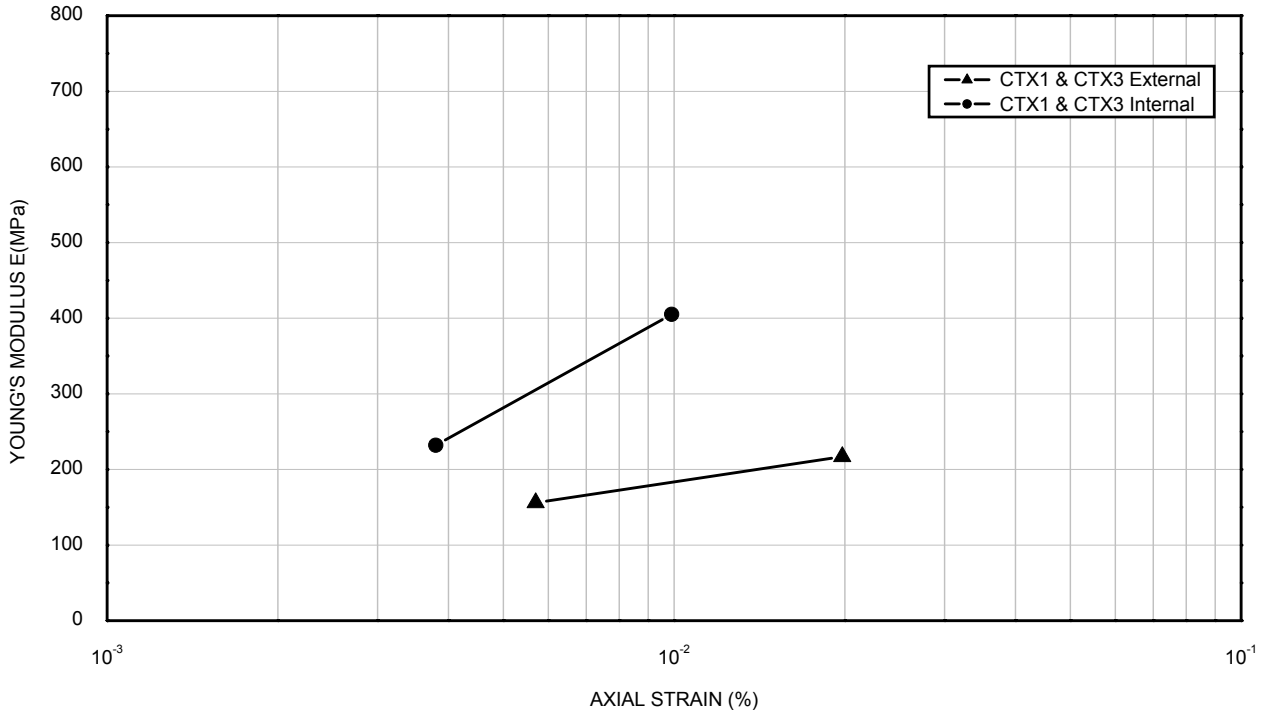
σ_{rc}'	:	834	kPa	Borehole	: CBH2009-8U
σ_{vc}'	:	834	kPa	Sample	: C5140
Nominal τ_{av}	:	--	kPa	Depth (m)	: 83.38
Nominal τ_{cy}	:	--	kPa		
Frequency	:	0.1	Hz		

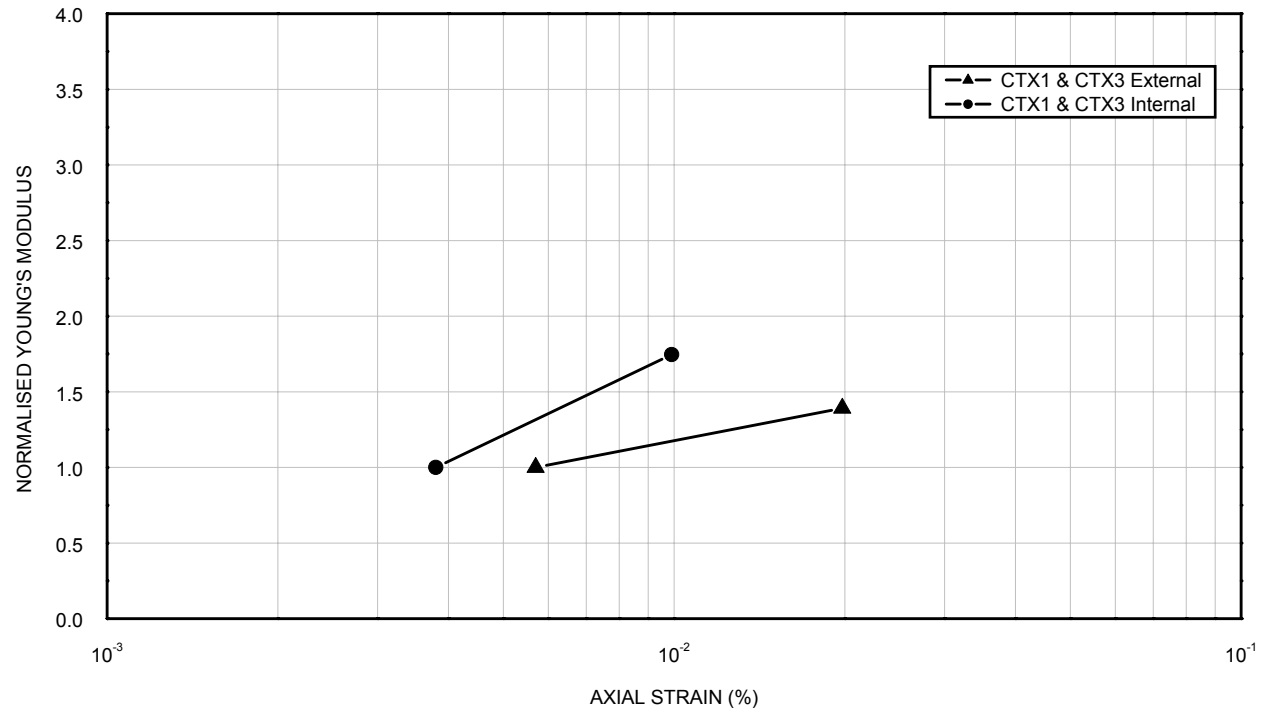
Checked by: Date:

Approved by: Date:

CYCLIC TRIAXIAL TEST
POST CYCLIC STATIC LOADING STAGE

Drawn by: Date:





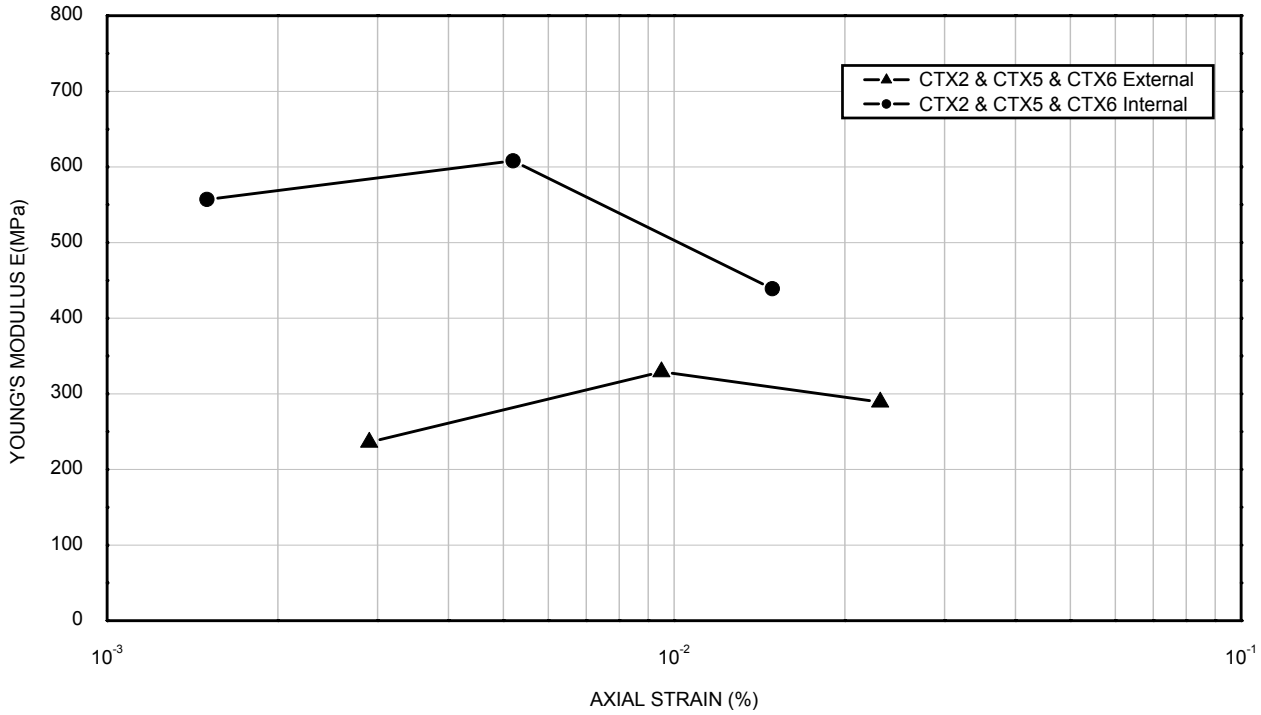
Template Issue: 2 File Name : / .OPJ

Date: Date:

Checked by: Approved by:

Test Number	:	CTX1	CTX3	CTX4
Borehole	:	CBH2009_8U	CBH2009_8U	CBH2009_8U
Sample	:	C5135	C5138	C5135
Depth (m)	:	56.15	59.55	56.32

Drawn by: Date:



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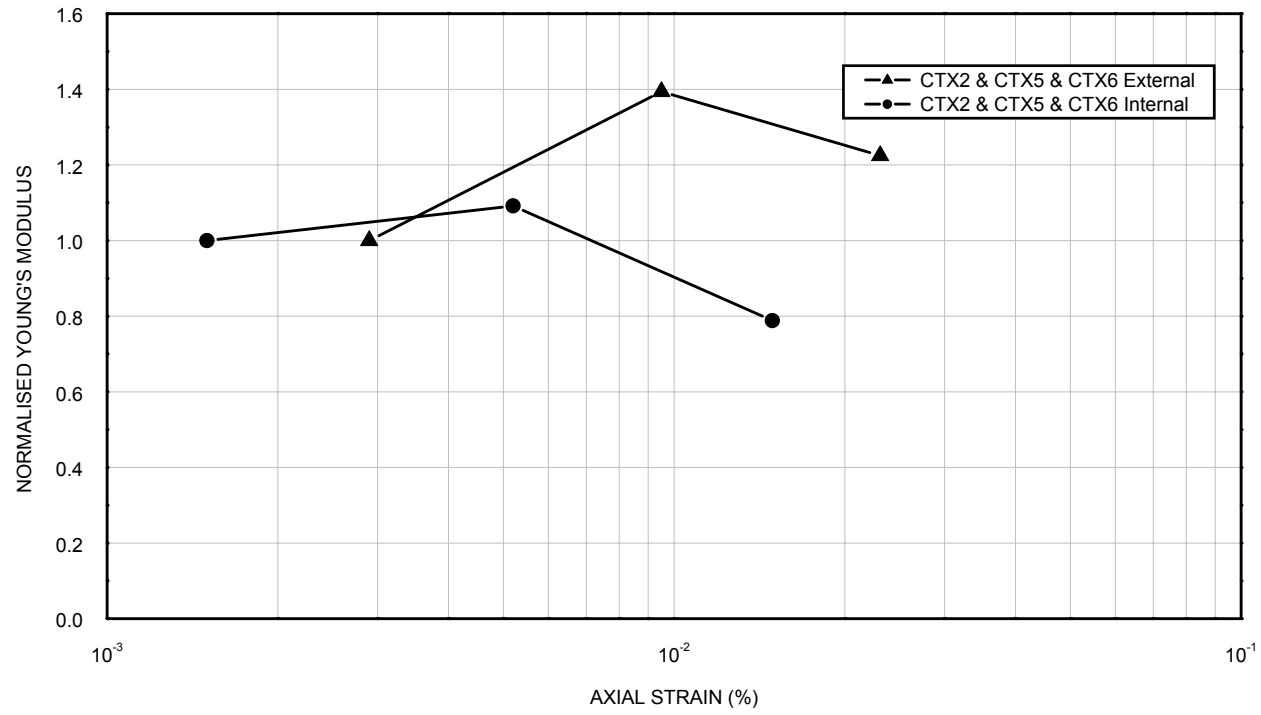


Checked by: Date: Approved by: Date:

Test Number	:	CTX2	CTX5	CTX6
Borehole	:	CBH2009_8U	CBH2009_8U	CBH2009_8U
Sample	:	C5140	C5140	C5139
Depth (m)	:	83.71	83.90	83.38

RESONANT COLUMN TEST

GENERAL

Resonant column (RC) tests are carried out using “GDS” commercial equipment. This apparatus incorporates a "fixed free" torsional resonant column device. The specimen is fully fixed at the bottom and an electrical or electromagnetic oscillator applies torsional motion to the top. This in-house method is based closely on the procedures given in ASTM D 4015-07, coupled with innovative modifications to the apparatus.

The test allows determination of shear modulus and damping ratio at small shear strain values in solid cylindrical soil specimens by torsional or flexural vibration. A generic outline of the test procedure is presented here.

TEST PROCEDURE

RC tests are typically carried out on undisturbed specimens prepared to a height to diameter ratio of 2:1, in accordance with the procedures given in ASTM D 4015-07, except as described in the following methodology. Pre-test triaxial cell checks are undertaken in accordance with standard procedures.

Specimen Preparation

(1) Cohesive Specimens:

The specimen is extruded from the sample tube and carefully trimmed to a height to diameter ratio of approximately 2:1 in accordance with BS1377:1990. The specimen is weighed and measured to determine the bulk density and a moisture content determination is carried out on a portion of soil representative of the soil to be tested. This allows an estimate to be made of the initial air-voids in the specimen.

(2) Cohesionless Specimens:

The specimen is reconstituted by compaction in a mould, to a specified density using the general method proposed by Ladd (1978) modified in accordance with specification requirements and/or standard procedures. Typically the soil is tamped into the mould in eight layers. The initial layers are compacted to a lower relative density than the target density in order to account for the additional compaction caused by subsequent layers, and so achieve a final uniform dry density across the whole specimen.

After preparation the specimen is placed on a base platen mounted inside a triaxial cell, with allocation for pore water pressure measurement and drainage from the specimen. The specimen is then enclosed within a rubber membrane which is sealed to the base platen with rubber O rings. The triaxial cell arrangement incorporates a top mounted actuator to allow full control of the vertical movement of the vibration excitation device and top platen assembly during placement of the specimen. The top (active-end) platen is connected to the vibration excitation device and seated onto the upper end of the soil specimen under a small vertical seating stress. The membrane is then sealed to the top platen with a rubber O ring.

Both the upper and lower platens incorporate a fully fixed, fully rigid sintered bronze disc, sufficiently roughened to provide an efficient interface with each end of the specimen. Several roughness profiles are available allowing for the optimum coupling to be selected for a range of soil types. For testing of hard cohesive or semi rock specimens where the interface disc alone may not provide an adequate connection, a fully fixed coupling may be achieved using a thin layer of dental plaster or other suitable semi-permanent fixative at the platen specimen interface.

Vibration Excitation Device

The vibration excitation device consists of either an electrical servo motor or a Sokoe type electromagnetic arrangement, each capable of applying a sinusoidal torsional vibration to the active-end platen. These oscillators each comply with the specifications given in ASTM D 4015-07. The coupling between the oscillator and the platen is fully rigid.

Apparatus Assembly

The oscillator, rotational proximitor and accelerometer are connected to the digital control and acquisition system. The cell wall is lowered into place and securely fixed in position at the cell top. The external LVDT, used to measure vertical displacement during consolidation and shear is conneted to the specimen cap.

Saturation

After assembly the cell is partially filled with either de-aired water or silcon oil until the fluid level is above that of the entire membrane. Cell pressure is then applied to the specimen via the air-liquid interface using a regulated air pressure line.

An initial pore-water pressure reading is taken and an increment of cell pressure is applied, whilst noting the corresponding increase in pore-water pressure measured in the specimen. If the increase in pore-water pressure is less than 0.95 of the increase in cell pressure a further increase in cell pressure is applied and the initial process repeated. Where it is not possible to fully saturate the specimen under constant moisture content, the standard procedure for using a back pressure may be employed.

It should be noted that during back pressure saturation the specimen is typically allowed to uptake an amount of water approximately equal to the estimated air-voids before a further increment of cell pressure is applied. Pore-water pressure is normally measured at the base of the specimen and drainage/back pressure is applied to the top of the specimen.

Isotropic Consolidation

The specimen is typically isotropically consolidated to the required effective principle stress.

The required effective stress is applied to the specimen via the cell pressure, with a minimum back pressure of 300 kPa being used to maintain specimen saturation. An initial reading is taken on the volume change indicator and the drainage line is opened to the drained face (top) of the specimen, with readings of volume change and time being logged automatically via the control software. Pore-water pressure dissipation is recorded on the undrained face (base) of the specimen. Consolidation is considered to be complete when the excess pore-water pressure is less than 5% of the effective stress and there is no significant volume change for a period of one hour.

At the end of the consolidation stages the consolidated cross sectional area and length of the specimen are calculated using conventional assumptions, based on the volume changes during the saturation and the consolidation phases.

Torsional Vibration

The following steps are automatically performed by the digital control system in order to establish the resonant frequency, strain amplitude and system damping at each torque increment:

(i) A nominal torque is applied and the frequency of excitation increased until the applied current and the acceleration of the top platen are in phase (i.e the fundamental system resonance frequency is obtained). This is the starting point for the resonant phase.
(ii) Readings of torque input, proximitor displacement, acceleration and frequency are continually logged during resonance and strain amplitude calculated.
(iii) At each strain amplitude a value of damping is measured using the free-vibration amplitude decay method, see below.
(iv) The torque reading is increased and steps (i) through (iii) are repeated. At intervals, the torque level is reduced to the initial level and an additional set of readings is taken. The results of this test are compared to the results of the first and will indicate any changes in the specimen due to vibration at higher strain levels.
(v) Steps (i) through (iv) are repeated, increasing the power until there is no defined peak in the frequency response curve or a specified maximum strain amplitude is reached.

Following completion of the torsional vibration stage the specimen may be consolidated or swelled to a different effective stress state and the vibration testing repeated.

Calibration

The mass polar moment of inertia of the resonant column drive system (I_o) is derived experimentally according to the procedures defined in ASTM D 4015-07. Tests are performed to compute the resonant frequency of the system in torsion using a range of calibration rods.

Free-vibration Damping Ratio

When performing damping ratio, the apparatus is designed to minimise the influence of equipment damping. Historically, during free vibration decay (after the power is normally shut off at resonance) 'back' EMF is usually generated in the coils by the movement of the magnets, causing large equipment damping errors. In the Soil Mechanics resonant column the software switches the hardware to provide an 'open circuit' through the coils during free vibration decay, which prevents 'back' EMF generation.

PRESENTATION OF RESULTS

The results of the tests are presented in accordance with ASTM D 4015-07. Depending on project requirements, the following plots may be presented:

(i) Root time versus vertical strain during consolidation.

(ii) Shear strain (%) versus shear modulus (MPa).

(iii) Shear strain (%) versus free-vibration damping ratio.

ACCURACY OF MEASUREMENTS

Horizontal stress	$\pm$ 1 kPa
Vertical stress	$\pm$ 1 kPa
Deformation	$\pm$ 0.01 mm

REFERENCES

ASTM D 6528-07 (2007) “Standard Test Methods for Modulus and Damping of Soils by Resonant-Column” American Society for the Testing of Materials.

Ladd, R. S. "Preparing Test Specimens Using Undercompaction", Geochemical Testing Journal, GTJODJ, Vol. 1, No. 1, March 1978, pp 16-23.

Available specimen sizes (dxh)

- **50mm x 100mm** ✓
- **70mm x 140mm** ✓
- **Custom** ✓

Power amplifier

- **Current driven** ✓

Software

- **Fully automated** ✓

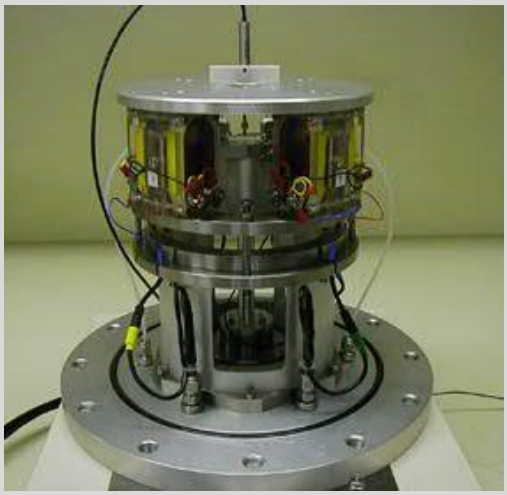
Available tests

- **Torsion** ✓
- **Flexure** ✓
- **Damping** ✓

Optional tests

- ***Torsional shear*** ✓

Resonant Column Apparatus (RCA)



What is it?

The GDS Resonant Column Apparatus (RCA) is used to excite one end of a confined solid or hollow cylindrical soil specimen.

Features

Resonance in torsion.
- Resonance in flexure.
- Damping Ratio in torsion.
- Damping Ratio in flexure.
- Slow speed (<2Hz) torsional shear.

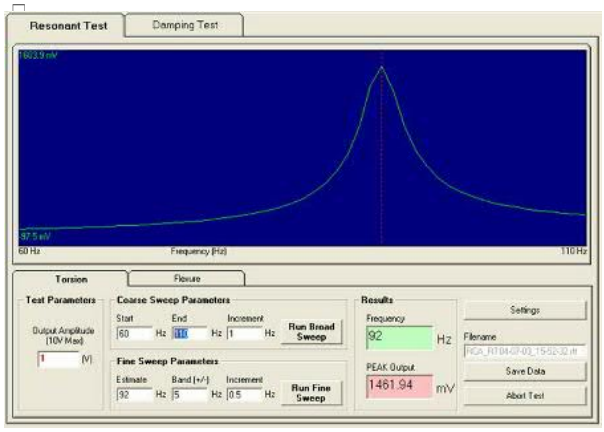


Fig. 1 GDS RCA software resonance test data

Technical Specifications

Damping by free vibration

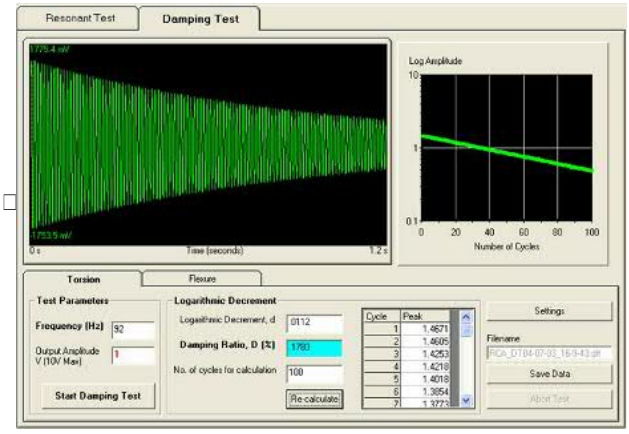


Fig.2 GDS RCA software damping test data

Torsional / flexural vibrations

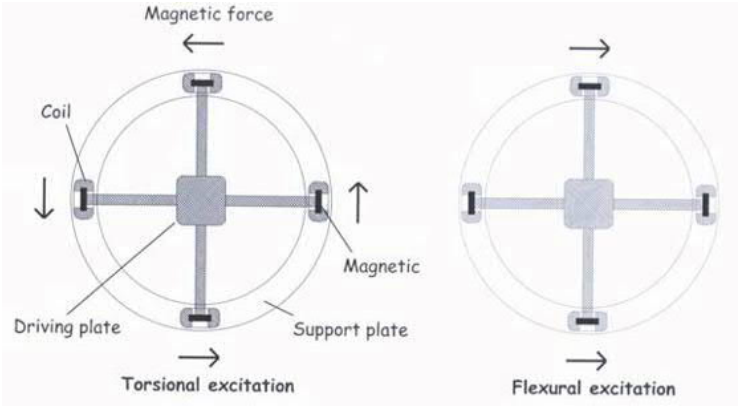


Fig. 3 Drive schematic for torsional and flexural excitation

State-of-the-art current-driven amplifier

Calibration equipment

Fig. 4 Calibration bars and weights

Why buy a GDS RCA?

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-
-
-
-
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-
-

Due to continued development specifications may change without notice

ISOTROPICALLY CONSOLIDATED UNDRAINED RESONANT COLUMN TEST
In house method based on ASTM D4015

Project No	A0012-10	Sample Details:	Hole No.	CBH2009-7
Project	ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE		Sample No	17
			Depth (m)	54.35-54.75
			Type	CS

Soil Description Soft brownish grey CLAY.

Preparation Undisturbed

Sample details

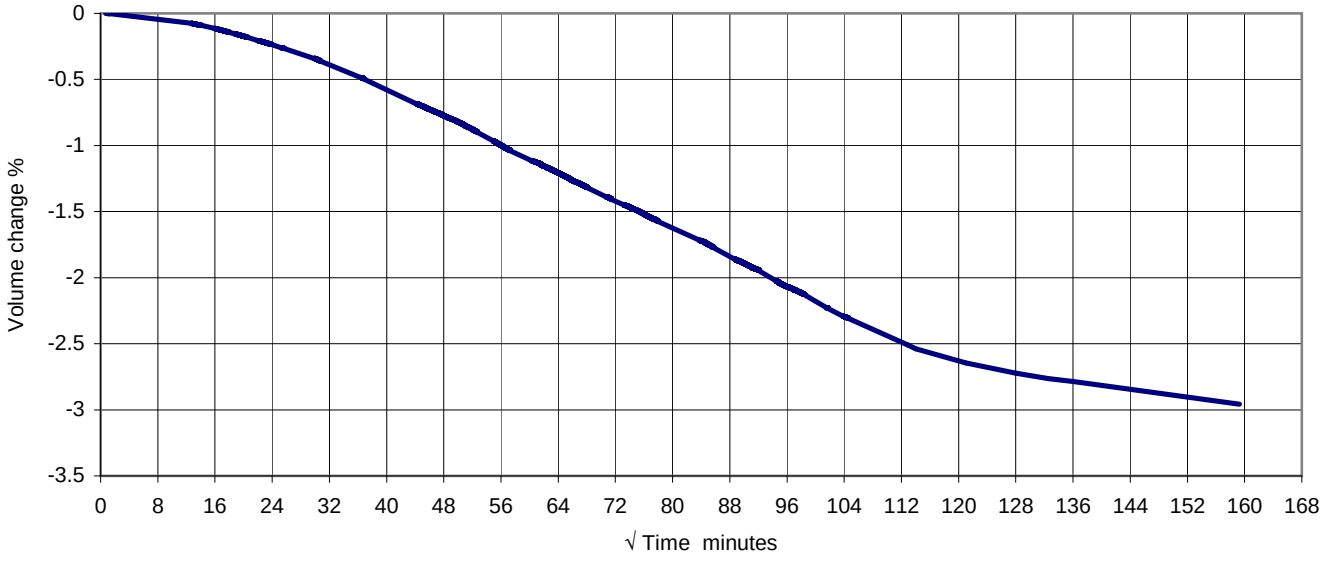
	Particle Density	2.65	Mg/m^3	Assumed

SPECIMEN DETAILS

Initial	Diameter	72.20	mm
	Height	140.52	mm
	Volume	575.31	mL
	Mass of specimen	1071.80	g
	Bulk density	1.86	Mg/m^3
	Moisture content	34.7	%
	Dry density	1.38	Mg/m^3
	Voids ratio	0.92	
	Initial saturation	100	%

TEST CONDITIONS

Saturation	Specimen saturated by application of cell pressure only.		
	Final back pressure	0	kPa
	Final B value	0.96	
Isotropic Consolidation	Cell pressure applied	650	kPa
	Effective stress	550	kPa



ISOTROPICALLY CONSOLIDATED UNDRAINED RESONANT COLUMN TEST
In house method based on ASTM D4015

Project No	A0012-10	Sample Details:	Hole No.	CBH2009-7
Project	ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE		Sample No	17
			Depth (m)	54.35-54.75
			Type	CS

RESONANCE AND DAMPING TEST

			Specimen after consolidation					
Cell pressure	650	kPa	Mass	1054.4	g	Bulk density	1.890	Mg/m^3
Back pressure	100	kPa	Diameter	71.5	mm	Moisture content	32.5	%
Effective stress	550	kPa	Height	139.1	mm	Dry density	1.426	Mg/m^3

Equipment GDS Instruments Resonant Column cell

Type of test Torsional shear modulus with free end damping

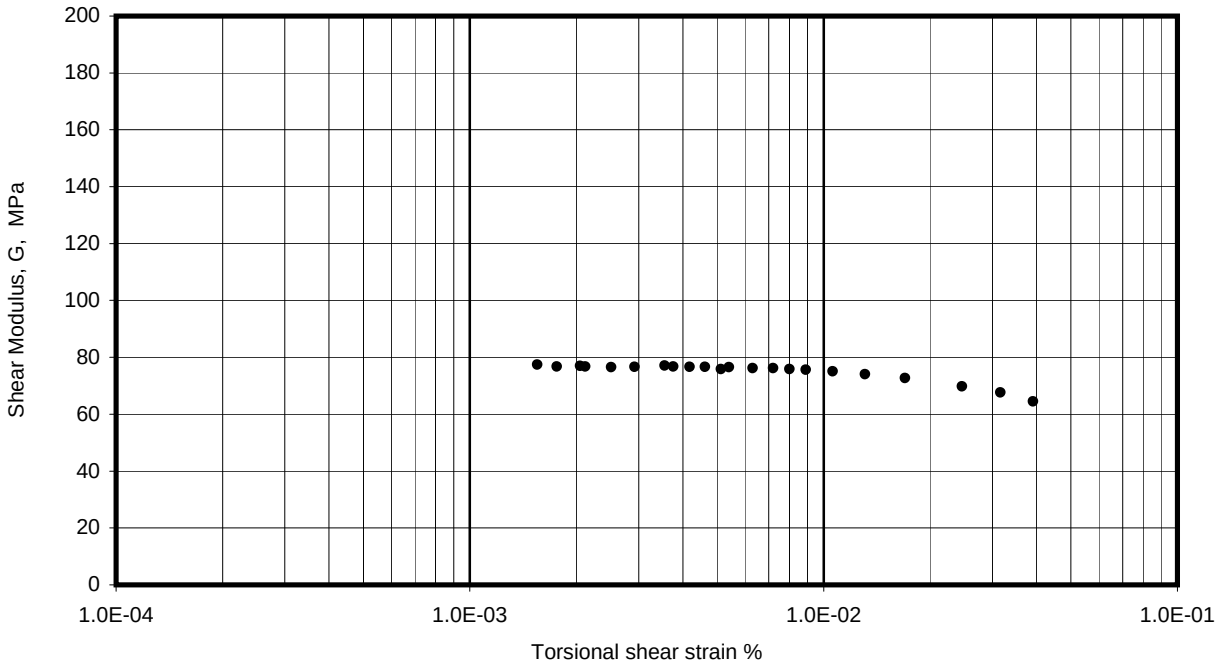
Table of results

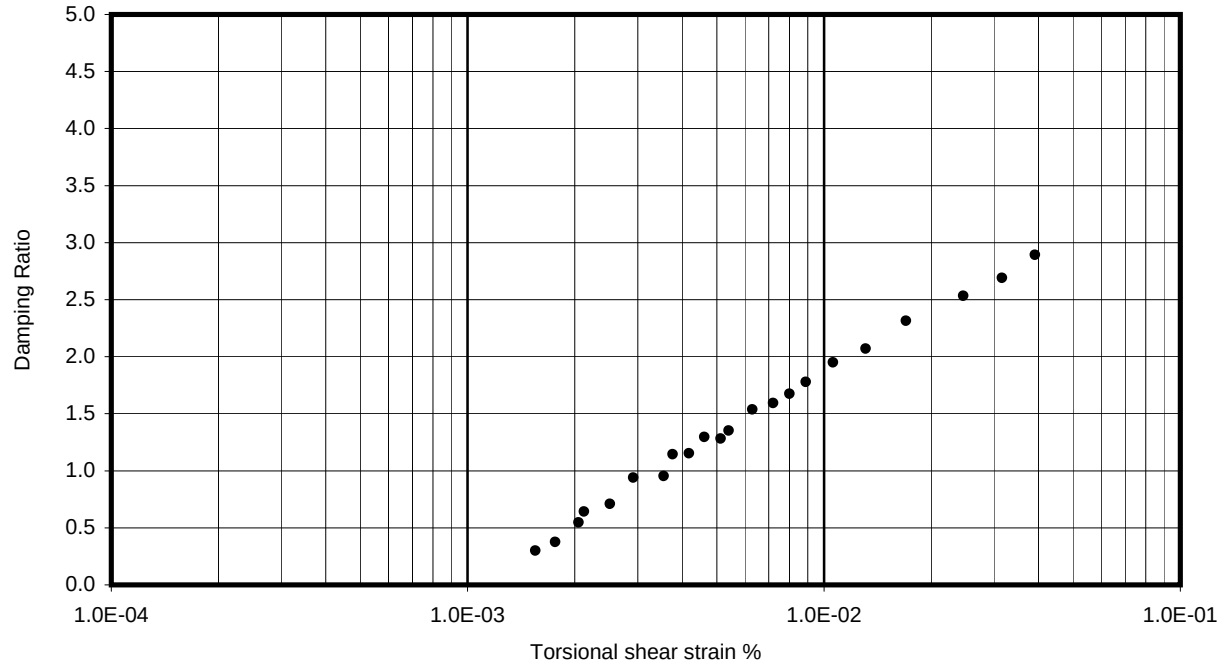
Frequency (Hz)	Shear Modulus,G MPa	Shear strain %	Damping Ratio	Log decrement
95.9	77.4	0.00155	0.3008	0.0189
95.5	76.8	0.00176	0.3756	0.0236
95.6	77.0	0.00205	0.5475	0.0344
95.5	76.8	0.00212	0.6430	0.0404
95.3	76.5	0.00251	0.7087	0.0445
95.4	76.6	0.00292	0.9390	0.0590
95.7	77.1	0.00355	0.9533	0.0599
95.5	76.8	0.00376	1.1458	0.0720
95.4	76.6	0.00418	1.1522	0.0724
95.4	76.6	0.00462	1.2970	0.0815
94.9	75.8	0.00513	1.2811	0.0805
95.3	76.5	0.00540	1.3511	0.0849
95.1	76.2	0.00630	1.5373	0.0966
95.1	76.2	0.00720	1.5929	0.1001
94.9	75.8	0.00800	1.6757	0.1053
94.8	75.7	0.00890	1.7775	0.1117
94.4	75.0	0.01060	1.9493	0.1225
93.8	74.1	0.01310	2.0702	0.1301
92.9	72.7	0.01700	2.3151	0.1455
91.0	69.7	0.02460	2.5329	0.1592
89.6	67.6	0.03159	2.6919	0.1692
87.5	64.5	0.03910	2.8938	0.1819

ISOTROPICALLY CONSOLIDATED UNDRAINED RESONANT COLUMN TEST
In house method based on ASTM D4015

Project No	A0012-10	Sample Details:	Hole No.	CBH2009-7
Project	ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE		Sample No	17
			Depth (m)	54.35-54.75
			Type	CS

PARAMETER PLOTS

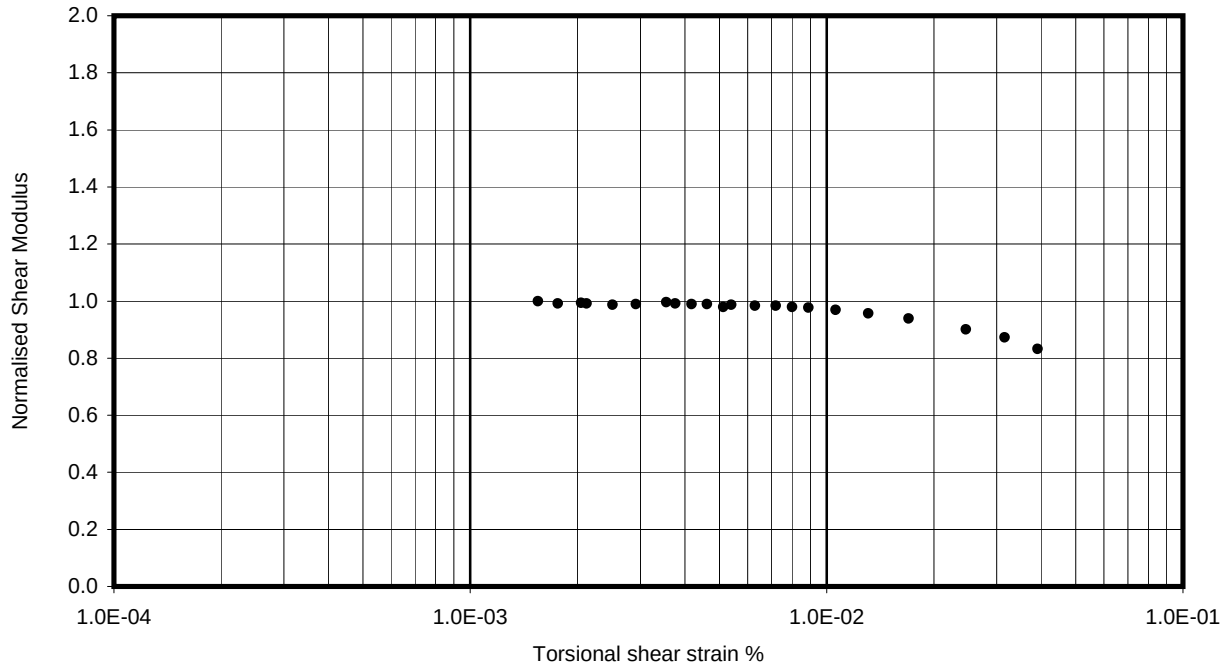


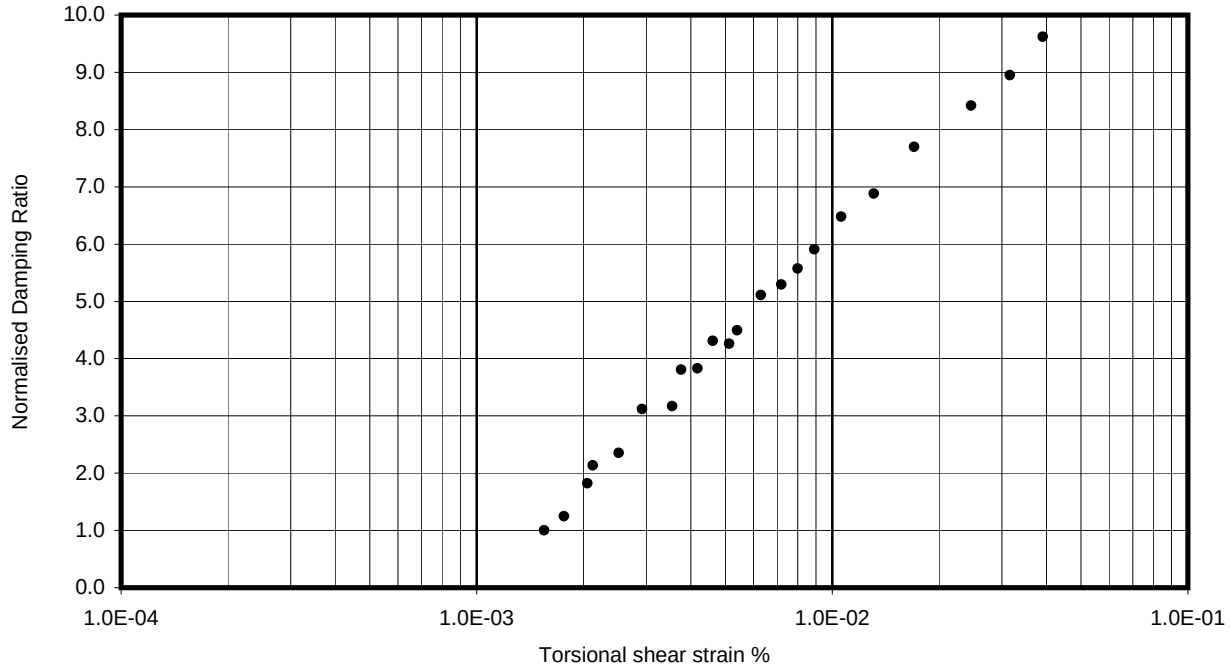


ISOTROPICALLY CONSOLIDATED UNDRAINED RESONANT COLUMN TEST
In house method based on ASTM D4015

Project No	A0012-10	Sample Details:	Hole No.	CBH2009-7
Project	ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE		Sample No	17
			Depth (m)	54.35-54.75
			Type	CS

NORMALISED PLOTS





ISOTROPICALLY CONSOLIDATED UNDRAINED RESONANT COLUMN TEST
In house method based on ASTM D4015

Project No	A0012-10	Sample Details:	Hole No.	CBH2009-8U
Project	ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE		Sample No	132
			Depth (m)	81.12-81.60
			Type	CS

Soil Description Very stiff grey slightly sandy silty fissured CLAY.

Preparation Undisturbed

Sample details

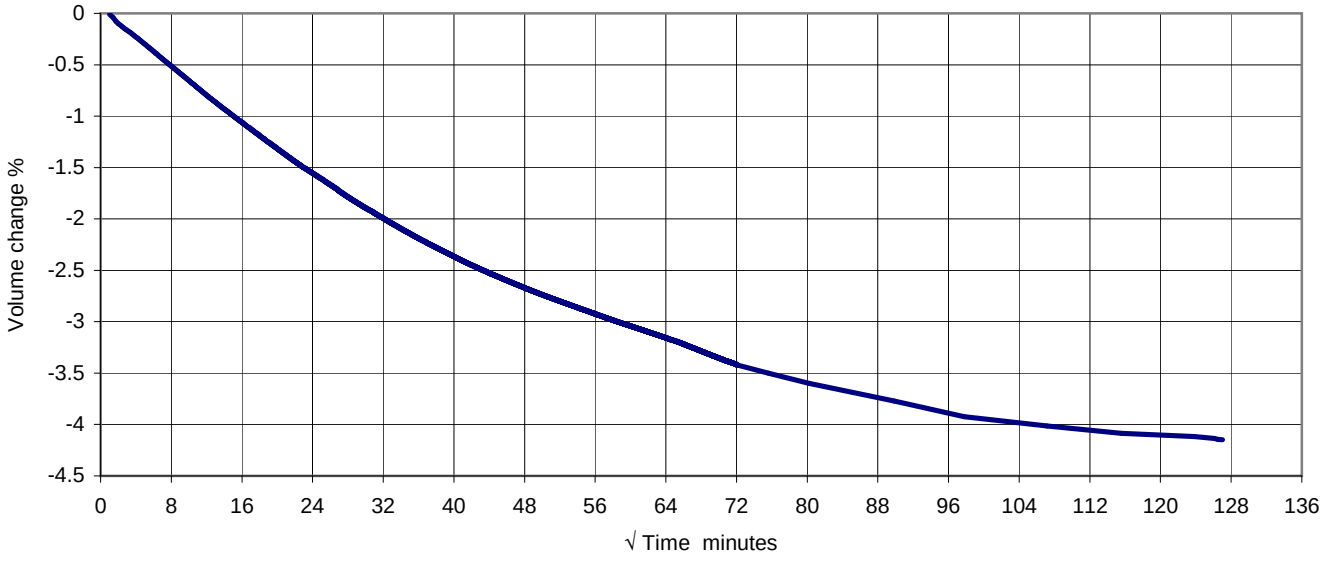
	Particle Density	2.65	Mg/m^3	Assumed

SPECIMEN DETAILS

Initial	Diameter	72.20	mm
	Height	140.52	mm
	Volume	575.31	mL
	Mass of specimen	1037.19	g
	Bulk density	1.80	Mg/m^3
	Moisture content	38.0	%
	Dry density	1.31	Mg/m^3
	Voids ratio	1.03	
	Initial saturation	98	%

TEST CONDITIONS

Saturation	Specimen saturated by application of cell pressure only.		
	Final back pressure	0	kPa
	Final B value	0.96	
Isotropic Consolidation	Cell pressure applied	900	kPa
	Effective stress	800	kPa



ISOTROPICALLY CONSOLIDATED UNDRAINED RESONANT COLUMN TEST
In house method based on ASTM D4015

Project No	A0012-10	Sample Details:	Hole No.	CBH2009-8U
Project	ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE		Sample No	17
			Depth (m)	81.12-81.60
			Type	CS

RESONANCE AND DAMPING TEST

			Specimen after consolidation					
Cell pressure	900	kPa	Mass	1013.3	g	Bulk density	1.837	Mg/m^3
Back pressure	100	kPa	Diameter	71.2	mm	Moisture content	34.8	%
Effective stress	800	kPa	Height	138.6	mm	Dry density	1.362	Mg/m^3

Equipment GDS Instruments Resonant Column cell

Type of test Torsional shear modulus with free end damping

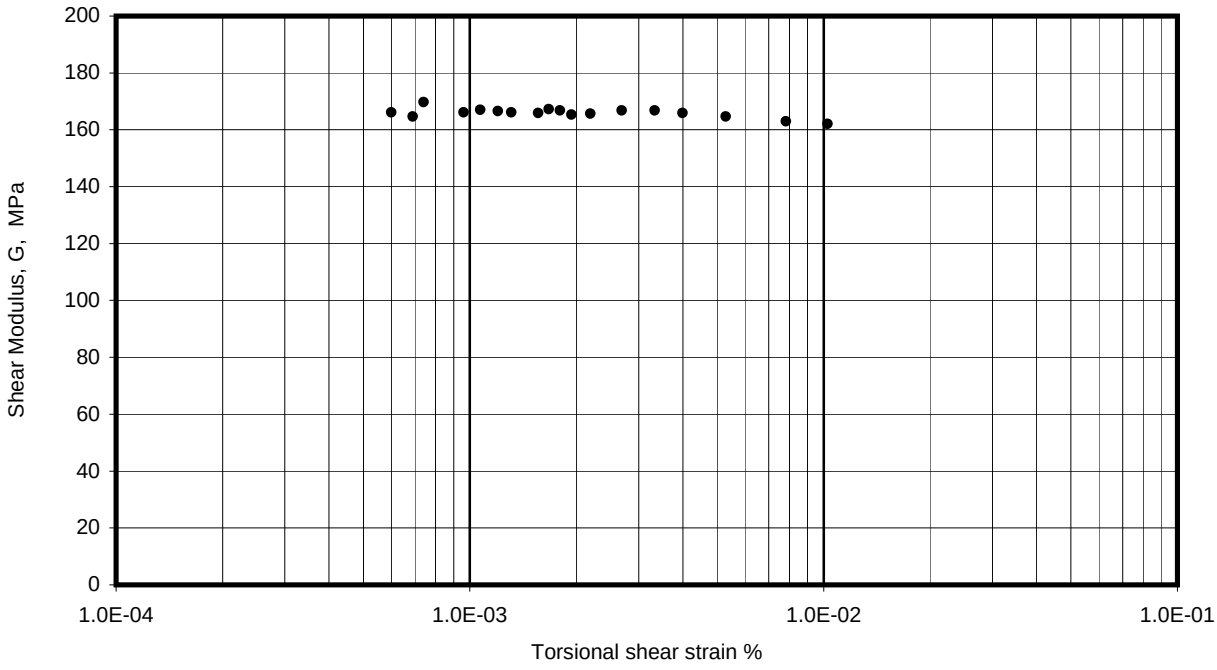
Table of results

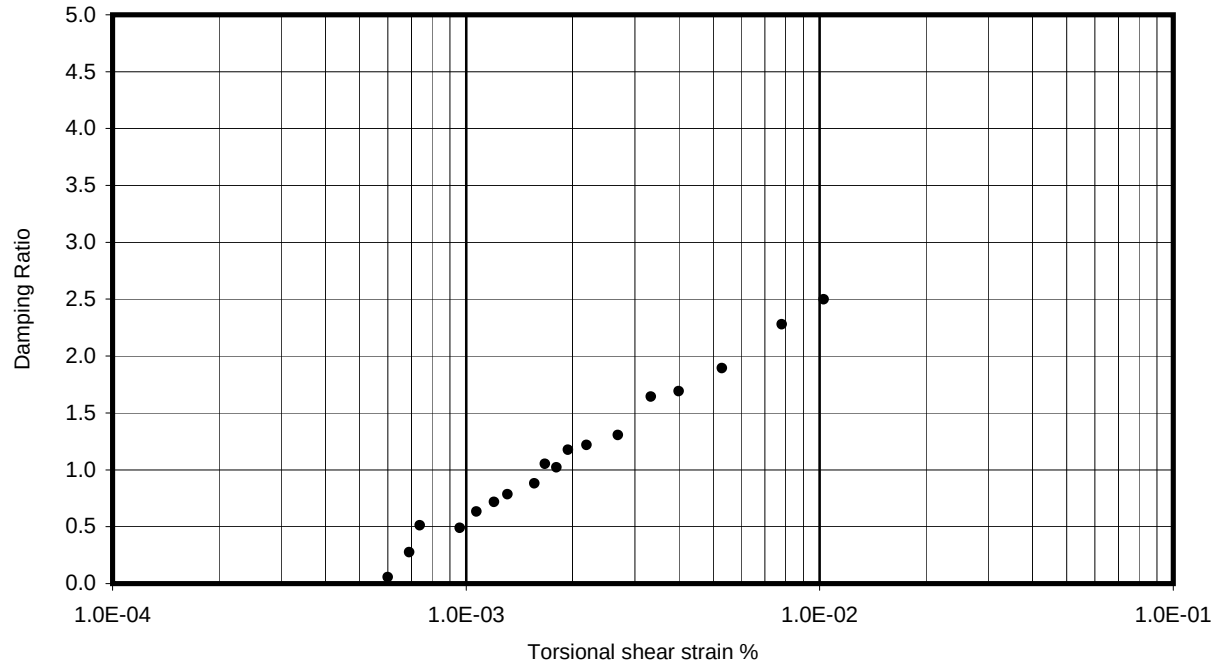
Frequency (Hz)	Shear Modulus,G MPa	Shear strain %	Damping Ratio	Log decrement
139.7	166.1	0.00060	0.0557	0.0035
139.1	164.7	0.00069	0.2753	0.0173
141.2	169.7	0.00074	0.5125	0.0322
139.7	166.1	0.00096	0.4886	0.0307
140.1	167.0	0.00107	0.6318	0.0397
139.9	166.6	0.00120	0.7162	0.0450
139.7	166.1	0.00131	0.7862	0.0494
139.6	165.9	0.00156	0.8817	0.0554
140.2	167.3	0.00167	1.0535	0.0662
140.0	166.8	0.00180	1.0201	0.0641
139.4	165.4	0.00194	1.1761	0.0739
139.5	165.6	0.00219	1.2174	0.0765
140.0	166.8	0.00269	1.3066	0.0821
140.0	166.8	0.00333	1.6423	0.1032
139.6	165.9	0.00399	1.6900	0.1062
139.1	164.7	0.00529	1.8940	0.1193
138.4	163.0	0.00782	2.2801	0.1433
138.0	162.1	0.01027	2.4980	0.1570

ISOTROPICALLY CONSOLIDATED UNDRAINED RESONANT COLUMN TEST
In house method based on ASTM D4015

Project No	A0012-10	Sample Details:	Hole No.	CBH2009-8U
Project	ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE		Sample No	17
			Depth (m)	81.12-81.60
			Type	CS

PARAMETER PLOTS

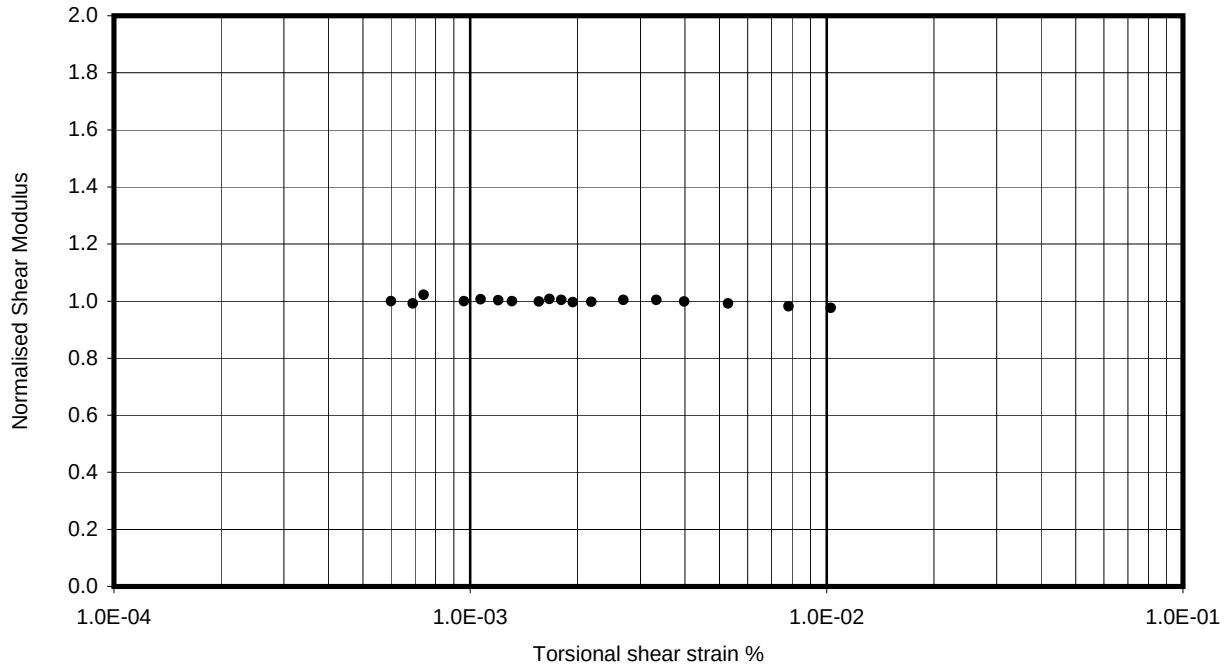


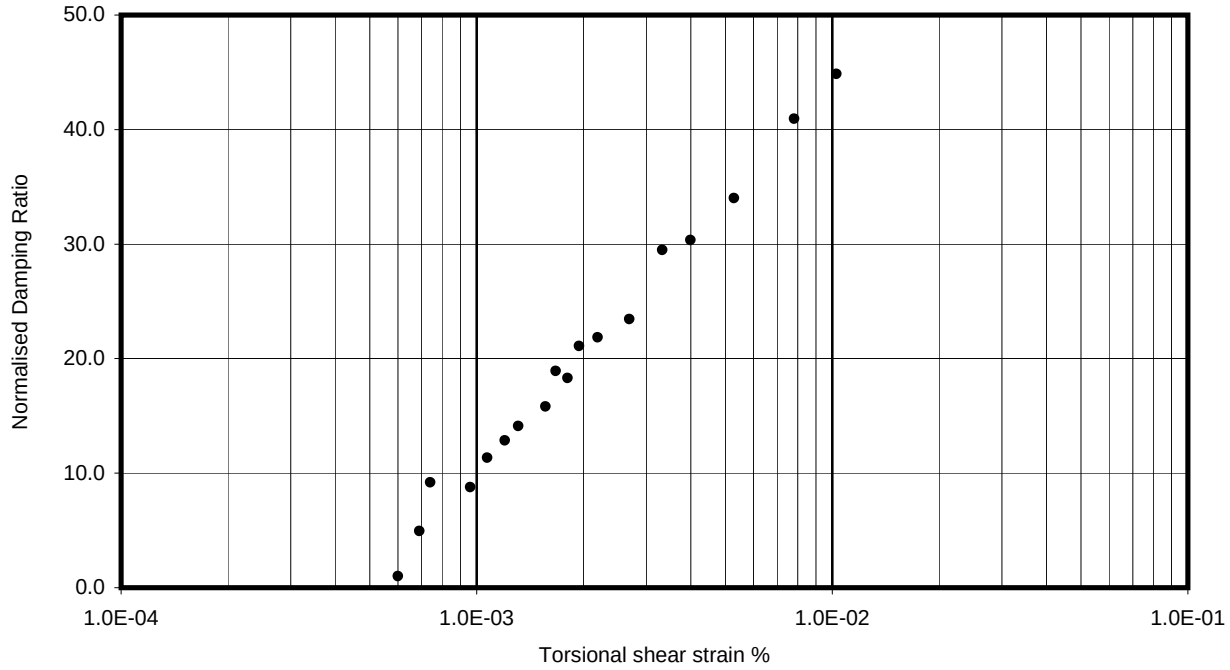


ISOTROPICALLY CONSOLIDATED UNDRAINED RESONANT COLUMN TEST
In house method based on ASTM D4015

Project No	A0012-10	Sample Details:	Hole No.	CBH2009-8U
Project	ONSHORE INVESTIGATION PHASE 1 FOR SIZEWELL SITE		Sample No	17
			Depth (m)	81.12-81.60
			Type	CS

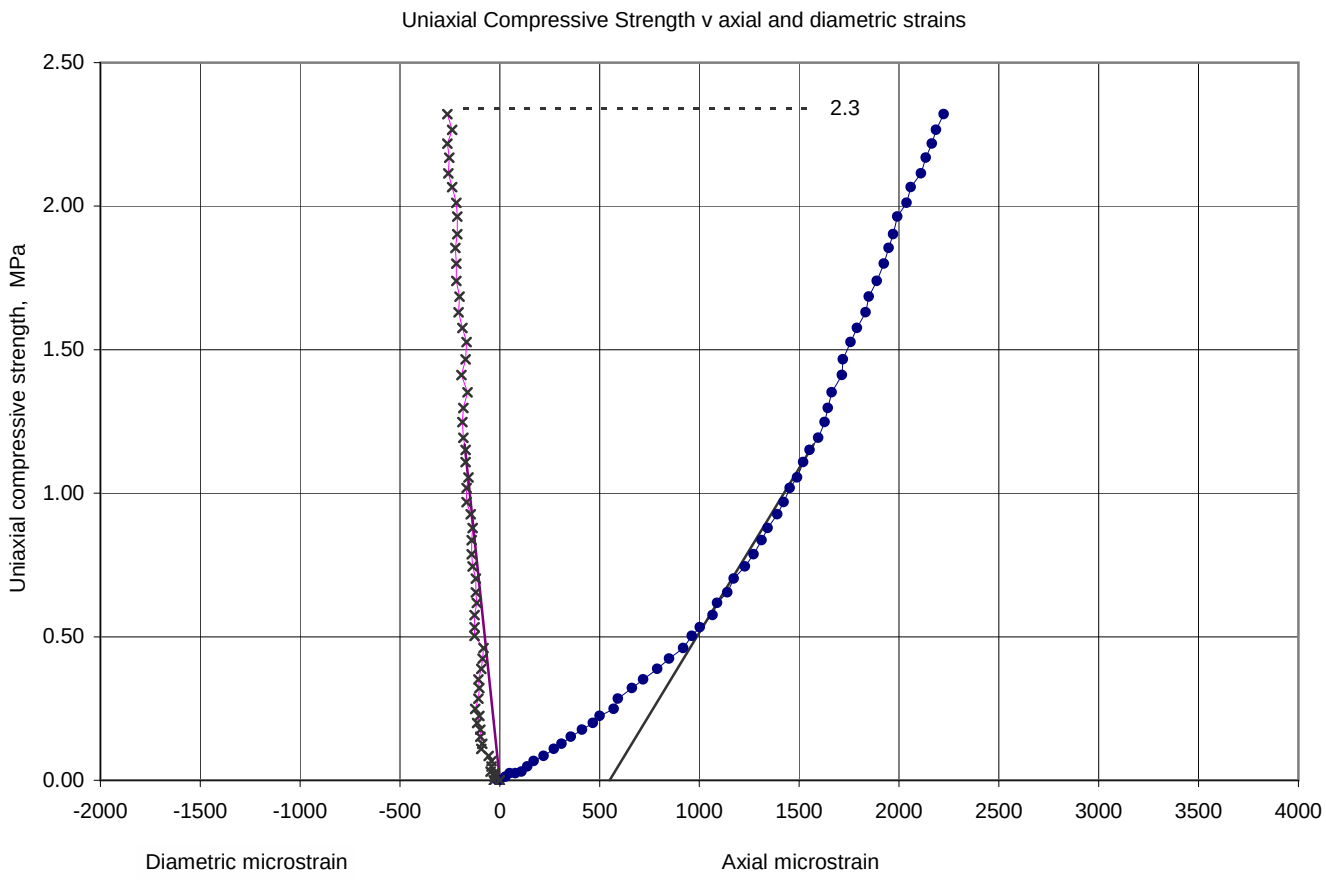
NORMALISED PLOTS





UNIAXIAL COMPRESSIVE STRENGTH and DEFORMABILITY of ROCK

Project No.	A0012-10	Sample Details :	Hole No.	CBH2009-2
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BLG)	88.05 - 88.40
			No.	28
			Type	CS
			ID	



Rock type	White blocky CHALK	
Condition for test	As received	
Length, L	252.89	mm
Diameter, D	98.16	mm
L/D	2.58	
Bulk density	1.95	Mg/m^3
Dry density	1.50	Mg/m^3
Moisture Content	29.7	%
Saturation	100	% (particle density assumed 2.70 Mg/m3)
Mode of failure	: shear	

Zero corrections applied prior to secant interpretation, microstrain	Axial	Diametral
	550	

Rate of loading	0.2	mm/min
Duration of test	386	seconds
Maximum Axial Load	17.7	kN
Maximum Uniaxial Compressive Strength, UCS	2.34	MPa
Young's Modulus of Elasticity (axial) Secant, 0-50% UCS	1145	MPa
Diametric slope Secant, 0-50% UCS	-6656	MPa
Poisson's Ratio	0.17	

Notes :

Test carried out in accordance with : Rock Characterization and Monitoring ISRM Suggested Methods p.114

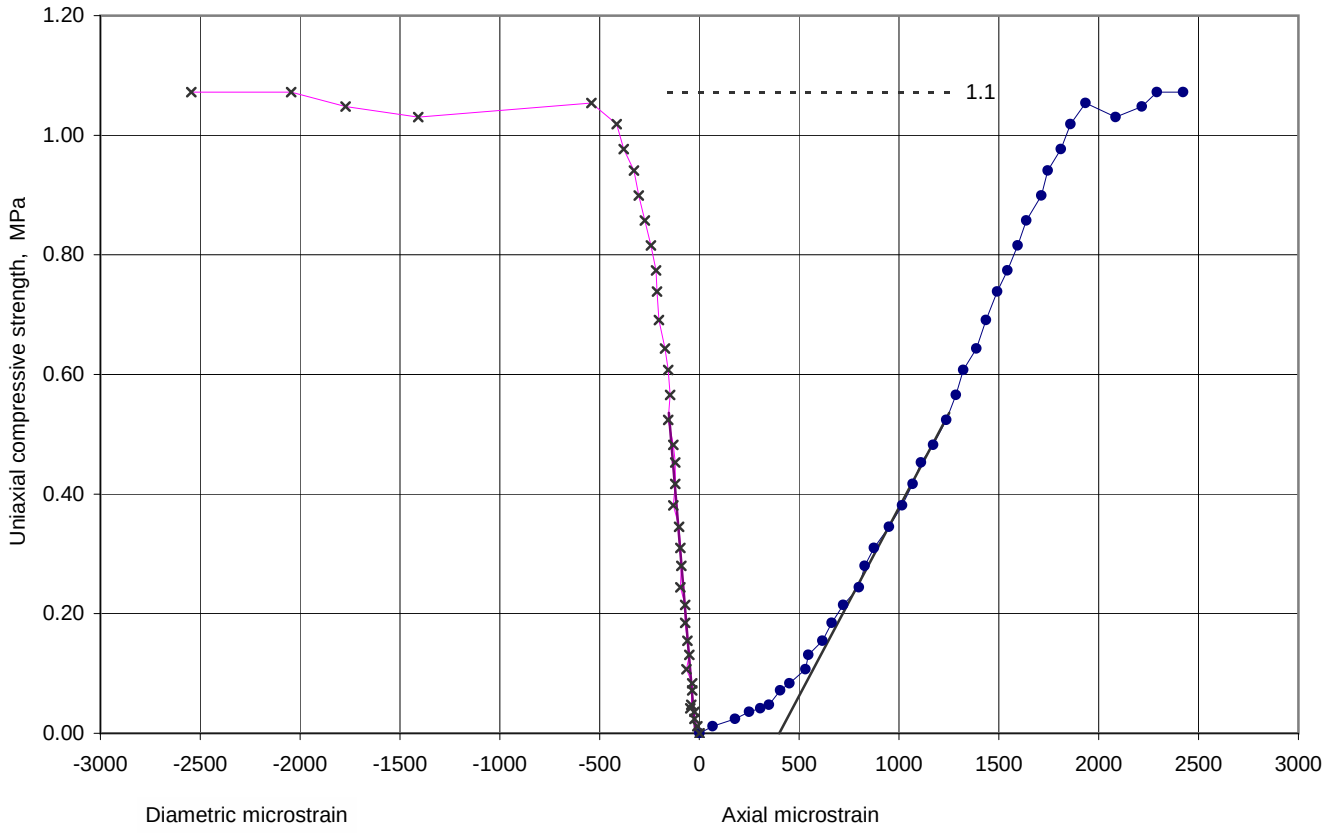
Deformations measured by strain transducer with resolution of 0.001mm

Strain controlled test performed due to weakness of sample

UNIAXIAL COMPRESSIVE STRENGTH and DEFORMABILITY of ROCK

Project No.	A0012-10	Sample Details :	Hole No.	CBH2009-2
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BLG)	94.80-95.20
			No.	30
			Type	CS
			ID	

Uniaxial Compressive Strength v axial and diametric strains



Rock type	White blocky CHALK		
Condition for test	As received		
Length, L	212.57	mm	
Diameter, D	99.01	mm	
L/D	2.15		* outside specification for ISRM
Bulk density	1.94	Mg/m^3	
Dry density	1.50	Mg/m^3	
Moisture Content	29.2	%	
Saturation	98.8	%	(particle density assumed 2.70 Mg/m3)
Mode of failure	: shear		

Zero corrections applied prior to secant interpretation, microstrain	Axial	Diametral
	400	-20

Rate of loading	0.2	mm/min
Duration of test	390	seconds
Maximum Axial Load	8.25	kN
Maximum Uniaxial Compressive Strength, UCS	1.07	MPa
Young's Modulus of Elasticity (axial) Secant, 0-50% UCS	630	MPa
Diametric slope Secant, 0-50% UCS	-4007	MPa
Poisson's Ratio	0.16	

Notes :

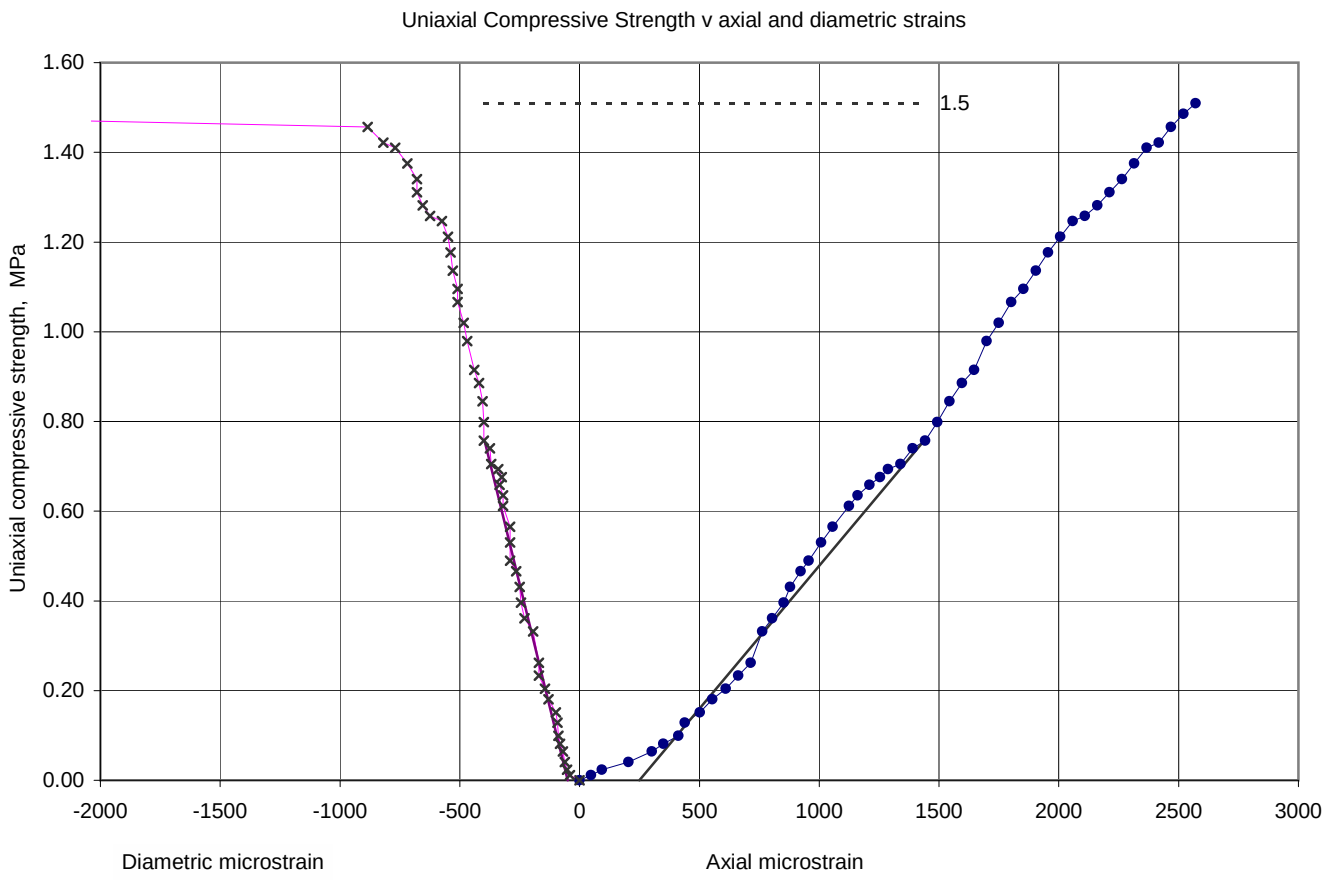
Test carried out in accordance with : Rock Characterization and Monitoring ISRM Suggested Methods p.114

Deformations measured by strain transducer with resolution of 0.001mm

Strain controlled test performed due to weakness of sample

UNIAXIAL COMPRESSIVE STRENGTH and DEFORMABILITY of ROCK

Project No.	A0012-10	Sample Details :	Hole No.	CBH2009-2
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BLG)	103.54 - 103.95
			No.	32
			Type	CS
			ID	



Rock type White blocky CHALK

Condition for test As received

Length, L	268.70	mm
Diameter, D	100.10	mm
L/D	2.68	
Bulk density	1.97	Mg/m^3
Dry density	1.54	Mg/m^3
Moisture Content	27.7	%
Saturation	99.7	%

(particle density assumed 2.70 Mg/m3)

Mode of failure : multiple shear

Zero corrections applied prior to secant interpretation, microstrain	Axial	Diametral
	250	-50

Rate of loading	0.2	mm/min
Duration of test	606	seconds
Maximum Axial Load	11.88	kN
Maximum Uniaxial Compressive Strength, UCS	1.51	MPa
Young's Modulus of Elasticity (axial) Secant, 0-50% UCS	637	MPa
Diametric slope Secant, 0-50% UCS	-2184	MPa
Poisson's Ratio	0.29	

Notes :

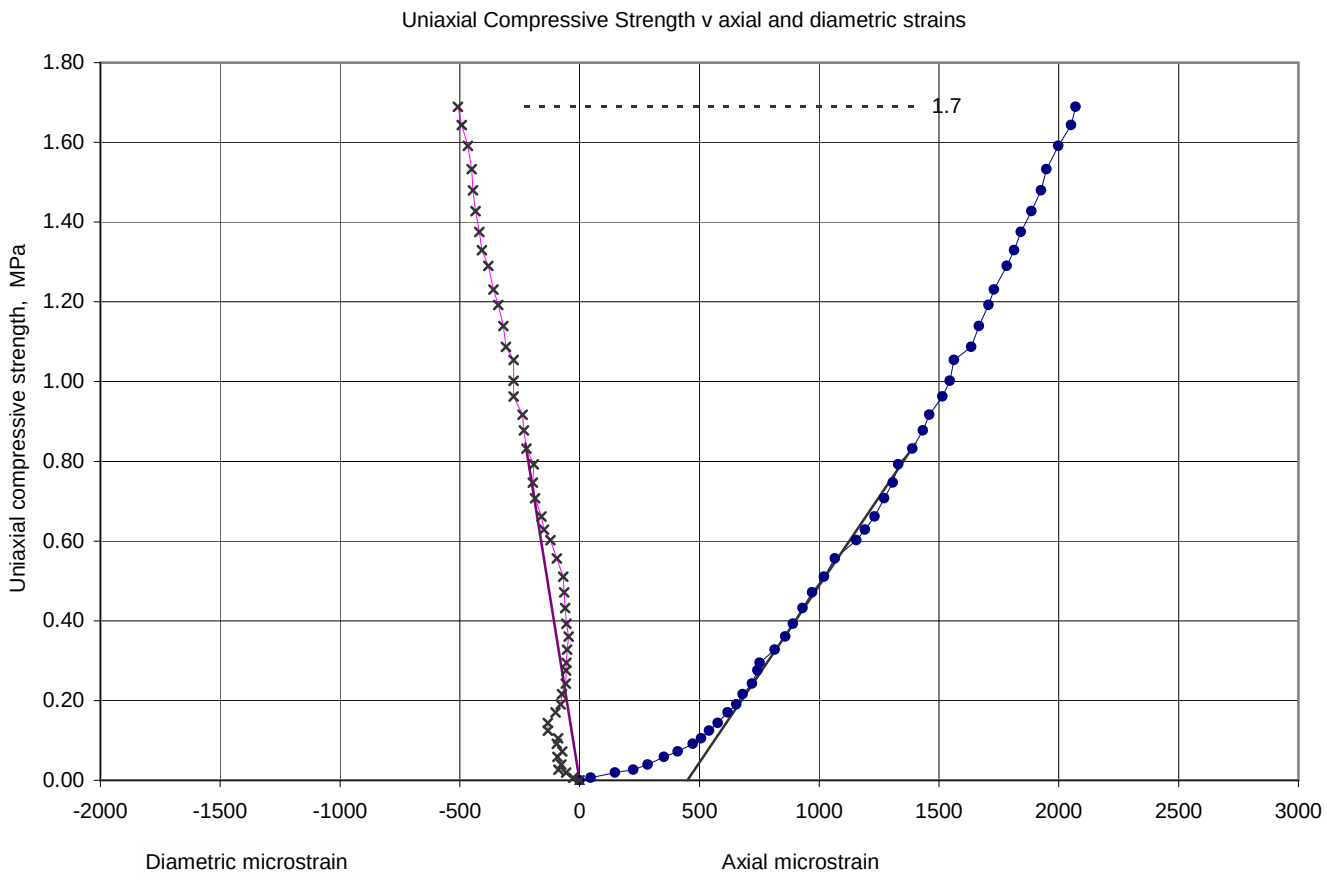
Test carried out in accordance with : Rock Characterization and Monitoring ISRM Suggested Methods p.114

Deformations measured by strain transducer with resolution of 0.001mm

Strain controlled test performed due to weakness of sample

UNIAXIAL COMPRESSIVE STRENGTH and DEFORMABILITY of ROCK

Project No.	A0012-10	Sample Details :	Hole No.	CBH2009-2
Project Name	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE		Depth (m BLG)	110.50 - 110.90
			No.	34
			Type	CS
			ID	



Rock type White blocky CHALK

Condition for test As received

Length, L	223.00	mm	
Diameter, D	94.42	mm	
L/D	2.36		* outside specification for ISRM
Bulk density	1.92	Mg/m^3	
Dry density	1.49	Mg/m^3	
Moisture Content	29.0	%	
Saturation	95.7	%	(particle density assumed 2.70 Mg/m3)
Mode of failure	: multiple shear		

Zero corrections applied prior to secant interpretation, microstrain	Axial	Diametral
	450	0

Rate of loading	0.2	mm/min
Duration of test	258	seconds
Maximum Axial Load	11.83	kN
Maximum Uniaxial Compressive Strength, UCS	1.69	MPa
Young's Modulus of Elasticity (axial) Secant, 0-50% UCS	888	MPa
Diametric slope Secant, 0-50% UCS	-3747	MPa
Poisson's Ratio	0.24	

Notes :

Test carried out in accordance with : Rock Characterization and Monitoring ISRM Suggested Methods p.114

Deformations measured by strain transducer with resolution of 0.001mm

Strain controlled test performed due to weakness of sample

SATURATED MOISTURE CONTENT OF CHALK - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample				Specimen details			Saturated Moisture Content[3]	Porosity (calculated)		Remarks
	No.	Depth (m) from	Depth (m) to	type	Moisture Content[1] %	Bulk density[2] Mg/m^3	Dry density Mg/m^3	%	%		
CBH2009-2	28	88.05	88.40	CS	27	1.98	1.56	27	42		
CBH2009-2	30	94.80	95.20	CS	30	1.94	1.49	30	45		
CBH2009-2	32	103.54	103.95	CS	29	1.94	1.50	29	44		
CBH2009-2	34	110.50	110.90	CS	29	1.94	1.50	29	44		
CBH2009-2	36	117.97	118.40	CS	36	1.94	1.43	33	47		

Notes : Test Specification : British Standard 1377 : Part 2 : 1990 clause 3.3

1 Specimen dried at 105 - 110 ^{o}C

2 Derived as part of standard test by immersion in water (buoyancy)

3 As required by BS1377, SMC derived using particle density 2.70 Mg/m^3

above notes apply unless annotated otherwise in the remarks

INDEX PROPERTIES OF ROCK - SUMMARY OF RESULTS

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

Hole No.	Sample				Water Content[1]	Saturation and Caliper [2]		Saturation and Buoyancy [3]			Remarks
	No.	Depth (m)		type		Dry density	Porosity	Dry density	Porosity		
		from	to		%	Mg/m^3	%	Mg/m^3	%		
CBH 2009_2	19	50.20	50.30	CS	3.3						
CBH 2009_7	18	49.20	49.30	CS	2.4						
CBH 2009_8U	123	51.69	51.81	CS	4.0						

Notes : Test Specification : International Society for Rock Mechanics (ISRM), Rock Characterization Testing and Monitoring, Suggested Methods, 1981

1 ISRM p83 test 1, water content at 105 ± 3 ^{o}C, specimen as received at the laboratory

2 ISRM p83 test 2, bulk volume obtained by caliper measurement, pore volume by water saturation, average of 3 results, individual results available on request

3 ISRM p84 test 3, bulk volume by buoyancy technique, pore volume by water saturation

above notes apply unless annotated otherwise in the remarks

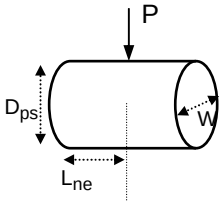
Point Load Index Test
ISRM:1985

Project No	Project Name
A0012-10	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

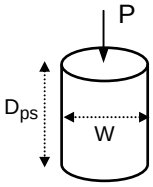
All specimens tested at **as received water content** unless shown otherwise

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction (U = unknown or random)
L - parallel to planes of weakness
P - perpendicular to planes of weakness
Dimensions
D_{ps} - Distance between platens (platen separation)
D_{ps}' - at failure
L_{ne} - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P

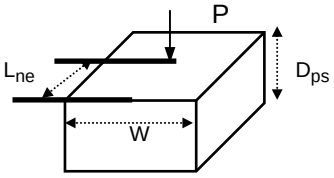
Diametral



Axial



Block/irregular lump



Borehole	Depth, m	Sample Ref	Sample Type	Specimen Ref	Specimen Depth	Rock type	Test Type see ISRM Fig 5 and 8		Failure Valid (Y/N)	Dimensions			LOAD P	De equivalent diameter, mm	Point Load Index MPa $F = (De/50)^{0.45}$		Remarks
							Type (D, A, I, B)	Direction (L, P or U)		Lne mm	Dps' mm	W mm	kN		I_s	$I_{s(50)}$	
CBH 2009_2	50.20 - 50.30	19	CS			SILTSTONE	A	U	Y		57.0	100.2	7.00	85.28	0.96	1.22	
CBH 2009_7	49.20 - 49.30	18	CS			SILTSTONE	A	U	Y		62.0	100.0	9.00	88.85	1.14	1.48	
CBH 2009_8U	51.69 - 51.81	123	CS			SILTSTONE	I	U	Y	35.0	63.0	100.5	13.00	89.79	1.61	2.10	

QA Ref
ISRM 85
Rev 55
Nov 08

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UKAS TESTING 1157

Printed:14/02/2011 10:00

Figure
PLT 1

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Report No A0012-10/5

ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE

FACTUAL REPORT ON GROUND INVESTIGATION

VOLUME 5 : PHOTOGRAPHS

Carried out for: NNB Generation Company Limited

August 2011

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Soil Mechanics part of Environmental Scientifics Group

ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE
FACTUAL REPORT ON GROUND INVESTIGATION

VOLUME 5 : PHOTOGRAPHS

Report No: A0012-10/5

Date: August 2011

Employer:

NNB Generation Company Limited
40 Grosvenor Place
Victoria
London
SW1X 7EN

Issue No	Date	Details
1	August 2011	Report as submitted

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REPORT STRUCTURE

VOLUME NO	TITLE	REPORT NO
1	TEXT, MONITORING AND DRAWINGS	A0012-10/1
2A	EXPLORATORY HOLE RECORDS: 1:25 SCALE BOREHOLE LOGS	A0012-10/2A
2B	EXPLORATORY HOLE RECORDS: 1:25 SCALE BOREHOLE AND TRIAL PIT LOGS 1:100 SCALE BOREHOLE LOGS SPLIT TUBE SAMPLE DESCRIPTIONS DISCONTINUITY LOGS	A0012-10/2B
3A	IN SITU TESTING: DRILLING PARAMETER RESULTS MENARD PRESSUREMETER TESTING	A0012-10/3A
3B	IN SITU TESTING: CONE PENETRATION TESTING GEOPHYSICAL TESTING PUMPING TEST	A0012-10/3B
3C	IN SITU TESTING: SELF BORING PRESSUREMETER TESTING	A0012-10/3C
4	GEOTECHNICAL LABORATORY TESTING	A0012-10/4
5	**PHOTOGRAPHS**	**A0012-10/5**
6	COMPREHENSIVE AND DATA INTEGRATION REPORT	A0012-10/6

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B U100 SAMPLE PHOTOGRAPHS
C TRIAL PIT PHOTOGRAPHS

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ROTARY CORE PHOTOGRAPHS

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Photographs

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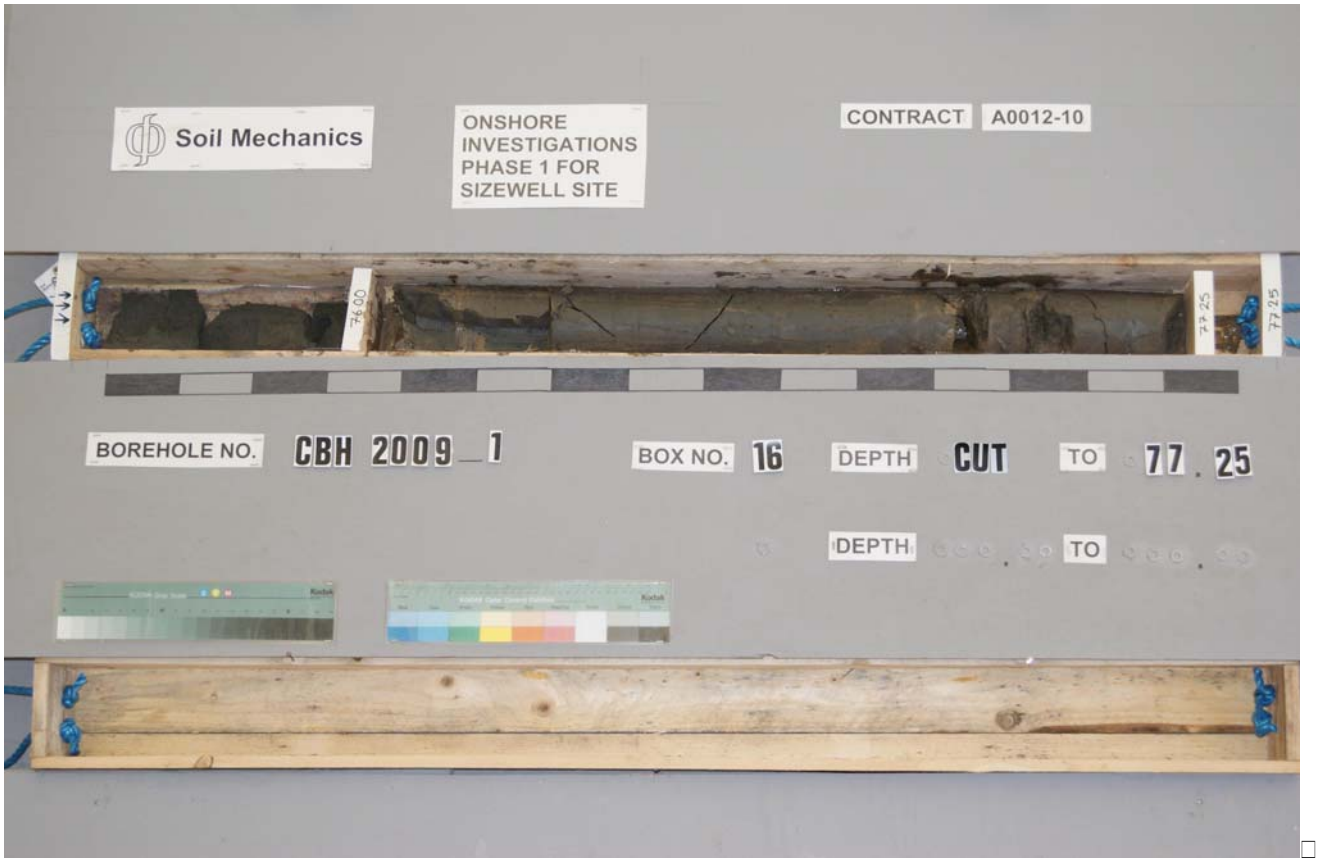

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 5

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	Carried out for	NNB Generation Company Limited	

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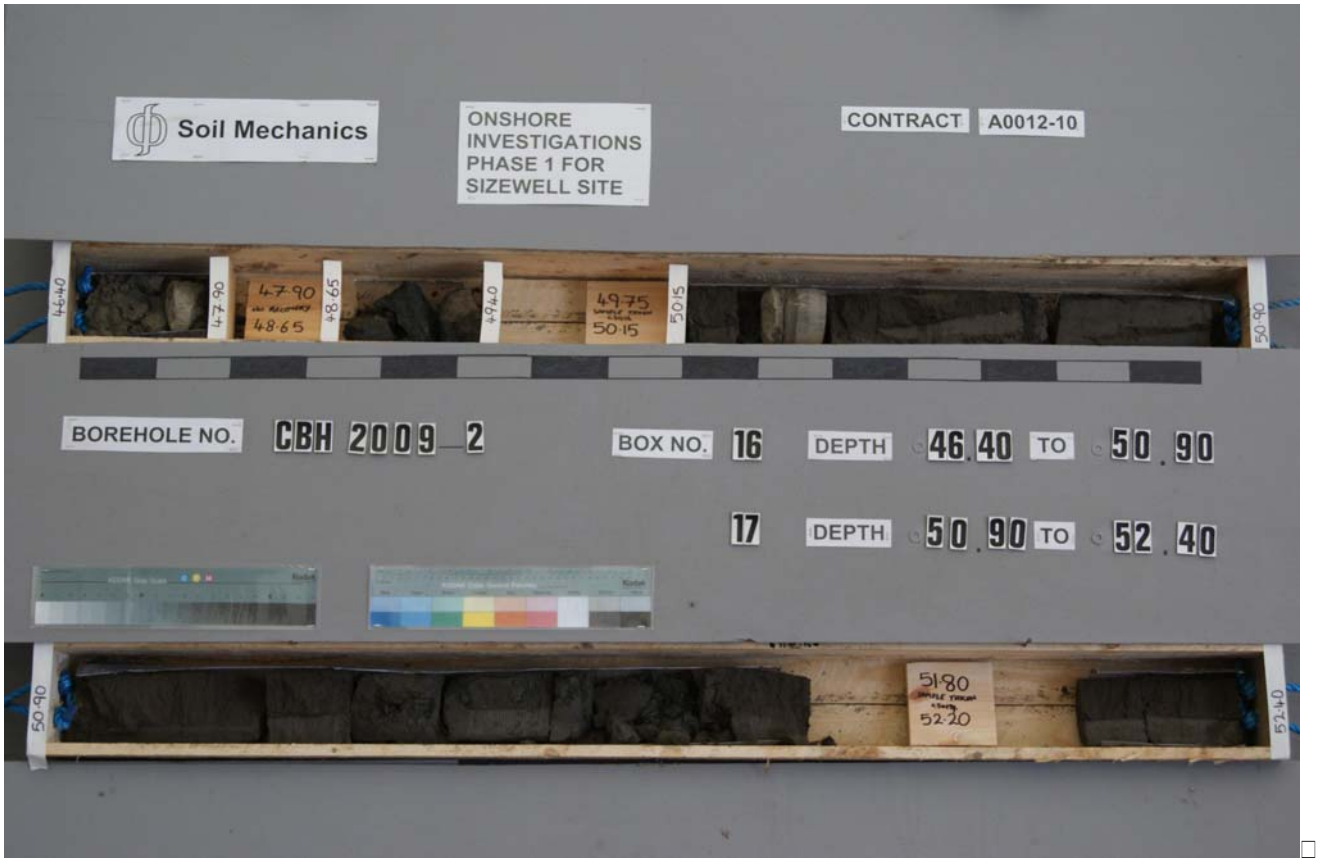

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 11

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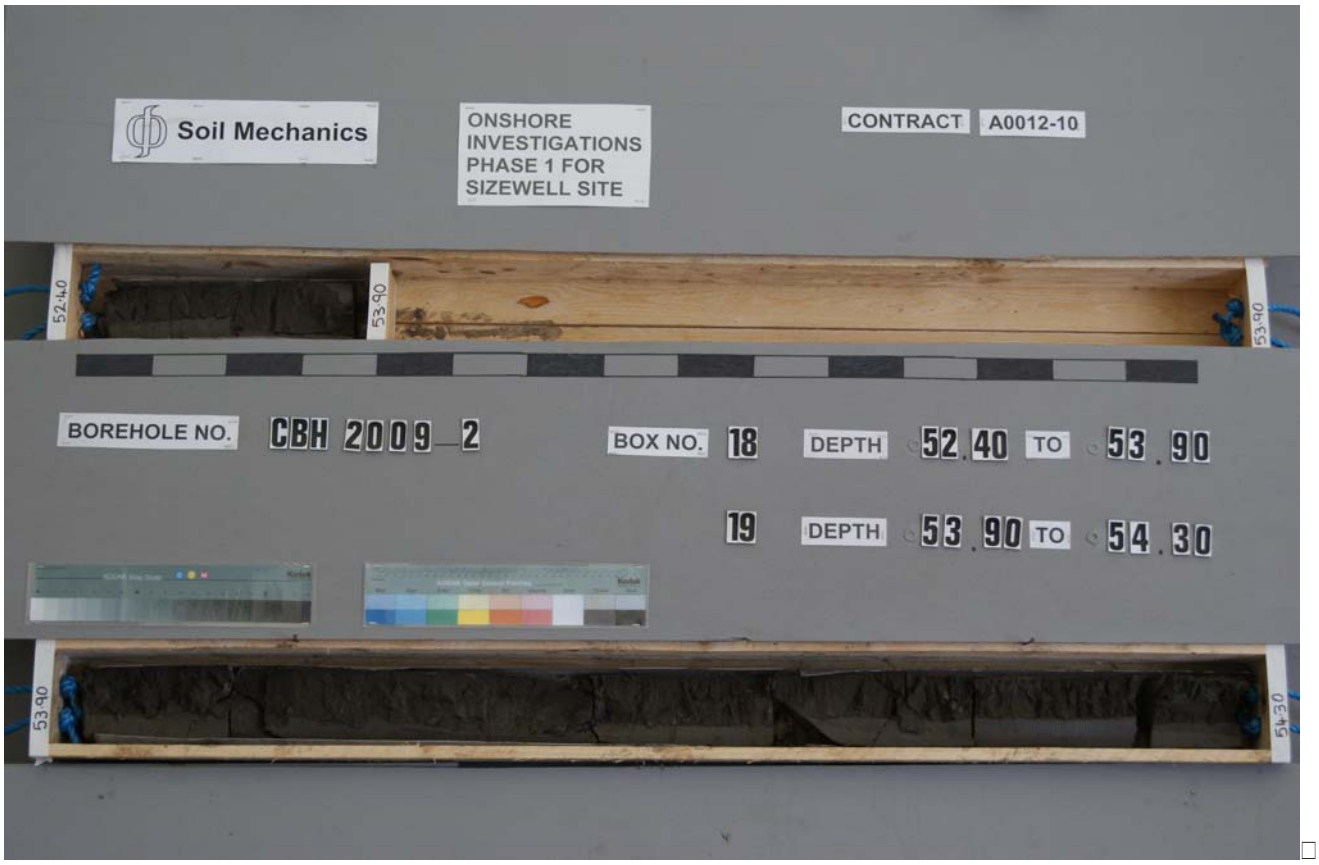

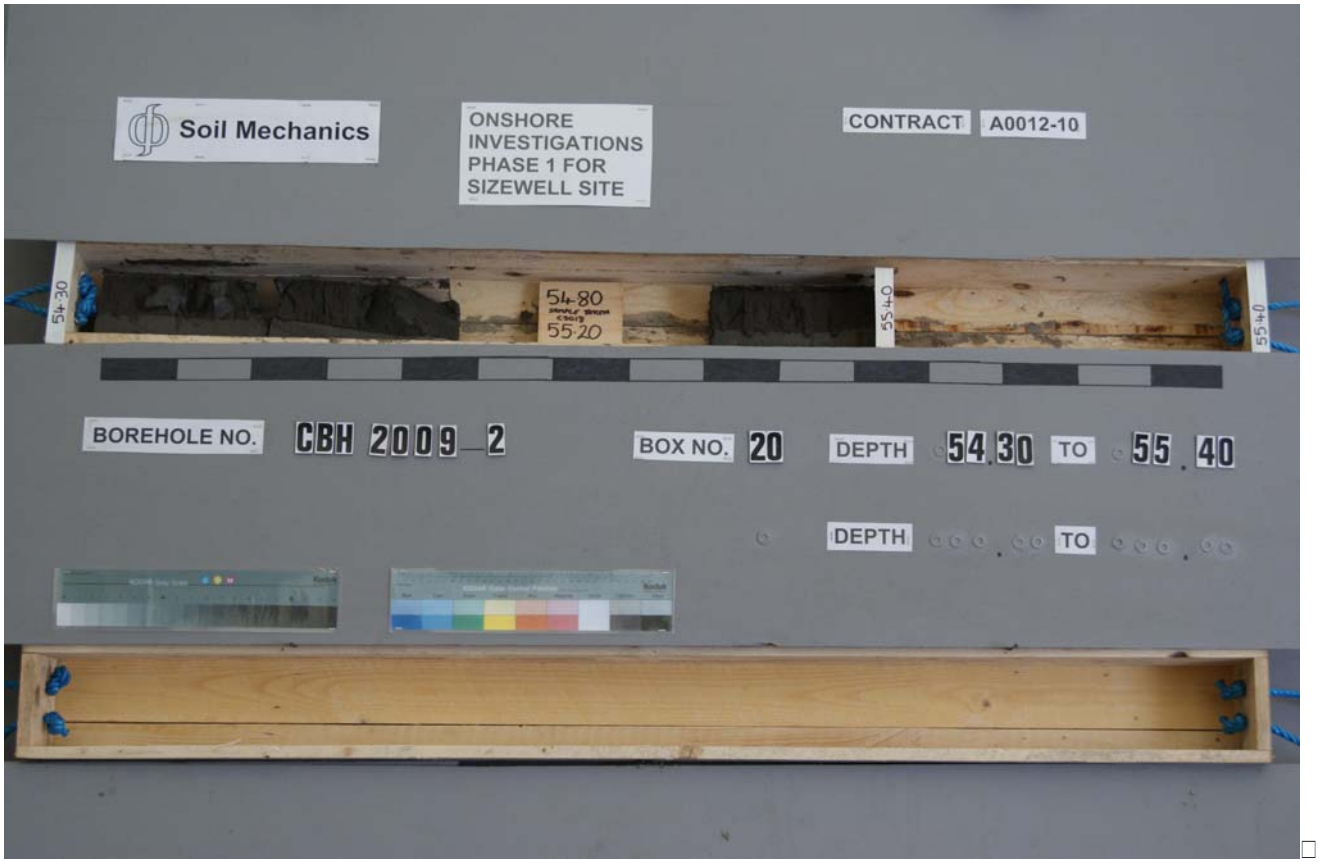

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 12

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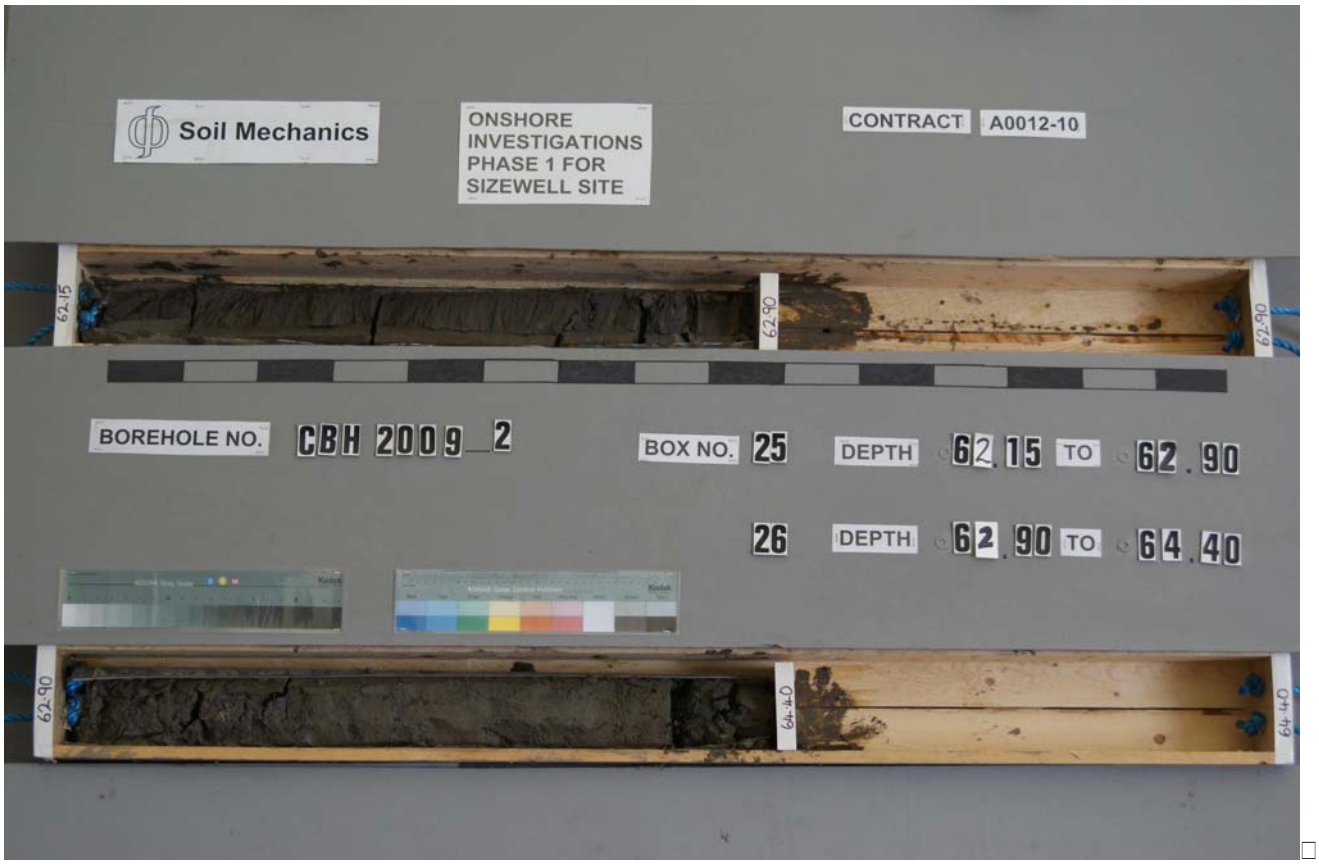

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	Carried out for: NNB Generation Company Limited	

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	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

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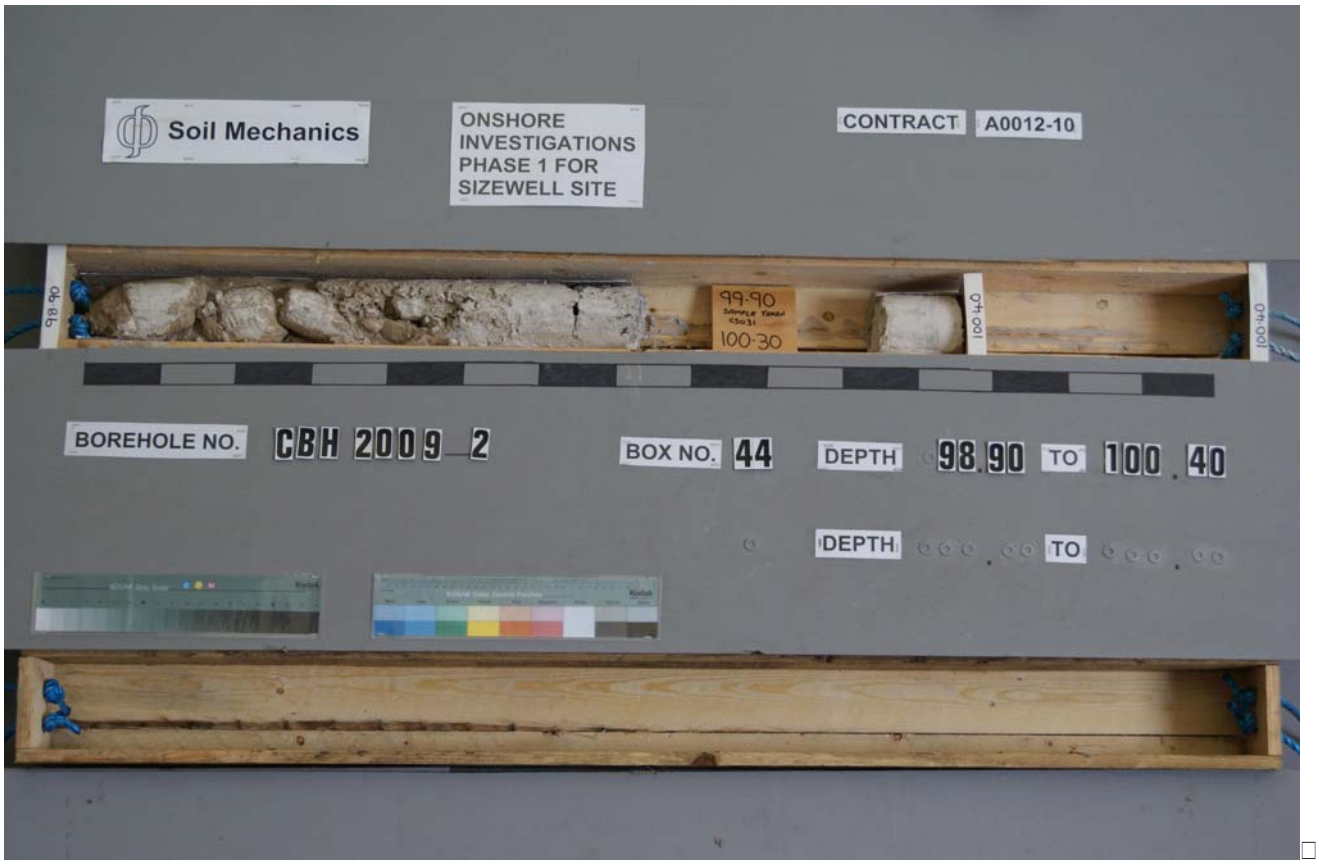

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	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 20

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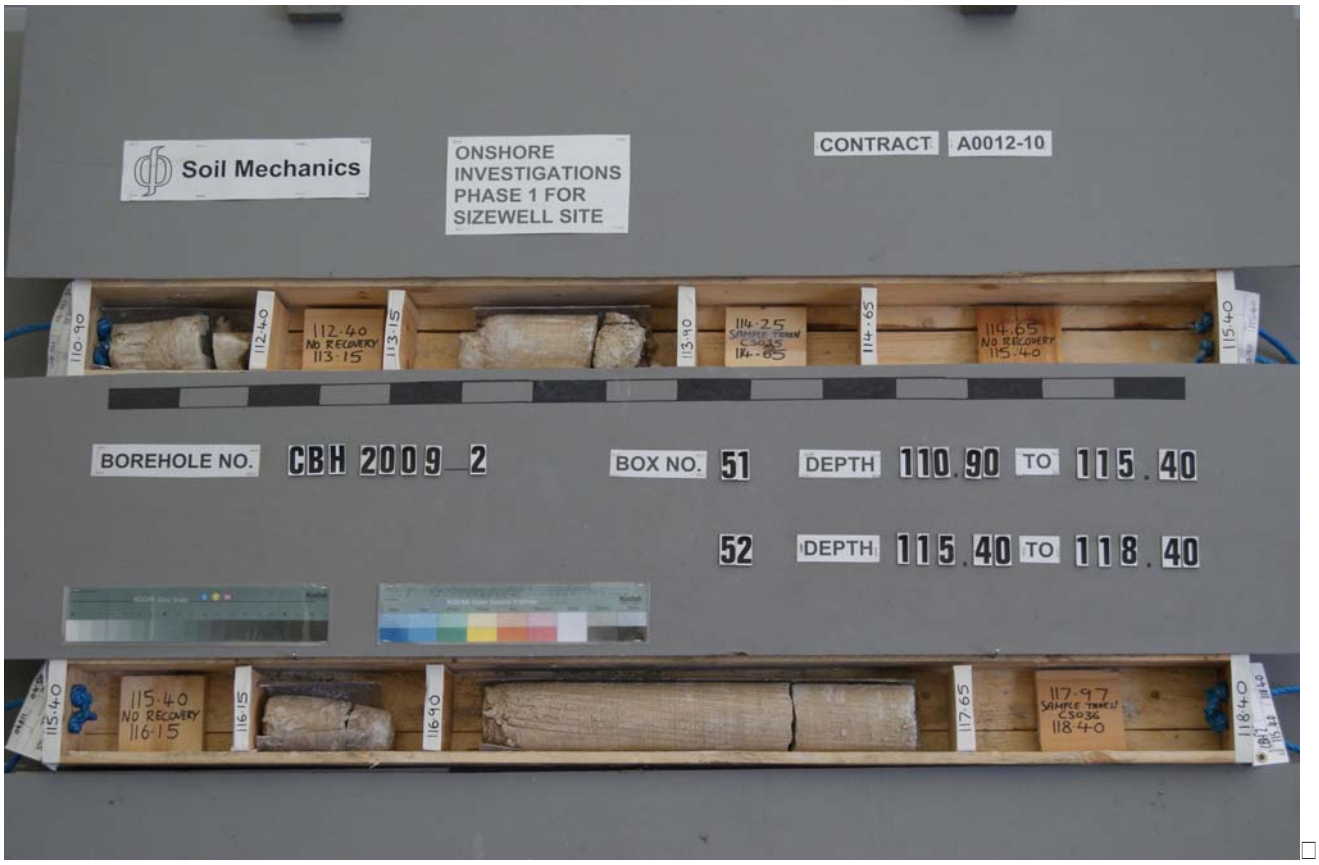

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	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate: 22
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	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 27

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	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 28

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	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 29

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	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 30

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	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 31

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	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 32

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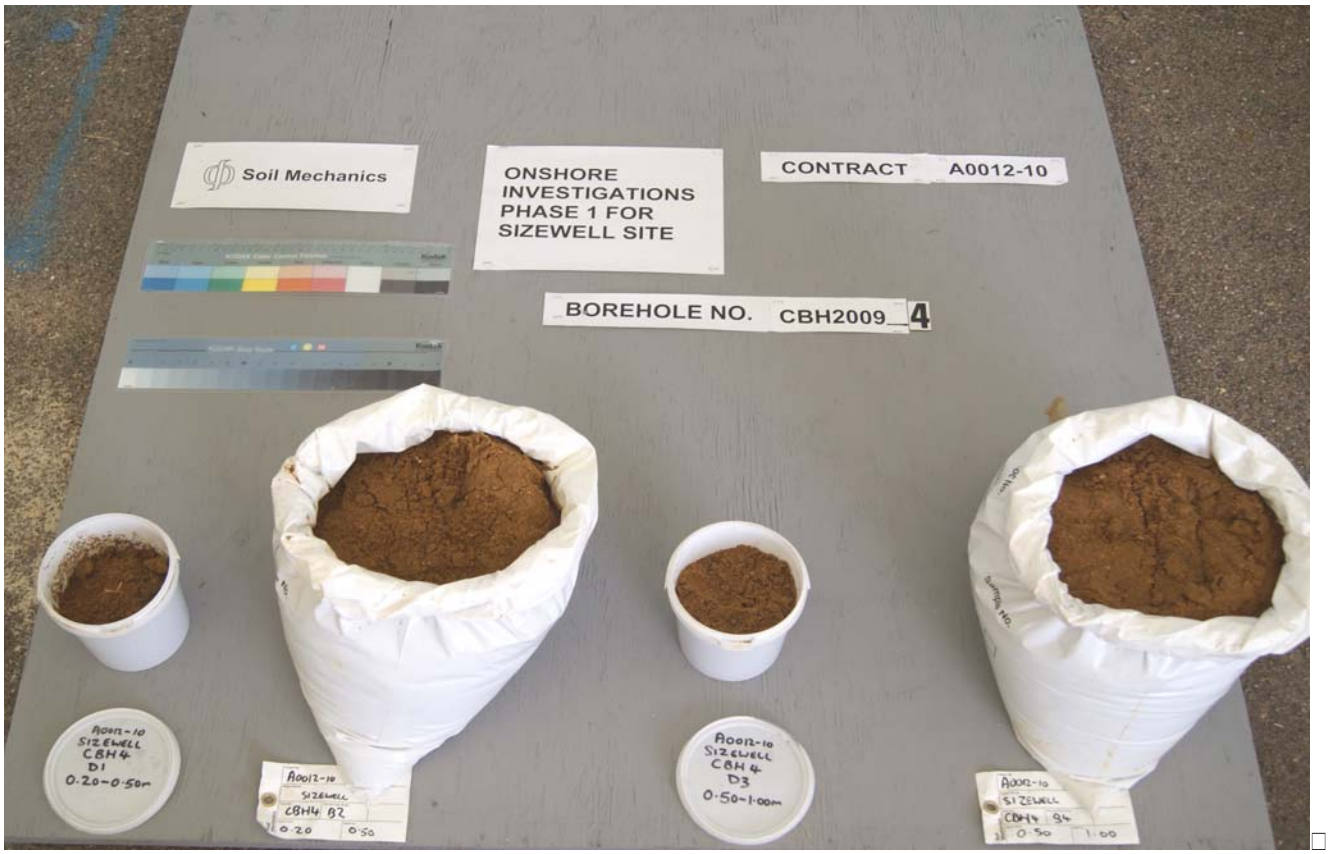

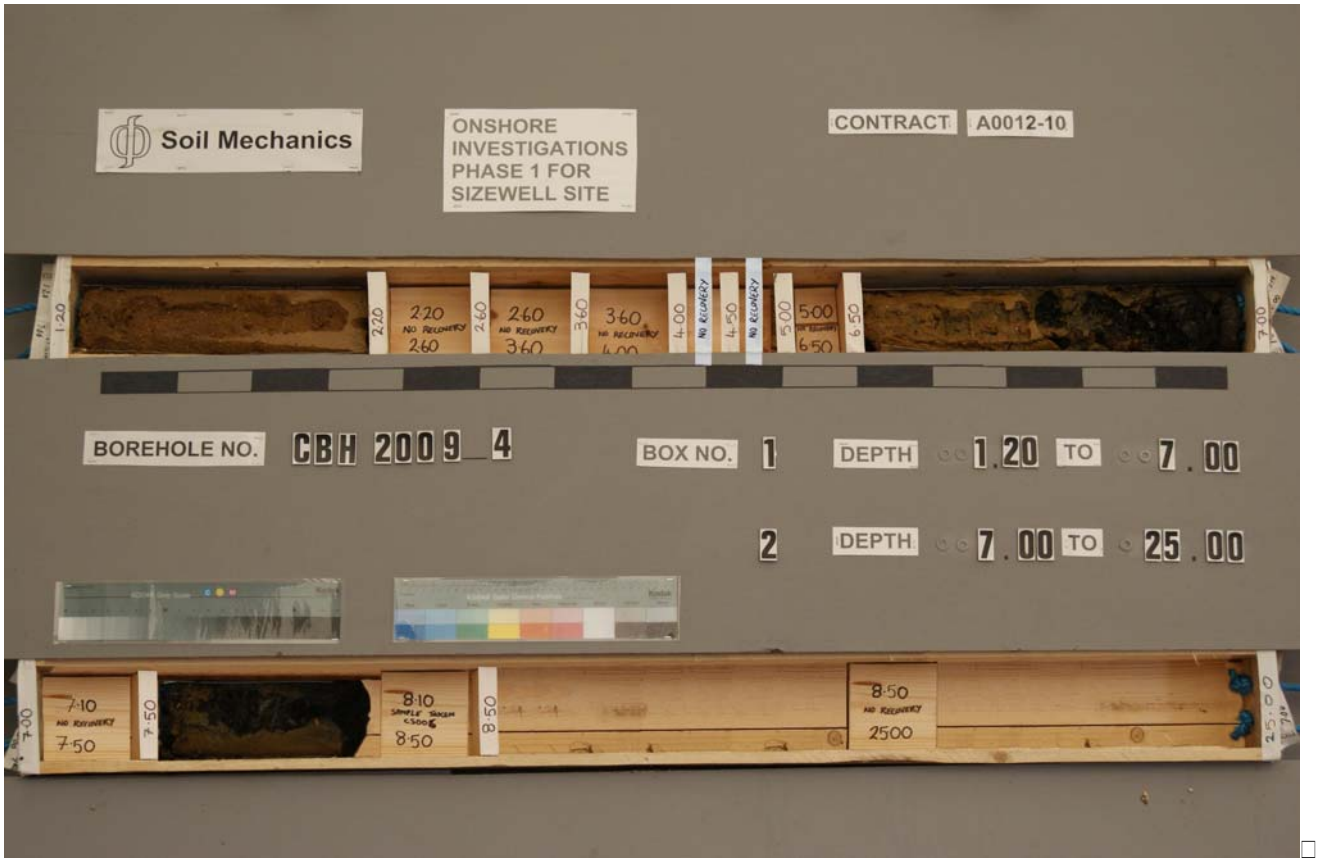

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 33

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	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 34

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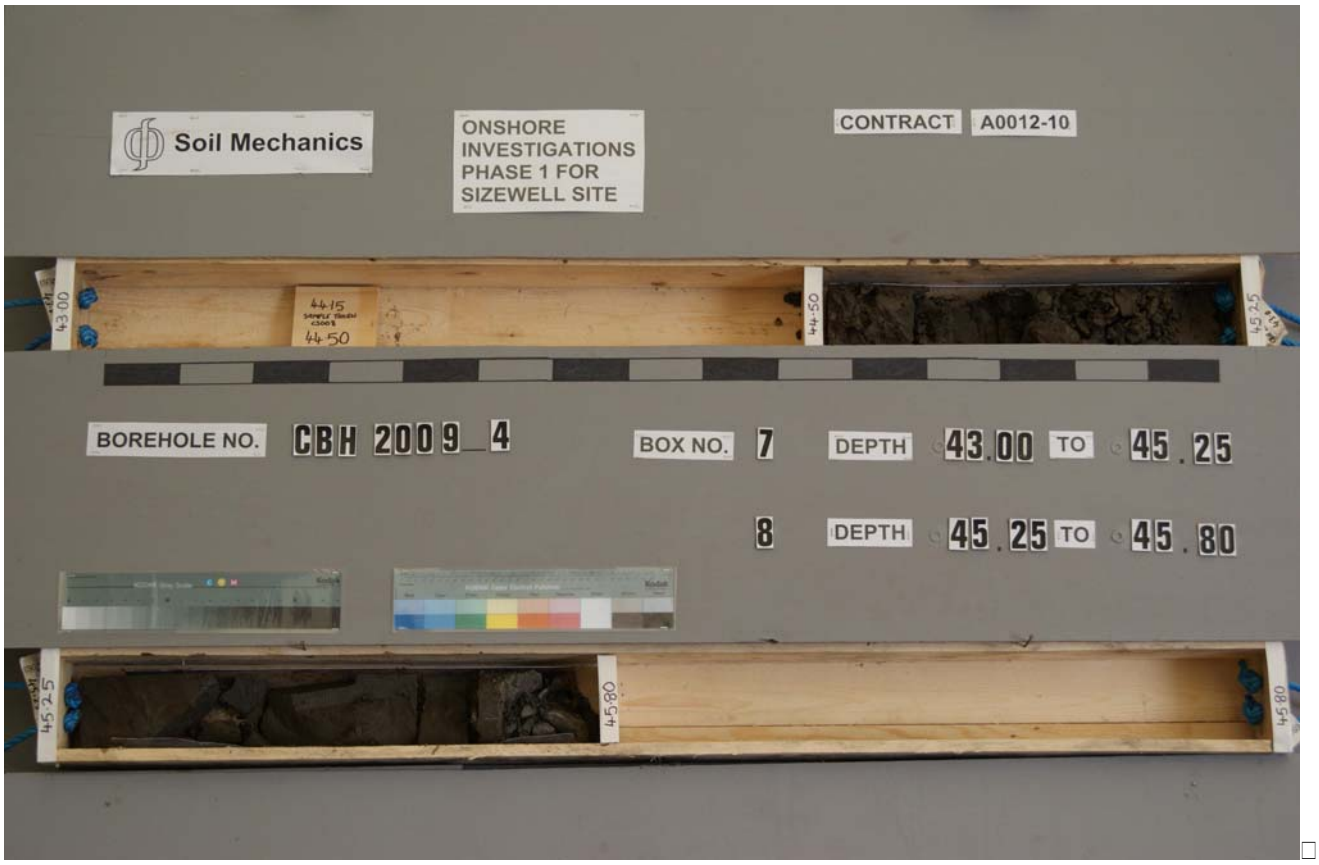

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 35

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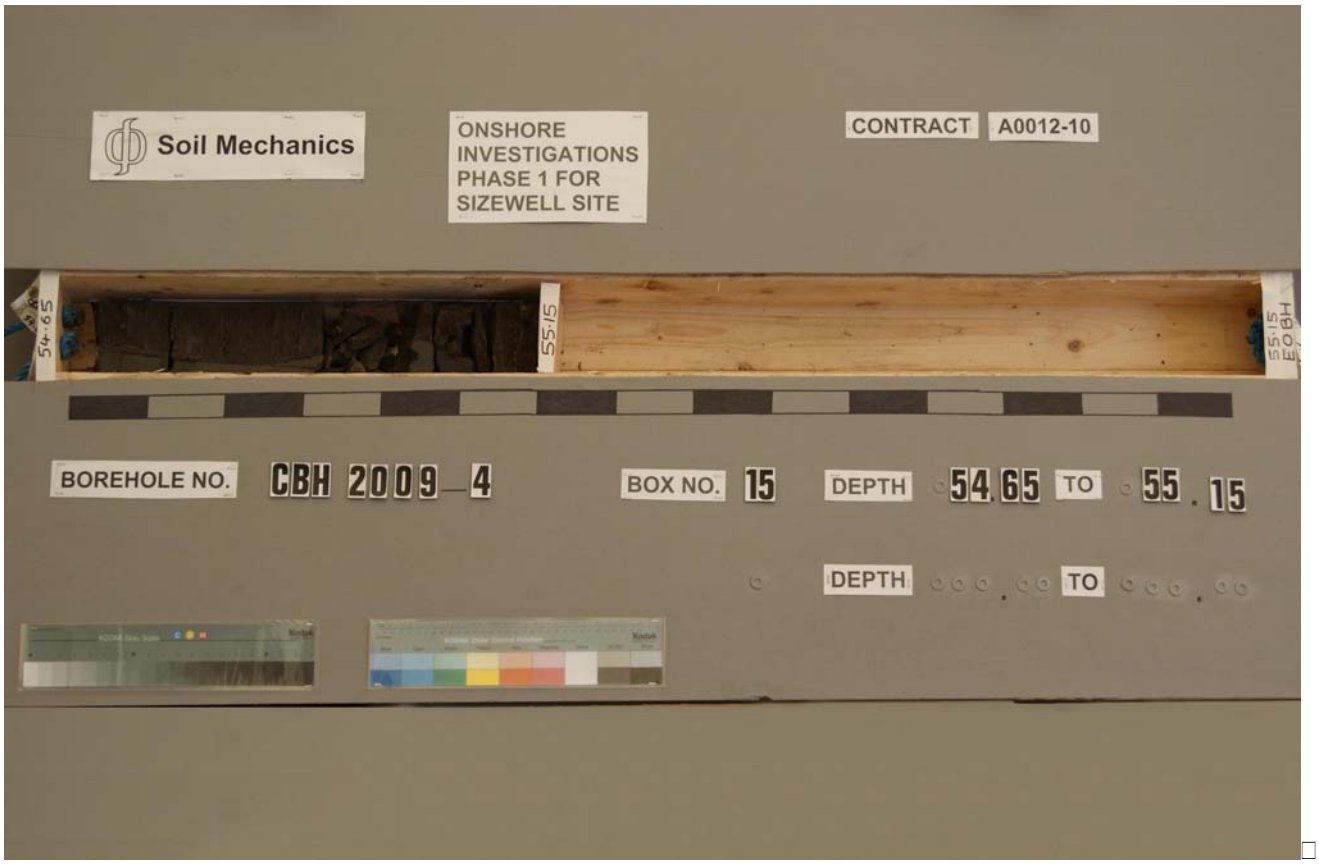
	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 36

Photographs

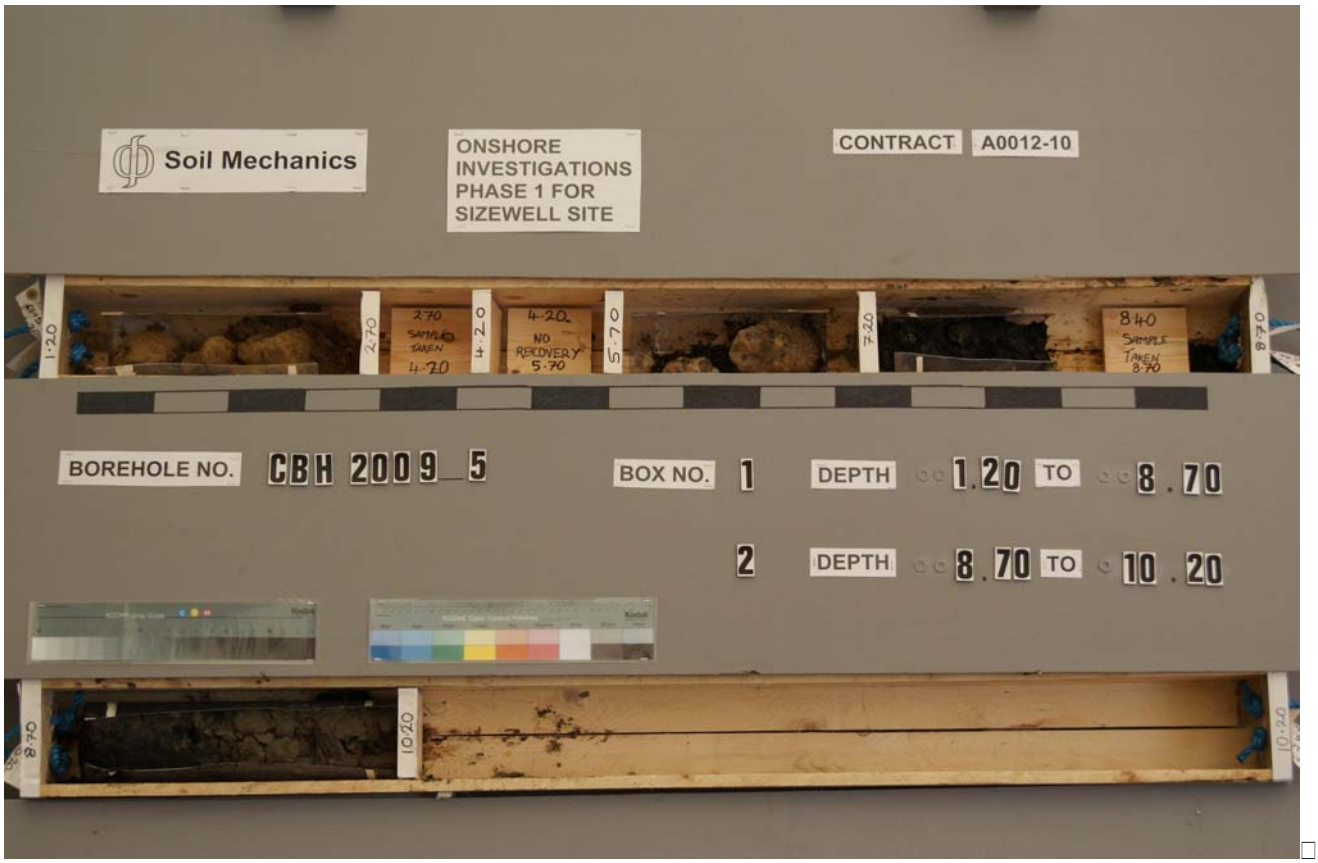
Soil Mechanics



	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 37
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics



	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 38
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

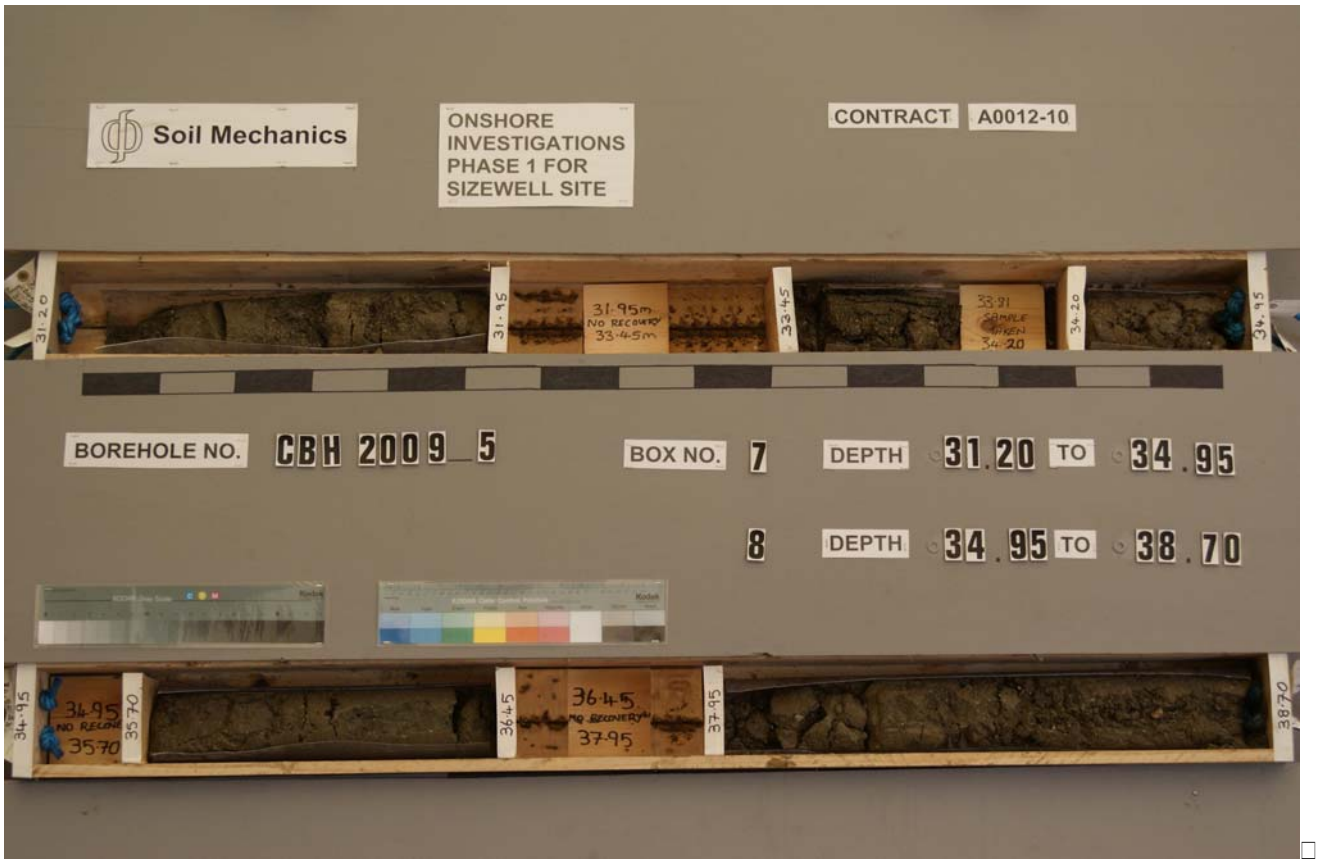
Photographs

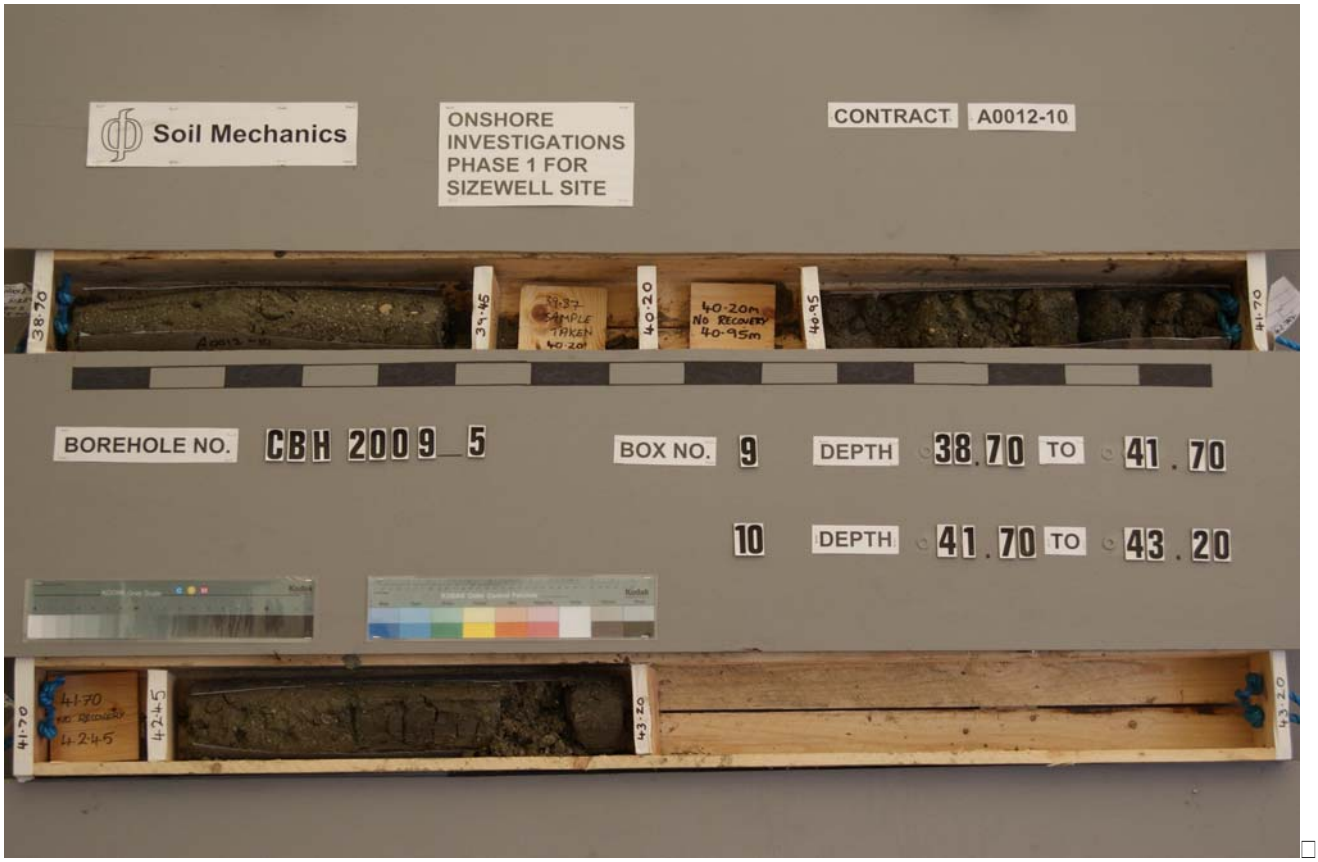
Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 39

Photographs

Soil Mechanics

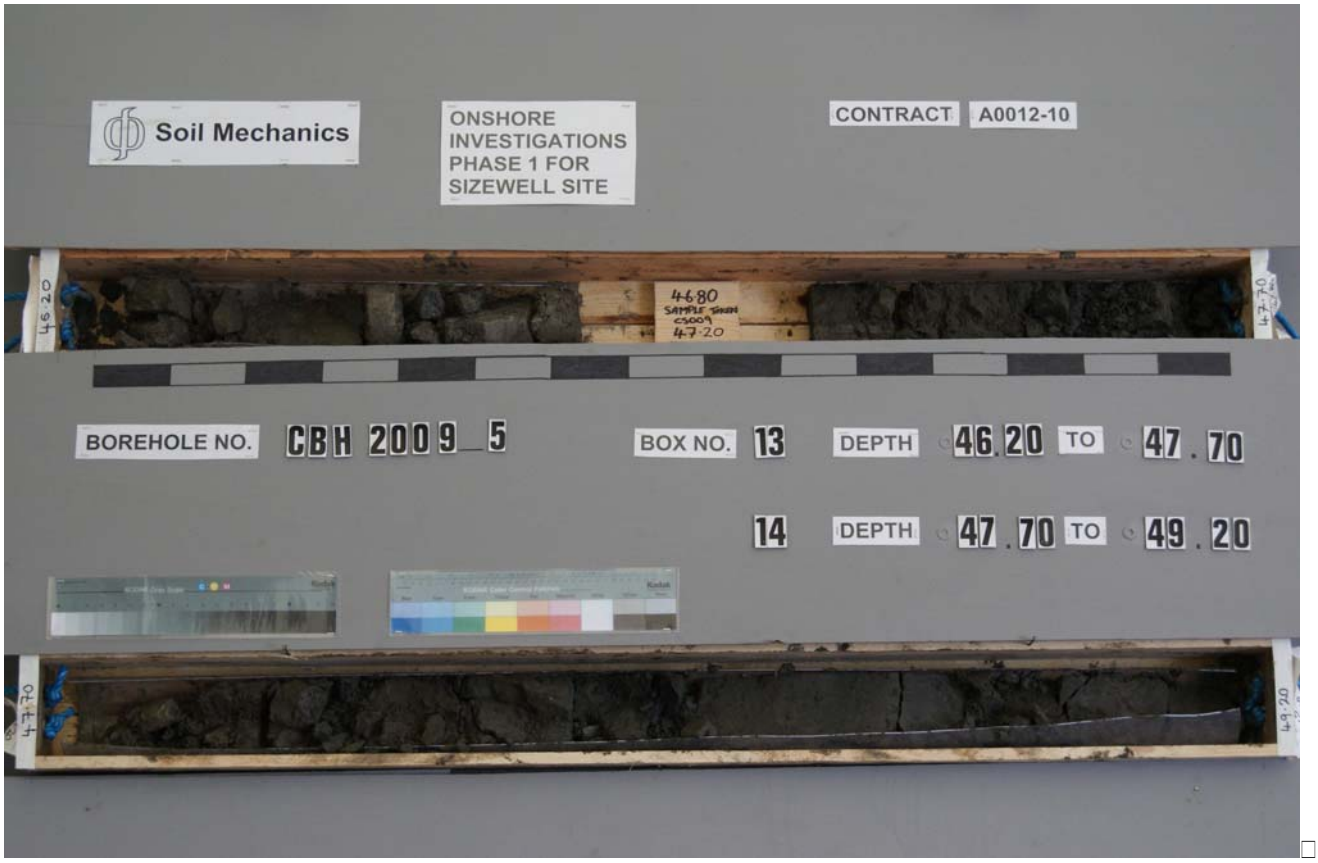




	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 40

Photographs

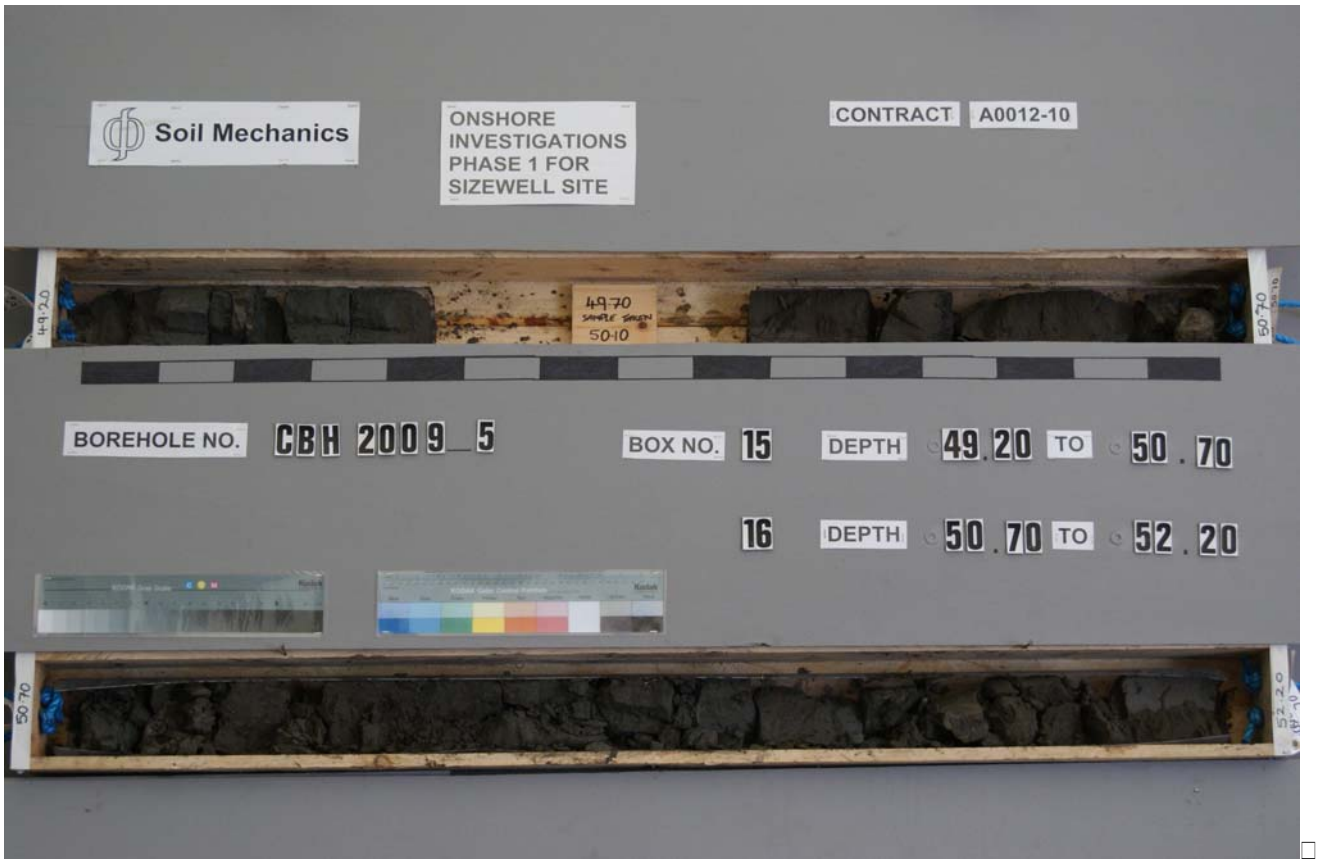
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 41

Photographs

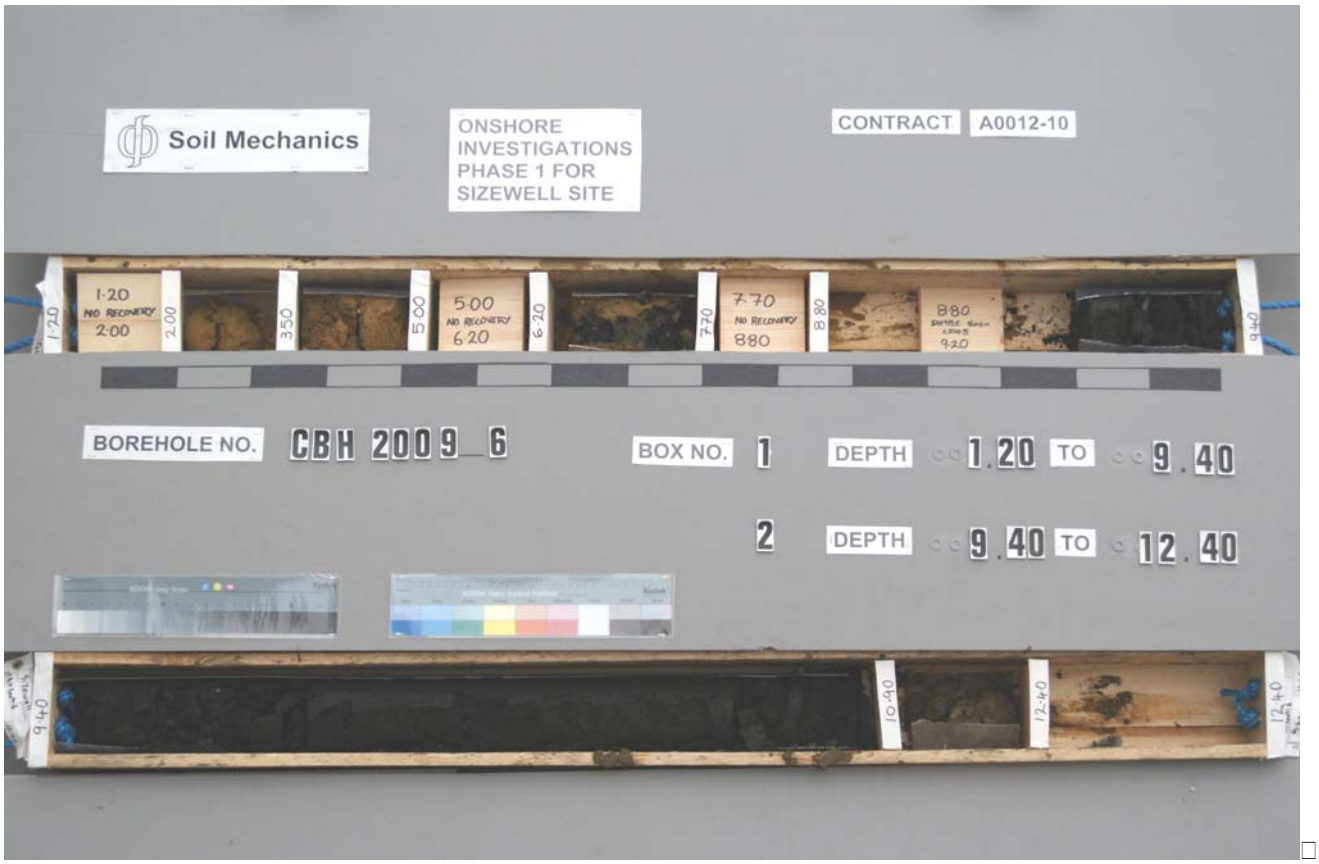
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 42
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 43

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 44

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 45

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 46

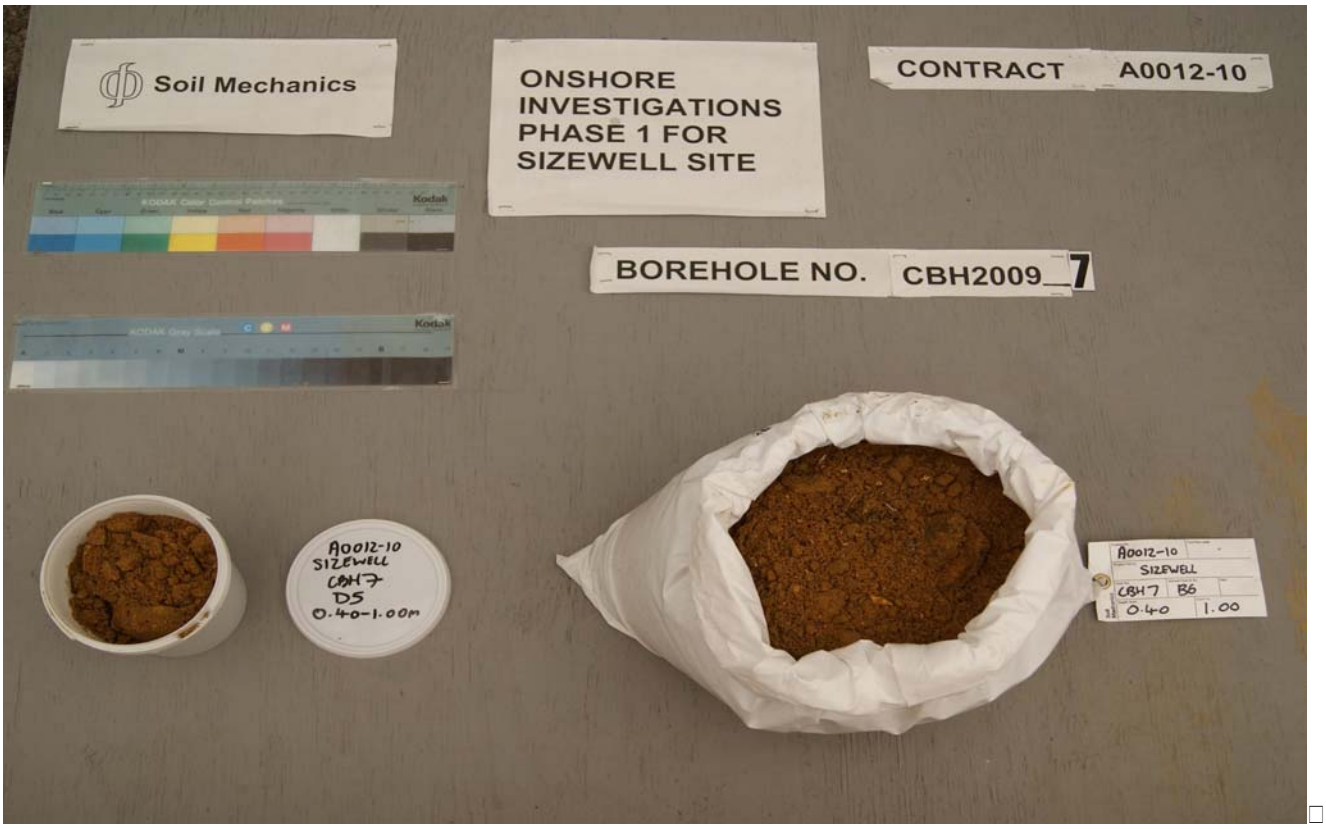
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate: 47
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 48
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 49

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 50

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 51
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 52

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 53

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 54

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 55
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 56

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	57
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 58

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 59

Photographs

Soil Mechanics

Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 60
Project No.	A0012-10	
Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 61
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 62

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 63

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 64

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 65

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 66

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 67

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 68

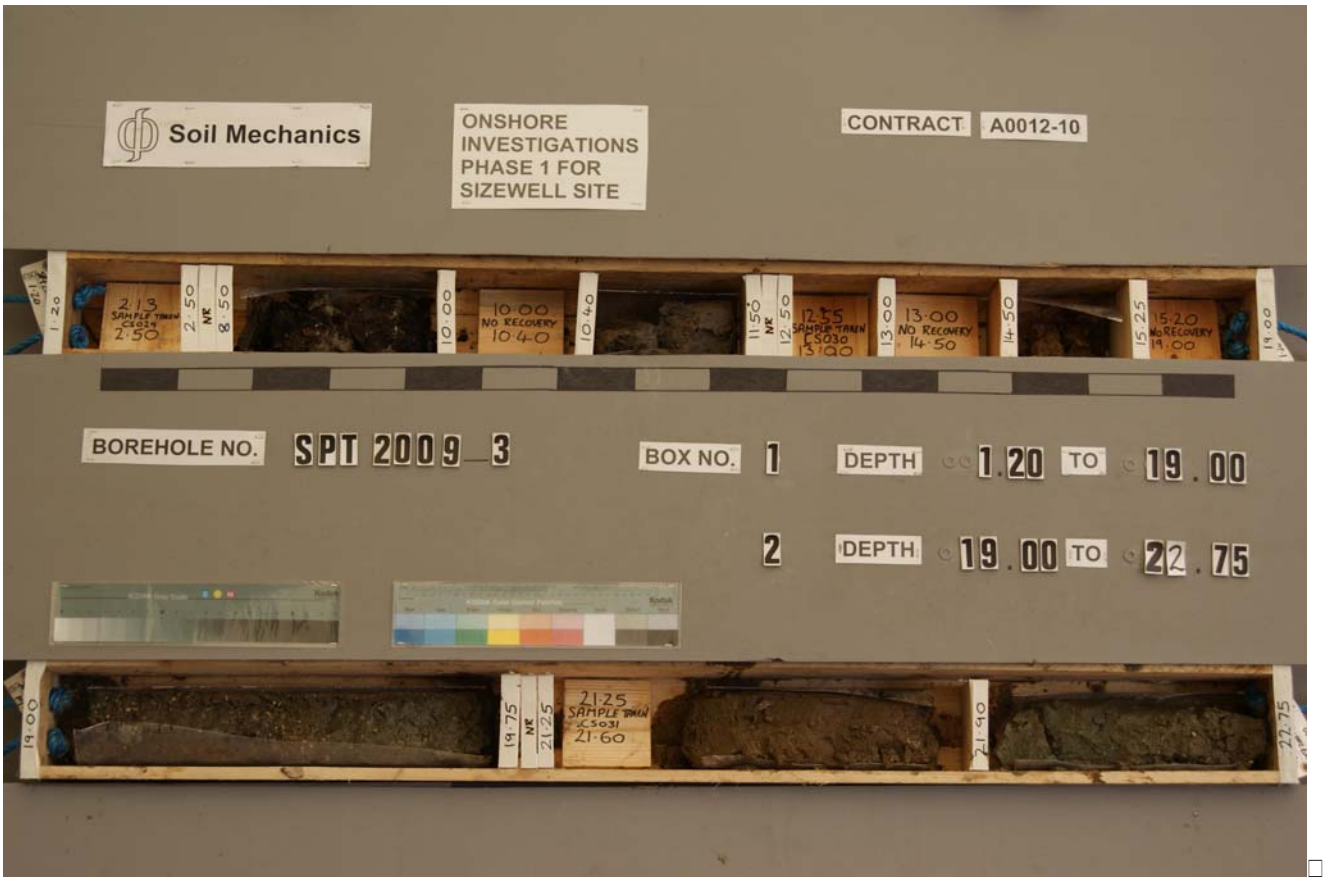
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 69

Photographs

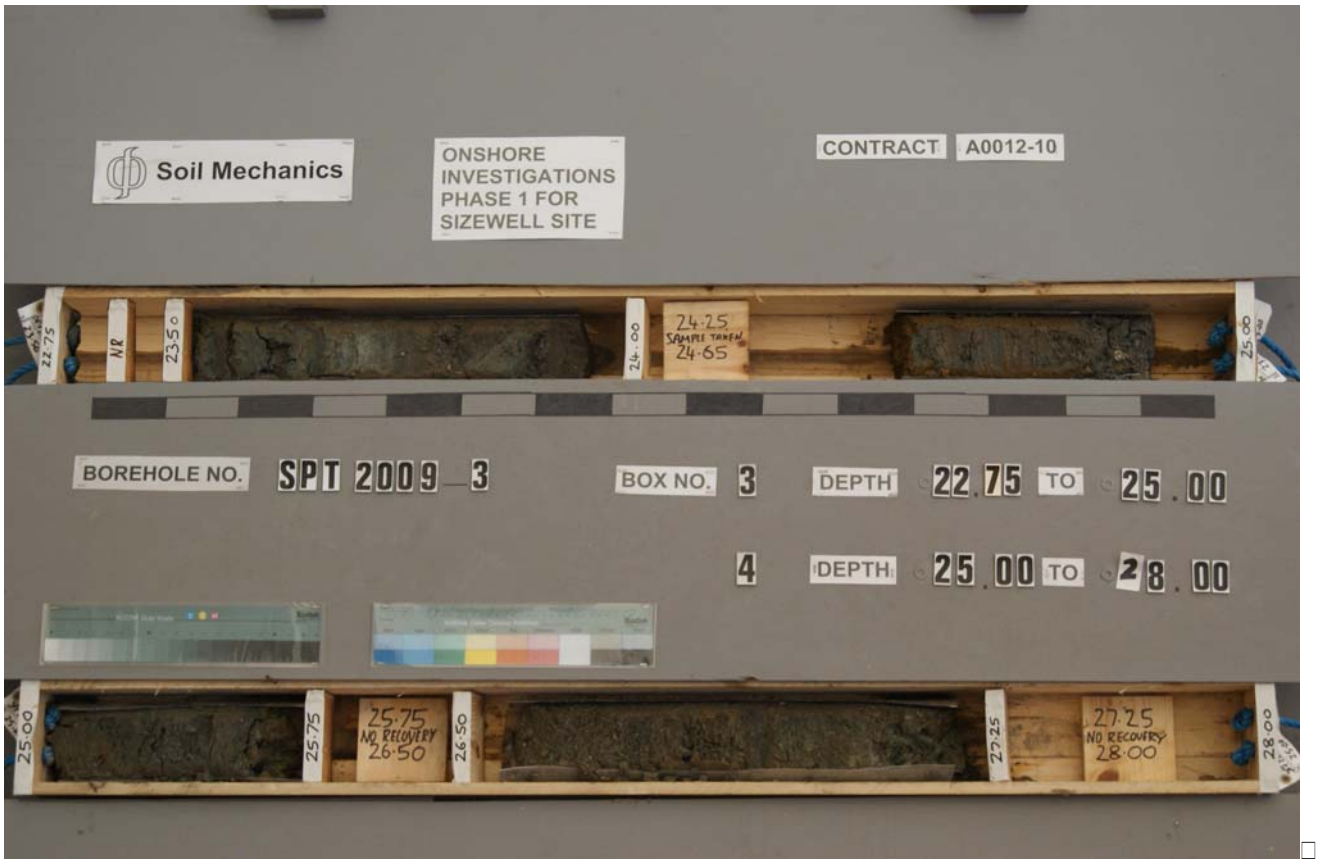
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 70

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 71
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

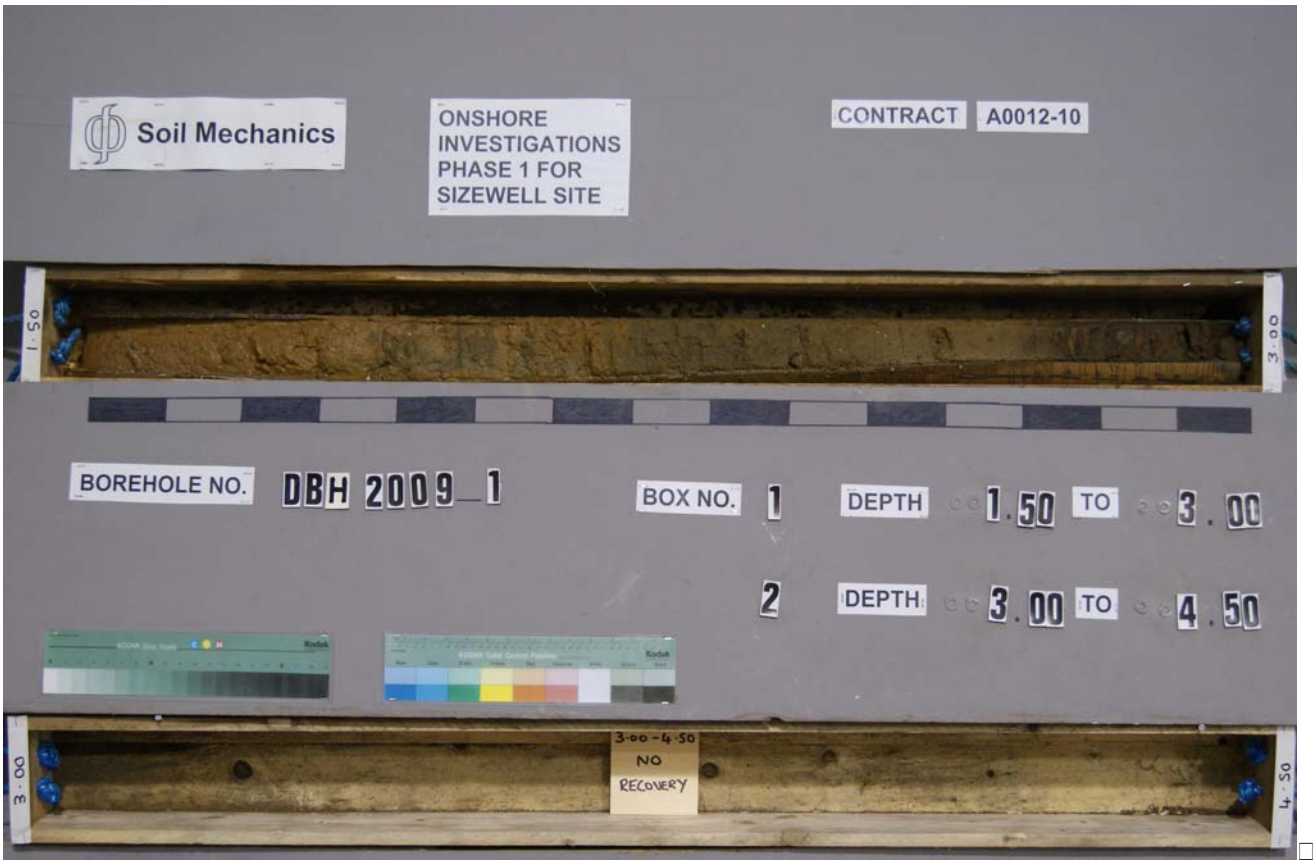
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 72

Photographs

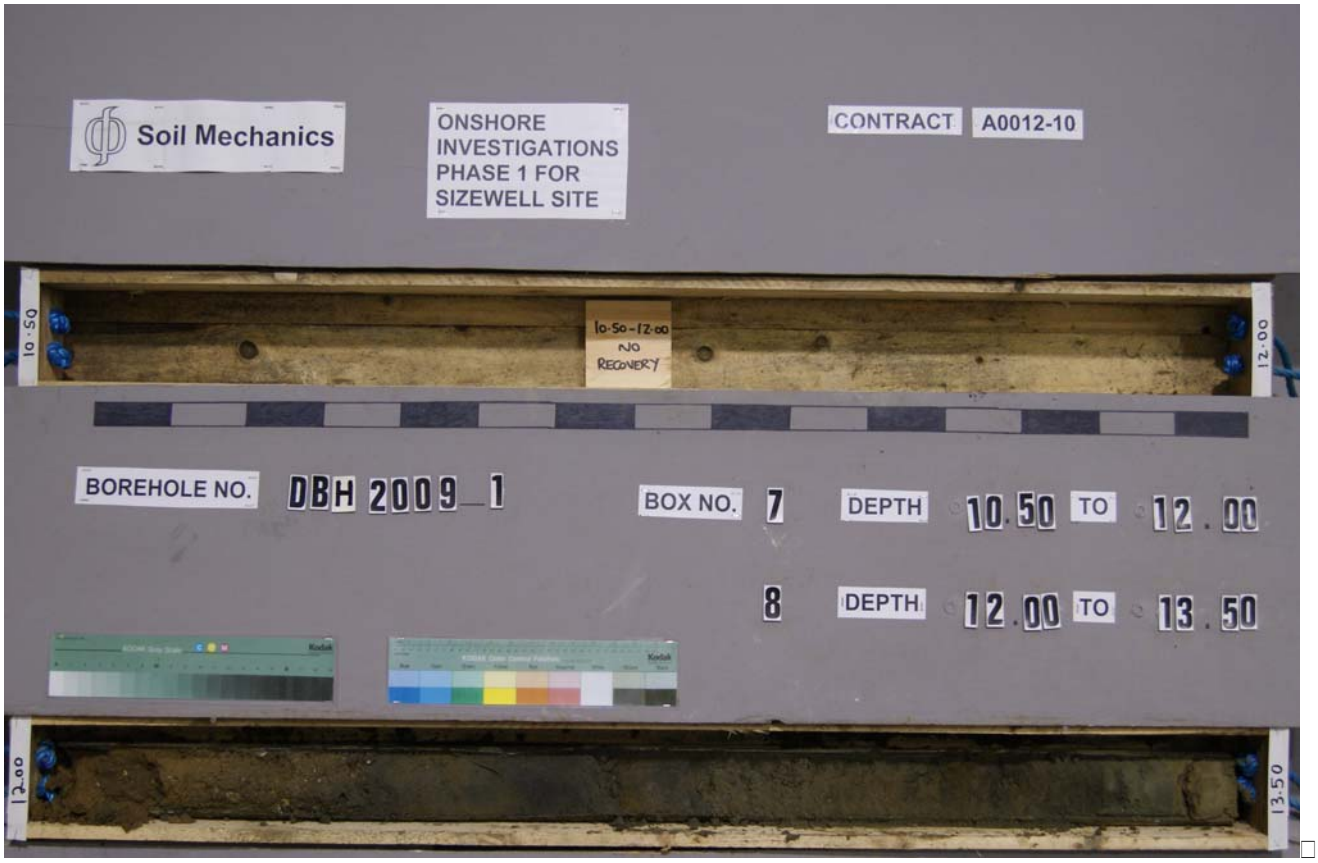
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 73

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 74

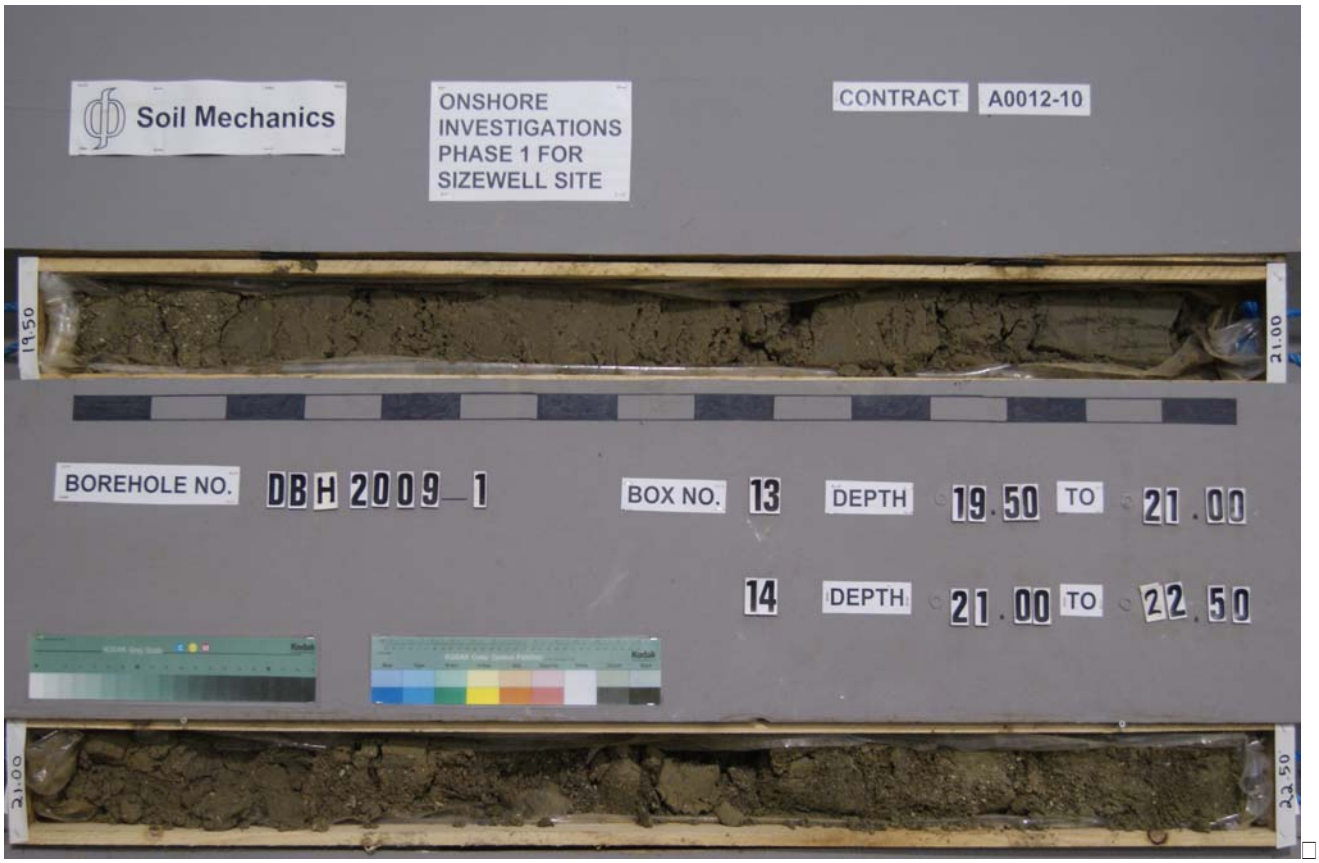
Photographs

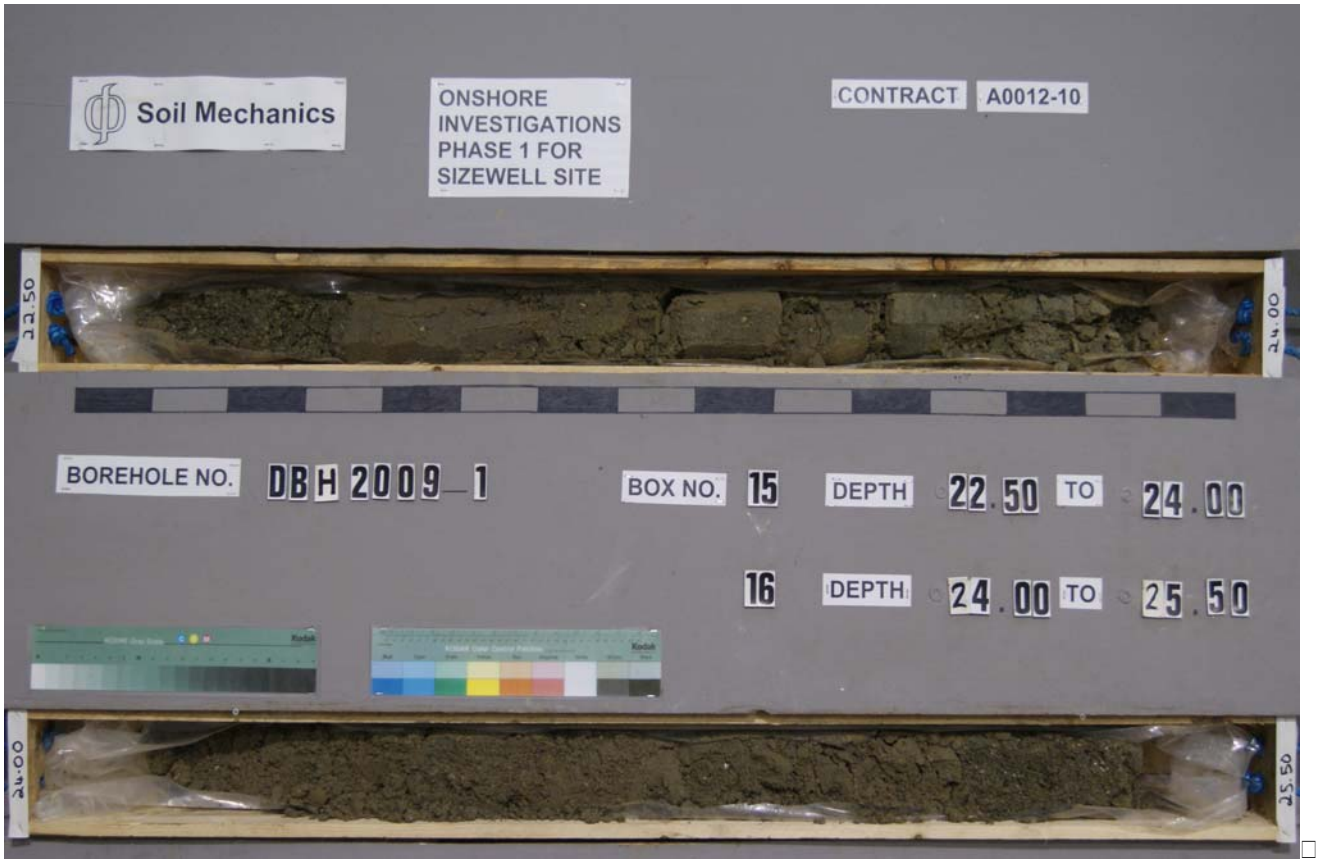
Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 75
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics





	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 76

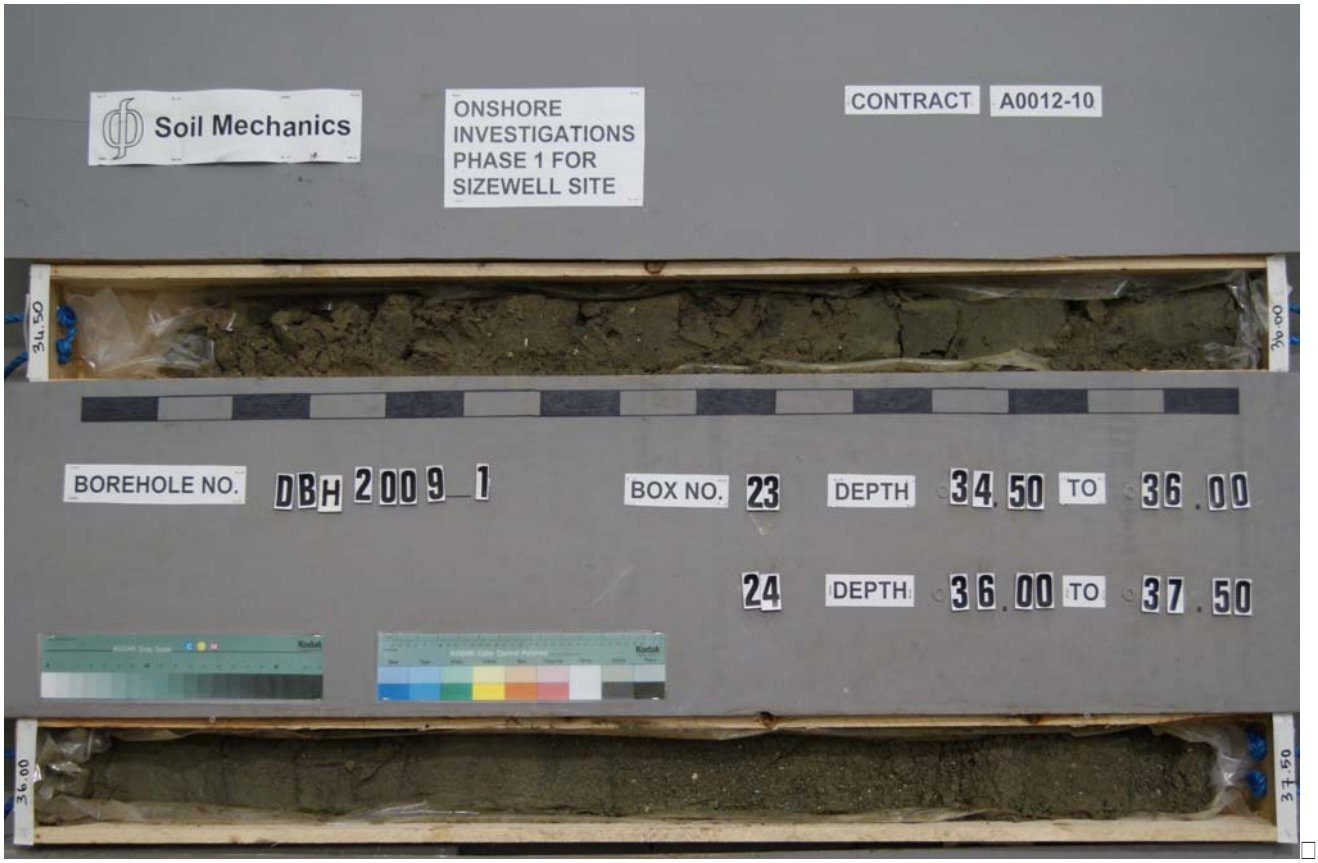
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 77

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 78

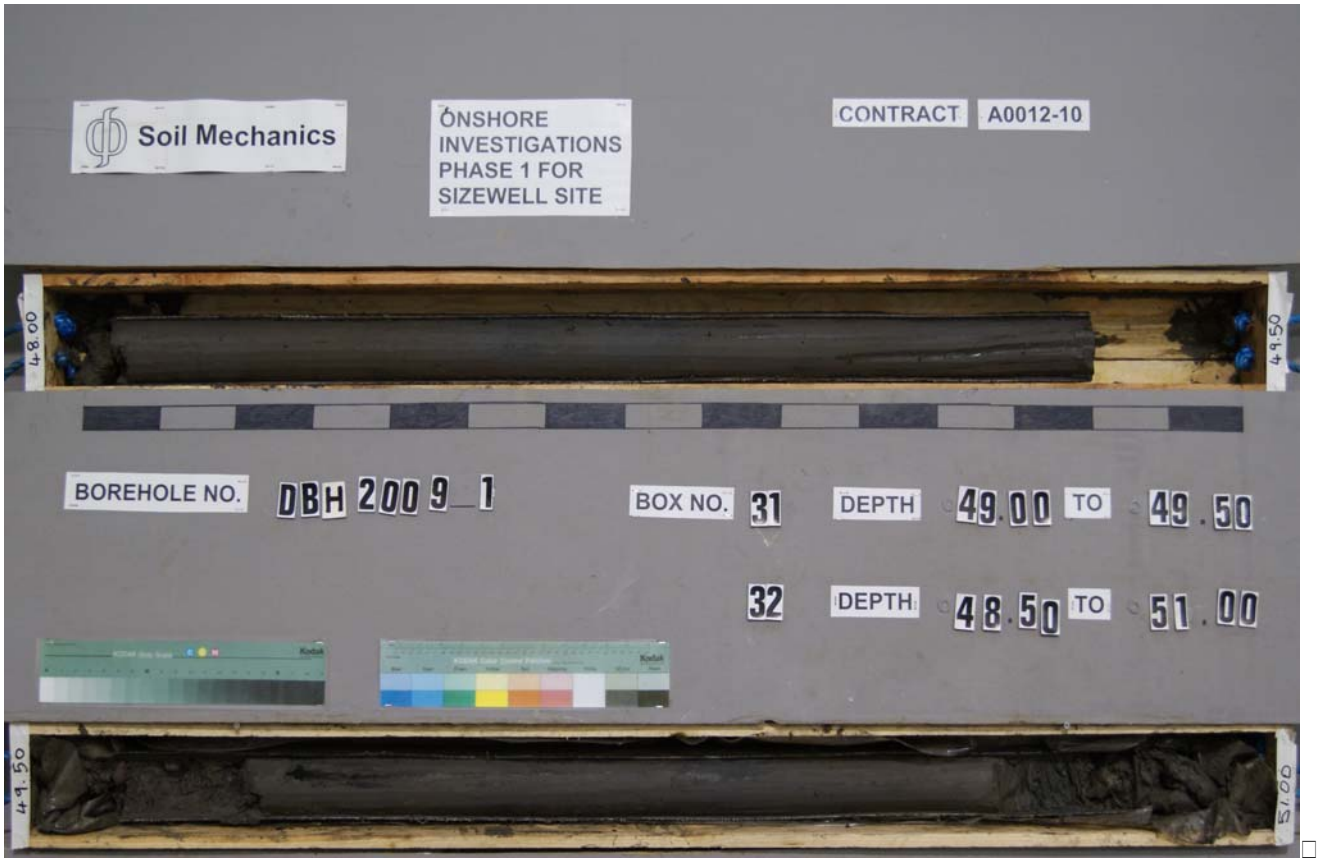
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 79

Photographs

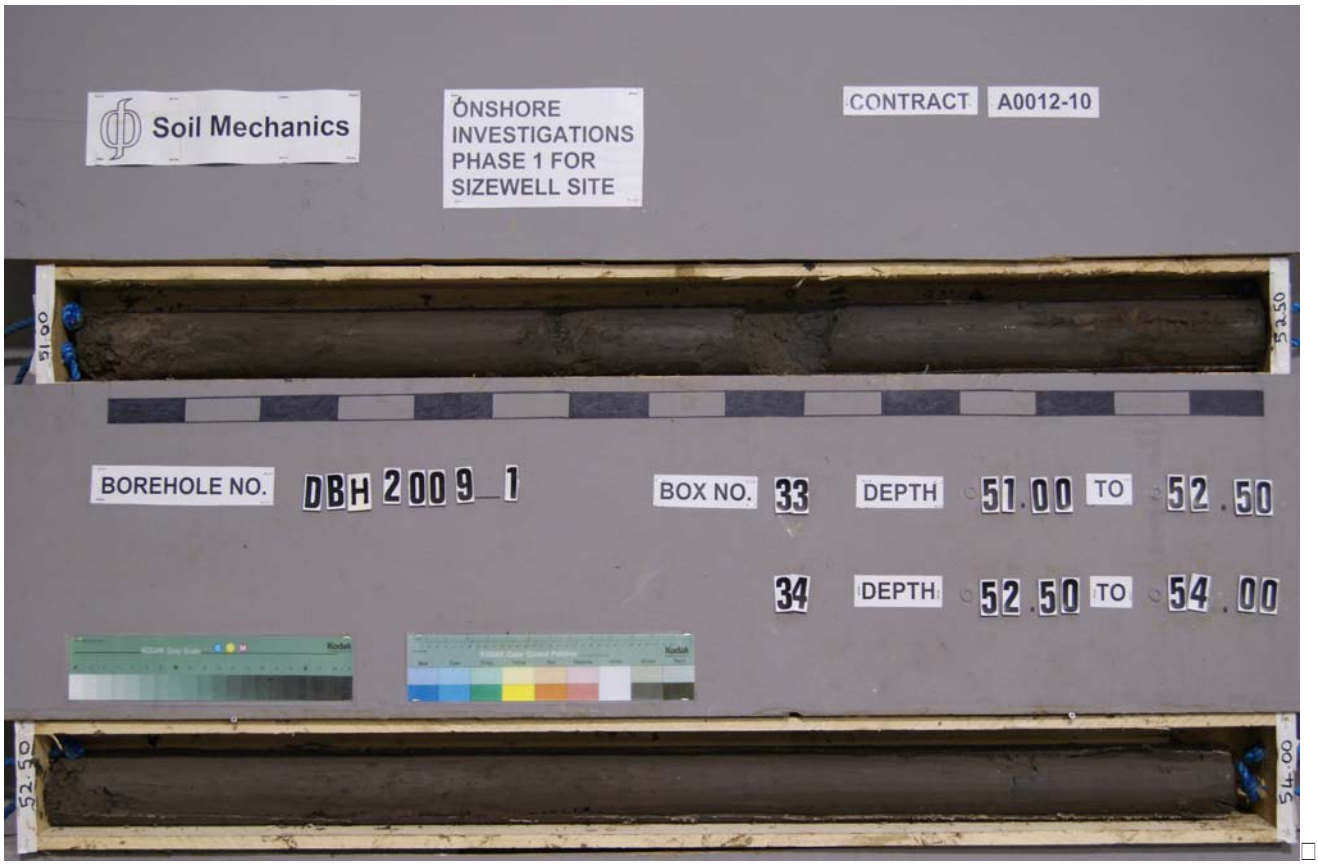
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 80

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 81

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 82

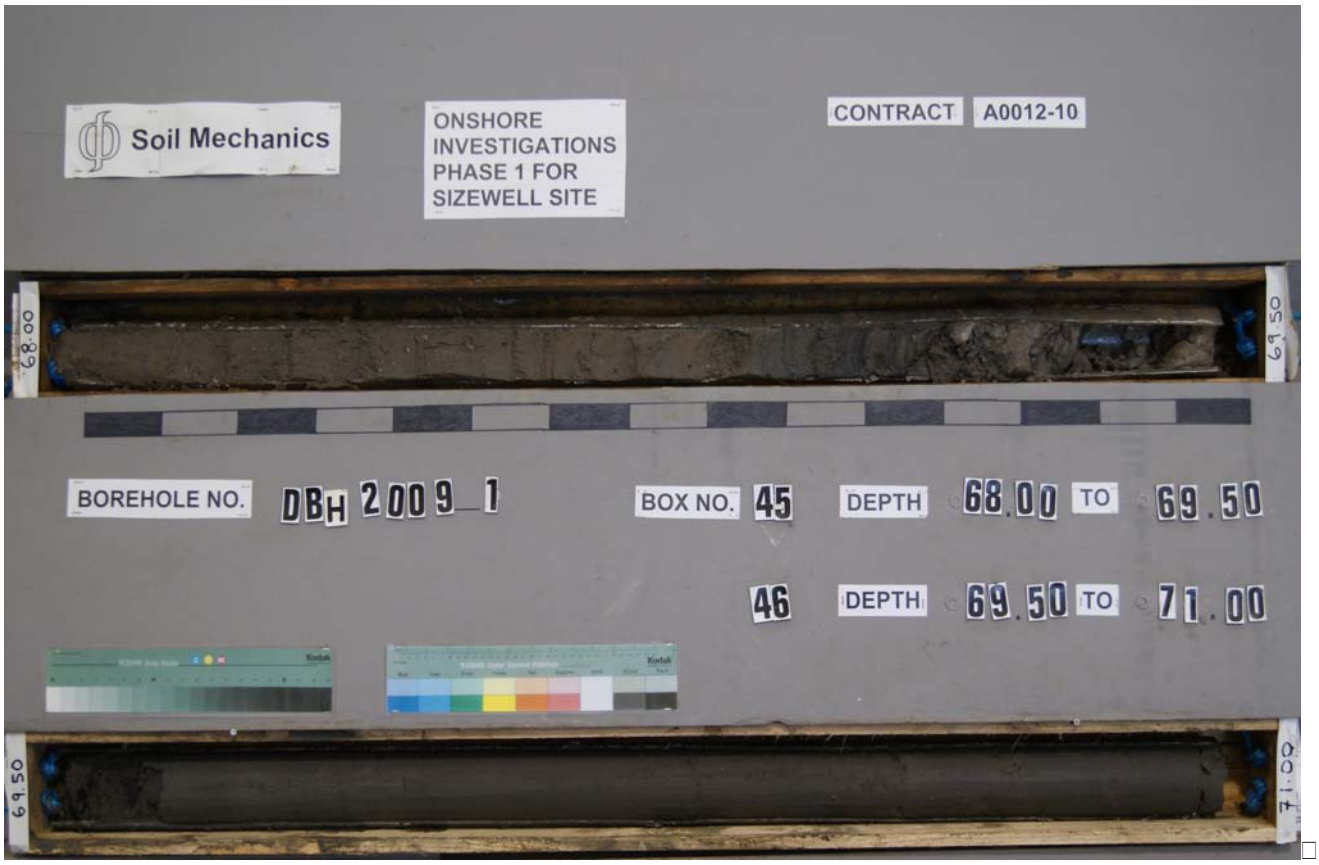
Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	83
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 84

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 85

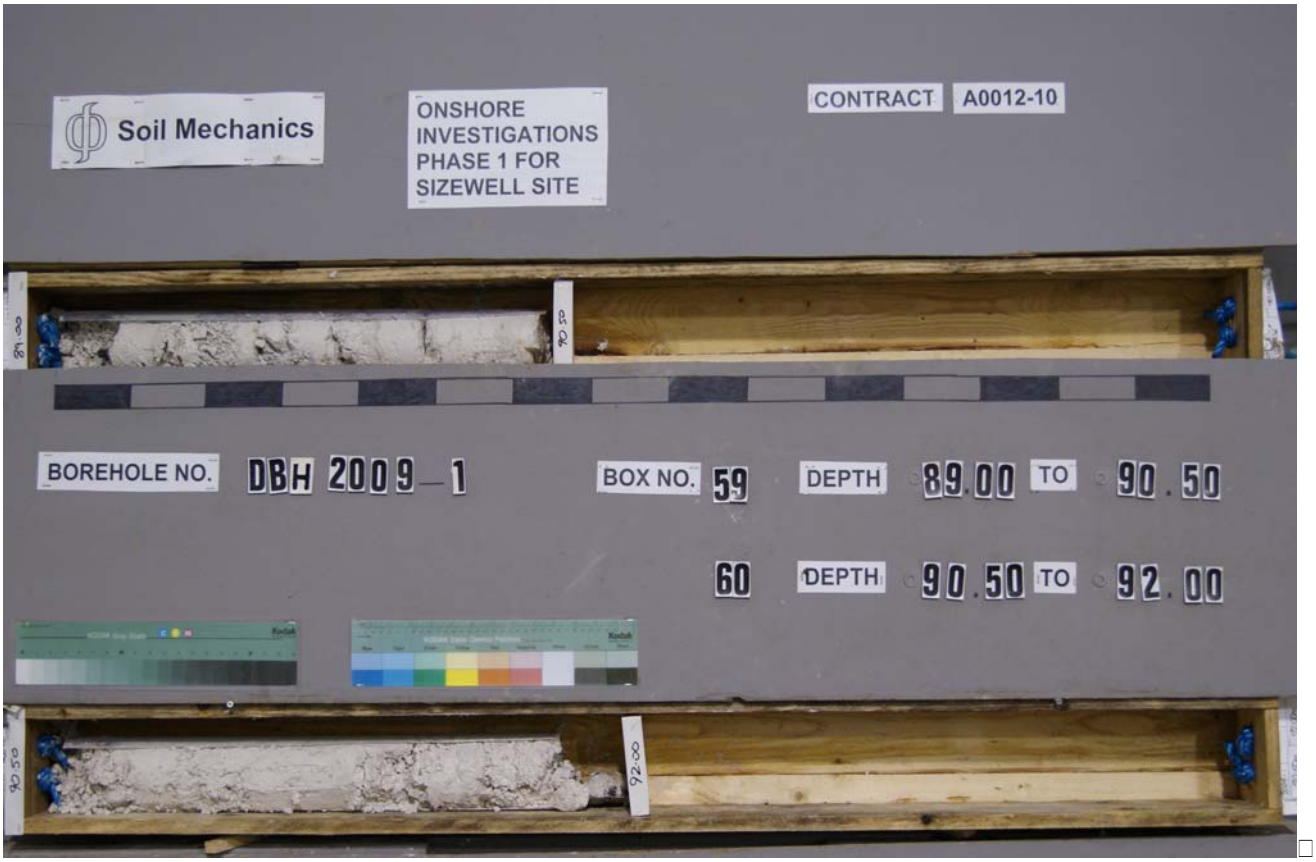
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 86
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

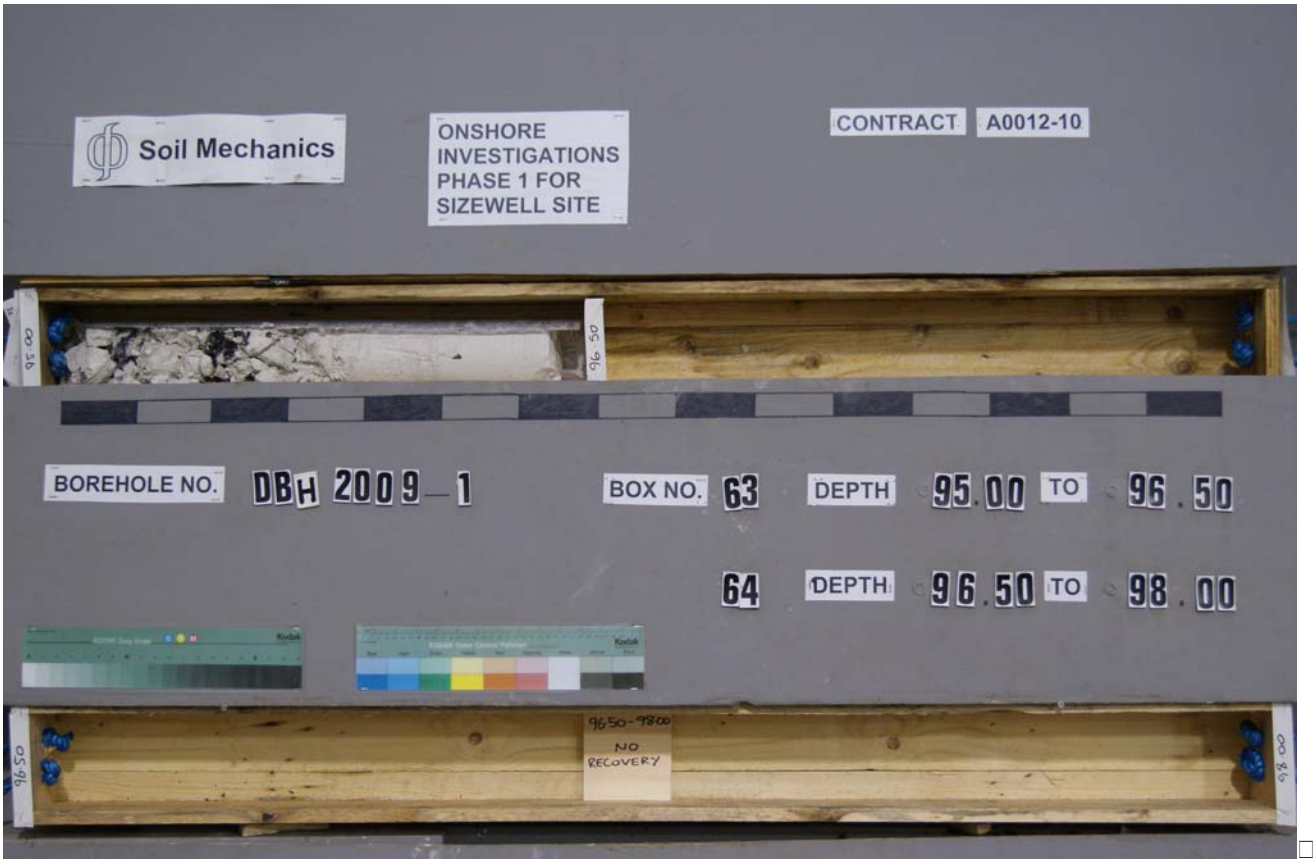
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 87
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

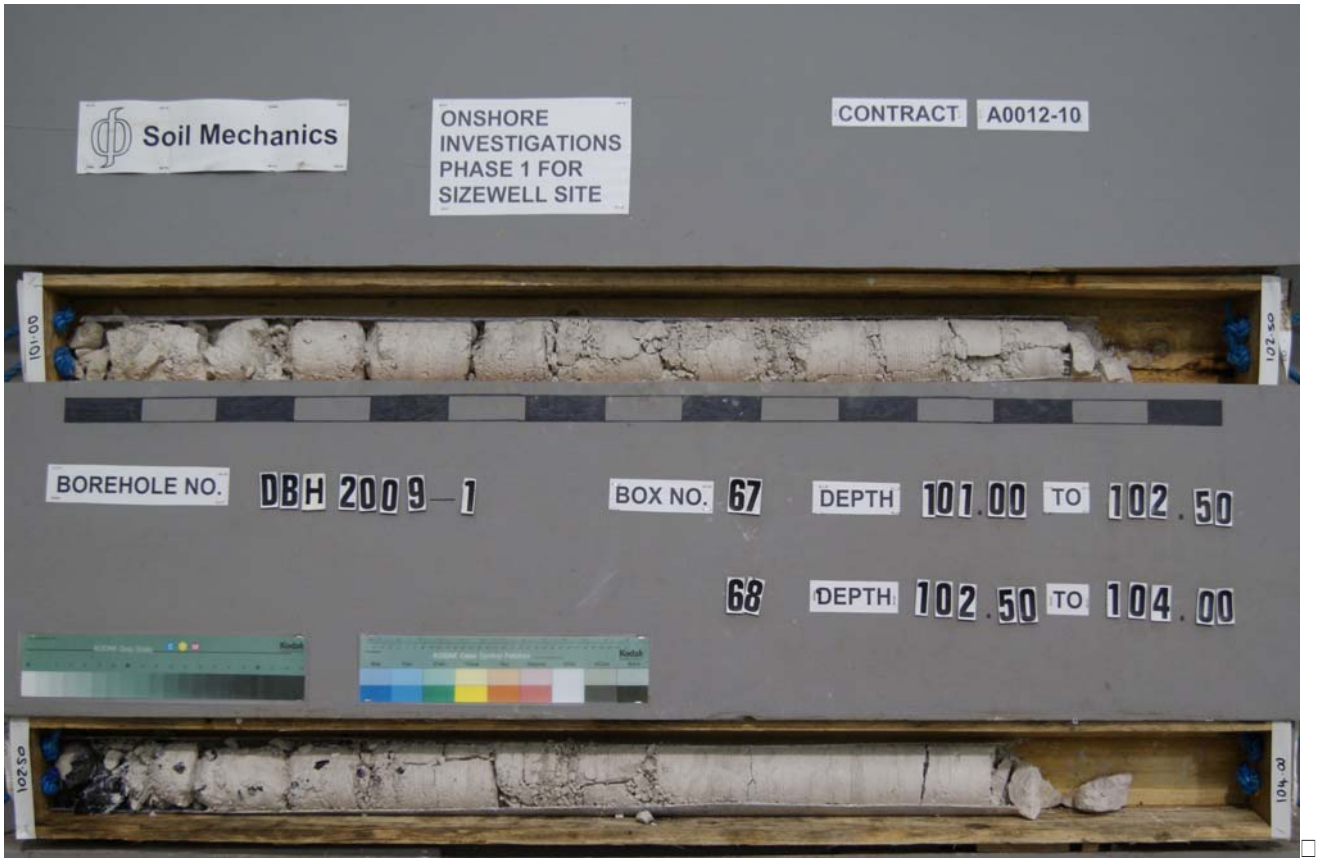
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 88

Photographs

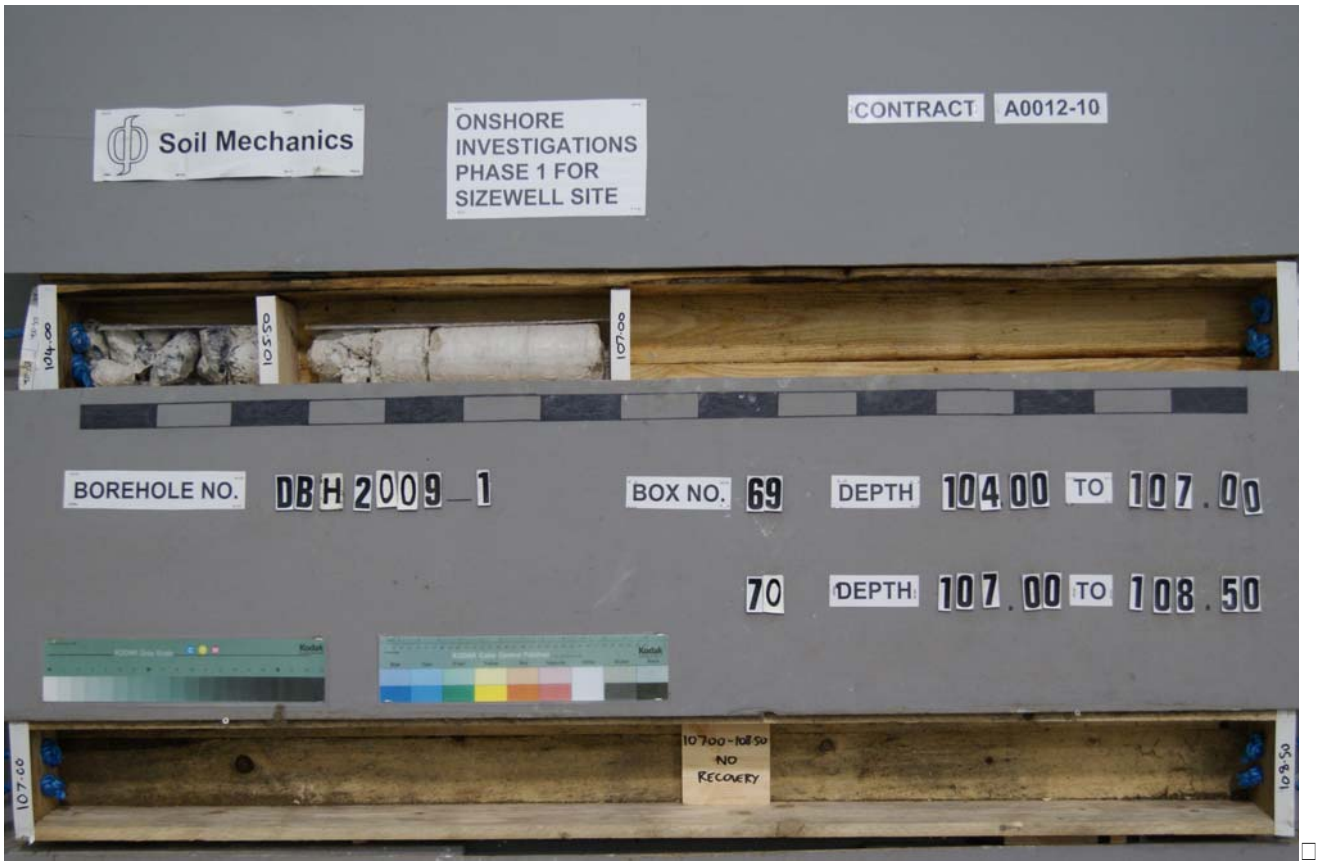
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 89

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 90

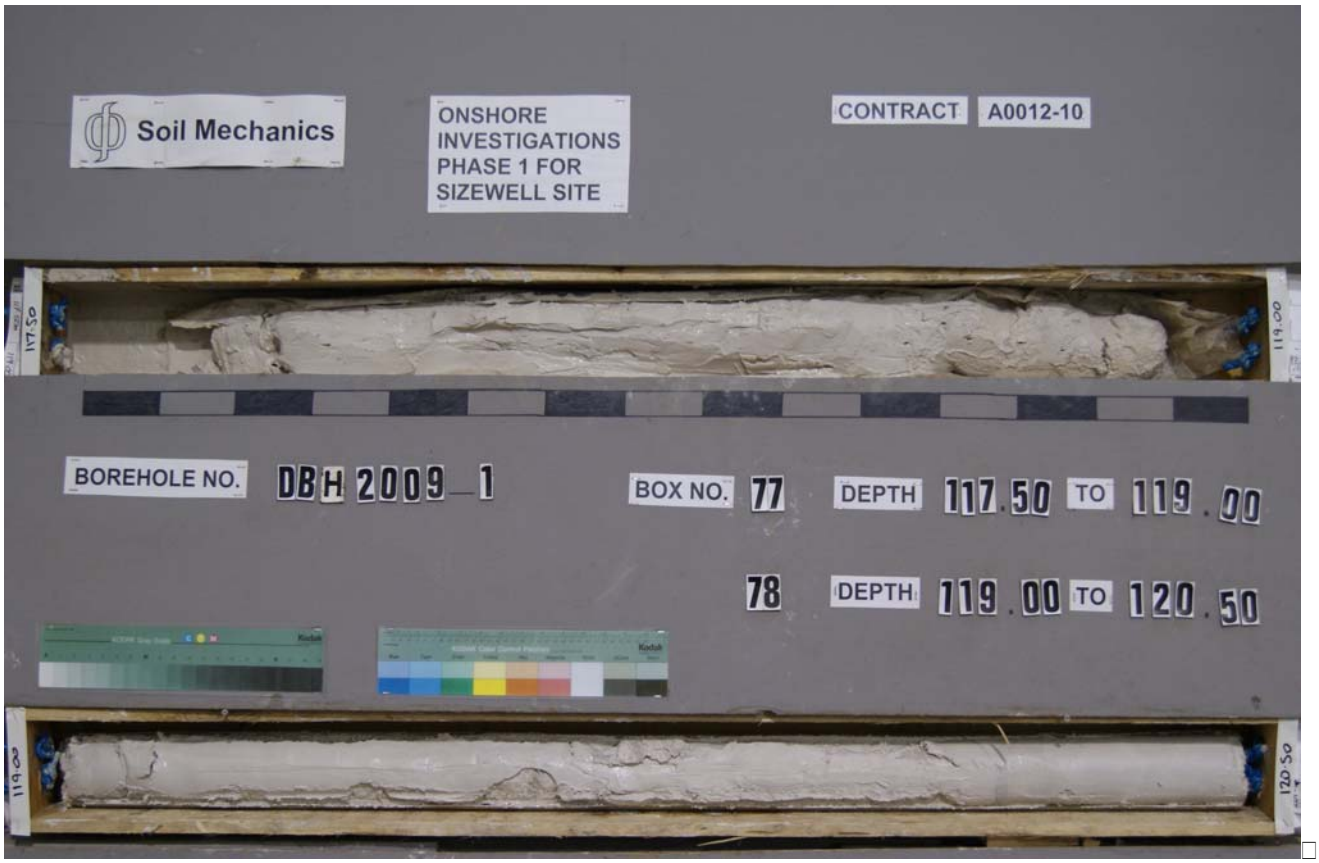
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 91

Photographs

Soil Mechanics



Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 92
Project No.	A0012-10	
Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 93

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 94

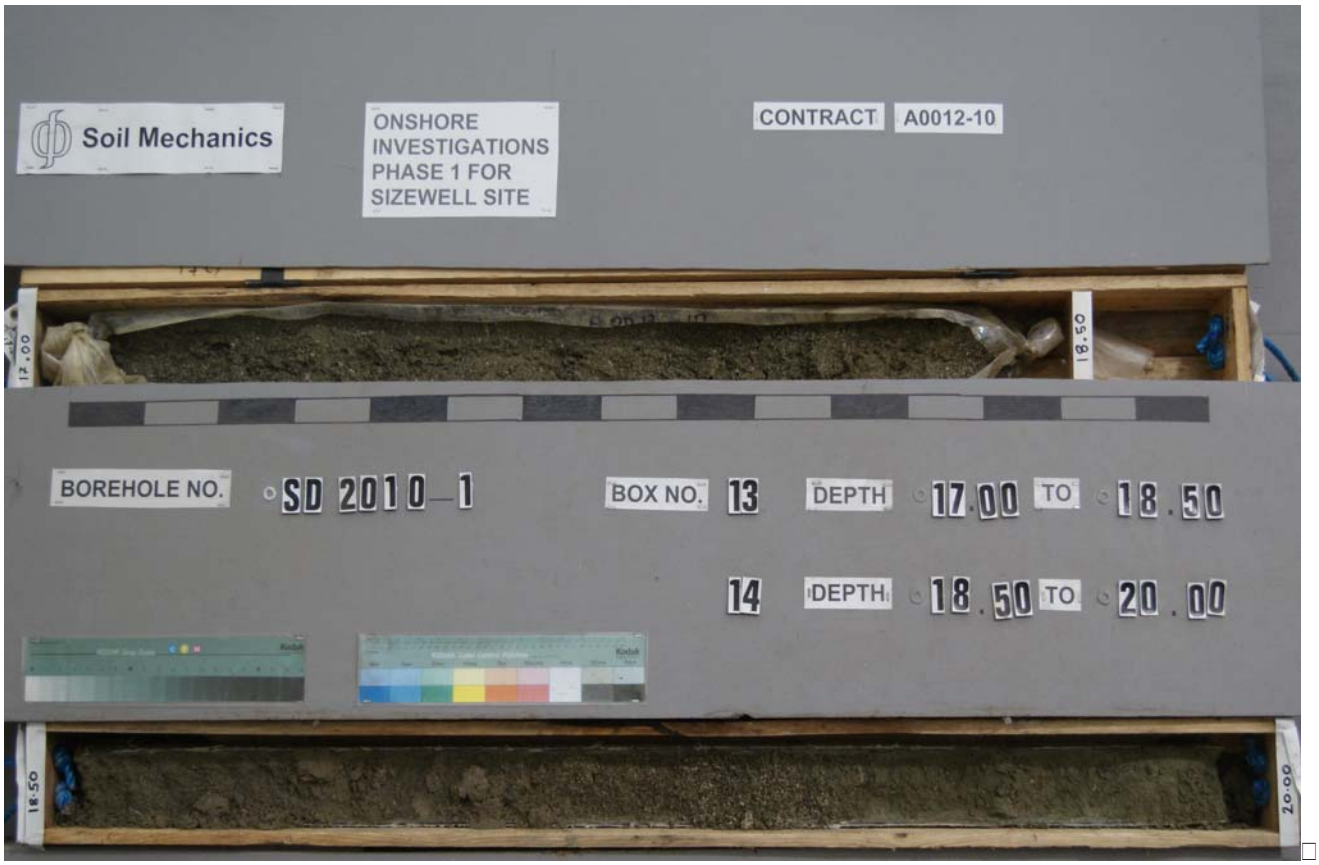
Photographs

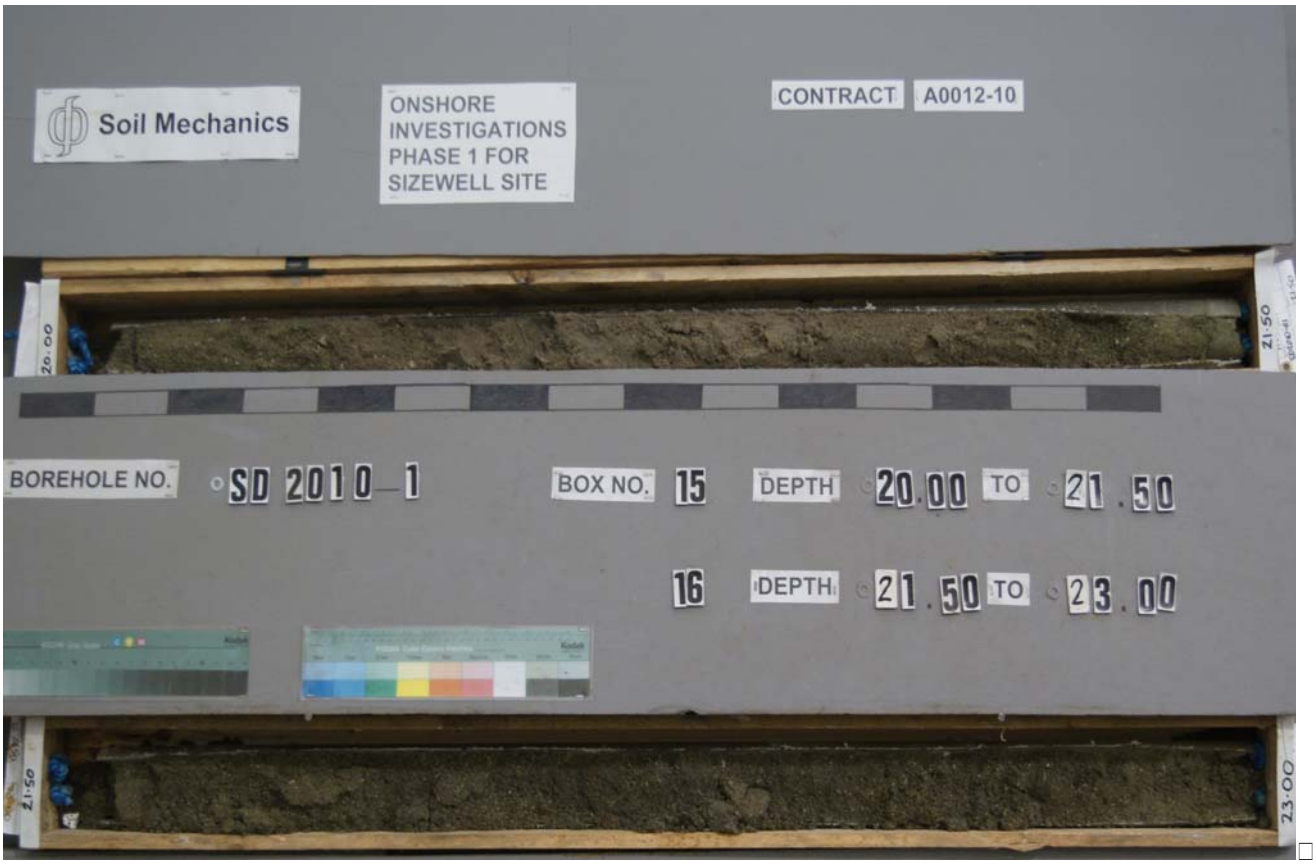
Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 95

Photographs

Soil Mechanics





	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 96

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 97
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 98

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 99

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 100

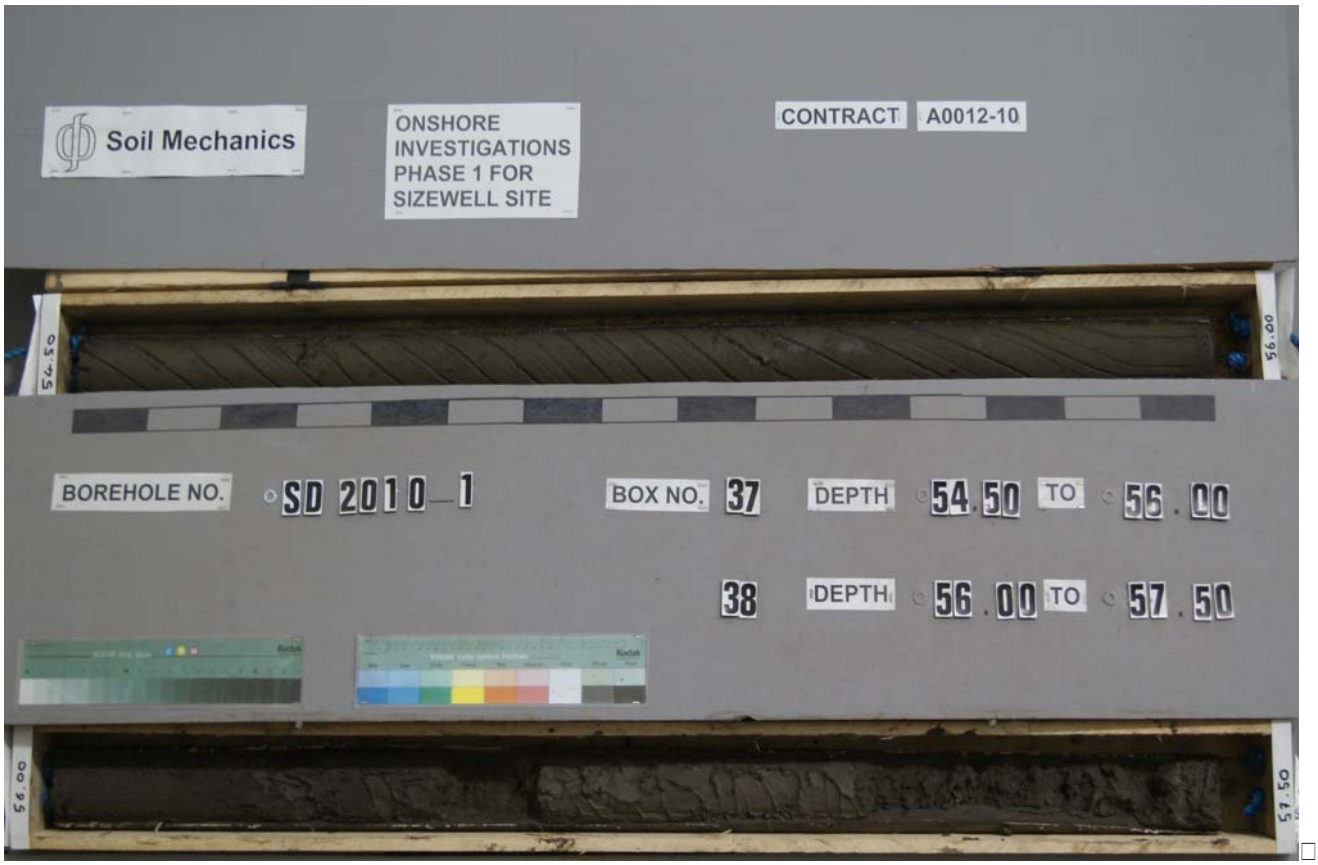
Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 101
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

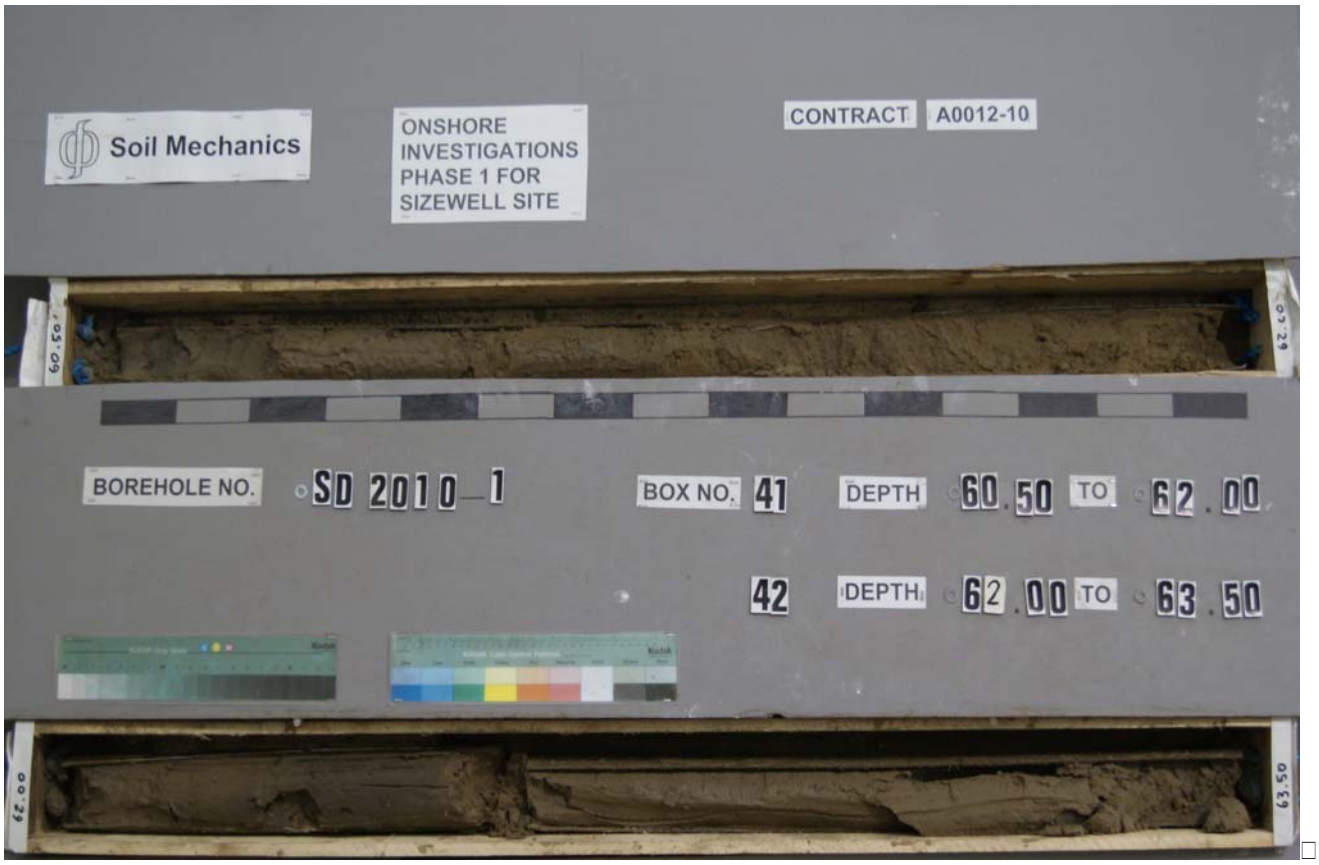
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 102

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 103

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 104

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 105

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	106
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 107

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 108

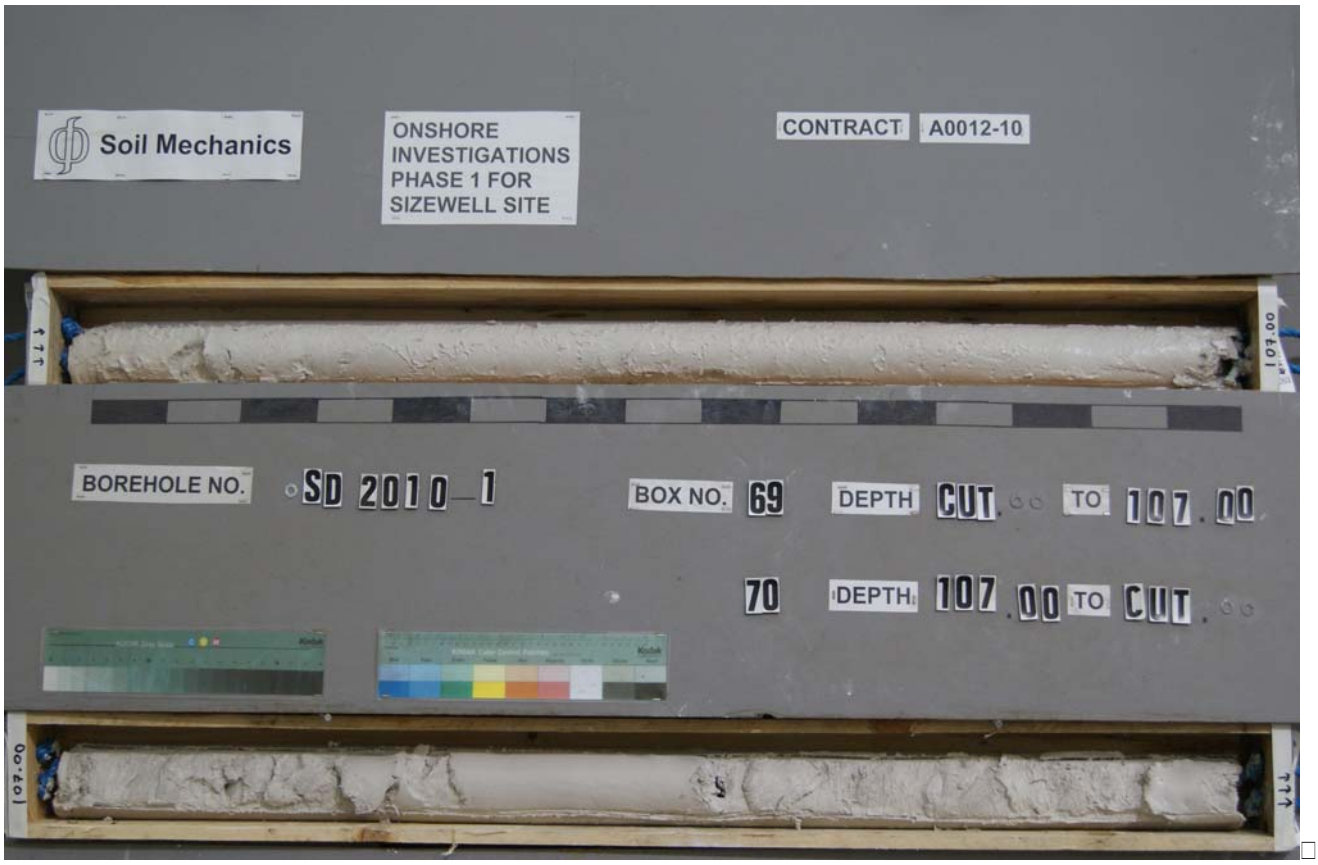
Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 109
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics



	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 110
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 111
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics

Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 112
Project No.	A0012-10	
Carried out for	NNB Generation Company Limited	

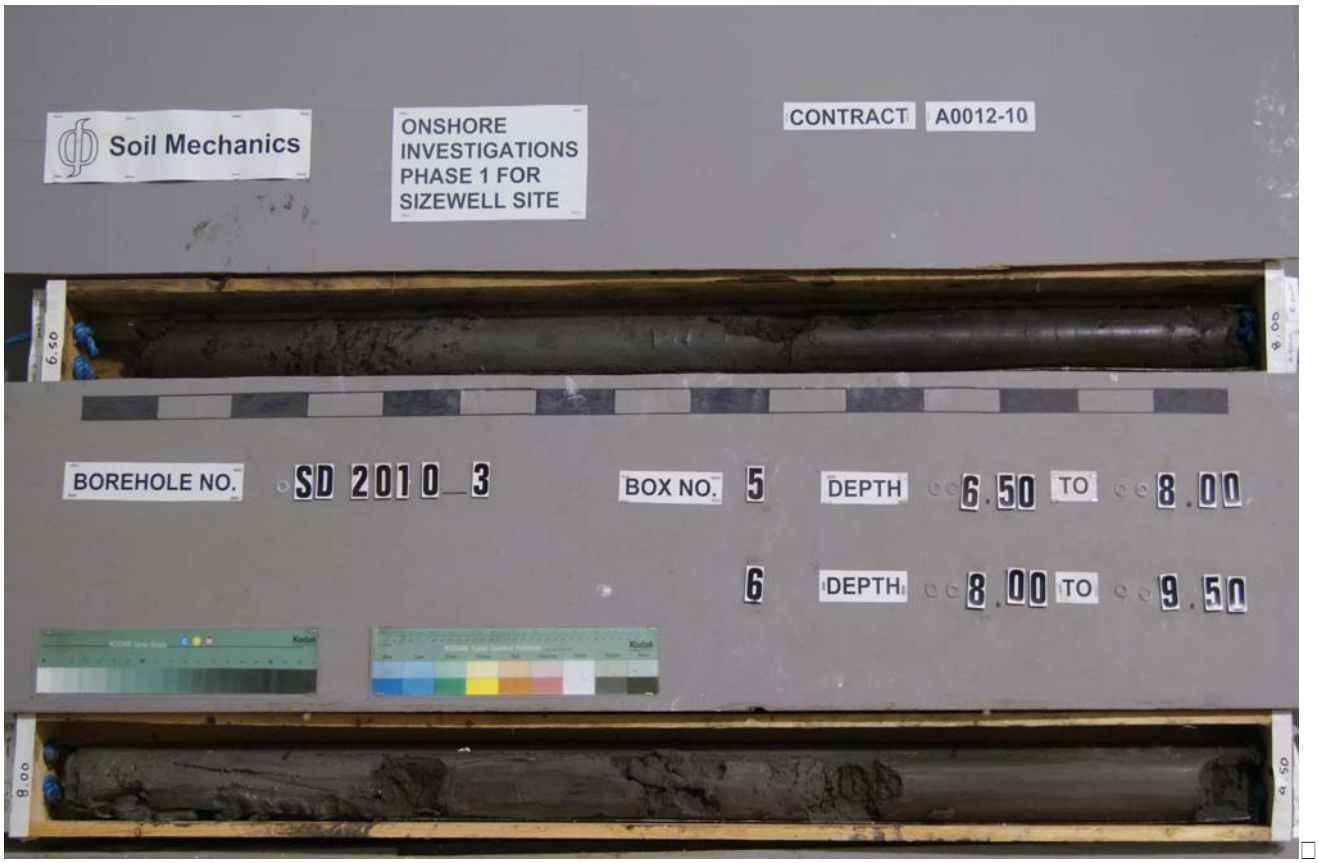
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 113
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 114

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 115

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 116

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 117

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 118

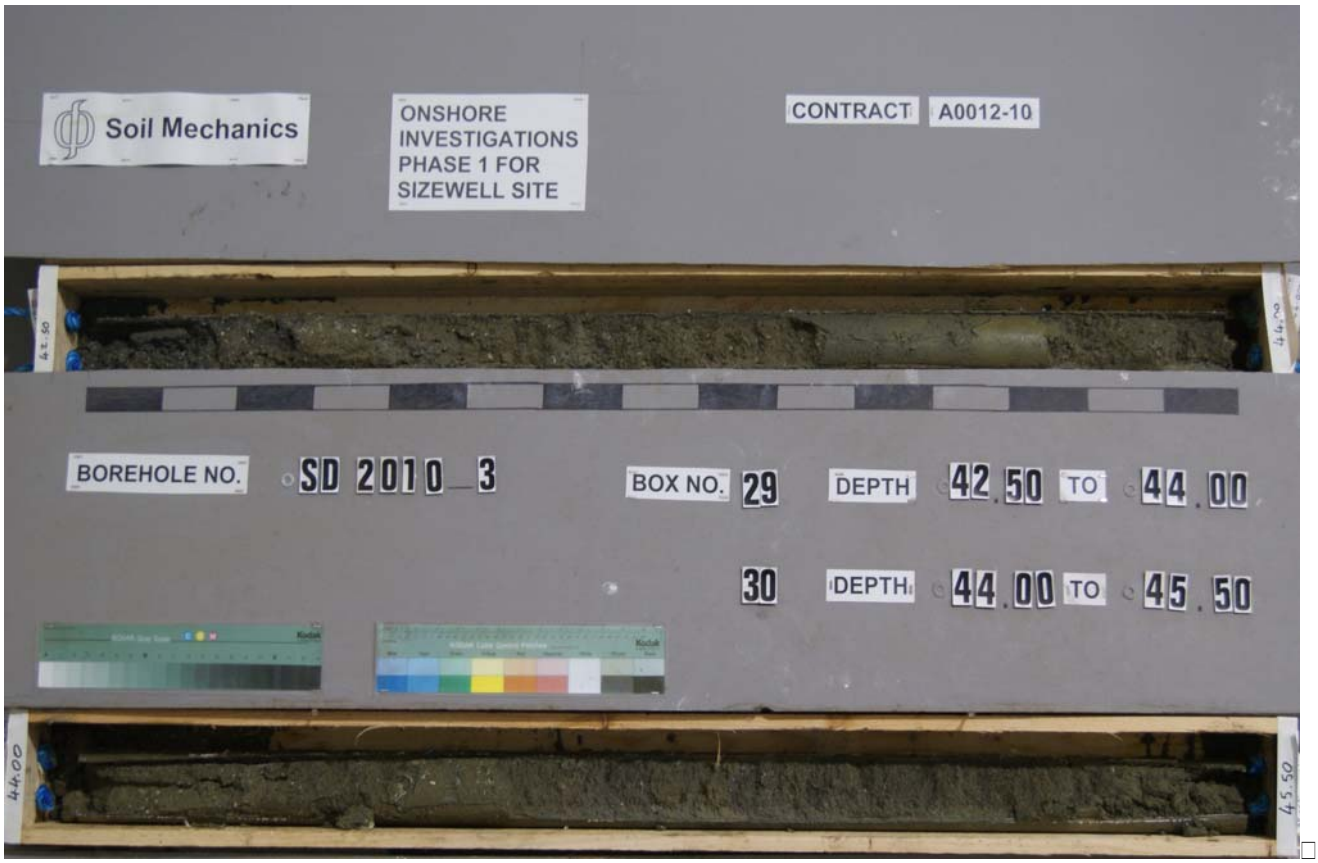
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 119

Photographs

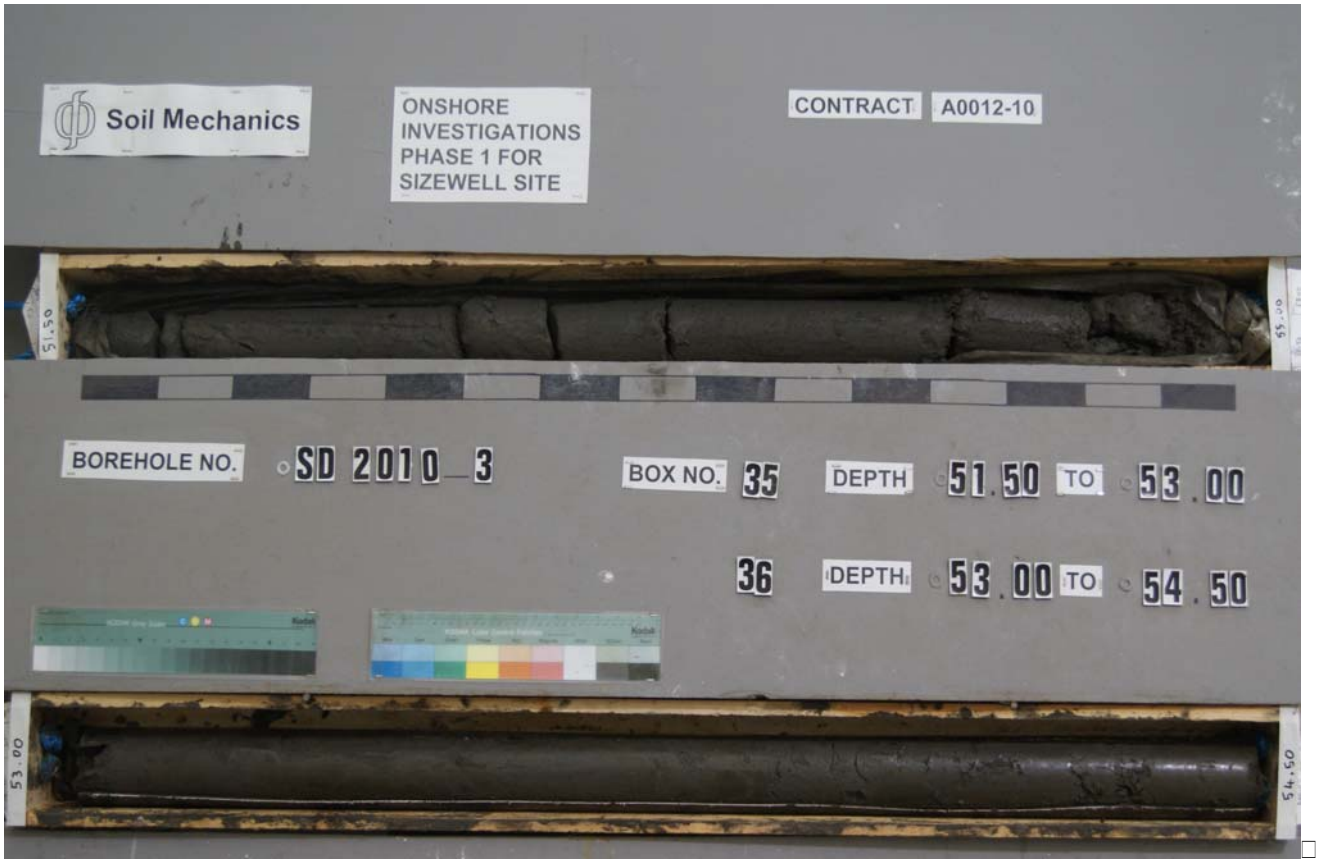
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 120

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 121

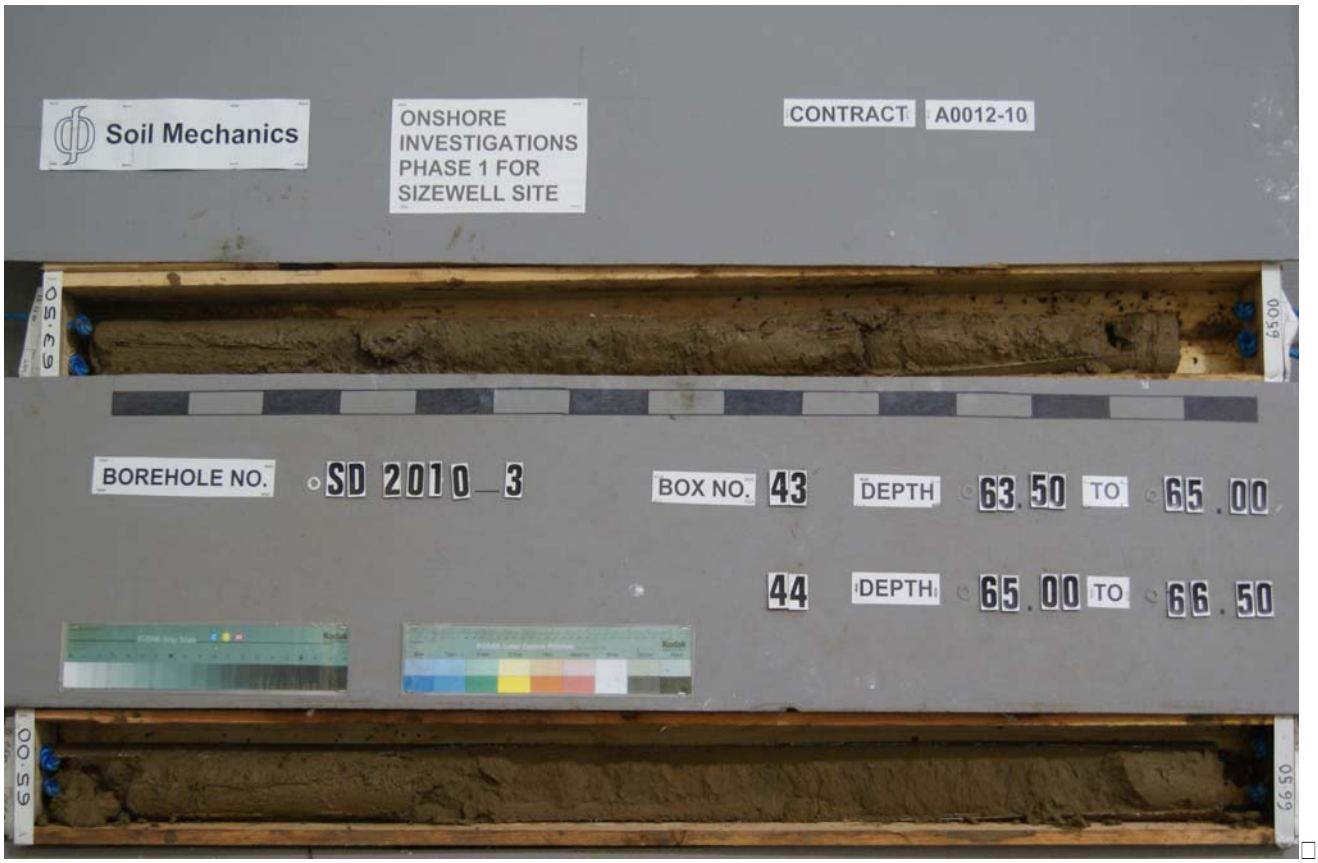
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 122

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 123

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 124

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 125

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 126

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 127

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 128

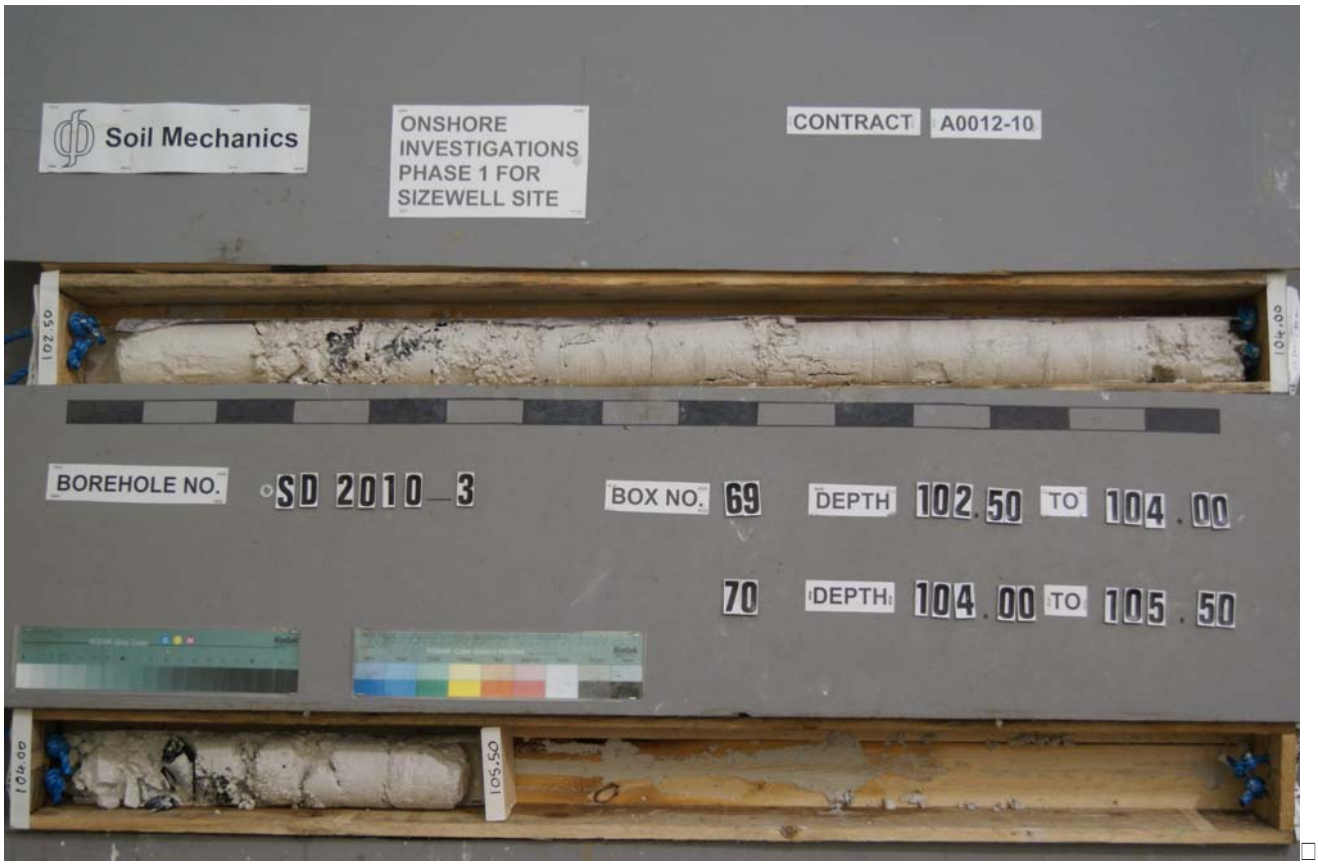
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 129

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 130

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 131

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 132

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 133

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 134

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate: 135
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 136

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 137

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 138

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 139

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 140

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	141
	Carried out for	NNB Generation Company Limited	

ENCLOSURE B

U100 SAMPLE PHOTOGRAPHS

U100 Samples Plate 1 to 50

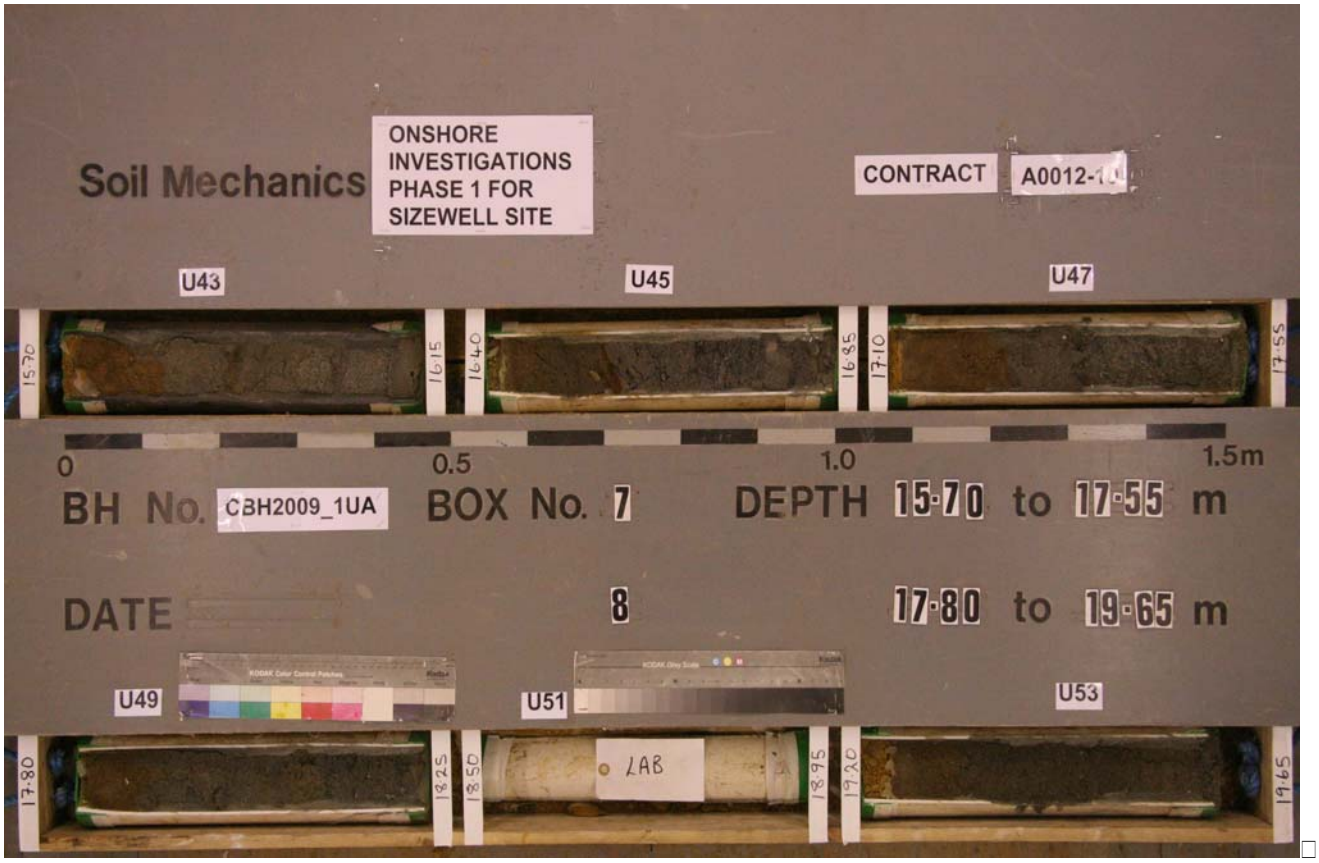
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 1

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 2

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 3

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 4

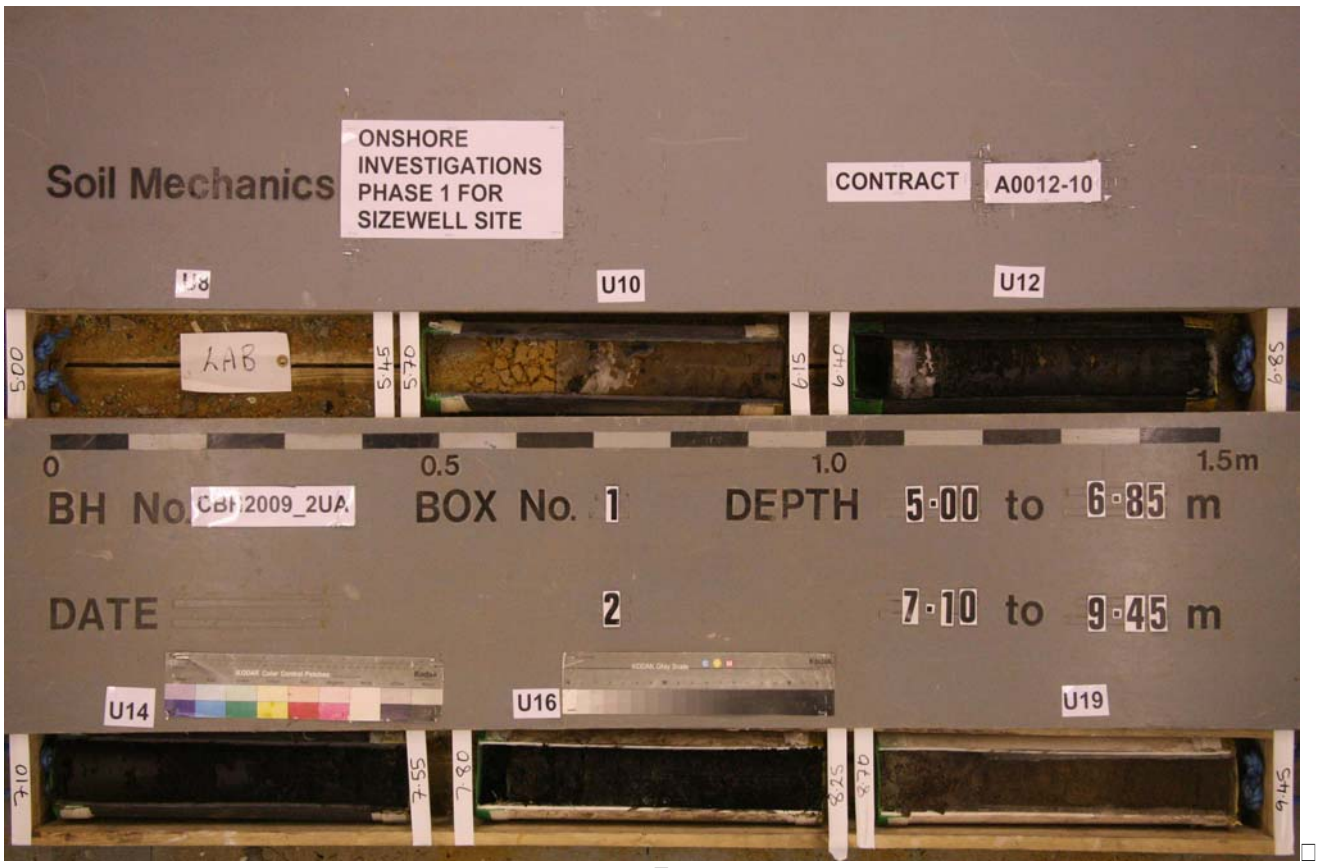
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 5

Photographs

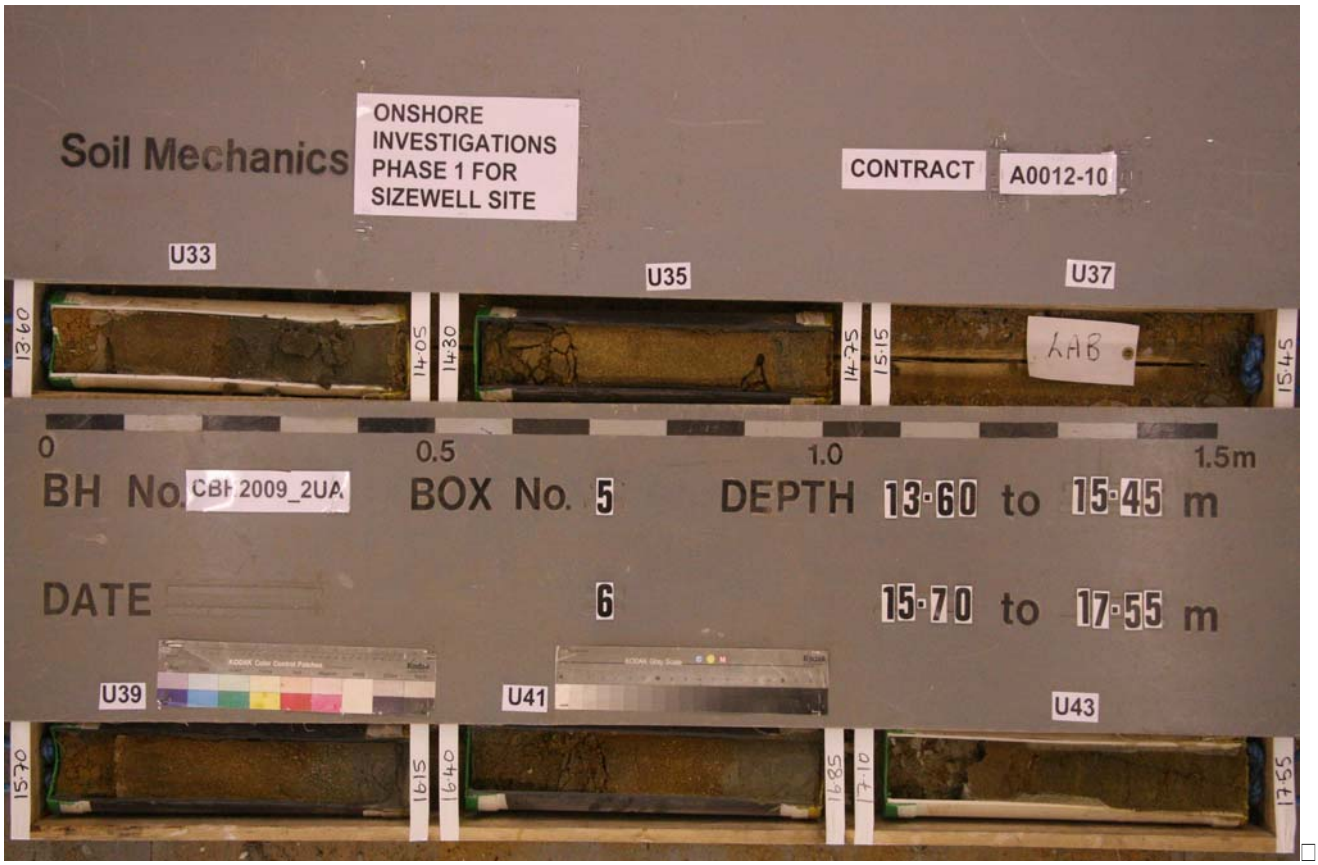
Soil Mechanics



	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 6
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

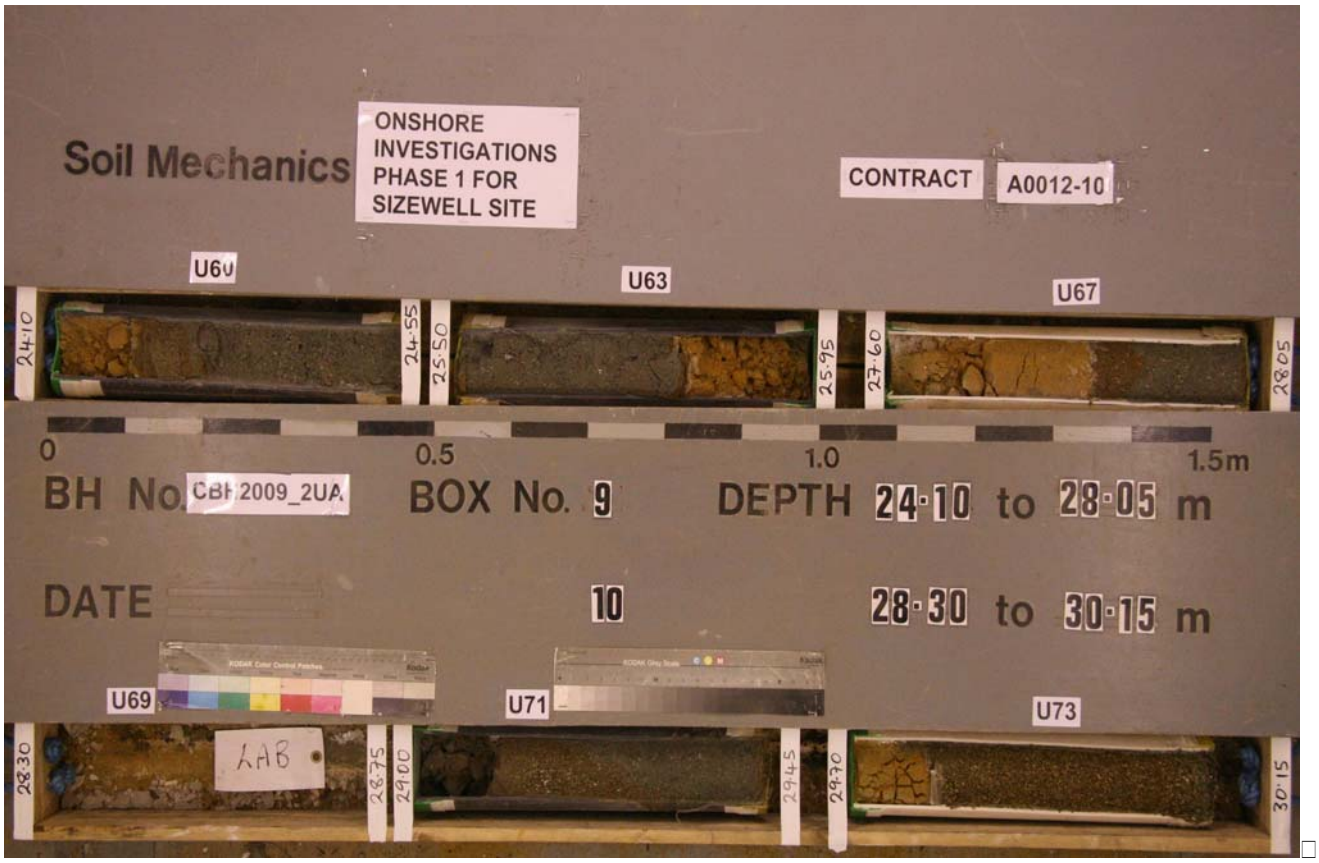
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 7

Photographs

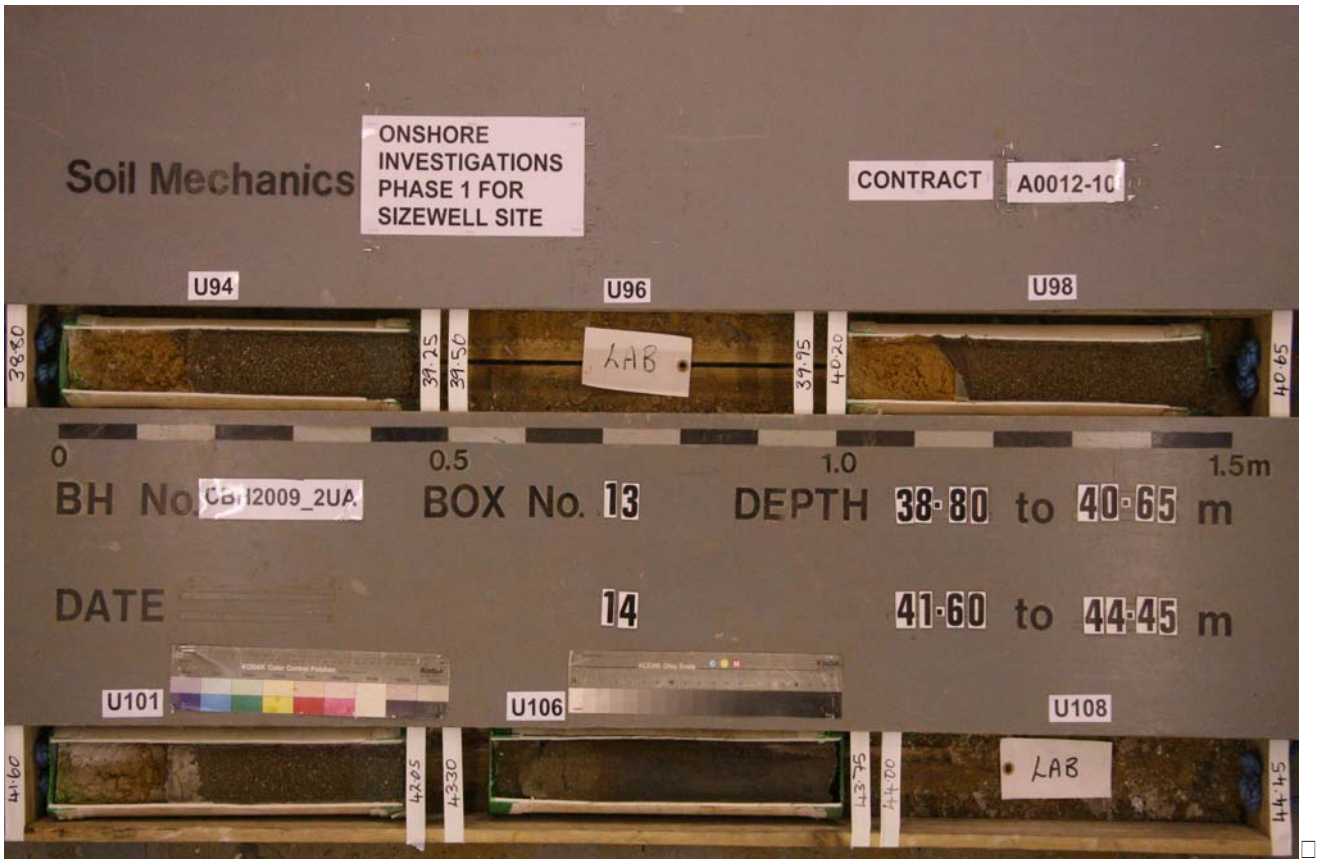
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 8

Photographs

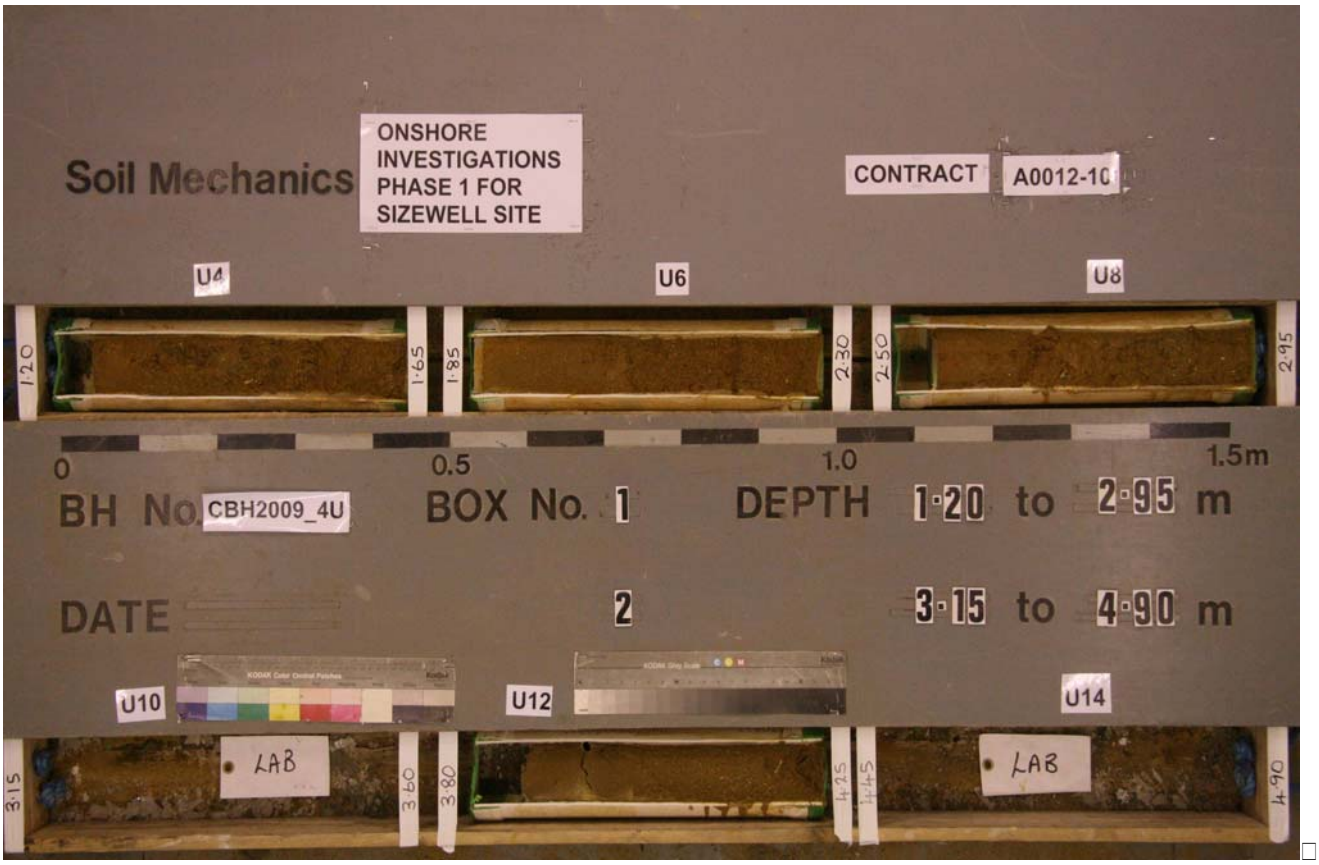
Soil Mechanics

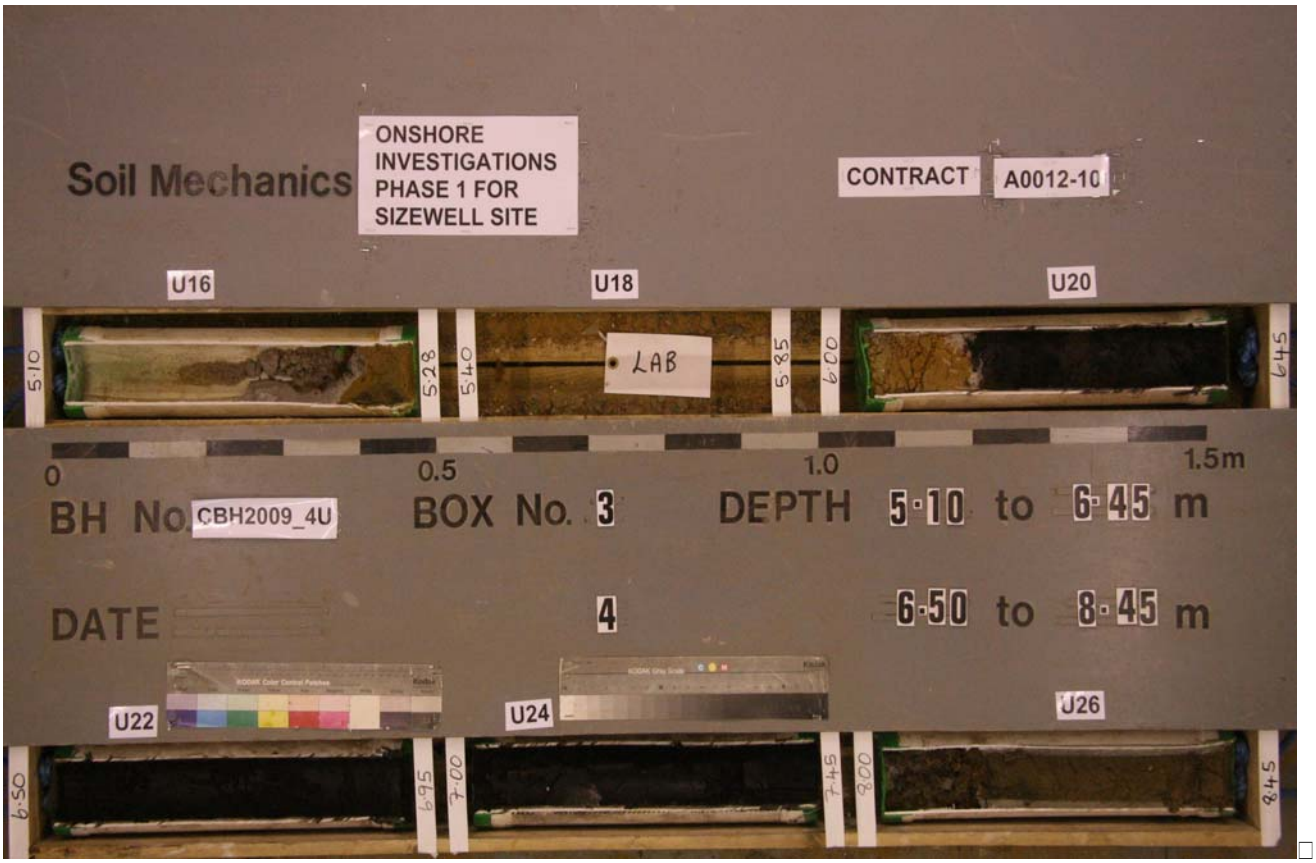


	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 9
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics

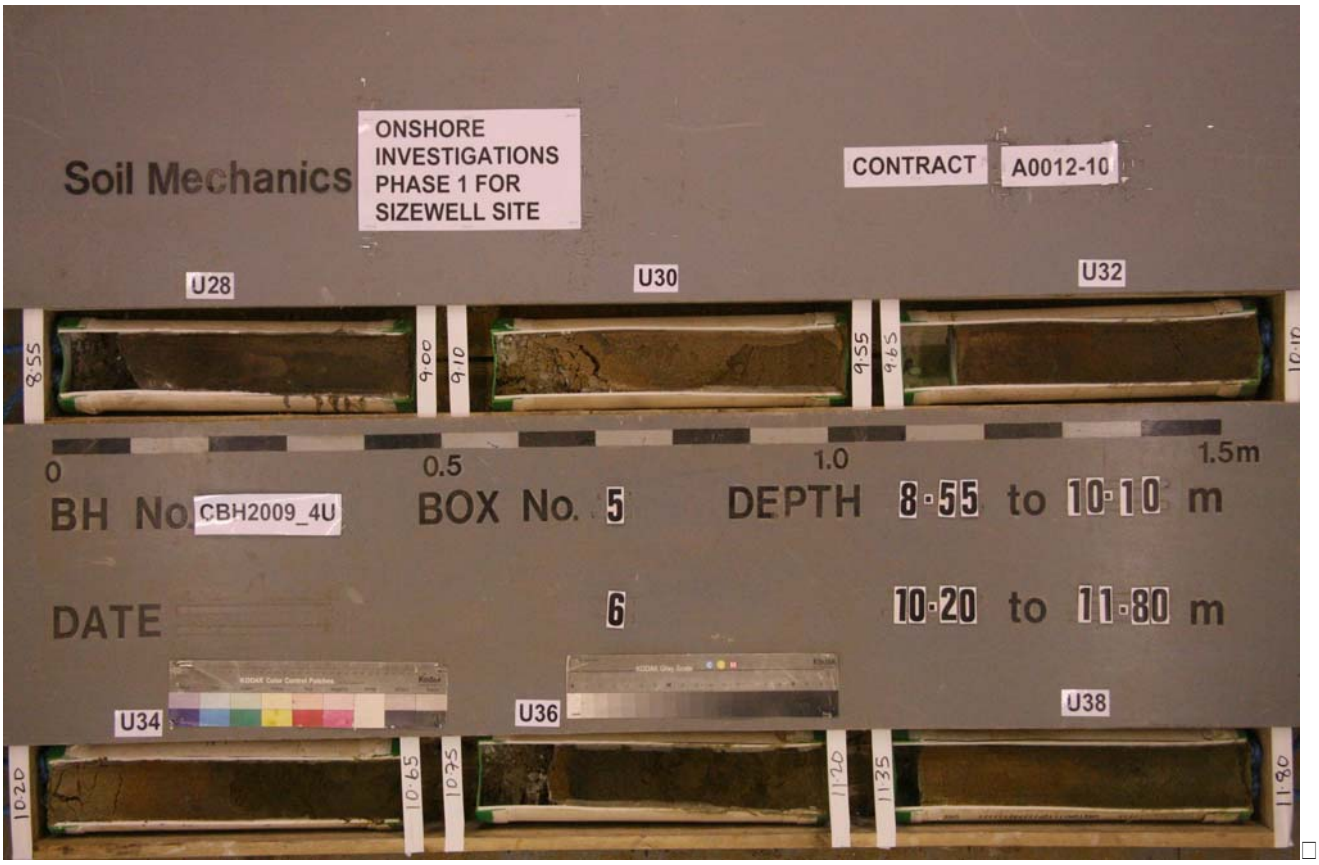




	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 10

Photographs

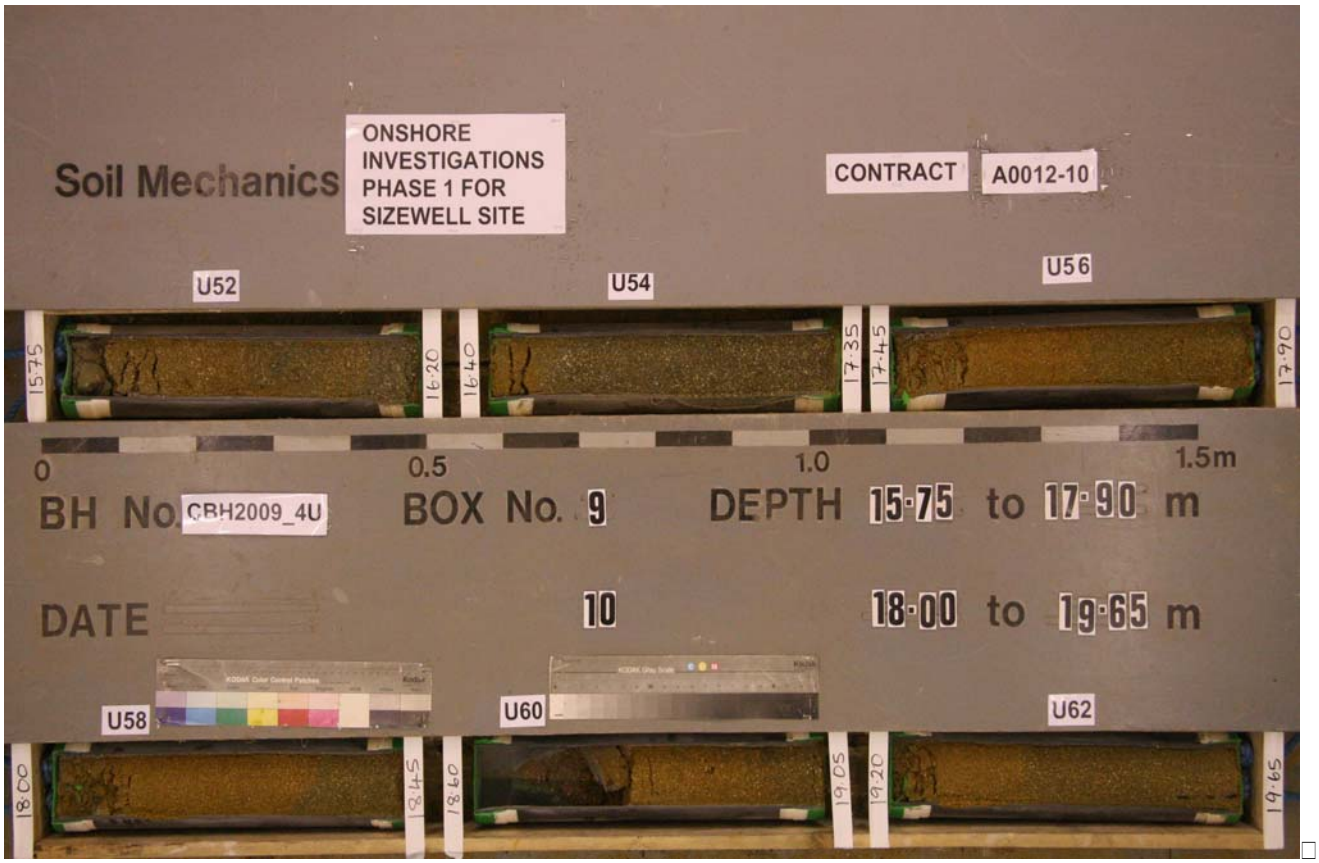
Soil Mechanics



	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	11
	Carried out for	NNB Generation Company Limited	

Photographs

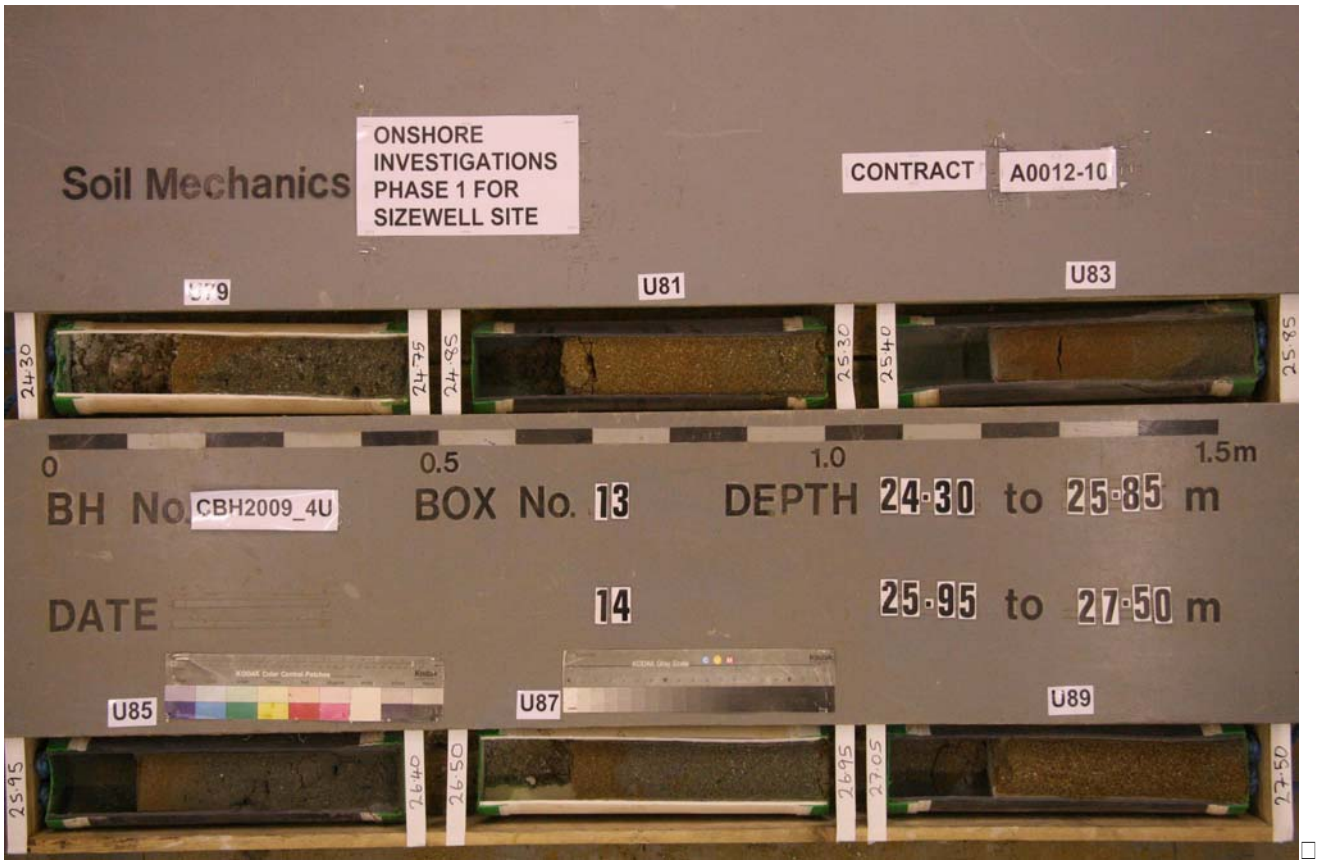
Soil Mechanics



	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	12
	Carried out for	NNB Generation Company Limited	

Photographs

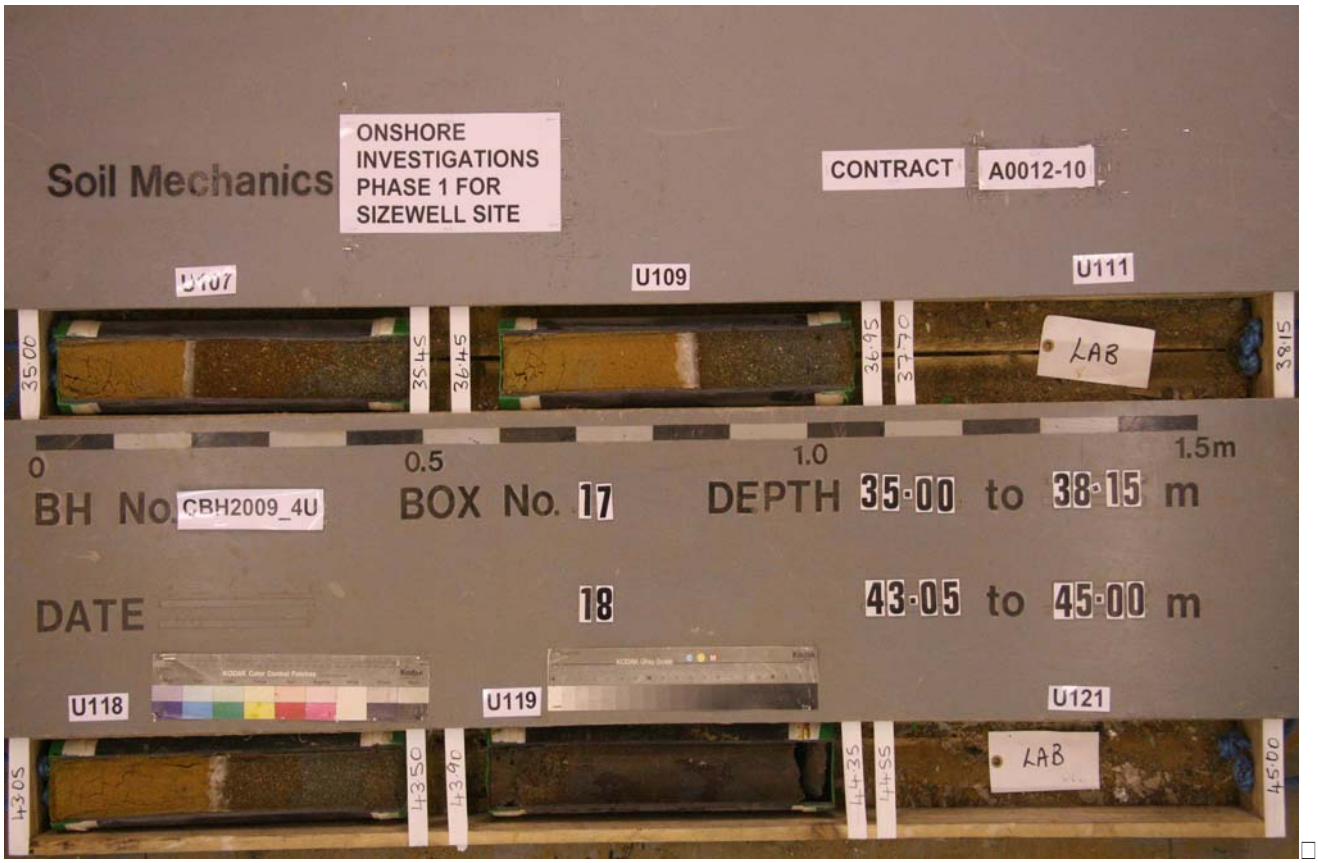
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 13

Photographs

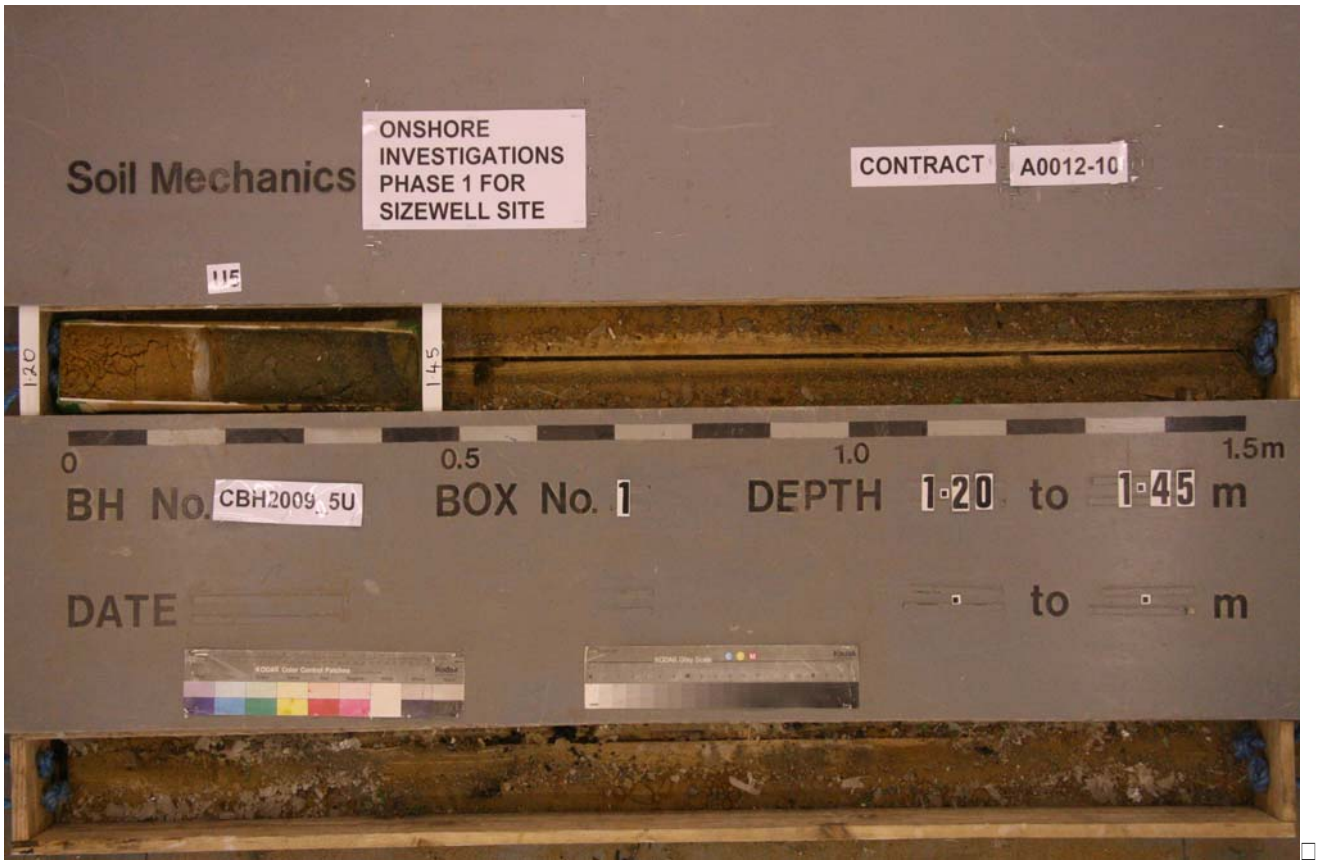
Soil Mechanics



	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	14
	Carried out for	NNB Generation Company Limited	

Photographs

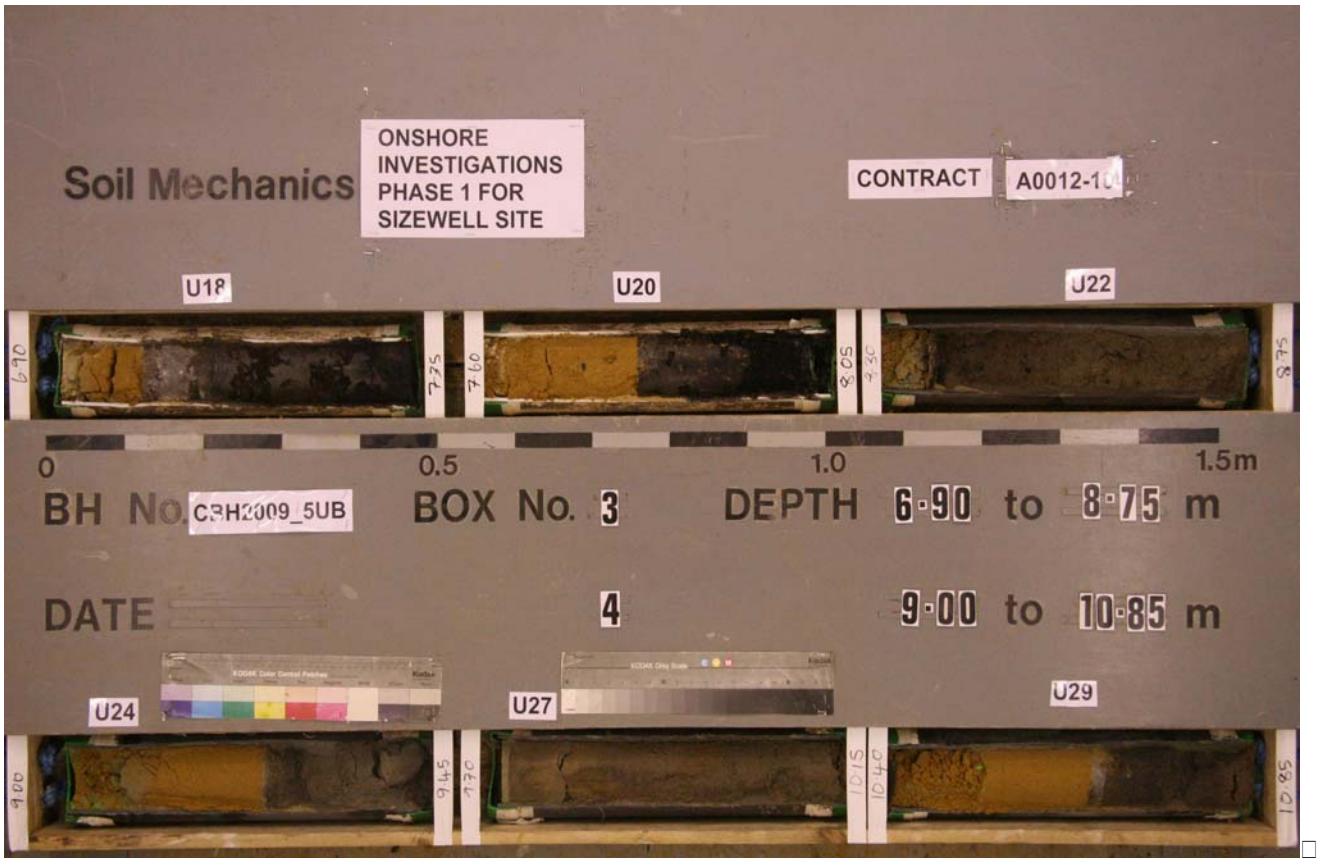
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 15

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 16

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 17

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	18
	Carried out for	NNB Generation Company Limited	

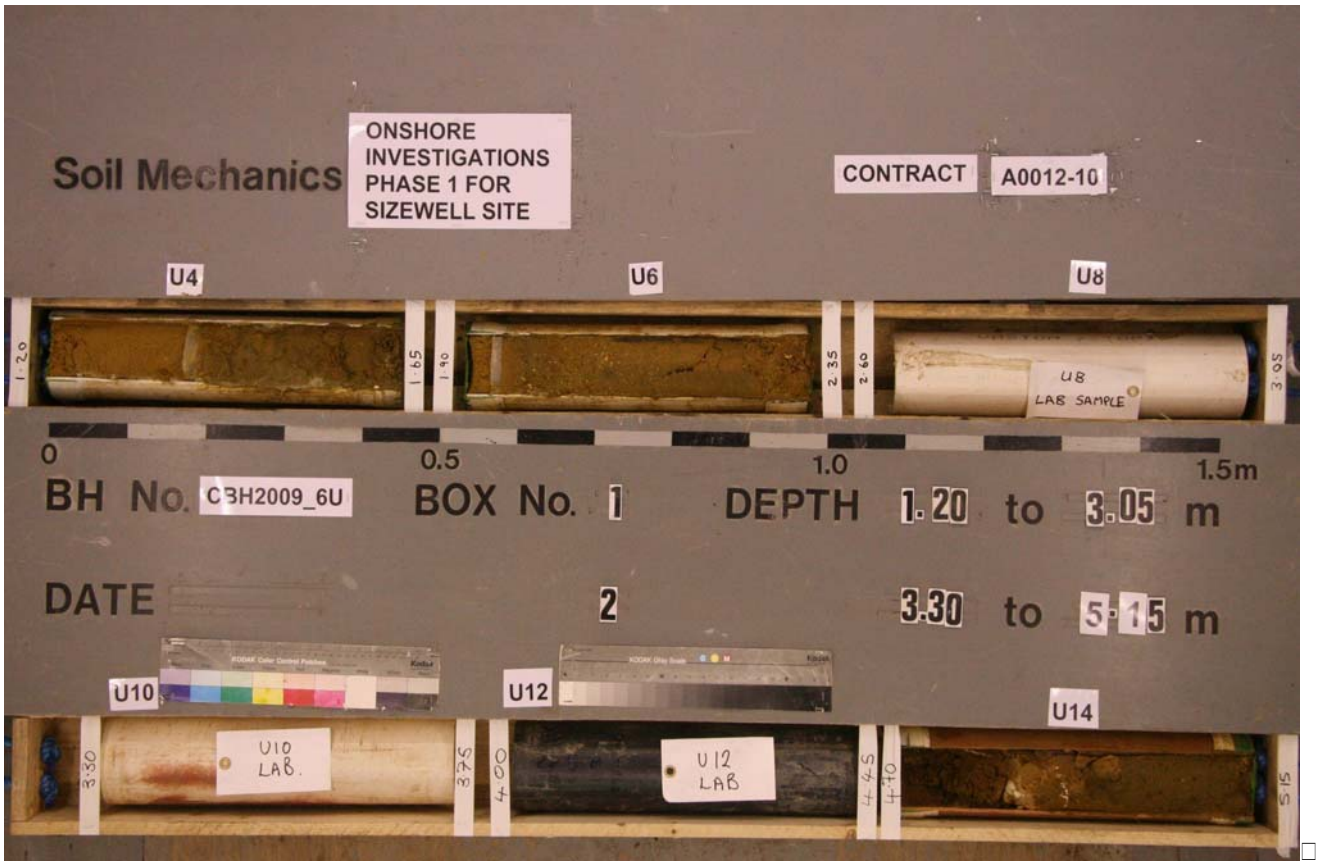
Photographs

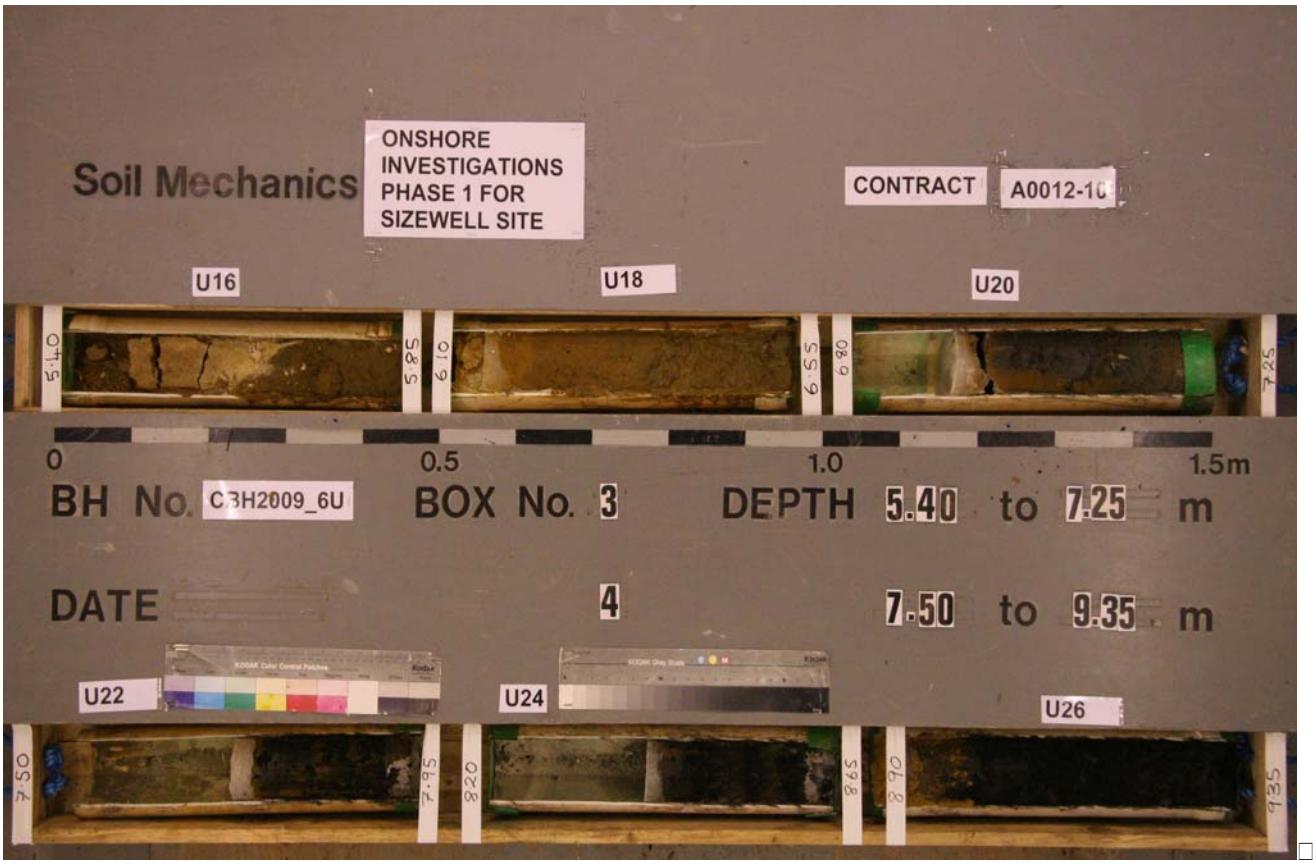
Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 19

Photographs

Soil Mechanics

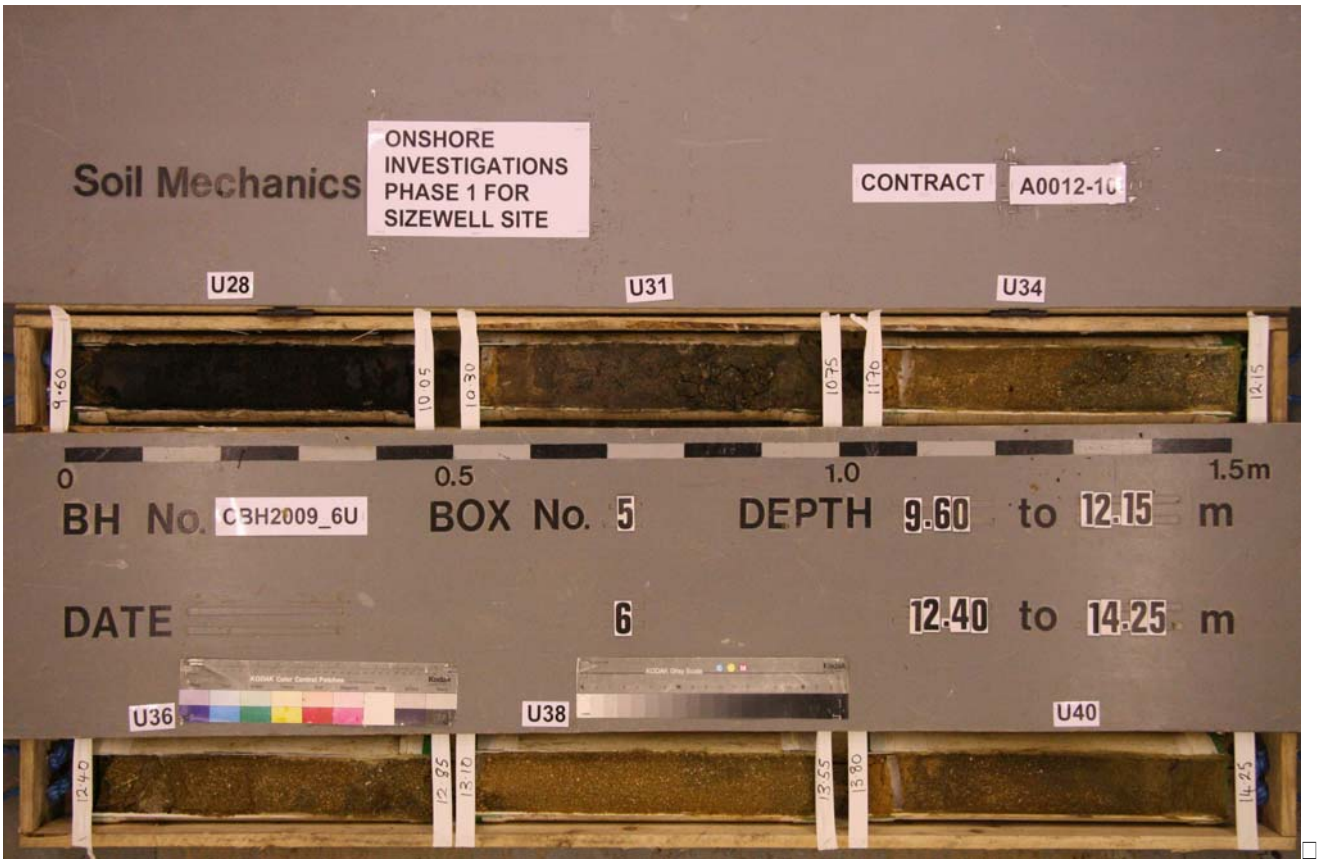


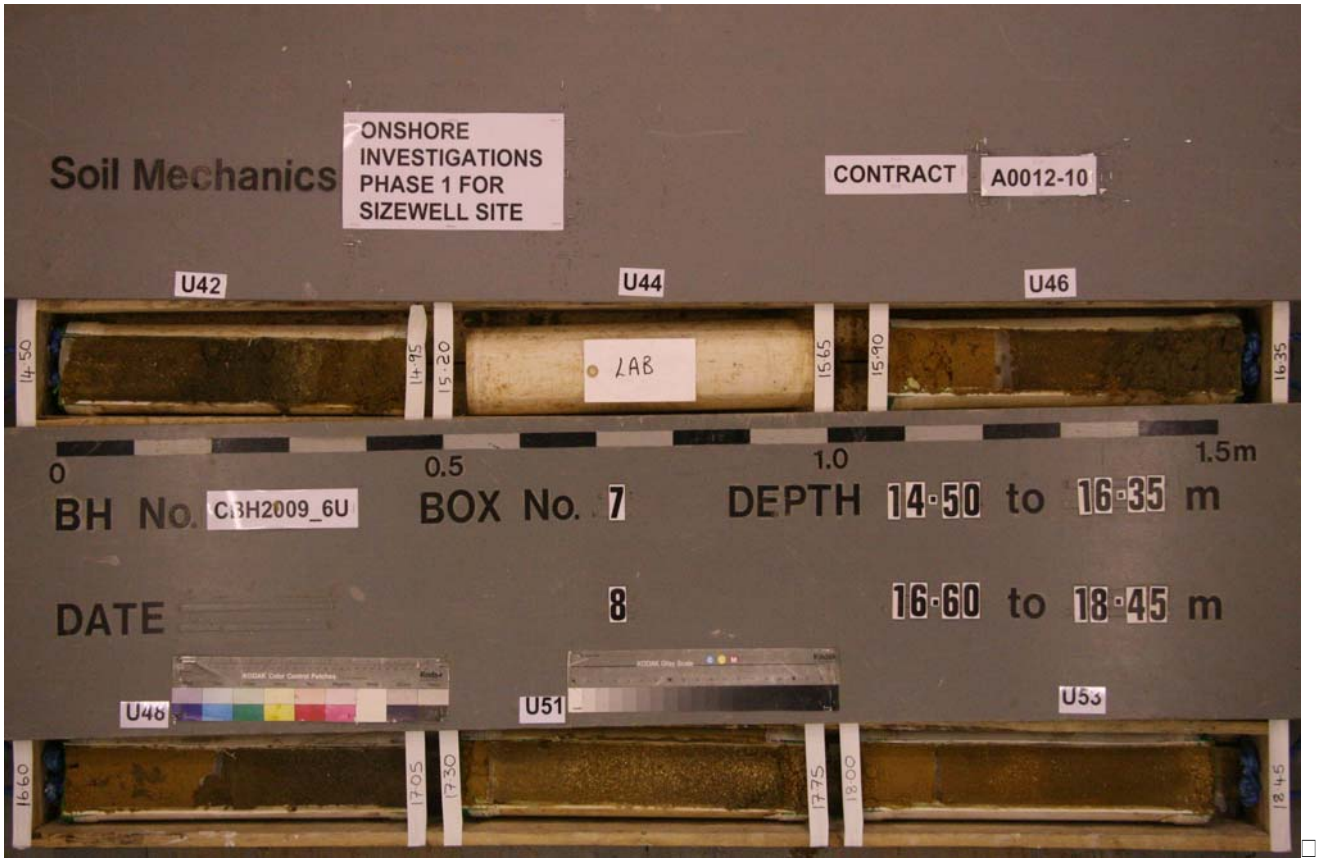


	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 20

Photographs

Soil Mechanics

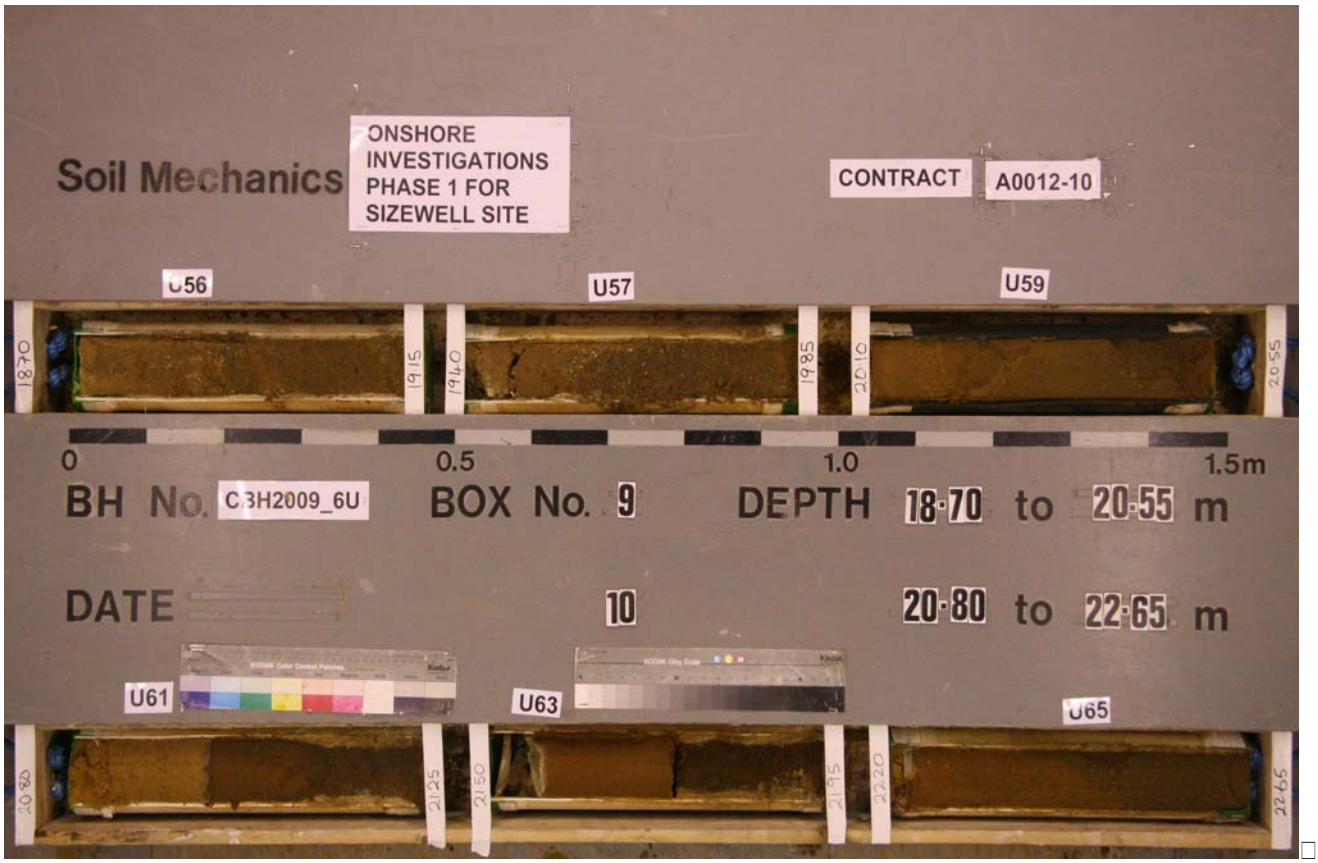


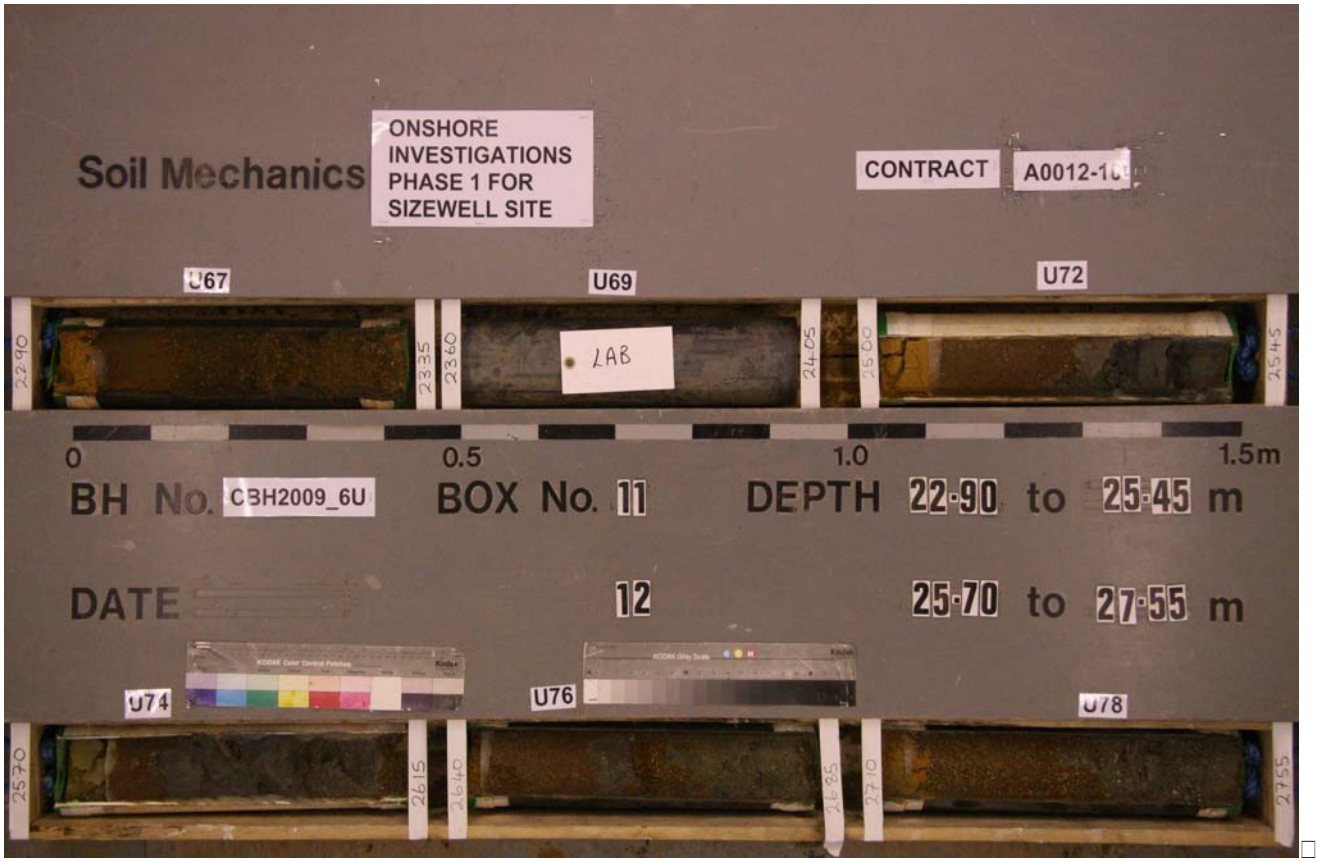


	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 21
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics

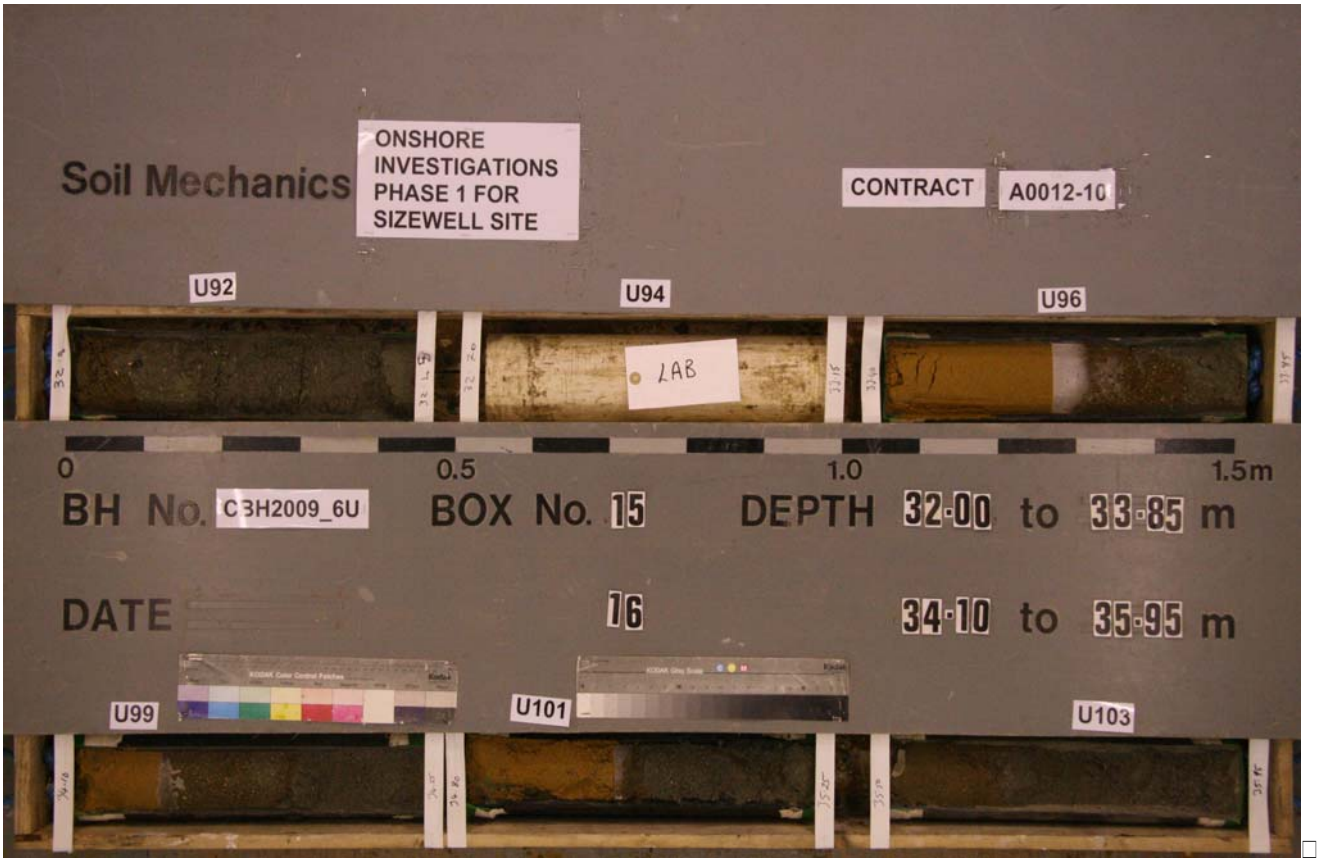




	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 22

Photographs

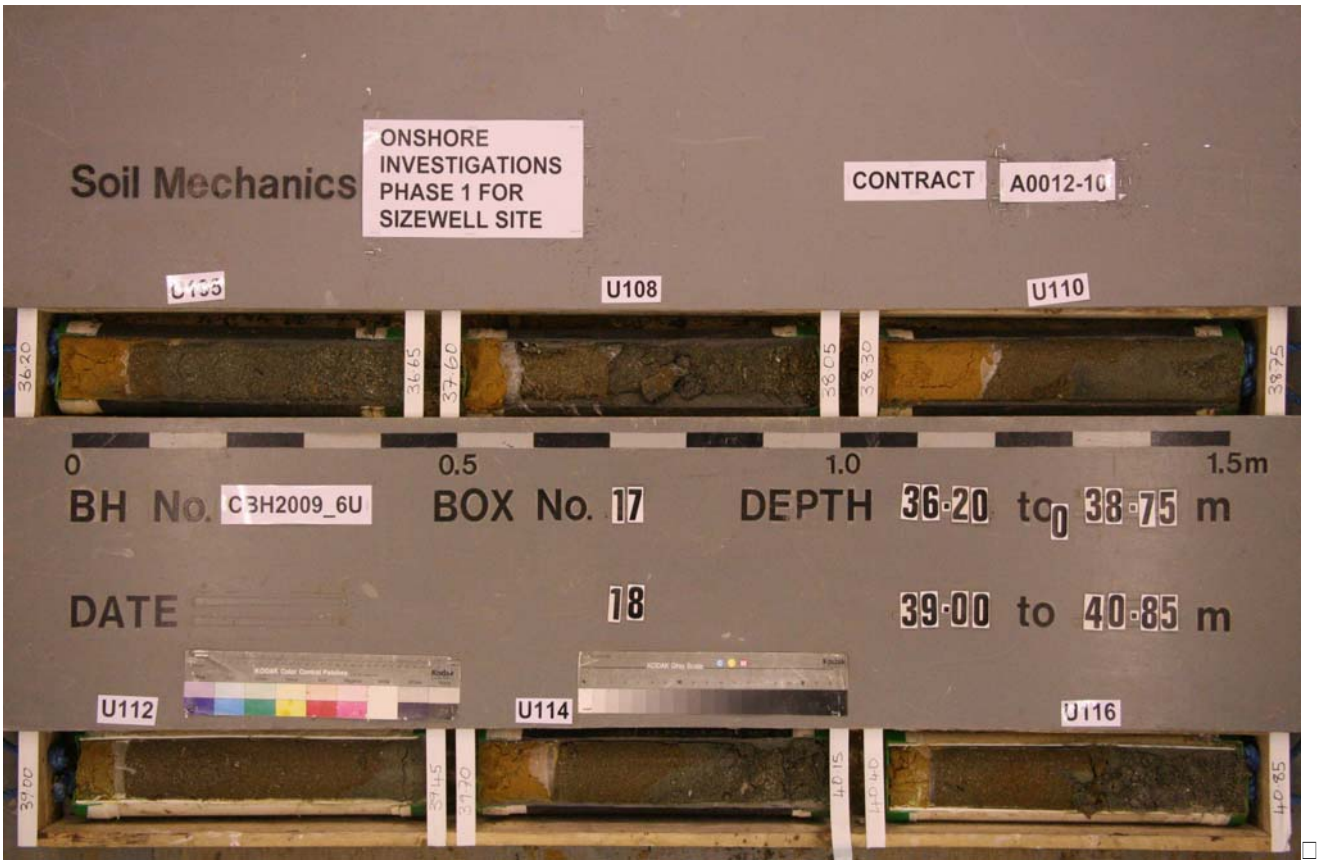
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 23

Photographs

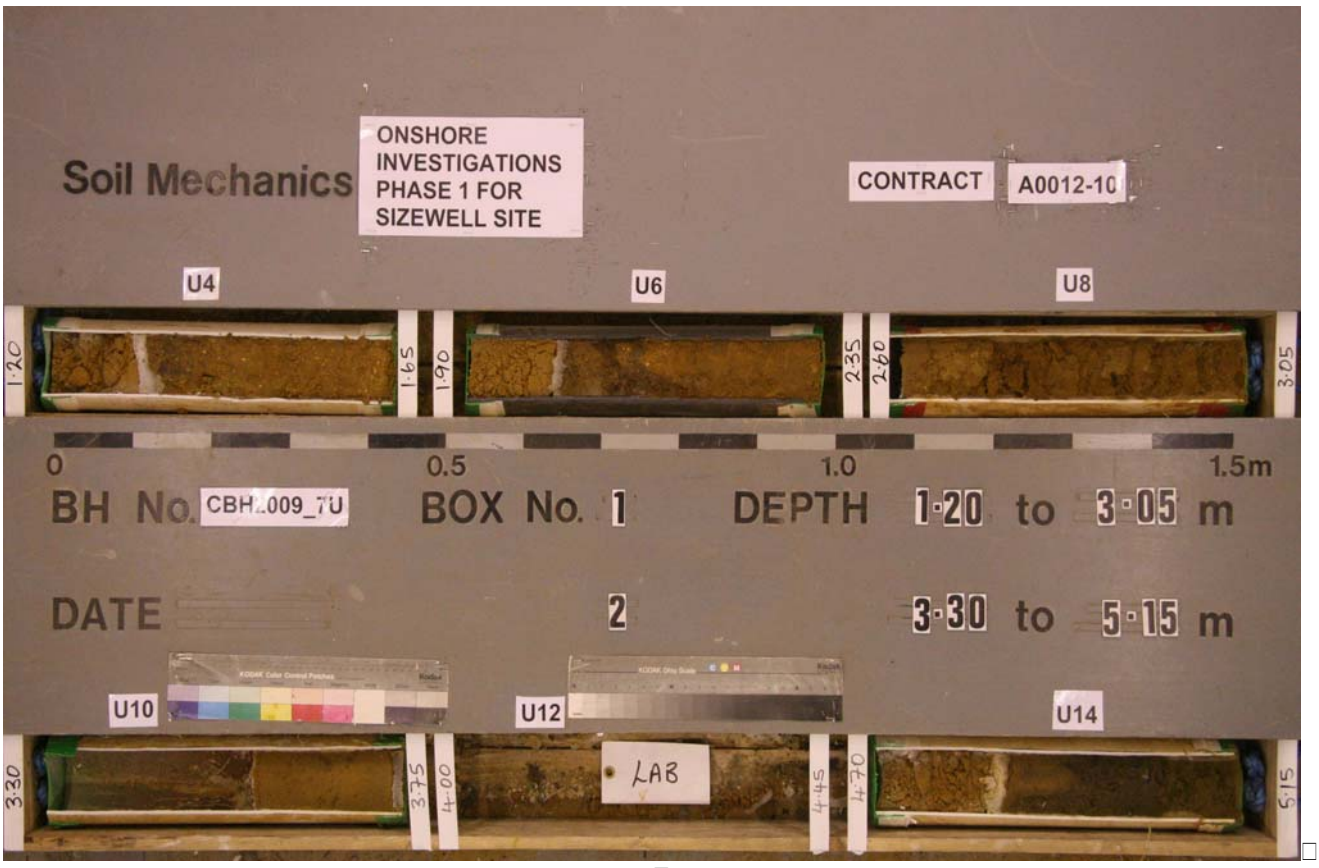
Soil Mechanics



Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 24
Project No.	A0012-10	
Carried out for	NNB Generation Company Limited	

Photographs

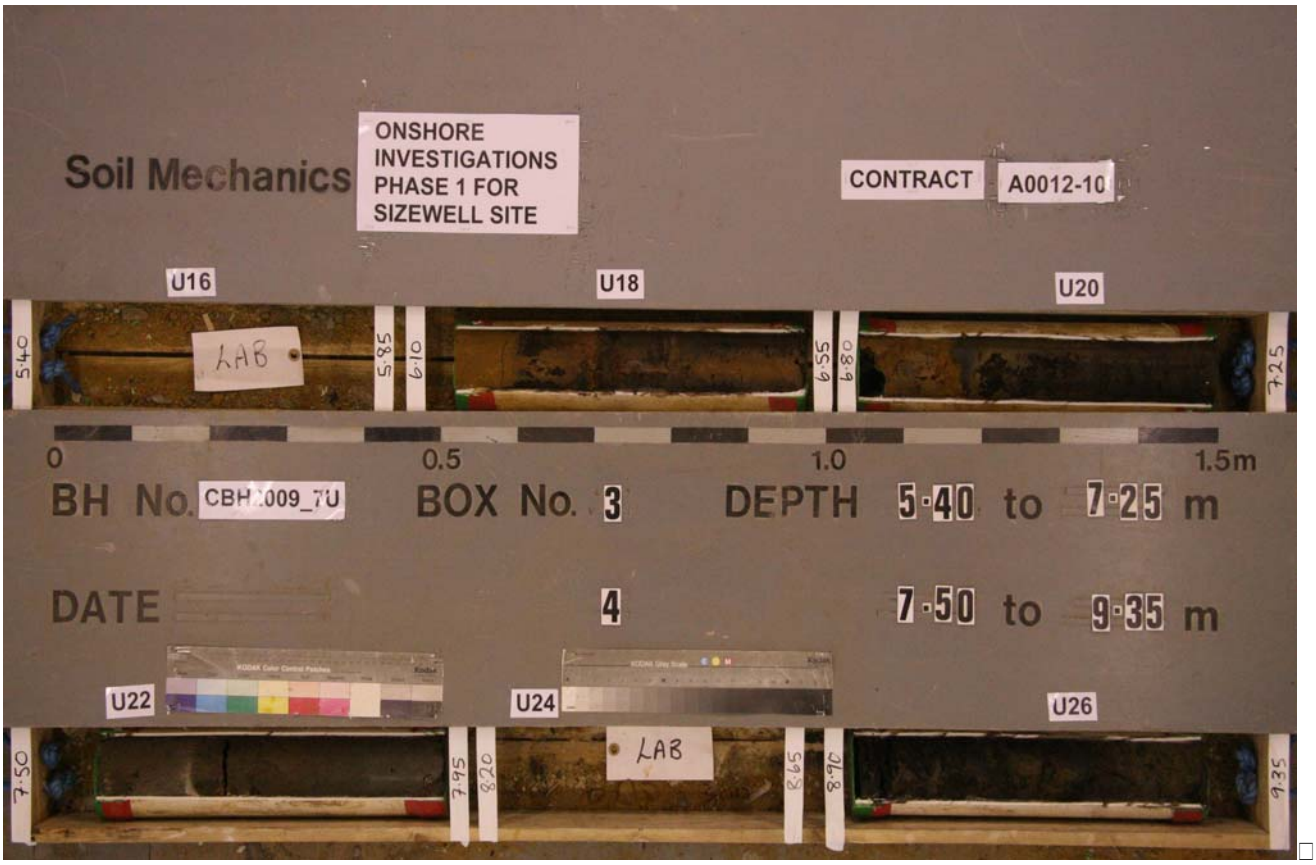
Soil Mechanics



Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 25
Project No.	A0012-10	
Carried out for	NNB Generation Company Limited	

Photographs

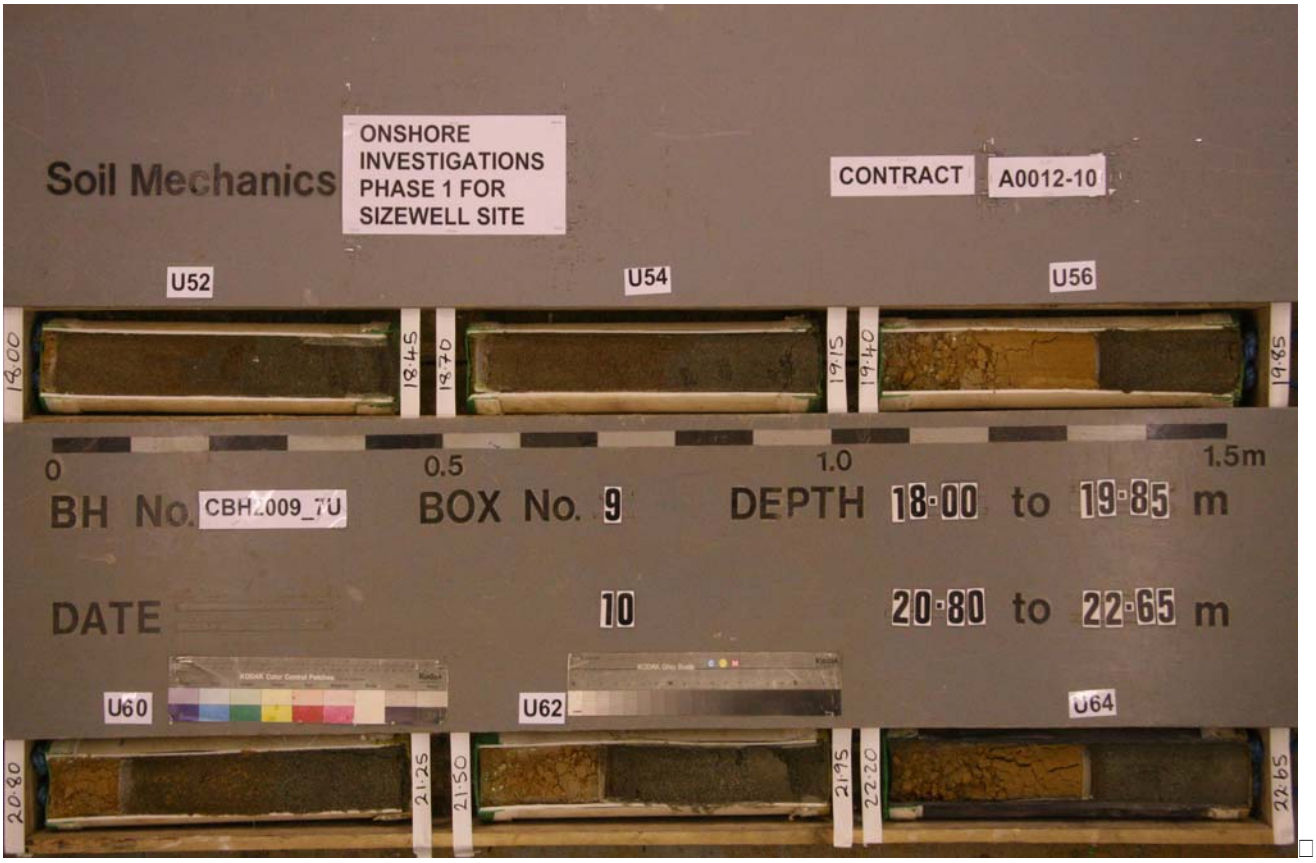
Soil Mechanics



Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 26
Project No.	A0012-10	
Carried out for	NNB Generation Company Limited	

Photographs

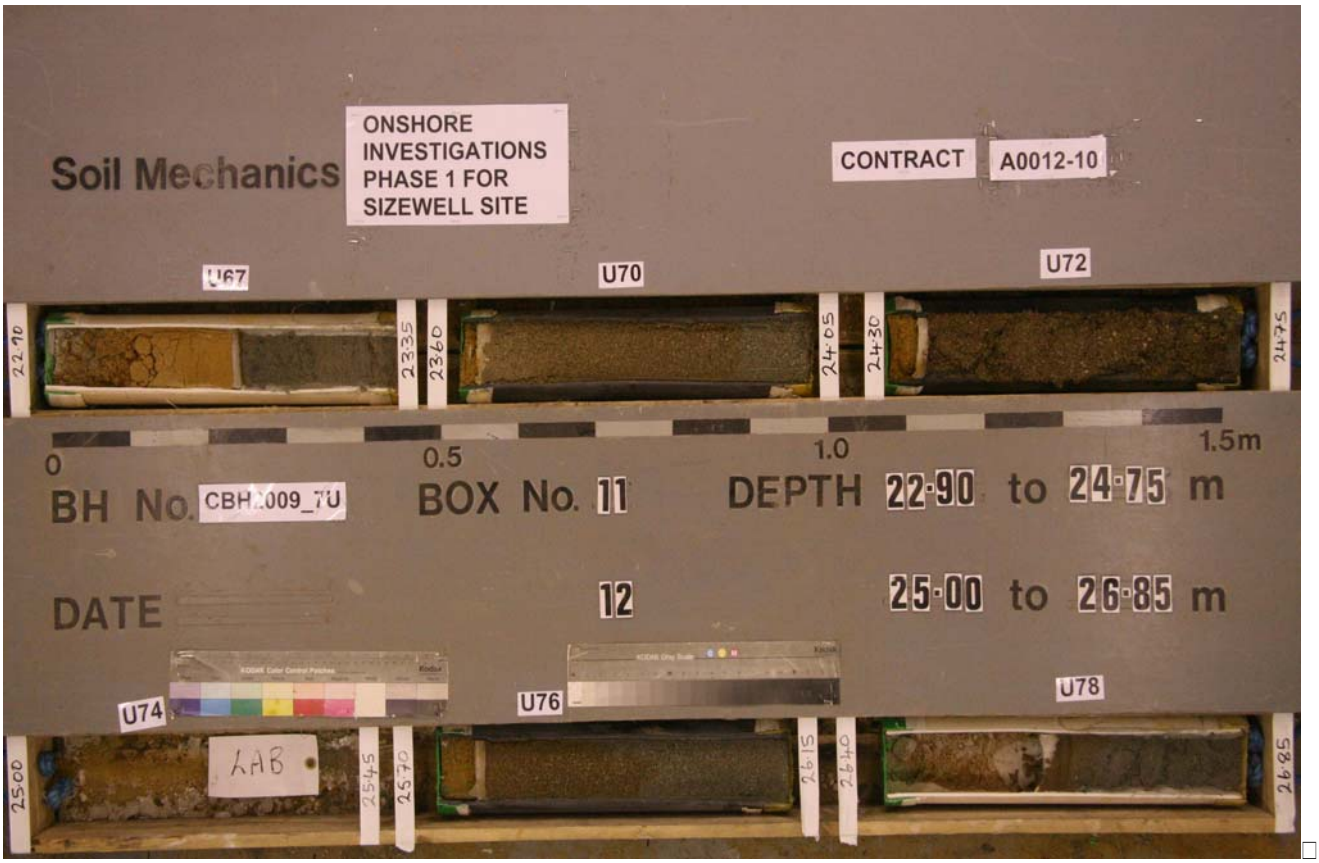
Soil Mechanics

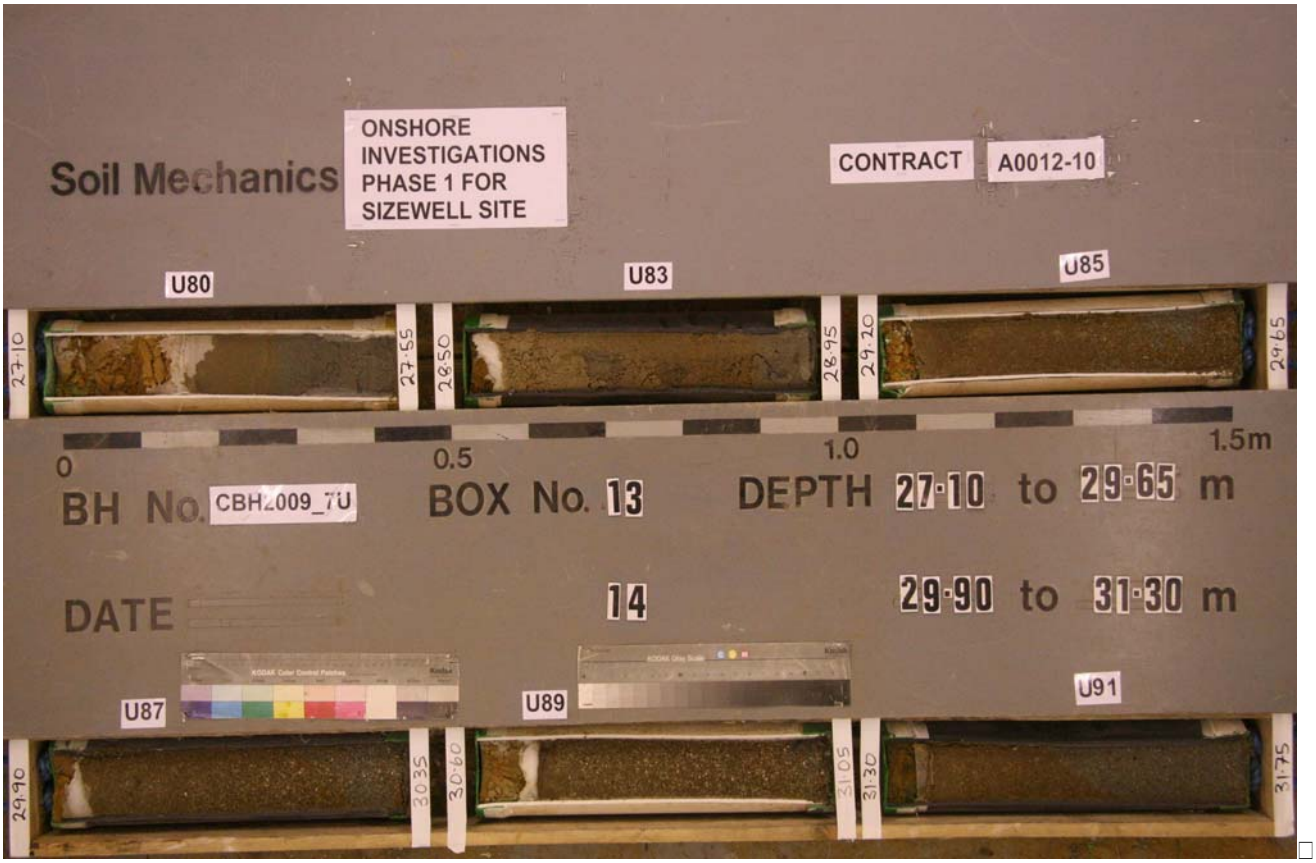


	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	27
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

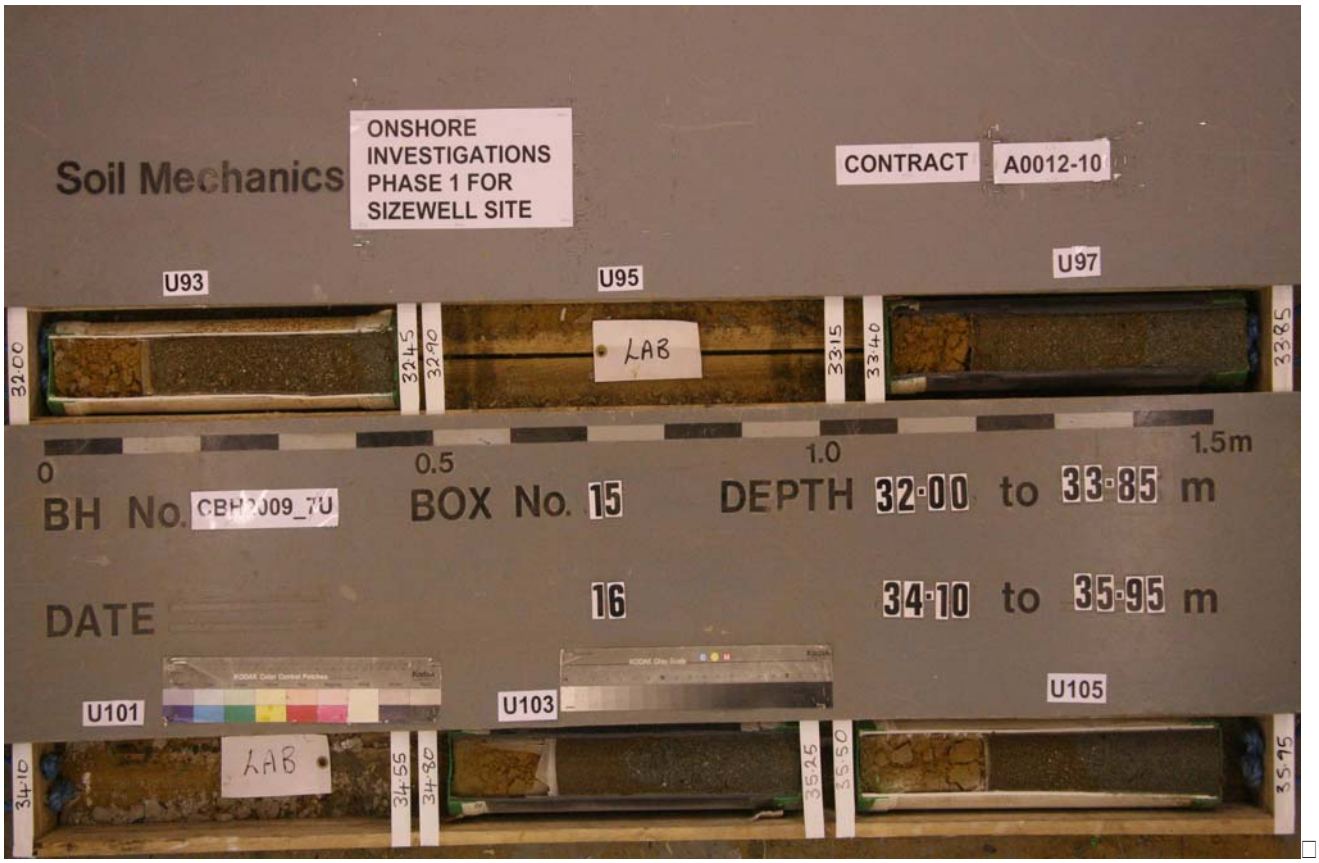




	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 28

Photographs

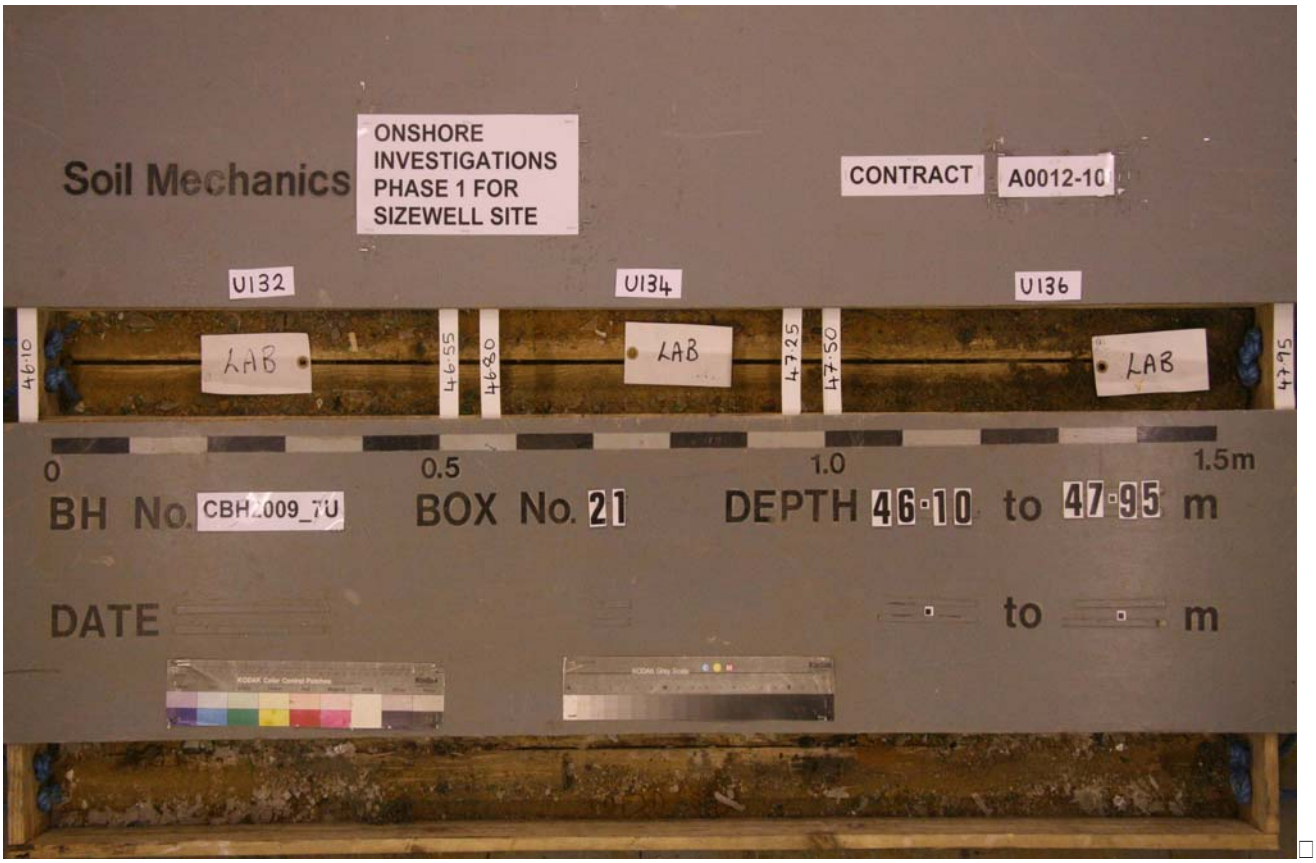
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 29

Photographs

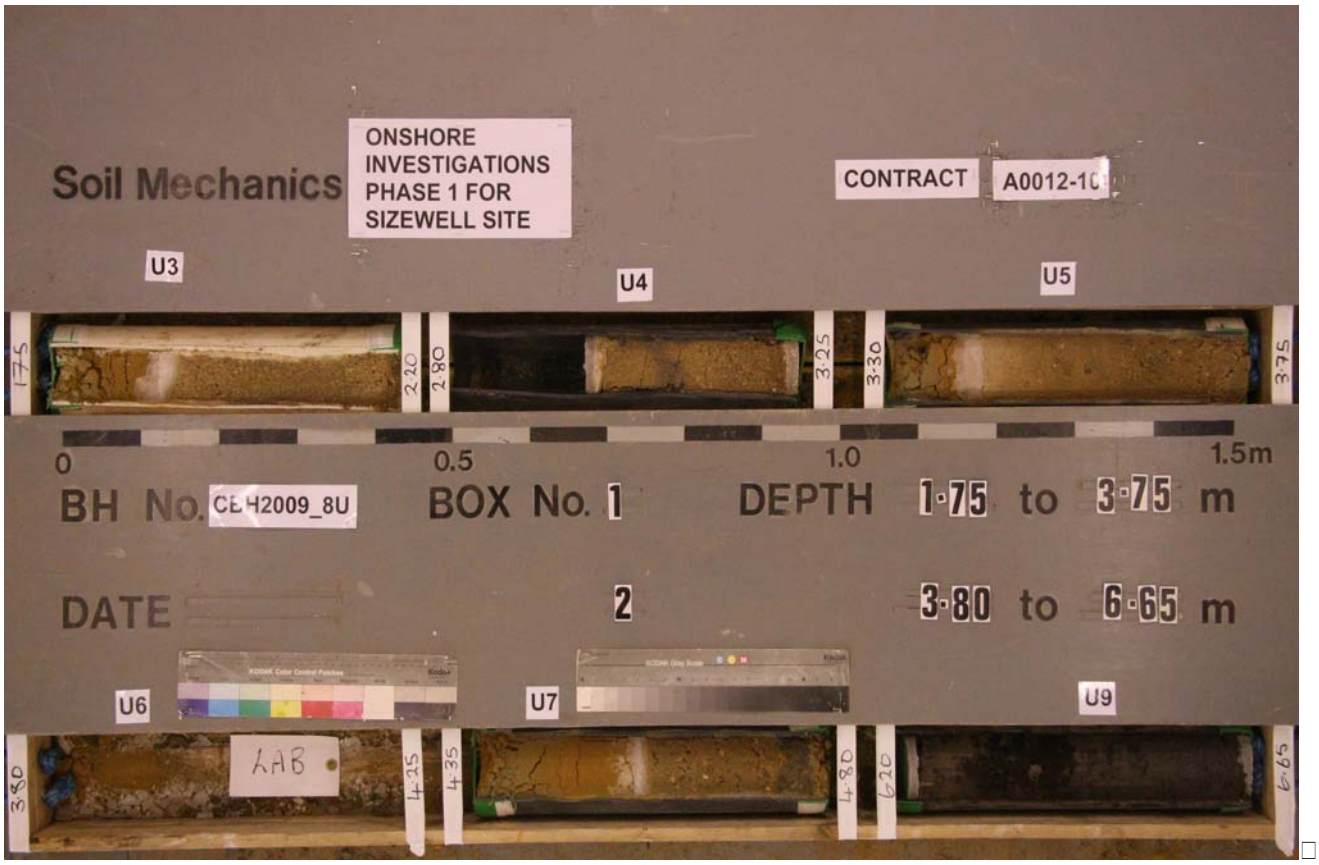
Soil Mechanics

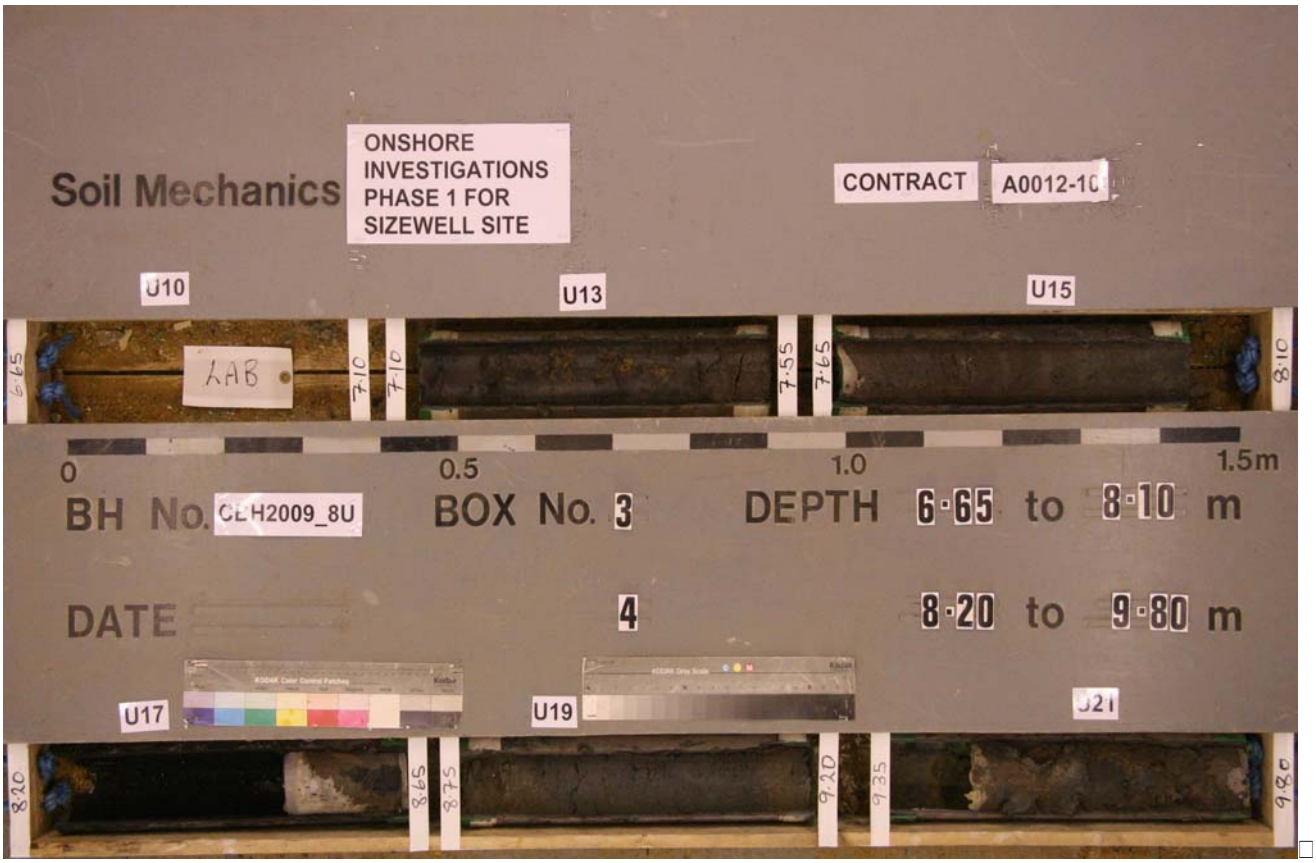


	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 30
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics





	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 31

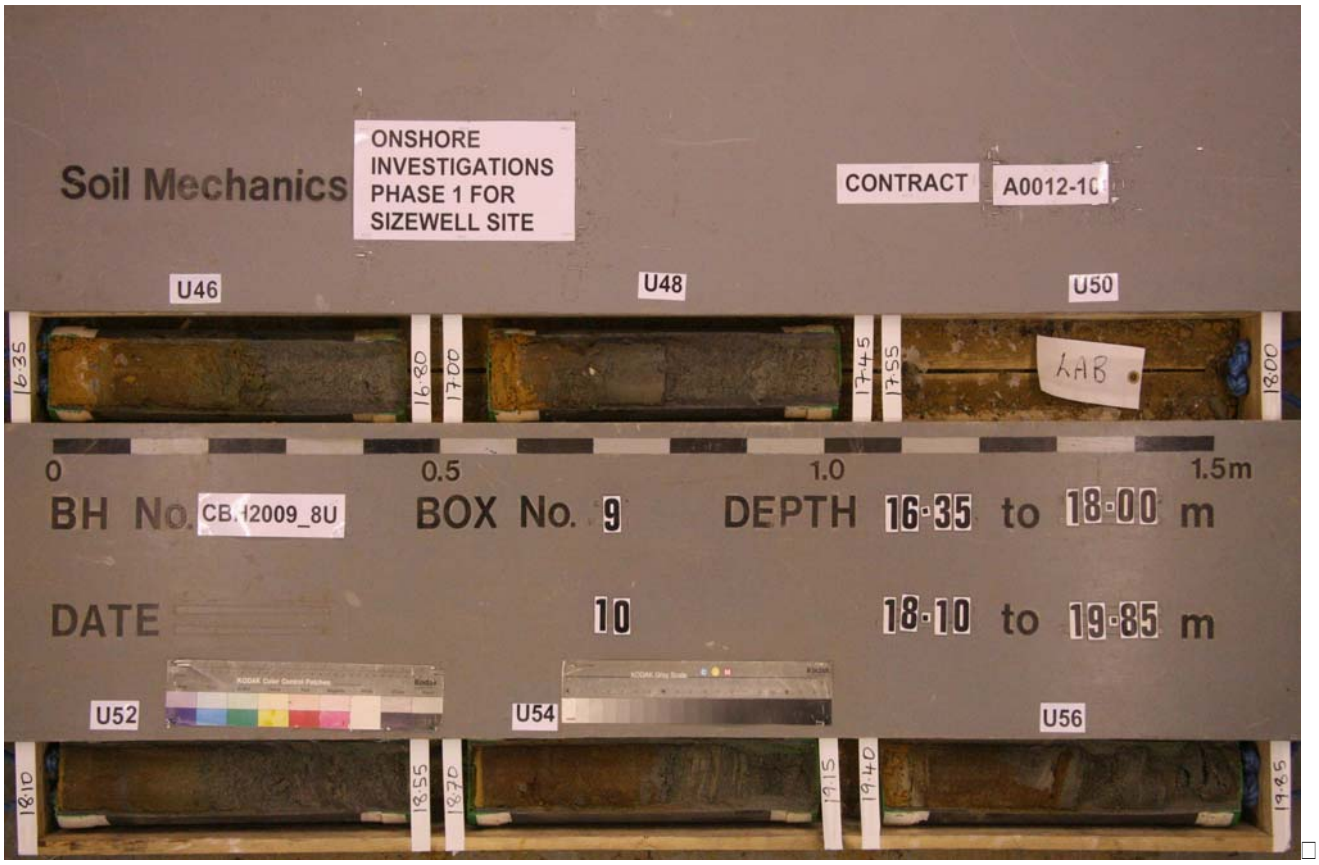
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 32

Photographs

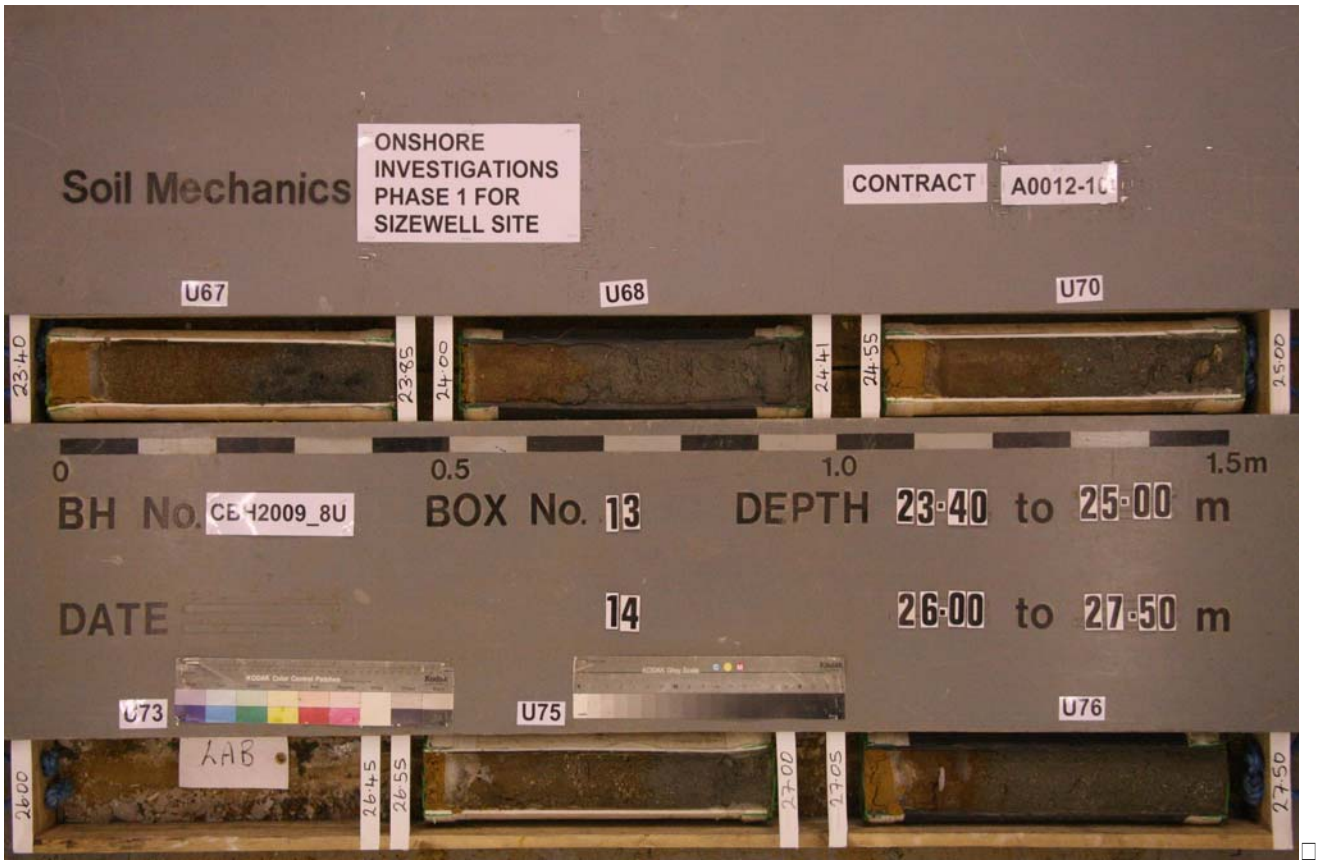
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 33

Photographs

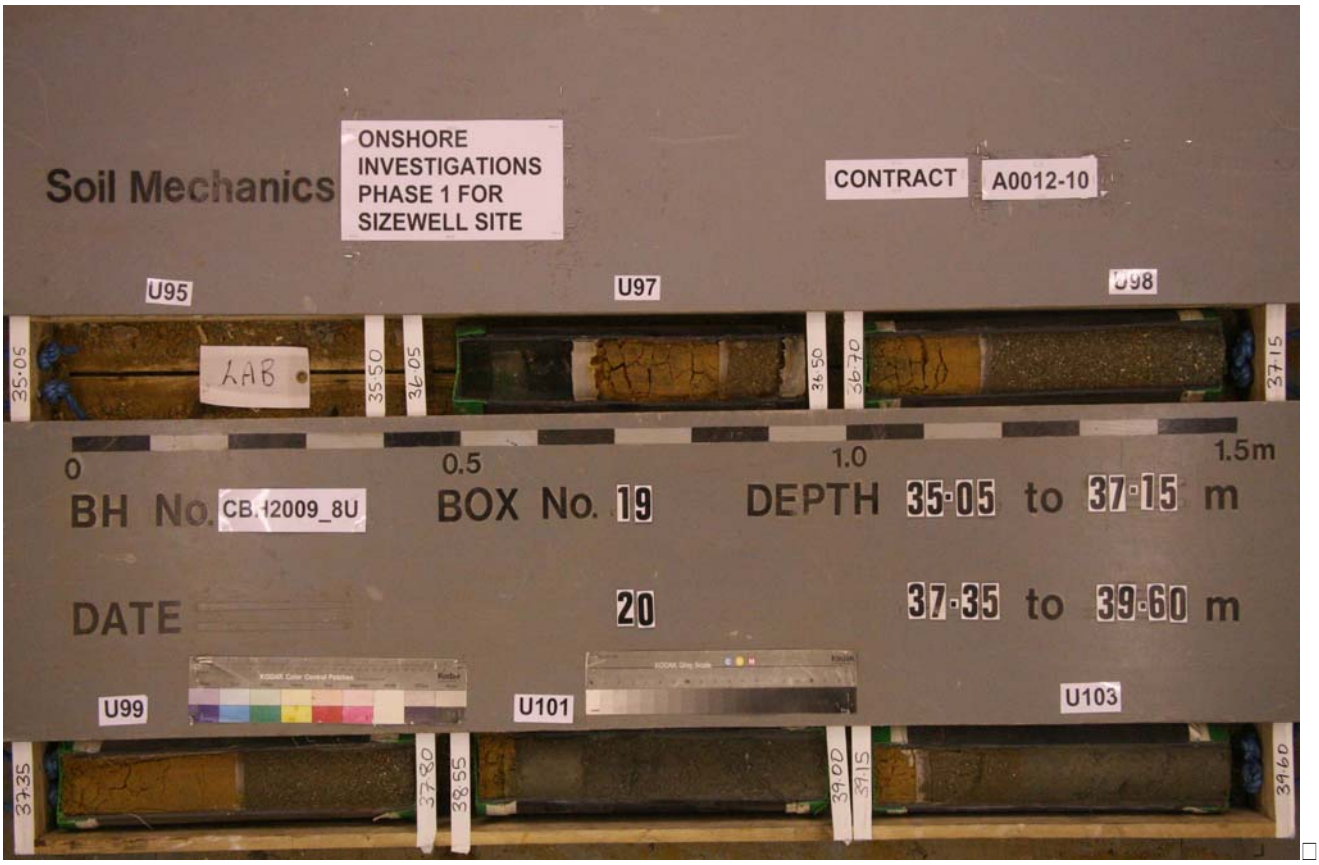
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 34

Photographs

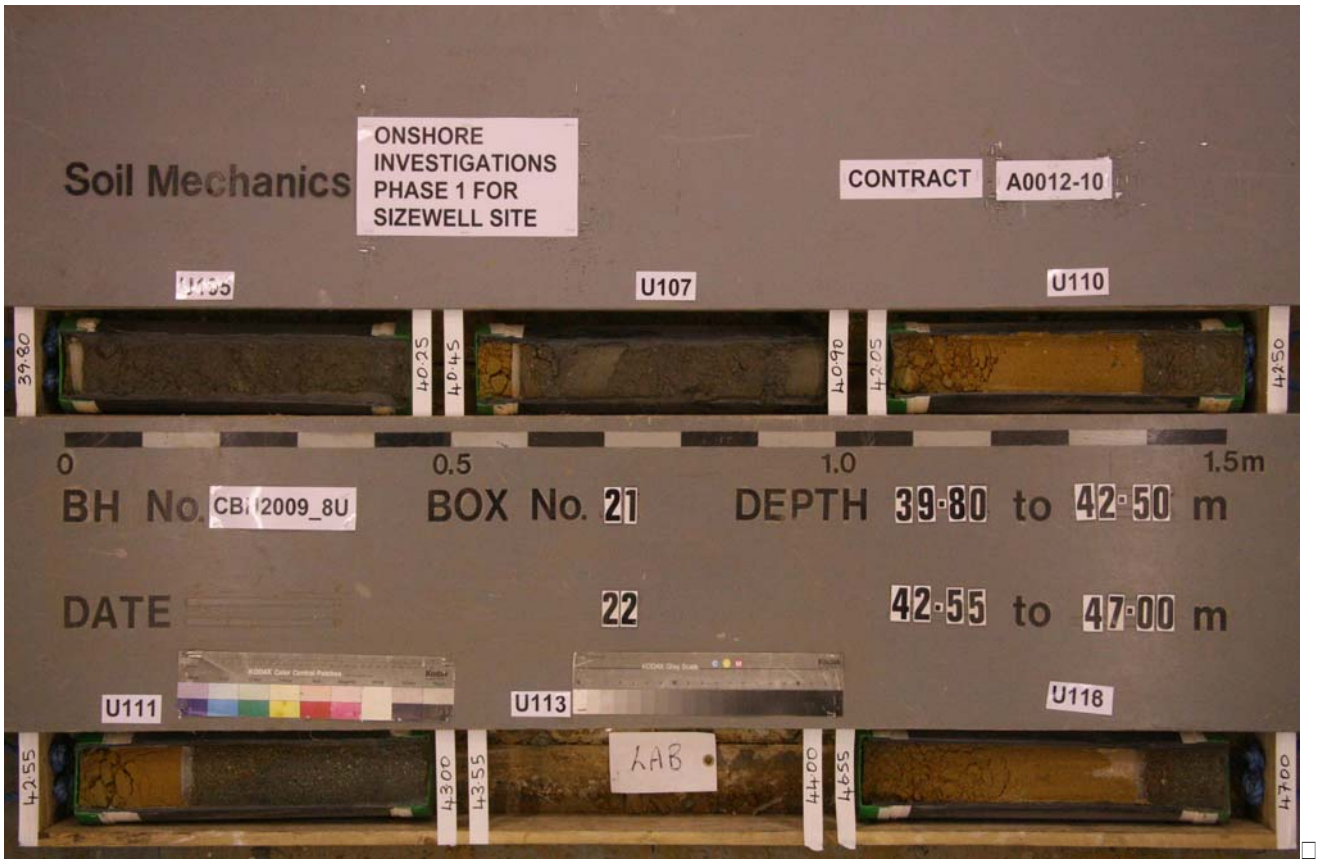
Soil Mechanics

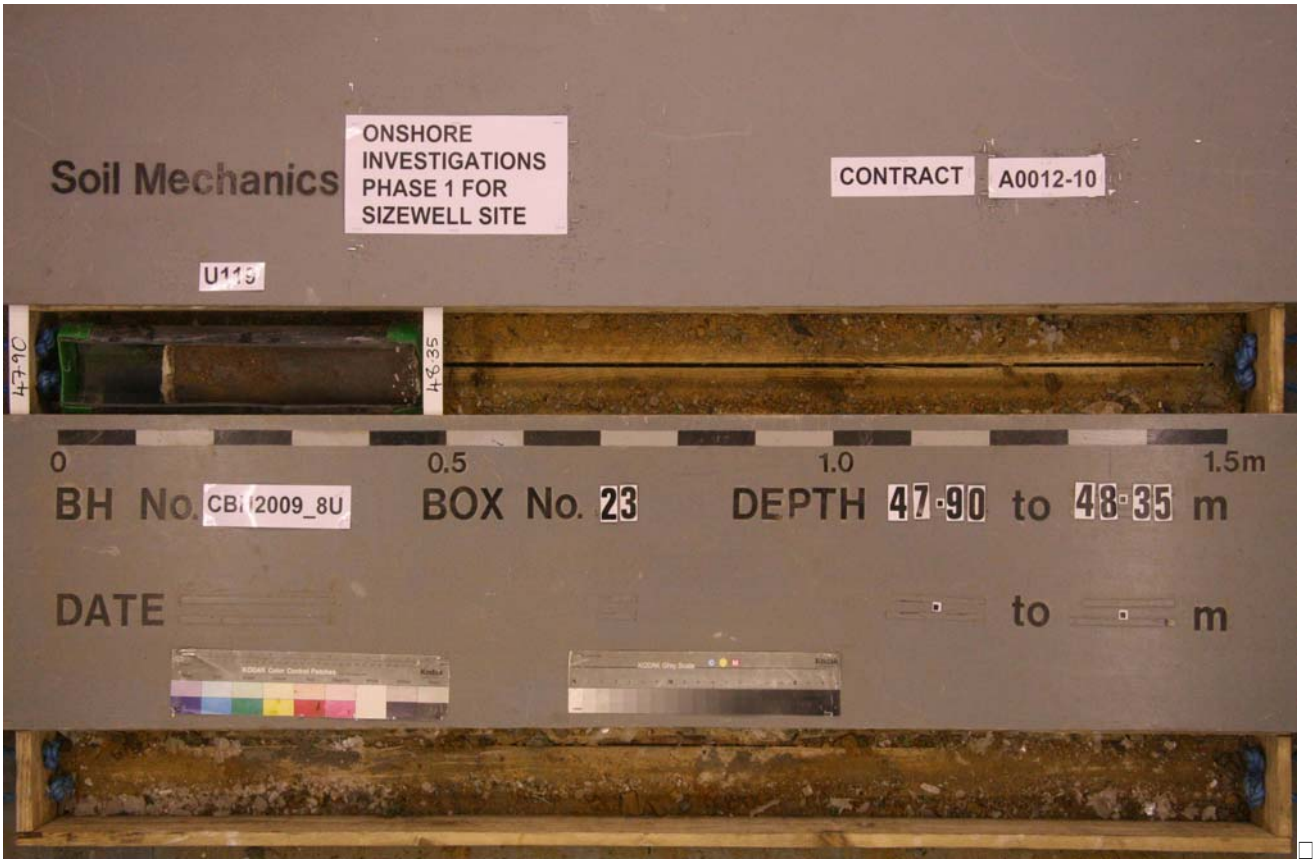


	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 35

Photographs

Soil Mechanics

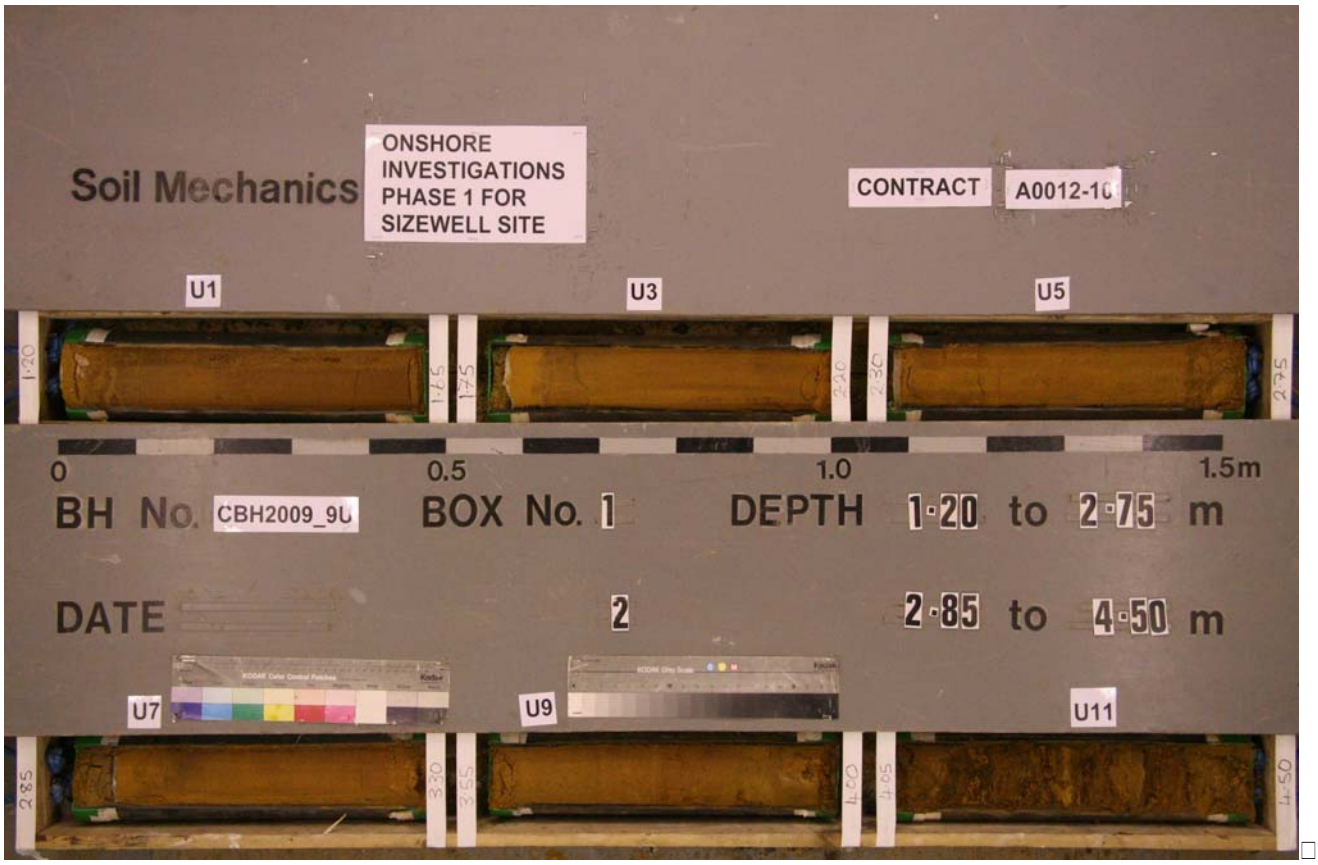


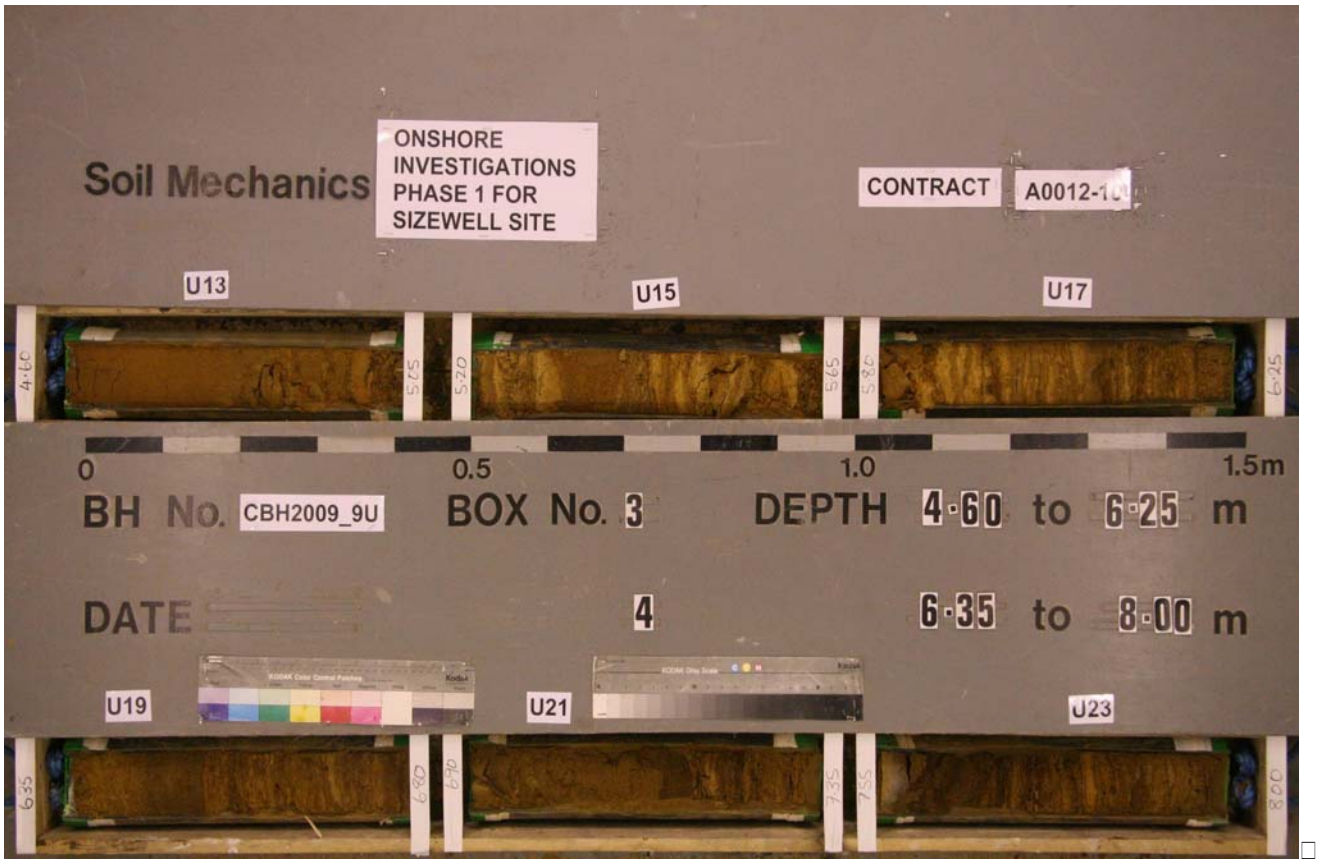


	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 36

Photographs

Soil Mechanics





	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	37
	Carried out for	NNB Generation Company Limited	

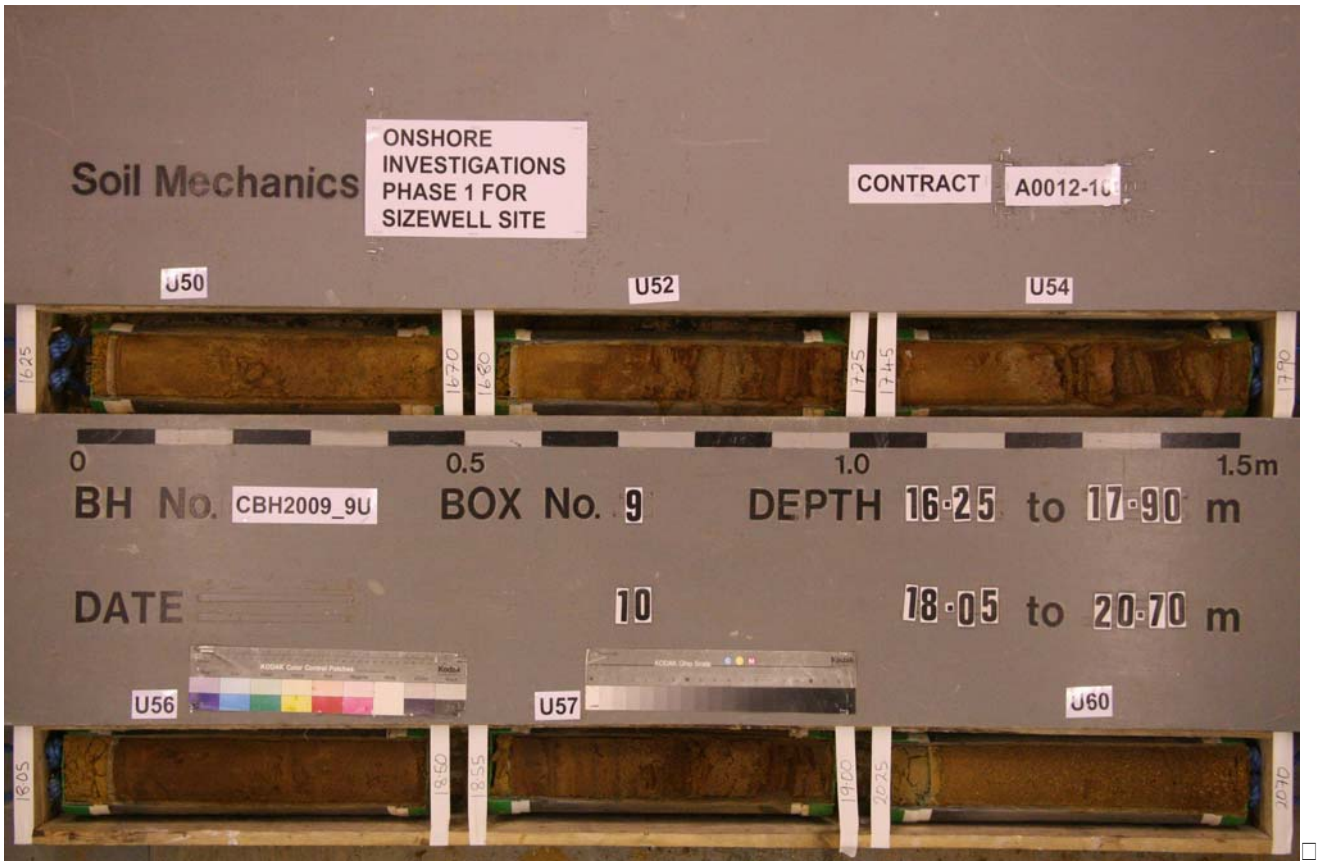
Photographs

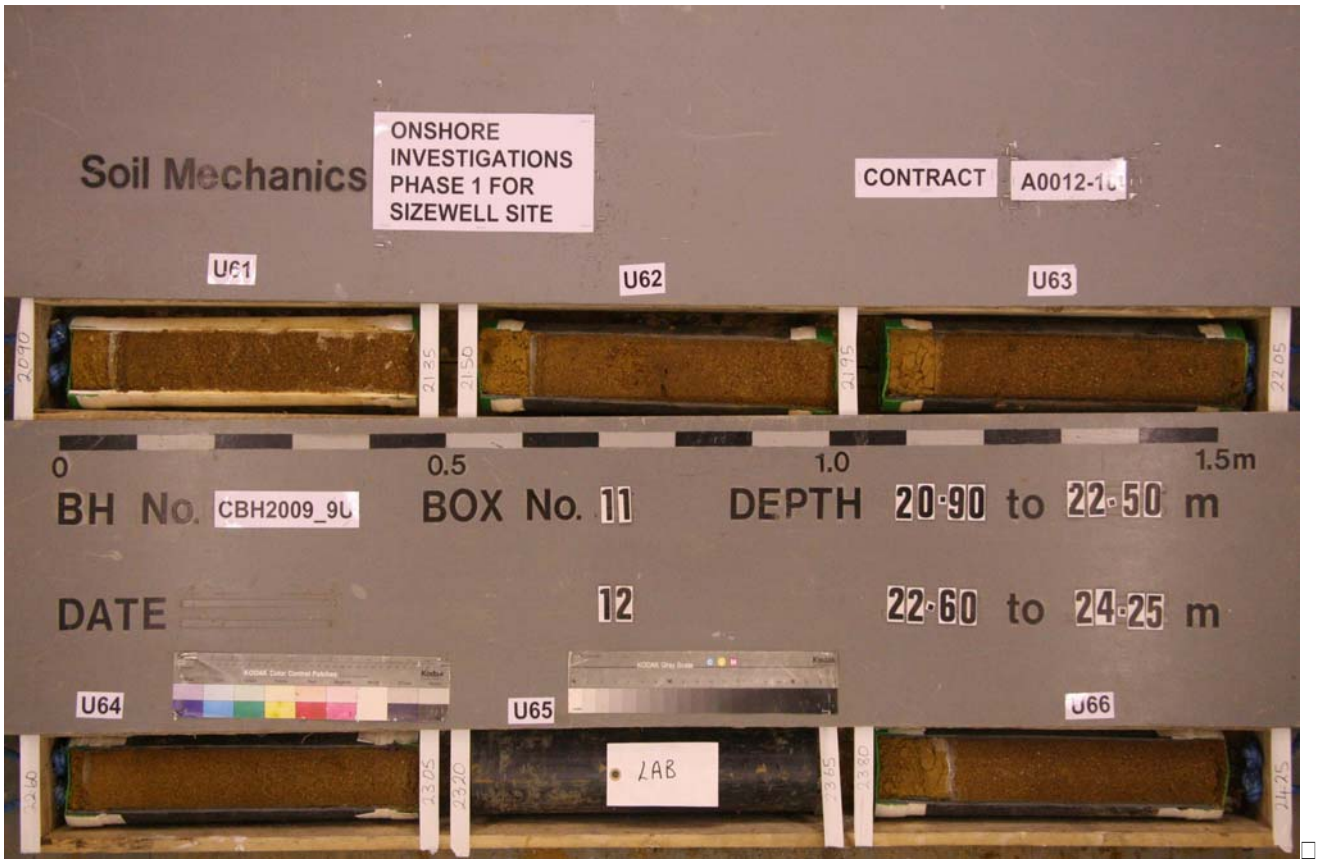
Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 38

Photographs

Soil Mechanics

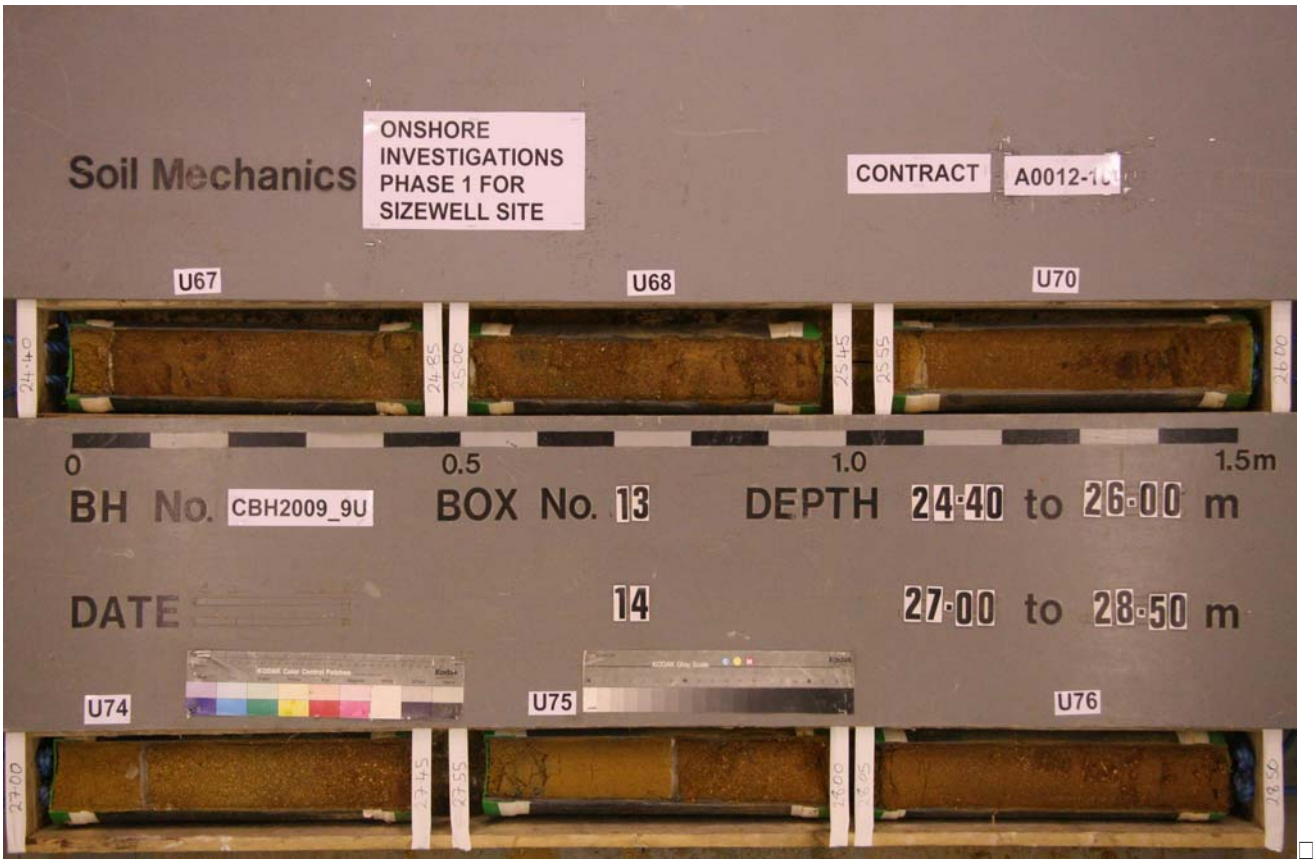


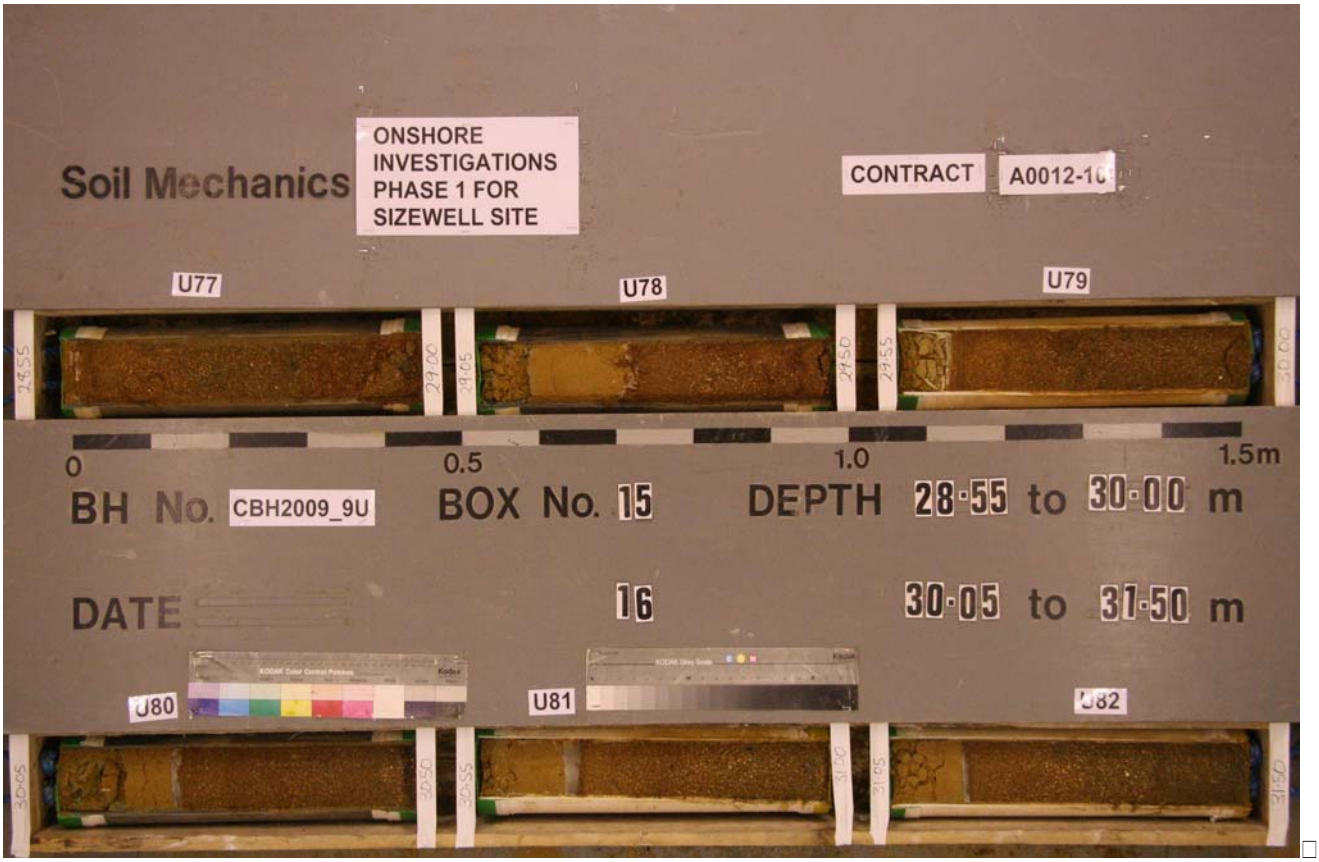


	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 39

Photographs

Soil Mechanics

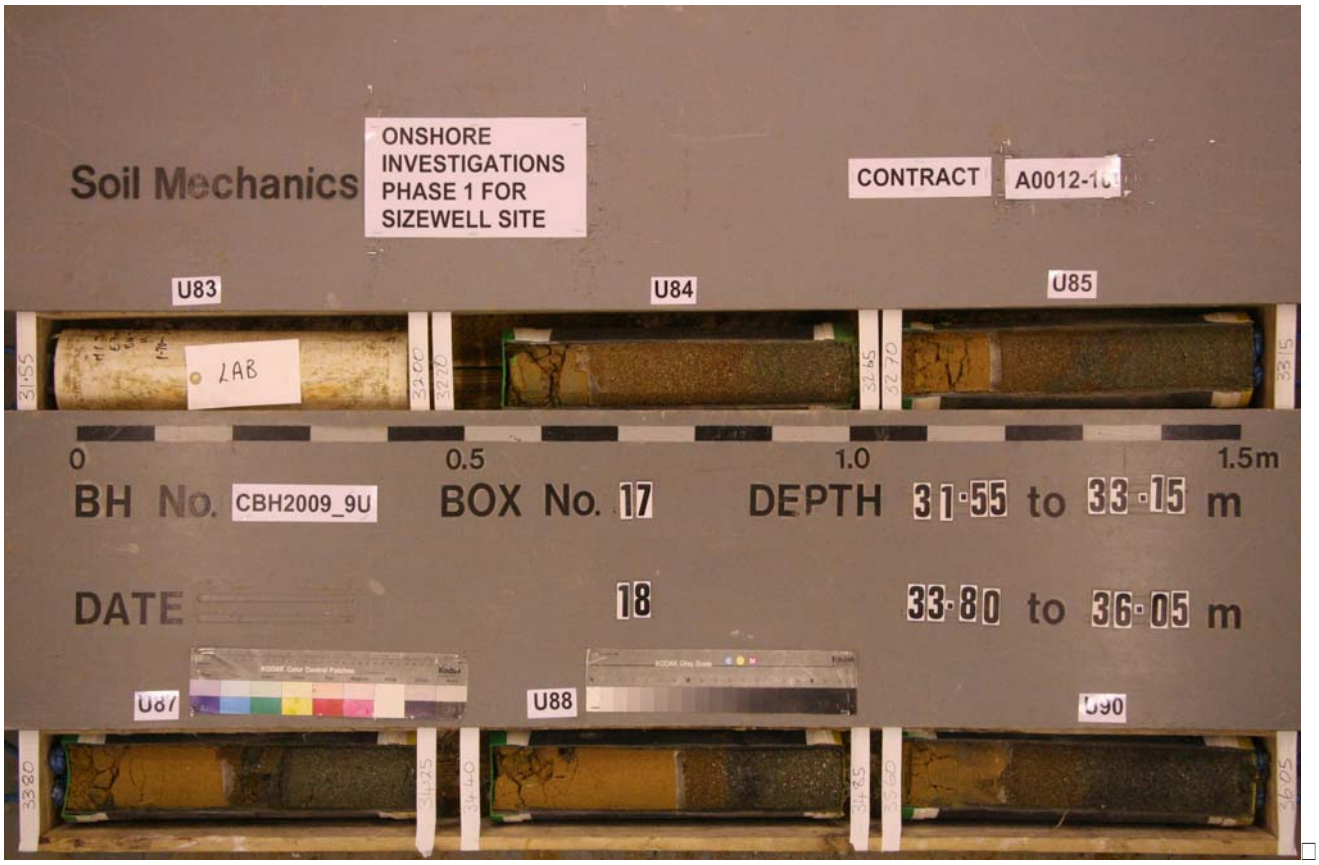




	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 40

Photographs

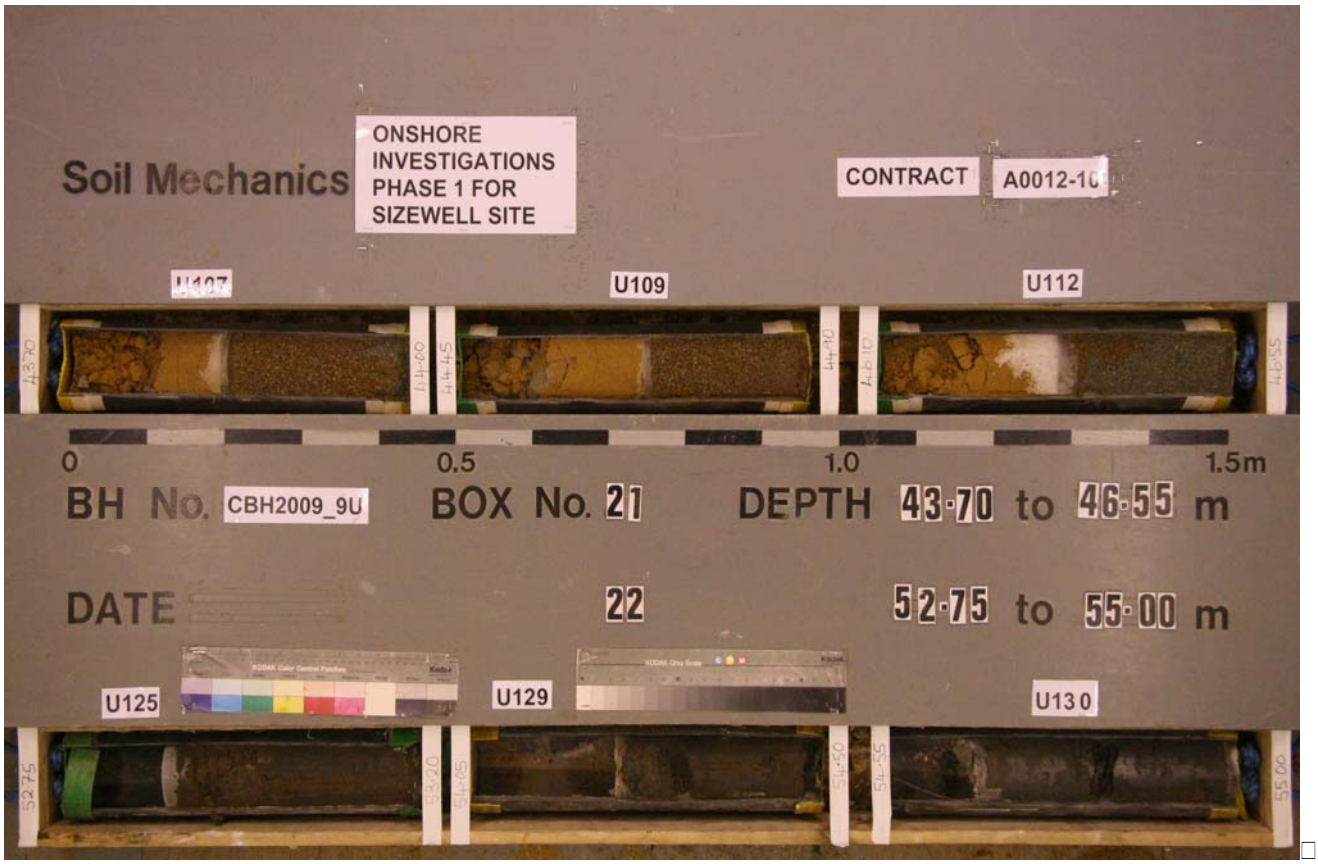
Soil Mechanics



	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	41
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics



Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 42
Project No.	A0012-10	
Carried out for	NNB Generation Company Limited	

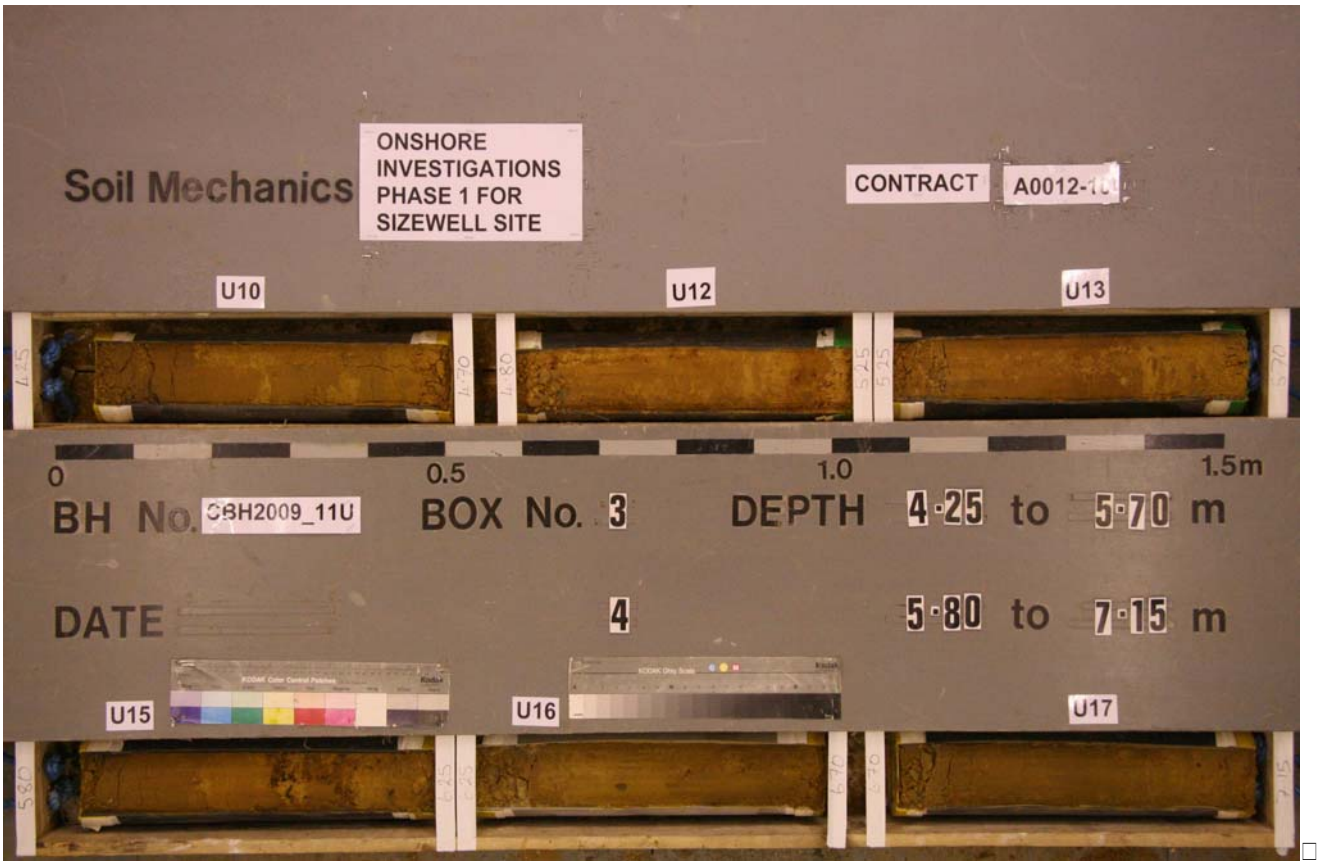
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 43

Photographs

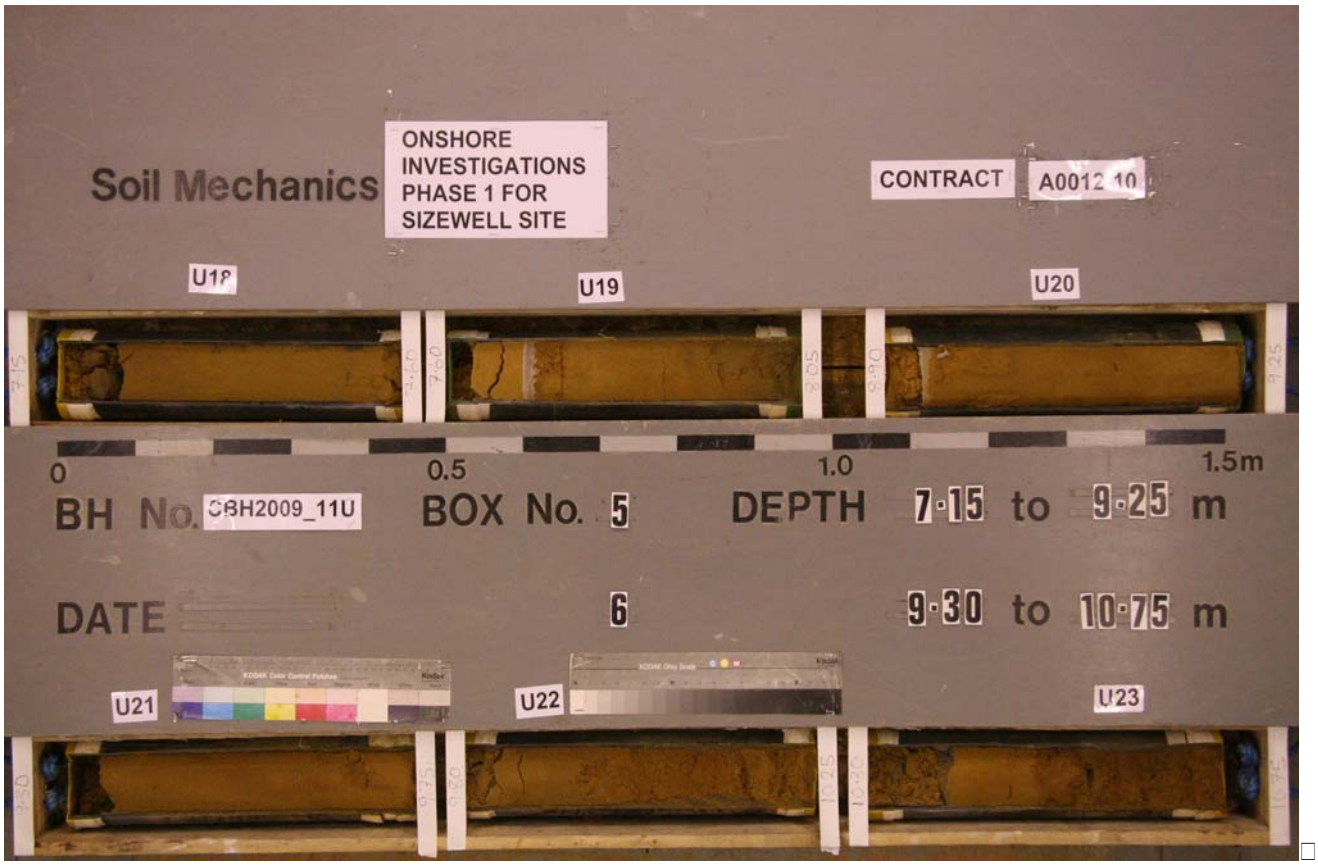
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 44

Photographs

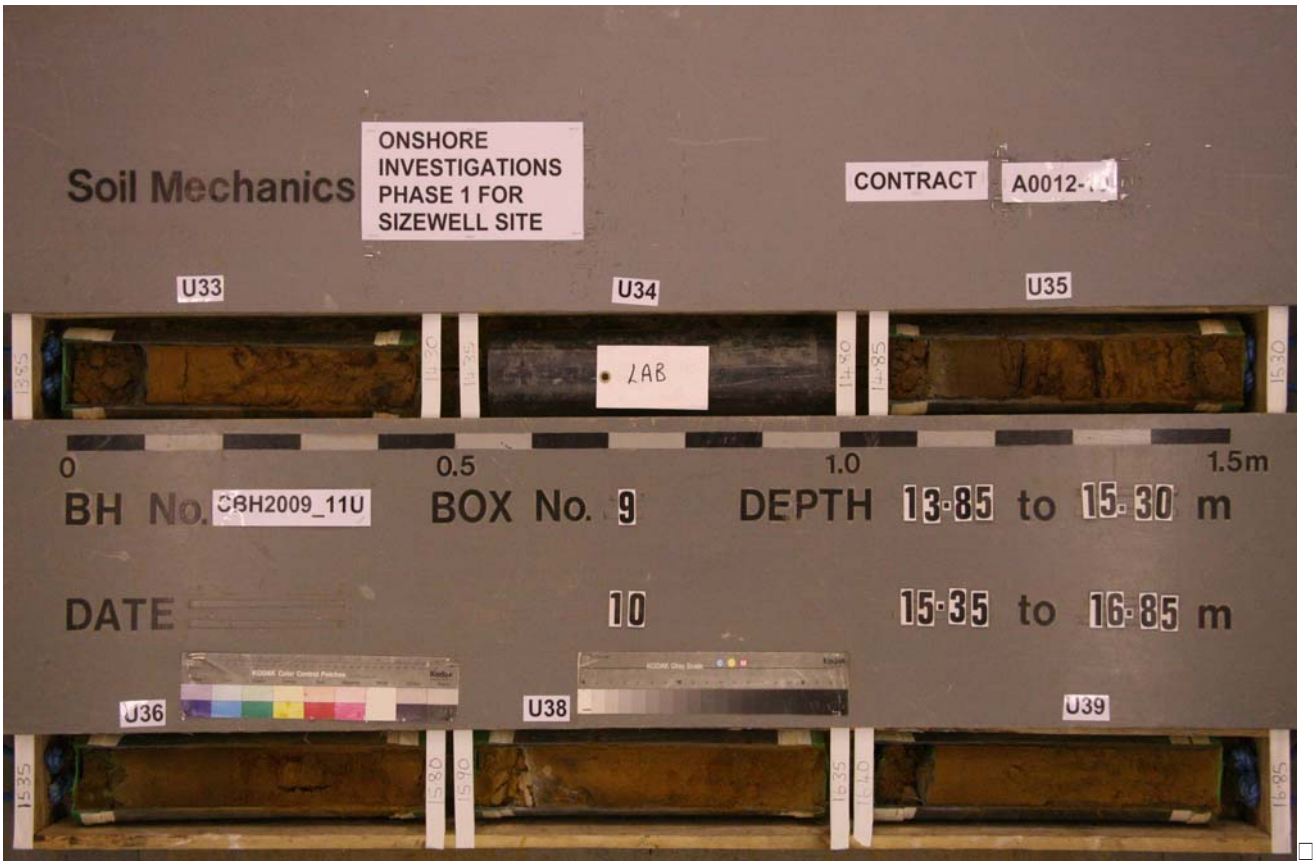
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 45

Photographs

Soil Mechanics



	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 46
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 47

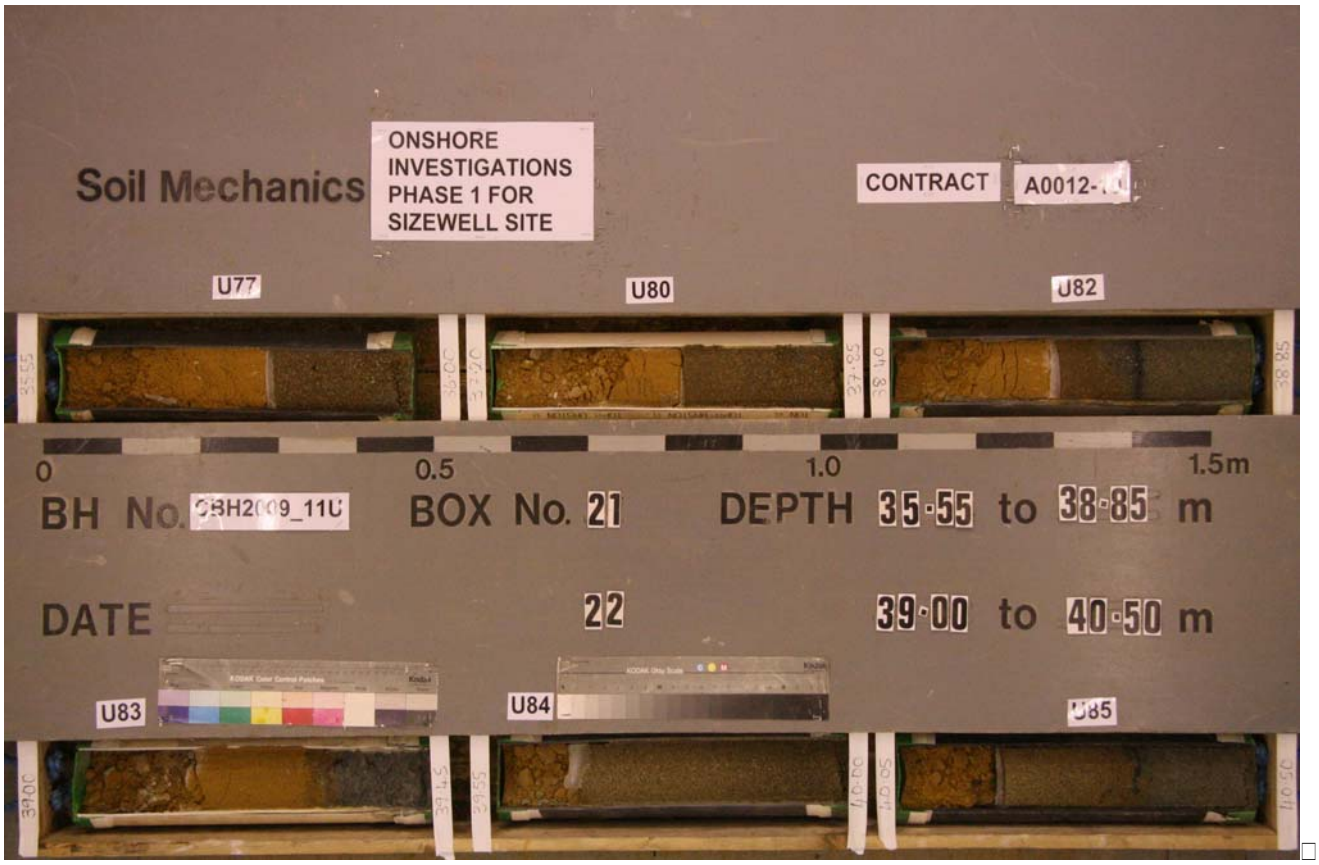
Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 48

Photographs

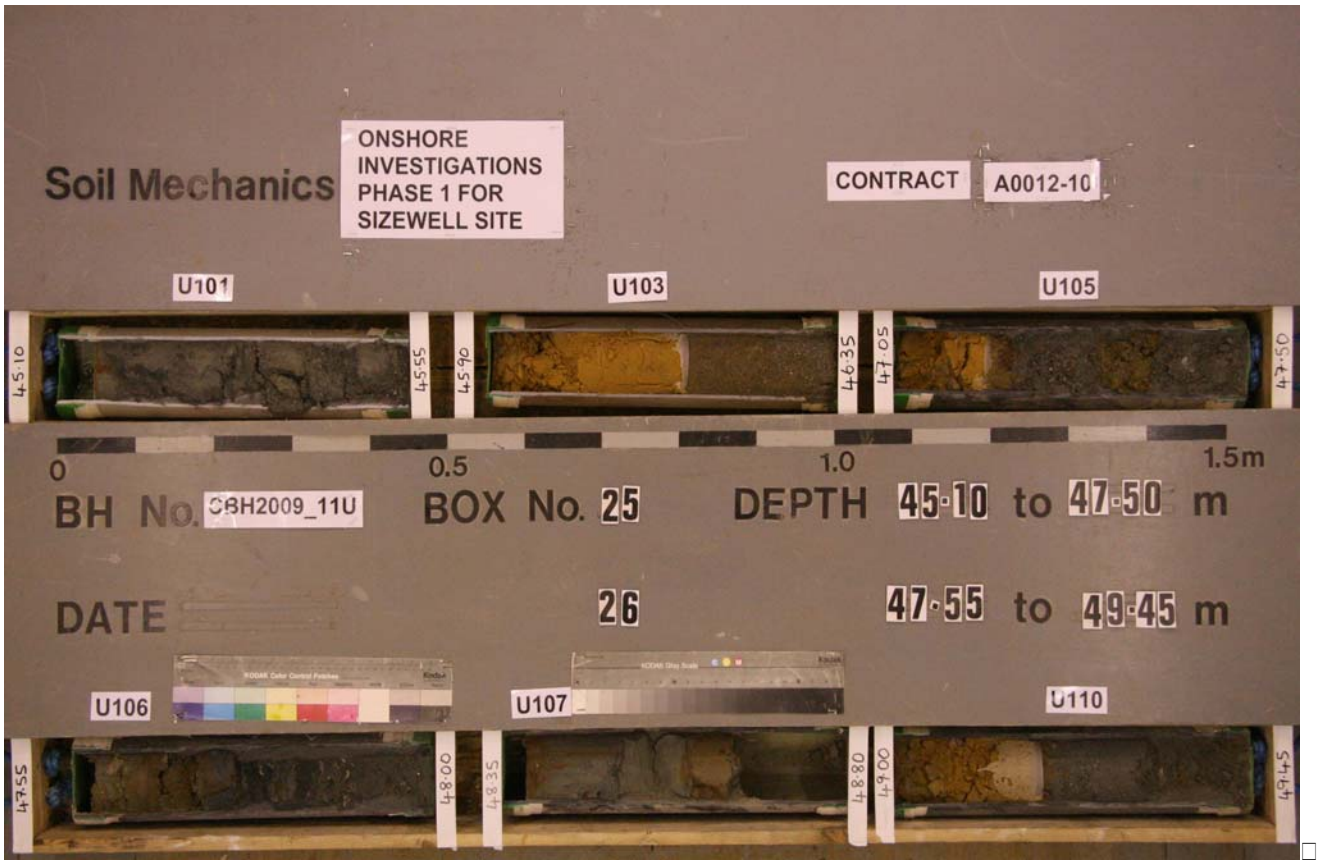
Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 49

Photographs

Soil Mechanics



	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 50

ENCLOSURE C

TRIAL PIT PHOTOGRAPHS

Trail Pits Plate 1 to 123

Photographs

Soil Mechanics

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□□□□□□ □	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 1

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 2
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics

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□□□□□□ □	**Project** ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE **Project No.** A0012-10 **Carried out for** NNB Generation Company Limited	**Plate** 3

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	4
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

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□□□□□□ □	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 5

Photographs

Soil Mechanics

Plate A

Plate D

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 6
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 8
	Project No.: A0012-10	
	Carried out for: NNB Generation Company Limited	

Photographs

Soil Mechanics

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□□□□□□ □	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate 9
	Project No.	A0012-10	
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	10
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

Trial Pit 9 Face A

Trial Pit 9 Face D

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 11

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	12
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

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□□□□□□ □	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 13

Photographs

Soil Mechanics

Photographs

Soil Mechanics

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□□□□□□ □	**Project** **ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE** **Proiect No.** **A0012-10** **Carried out for** **NNB Generation Company Limited**	**Plate** **15**

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	16
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 17

Photographs

Soil Mechanics

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	19
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

Trial Pit 15 Face A

Trial Pit 15 Face D

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 20

Photographs

Soil Mechanics

Trial Pit A

Trial Pit D

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 21

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	22
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

Trial Pit A

Trial Pit D

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 23

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	24
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

Plate A

Plate D

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 25

Photographs

Soil Mechanics

Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
Project No.	A0012-10	26
Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

Trial Pit 20 Face A

Trial Pit 20 Face D

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 27

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	28
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

Trial Pit 21 Face A

Trial Pit 21 Face D

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	29
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	30
	Carried out for	NNB Generation Company Limited	

Appendix F – Ground Investigation Factual Reports

On-shore Investigations Phase 1 for Sizewell Site 2011

CONTINUED

Photographs

Soil Mechanics

Plate A

Plate D

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 31

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	32
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	33
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	34
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

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r D

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	35
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	36
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

Figure A

Figure D

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 37

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	38
	Carried out for	NNB Generation Company Limited	

Photographs

Soil Mechanics

Plate A

Plate D

	Project: ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE Project No.: A0012-10 Carried out for: NNB Generation Company Limited	Plate 39

Photographs

Soil Mechanics

	Project	ONSHORE INVESTIGATIONS PHASE 1 FOR SIZEWELL SITE	Plate
	Project No.	A0012-10	40
	Carried out for	NNB Generation Company Limited	