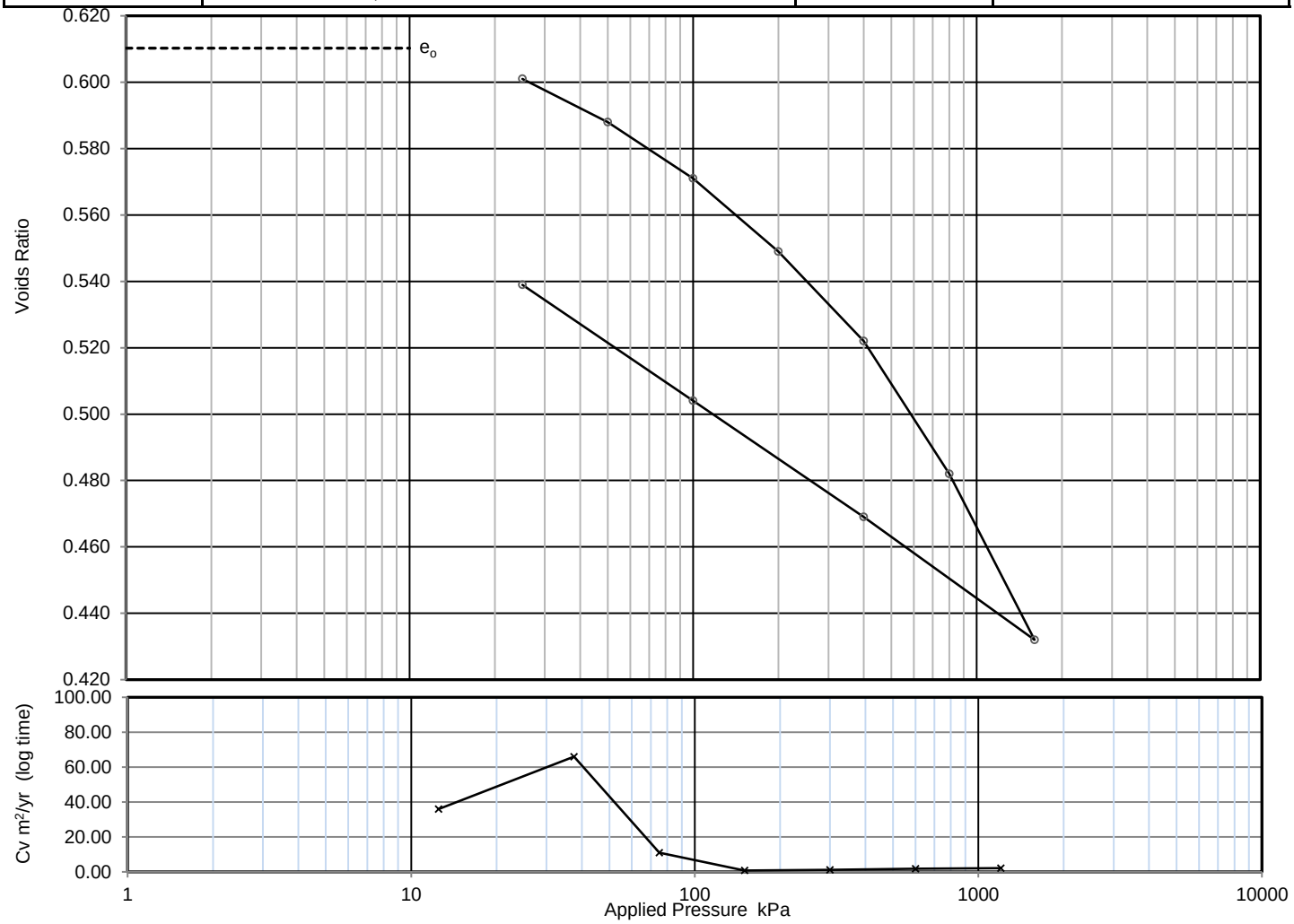
	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3			Job Ref	D8044
				Borehole/Pit No.	BH49
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth	2.2
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Firm, brown, CLAY			KeyLAB ID	SLMK2017091326
Test Method	BS1377:Part 5:1990, clause 3			Date started	



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.610	-	-	-	-
25	0.601	0.24	36	44	0.000096
50	0.588	0.32	66	200	0.00052
100	0.571	0.22	11	210	0.0014
200	0.549	0.14	0.76	120	0.001
400	0.522	0.089	1.1	52	0.0012
800	0.482	0.065	1.8	37	0.0017
1,600	0.432	0.042	2.2	23	0.0023
400	0.469	0.021			
100	0.504	0.081			
25	0.539	0.3			

Preparation

Index tests Liquid limit % Plastic limit %

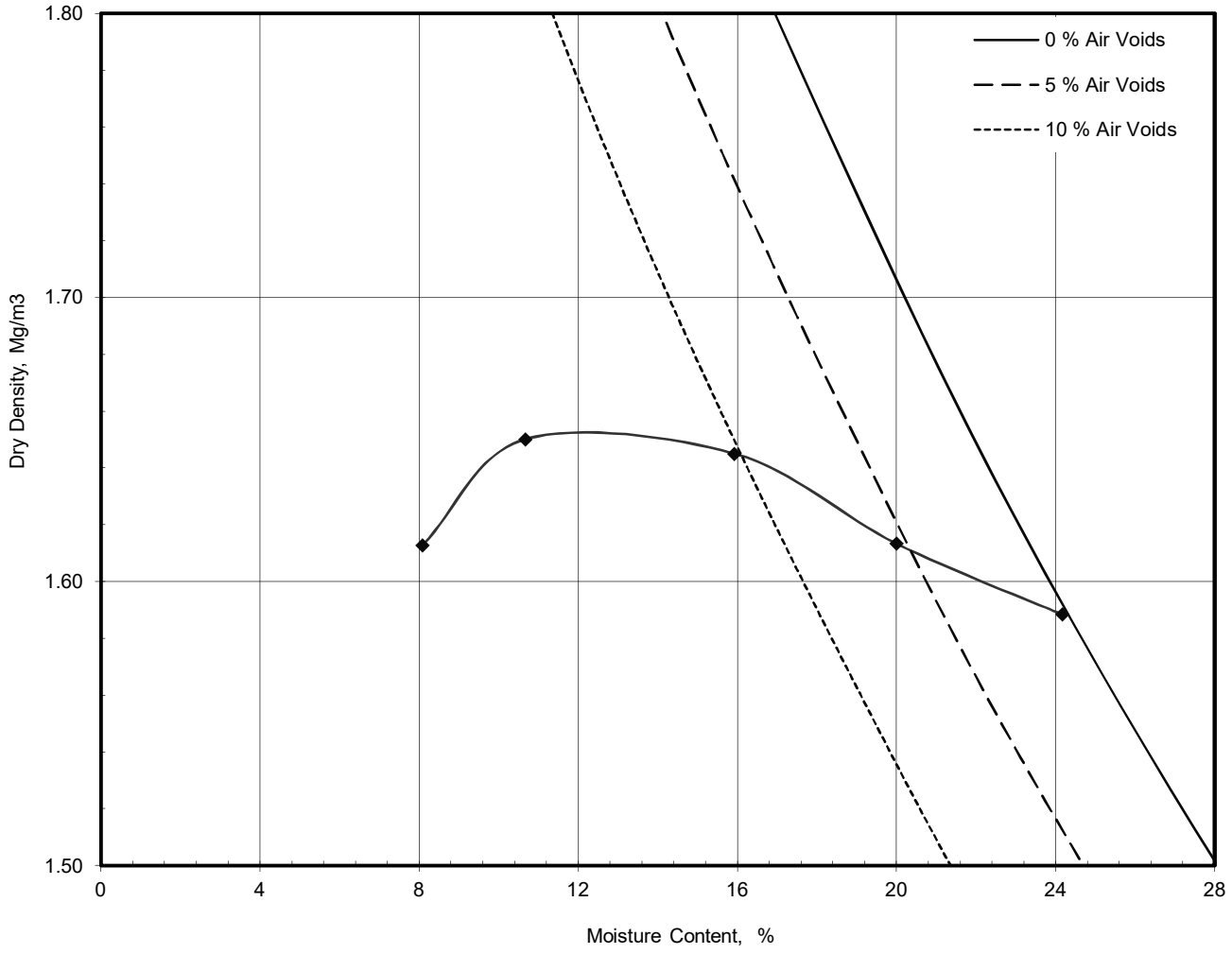
Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	19.11	mm
Moisture Content	18.6	21.7	%
Bulk density	1.95		Mg/m3
Dry density	1.65		Mg/m3
Voids Ratio	0.610		
Saturation	81		%
Average temperature for test	19.0		oC
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Final values should be used with caution Cv plotted at mid point of load increments Cv corrected to 20oC	Tested	Checked	Approved	Printed :	Fig. No
	TT	KW	KW	17/10/2017 14:26	1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	D8044
				Borehole / Pit No	TP10
Site Name	IAMP Sunderland			Sample No	
Soil Description	Brown, slightly gravelly, clayey, sandy SILT			Depth	0.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	SLMK2017091346
				Compaction Test Reference/No.	

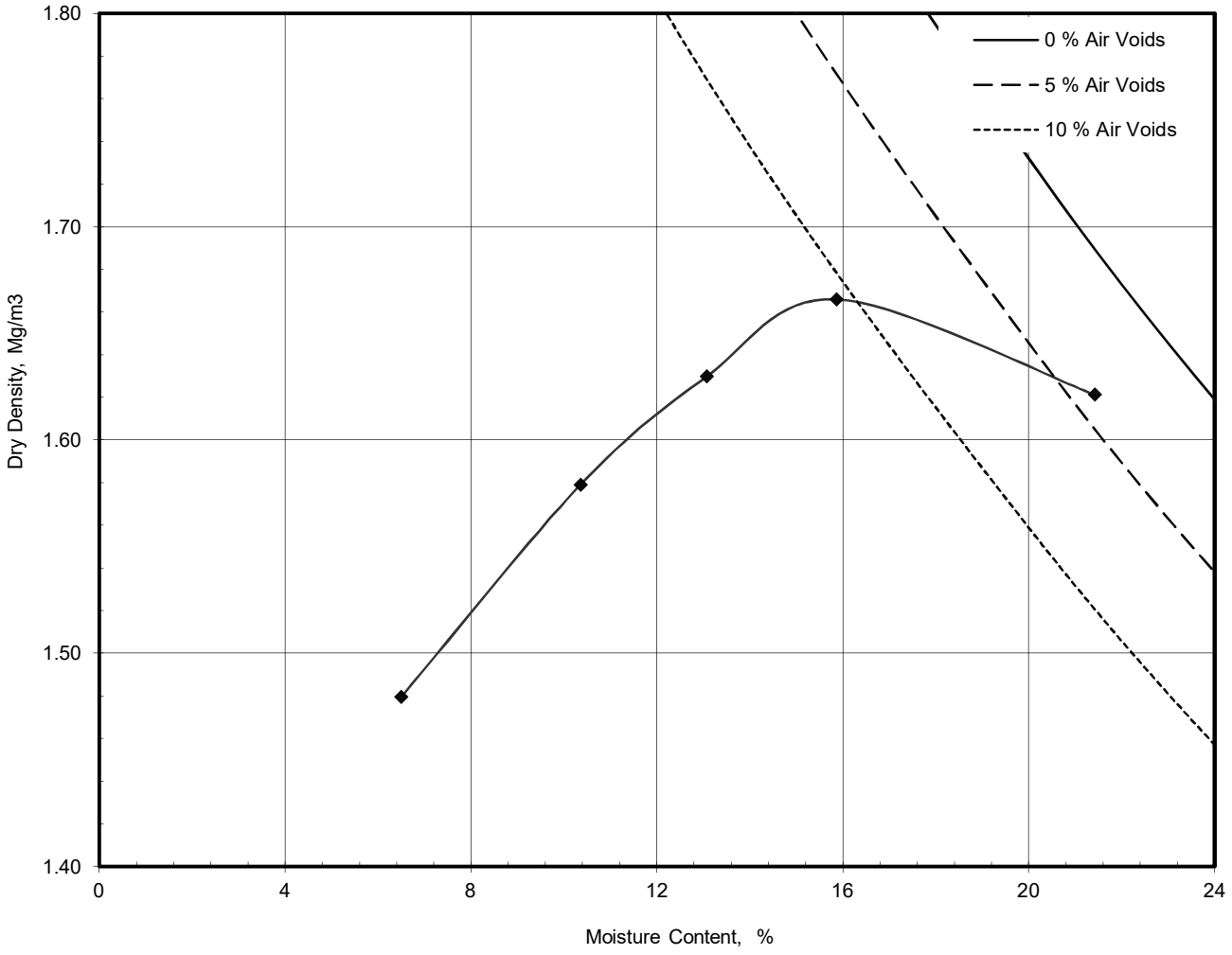


Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Measured using gas jar	Mg/m³	2.59

Maximum Dry Density	Mg/m³	**1.66**
Optimum Moisture Content	%	**13**

Operator	Checked	Approved	Remarks	
M.Southgate	KW	KW	8 %, 11%, 16%, 20% (natural), 24%	**Fig** Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	D8044
				Borehole / Pit No	TP10
Site Name	IAMP Sunderland			Sample No	
Soil Description	Brown, slightly sandy, CLAY			Depth	1.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	SLMK2017091349
				Compaction Test Reference/No.	



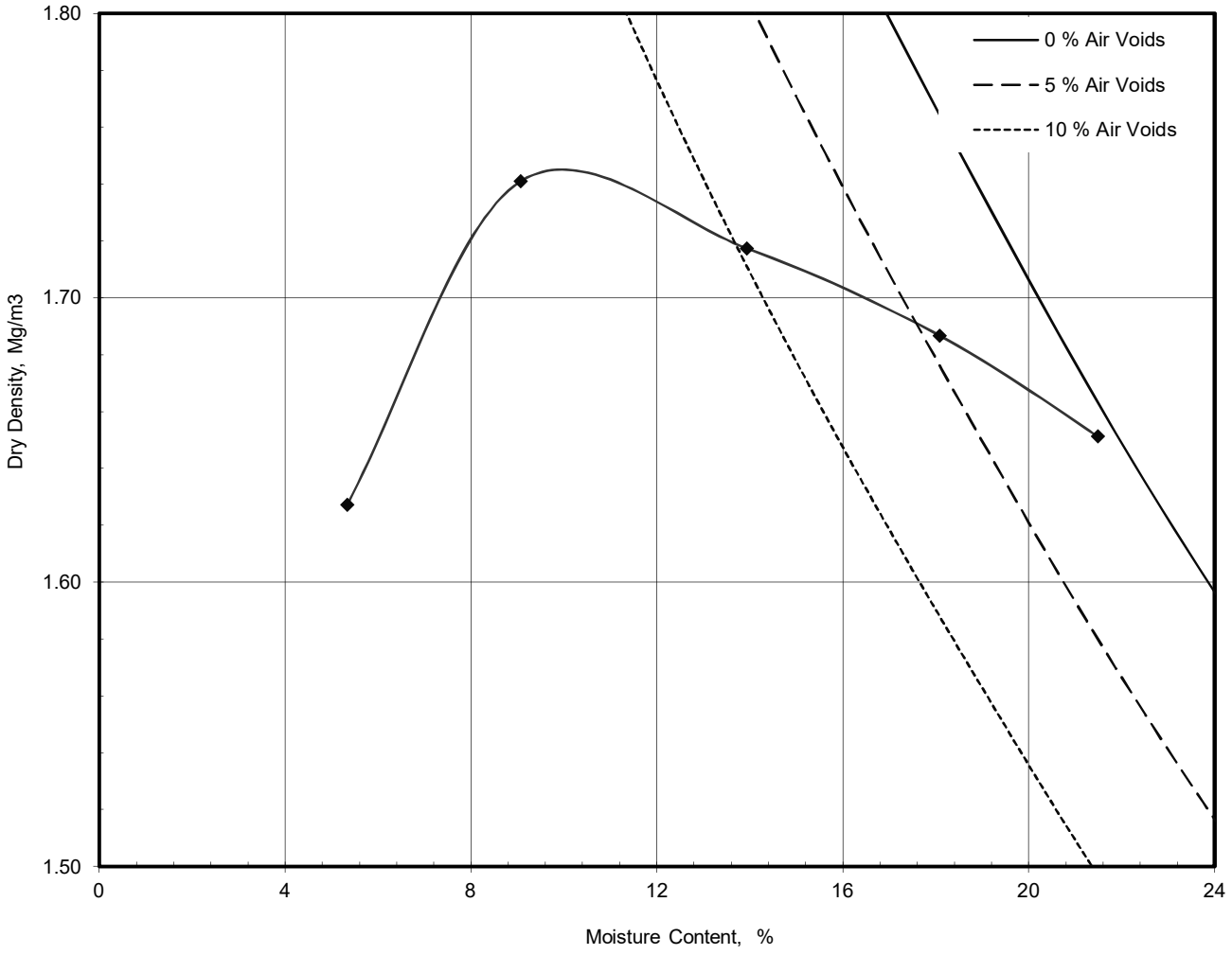
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**1.67**

Optimum Moisture Content	%	**16**

Operator	Checked	Approved	Remarks	Fig
A.Bulmer	KW	KW		Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	D8044
				Borehole / Pit No	TP13
Site Name	IAMP Sunderland			Sample No	
Soil Description	Brown, slightly gravelly, clayey, sandy SILT			Depth	0.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	SLMK2017091353
				Compaction Test Reference/No.	



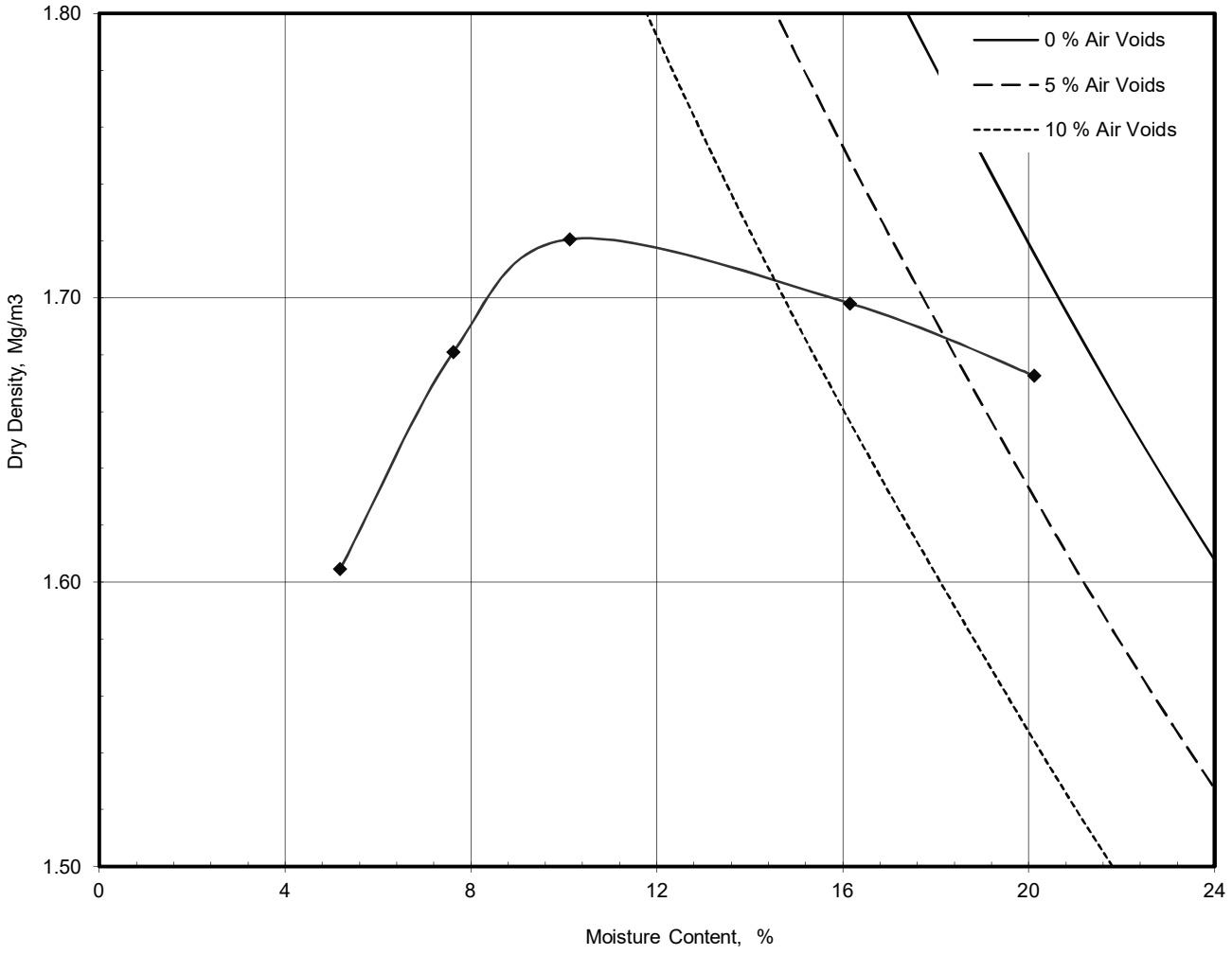
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Measured using gas jar	Mg/m³	2.59

Maximum Dry Density	Mg/m³	**1.74**

Optimum Moisture Content	%	**9.1**

Operator	Checked	Approved	Remarks	
M.Southgate	KW	KW	^%, 10%, 14%, 18% (natural), 22%	**Fig** Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	D8044
				Borehole / Pit No	TP13
Site Name	IAMP Sunderland			Sample No	
Soil Description	Brown, slightly clayey, sandy SILT			Depth	1.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	SLMK2017091356
				Compaction Test Reference/No.	

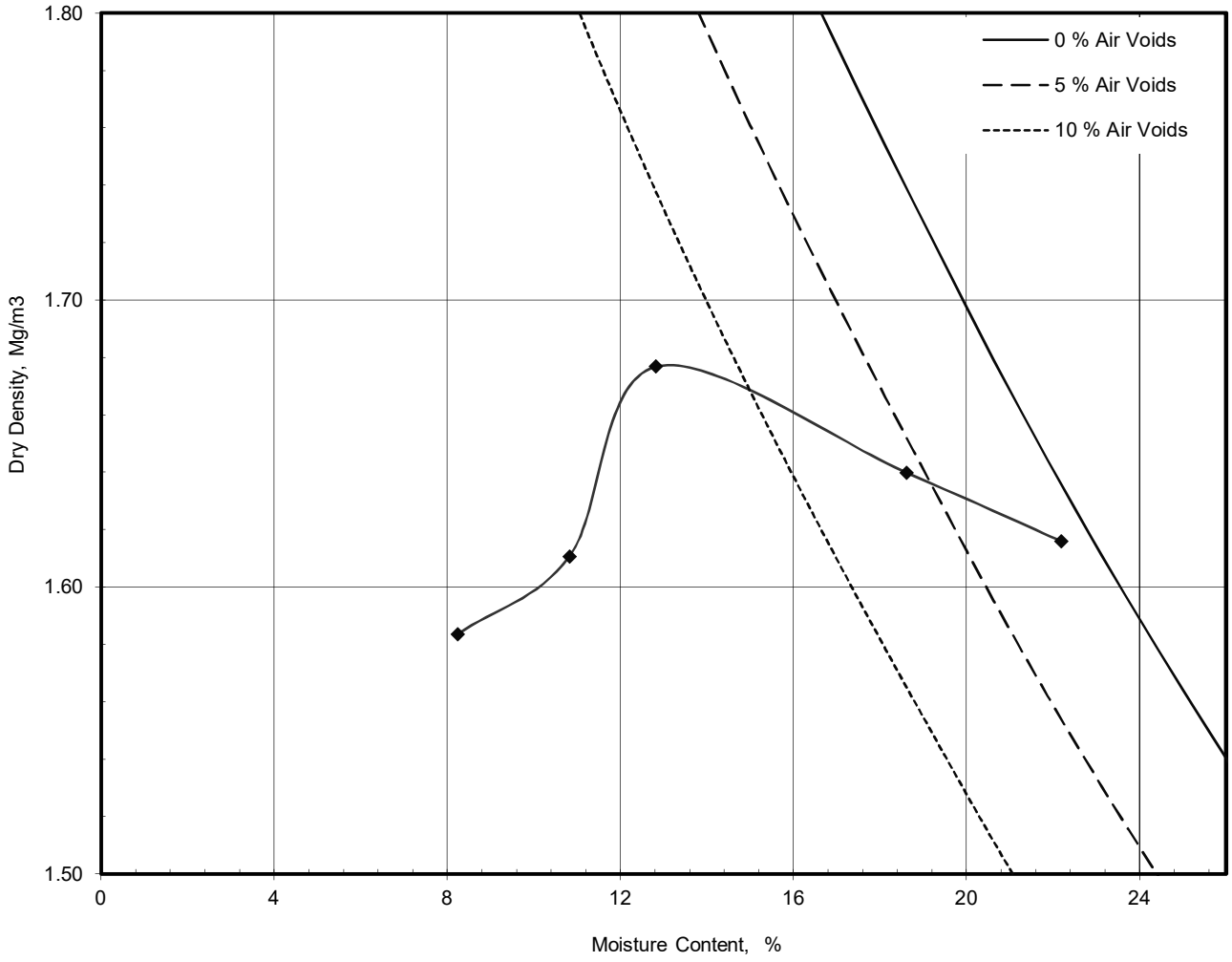


Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Measured using gas jar	Mg/m³	2.62

Maximum Dry Density	Mg/m³	**1.72**
Optimum Moisture Content	%	**10**

Operator	Checked	Approved	Remarks	
M.Southgate	KW	KW	5%, 8%, 10%, 16%, 20% (natural)	**Fig** Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	D8044
				Borehole / Pit No	TP19
Site Name	IAMP Sunderland			Sample No	
Soil Description	Brown, slightly gravelly, slightly sandy, clayey SILT			Depth	0.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	SLMK2017091369
				Compaction Test Reference/No.	



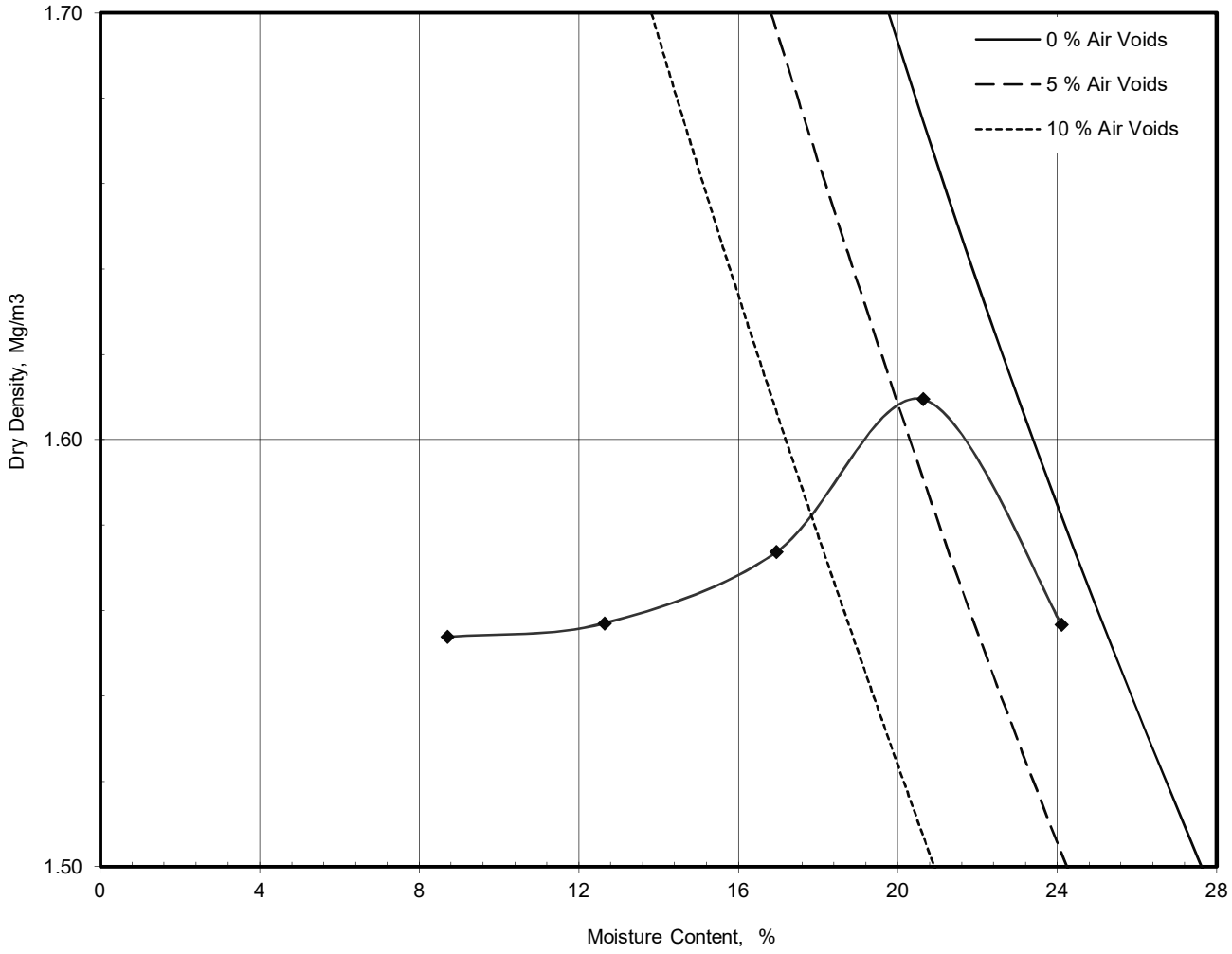
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Measured using gas jar	Mg/m³	2.57

Maximum Dry Density	Mg/m³	**1.68**

Optimum Moisture Content	%	**13**

Operator	Checked	Approved	Remarks	
M.Southgate	KW	KW	8%, 11%, 13%, 19% (natural), 22%	**Fig** Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	D8044
				Borehole / Pit No	TP25
Site Name	IAMP Sunderland			Sample No	
Soil Description	Brown, slightly gravelly, clayey, silty SAND			Depth	0.60 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	SLMK2017091388
				Compaction Test Reference/No.	



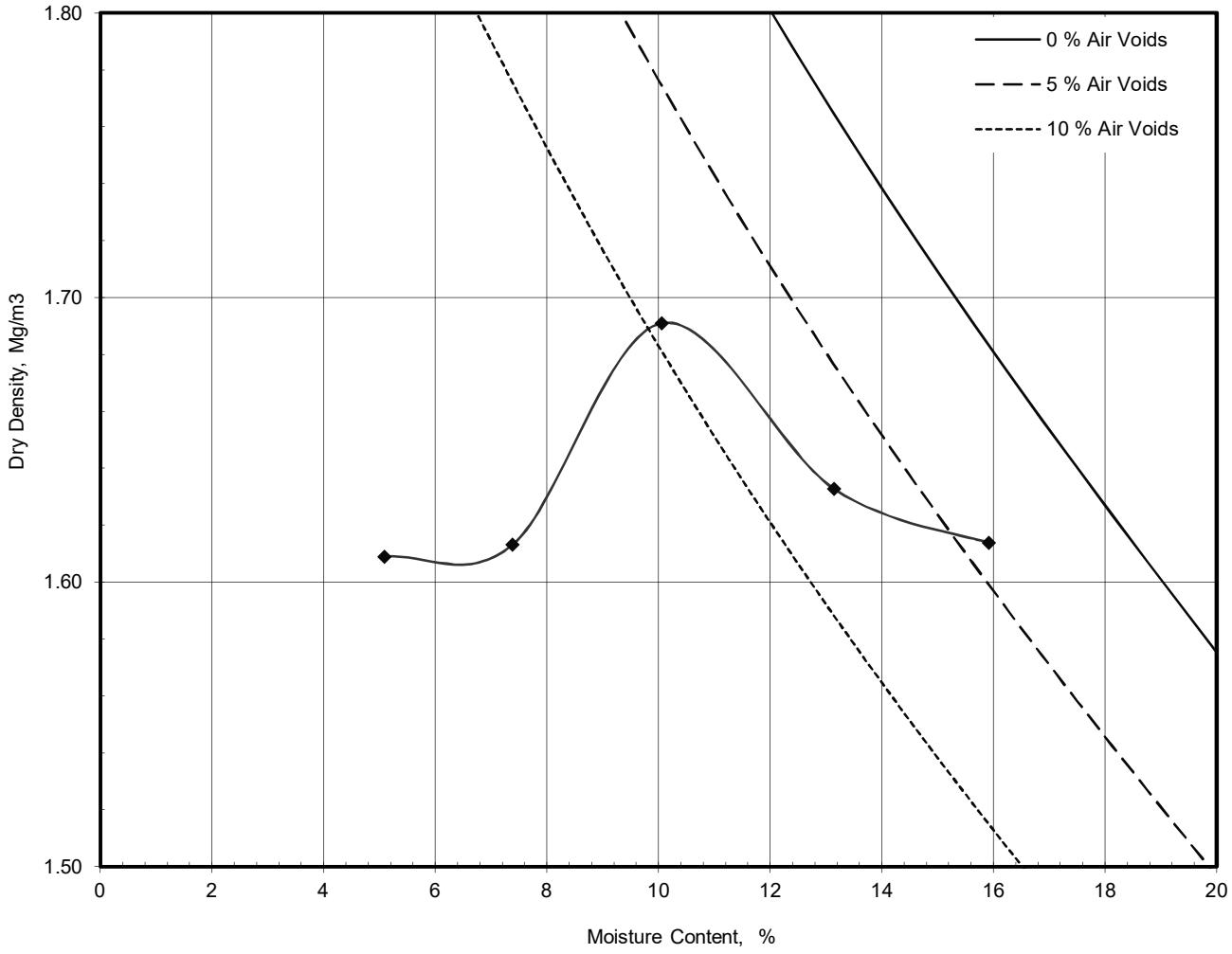
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Measured using gas jar	Mg/m³	2.56

Maximum Dry Density	Mg/m³	**1.61**

Optimum Moisture Content	%	**21**

Operator	Checked	Approved	Remarks	Fig
M.Southgate	KW	KW	9%, 13% 17%, 21% (natural), 24%	Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	D8044
				Borehole / Pit No	TP25
Site Name	IAMP Sunderland			Sample No	
Soil Description	Brown, slightly gravelly, sandy, clayey SILT			Depth	1.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	SLMK2017091391
				Compaction Test Reference/No.	



Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Measured using gas jar	Mg/m³	2.30

Maximum Dry Density	Mg/m³	**1.69**

Optimum Moisture Content	%	**10**

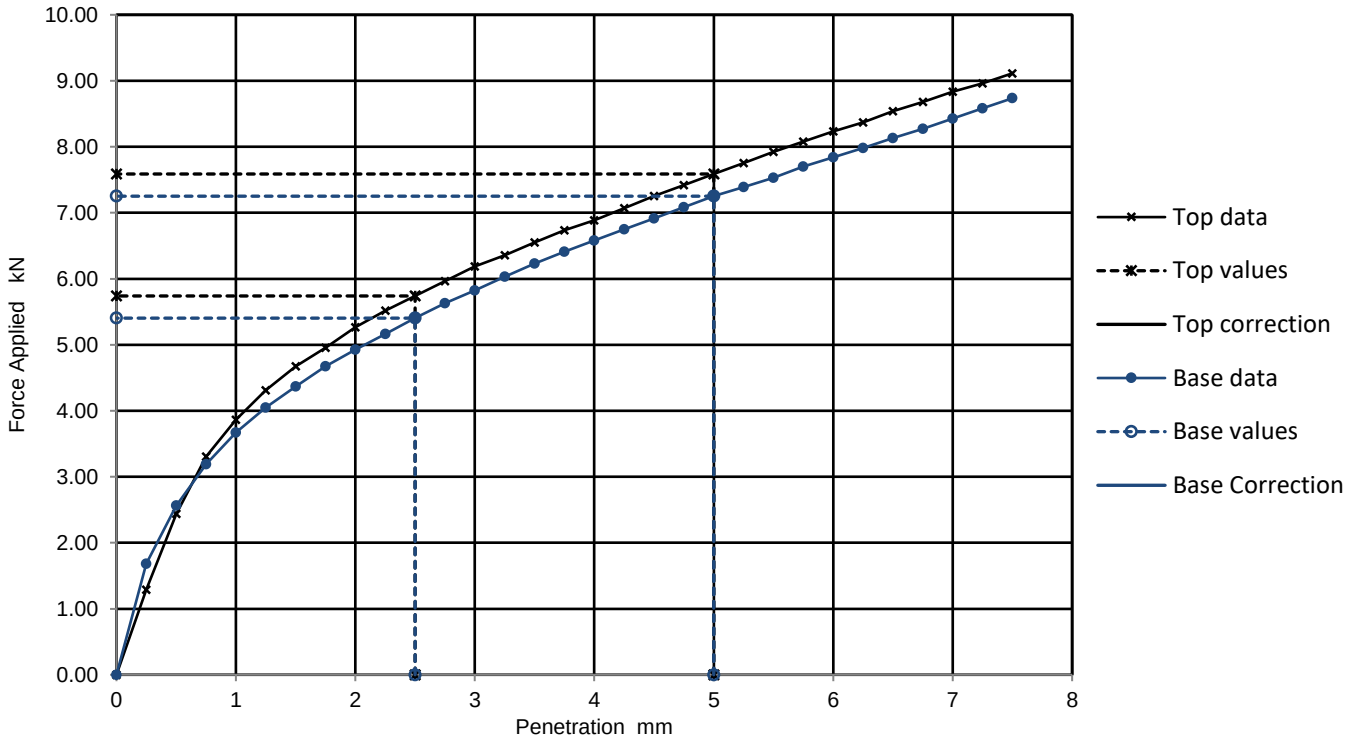
Operator	Checked	Approved	Remarks	Fig
M.Southgate	KW	KW	5%, 7%, 10%, 13%, 16% (natural)	Sheet 1 of 1

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP10
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	1	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091346
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.80	Mg/m3	Surcharge applied	6	kg
	Dry density	1.66	Mg/m3		4	kPa
	Moisture content	8.3	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		43.0	38.0	43.0	42.0	8.0
BASE		41.0	36.0	41.0		7.7

General remarks	Test specific remarks	Approved
Tested at 8% Moisture Content : HV: 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	1

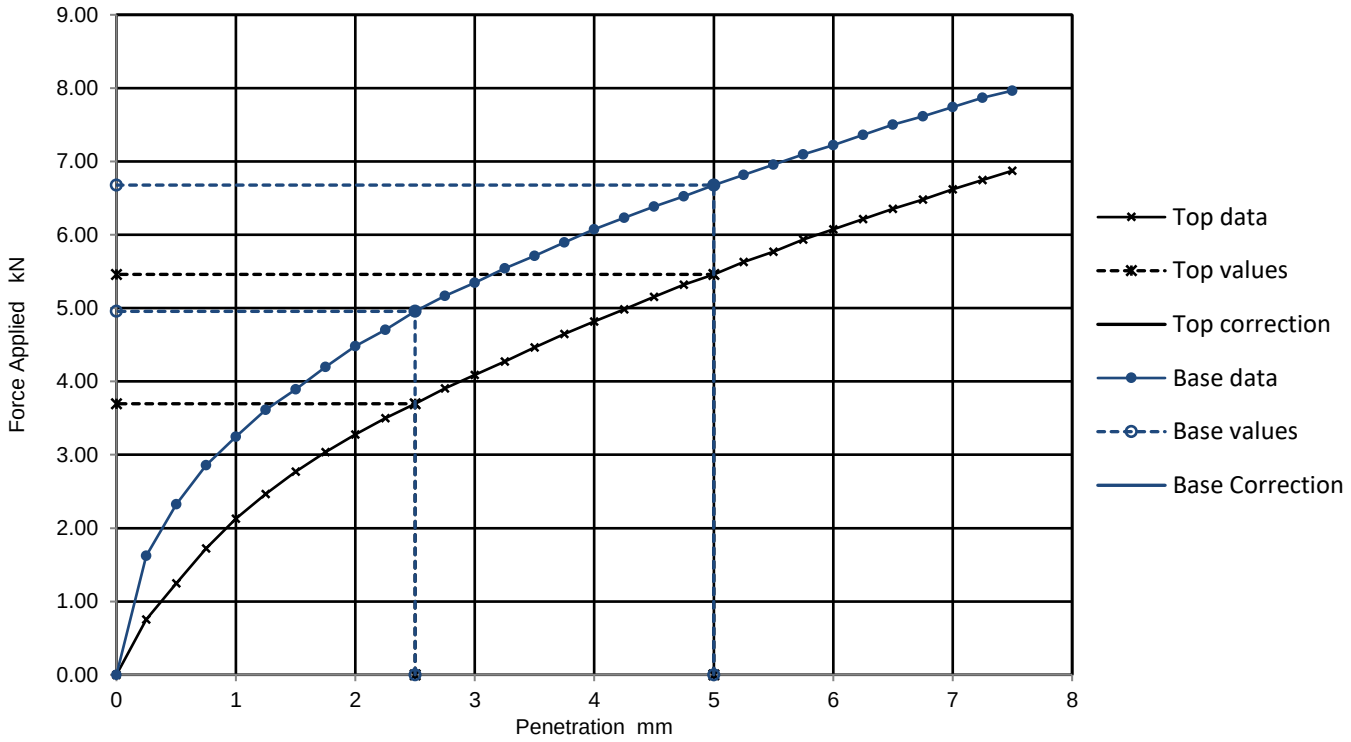
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP10
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	2	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly clayey, sandy SILT			KeyLAB ID	SLMK2017091346
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.97	Mg/m3	Surcharge applied	6	kg
	Dry density	1.76	Mg/m3		4	kPa
	Moisture content	12.0	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		28.0	27.0	28.0		11.6
BASE		38.0	33.0	38.0		11.2

General remarks	Test specific remarks	Approved
Tested at 11% Moisture Content : HV 120 kPa (top & base)		KW

Fig No.	1
Sheet No	2

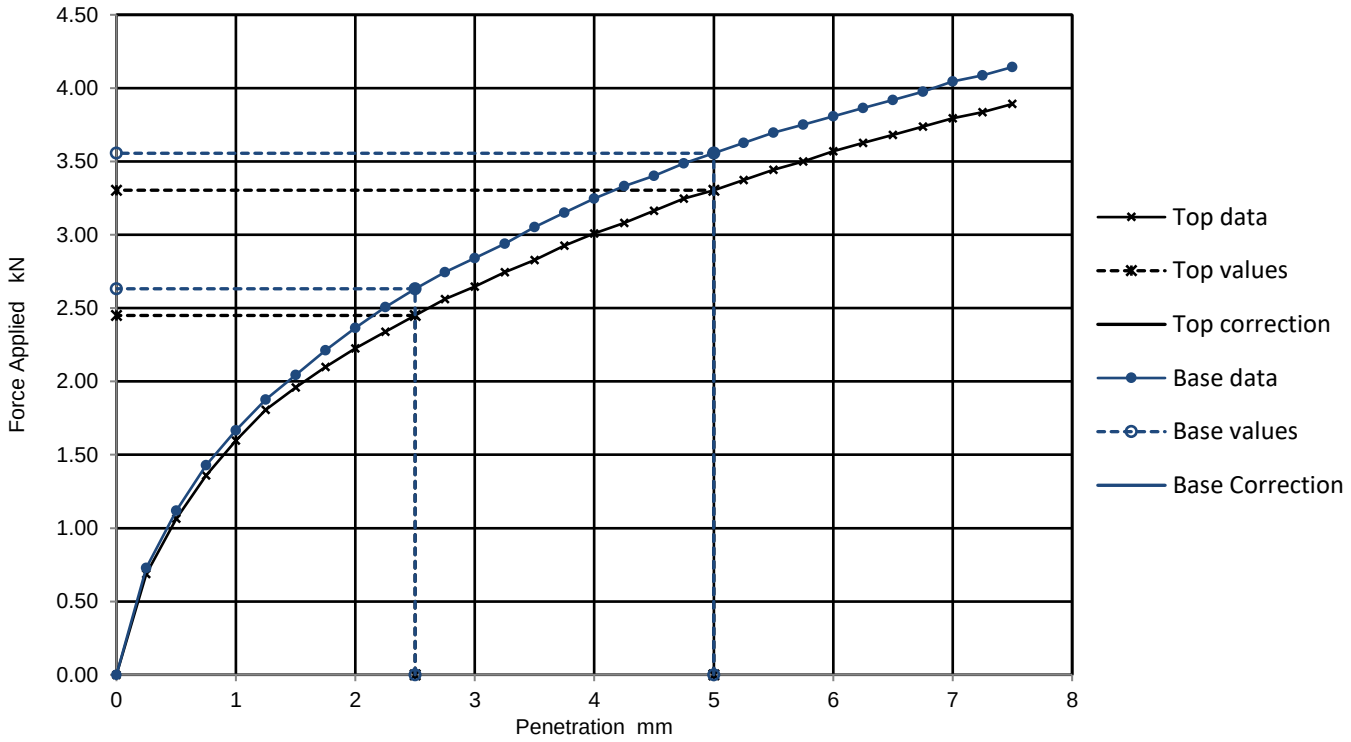
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP10
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091346
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.06	Mg/m3	Surcharge applied	6	kg
	Dry density	1.78	Mg/m3		4	kPa
	Moisture content	15.6	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		19.0	17.0	19.0	19.0	15.6
BASE		20.0	18.0	20.0		15.4

General remarks	Test specific remarks	Approved
Tested at 16% Moisture Content : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	3

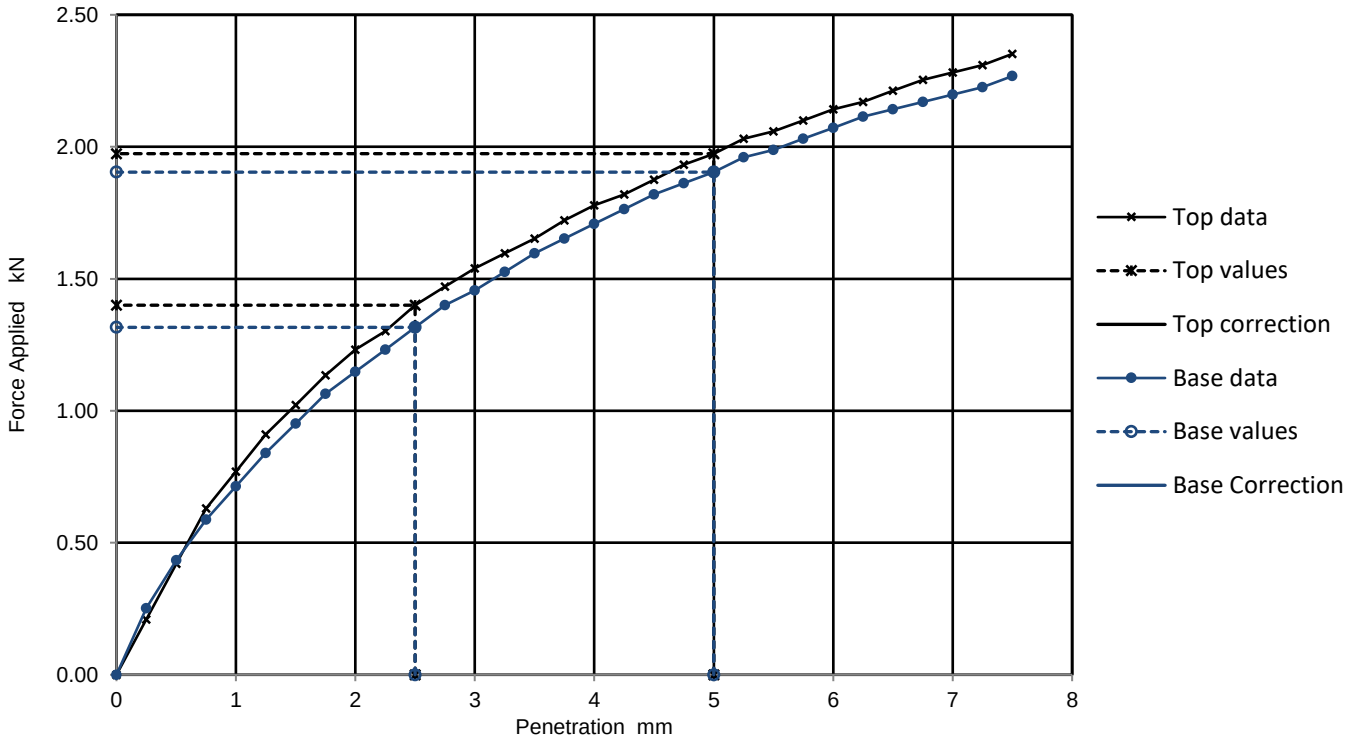
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP10
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	4	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091346
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.07	Mg/m3	Surcharge applied	6	kg
	Dry density	1.72	Mg/m3		4	kPa
	Moisture content	20.3	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		11.0	9.9	11.0	10.0	20.3
BASE		10.0	9.5	10.0		20.3

General remarks	Test specific remarks	Approved
Tested at 20% Moisture Content (Natural) : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	4

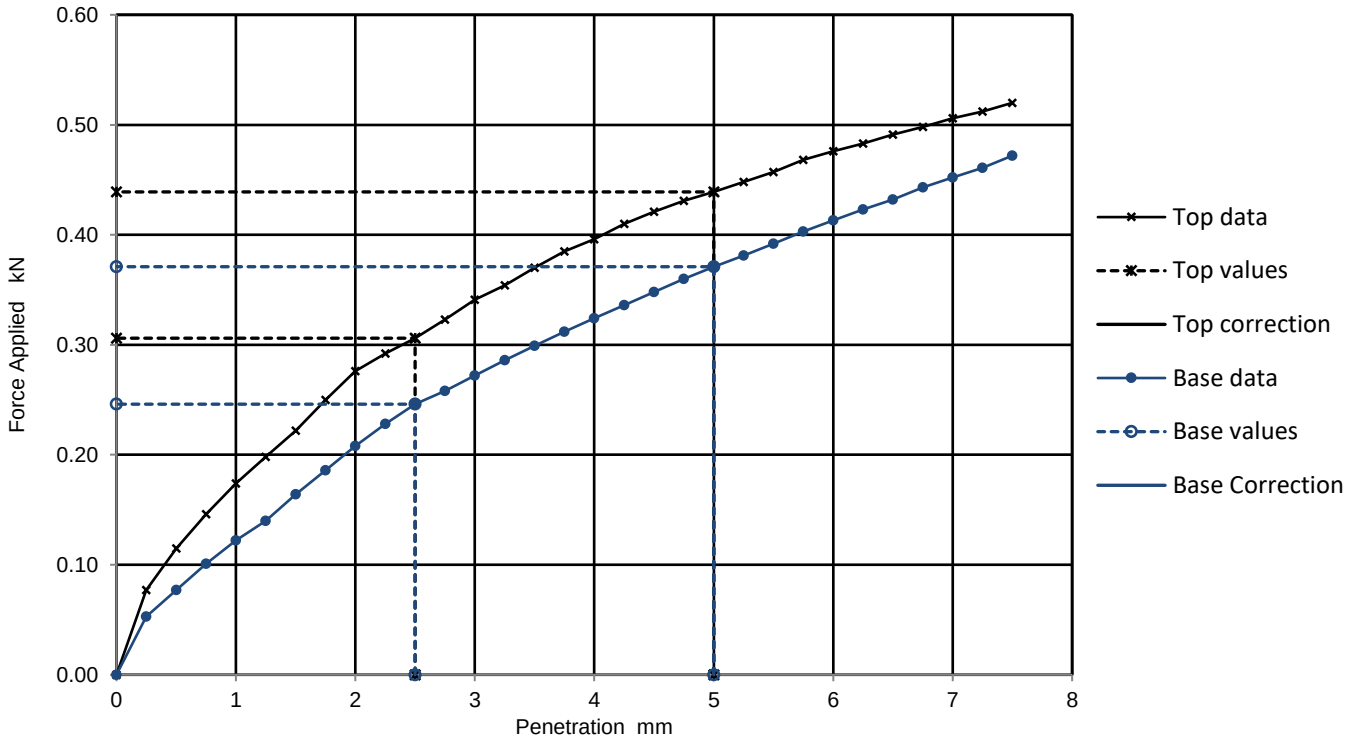
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP10
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	5	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091346
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.01	Mg/m3	Surcharge applied	6	kg
	Dry density	1.62	Mg/m3		4	kPa
	Moisture content	24.3	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		2.3	2.2	2.3		23.8
BASE		1.9	1.9	1.9		23.7

General remarks	Test specific remarks	Approved
Tested at 24% Moisture Content : HV: 32kPa (top) & 35 kPa (base)		KW

Fig No.	1
Sheet No	5

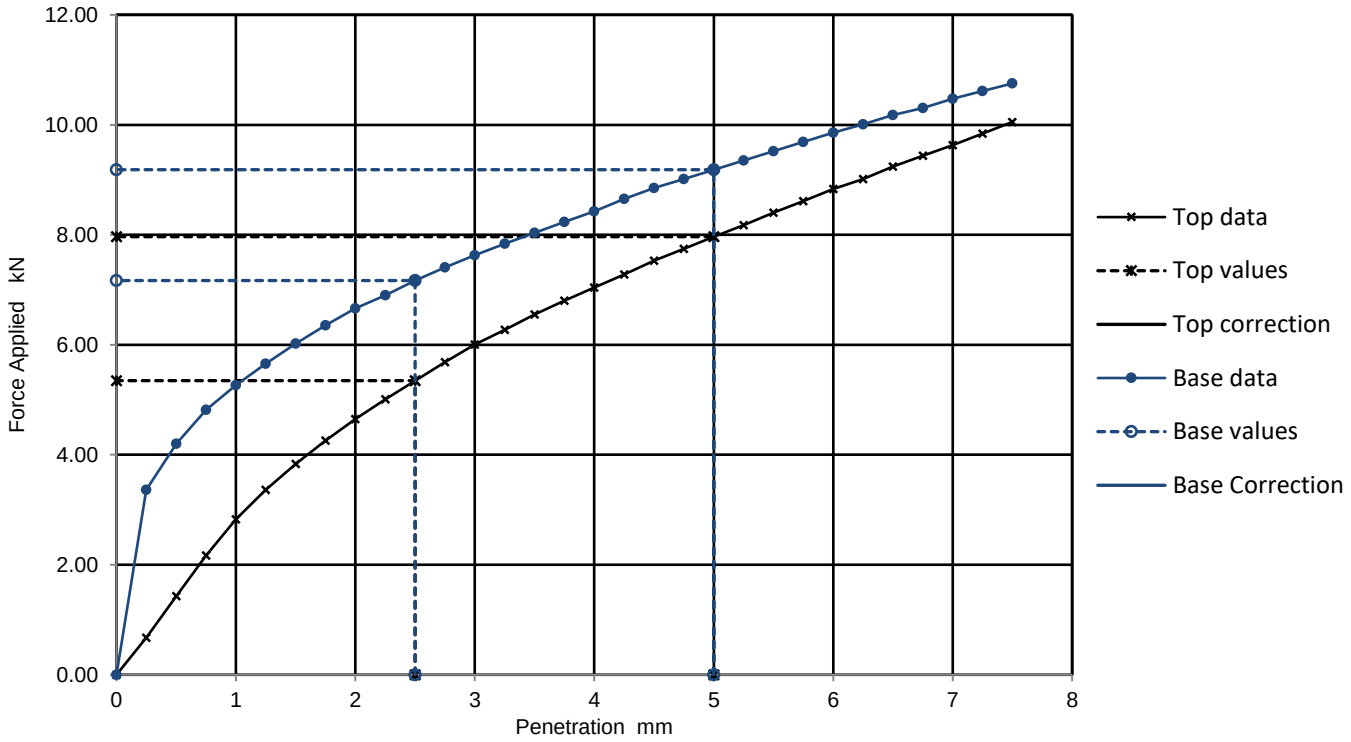
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	1	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091353
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.86	Mg/m3	Surcharge applied	6	kg
	Dry density	1.77	Mg/m3		4	kPa
	Moisture content	5.2	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		41.0	40.0	41.0		5.3
BASE		54.0	46.0	54.0		5.1

General remarks	Test specific remarks	Approved
Tested at 5% Moisture Content : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	6

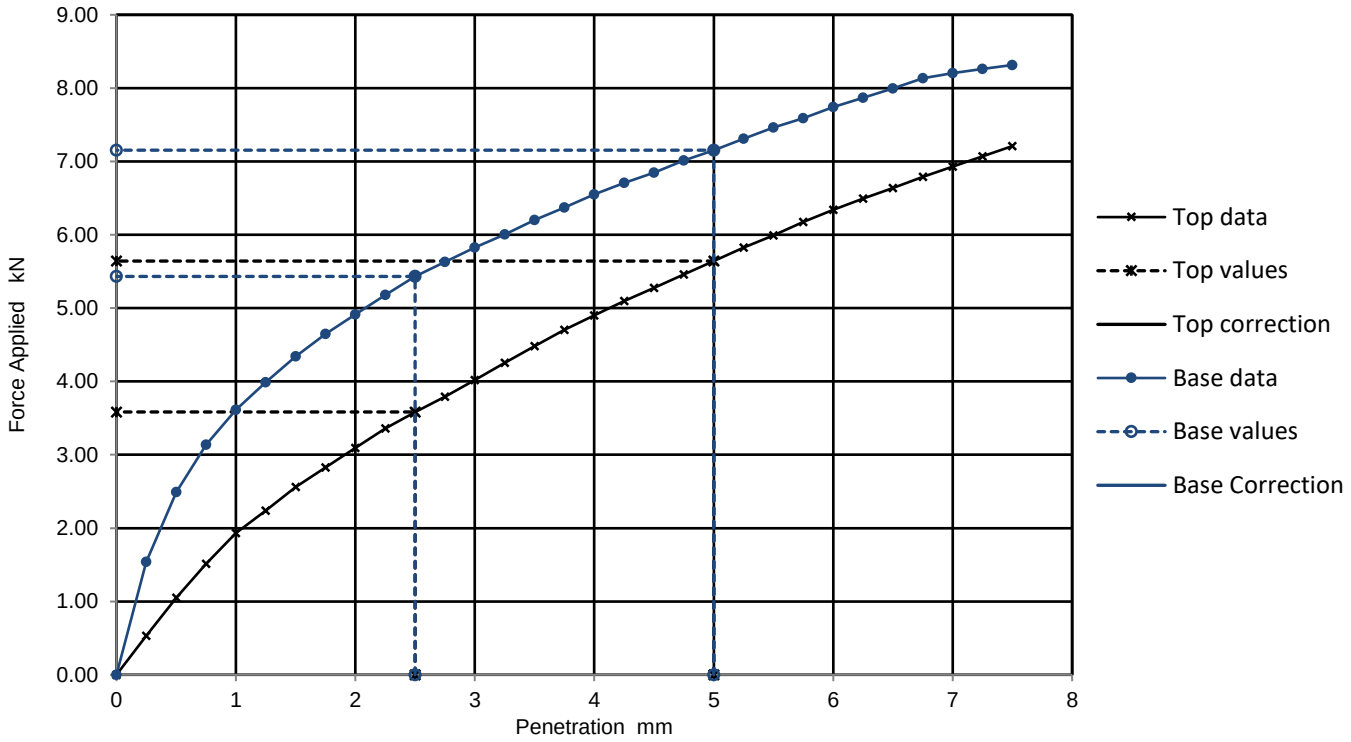
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	2	Specimen Depth	m	Sample Type	B
Specimen Description	Brown slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091353
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.99	Mg/m3	Surcharge applied	6	kg
	Dry density	1.85	Mg/m3		4	kPa
	Moisture content	7.7	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		27.0	28.0	28.0		8.4
BASE		41.0	36.0	41.0		8.1

General remarks	Test specific remarks	Approved
Tested at 10% Moisture Content : HV: 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	7

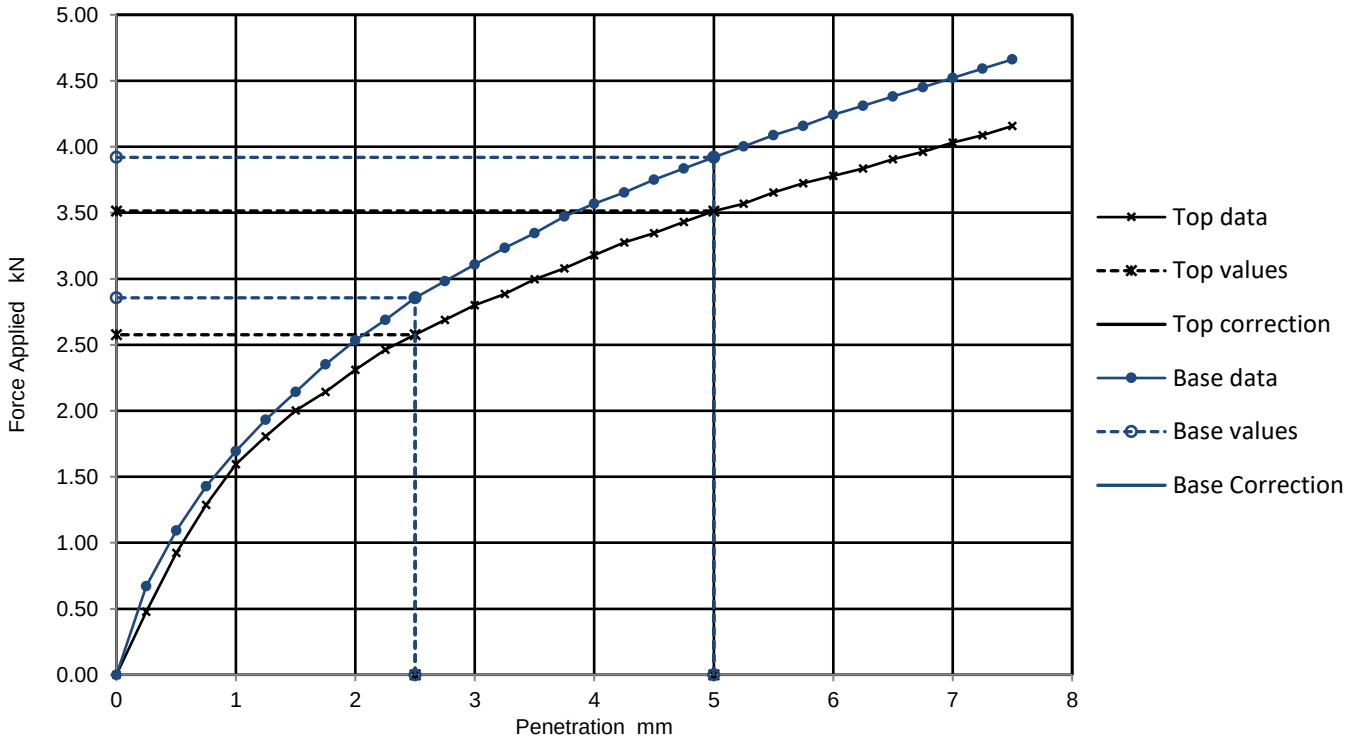
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091353
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.10	Mg/m3	Surcharge applied	6	kg
	Dry density	1.85	Mg/m3		4	kPa
	Moisture content	13.8	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		20.0	18.0	20.0	21.0	13.1
BASE		22.0	20.0	22.0		13.6

General remarks	Test specific remarks	Approved
Tested at 14% Moisture Content : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	8

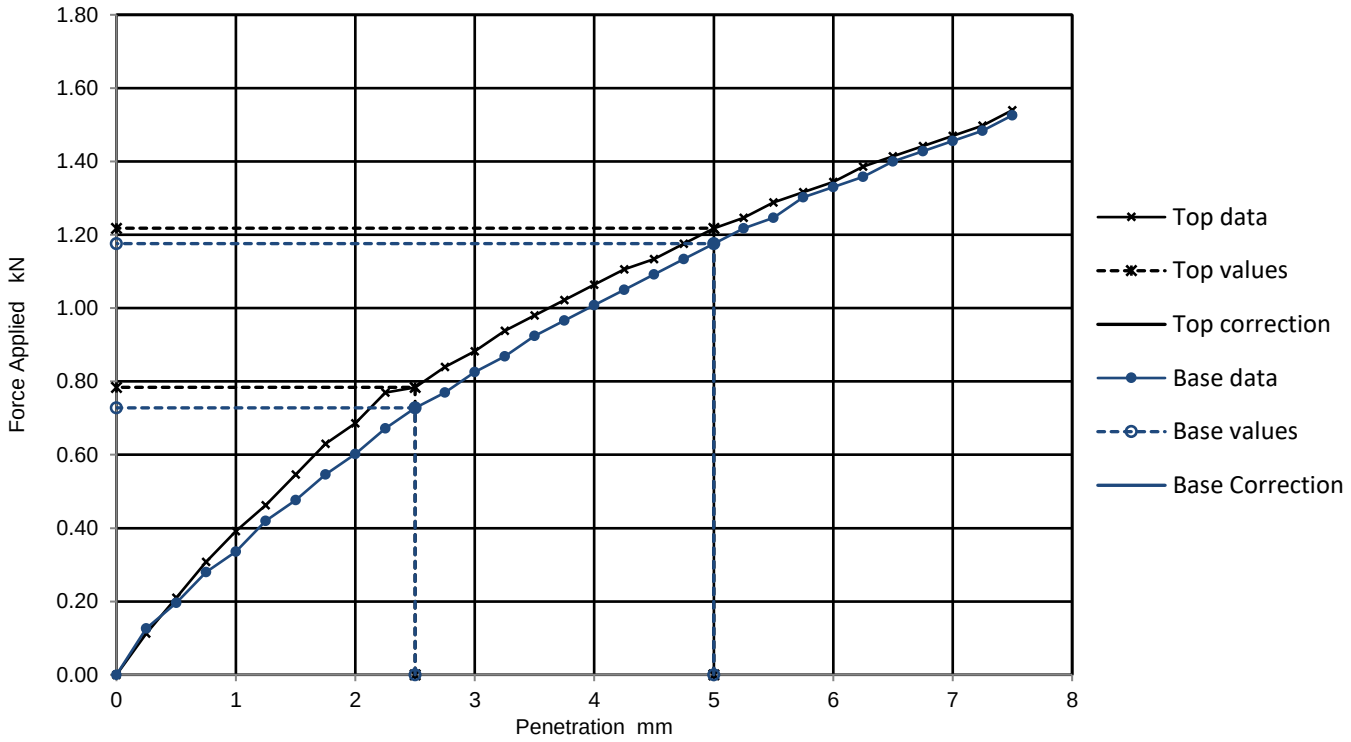
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	4	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091353
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.10	Mg/m3	Surcharge applied	6	kg
	Dry density	1.78	Mg/m3		4	kPa
	Moisture content	17.9	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		5.9	6.1	6.1	6.0	17.8
BASE		5.5	5.9	5.9		17.9

General remarks	Test specific remarks	Approved
Tested at 18% Moisture Content (Natural) : HV 120+ kPa (top) & 114 kPa (base)		KW

Fig No.	1
Sheet No	9

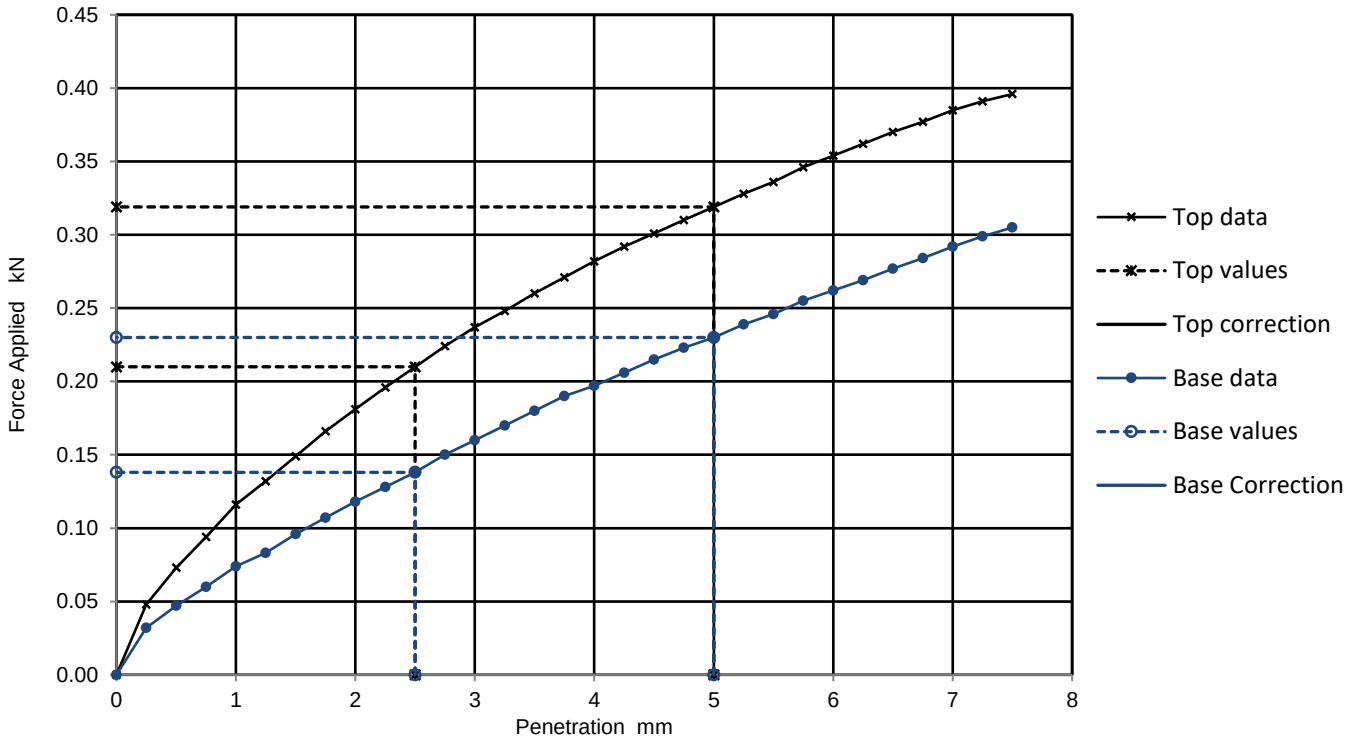
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	5	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091353
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.03	Mg/m3	Surcharge applied	6	kg
	Dry density	1.67	Mg/m3		4	kPa
	Moisture content	21.8	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		1.6	1.6	1.6		21.6
BASE		1.0	1.2	1.2		21.9

General remarks	Test specific remarks	Approved
Tested at 22% Moisture Content : HV 28kPa (top) & 29 kPa (base)		KW

Fig No.	1
Sheet No	10

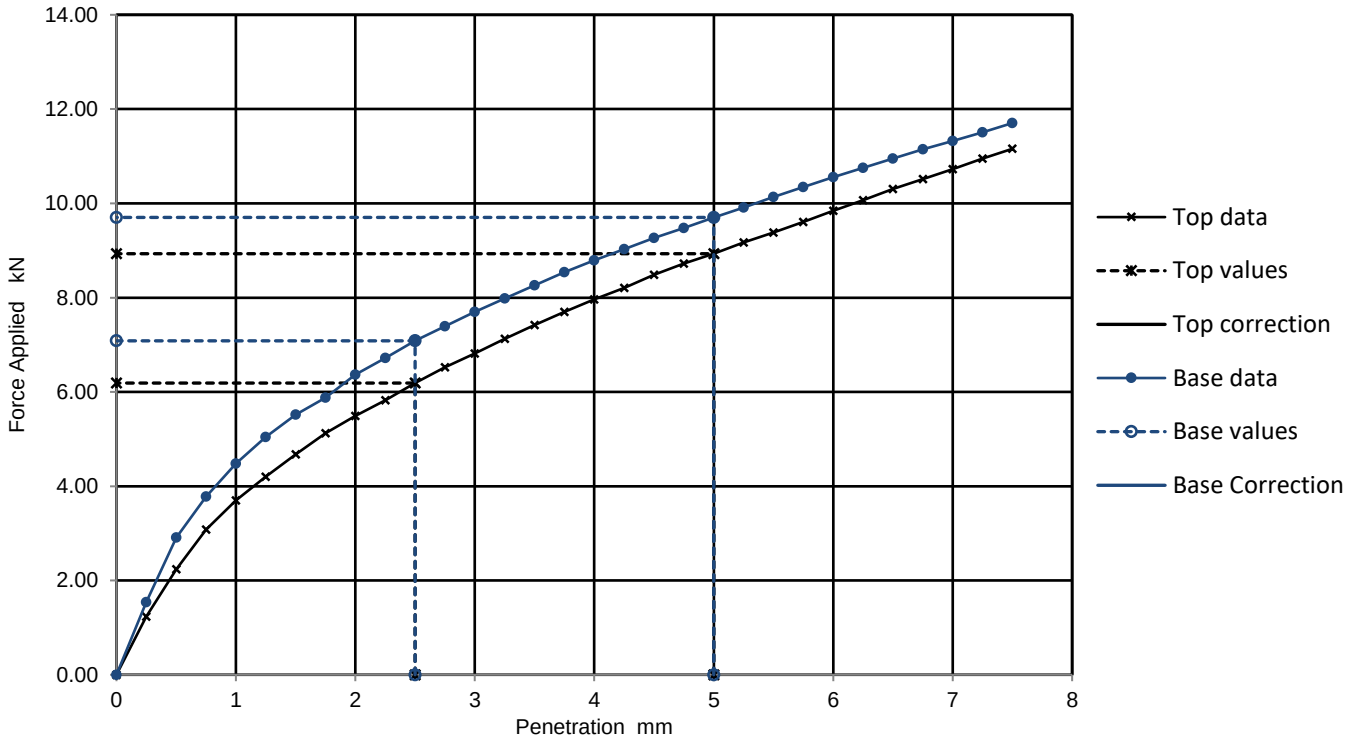
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	1	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly clayey, sandy SILT			KeyLAB ID	SLMK2017091356
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.83	Mg/m3	Surcharge applied	6	kg
	Dry density	1.75	Mg/m3		4	kPa
	Moisture content	4.6	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		47.0	45.0	47.0	50.0	4.8
BASE		54.0	49.0	54.0		4.9

General remarks	Test specific remarks	Approved
Tested at 5% Moisture Content : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	11

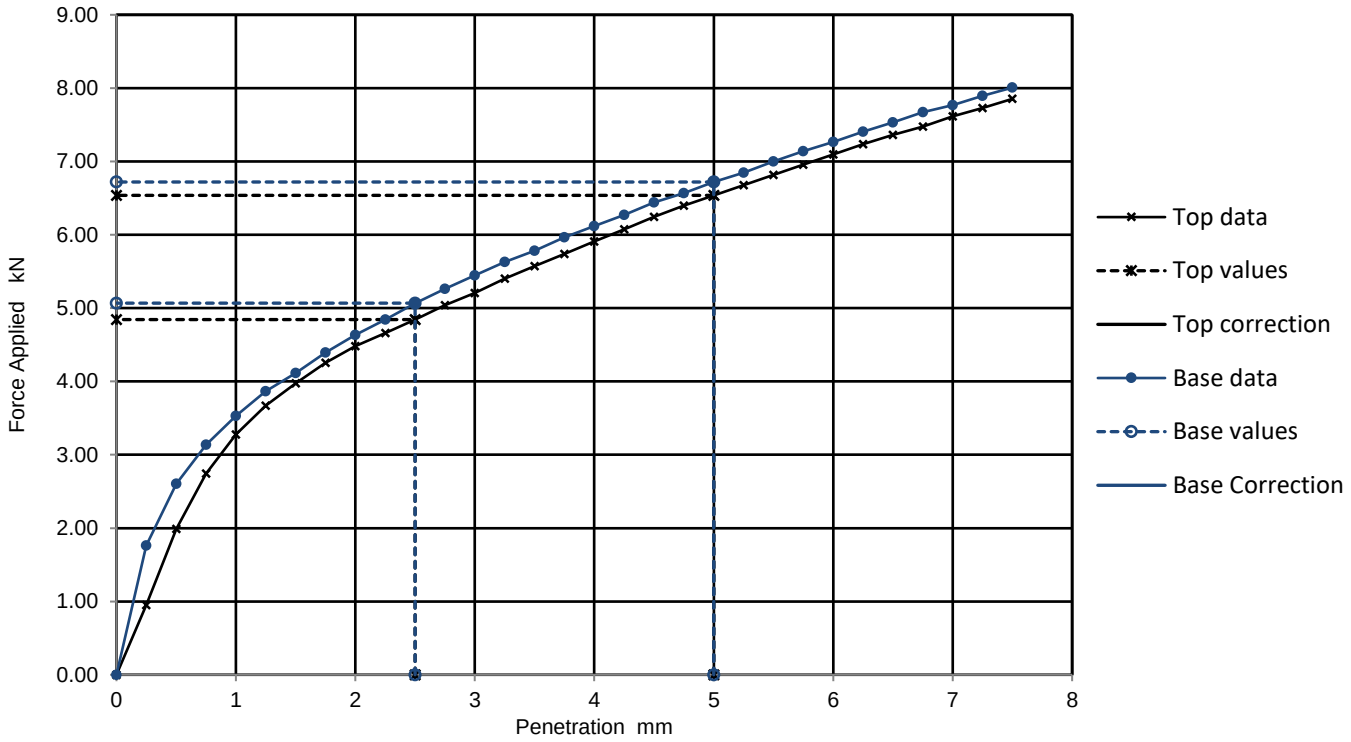
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	2	Specimen Depth	m	Sample Type	B
Specimen Description	brown, slightly clayey, sandy SILT			KeyLAB ID	SLMK2017091356
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.84	Mg/m3	Surcharge applied	6	kg
	Dry density	1.71	Mg/m3		4	kPa
	Moisture content	7.5	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		37.0	33.0	37.0	38.0	7.5
BASE		38.0	34.0	38.0		7.7

General remarks	Test specific remarks	Approved
Tested at 8% Moisture Content HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	12

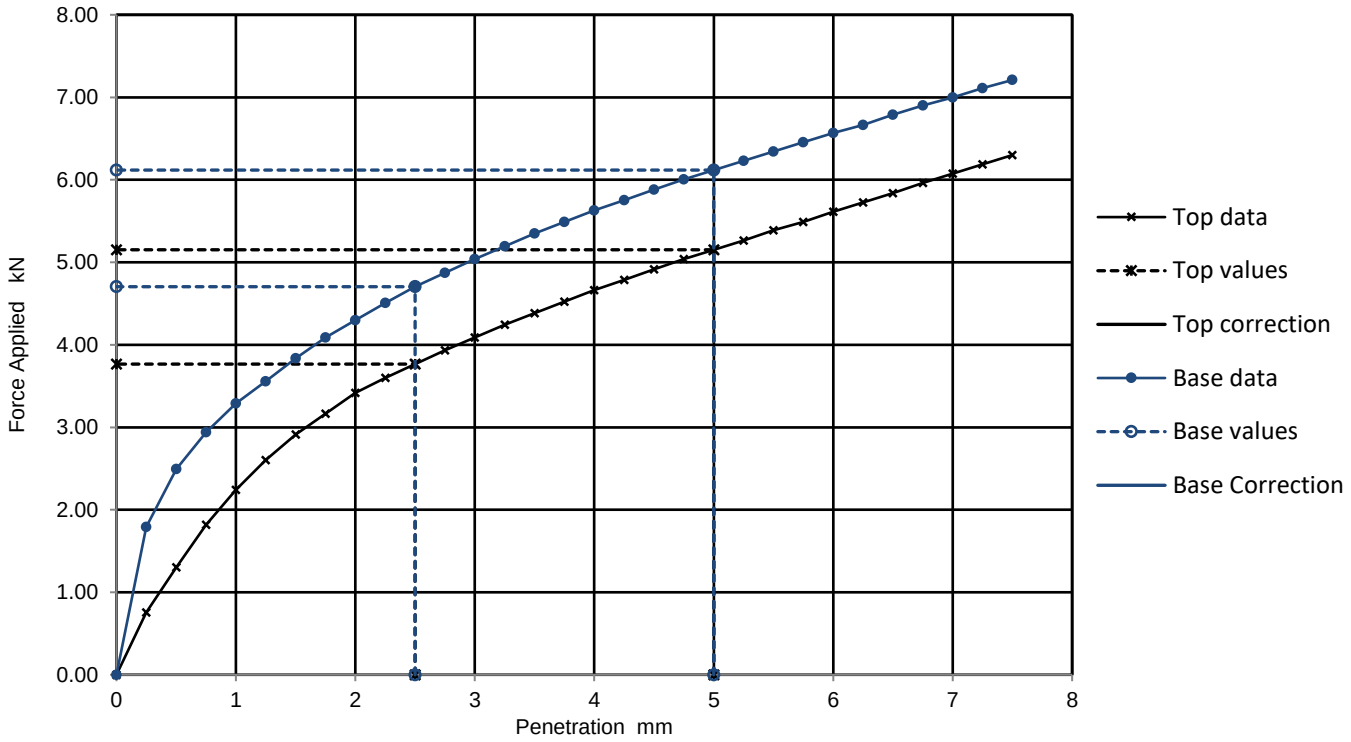
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly clayey, sandy SILT			KeyLAB ID	SLMK2017091356
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.02	Mg/m3	Surcharge applied	6	kg
	Dry density	1.84	Mg/m3		4	kPa
	Moisture content	9.7	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		29.0	26.0	29.0		10.1
BASE		36.0	31.0	36.0		9.7

General remarks	Test specific remarks	Approved
Tested at 10% Moisture Content : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	13

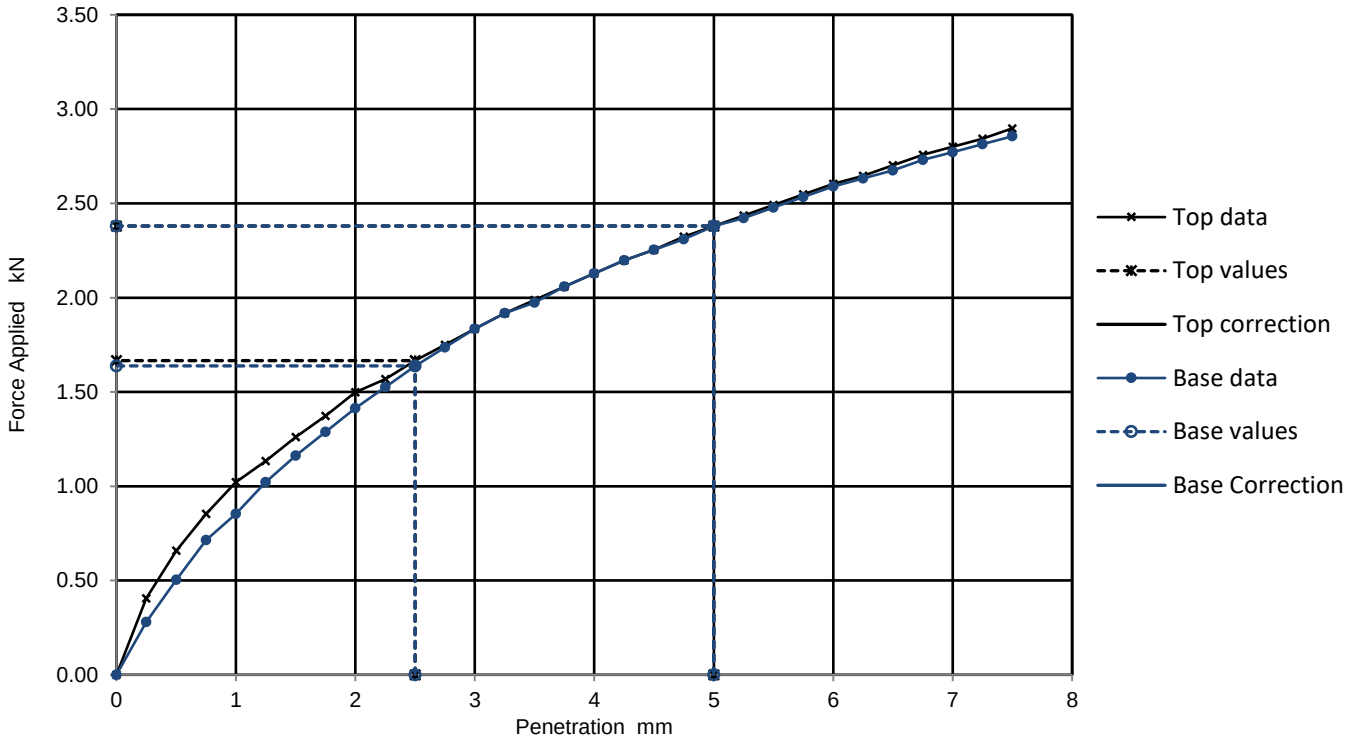
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	4	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly clayey, sandy SILT			KeyLAB ID	SLMK2017091356
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.12	Mg/m3	Surcharge applied	6	kg
	Dry density	1.83	Mg/m3		4	kPa
	Moisture content	15.7	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		13.0	12.0	13.0	13.0	15.7
BASE		12.0	12.0	12.0		15.6

General remarks	Test specific remarks	Approved
Tested at 16% Moisture Content : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	14

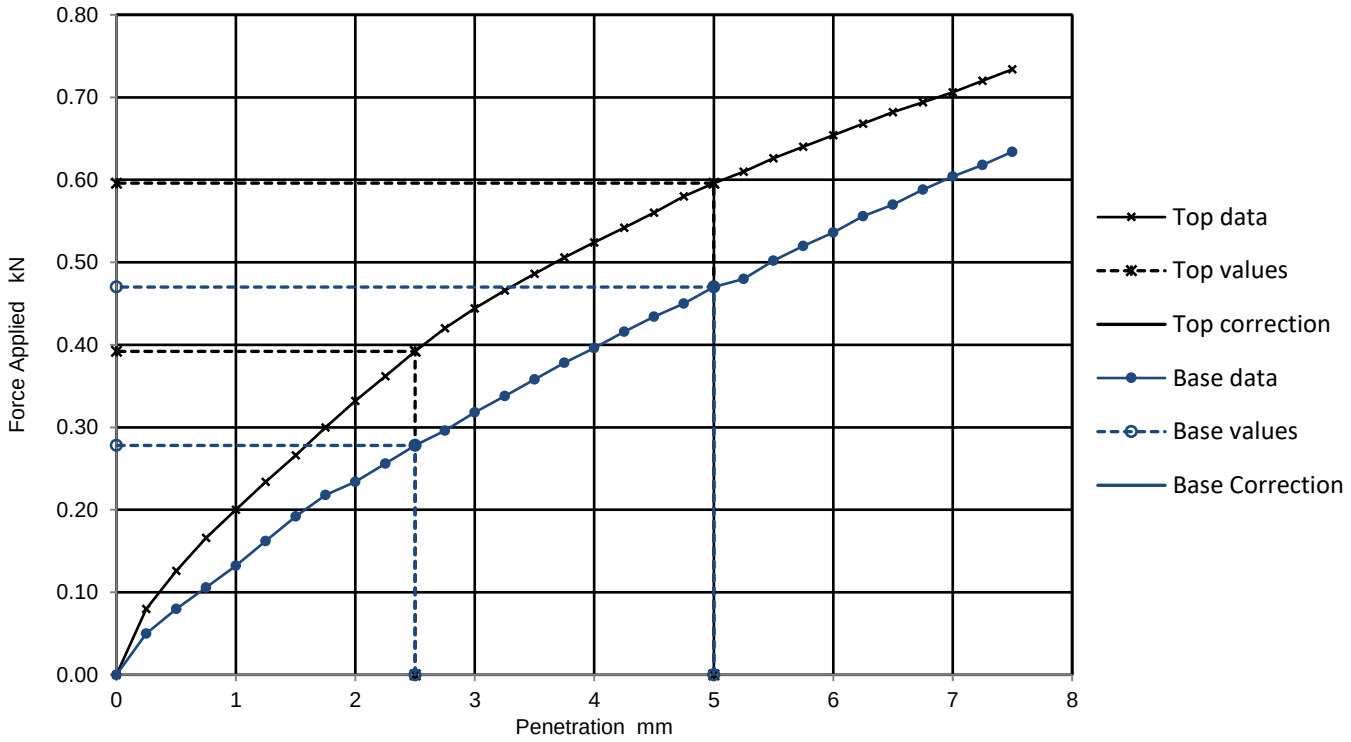
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	5	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly clayey, sandy SILT			KeyLAB ID	SLMK2017091356
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.07	Mg/m3	Surcharge applied	6	kg
	Dry density	1.73	Mg/m3		4	kPa
	Moisture content	19.6	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		3.0	3.0	3.0		19.8
BASE		2.1	2.4	2.4		19.6

General remarks	Test specific remarks	Approved
Tested at 20% Moisture Content (Natural) : HV 51kPa (top) & 53kPa (base)		KW

Fig No.	1
Sheet No	15

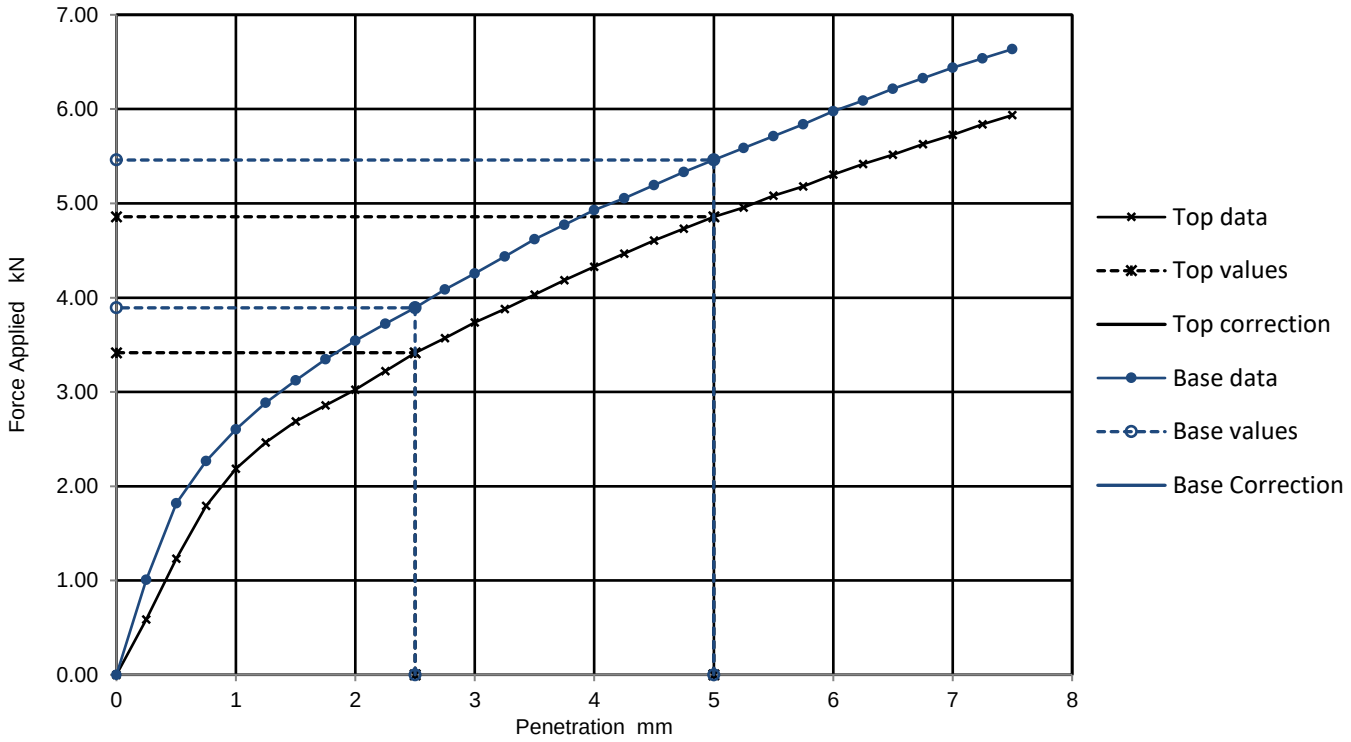
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP19
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	1	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, slightly sandy, clayey SILT			KeyLAB ID	SLMK2017091369
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.78	Mg/m3	Surcharge applied	6	kg
	Dry density	1.64	Mg/m3		4	kPa
	Moisture content	8.3	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		26.0	24.0	26.0	28.0	8.1
BASE		29.0	27.0	29.0		

General remarks	Test specific remarks	Approved
Tested at 8% Moisture Content HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	26

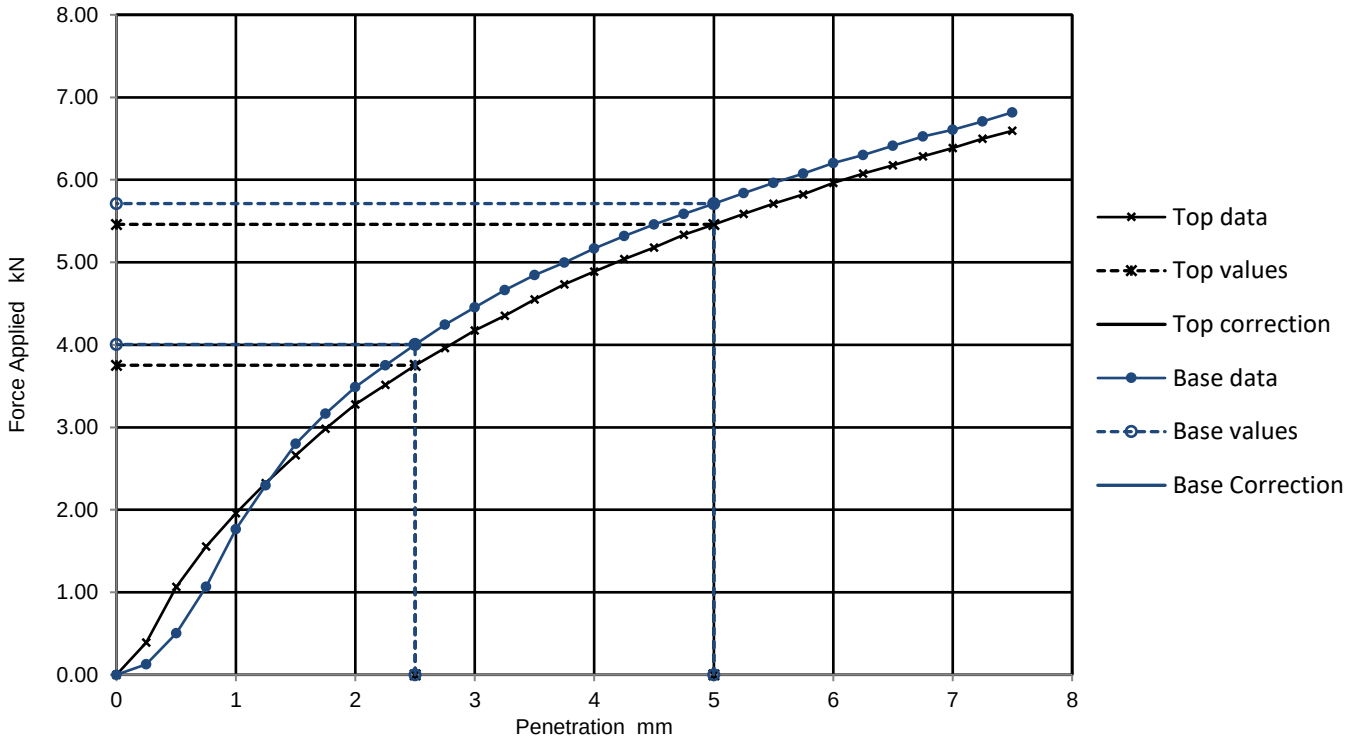
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP19
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	2	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, slightly sandy, clayey SILT			KeyLAB ID	SLMK2017091369
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.94	Mg/m3	Surcharge applied	6	kg
	Dry density	1.75	Mg/m3		4	kPa
	Moisture content	11.1	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		28.0	27.0	28.0	29.0	10.6
BASE		30.0	29.0	30.0		10.6

General remarks	Test specific remarks	Approved
Tested at 11% Moisture Content HV : 120 kPa (top & base)		KW

Fig No.	1
Sheet No	27

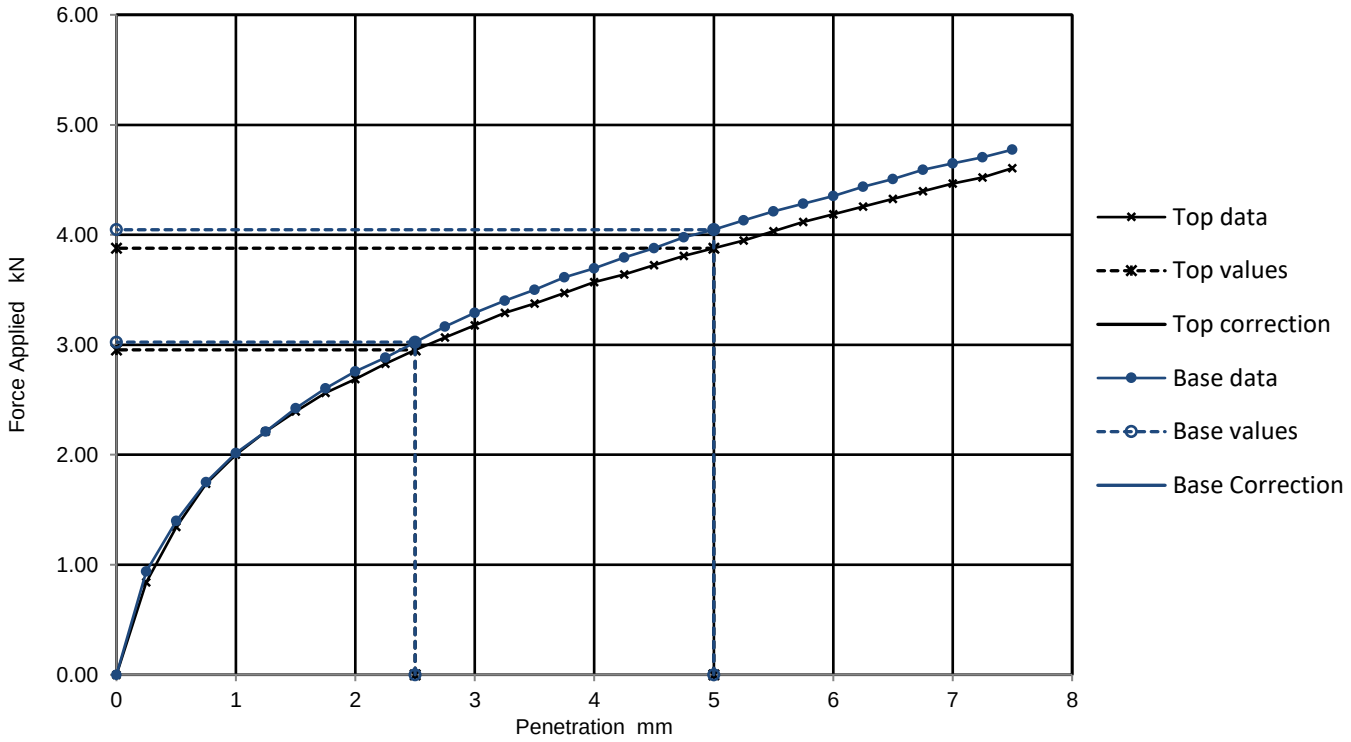
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP19
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly grvelly, slightly sandy, clayey SILT			KeyLAB ID	SLMK2017091369
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.01	Mg/m3	Surcharge applied	6	kg
	Dry density	1.78	Mg/m3		4	kPa
	Moisture content	12.8	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		22.0	19.0	22.0	23.0	12.7
BASE		23.0	20.0	23.0		12.9

General remarks	Test specific remarks	Approved
Tested at 13% Moisture Content HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	28

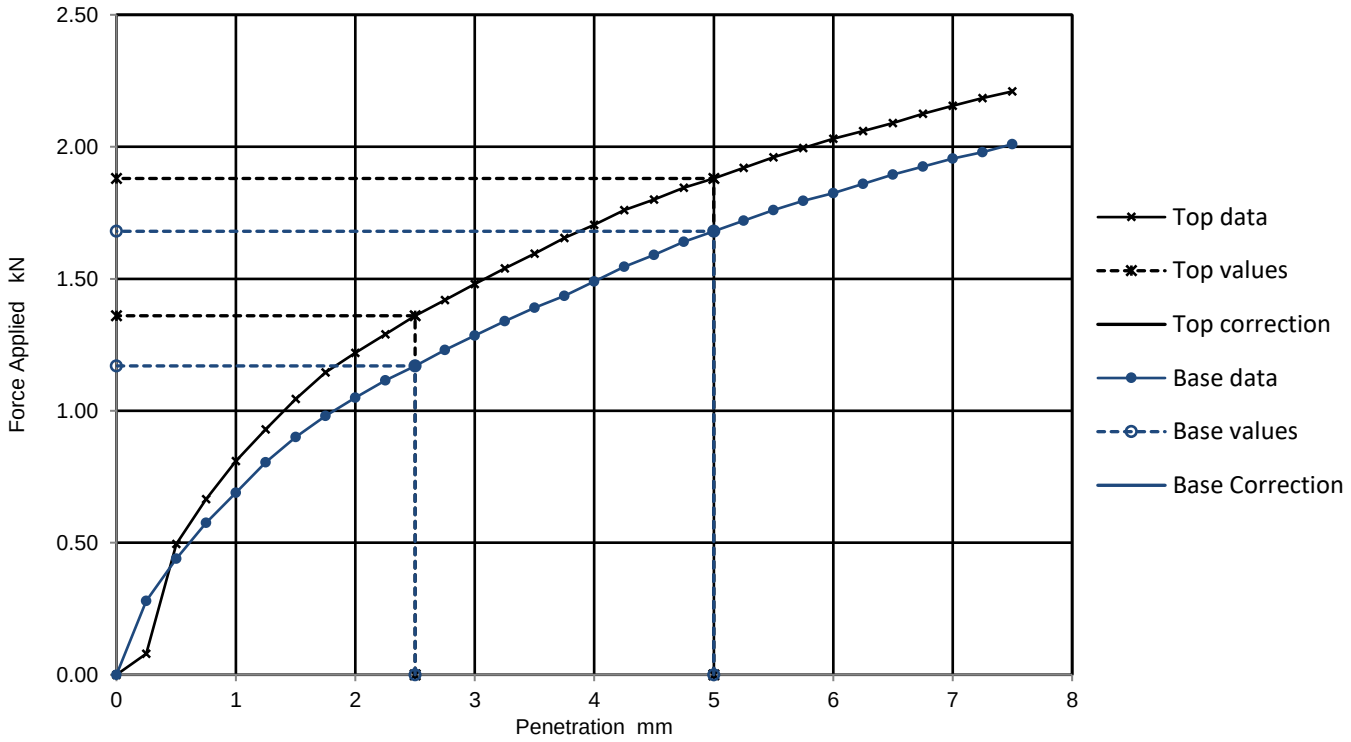
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP19
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	4	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, slightlys andy, clayey SILT			KeyLAB ID	SLMK2017091369
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.05	Mg/m3	Surcharge applied	6	kg
	Dry density	1.72	Mg/m3		4	kPa
	Moisture content	19.0	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		10.0	9.4	10.0	9.6	19.3
BASE		8.9	8.4	8.9		18.8

General remarks	Test specific remarks	Approved
Tested at 19% Moisture Content (Natural) HV 112 kPa (base) & 118 kPa (top)		KW

Fig No.	1
Sheet No	29

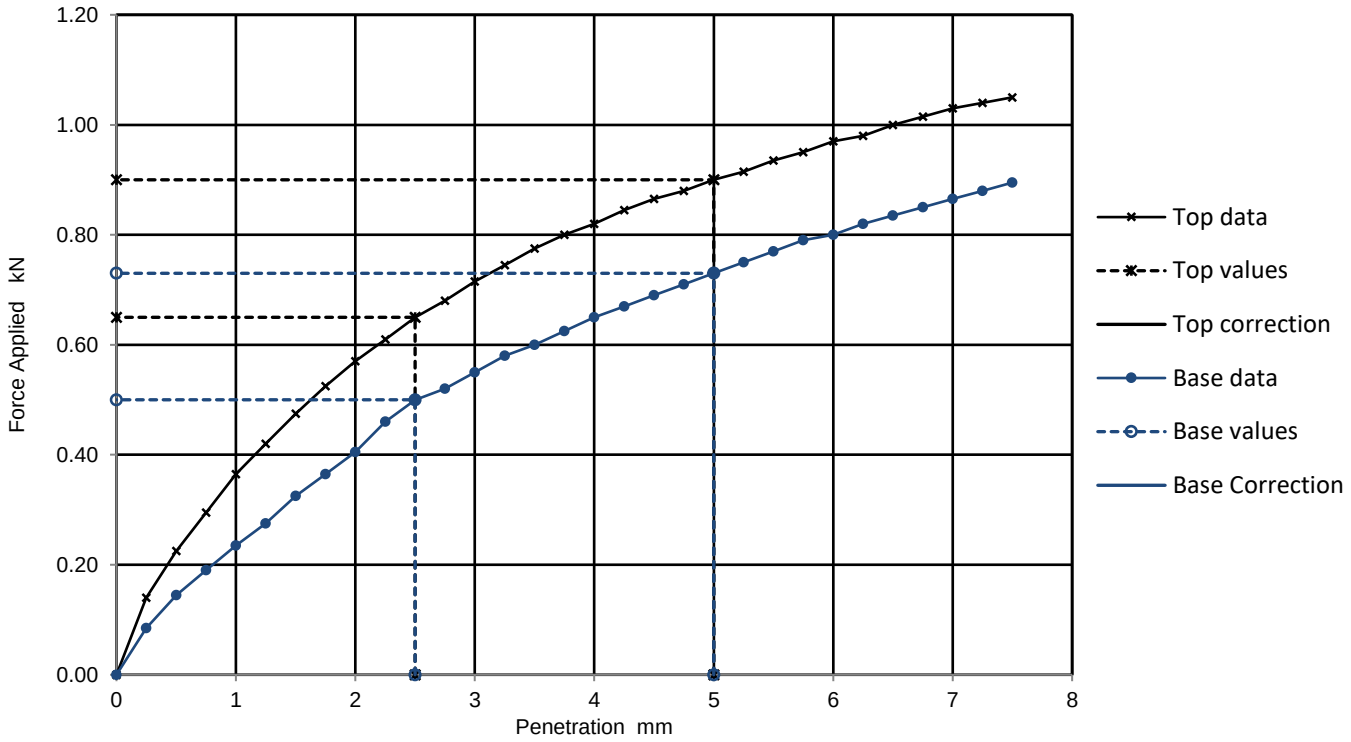
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP19
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.50
Specimen Reference	5	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, slightly sandy, clayey SILT			KeyLAB ID	SLMK2017091369
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.04	Mg/m3	Surcharge applied	6	kg
	Dry density	1.67	Mg/m3		4	kPa
	Moisture content	22.2	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		4.9	4.5	4.9		22.2
BASE		3.8	3.7	3.8		21.8

General remarks	Test specific remarks	Approved
Tested at 22% Moisture Content HV : 65kPa (top) & 64 kPa (base)		KW

Fig No.	1
Sheet No	30

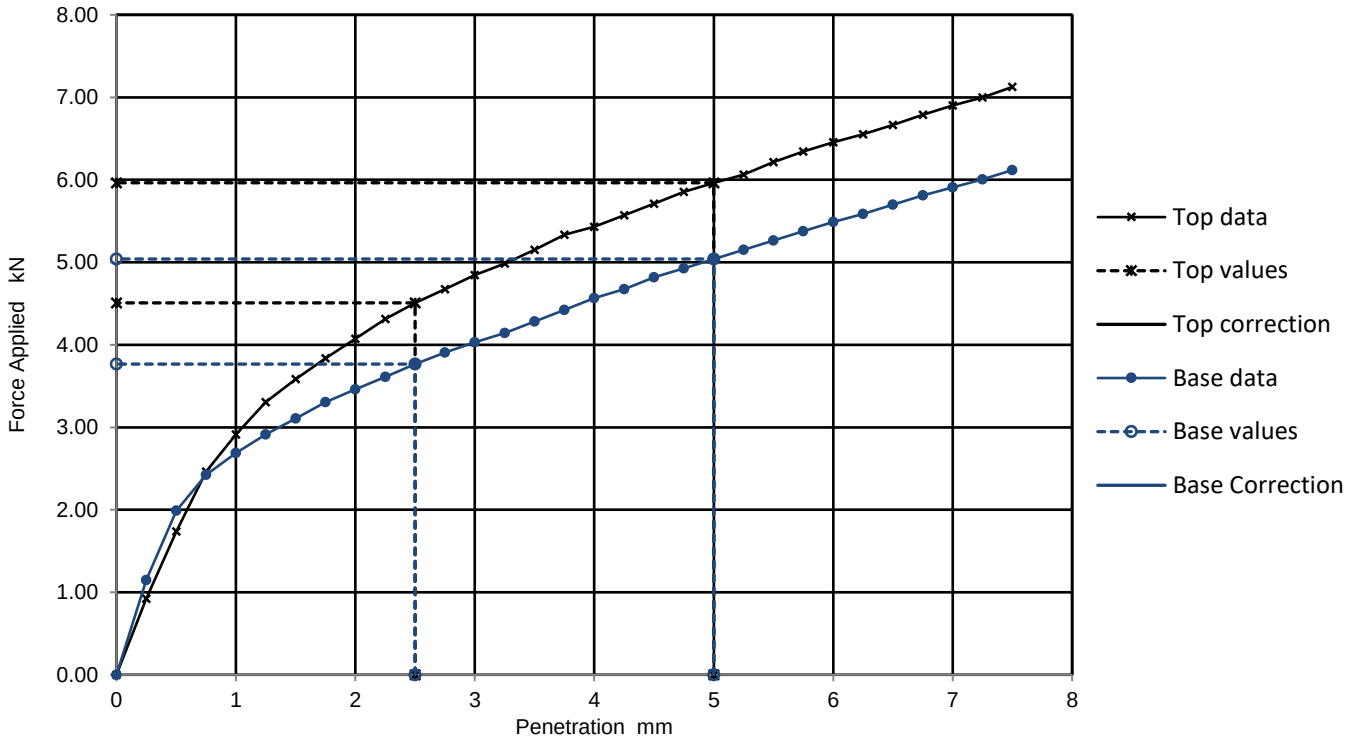
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.60
Specimen Reference	1	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, silty SAND			KeyLAB ID	SLMK2017091388
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.70	Mg/m3	Surcharge applied	6	kg
	Dry density	1.57	Mg/m3		4	kPa
	Moisture content	8.4	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		34.0	30.0	34.0	31.0	8.5
BASE		29.0	25.0	29.0		8.2

General remarks	Test specific remarks	Approved
Tested at 9% Moisture Content : HV: 120+ kPa 9top & base)		KW

Fig No.	1
Sheet No	36

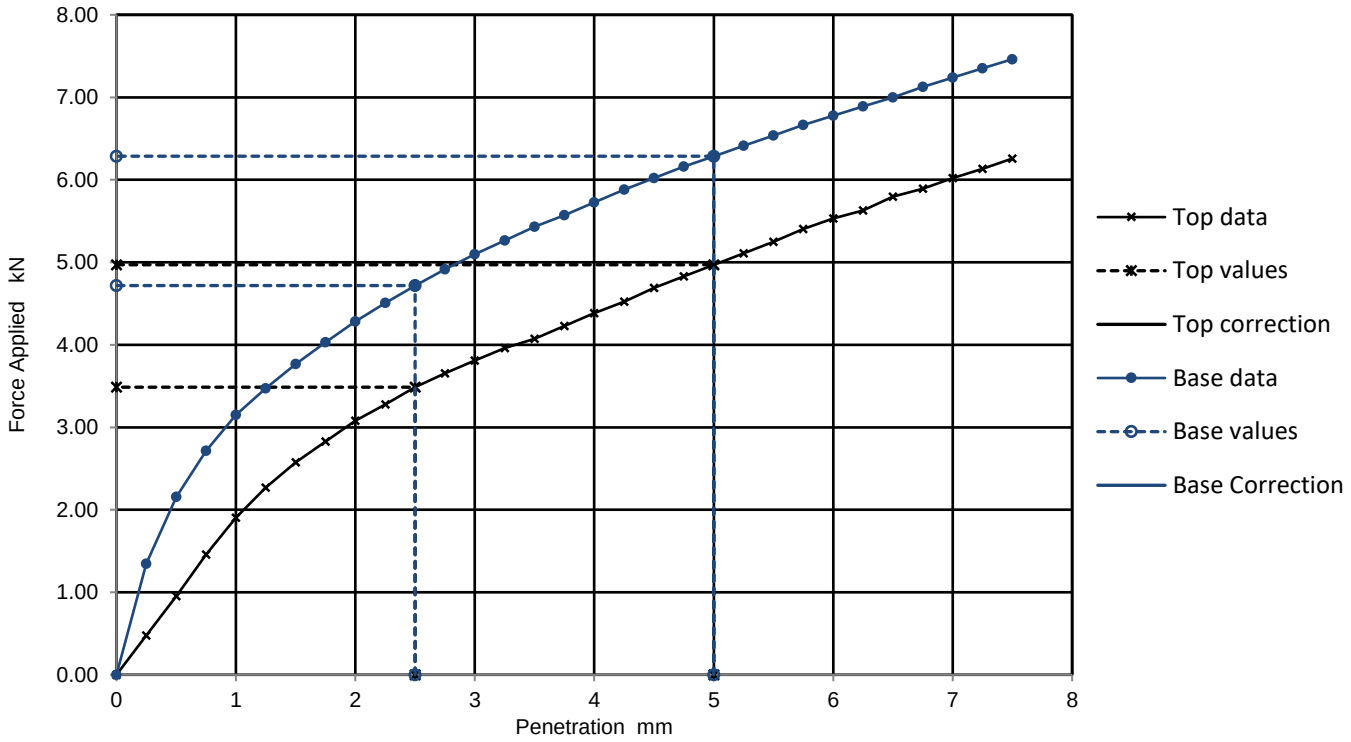
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.60
Specimen Reference	2	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, silty SAND			KeyLAB ID	SLMK2017091388
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.90	Mg/m3	Surcharge applied	6	kg
	Dry density	1.68	Mg/m3		4	kPa
	Moisture content	12.8	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		26.0	25.0	26.0		12.5
BASE		36.0	31.0	36.0		12.7

General remarks	Test specific remarks	Approved
Tested at 13% Natural Moisture HV : 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	37

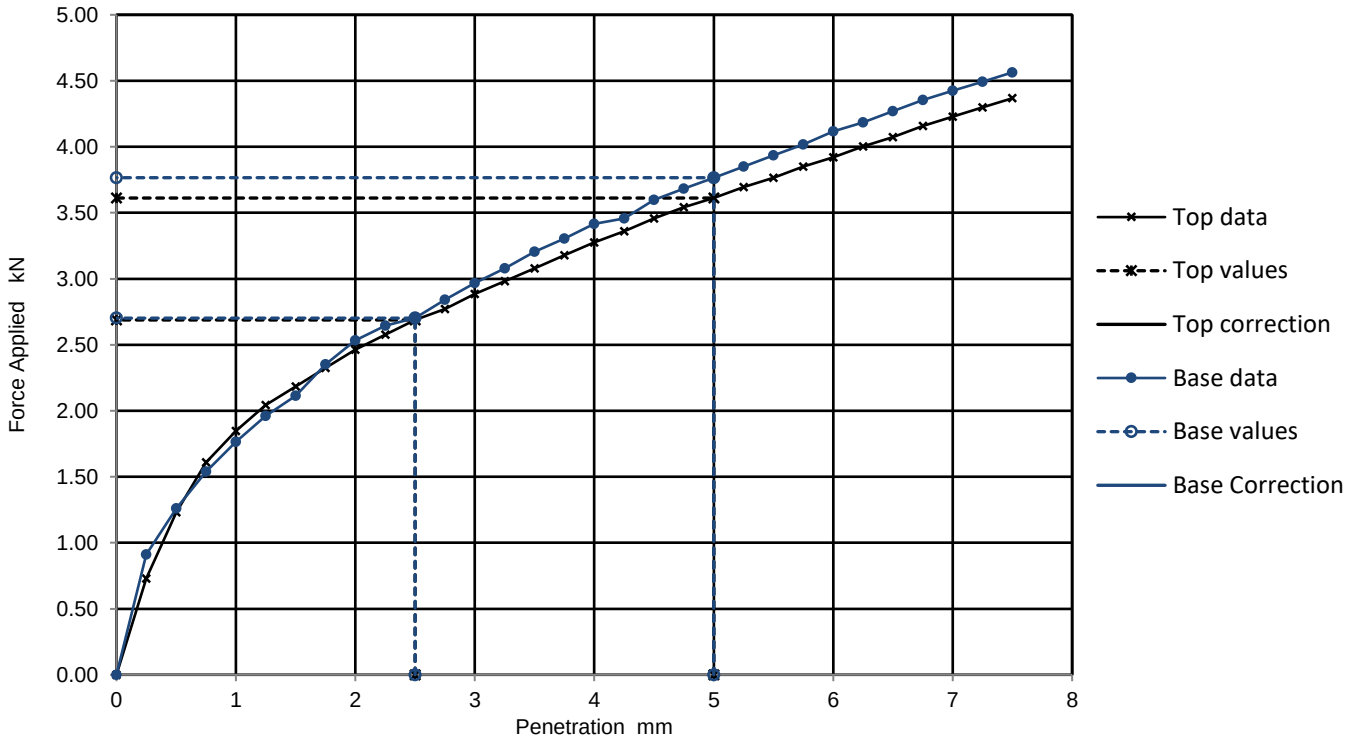
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.60
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, silty SAND			KeyLAB ID	SLMK2017091388
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.97	Mg/m3	Surcharge applied	6	kg
	Dry density	1.68	Mg/m3		4	kPa
	Moisture content	17.1	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		20.0	18.0	20.0	20.0	16.3
BASE		20.0	19.0	20.0		16.5

General remarks	Test specific remarks	Approved
Tested at 17% Moisture Content HV: 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	38

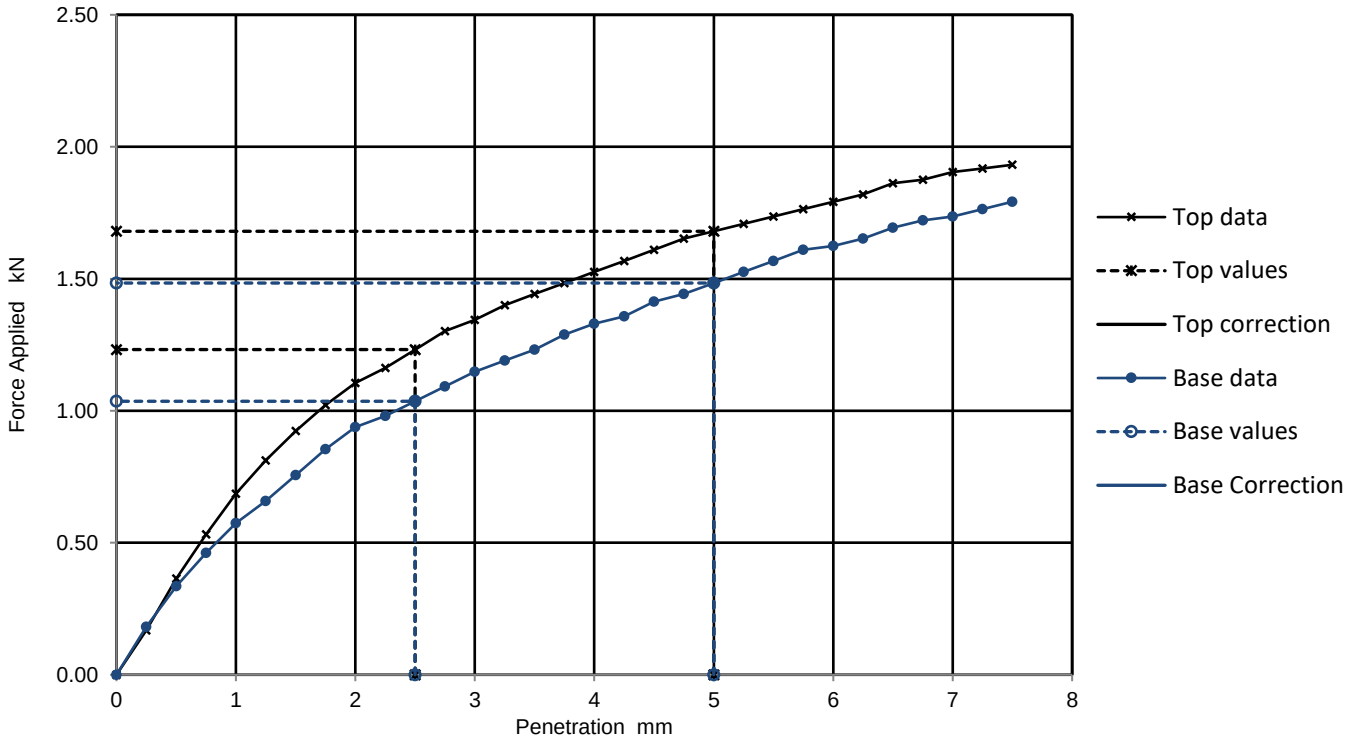
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.60
Specimen Reference	4	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, silty SAND			KeyLAB ID	SLMK2017091388
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.04	Mg/m3	Surcharge applied	6	kg
	Dry density	1.69	Mg/m3		4	kPa
	Moisture content	20.9	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		9.3	8.4	9.3	8.6	21.1
BASE		7.8	7.4	7.8		20.9

General remarks	Test specific remarks	Approved
Tested at 21% Moisture Content (Natural) : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	39

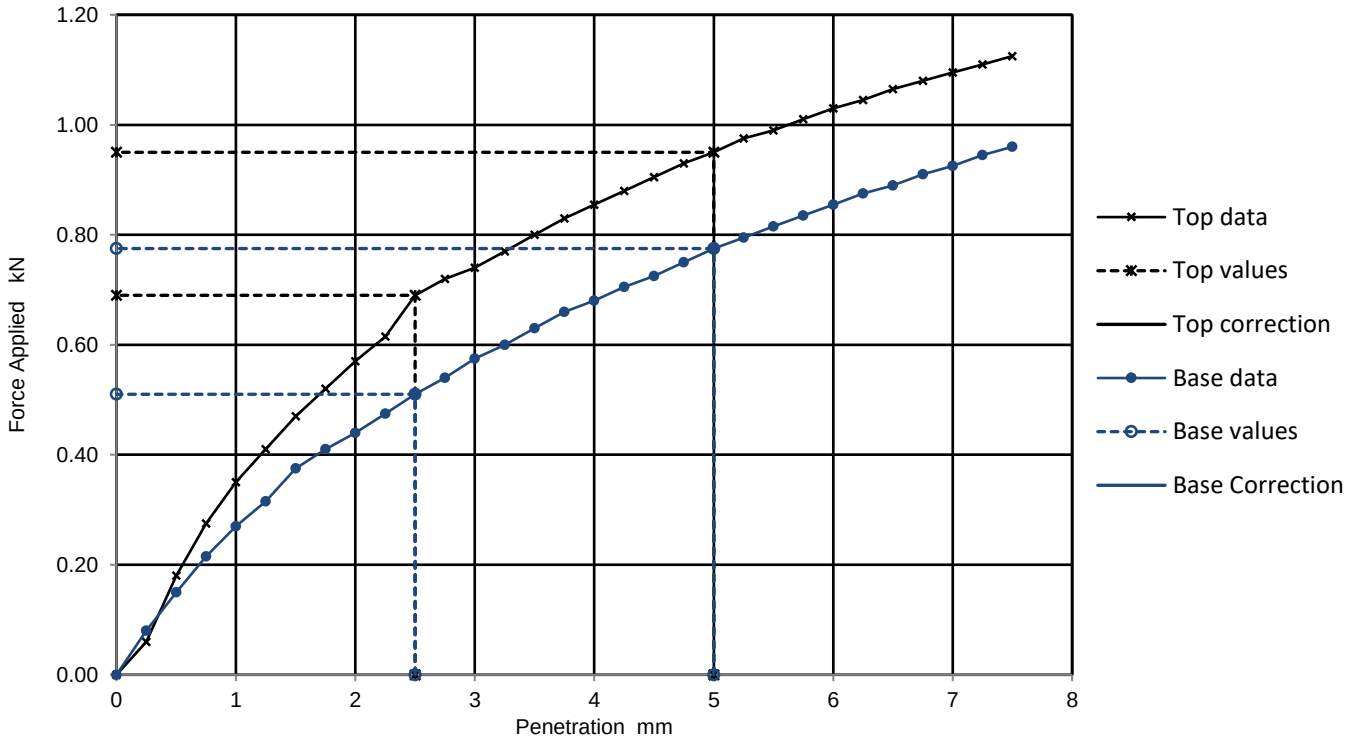
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	0.60
Specimen Reference	5	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, silty SAND			KeyLAB ID	SLMK2017091388
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.98	Mg/m3	Surcharge applied	6	kg
	Dry density	1.60	Mg/m3		4	kPa
	Moisture content	23.6	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		5.2	4.8	5.2		23.2
BASE		3.9	3.9	3.9		24.0

General remarks	Test specific remarks	Approved
Tested at 24% Moisture Content HV: Top (66 kPa) & base (69 kPa)		KW

Fig No.	1
Sheet No	5

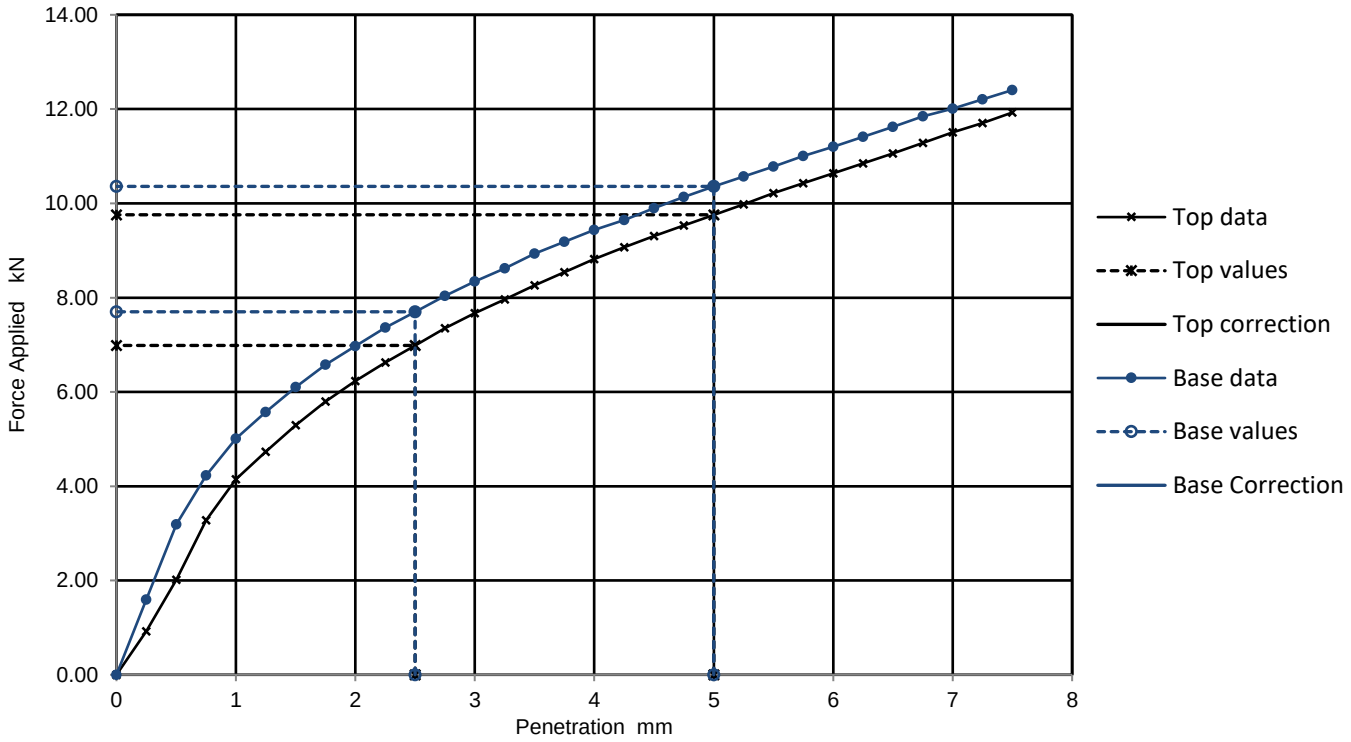
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	1	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, sandy, clayey SILT			KeyLAB ID	SLMK2017091391
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.81	Mg/m3	Surcharge applied	6	kg
	Dry density	1.72	Mg/m3		4	kPa
	Moisture content	5.0	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		53.0	49.0	53.0	56.0	5.4
BASE		58.0	52.0	58.0		5.0

General remarks	Test specific remarks	Approved
Tested at 5% Moisture Content : HV 120+ (top & base)		KW

Fig No.	1
Sheet No	41

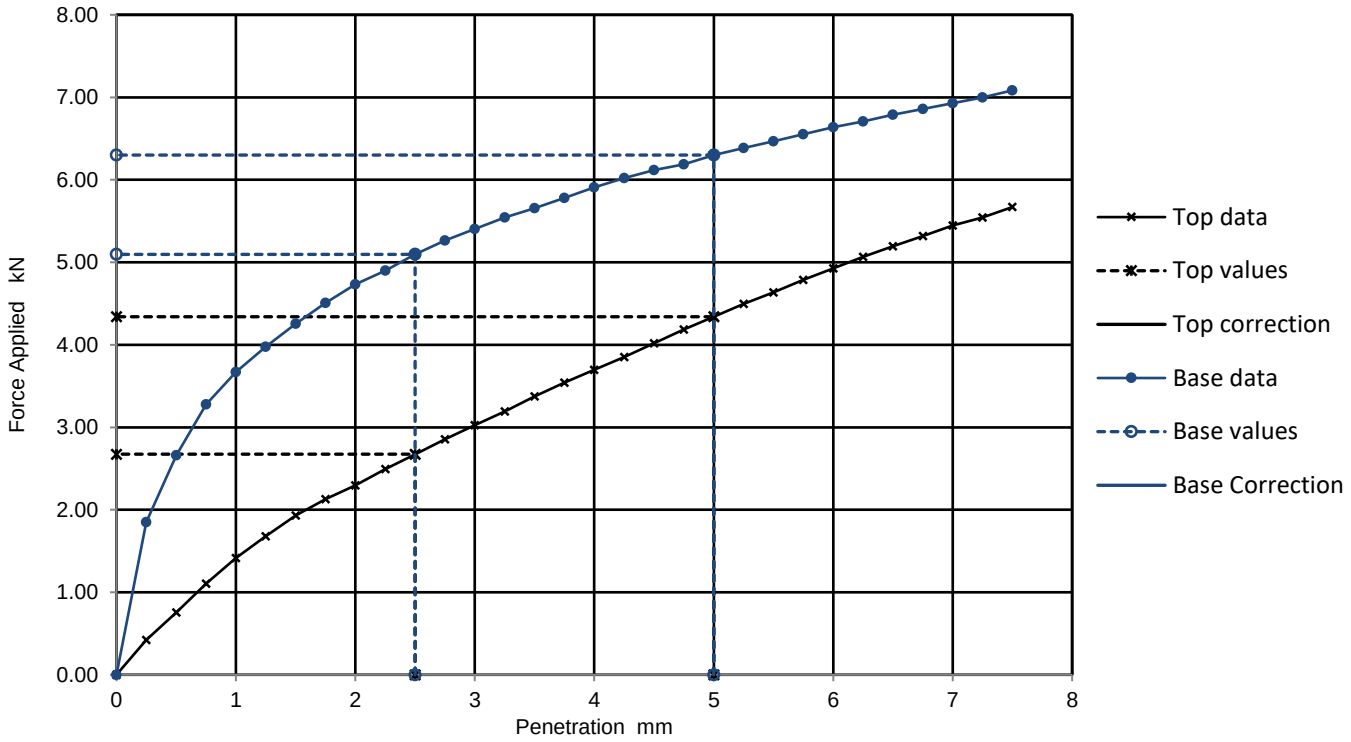
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	2	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, sandy, clayey SILT			KeyLAB ID	SLMK2017091391
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.78	Mg/m3	Surcharge applied	6	kg
	Dry density	1.66	Mg/m3		4	kPa
	Moisture content	7.1	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		20.0	22.0	22.0		7.4
BASE		39.0	32.0	39.0		7.4

General remarks	Test specific remarks	Approved
Tested at 7% Moisture Content : HV : 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	42

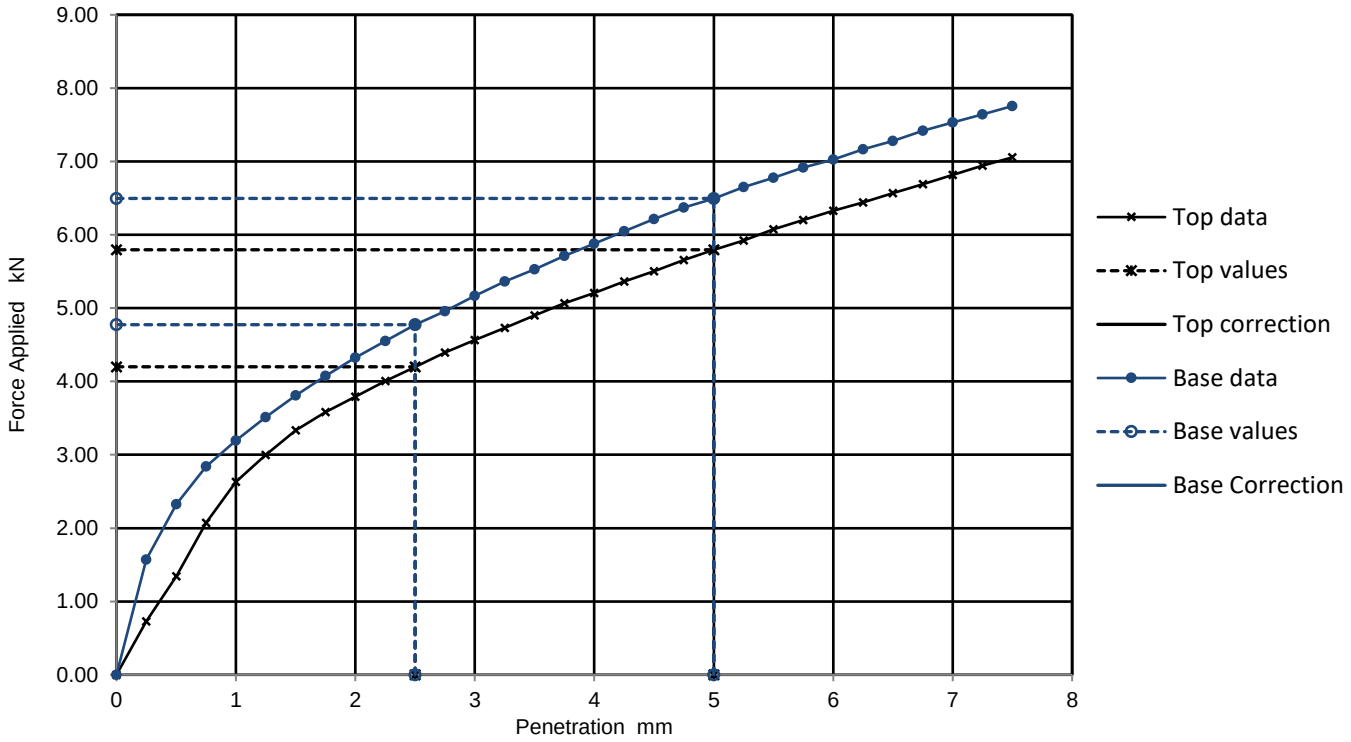
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, sandy, clayey SILT			KeyLAB ID	SLMK2017091391
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.94	Mg/m3	Surcharge applied	6	kg
	Dry density	1.76	Mg/m3		4	kPa
	Moisture content	10.3	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		32.0	29.0	32.0	34.0	10.0
BASE		36.0	32.0	36.0		9.5

General remarks	Test specific remarks	Approved
Tested at 10% Moisture Content : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	43

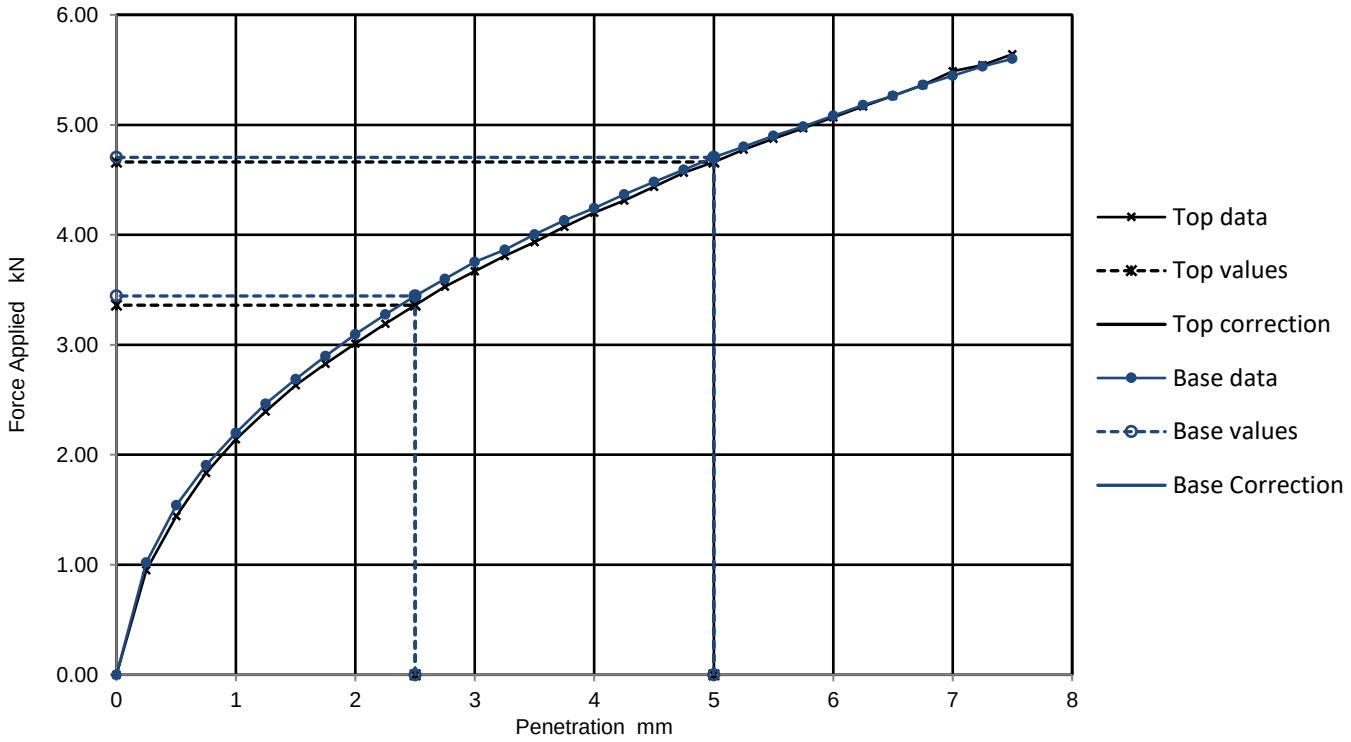
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	4	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, sandy, clayey SILT			KeyLAB ID	SLMK2017091391
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.00	Mg/m3	Surcharge applied	6	kg
	Dry density	1.77	Mg/m3		4	kPa
	Moisture content	12.7	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		25.0	23.0	25.0	26.0	12.7
BASE		26.0	24.0	26.0		11.9

General remarks	Test specific remarks	Approved
Tested at 13% Moisture Content : HV 120+ kPa (top & base)		KW

Fig No.	1
Sheet No	44

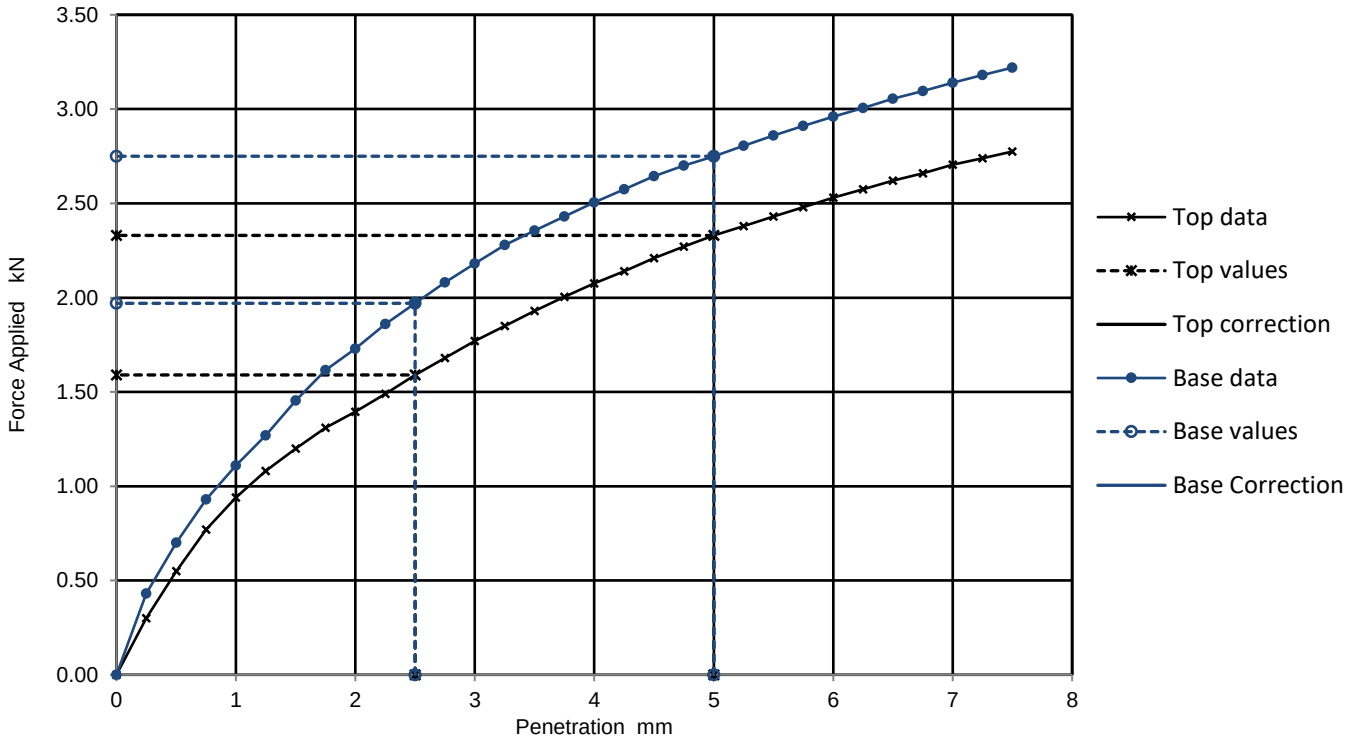
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth m	1.50
Specimen Reference	5	Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightkly gravelly, sandy, clayey SILT			KeyLAB ID	SLMK2017091391
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.05	Mg/m3	Surcharge applied	6	kg
	Dry density	1.77	Mg/m3		4	kPa
	Moisture content	15.9	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		12.0	12.0	12.0		16.8
BASE		15.0	14.0	15.0		16.0

General remarks	Test specific remarks	Approved
Tested at 16% Moisture Content (Natural) : HV 120 + kPa (top & base)		KW

Fig No.	1
Sheet No	10

Lab Sheet Reference :

	Moisture Condition Value / Moisture Content Relationship			Job Ref	D8044
				Borehole/Pit No.	TP10
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth	0.5
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091346
Test Method	BS1377:Part4:1990:clause 5.5			Date started	28/09/2017

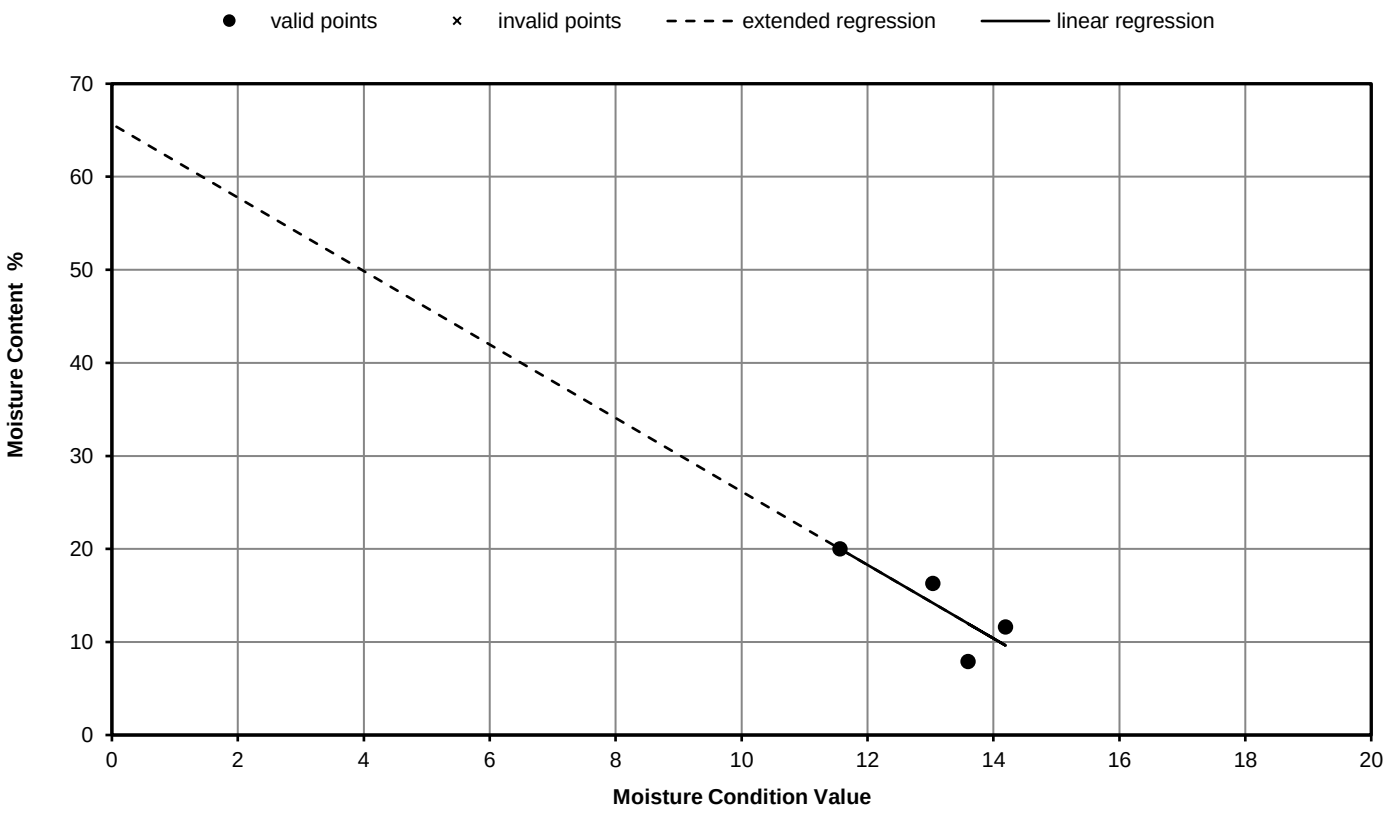
Sample preparation

Amount of material larger than 20mm sieve removed	0	%
Natural Moisture Content of sample	20	%
Initial Moisture Content of test sample below 20mm		%

General remarks

Table of results

MCV Test Number	1	2	3	4	5
Moisture Content, %	7.9	11.6	16.3	20.0	
Moisture Condition Value	13.6	14.2	13.0	11.6	6.0
MCV report	13.6	14.2	13	11.6	6
Effective / Valid data point	YES	YES	YES	YES	NO
Specimen remarks					



Tested	Checked	Approved
UM	KW	KW

	Moisture Condition Value / Moisture Content Relationship			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth	0.5
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, clayey, sandy SILT			KeyLAB ID	SLMK2017091353
Test Method	BS1377:Part4:1990:clause 5.5			Date started	28/09/2017

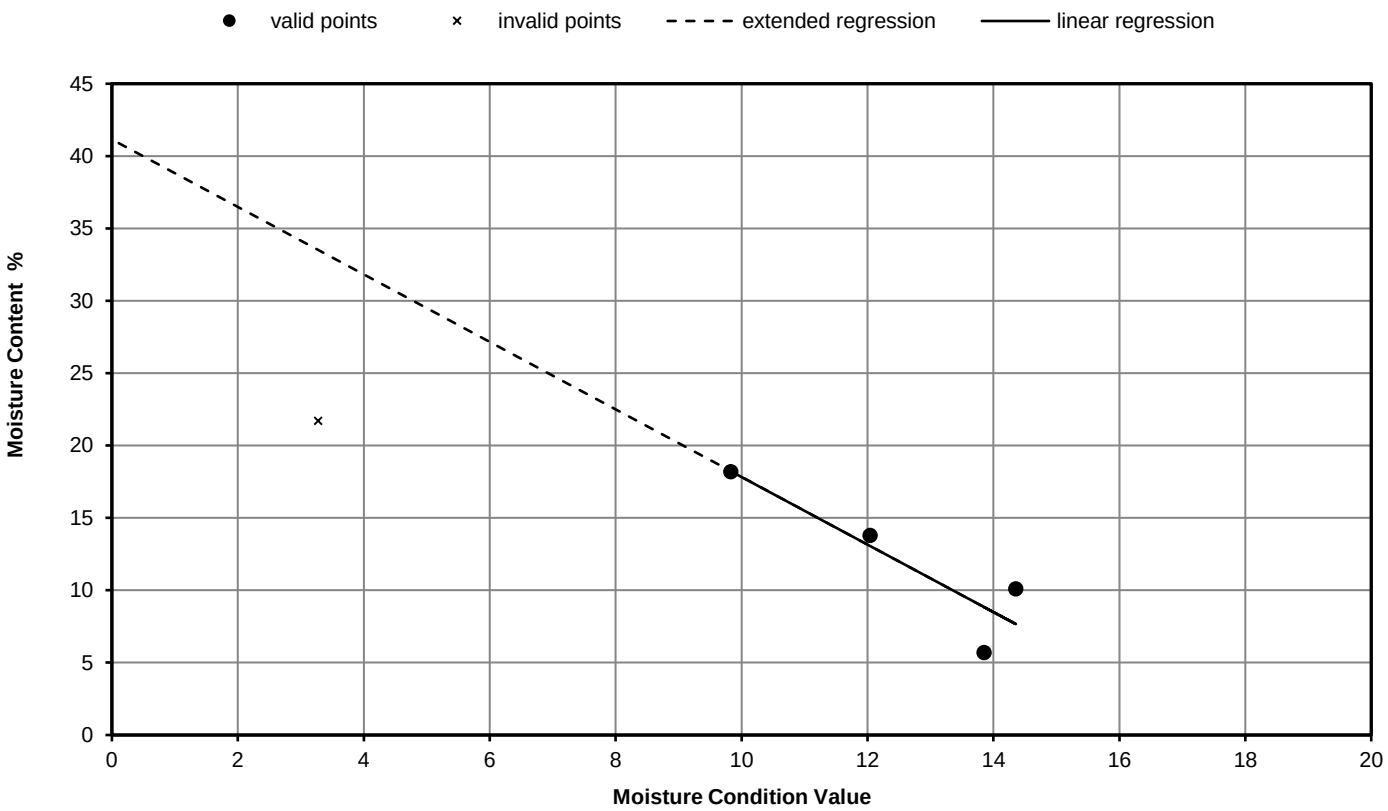
Sample preparation

Amount of material larger than 20mm sieve removed	0	%
Natural Moisture Content of sample	18	%
Initial Moisture Content of test sample below 20mm		%

General remarks

Table of results

MCV Test Number	1	2	3	4	5
Moisture Content, %	5.7	10.1	13.8	18.2	21.7
Moisture Condition Value	13.8	14.4	12.0	9.8	3.3
MCV report	13.8	14.4	12	9.8	3.3
Effective / Valid data point	YES	YES	YES	YES	NO
Specimen remarks					



Tested	Checked	Approved
M.Southgate	KW	KW

	Moisture Condition Value / Moisture Content Relationship			Job Ref	D8044
				Borehole/Pit No.	TP13
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth	1.5
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly clayey, sandy SILT			KeyLAB ID	SLMK2017091356
Test Method	BS1377:Part4:1990:clause 5.5			Date started	29/09/2017

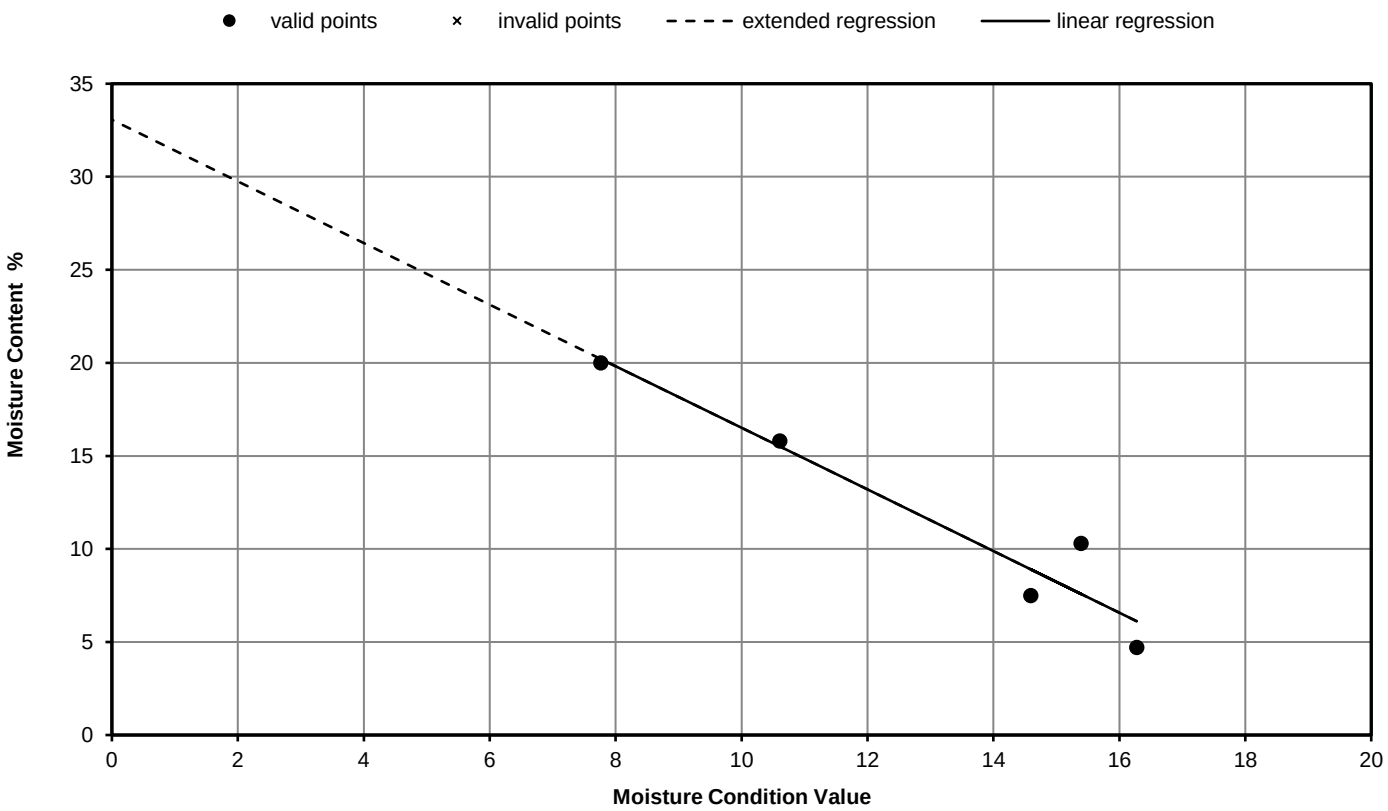
Sample preparation

Amount of material larger than 20mm sieve removed	0	%
Natural Moisture Content of sample	20	%
Initial Moisture Content of test sample below 20mm		%

General remarks

Table of results

MCV Test Number	1	2	3	4	5
Moisture Content, %	4.7	7.5	10.3	15.8	20.0
Moisture Condition Value	16.3	14.6	15.4	10.6	7.8
MCV report	16.3	14.6	15.4	10.6	7.8
Effective / Valid data point	YES	YES	YES	YES	YES
Specimen remarks					



Tested	Checked	Approved
M.Southgate	KW	KW

	Moisture Condition Value / Moisture Content Relationship			Job Ref	D8044
				Borehole/Pit No.	TP19
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth	0.5
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, slightly sandy, clayey SILT			KeyLAB ID	SLMK2017091369
Test Method	BS1377:Part4:1990:clause 5.5			Date started	

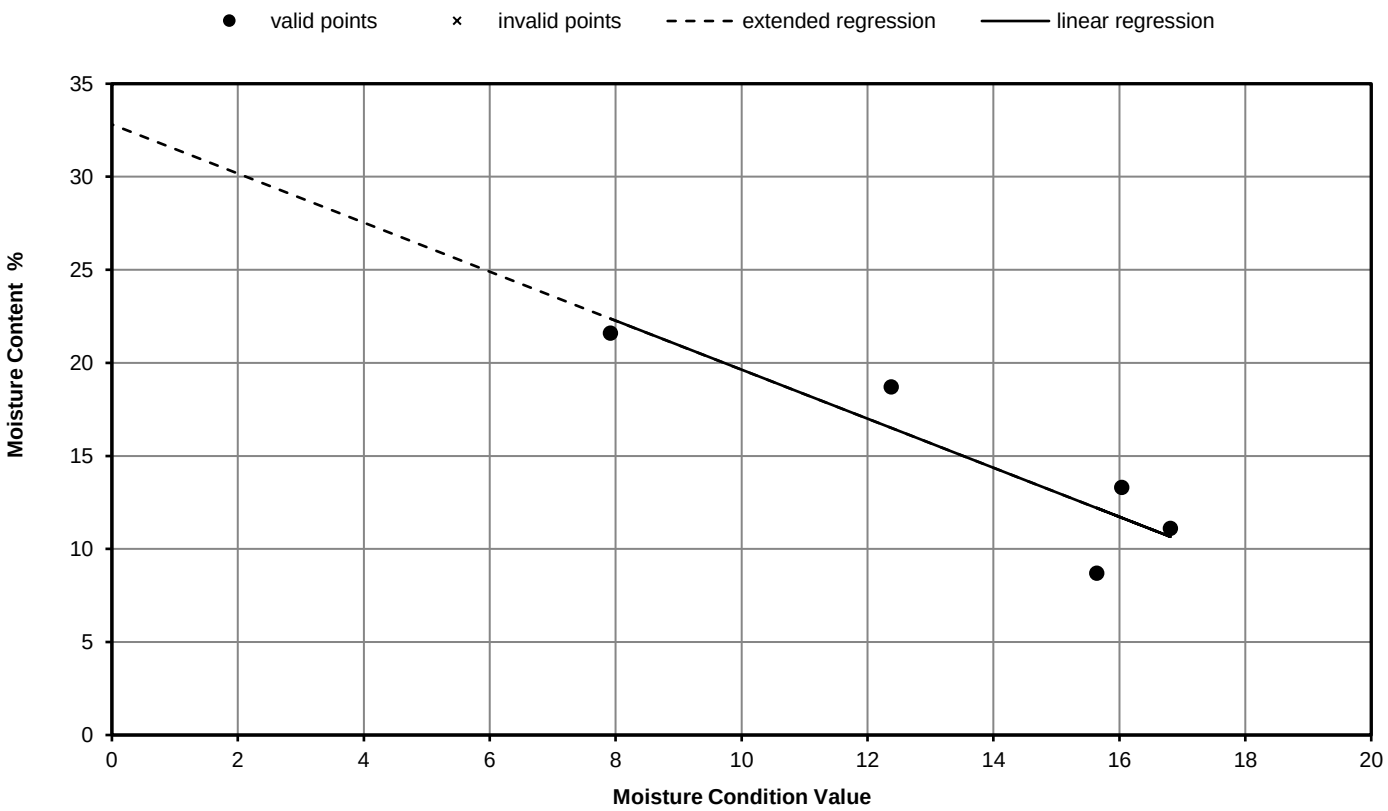
Sample preparation

Amount of material larger than 20mm sieve removed	0	%
Natural Moisture Content of sample	19	%
Initial Moisture Content of test sample below 20mm		%

General remarks

Table of results

MCV Test Number	1	2	3	4	5
Moisture Content, %	8.7	11.1	13.3	18.7	21.6
Moisture Condition Value	15.6	16.8	16.0	12.4	7.9
MCV report	15.6	16.8	16	12.4	7.9
Effective / Valid data point	YES	YES	YES	YES	YES
Specimen remarks					



Tested	Checked	Approved
M.Southgate	KW	KW

	Moisture Condition Value / Moisture Content Relationship			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth	0.6
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightlty gravell, clayey, silty SAND			KeyLAB ID	SLMK2017091388
Test Method	BS1377:Part4:1990:clause 5.5			Date started	

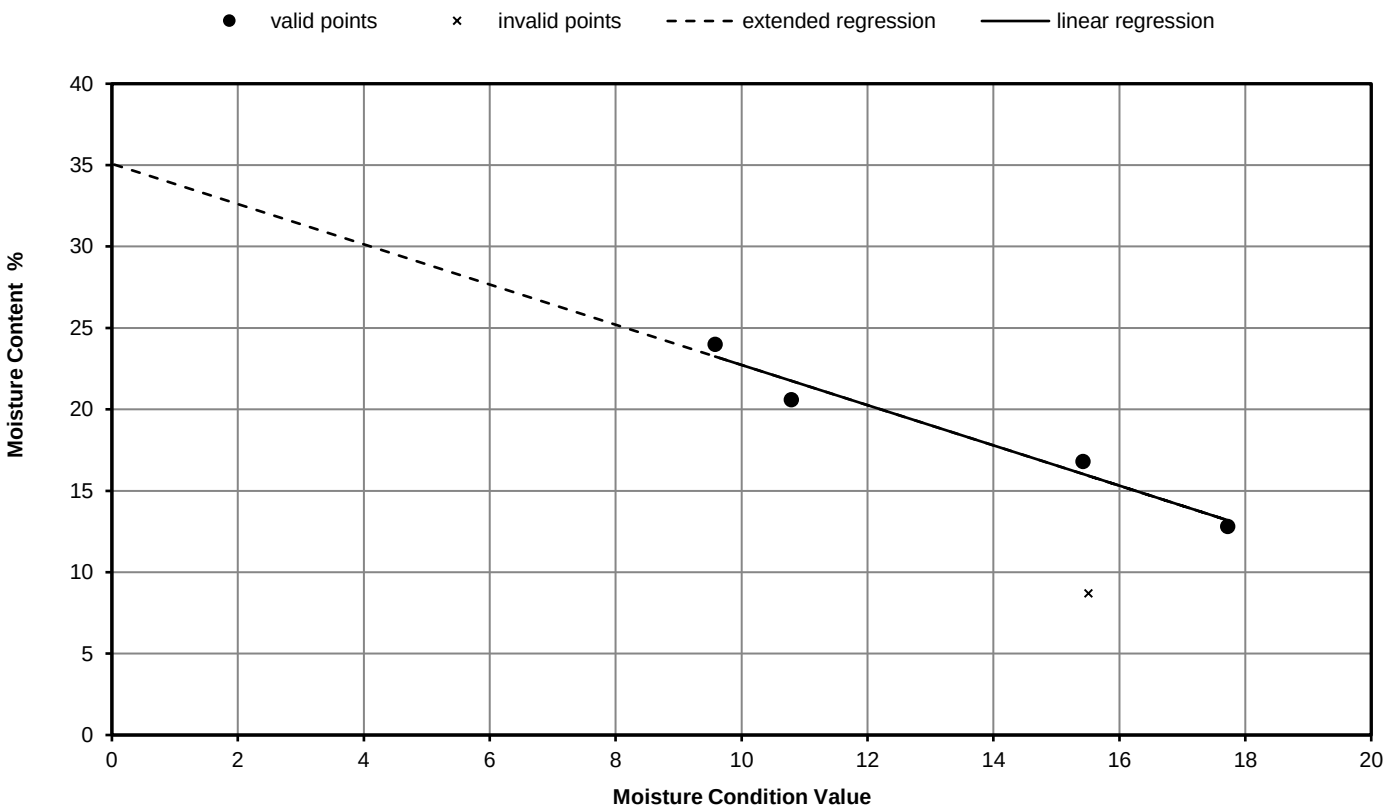
Sample preparation

Amount of material larger than 20mm sieve removed	0	%
Natural Moisture Content of sample	21	%
Initial Moisture Content of test sample below 20mm		%

General remarks

Table of results

MCV Test Number	1	2	3	4	5
Moisture Content, %	8.7	12.8	16.8	20.6	24.0
Moisture Condition Value	15.5	17.7	15.4	10.8	9.6
MCV report	15.5	17.7	15.4	10.8	9.6
Effective / Valid data point	NO	YES	YES	YES	YES
Specimen remarks					



Tested	Checked	Approved
UM	KW	KW

	Moisture Condition Value / Moisture Content Relationship			Job Ref	D8044
				Borehole/Pit No.	TP25
Site Name	IAMP Sunderland			Sample No.	
Soil Description				Depth	1.5
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown, slightly gravelly, sandy, clayey SILT			KeyLAB ID	SLMK2017091391
Test Method	BS1377:Part4:1990:clause 5.5			Date started	

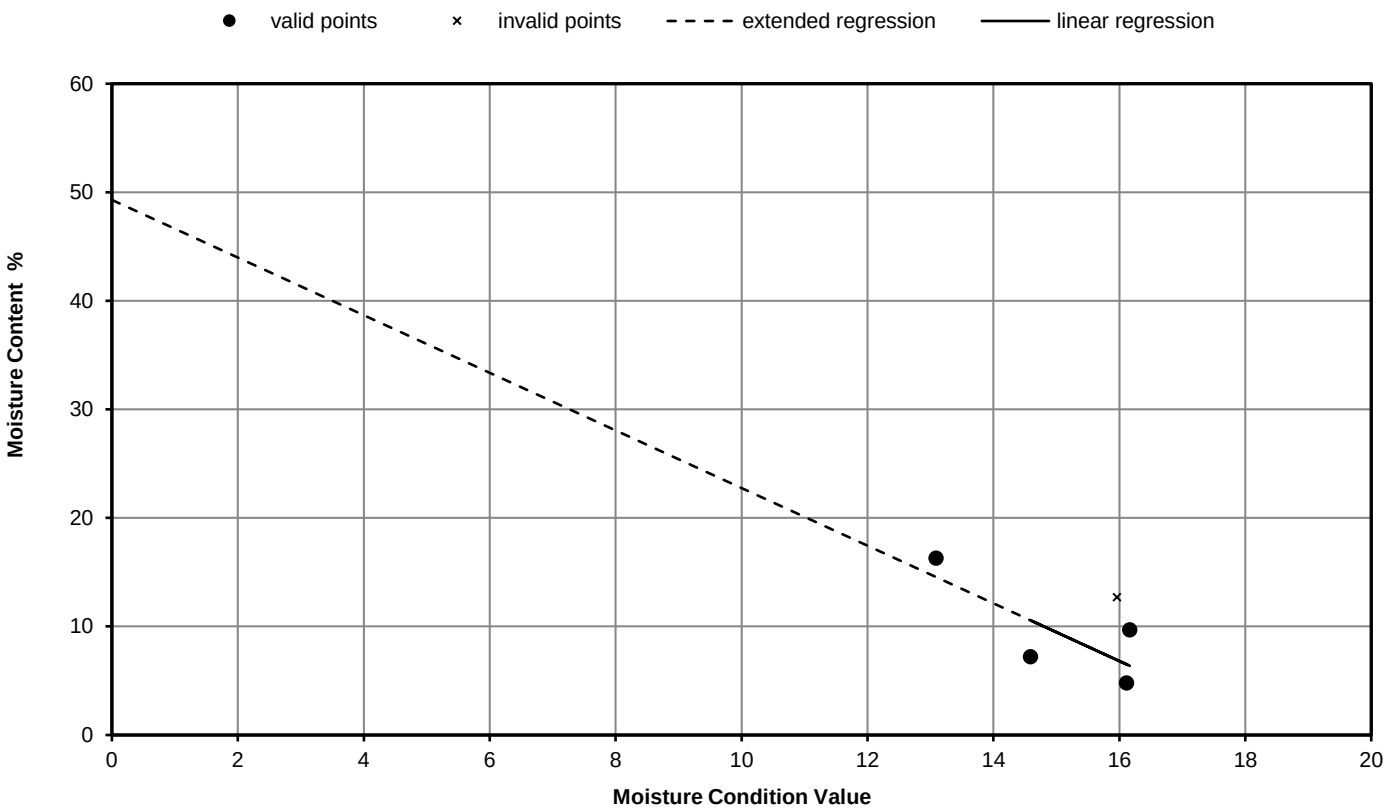
Sample preparation

Amount of material larger than 20mm sieve removed	0	%
Natural Moisture Content of sample	16	%
Initial Moisture Content of test sample below 20mm		%

General remarks

Table of results

MCV Test Number	1	2	3	4	5
Moisture Content, %	4.8	7.2	9.7	12.7	16.3
Moisture Condition Value	16.1	14.6	16.2	16.0	13.1
MCV report	16.1	14.6	16.2	16	13.1
Effective / Valid data point	YES	YES	YES	NO	YES
Specimen remarks					



Tested	Checked	Approved
UM	KW	KW

2531

ANALYTICAL TEST REPORT

Contract no: Collated report

Contract name: IAMP - Preliminary Ground Investigation

Client reference: D8044

Clients name: Solmek

Clients address: 12 Yarm Road
Stockton-on-Tees
TS18 3NA

Samples received: 24 August 2017, 31 August 2017, & 15 September 2017

Analysis started: 24 August 2017

Analysis completed 25 September 2017

Report issued: 07 February 2018

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by:
Dave Bowerbank
Customer Services Co-ordinator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
66843-1	BH24	0.50	Clay	-	-	22.6
66843-2	BH24	3.70	Clay	-	-	19.3
66843-3	BH24	7.70	Clay	-	-	23.0
66843-4	BH24	9.70	Silty Sand	-	-	20.0
66939-1	BH25	1.90	Clay	-	-	10.5
66843-5	BH25	4.50	Clay	-	-	17.8
66939-2	BH31	2.00	Clay	-	-	10.3
66843-8	BH31	0.80	Clay	-	-	19.5
66843-9	BH38	0.50	Clay with Gravel	-	-	12.7
66843-10	BH38	3.70	Silty Clay	-	-	19.4
67330-1	BH39	1.90	Clay	-	-	16.0
67330-2	BH39	3.50	Clay	-	-	22.5
67324-1	BH40	1.00	Sandy Clay	-	-	17.7
66843-11	BH45	1.70	Loamy Clay	-	-	14.2
66843-12	BH46	0.60	Sandy Clay with Gravel	-	-	14.1
66939-3	BH48	3.70	Clay	-	-	16.9
66843-13	BH48	1.90	Clay	-	-	18.7
67324-2	BH49	1.00	Clay	-	-	16.2
67324-3	BH49	2.70	Clay	-	-	15.6
67324-4	BH50	0.75	Clay	-	-	16.9
67330-3	TP10	1.00	Clay	-	-	16.9
67330-4	TP13	1.00	Clay with Gravel	-	-	13.3
67330-8	TP19	1.00	Sandy Clay with Gravel	-	-	15.0
67330-11	TP25	1.10	Sandy Clay with Gravel	-	-	13.5

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SOILS

Lab number			66843-1	66843-2	66843-3	66843-4	66939-1	66843-5
Sample id			BH24	BH24	BH24	BH24	BH25	BH25
Depth (m)			0.50	3.70	7.70	9.70	1.90	4.50
Date sampled			24/08/2017	24/08/2017	24/08/2017	24/08/2017	08/08/2017	24/08/2017
Test	**Method**	**Units**						
pH	CE004 M	units	7.9	8.3	8.3	8.4	8.4	8.3
Magnesium (2:1 water soluble)	CE061	mg/l Mg	-	-	-	-	-	-
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	13	8.1	9.4	13	13	10
Nitrate (2:1 water soluble)	CE049 U	mg/l NO_3	-	-	-	-	-	-
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	36	146	182	95	93	151
Sulphate (total)	CE062 M	mg/kg SO_4	302	1108	771	787	457	806
Sulphur (total)	CE127	mg/kg S	106	584	1676	3092	138	2203

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SOILS

Lab number			66843-8	66939-2	66843-9	66843-10	67330-1	67330-2
Sample id			BH31	BH31	BH38	BH38	BH39	BH39
Depth (m)			0.80	2.00	0.50	3.70	1.90	3.50
Date sampled			24/08/2017	08/08/2017	24/08/2017	24/08/2017	14/09/2017	14/09/2017
Test	**Method**	**Units**						
pH	CE004 M	units	8.1	8.1	8.3	8.4	8.3	8.0
Magnesium (2:1 water soluble)	CE061	mg/l Mg	23	-	-	-	-	-
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	12	14	11	9.4	8.4	10
Nitrate (2:1 water soluble)	CE049 U	mg/l NO_3	<1	-	-	-	-	-
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	188	393	181	107	72	111
Sulphate (total)	CE062 M	mg/kg SO_4	782	1164	547	900	378	523
Sulphur (total)	CE127	mg/kg S	284	2762	229	2623	147	628

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SOILS

Lab number			67324-1	66843-11	66843-12	66843-13	66939-3	67324-2
Sample id			BH40	BH45	BH46	BH48	BH48	BH49
Depth (m)			1.00	1.70	0.60	1.90	3.70	1.00
Date sampled			07/09/2017	24/08/2017	24/08/2017	24/08/2017	08/08/2017	07/09/2017
Test	**Method**	**Units**						
pH	CE004 M	units	8.0	8.6	7.8	8.5	8.2	7.9
Magnesium (2:1 water soluble)	CE061	mg/l Mg	-	-	-	-	-	-
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	5.6	6.3	1.8	5.1	10	8.3
Nitrate (2:1 water soluble)	CE049 U	mg/l NO_3	-	-	-	-	-	-
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	26	45	30	29	206	142
Sulphate (total)	CE062 M	mg/kg SO_4	280	439	231	249	876	679
Sulphur (total)	CE127	mg/kg S	182	1115	<100	114	1797	245

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SOILS

Lab number			67324-3	67324-4	67330-3	67330-4	67330-8	67330-11
Sample id			BH49	BH50	TP10	TP13	TP19	TP25
Depth (m)			2.70	0.75	1.00	1.00	1.00	1.10
Date sampled			07/09/2017	07/09/2017	14/09/2017	14/09/2017	14/09/2017	14/09/2017
Test	**Method**	**Units**						
pH	CE004 [M]	units	8.1	8.1	8.4	8.4	8.1	8.2
Magnesium (2:1 water soluble)	CE061	mg/l Mg	-	-	-	-	-	-
Chloride (2:1 water soluble)	CE049 [U]	mg/l Cl	6.9	11	9.3	14	23	10
Nitrate (2:1 water soluble)	CE049 [U]	mg/l NO_3	-	-	-	-	-	-
Sulphate (2:1 water soluble)	CE061 [M]	mg/l SO_4	48	170	60	114	162	106
Sulphate (total)	CE062 [M]	mg/kg SO_4	302	675	301	454	647	451
Sulphur (total)	CE127	mg/kg S	140	310	124	146	180	158

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO_3
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	M	100	mg/kg SO_4
CE127	Sulphur (total)	Acid extraction, ICP-MS	Dry		100	mg/kg S

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
66939-1	BH25	1.90	N	
66843-5	BH25	4.50	N	
66939-2	BH31	2.00	N	
66843-8	BH31	0.80	N	
66843-9	BH38	0.50	N	
66843-10	BH38	3.70	N	
67330-1	BH39	1.90	N	
67330-2	BH39	3.50	N	
67324-1	BH40	1.00	N	
66843-11	BH45	1.70	N	
66843-12	BH46	0.60	N	
66939-3	BH48	3.70	N	
66843-13	BH48	1.90	N	
67324-2	BH49	1.00	N	
67324-3	BH49	2.70	N	
67324-4	BH50	0.75	N	
67330-3	TP10	1.00	N	
67330-4	TP13	1.00	N	
67330-8	TP19	1.00	N	
67330-11	TP25	1.10	N	

LABORATORY REPORT

4043

Contract Number: PSL17/4792

Report Date: 01 November 2017

Client's Reference: D8044

Client Name: Solmek
12 Yarm Road
Stockton-on-Tees
TS18 3NA

For the attention of: Kathryn Watkin

Contract Title: IAMP - Preliminary Ground Investigation

Date Received: 3/10/2017
Date Commenced: 3/10/2017
Date Completed: 1/11/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	A Fry (Senior Technician)

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awatkins@prosoils.co.uk

ONE DIMENSIONAL CONSOLIDATION TEST

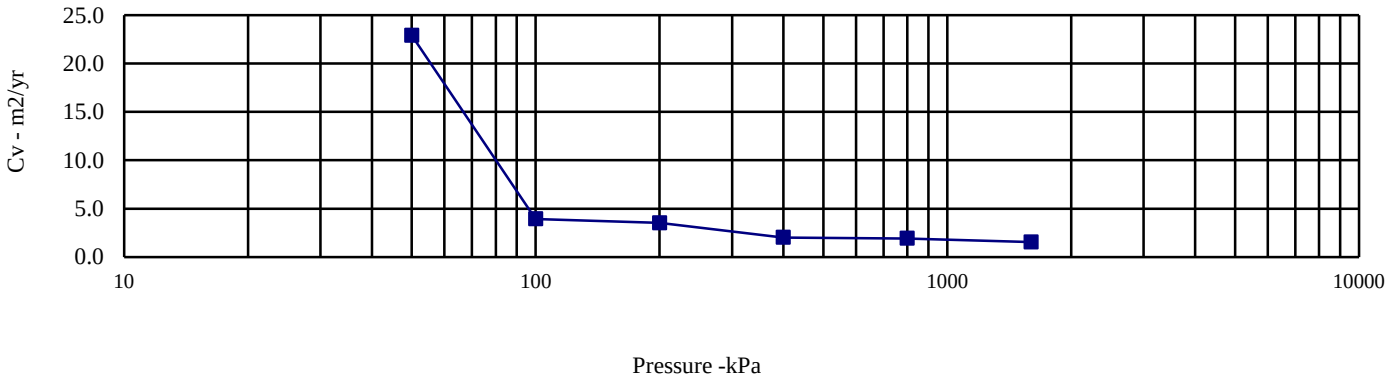
BS 1377: Part 5: 1990: Clause 3

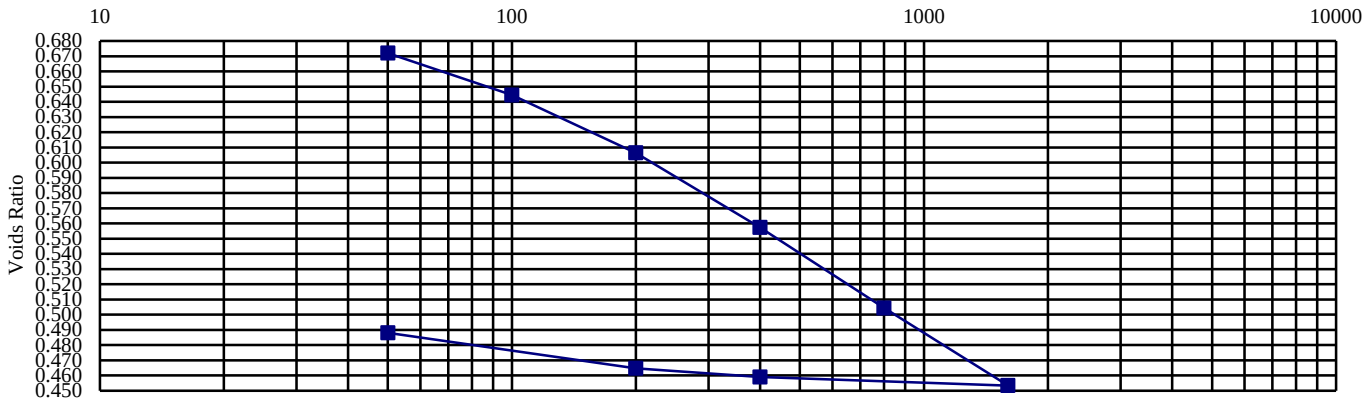
Hole Number: BH21 **Top Depth (m):** 1.20

Sample Number: **Base Depth (m) :**

Sample Type: U

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	25						
Bulk Density (Mg/m3):	1.94	0	50	0.532	22.898	Method used to determine CV:	T90
Dry Density (Mg/m3):	1.54	50	100	0.332	3.929		
Voids Ratio:	0.718	100	200	0.231	3.531	Nominal temperature during test ' C:	20
Degree of saturation:	94.1	200	400	0.153	2.014		
Height (mm):	20.07	400	800	0.085	1.919	Remarks: Brown gravelly slightly sandy silty CLAY	
Diameter (mm)	75.06	800	1600	0.042	1.556		
Particle Density (Mg/m3): Assumed	2.65	1600	400	0.003	5.243		
		400	200	0.019	3.978		
		200	50	17.080	0.670		





UKAS TESTING 4043	PSL Professional Soils Laboratory	**IAMP - Preliminary Ground Investigation**	**Contract No:** PSL17/4792 **Client Ref:** D8044

ONE DIMENSIONAL CONSOLIDATION TEST

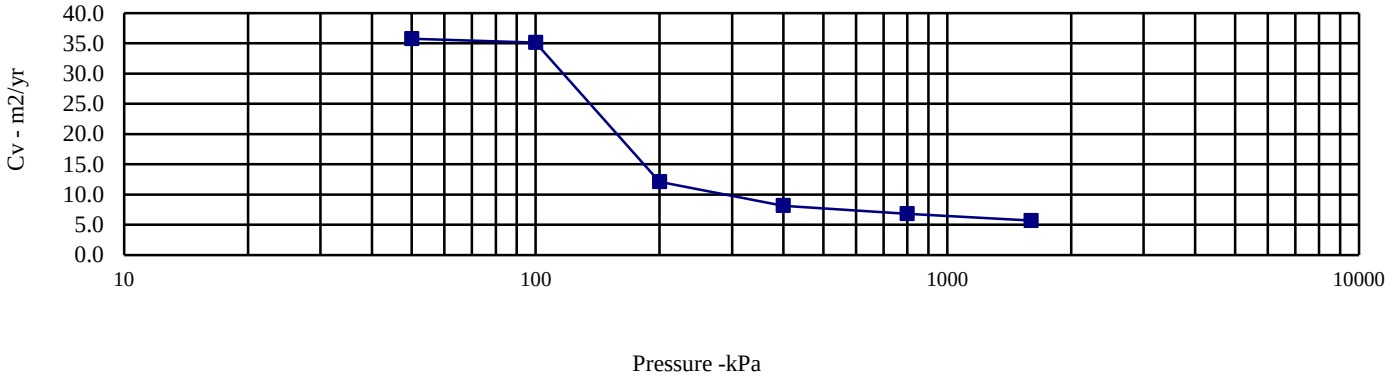
BS 1377: Part 5: 1990: Clause 3

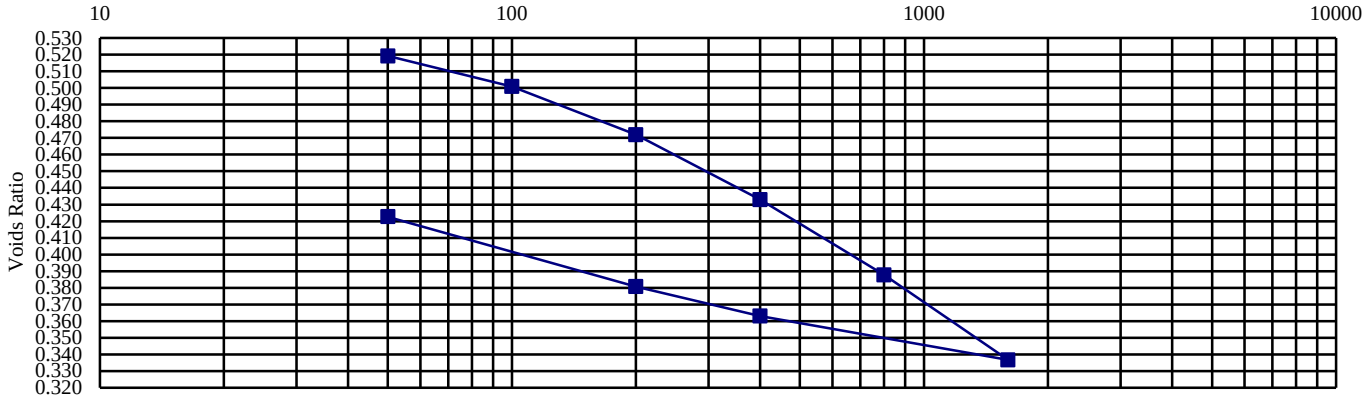
Hole Number: BH21 **Top Depth (m):** 3.00

Sample Number: **Base Depth (m) :**

Sample Type: U

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	20						
Bulk Density (Mg/m3):	2.06	0	50	0.252	35.774	Method used to determine CV:	T90
Dry Density (Mg/m3):	1.72	50	100	0.242	35.154		
Voids Ratio:	0.539	100	200	0.193	12.123	Nominal temperature during test ' C:	20
Degree of saturation:	96.3	200	400	0.133	8.158		
Height (mm):	20.02	400	800	0.079	6.823	Remarks: Brown slightly gravelly sandy silty CLAY.	
Diameter (mm)	75.05	800	1600	0.046	5.703		
Particle Density (Mg/m3): Assumed	2.65	1600	400	0.016	6.575		
		400	200	0.065	3.436		
		200	50	17.852	1.520		



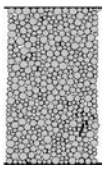


UKAS TESTING 4043	PSL Professional Soils Laboratory	IAMP - Preliminary Ground Investigation	Contract No: PSL17/4792
			Client Ref: D8044

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
 *sketch showing specimen location in original sample*	Depth		1.20m	
	Description		Brown gravelly slightly sandy silty CLAY.	
	Type		Undisturbed, vertical orientation.	
	Initial Length	L_0	(mm)	210.0
	Initial Diameter	D_0	(mm)	102.5
	Initial Weight	W_0	(gr)	3325.0
	Initial Bulk Density	ρ_0	(Mg/m3)	1.92
	Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions			Stage 1	2
Initial Cell Pressure	σ_{3i}	(kPa)	775	
Initial Back Pressure	U_{bi}	(kPa)	750	
Membrane Thickness	m_b	(mm)	0.400	
Displacement Input	L_{IP}	(mm)	CH 3	
Load Input	N_{IP}	(N)	CH 1	
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 4	
Sample Volume	V	(cm3)	CH 2	
Initial Moisture	$\omega_i\%$	(%)	25	
Initial Dry Density	ρ_{di}	(Mg/m3)	1.54	
Initial Voids Ratio	e_i	.	0.722	
Initial Degree of Saturation	S_i	(%)	91	
B Value	B	.	0.98	

Final Conditions				
Final Moisture	$\omega_f\%$	(%)	25	
Final Dry Density	ρ_{df}	(Mg/m3)	1.54	
Final Voids Ratio	e_f	.	0.717	
Final Degree of Saturation	S_f	(%)	93.3	
			Stage 1	2
Failure Criteria		.	Max. Dev. Stress	
Strain At Failure	$\varepsilon\%$	(%)	13.82	
Stress At Failure	$(\sigma_1 - \sigma_3)$	(kPa)	133.8	
Minor Stress At Failure	σ_3'	(kPa)	52.0	
Major Stress At Failure	σ_1'	(kPa)	185.8	
Principal Stress At Failure	σ_1'/σ_3'		3.574	

Notes

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH21 1.20m U
		Test Date	11/10/2017
Site Reference		Borehole	BH21
Jobfile	IAMP - Preliminary Ground	Sample	1.20m U
Client	Dunelm	Depth	1.20m
Operator	Checked	Approved	

Database: .\SQLEXPRESS \ System 3

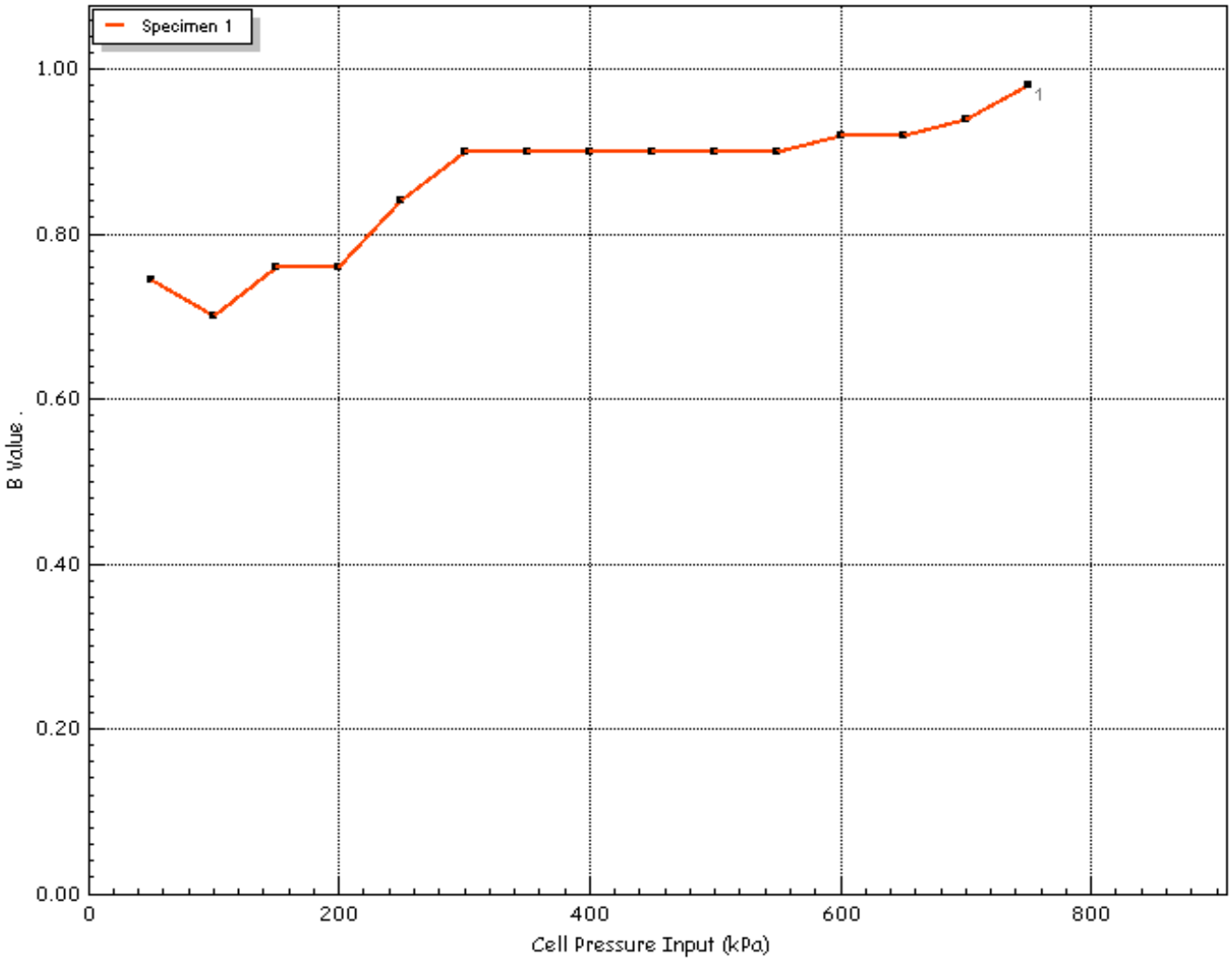
Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

			1
Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	750
Pore Water Pressure Input	u_{pwp}	(kPa)	727
B Value	B	.	0.98



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH21 1.20m U
Database: .\SQLEXPRESS \ System 3		Test Date	11/10/2017
Site Reference		Borehole	BH21
Jobfile	IAMP - Preliminary Ground	Sample	1.20m U
Client	Dunelm	Depth	1.20m
Operator	Checked	Approved	

Professional Soils Laboratory

Effective Stress Triaxial Compression

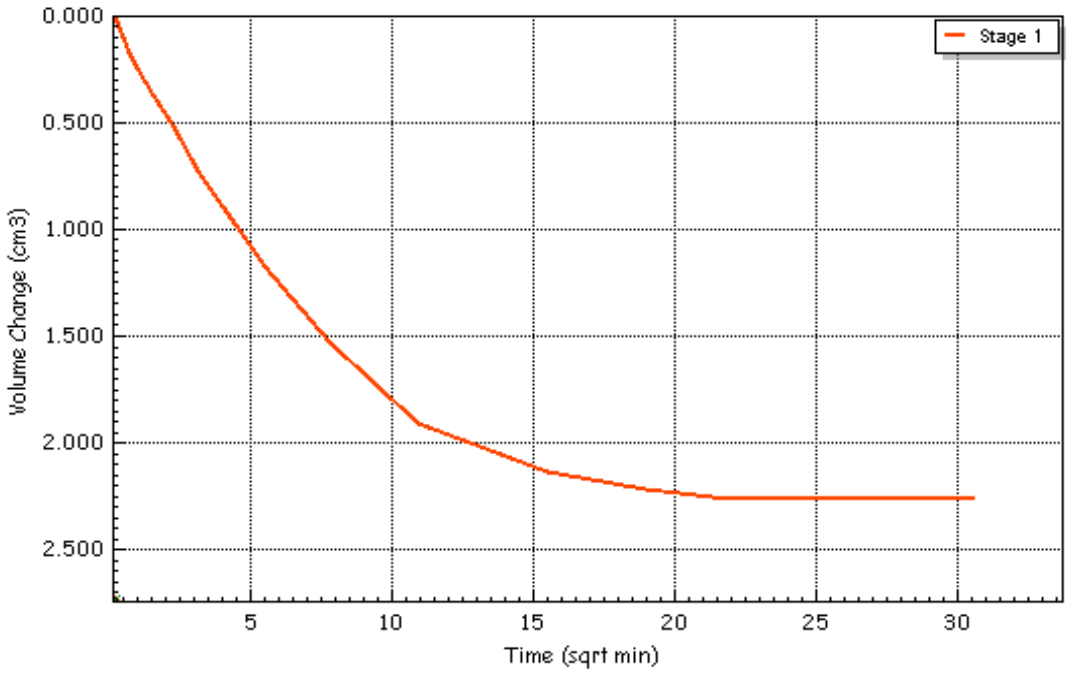
Consolidated Undrained

Consolidation Plots

Initial Conditions			Stage 1
Initial Cell Pressure	σ_3	(kPa)	775
Initial Back Pressure	u_{bi}	(kPa)	750
Pore Water Pressure Input	u_{pwp}	(kPa)	752
Drainage Method			Radial+One End

Final Conditions			Stage 1
PWP Dissipation %	U%	(%)	100.00
Volumetric Strain	ε_v%	(%)	0.13
Corrected Length	L_c	(mm)	209.9
Corrected Area	A_c	82.44	82.44
Corrected Volume	V_c	(cm3)	1730.572
T100 Time to Failure	t_{100}	(min)	100.23
Consolidation	c_v	(m2/year)	2.165
Compressibility	m_v	(m2/MN)	0.652
Test Time	t_F	(h:m:s)	03:00:24
Estimated Strain to Failure	ε%	(%)	5.0
Shear Machine Speed	d_r	(mm/min)	0.05817

Notes



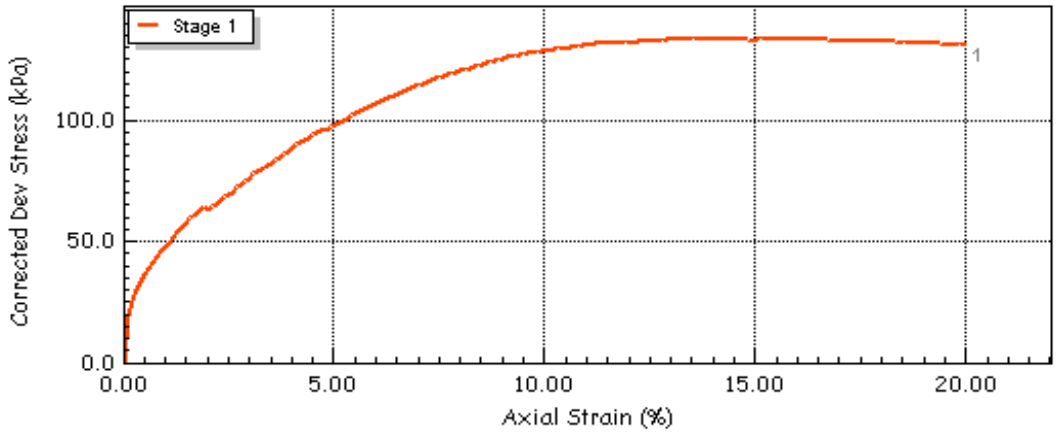
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH21 1.20m U
Database: .\SQLEXPRESS \ System 3		Test Date	11/10/2017
Site Reference		Borehole	BH21
Jobfile	IAMP - Preliminary Ground	Sample	1.20m U
Client	Dunelm	Depth	1.20m
Operator	Checked	Approved	

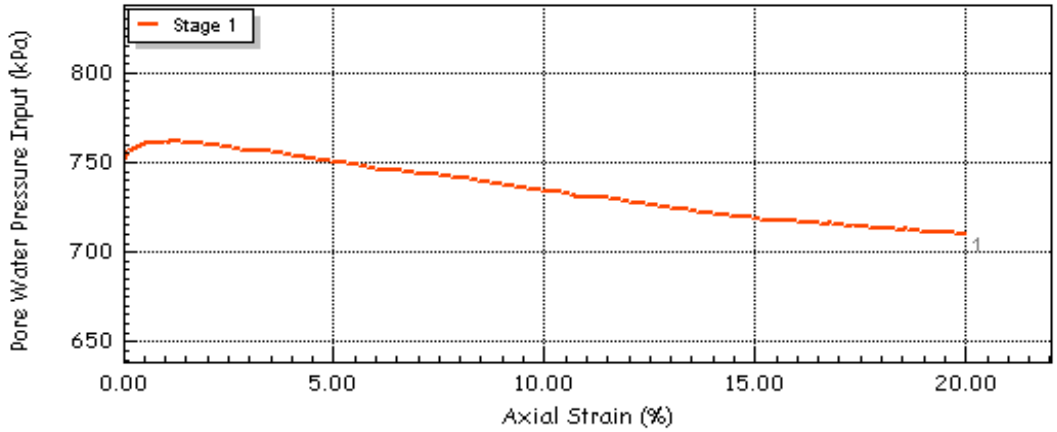
Professional Soils Laboratory

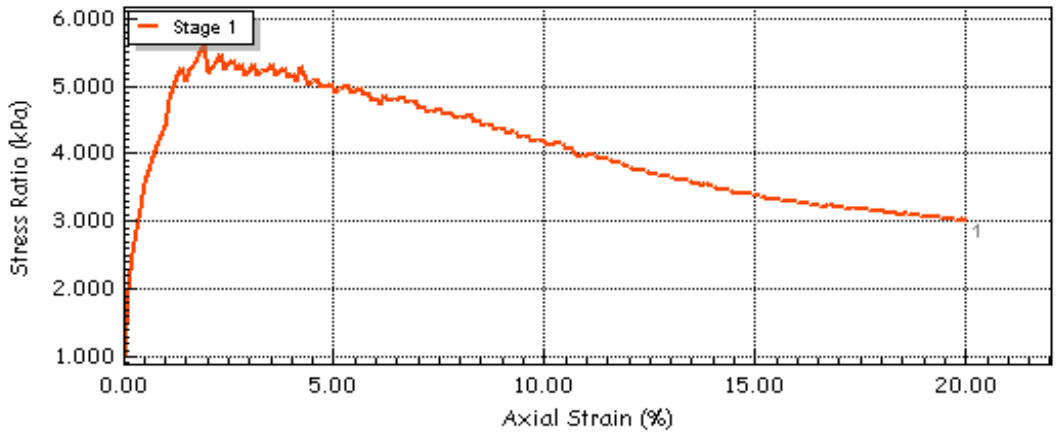
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







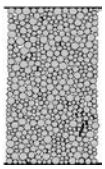
PSL Professional Soils Laboratory	Test Method BS1377-8 : 1990 : Clause 7 Database: .\SQLEXPRESS \ System 3	Test Name Test Date	BH21 1.20m U 11/10/2017
	Site Reference Jobfile IAMP - Preliminary Ground Client Dunelm	Borehole Sample Depth	BH21 1.20m U 1.20m
	Operator	Checked	Approved

Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
 *sketch showing specimen location in original sample*	Depth		3.00m	
	Description		Brown slightly gravelly sandy silty CLAY.	
	Type		Undisturbed, vertical orientation.	
	Initial Length	L_0	(mm)	210.5
	Initial Diameter	D_0	(mm)	102.5
	Initial Weight	W_0	(gr)	3694.0
	Initial Bulk Density	ρ_0	(Mg/m3)	2.13
	Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions			Stage 1	2
Initial Cell Pressure	σ_{3i}	(kPa)	909	
Initial Back Pressure	U_{bi}	(kPa)	850	
Membrane Thickness	m_b	(mm)	0.400	
Displacement Input	L_{IP}	(mm)	CH 2	
Load Input	N_{IP}	(N)	CH 1	
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	
Sample Volume	V	(cm3)	CH 2	
Initial Moisture	$\omega_i\%$	(%)	19	
Initial Dry Density	ρ_{di}	(Mg/m3)	1.78	
Initial Voids Ratio	e_i	.	0.488	
Initial Degree of Saturation	S_i	(%)	100	
B Value	B	.	0.96	

Final Conditions				
Final Moisture	$\omega_f\%$	(%)	20	
Final Dry Density	ρ_{df}	(Mg/m3)	1.78	
Final Voids Ratio	e_f	.	0.488	
Final Degree of Saturation	S_f	(%)	100.0	
			Stage 1	2
Failure Criteria		.	Max. Dev. Stress	
Strain At Failure	$\varepsilon\%$	(%)	5.54	
Stress At Failure	$(\sigma_1 - \sigma_3)$	(kPa)	137.4	
Minor Stress At Failure	σ_3'	(kPa)	55.0	
Major Stress At Failure	σ_1'	(kPa)	192.4	
Principal Stress At Failure	σ_1'/σ_3'		3.498	

Notes

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH21 3.00m U
		Test Date	11/10/2017
Site Reference		Borehole	BH21
Jobfile	IAMP- Preliminary	Sample	3.00m U
Client	Dunelm	Depth	3.00m
Operator	Checked	Approved	

Database: .\SQLEXPRESS \ System 3

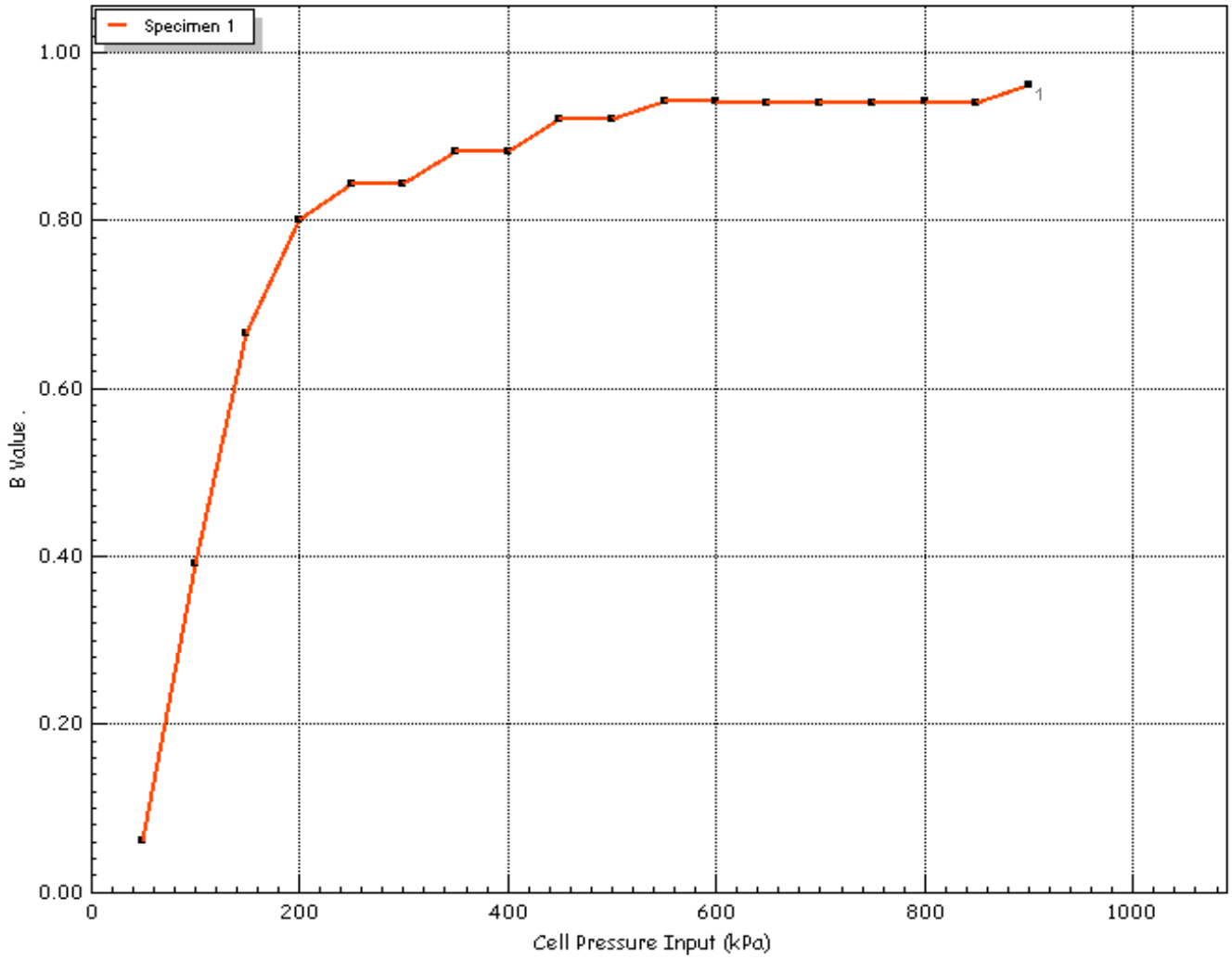
Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

			1
Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	900
Pore Water Pressure Input	u_{pwp}	(kPa)	844
B Value	B	.	0.96



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH21 3.00m U
Database: .\SQLEXPRESS \ System 3		Test Date	11/10/2017
Site Reference		Borehole	BH21
Jobfile	IAMP- Preliminary	Sample	3.00m U
Client	Dunelm	Depth	3.00m
Operator	Checked	Approved	

Professional Soils Laboratory

Effective Stress Triaxial Compression

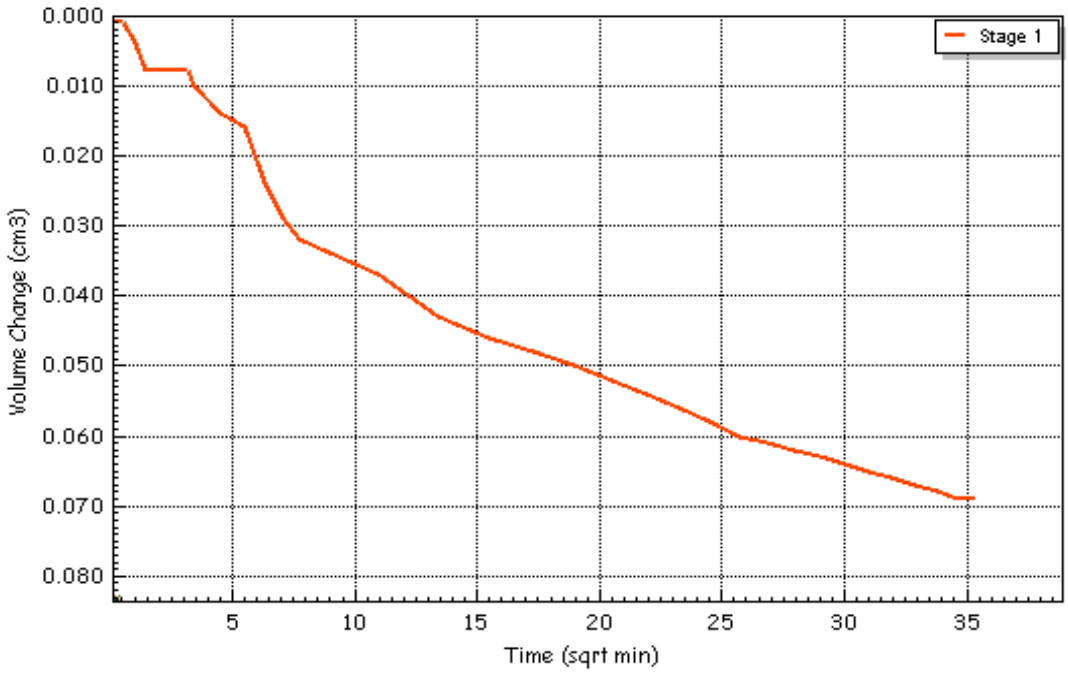
Consolidated Undrained

Consolidation Plots

Initial Conditions			Stage 1
Initial Cell Pressure	σ_3	(kPa)	910
Initial Back Pressure	u_{bi}	(kPa)	850
Pore Water Pressure Input	u_{pwp}	(kPa)	854
Drainage Method			Radial+One End

Final Conditions			Stage 1
PWP Dissipation %	U%	(%)	100.00
Volumetric Strain	ε_v%	(%)	0.00
Corrected Length	L_c	(mm)	210.5
Corrected Area	A_c	82.51	82.51
Corrected Volume	V_c	(cm3)	1736.890
T100 Time to Failure	t_{100}	(min)	111.59
Consolidation	c_v	(m2/year)	1.944
Compressibility	m_v	(m2/MN)	0.010
Test Time	t_F	(h:m:s)	03:20:51
Estimated Strain to Failure	ε%	(%)	5.0
Shear Machine Speed	d_r	(mm/min)	0.05240

Notes



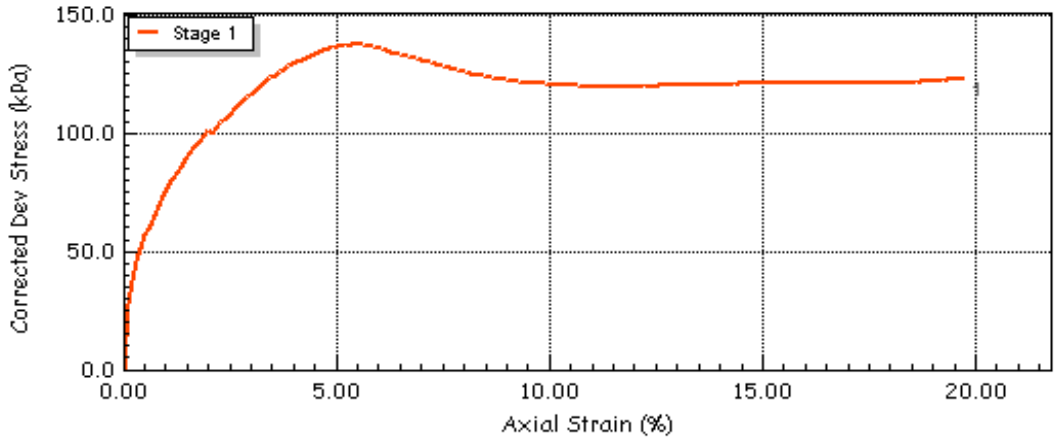
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH21 3.00m U
Database: .\SQLEXPRESS \ System 3		Test Date	11/10/2017
Site Reference		Borehole	BH21
Jobfile	IAMP- Preliminary	Sample	3.00m U
Client	Dunelm	Depth	3.00m
Operator	Checked	Approved	

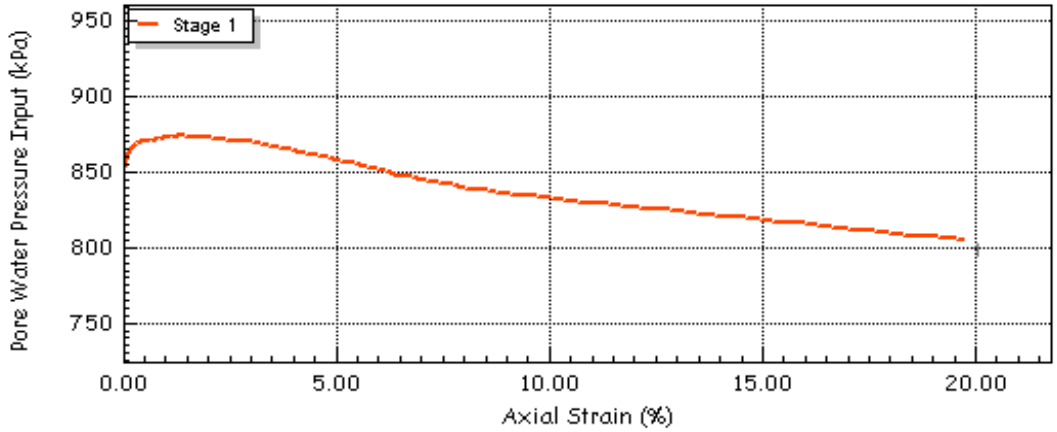
Professional Soils Laboratory

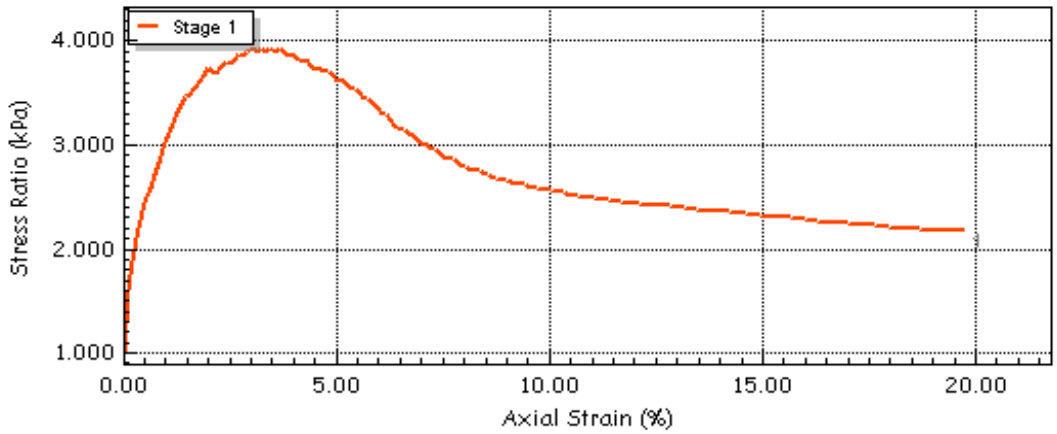
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH21 3.00m U
Database: .\SQLEXPRESS \ System 3		Test Date	11/10/2017
Site Reference		Borehole	BH21
Jobfile	IAMP- Preliminary	Sample	3.00m U
Client	Dunelm	Depth	3.00m
Operator	Checked	Approved	

Professional Soils Laboratory

LABORATORY REPORT

4043

Contract Number: PSL17/4848

Report Date: 09 February 2018

Client's Reference: D8044

Client Name: Solmek
12 Yarm Road
Stockton-on-Tees
TS18 3NA

For the attention of: Kathryn Watkin

Contract Title: IAMP - Preliminary Ground Investigation

Date Received: 4/10/2017
Date Commenced: 4/10/2017
Date Completed: 25/10/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	A Fry (Senior Technician)

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SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH16B	18.10		A	Perp	90	84	7560	9625.69	98.11	-	6.90	0.717	1.354	0.97	Valid	
BH17	18.30		A	Perp	85	67	5695	7251.10	85.15	-	2.29	0.316	1.271	0.40	Valid	
BH17	19.15		A	U	85	60	5100	6493.52	80.58	-	2.45	0.377	1.240	0.47	Valid	
BH17	20.40		A	U	85	65	5525	7034.65	83.87	-	7.48	1.063	1.262	1.34	Valid	
BH17	22.50		A	U	85	45	3825	4870.14	69.79	-	4.59	0.942	1.162	1.10	Valid	
BH24	18.95		I	U	50	45	2250	2864.79	53.52	-	0.16	0.056	1.031	0.06	Valid	
BH24	19.45		A	U	90	63	5670	7219.27	84.97	-	1.10	0.152	1.269	0.19	Valid	
BH25	19.10		I	U	50	37	1850	2355.49	48.53	-	9.03	3.834	0.987	3.78	Valid	
BH25	19.90		A	U	90	67	6030	7677.63	87.62	-	0.35	0.046	1.287	0.06	Valid	
BH25	21.40		A	U	90	77	6930	8823.55	93.93	-	10.78	1.222	1.328	1.62	Valid	
BH25	21.90		I	U	45	42	1890	2406.42	49.06	-	0.83	0.345	0.991	0.34	Valid	
BH28	15.20		A	U	85	64	5440	6926.42	83.23	-	0.37	0.053	1.258	0.07	Valid	
BH28	16.00		A	U	85	40	3400	4329.01	65.80	-	0.20	0.046	1.131	0.05	Valid	
BH28	16.70		I	U	55	51	2805	3571.44	59.76	-	0.16	0.045	1.084	0.05	Valid	
BH28	19.00		A	U	85	71	6035	7684.00	87.66	-	3.40	0.442	1.287	0.57	Valid	
BH28	19.22		A	U	85	33	2805	3571.44	59.76	-	0.44	0.123	1.084	0.13	Valid	
BH28	19.65		A	U	85	65	5525	7034.65	83.87	-	3.67	0.522	1.262	0.66	Valid	
BH28	21.20		A	Perp	85	28	2380	3030.31	55.05	-	1.87	0.617	1.044	0.64	Valid	
BH28	21.50		A	U	85	38	3230	4112.56	64.13	-	3.91	0.951	1.119	1.06	Valid	
BH28	23.77		A	U	85	65	5525	7034.65	83.87	-	4.50	0.640	1.262	0.81	Valid	
BH28	25.69		A	U	80	55	4400	5602.25	74.85	-	3.16	0.564	1.199	0.68	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043	PSL Professional Soils Laboratory	**IAMP - Preliminary Ground Investigation**	**Contract No:**
			PSL17/4848
			Client Ref:
			D8044

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH16B	18.10		D	Par	-	90	8100	90.00	-	5.06	0.625	1.303	0.81	Valid	
BH17	18.30		D	Par	-	85	7225	85.00	-	1.70	0.235	1.270	0.30	Valid	
BH17	19.15		D	U	-	85	7225	85.00	-	1.03	0.143	1.270	0.18	Valid	
BH17	20.40		D	U	-	85	7225	85.00	-	2.72	0.376	1.270	0.48	Valid	
BH17	22.50		D	U	-	85	7225	85.00	-	0.29	0.040	1.270	0.05	Valid	
BH24	19.45		D	U	-	90	8100	90.00	-	0.38	0.047	1.303	0.06	Valid	
BH25	19.90		D	U	-	90	8100	90.00	-	0.24	0.030	1.303	0.04	Valid	
BH25	21.40		D	U	-	90	8100	90.00	-	4.31	0.532	1.303	0.69	Valid	
BH28	15.20		D	U	-	85	7225	85.00	-	0.34	0.047	1.270	0.06	Valid	
BH28	16.00		D	U	-	85	7225	85.00	-	0.15	0.021	1.270	0.03	Valid	
BH28	19.00		D	U	-	85	7225	85.00	-	1.84	0.255	1.270	0.32	Valid	
BH28	19.22		D	U	-	85	7225	85.00	-	0.78	0.108	1.270	0.14	Valid	
BH28	19.65		D	U	-	85	7225	85.00	-	0.70	0.097	1.270	0.12	Valid	
BH28	21.20		D	Par	-	85	7225	85.00	-	0.69	0.096	1.270	0.12	Valid	
BH28	21.50		D	U	-	85	7225	85.00	-	0.33	0.046	1.270	0.06	Valid	
BH28	23.77		D	U	-	85	7225	85.00	-	1.52	0.210	1.270	0.27	Valid	
BH28	25.69		D	U	-	80	6400	80.00	-	1.11	0.173	1.236	0.21	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

IAMP - Preliminary Ground Investigation

Contract No: PSL17/4848

Client Ref: D8044

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH31	20.80		A	U	80	73	5840	7435.72	86.23	-	4.56	0.613	1.278	0.78	Valid	
BH31	21.75		A	U	80	35	2800	3565.07	59.71	-	3.51	0.985	1.083	1.07	Valid	
BH31	23.30		A	U	80	47	3760	4787.38	69.19	-	11.13	2.325	1.157	2.69	Valid	
BH31	24.40		A	U	75	58	4350	5538.59	74.42	-	29.88	5.395	1.196	6.45	Valid	
BH38	18.35		A	U	90	38	3420	4354.48	65.99	-	0.38	0.087	1.133	0.10	Valid	
BH38	21.45		A	U	90	70	6300	8021.41	89.56	-	3.80	0.474	1.300	0.62	Valid	
BH39	11.70		A	U	90	60	5400	6875.49	82.92	-	1.47	0.214	1.256	0.27	Valid	
BH39	12.60		A	Perp	90	76	6840	8708.96	93.32	-	3.68	0.423	1.324	0.56	Valid	
BH39	13.60		A	U	90	70	6300	8021.41	89.56	-	1.03	0.128	1.300	0.17	Valid	
BH39	14.60		A	U	90	76	6840	8708.96	93.32	-	2.65	0.304	1.324	0.40	Valid	
BH39	15.40		A	Perp	90	78	7020	8938.14	94.54	-	1.80	0.201	1.332	0.27	Valid	
BH40	6.40		A	U	90	47	4230	5385.80	73.39	-	1.49	0.277	1.188	0.33	Valid	
BH45	14.70		A	U	90	62	5580	7104.68	84.29	-	7.65	1.077	1.265	1.36	Valid	
BH45	15.80		A	U	90	73	6570	8365.18	91.46	-	4.81	0.575	1.312	0.75	Valid	
BH45	18.00		A	Perp	75	64	4800	6111.55	78.18	-	6.49	1.062	1.223	1.30	Valid	
BH46	9.50		A	U	90	75	6750	8594.37	92.71	-	14.99	1.744	1.320	2.30	Valid	
BH46	10.10		A	U	90	78	7020	8938.14	94.54	-	4.86	0.544	1.332	0.72	Valid	
BH46	12.20		I	U	37	23	851	1083.53	32.92	-	0.31	0.286	0.829	0.24	Valid	
BH46	13.30		A	U	90	43	3870	4927.44	70.20	-	1.18	0.239	1.165	0.28	Valid	
BH46	14.20		A	U	90	57	5130	6531.72	80.82	-	0.19	0.029	1.241	0.04	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043	PSL Professional Soils Laboratory	**IAMP - Preliminary Ground Investigation**	**Contract No:**
			PSL17/4848
			Client Ref:
			D8044

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH31	20.80		D	U	-	80	6400	80.00	-	5.50	0.859	1.236	1.06	Valid	
BH31	21.75		D	U	-	80	6400	80.00	-	0.30	0.047	1.236	0.06	Valid	
BH31	23.30		D	U	-	80	6400	80.00	-	7.64	1.194	1.236	1.47	Valid	
BH31	24.40		D	U	-	75	5625	75.00	-	22.97	4.084	1.200	4.90	Valid	
BH38	18.35		D	U	-	90	8100	90.00	-	0.49	0.060	1.303	0.08	Valid	
BH38	21.45		D	U	-	90	8100	90.00	-	2.64	0.326	1.303	0.42	Valid	
BH39	11.70		D	U	-	90	8100	90.00	-	0.17	0.021	1.303	0.03	Valid	
BH39	12.60		D	Par	-	90	8100	90.00	-	1.62	0.200	1.303	0.26	Valid	
BH39	13.60		D	U	-	90	8100	90.00	-	0.23	0.028	1.303	0.04	Valid	
BH39	14.60		D	U	-	90	8100	90.00	-	2.16	0.267	1.303	0.35	Valid	
BH39	15.40		D	Par	-	90	8100	90.00	-	2.03	0.251	1.303	0.33	Valid	
BH40	6.40		D	U	-	90	8100	90.00	-	0.57	0.070	1.303	0.09	Valid	
BH45	14.70		D	U	-	90	8100	90.00	-	6.08	0.751	1.303	0.98	Valid	
BH45	15.80		D	U	-	90	8100	90.00	-	2.07	0.256	1.303	0.33	Valid	
BH45	18.00		D	Par	-	75	5625	75.00	-	3.33	0.592	1.200	0.71	Valid	
BH46	9.50		D	U	-	90	8100	90.00	-	29.88	3.689	1.303	4.81	Valid	
BH46	10.10		D	U	-	90	8100	90.00	-	2.63	0.325	1.303	0.42	Valid	
BH46	13.30		D	U	-	90	8100	90.00	-	0.72	0.089	1.303	0.12	Valid	
BH46	14.20		D	U	-	90	8100	90.00	-	0.19	0.023	1.303	0.03	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

IAMP - Preliminary Ground Investigation

Contract No: PSL17/4848

Client Ref: D8044

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH47	16.10		A	Perp	90	54	4860	6187.94	78.66	-	2.46	0.398	1.226	0.49	Valid	
BH47	16.70		A	Perp	90	74	6660	8479.78	92.09	-	7.95	0.938	1.316	1.23	Valid	
BH47	17.70		A	U	90	58	5220	6646.31	81.52	-	5.78	0.870	1.246	1.08	Valid	
BH48	19.40		A	U	90	45	4050	5156.62	71.81	-	3.04	0.590	1.177	0.69	Valid	
BH48	20.95		A	U	90	58	5220	6646.31	81.52	-	2.60	0.391	1.246	0.49	Valid	
BH48	21.50		I	U	49	45	2205	2807.49	52.99	-	1.80	0.641	1.026	0.66	Valid	
BH49	9.00		A	U	90	68	6120	7792.23	88.27	-	0.66	0.085	1.291	0.11	Valid	
BH49	10.30		A	U	90	45	4050	5156.62	71.81	-	2.20	0.427	1.177	0.50	Valid	
BH49	11.83		A	U	90	29	2610	3323.16	57.65	-	1.50	0.451	1.066	0.48	Valid	
BH49	12.50		A	U	90	46	4140	5271.21	72.60	-	3.67	0.696	1.183	0.82	Valid	
BH49	13.90		A	U	90	67	6030	7677.63	87.62	-	7.28	0.948	1.287	1.22	Valid	
BH49	14.80		A	U	90	66	5940	7563.04	86.97	-	7.67	1.014	1.283	1.30	Valid	
BH49	15.90		I	U	48	32	1536	1955.70	44.22	-	1.01	0.516	0.946	0.49	Valid	
BH50	12.20		A	U	90	77	6930	8823.55	93.93	-	4.39	0.498	1.328	0.66	Valid	
BH50	13.20		A	U	90	60	5400	6875.49	82.92	-	1.82	0.265	1.256	0.33	Valid	
BH50	14.00		A	U	90	64	5760	7333.86	85.64	-	1.77	0.241	1.274	0.31	Valid	
BH50	15.20		A	U	90	58	5220	6646.31	81.52	-	2.68	0.403	1.246	0.50	Valid	
BH50	16.00		I	U	42	34	1428	1818.19	42.64	-	1.01	0.555	0.931	0.52	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

IAMP - Preliminary Ground Investigation

Contract No:
PSL17/4848
Client Ref:
D8044

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH47	16.10		D	Par	-	90	8100	90.00	-	0.78	0.096	1.303	0.13	Valid	
BH47	16.70		D	Par	-	90	8100	90.00	-	1.57	0.194	1.303	0.25	Valid	
BH47	17.70		D	U	-	90	8100	90.00	-	2.05	0.253	1.303	0.33	Valid	
BH48	19.40		D	U	-	90	8100	90.00	-	1.48	0.183	1.303	0.24	Valid	
BH48	20.95		D	U	-	90	8100	90.00	-	0.14	0.017	1.303	0.02	Valid	
BH49	9.00		D	U	-	90	8100	90.00	-	0.45	0.056	1.303	0.07	Valid	
BH49	10.30		D	U	-	90	8100	90.00	-	1.68	0.207	1.303	0.27	Valid	
BH49	11.83		D	U	-	90	8100	90.00	-	1.14	0.141	1.303	0.18	Valid	
BH49	12.50		D	U	-	90	8100	90.00	-	5.57	0.688	1.303	0.90	Valid	
BH49	13.90		D	U	-	90	8100	90.00	-	4.47	0.552	1.303	0.72	Valid	
BH49	14.80		D	U	-	90	8100	90.00	-	7.20	0.889	1.303	1.16	Valid	
BH50	12.20		D	U	-	90	8100	90.00	-	2.91	0.359	1.303	0.47	Valid	
BH50	13.20		D	U	-	90	8100	90.00	-	1.56	0.193	1.303	0.25	Valid	
BH50	14.00		D	U	-	90	8100	90.00	-	1.15	0.142	1.303	0.18	Valid	
BH50	15.20		D	U	-	90	8100	90.00	-	0.17	0.021	1.303	0.03	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

IAMP - Preliminary Ground Investigation

Contract No: PSL17/4848

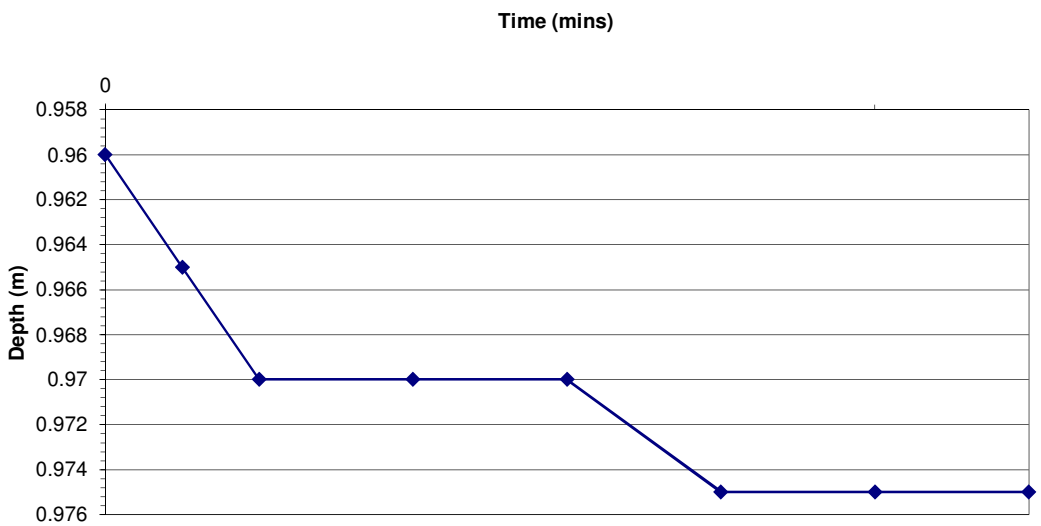
Client Ref: D8044

SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 2016
BRE Digest 365, Figure 2, Page 5

Client:	**Sunderland City Council**				
Site:	**International Advanced Manufacturing Park (IAMP), Sunderland**				
Job No:	**D8044**				
Pit No:	**TPS-01**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)				
			Pit Dimensions	Length (m) =	2.00
0	0.96			Width (m) =	0.65
0.5	0.965			Depth (m) =	2.00
1	0.97				
2	0.97	**Depth at start of test (m) =**			0.960
3	0.97	**Depth at end of test (m)=**			0.975
4	0.975	**75% level (m)=**			N/A
5	0.975	**50% Effective Depth**			1.0325
6	0.975	**25% level (m)=**			N/A
7	0.975				
8	0.975	**Base area of pit (m^2) =**			1.300
9	0.975	**Vp_{75-25} (m^3) =**			N/A
10	0.975	**α_{p50} (m^2) =**			6.772
15	0.975				
20	0.975				
25	0.975		**V**		0.0195
30	0.975		**T**		5400
40	0.975				
50	0.975	**Soil infiltration rate, f, (m/s) =**		**5.33E-07**	**Inferred value**
60	0.975				
90	0.975				
120		**Input by:**	**SJS**	**Date:**	**29/08/2017**
180		**Checked by:**		**Date:**	



Notes:
1. Insufficent change in head and lack of infiltration to accurately calculate infiltration rate. Quoted rate should be regarded as indictaive only.

SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 2016
BRE Digest 365, Figure 2, Page 5

Client:	**Sunderland City Council**				
Site:	**International Advanced Manufacturing Park (IAMP), Sunderland**				
Job No:	**D8044**				
Pit No:	**TPS-02**		**Test No:**	**1**	

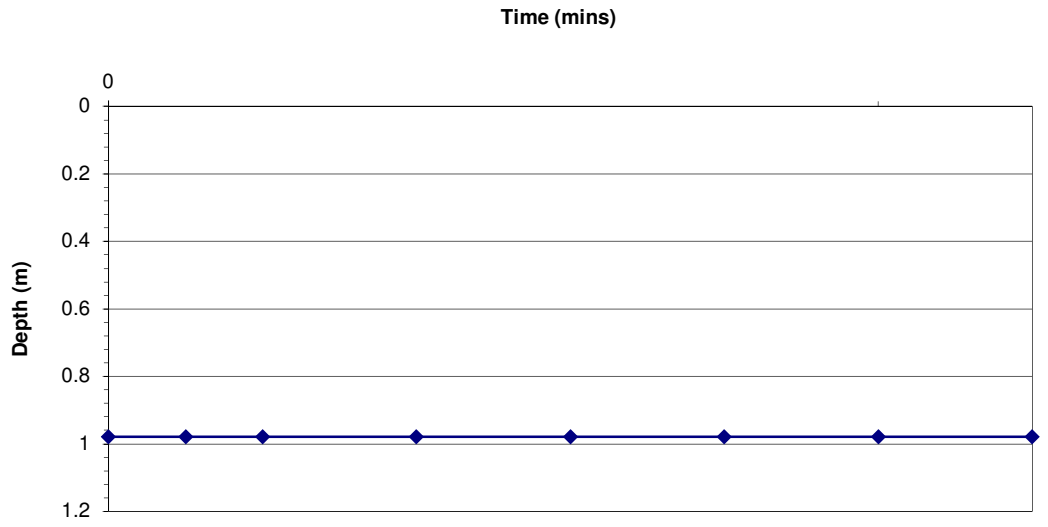
CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	0.98
0.5	0.98
1	0.98
2	0.98
3	0.98
4	0.98
5	0.98
6	0.98
7	0.98
8	0.98
9	0.98
10	0.98
15	0.98
20	0.98
25	0.98
30	0.98
40	0.98
50	0.98
60	0.98
90	0.98
120	
180	

Pit Dimensions		
	Length (m) =	1.90
	Width (m) =	0.65
	Depth (m) =	2.10

Depth at start of test (m) =	0.980
Depth at end of test (m)=	0.980
75% level (m)=	N/A
50% Effective Depth	1.12
25% level (m)=	N/A
Base area of pit (m^2) =	1.235
Vp_{75-25} (m^3) =	N/A
α_{p50} (m^2) =	6.947
V	0
T	5400

Soil infiltration rate, f, (m/s) =	**0.00E+00**		
Input by:	**SJS**	**Date:**	**29/08/2017**
Checked by:		**Date:**	



Notes:
1. Insufficent change in head and lack of infiltration to accurately calculate infiltration rate.

SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 2016
BRE Digest 365, Figure 2, Page 5

Client:	**Sunderland City Council**				
Site:	**International Advanced Manufacturing Park (IAMP), Sunderland**				
Job No:	**D8044**				
Pit No:	**TPS-03**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

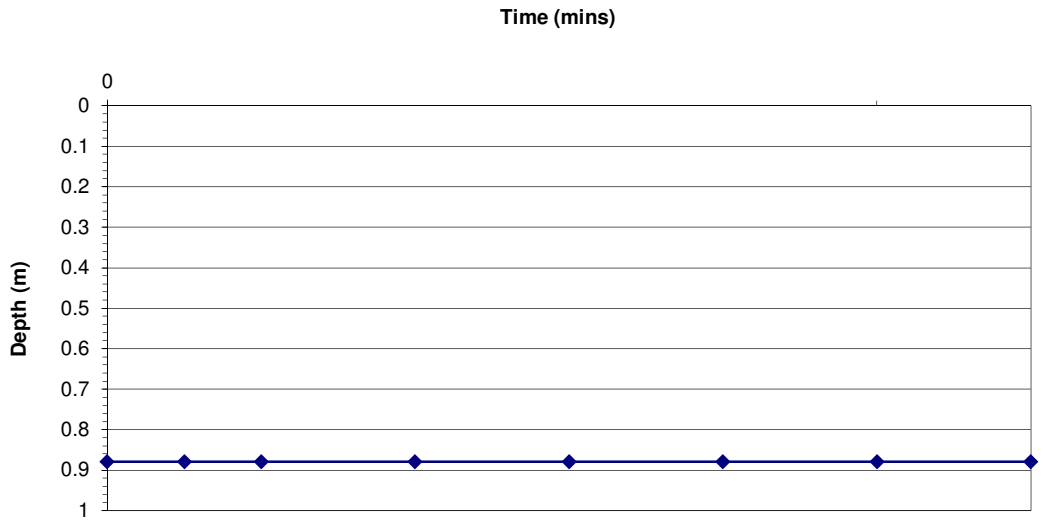
Time (min)	Depth (m)
0	0.88
0.5	0.88
1	0.88
2	0.88
3	0.88
4	0.88
5	0.88
6	0.88
7	0.88
8	0.88
9	0.88
10	0.88
15	0.88
20	0.88
25	0.88
30	0.88
40	0.88
50	0.88
60	0.88
90	0.88
120	
180	

Pit Dimensions	Length (m) =	2.10
	Width (m) =	0.65
	Depth (m) =	2.00

Depth at start of test (m) =	0.880
Depth at end of test (m)=	0.880
75% level (m)=	N/A
50% Effective Depth	1.12
25% level (m)=	N/A
Base area of pit (m^2) =	1.365
Vp_{75-25} (m^3) =	N/A
α_{p50} (m^2) =	7.525

V	0
T	5400

Soil infiltration rate, f, (m/s) =	**0.00E+00**	**Inferred value**	
Input by:	**SJS**	**Date:**	**29/08/2017**
Checked by:		**Date:**	



Notes:
1. Insufficent change in head and lack of infiltration to accurately calculate infiltration rate.

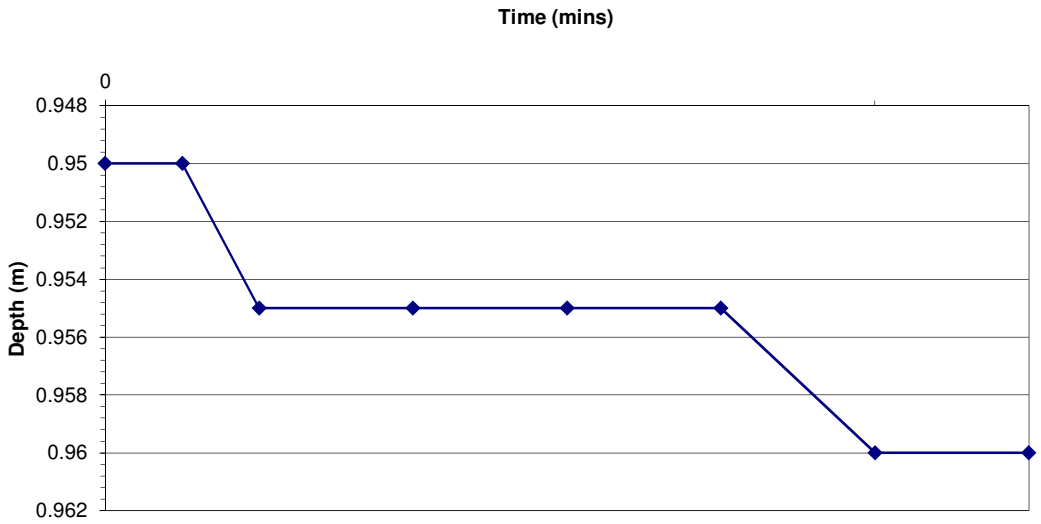
SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 2016
BRE Digest 365, Figure 2, Page 5

Client:	**Sunderland City Council**				
Site:	**International Advanced Manufacturing Park (IAMP), Sunderland**				
Job No:	**D8044**				
Pit No:	**TPS-04**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	0.95
0.5	0.95
1	0.955
2	0.955
3	0.955
4	0.955
5	0.96
6	0.96
7	0.96
8	0.96
9	0.96
10	0.96
15	0.96
20	0.96
25	0.96
30	0.96
40	0.96
50	0.96
60	0.96
90	0.96
120	
180	

Pit Dimensions	
Length (m) =	2.00
Width (m) =	0.65
Depth (m) =	2.00
Depth at start of test (m) =	0.950
Depth at end of test (m)=	0.960
75% level (m)=	N/A
50% Effective Depth	1.045
25% level (m)=	N/A
Base area of pit (m^2) =	1.300
Vp_{75-25} (m^3) =	N/A
α_{p50} (m^2) =	6.839
V	0.013
T	5400
Soil infiltration rate, f, (m/s) =	**3.52E-07** **Inferred value**
Input by:	**SJS**
Date:	**29/08/2017**
Checked by:	
Date:	



Notes:
1. Insufficent change in head and lack of infiltration to accurately calculate infiltration rate. Quoted rate should be regarded as indictaive only.

APPENDIX E

Gas Monitoring Results

GAS & GROUNDWATER MONITORING SHEET

Contract Number	D8044								**Dunelm Geotechnical & Environmental Ltd**
Contract Name	IAMP								
Date	20.12.17								
Time (start & finish)	8.00-16.00				**Visit**	1	**of**	6	
Weather	Overcast								
Ground Conditions	Wet								
Operator Initials	NY								
Ambient Readings	**O_2 (% v/v)**	20.0	**CO_2 (% v/v)**	ND	**CH_4 (% v/v)**	ND	**PID reading (ppm)**	ND	
Atmospheric Pressure (mbar)	**Start:**	**1028**			**Finish:**		**1028**		**Regional Trend:** Falling
Air temperature °C	**Start:**	**10**			**Finish:**		**10**		
Instrument Details	**Gas Data Ltd GFM 436 (Serial 12666)**								
Last Calibration	**GFM 436 16. 30.03.17**								
Instrument Details	**Tiger^{LT}** PID Meter								
Last Calibration	**27.02.17**								

BH No.	**Peak**	**Steady**	**Relative pressure mbar**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Low**	**Range**	**Range**	**SWL (m bgl)**	**Base of pipe (m bgl)**	**Remarks**
	Flow Rate (l/hr)			**CH_4 (%v/v)**		**CO_2 (%v/v)**		**O_2 (%v/v)**		**PID (ppm)**		**H_2S (ppm)**	**CO (ppm)**			
BH28	ND	ND	0.00	ND	ND	0.10	0.10	20.00	20.00	ND	ND	ND	ND	0.32	3.30	

Details of groundwater purging & sampling inc. volume sampled

Boreholes purged and 3 litres plus - 2 x 40ml sampled

BH28: Conductivity (mS/cm) - 0.203, Redox Potential (mV) - 95.6, Dissolved Oxygen (ppm) - 4.41, pH - 10.31, Temperature (ºC) - 7.51

BH32: Conductivity (mS/cm) - 0.928, Redox Potential (mV) - 155.2, Dissolved Oxygen (ppm) - 4.77, pH - 9.94, Temperature (ºC) - 7.79

BH35: Conductivity (mS/cm) - 0.936, Redox Potential (mV) - 124.9, Dissolved Oxygen (ppm) - 5.01, pH - 10.59, Temperature (ºC) - 4.68

BH36: Conductivity (mS/cm) - 0.939, Redox Potential (mV) - 116.5, Dissolved Oxygen (ppm) - 6.34, pH - 8.12, Temperature (ºC) - 9.51

Notes:

Monitoring order is from **left to right** across table above.
Regional trend is that shown at nearest Met office location at time of monitoring.

Key: **ND** **None Detected**
NR **Not Recorded**
SWL **Standing Water Level**

GAS & GROUNDWATER MONITORING SHEET

Contract Number	D8044								**Dunelm Geotechnical & Environmental Ltd**
Contract Name	IAMP								
Date	12.01.18								
Time (start & finish)	8.00-13.00				**Visit**	2	**of**	6	
Weather	Overcast								
Ground Conditions	Wet								
Operator Initials	NY								
Ambient Readings	**O_2 (% v/v)**	19.8	**CO_2 (% v/v)**	ND	**CH_4 (% v/v)**	ND	**PID reading (ppm)**	ND	
Atmospheric Pressure (mbar)	**Start:**	**1023**			**Finish:**		**1023**		**Regional Trend:** Falling
Air temperature °C	**Start:**	**6**			**Finish:**		**7**		
Instrument Details	**Gas Data Ltd GFM 436 (Serial 12666)**								
Last Calibration	**GFM 436 16. 30.03.17**								
Instrument Details	**Tiger^{LT}** PID Meter								
Last Calibration	**27.02.17**								

BH No.	**Peak**	**Steady**	**Relative pressure mbar**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Low**	**Range**	**Range**	**SWL (m bgl)**	**Base of pipe (m bgl)**	**Remarks**
	Flow Rate (l/hr)			**CH_4 (%v/v)**		**CO_2 (%v/v)**		**O_2 (%v/v)**		**PID (ppm)**		**H_2S (ppm)**	**CO (ppm)**			
BH28	ND	ND	0.00	ND	ND	0.10	0.10	19.80	19.80	ND	ND	ND	ND	0.36	3.30	
	Details of groundwater purging & sampling inc. volume sampled															
Notes:																

Monitoring order is from **left to right** across table above.
Regional trend is that shown at nearest Met office location at time of monitoring.

Key: **ND** **None Detected**
NR **Not Recorded**
SWL **Standing Water Level**

GAS & GROUNDWATER MONITORING SHEET

Contract Number	D8044								**Dunelm Geotechnical & Environmental Ltd**
Contract Name	IAMP								
Date	26.01.18								
Time (start & finish)	8.10-13.00				**Visit**	3	**of**	6	
Weather	Overcast								
Ground Conditions	Wet								
Operator Initials	NY								
Ambient Readings	**O_2 (% v/v)**	19.6	**CO_2 (% v/v)**	ND	**CH_4 (% v/v)**	ND	**PID reading (ppm)**	ND	
Atmospheric Pressure (mbar)	**Start:**	**1016**			**Finish:**		**1017**		**Regional Trend:** Rising
Air temperature °C	**Start:**	**4**			**Finish:**		**5**		
Instrument Details	**Gas Data Ltd GFM 436 (Serial 12666)**								
Last Calibration	**GFM 436 16. 30.03.17**								
Instrument Details	**Tiger**[LT] PID Meter								
Last Calibration	**27.02.17**								

BH No.	**Peak**	**Steady**	**Relative pressure mbar**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Low**	**Range**	**Range**	**SWL (m bgl)**	**Base of pipe (m bgl)**	**Remarks**
	Flow Rate (l/hr)			**CH_4 (%v/v)**		**CO_2 (%v/v)**		**O_2 (%v/v)**		**PID (ppm)**		**H_2S (ppm)**	**CO (ppm)**			
BH28	ND	ND	0.00	ND	ND	ND	ND	18.90	18.90	ND	ND	ND	ND	0.35	3.30	

Details of groundwater purging & sampling inc. volume sampled

Notes:

Monitoring order is from **left to right** across table above.
Regional trend is that shown at nearest Met office location at time of monitoring.

Key: **ND** **None Detected**
NR **Not Recorded**
SWL **Standing Water Level**

GROUNDWATER MONITORING SHEET (POST SITEWORKS)

Contract Number	D8044				
Contract Name	IAMP				
Date	20.12.17				
Time (start & finish)	8.00-16.00	**Visit No.**	1	**of**	6
Weather	Overcast				
Ground Conditions	Wet				
Operator Initials	NY				

Dunelm Geotechnical & Environmental Ltd

	SWL (m)	**Base Of Hole (m)**											
BH16B	1.51	8.46											
BH17	1.65	16.00											
BH24	0.86	18.01											
BH25	0.82	11.61											
BH31	0.75	9.50											
BH38	0.91	2.61											
BH39	0.85	9.34											
BH40	0.75	3.80											
BH45	0.91	11.80											
BH46	1.24	4.63											
BH47	1.84	18.60											
BH48	1.62	11.10											
BH49	0.60	2.82											
BH50	1.13	20.00											

Notes:

Monitoring order is from **left to right** across table above.

Key:

GROUNDWATER MONITORING SHEET (POST SITEWORKS)

Contract Number	D8044				
Contract Name	IAMP				
Date	12.01.18				
Time (start & finish)	8.00-13.00	**Visit No.**	2	**of**	6
Weather	Overcast				
Ground Conditions	Wet				
Operator Initials	NY				

Dunelm Geotechnical & Environmental Ltd

	SWL (m)	**Base Of Hole (m)**											
BH16B	1.23	8.46											
BH17	1.55	16.00											
BH24	0.80	18.01											
BH25	1.05	11.61											
BH31	0.52	9.50											
BH38	0.66	2.61											
BH39	0.50	9.34											
BH40	0.66	3.80											
BH45	0.54	11.80											
BH46	0.92	4.63											
BH47	1.67	18.60											
BH48	0.61	11.10											
BH49	0.33	2.82											
BH50	0.89	20.00											

Notes:

Monitoring order is from **left to right** across table above.

Key:

GROUNDWATER MONITORING SHEET (POST SITEWORKS)

Contract Number	D8044				
Contract Name	IAMP				
Date	26.01.18				
Time (start & finish)	8.10-13.00	**Visit No.**	3	**of**	6
Weather	Overcast				
Ground Conditions	Wet				
Operator Initials	NY				

Dunelm Geotechnical & Environmental Ltd

	SWL (m)	**Base Of Hole (m)**											
BH16B	1.07	8.46											
BH17	1.51	16.00											
BH24	0.72	18.01											
BH25	0.86	11.61											
BH31	0.33	9.50											
BH38	0.60	2.61											
BH39	0.48	9.34											
BH40	0.66	3.80											
BH45	0.49	11.80											
BH46	0.92	4.63											
BH47	1.61	18.60											
BH48	1.57	11.10											
BH49	0.25	2.82											
BH50	0.54	20.00											

Notes:

Monitoring order is from **left to right** across table above.

Key:

APPENDIX F

Dunelm Conditions of Offer, Notes on Limitations & Basis for Contract

Dunelm Conditions of Offer, Notes on Limitations & Basis for Contract

These conditions accompany our tender and supercede any previous conditions issued. The firm will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by 3rd parties. The report, its content and format and associated data are copyright, and the property of the firm. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from the firm. A charge may be levied against such approval, the same to be made at the discretion of the firm.

Site investigation is a process of sampling. The scope and size of an investigation may be considered proportional to levels of confidence regarding the ground and groundwater conditions. The exploratory holes undertaken investigate only a small volume of the ground in relation to the overall size of the site, and can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions as encountered within each of the exploratory holes. There may be different ground conditions elsewhere on the site which have not been identified by this investigation and which therefore have not been taken into account in this report. Reports are generally subject to the comments of the local authority and Environment Agency. The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that mobile contamination, soil gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. Unrecorded ancient mining may occur anywhere where seams that have been worked and influence the rock and soil above. Dissolution cavities can occur where gypsum or chalk is present. Rotary drilling is the recommended technique to prove the integrity of the rock.

Where the scope of the investigation is limited via access to information, time constraints, equipment limitations, testing, interpretation or by the client or his agents budgetary constraints, elements not set out in the proposal and excluded from the report are deemed to be omitted from the scope of the investigation.

The firm cannot be held liable and do not warrant, or otherwise guarantee the validity of information provided by third parties and subsequently used in our reports. The firm are not responsible for the action negligent or otherwise of subcontractors or third parties.

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as ‘exploratory investigations’ in accordance with the definitions provided in paragraph 5.4 of BS 10175:2001 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

Where the type, number or/and depth of exploratory hole is specified by others, the firm cannot and will not be responsible for any subsequent shortfall or inadequacy in data, and any consequent shortfall in interpretation of environmental and geotechnical aspects which may be required at a later date in order to facilitate the design of permanent or temporary works.

All information acquired by the firm in the course of investigation is the property of the firm, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. The firm reserves the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing. The quoted rates do not include VAT, and payment terms are 30 days from dispatch of invoice from our offices. Quotes are subject to a site visit.

We have allowed for 1 mobilisation and normal working hours unless otherwise stated. The scope of the investigation may be reviewed following the desk study and/or fieldwork. We have not allowed for acquiring services information, and cannot be responsible for damage to underground services or pipes not shown to us or not clearly shown on plans. Costs incurred will be passed on to you, and in commissioning the firm, you understand and accept that you/your agent have a contractual relationship with the firm & you accept this. Our rates assume unobstructed, reasonably level and firm access to the exploratory positions and adequate clear working areas and headroom. We have priced on the basis that you or your client have the necessary permissions, wayleaves and approvals to access land. All boreholes and pits are backfilled with arisings except where gas monitoring pipes are installed with stopcock covers. Dunelm are not responsible for any uneven surfaces as a result of siteworks and rutting and backfilled excavations may require re-levelling and/or making good by others after fieldwork is complete. Dunelm have not allowed for subsequent reinstatement as a result of settlement. No price has been provided or requested for a return visit to remove pipework and covers. No price has been provided or requested for a return visit to remove pipework and covers. Hourly rates apply to consultancy only and do not include expenses unless otherwise shown. If warranties are required, legal costs incurred will be passed on to you assuming the firm agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.

We reserve the right to pursue full payment of the invoice prior to release of any information including reports. We advise you/your client that we may elect to pursue our statutory rights under late payment legislation, and will apply 8% to the base rate for unreasonably late payments. We will also apply the right to claim any associated legal costs incurred with recovery of late payments. The firm is exempt from the CIS Scheme. The firm offer to undertake work <u>only</u> in strict accordance with conditions covered by our current insurances, which are available for inspection. The company are not responsible for acts, negligent or otherwise of subcontractors and as a matter of policy cannot indemnify any other parties. Professional indemnity Insurance is limited to ten times the invoice net total except where stated otherwise by the firm, and we give notice that consequential loss as a direct or indirect result of the firms activities or omission of the same are excluded.