

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

[illegible]

Project Otter

Contract No:

PSL22/7303

Client Ref:

WIE17469

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

[illegible]

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular



Project Otter

Contract No:

PSL22/7303

Client Ref:

WIE17469

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

[illegible]

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random



Project Otter

Contract No:

PSL22/7303

Client Ref:

WIE17469



LABORATORY REPORT



4043

Contract Number: PSL22/7304

Report Date: 14 December 2022
Client's Reference: WIE17469-WBH113
Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Jamie Parr

Contract Title: Project Otter
Date Received: 14/11/2022
Date Commenced: 14/11/2022
Date Completed: 14/12/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)


S Eyre
(Senior Technician)

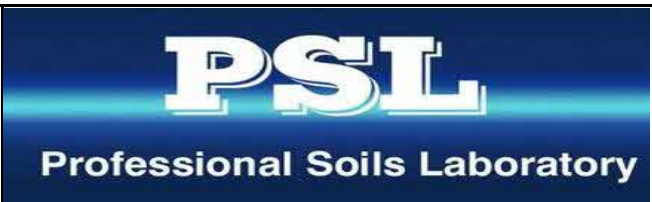
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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WBH113		B	1.00		Brown very gravelly clayey SAND.
WBH113		D	1.70		Brown gravelly SAND.
WBH113		B	2.00		Light brown gravelly clayey SAND
WBH113		U	7.50		Stiff grey CLAY.
WBH113		B	8.00		Grey CLAY.
WBH113		U	16.50		Stiff grey CLAY.
WBH113		B	17.00		Grey CLAY.
WBH113		B	26.00		Grey CLAY.
WBH113		U	34.50		Very stiff grey CLAY.



Project Otter

Contract No:
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Client Ref:
WIE71469

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



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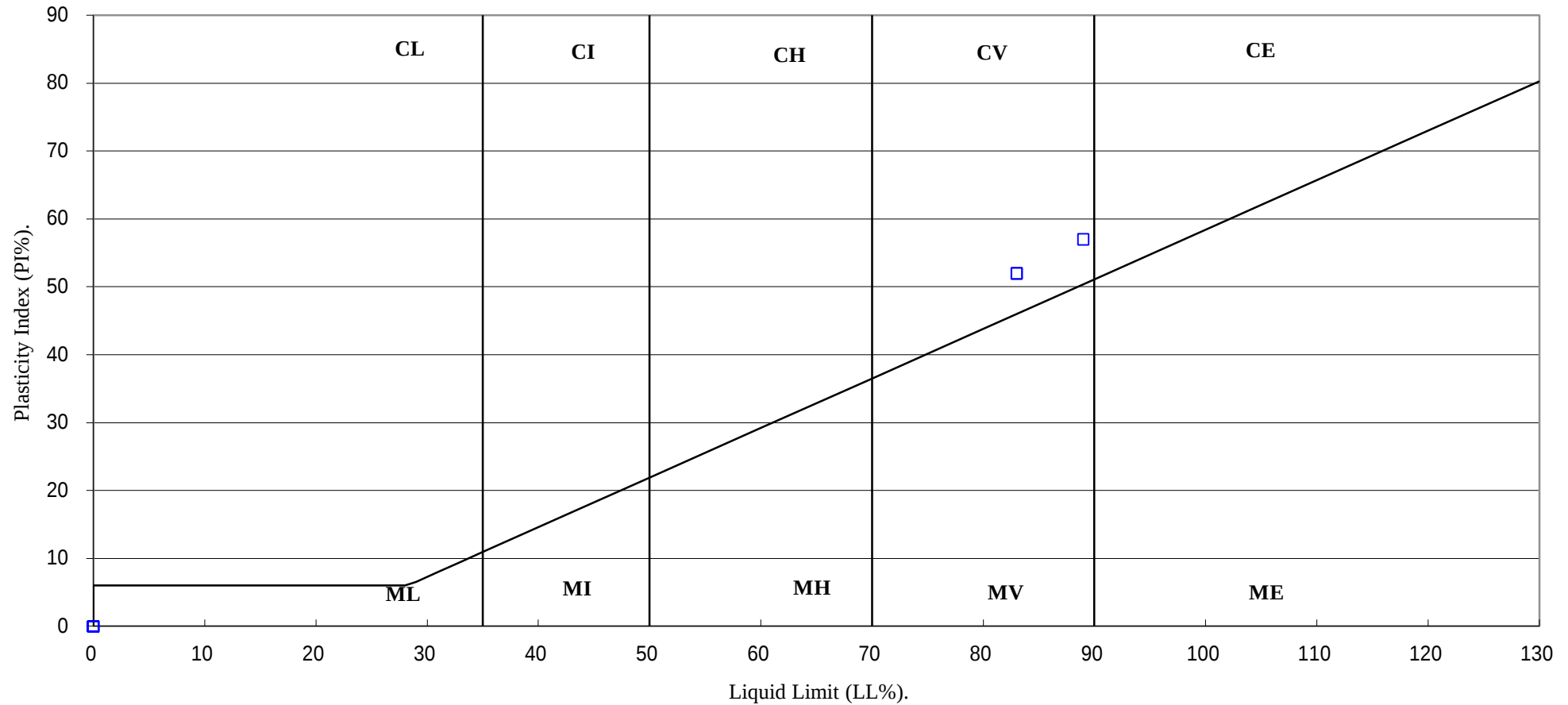
Contract No:

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Client Ref:

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PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

WBH113

Top Depth (m):

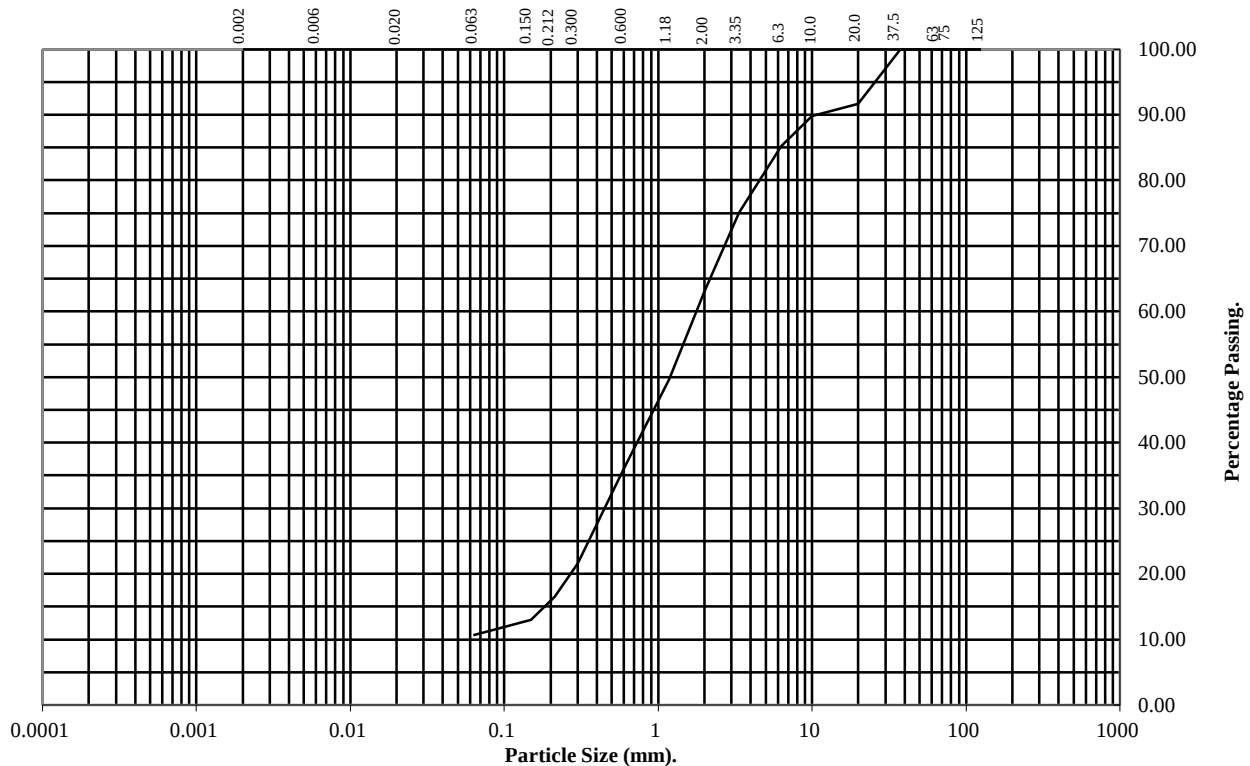
1.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	92
10	90
6.3	85
3.35	75
2	63
1.18	50
0.6	36
0.3	22
0.212	16
0.15	13
0.063	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	37
Sand	52
Silt/Clay	11

Remarks:

See Summary of Soil Descriptions



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Contract No:
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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WBH113

Top Depth (m):

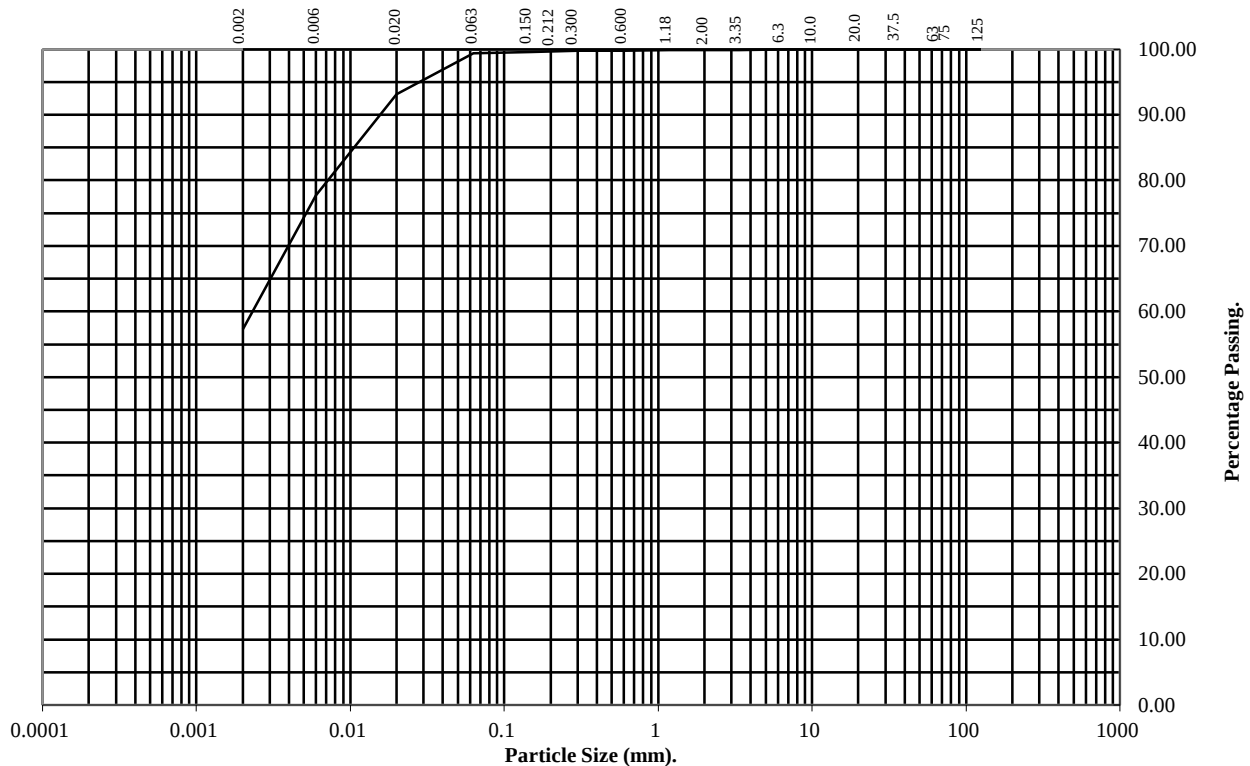
8.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	100
0.15	100
0.063	99

Particle Diameter	Percentage Passing
0.02	93
0.006	78
0.002	57

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	1
Silt	42
Clay	57

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WBH113

Top Depth (m):

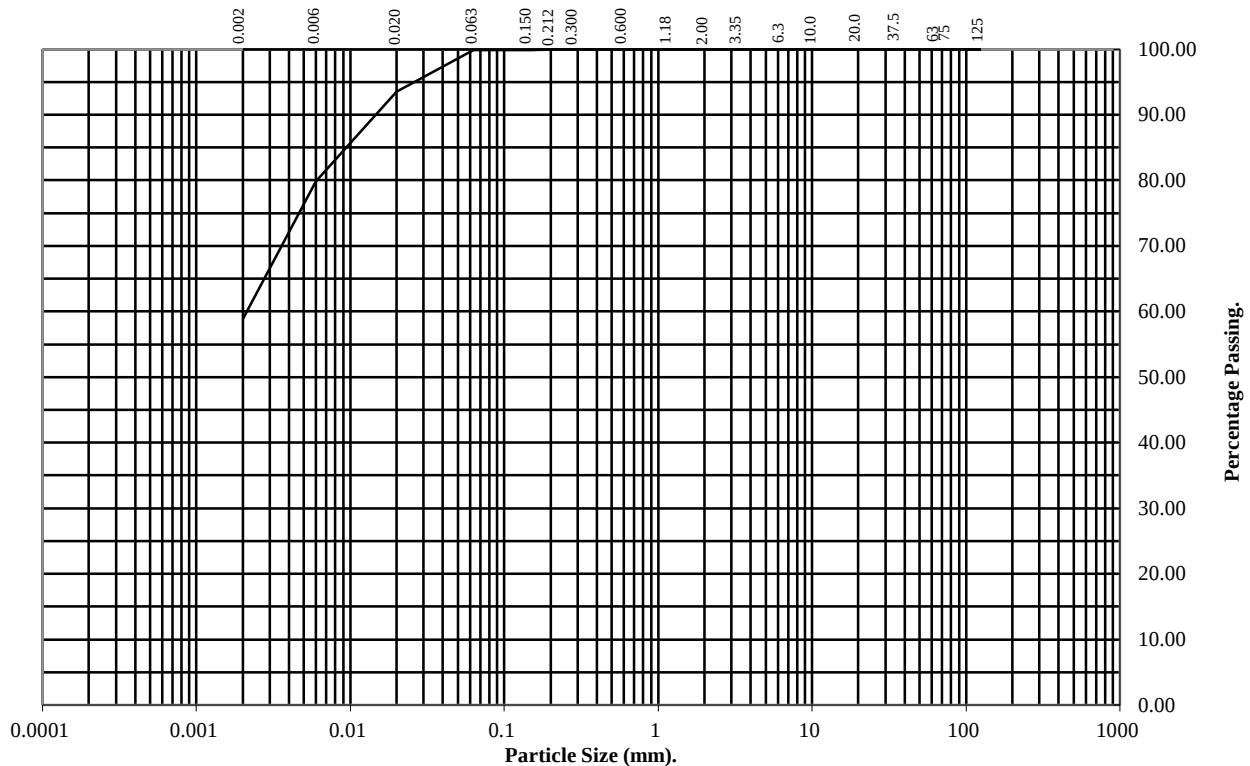
17.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	100
0.15	100
0.063	100

Particle Diameter	Percentage Passing
0.02	94
0.006	80
0.002	59

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	0
Silt	41
Clay	59

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WBH113

Top Depth (m):

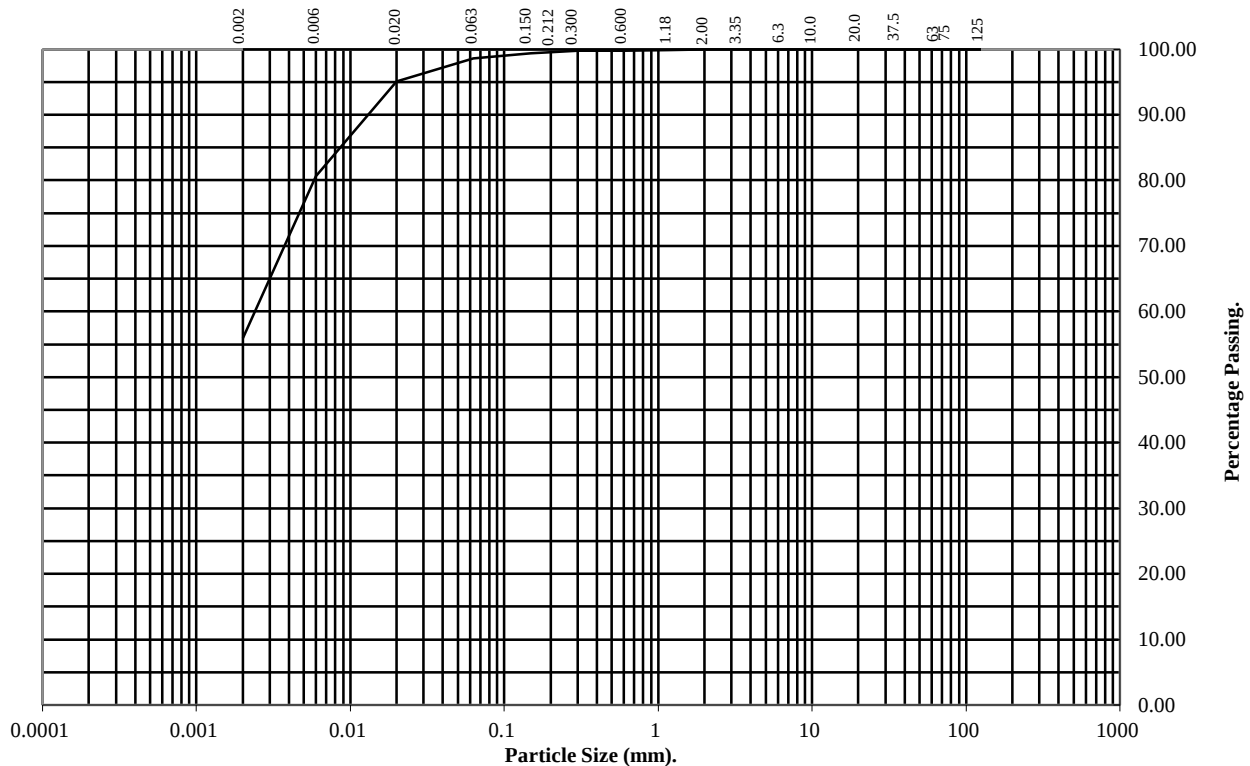
26.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	100
0.15	99
0.063	99

Particle Diameter	Percentage Passing
0.02	95
0.006	81
0.002	56

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	1
Silt	43
Clay	56

Remarks:

See Summary of Soil Descriptions



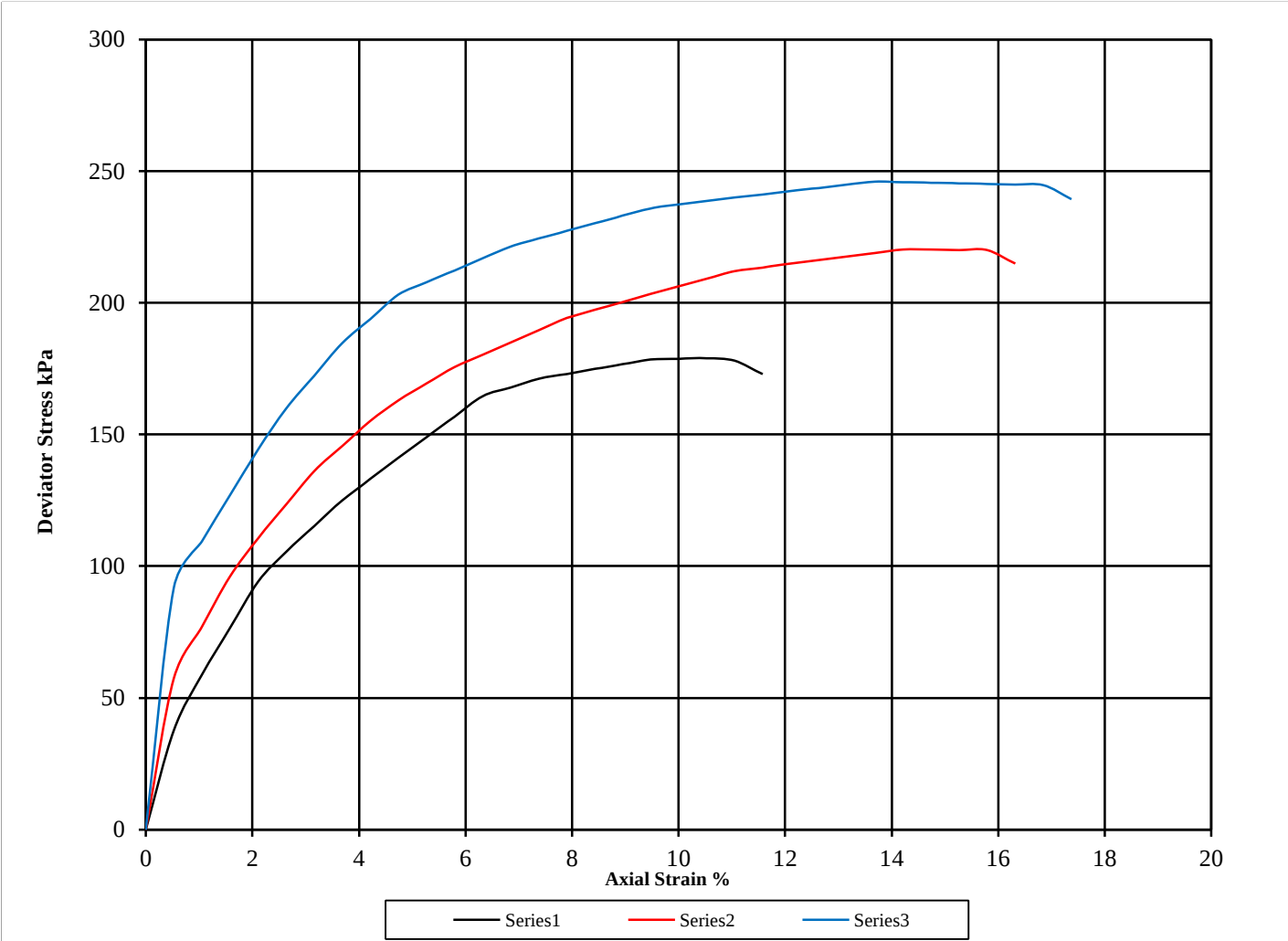
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Client Ref:
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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION
WITHOUT MEASUREMENT OF PORE PRESSURE
BS1377 : Part7 : 1990: Clause 8

Hole Number: WBH113 Top Depth (m): 7.50
Sample Number: Base Depth (m):
Sample Type: U



Diameter (mm):		38.0	Height (mm):		76.0	Test:	3x38mm Samples.			Remarks
Specimen	Specimen Depth	Moisture	Bulk	Dry	Cell	Deviator	Shear	Failure	Mode	Undisturbed Sample Specimens obtained by use of 3x38mm cutters Rate of strain - 2%/min Latex membrane used 0.2mm See summary of soil descriptions
		Content	Density	Density	Pressure	Stress	Strength	Strain	of	
		(%)	(Mg/m3)	(Mg/m3)	(kPa)	(kPa)	(kPa)	(%)	Failure	
1	7.50	25	1.86	1.49	75	179	90	10.5	Brittle	
2	7.50	25	1.86	1.48	150	220	110	14.2	Brittle	
3	7.50	25	1.86	1.48	300	246	123	13.7	Brittle	

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

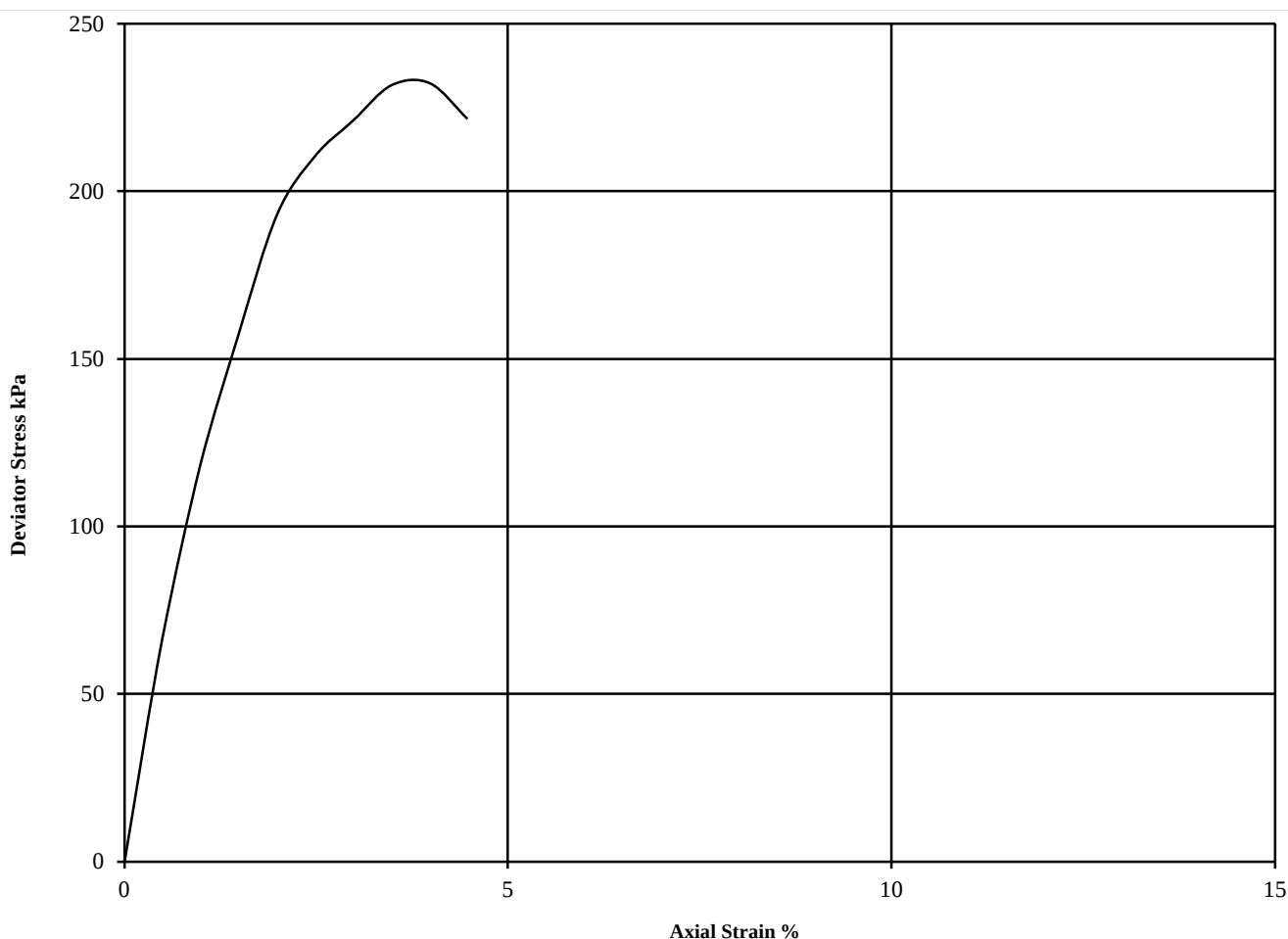
Hole Number: WBH113

Top Depth (m): 16.50

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions
					$(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	28	1.94	1.52	330	232	116	4.0	Brittle	



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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

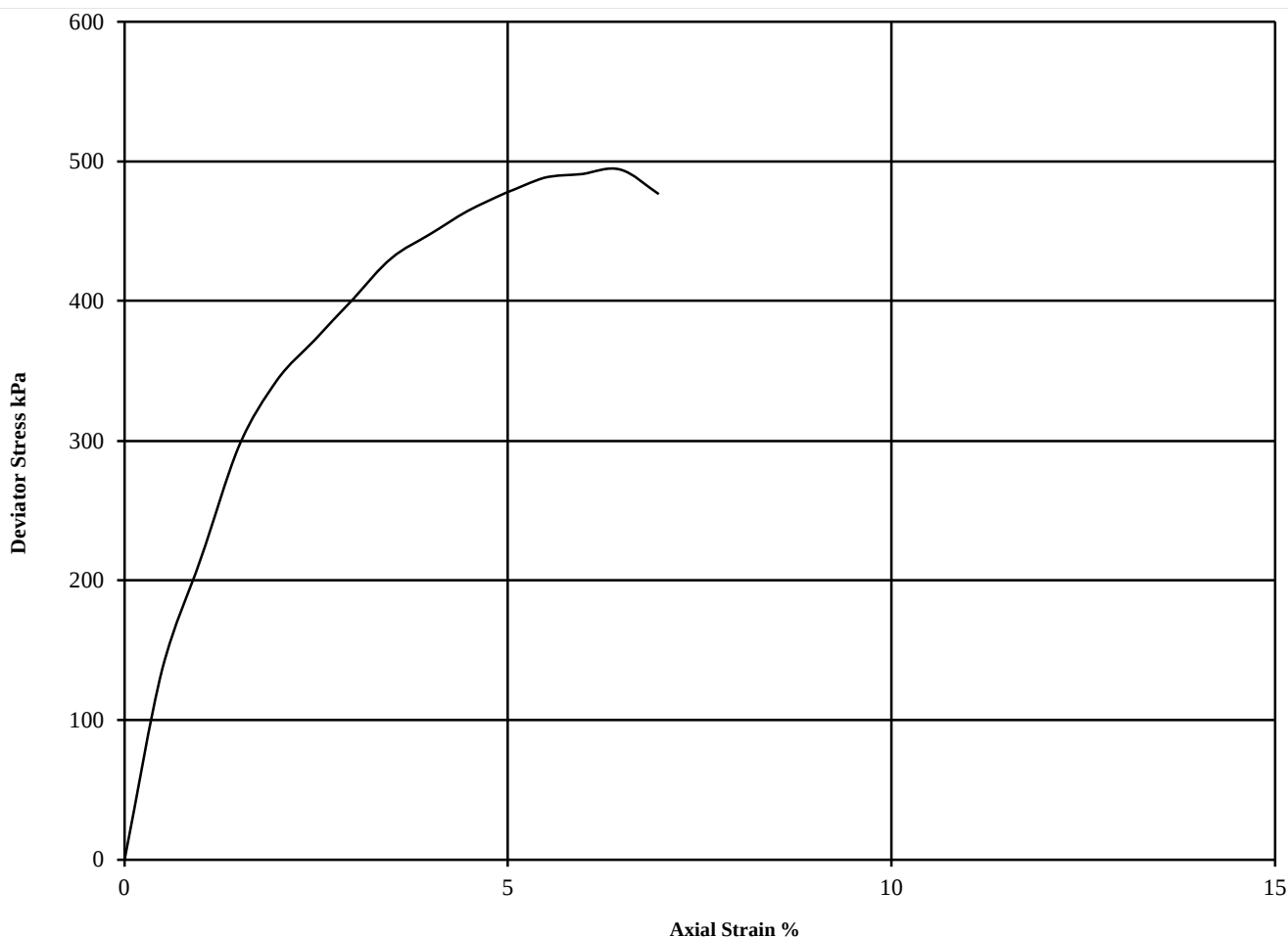
Hole Number: WBH113

Top Depth (m): 34.50

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions
					$(\frac{1}{2} \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	26	1.86	1.47	690	494	247	6.5	Brittle	



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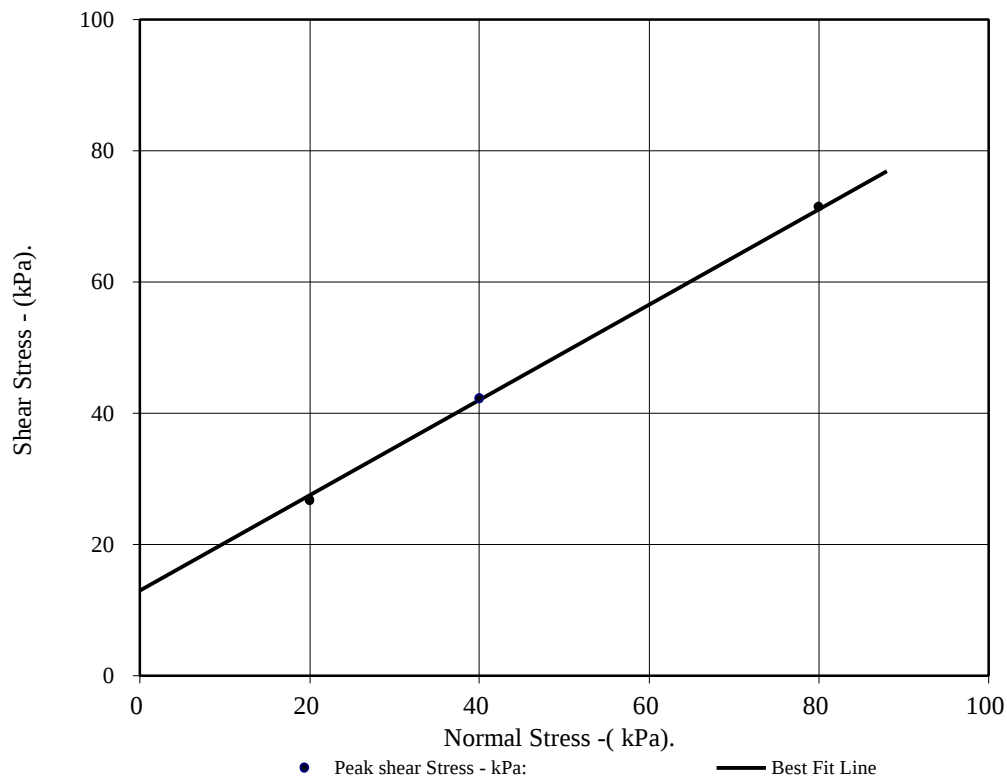
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CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4

Hole Number:	WBH113		Top Depth:	2.00	
Sample Number:			Base Depth:		
Sample Conditions:	Dry		Sample Type	B	
Particle Density - Mg/m3:	2.65	Assumed	Remarks:		
Sample Preparation:	Material tested passing 2mm sieve Remoulded using hand tamped effort.				
Sample Description:	See summary of soil descriptions.				
STAGE			1	2	3
Initial Conditions					
Height - mm:			19.99	19.99	19.99
Length - mm:			60.05	60.05	60.05
Moisture Content - %:			17	17	17
Bulk Density - Mg/m3:			2.10	2.10	2.10
Dry Density - Mg/m3:			1.79	1.79	1.79
Voids Ratio:			0.479	0.479	0.480
Normal Pressure- kPa			20	40	80
Consolidation Stage					
Consolidated Height - mm:			19.88	19.69	19.43
Shearing Stage					
Rate of Strain - mm/min			0.60	0.60	0.60
Displacement at peak shear stress - mm			2.71	3.01	3.62
Peak shear Stress - kPa:			27	42	72
Final Consolidated Conditions					
Moisture Content - %:			16	16	15
Bulk Density - Mg/m3:			2.11	2.13	2.16
Dry Density - Mg/m3:			1.83	1.84	1.88
Peak					
Angle of Shearing Resistance:(0)			36		
Effective Cohesion - kPa:			13		



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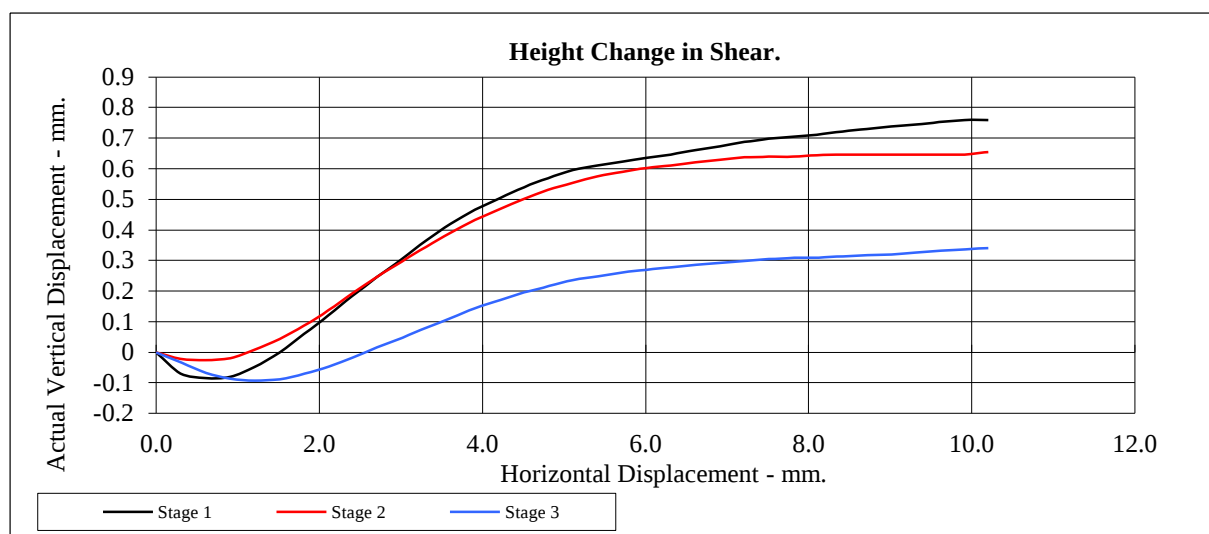
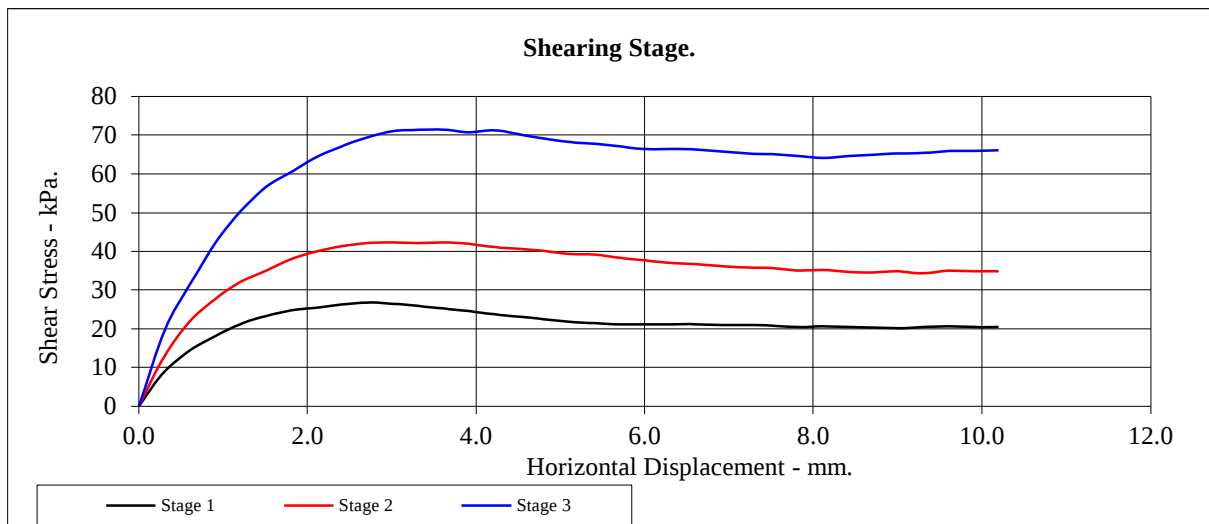
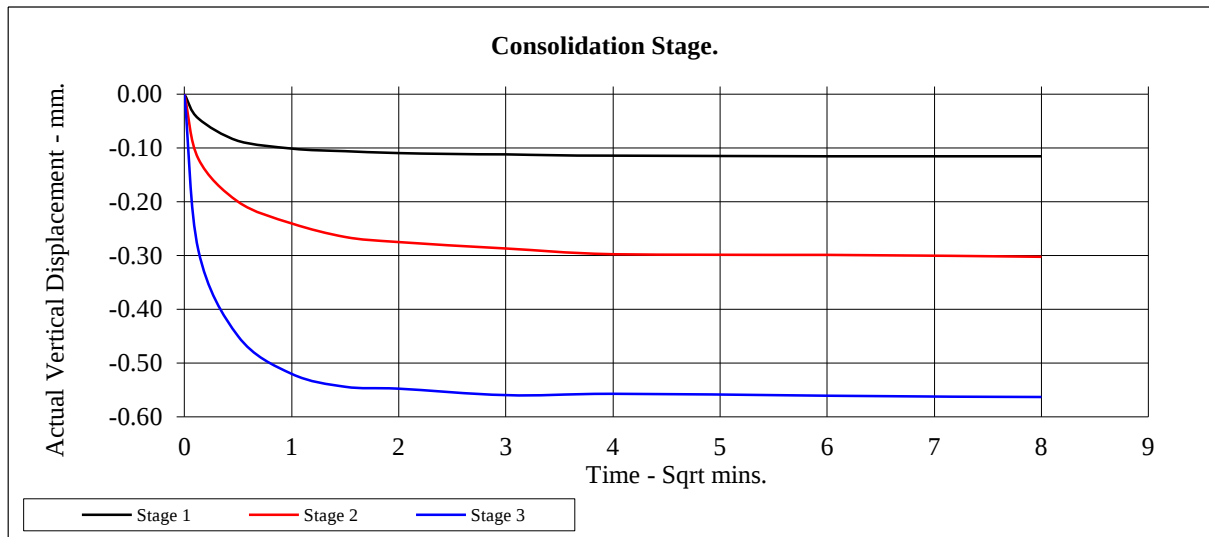
Project Otter

Contract No:
PSL22/7304
Client Ref:
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CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4

Hole Number:	WBH113	Top Depth:	2.00
Sample Number:		Base Depth:	



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Contract No:
PSL22/7304
Client Ref:
WIE71469



LABORATORY REPORT



4043

Contract Number: PSL22/7302

Report Date: 20 December 2022
Client's Reference: WIE17469-WBH114
Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Jamie Parr

Contract Title: Project Otter
Date Received: 14/11/2022
Date Commenced: 14/11/2022
Date Completed: 15/12/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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Checked and Approved Signatories:

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S Eyre
(Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WBH114		B	0.80		Brown sandy GRAVEL.
WBH114		B	1.50		Brown mottled grey slightly gravelly very sandy CLAY.
WBH114		B	4.00		Brown mottled grey slightly gravelly very sandy CLAY.
WBH114		U	6.00		Brown mottled grey CLAY.
WBH114		B	7.00		Brown mottled grey CLAY.
WBH114		U	12.00		Stiff brown mottled grey CLAY.
WBH114		B	17.00		Brown mottled grey CLAY.
WBH114		U	18.00		Very stiff brown mottled grey CLAY.
WBH114		U	24.00		Stiff grey slightly sandy CLAY.
WBH114		U	30.00		Grey slightly sandy CLAY.
WBH114		U	36.00		Stiff grey CLAY.



Project Otter

Contract No:

PSL22/7302

Client Ref:

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SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



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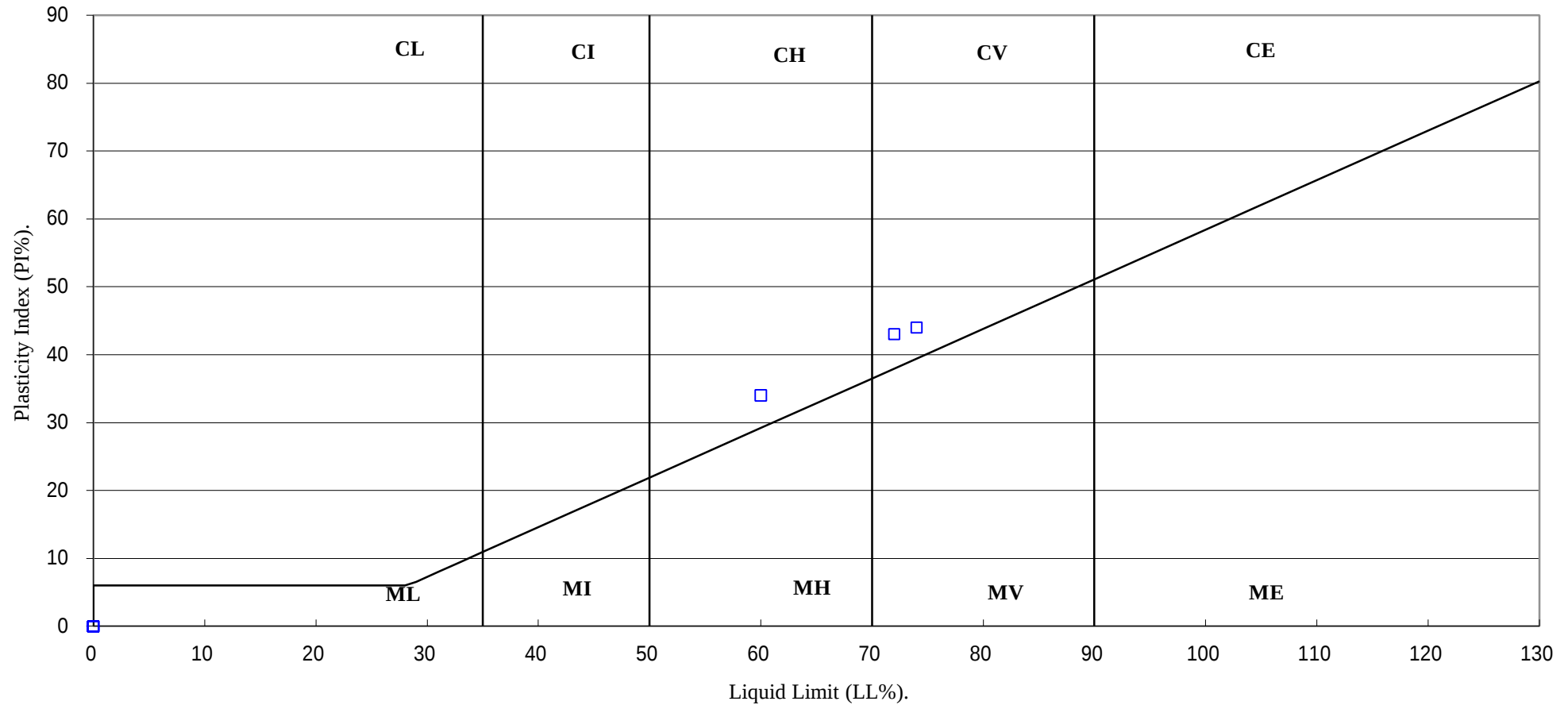
Contract No:

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Client Ref:

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PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



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Client Ref:

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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

WBH114

Top Depth (m):

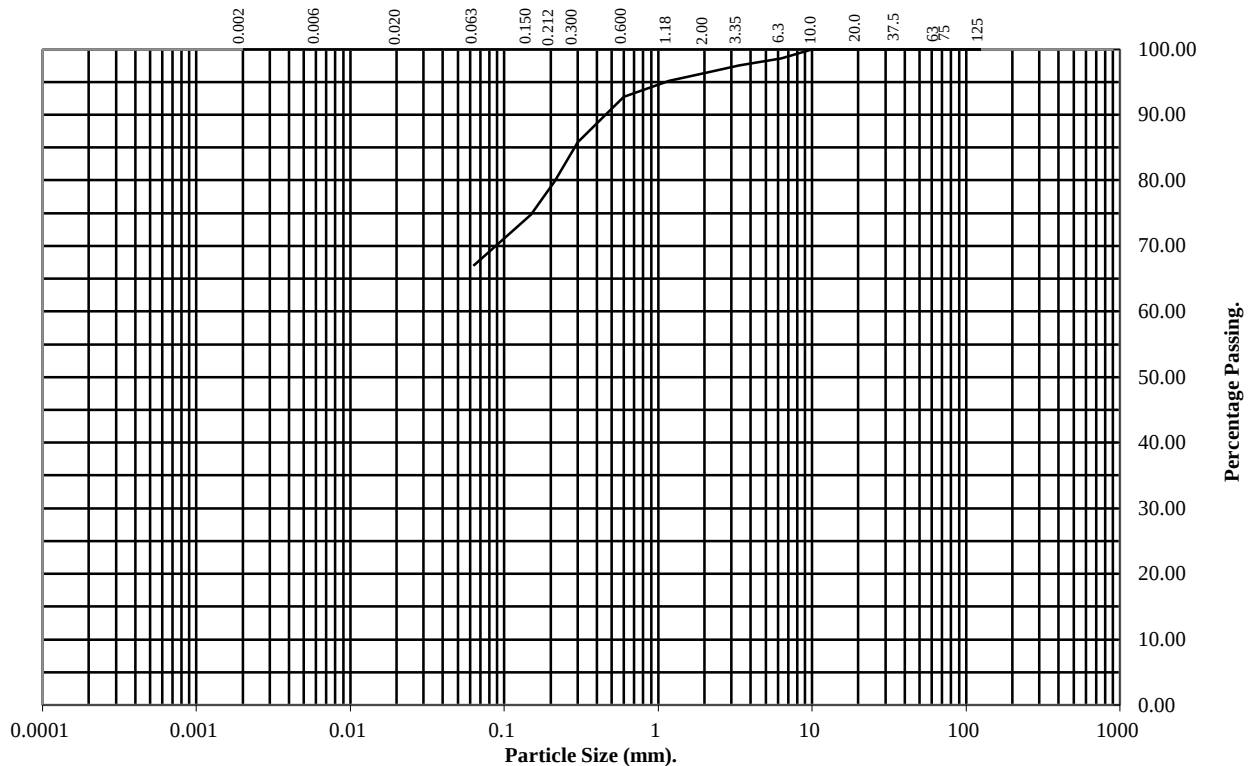
1.50

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	97
2	96
1.18	95
0.6	93
0.3	86
0.212	80
0.15	75
0.063	67

Soil Fraction	Total Percentage
Cobbles	0
Gravel	4
Sand	29
Silt/Clay	67

Remarks:

See Summary of Soil Descriptions



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Client Ref:
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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WBH114

Top Depth (m):

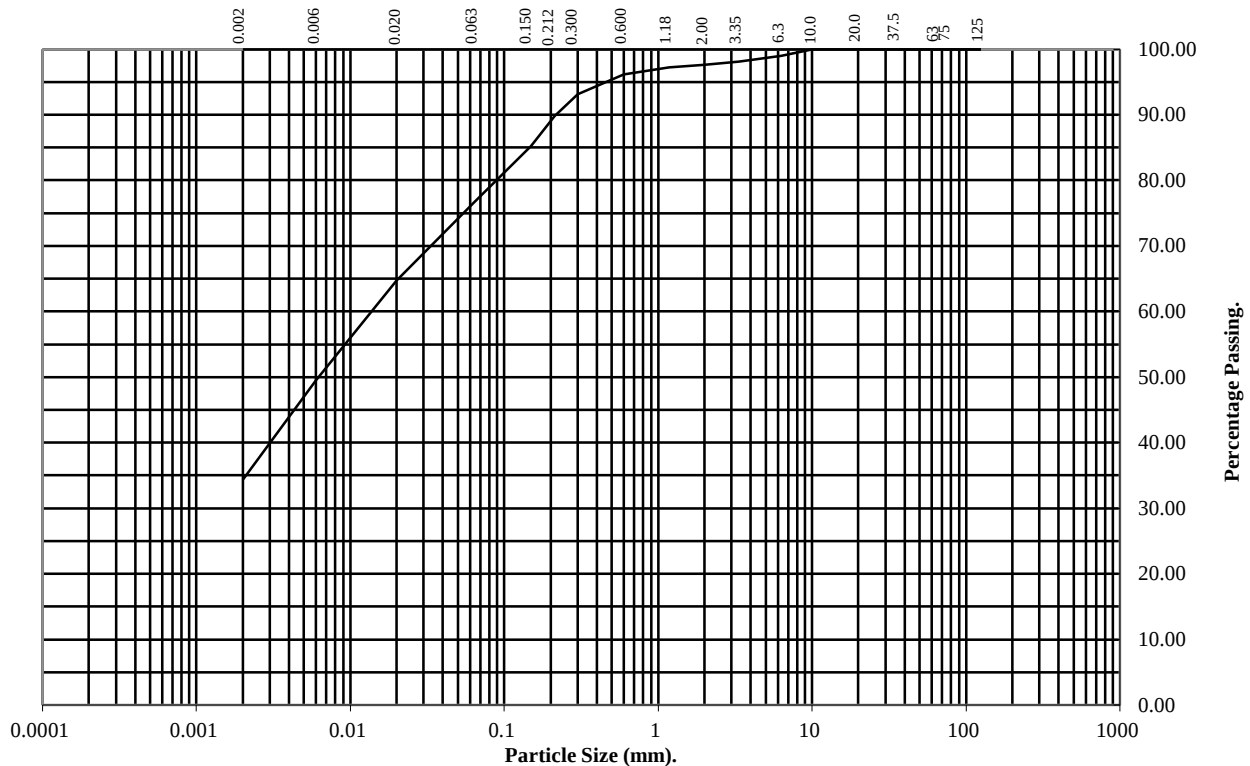
4.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	98
2	98
1.18	97
0.6	96
0.3	93
0.212	90
0.15	85
0.063	77

Particle Diameter	Percentage Passing
0.02	65
0.006	49
0.002	34

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	21
Silt	43
Clay	34

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WBH114

Top Depth (m):

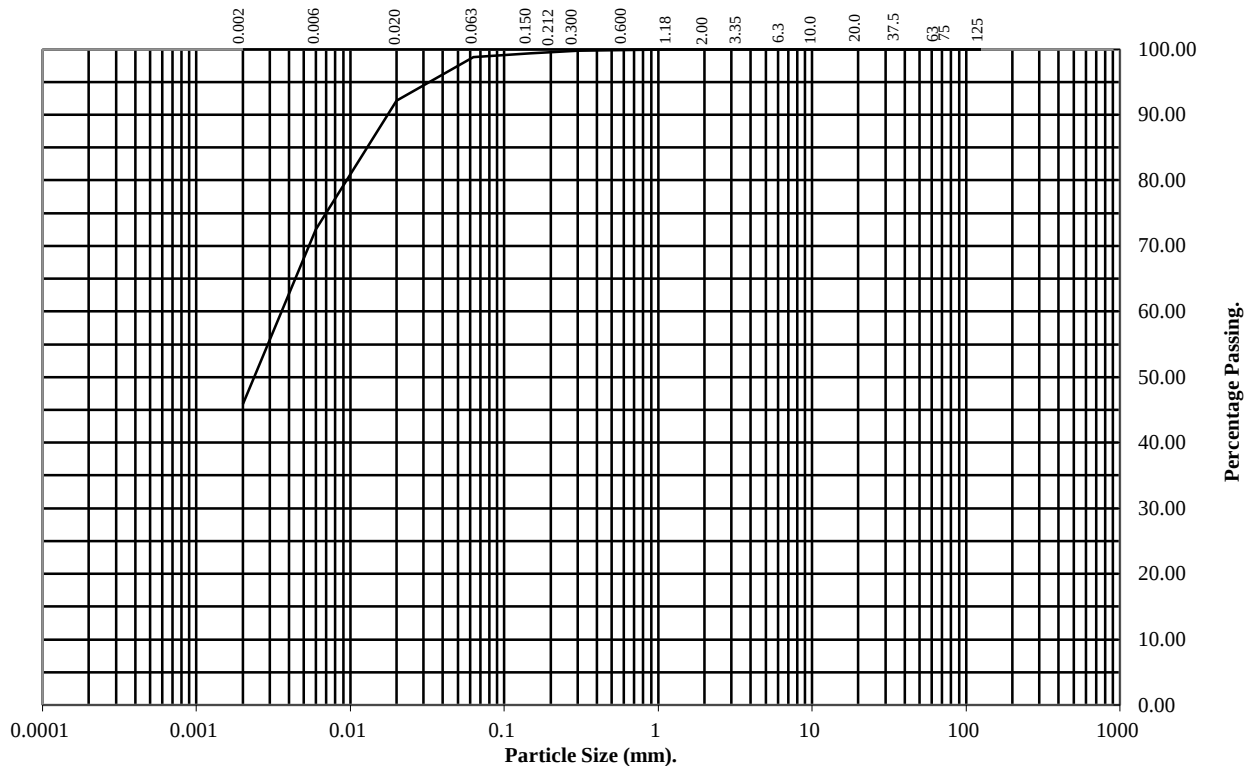
7.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	100
0.15	99
0.063	99

Particle Diameter	Percentage Passing
0.02	92
0.006	72
0.002	46

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	1
Silt	53
Clay	46

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WBH114

Top Depth (m):

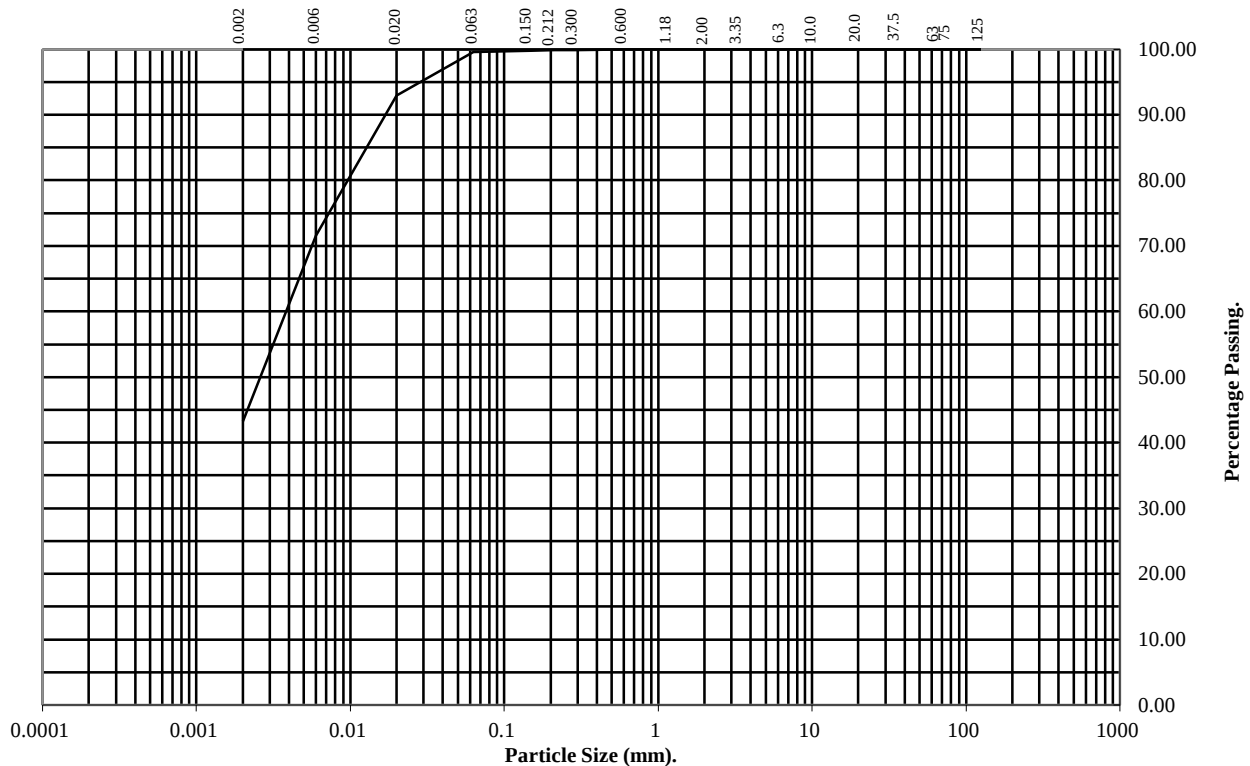
17.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	100
0.15	100
0.063	100

Particle Diameter	Percentage Passing
0.02	93
0.006	72
0.002	43

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	0
Silt	57
Clay	43

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WBH114

Top Depth (m):

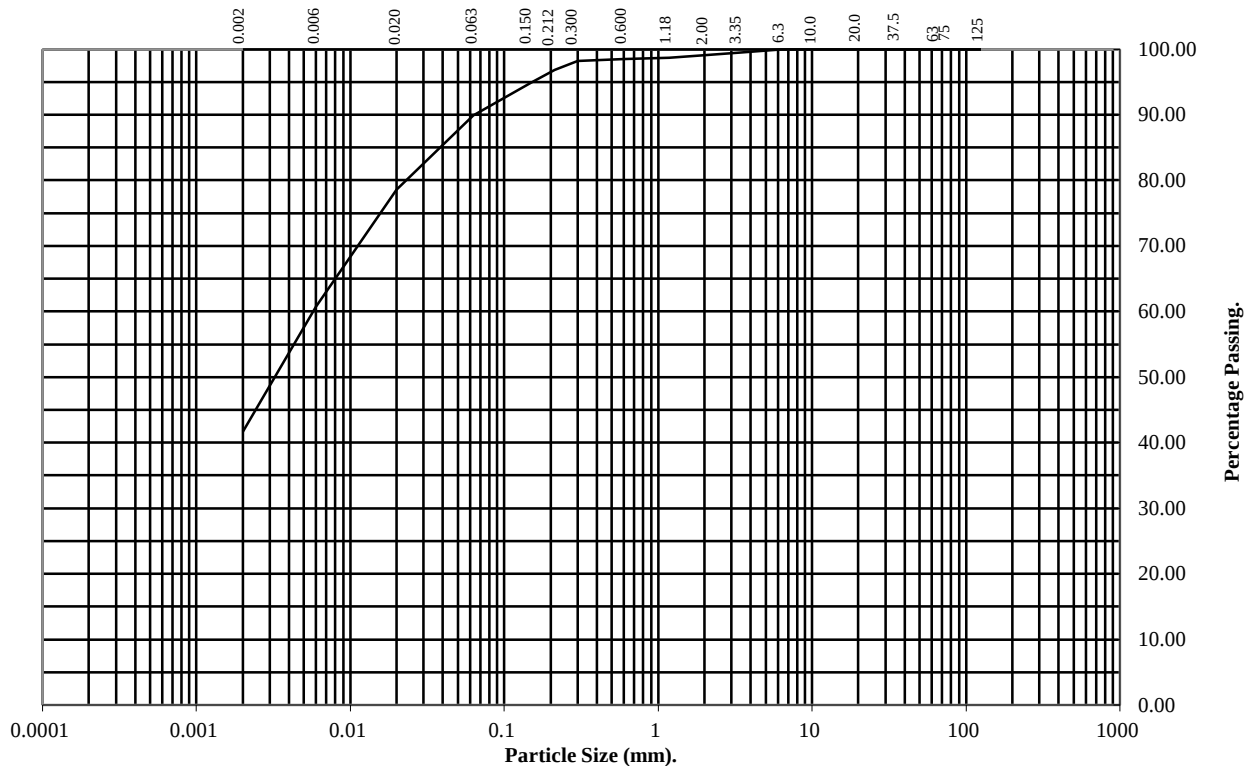
30.00

Sample Number:

Base Depth(m):

Sample Type:

U



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	99
1.18	99
0.6	98
0.3	98
0.212	97
0.15	95
0.063	90

Particle Diameter	Percentage Passing
0.02	79
0.006	61
0.002	42

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	9
Silt	48
Clay	42

Remarks:

See Summary of Soil Descriptions



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Contract No:
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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

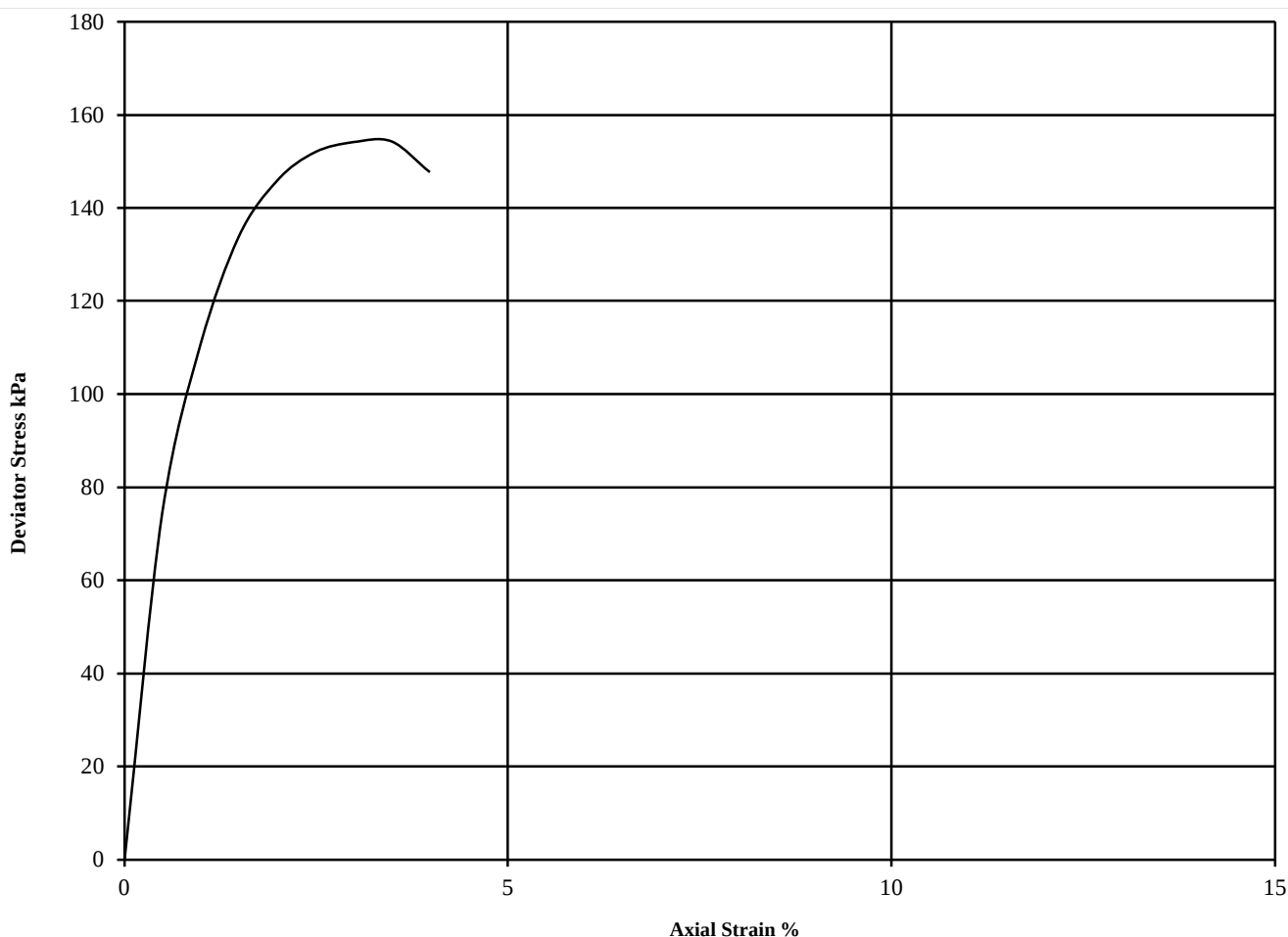
Hole Number: WBH114

Top Depth (m): 12.00

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions
					$(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	28	1.92	1.50	240	154	77	3.5	Brittle	



4043

PSL

Professional Soils Laboratory

Project Otter

Contract No:

PSL22/7302

Client Ref:

WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

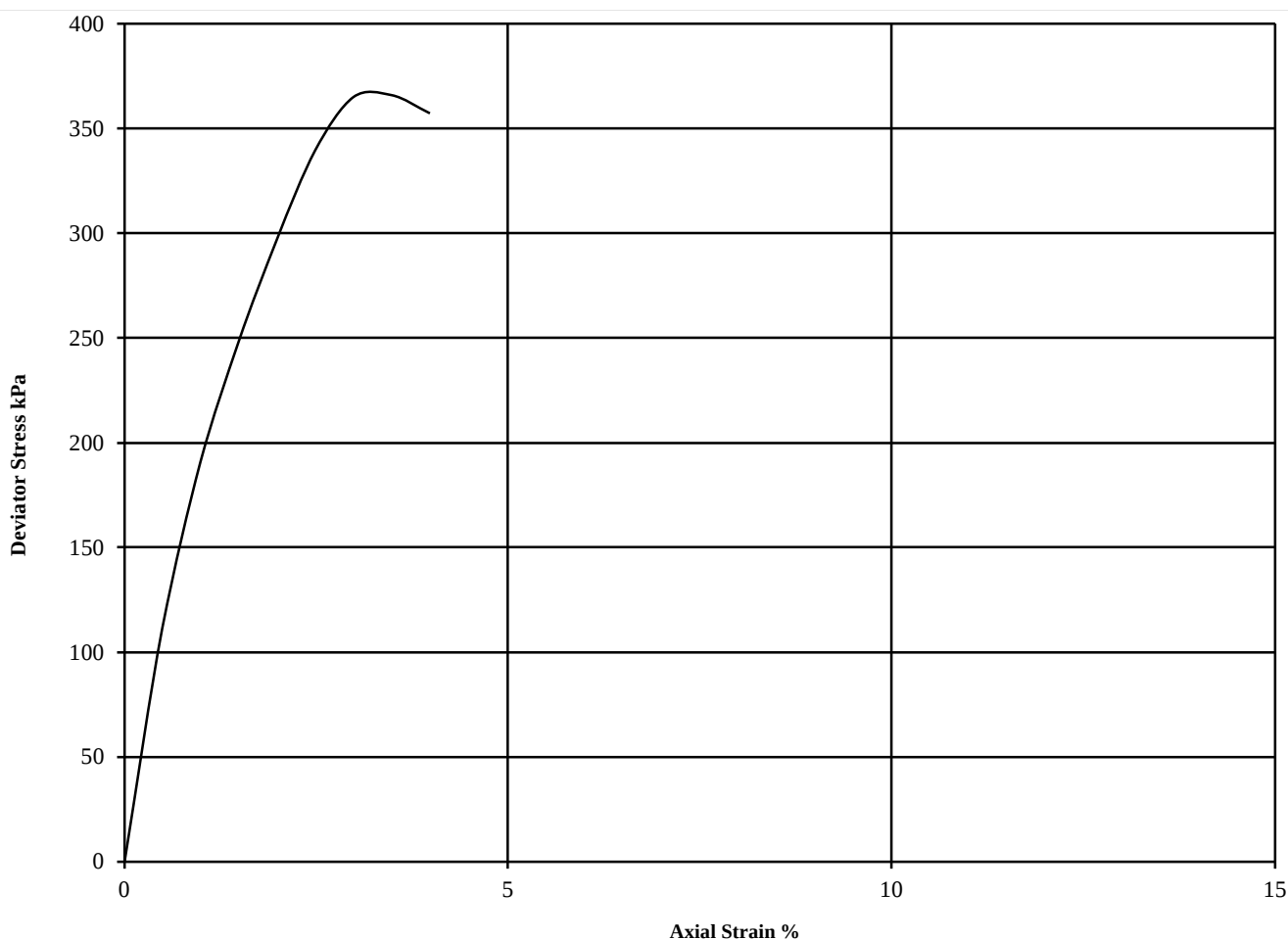
Hole Number: WBH114

Top Depth (m): 18.00

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions
					$(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	27	1.94	1.52	360	366	183	3.5	Brittle	



4043

PSL

Professional Soils Laboratory

Project Otter

Contract No:

PSL22/7302

Client Ref:

WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: WBH114

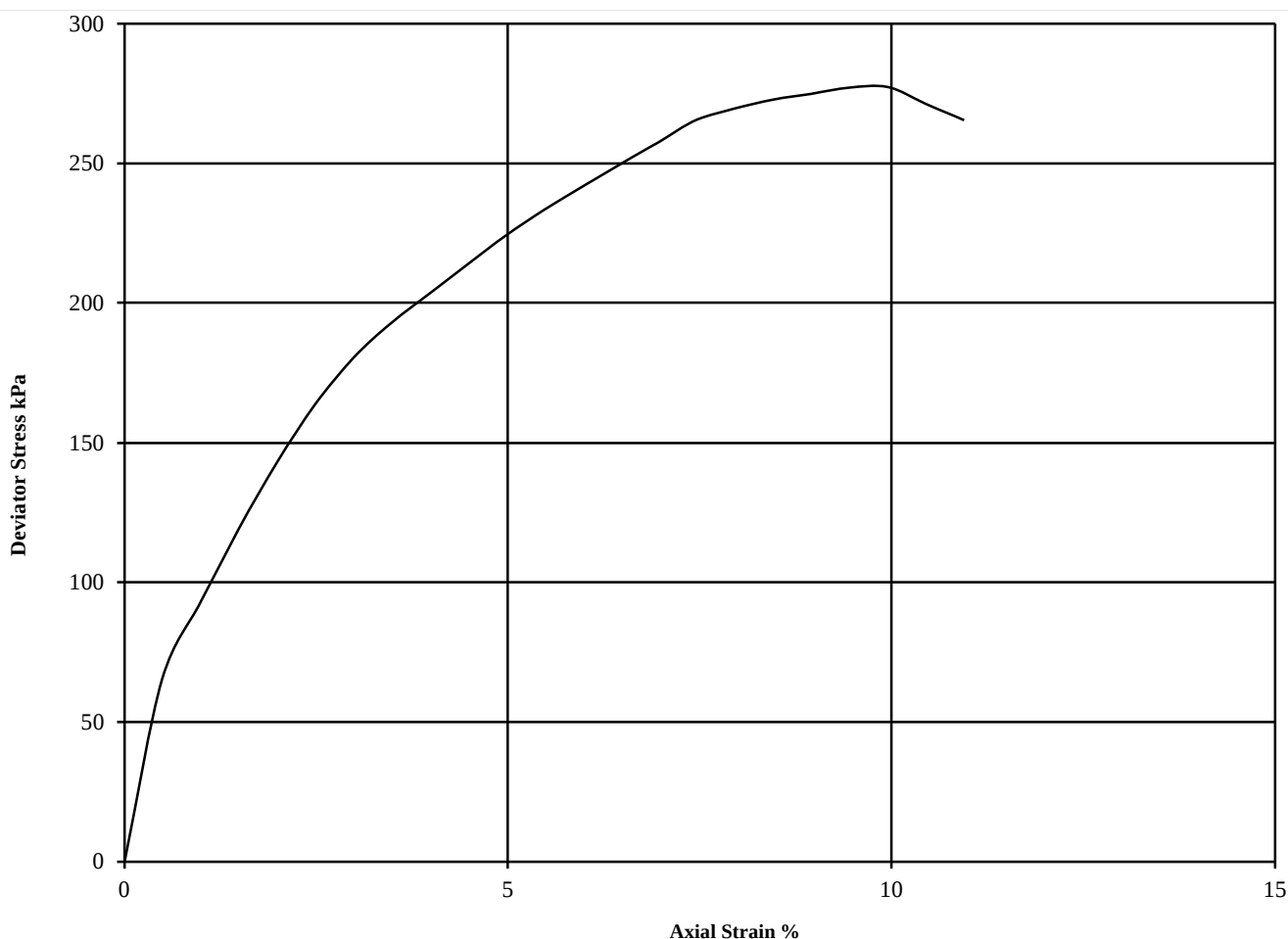
Top Depth (m): 24.00

Sample Number:

Base Depth (m):

Sample Type

U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35 See summary of soil descriptions
					$(\frac{1}{2} \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	26	1.90	1.51	120	277	139	10.0	Brittle	

* Single stage test due to early brittle failure



4043

PSL

Professional Soils Laboratory

Project Otter

Contract No:

PSL22/7302

Client Ref:

WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

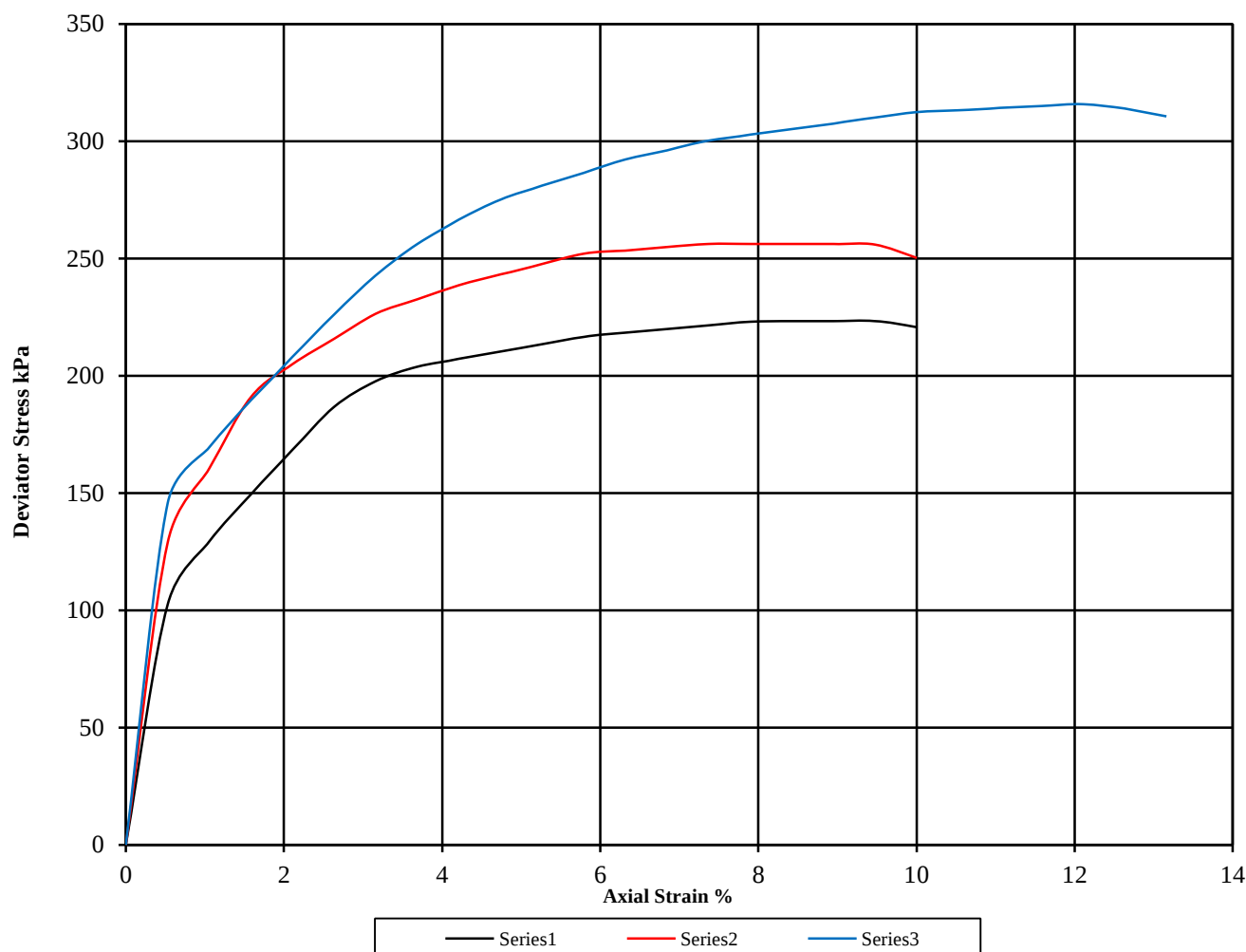
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: WBH114 Top Depth (m): 36.00

Sample Number: Base Depth (m):

Sample Type: U



Diameter (mm):		Height (mm):		Test:		3x38mm Samples.				Remarks
Specimen	Specimen Depth	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Shear Strength (kPa)	Failure Strain (%)	Mode of Failure	
1	36.00	29	1.76	1.37	360	223	112	9.5	Brittle	
2	36.00	29	1.76	1.37	720	256	128	7.4	Brittle	
3	36.00	29	1.76	1.37	1440	316	158	12.1	Brittle	

Set of 38mm due to intact material



Project Otter

Contract No:
PSL22/7302
Client Ref:
WIE17469

CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

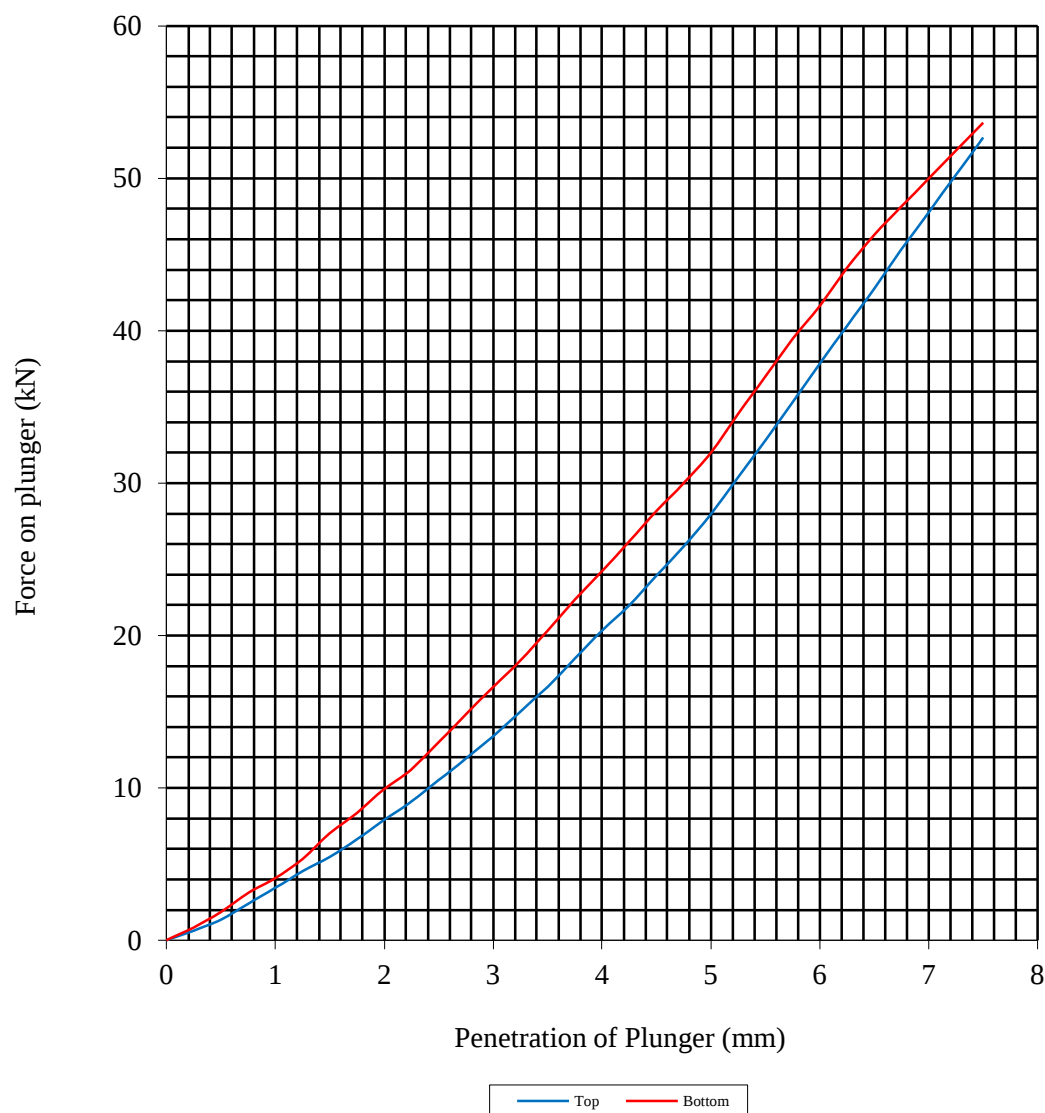
Hole Number: WBH114

Top Depth (m): 0.80

Sample Number:

Base Depth (m):

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	11	Surcharge Kg:	4.20	Sample Top	11	Sample Top	139.9
Bulk Density Mg/m3:	2.24	Soaking Time hrs	0	Sample Bottom	11	Sample Bottom	160.1
Dry Density Mg/m3:	2.01	Swelling mm:	0.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		12					
Compaction Conditions		2.5kg					



PSL
Professional Soils Laboratory

Project Otter

Contract No:
PSL22/7302
Client Ref:
WIE17469

ONE DIMENSIONAL CONSOLIDATION TEST

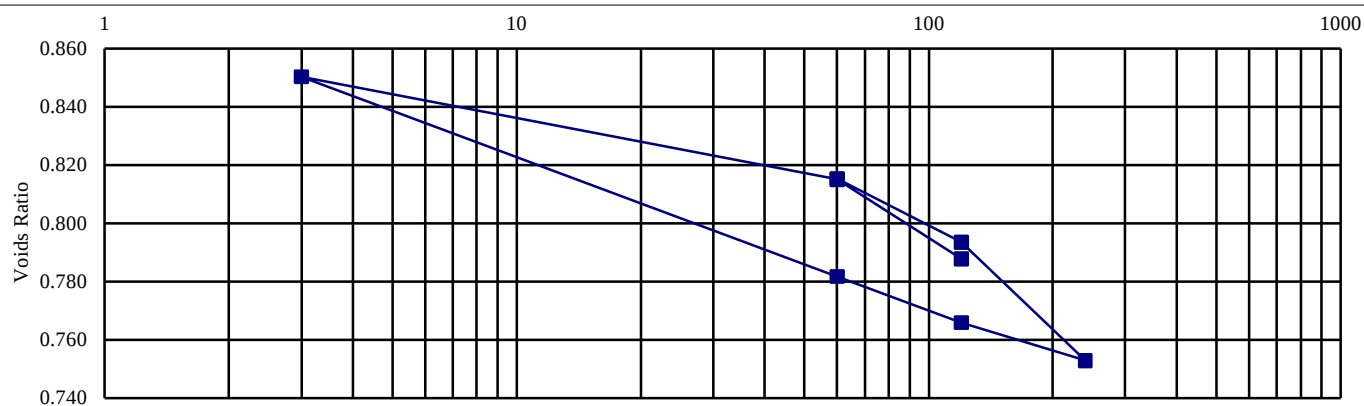
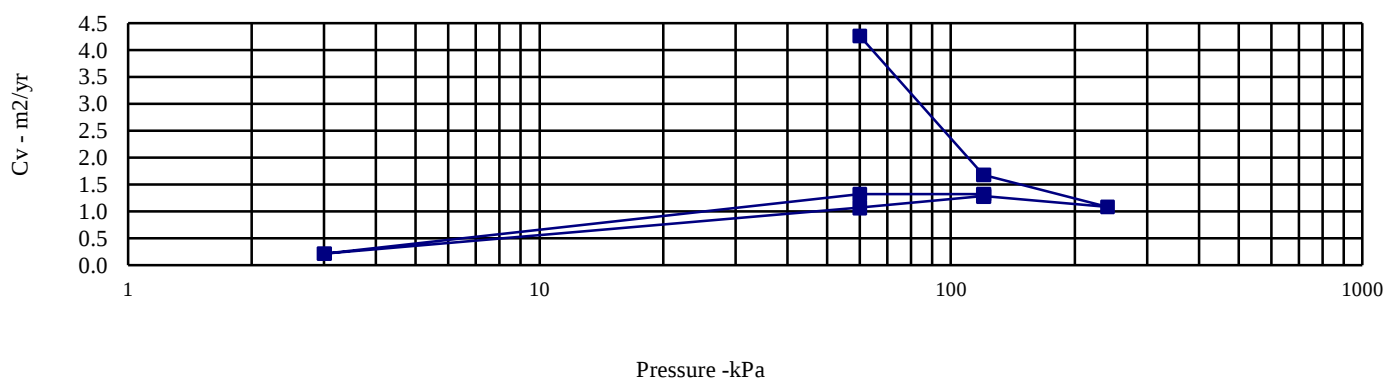
BS 1377: Part 5: 1990: Clause 3

Hole Number: WBH114 Top Depth (m): 6.00

Sample Number: Base Depth (m) : 6.00

Sample Type: U

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	32	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	1.91	0	60	0.213	4.264	Method used to	
Dry Density (Mg/m3):	1.44	60	120	0.201	1.682	determine CV:	T90
Voids Ratio:	0.839	120	240	0.189	1.086	Nominal temperature	
Degree of saturation:	102.4	240	120	0.062	1.285	during test ' C:	20
Height (mm):	20.02	120	60	0.149	1.065	Remarks:	
Diameter (mm)	75.01	60	3	0.674	0.214	See summary of soil descriptions	
Particle Density (Mg/m3):	2.65	3	60	0.334	1.325		
Assumed		60	120	0.250	1.322		



Project Otter

Contract No:
PSL22/7302
Client Ref:
WIE17469



Professional Soils Laboratory

TEST AMENDMENT NOTICE

(Please tick boxes as appropriate)

From: Matt Wooldridge

To: Jamie Parr

Date: 7 / 12 / 2022

Laboratory Ref: PSL2217302

Contract Number:

Location: Project Otter

☒ BH ☐ TP Sample Number

Depth (m):

Sample Type: ☒ U ☐ B ☐ D ☐ W ☐ P ☐ C

Test/s:

WBH114 3.50 60

The above sample cannot be tested for the following reasons:

- ☒ The Sample has not been received
- ☐ There is insufficient material for BS1377: 1990 testing
 - Maximum Grain Size (Minimum 10%): ☐ Fine ☐ Medium ☐ Coarse
 - Sample Mass (kg):
 - Required Mass (kg):
- ☐ The Sample has been previously tested.
- ☐ The Sample has been misplaced in the Laboratory.
- ☐ The Sample is unsuitable for testing because:

Please advise action required:

- ☐ Perform original test on the following alternative Sample:
 - ☐ BH ☐ TP Sample Number: Depth (m):
 - Sample Type: ☐ U ☐ B ☐ D ☐ W ☐ P ☐ C
- ☐ Combine original Sample with the following sample:
 - ☐ BH ☐ TP Sample Number: Depth (m):
 - Sample Type: ☐ U ☐ B ☐ D ☐ W ☐ P ☐ C
- ☐ Perform the following alternative test/s on the original Sample
- ☐ Perform non-standard test on material available
- ☐ Take no further action.

Signed
(Project Engineer)

Date

8/12



Certificate of Analysis

Certificate Number 22-25483

Issued: 15-Dec-22

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 22-25483

Client Reference PSL22/7302

Order No (not supplied)

Contract Title WIE17469: Project Otter

Description One Soil sample.

Date Received 09-Dec-22

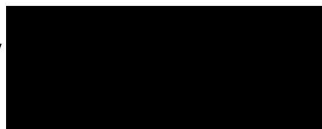
Date Started 09-Dec-22

Date Completed 15-Dec-22

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. 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 except in full, without the prior written approval of the laboratory.

Approved By



Kirk Bridgewood
General Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 22-25483

Client Ref PSL22/7302

Contract Title WIE17469: Project Otter

Lab No	2096368
Sample ID	WBH114
Depth	3.00
Other ID	
Sample Type	SOIL
Sampling Date	12/11/2022
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10
Inorganics				
pH	DETSC 2008#		pH	8.0
Chloride Aqueous Extract	DETSC 2055	1	mg/l	13
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	20
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	93
Sulphur as S, Total	DETSC 2320	0.01	%	0.03
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.08

Information in Support of the Analytical Results

Our Ref 22-25483
 Client Ref PSL22/7302
 Contract WIE17469: Project Otter

Containers Received & Deviating Samples

Lab No	Sample ID	Date		Containers Received	Holding time exceeded for tests	Inappropriate container for tests
		Sampled				
2096368	WBH114 3.00 SOIL	12/11/22		PT 500ml	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report



LABORATORY REPORT



Contract Number: PSL23/0045

Report Date: 17 January 2023
Client's Reference: WIE17469
Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Michael Berry

Contract Title: Project Otter

Date Received: 23/12/2022
Date Commenced: 23/12/2022
Date Completed: 17/1/2023

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:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)


T Watkins
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098
Email: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

Project Otter

Contract No:

PSL23/0045

Client Ref:

WIE17469

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



Project Otter

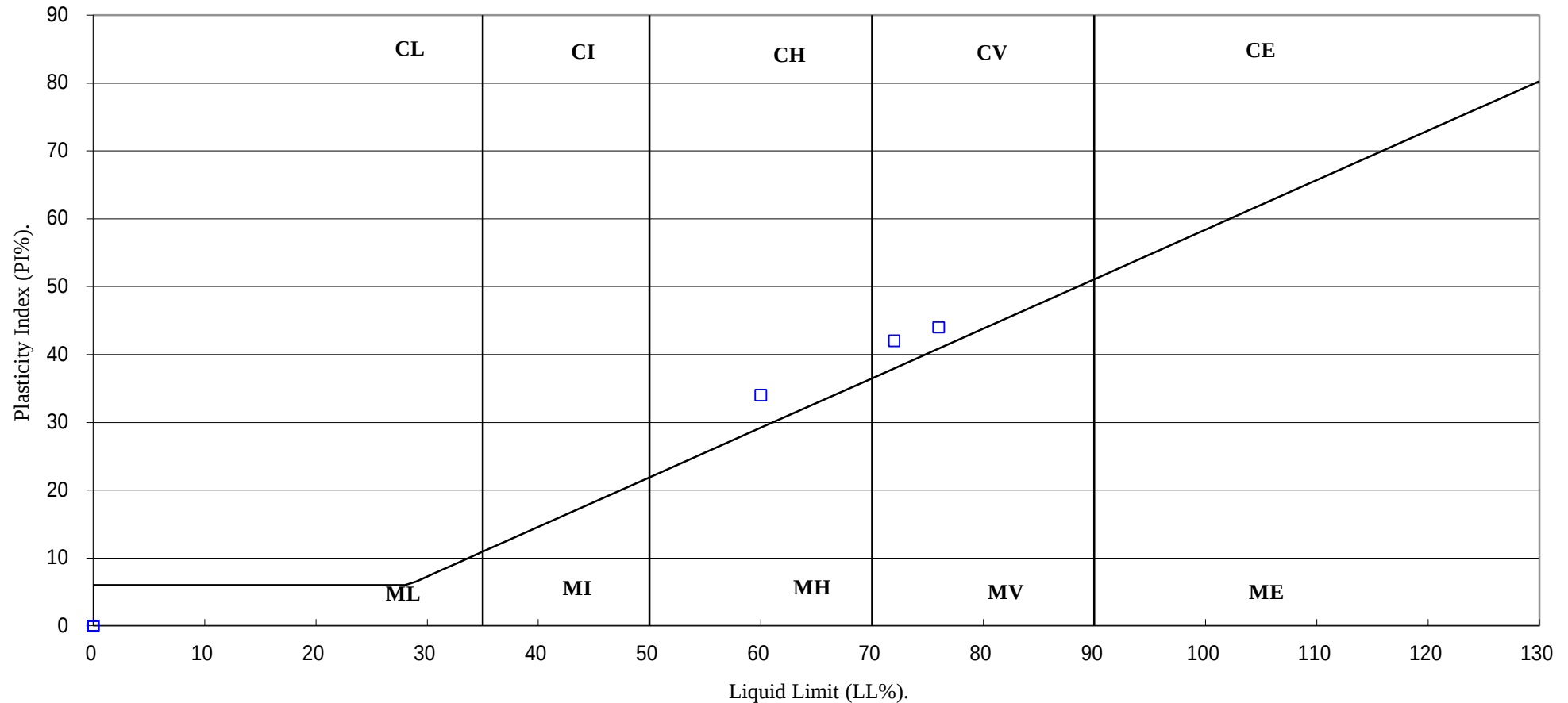
Contract No:

PSL23/0045

Client Ref:

WIE 7469

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



Project Otter

Contract No:

PSL23/0045

Client Ref:

WIE 7469

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

WBH115

Top Depth (m):

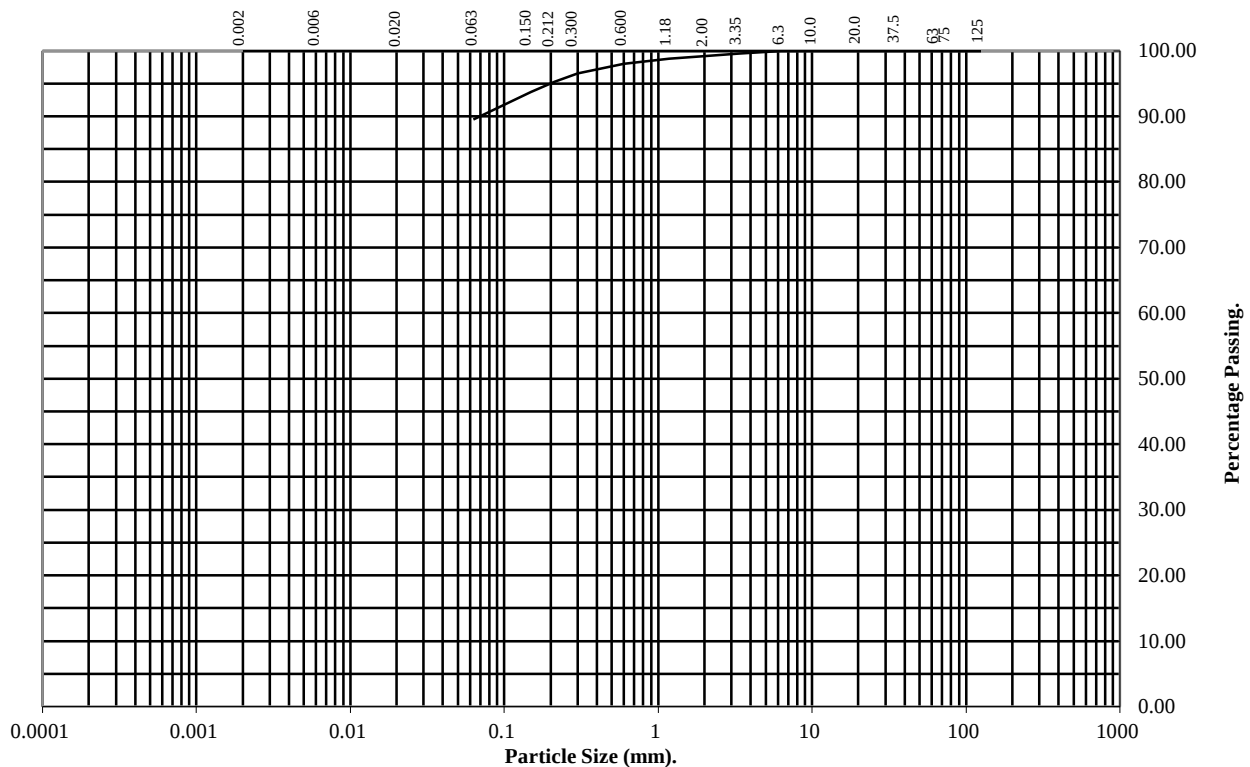
2.00

Sample Number:

Base Depth(m):

Sample Type:

D



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	98
0.3	97
0.212	95
0.15	94
0.063	90

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	9
Silt/Clay	90

Remarks:

See Summary of Soil Descriptions



Project Otter

Contract No:
PSL23/0045
Client Ref:
WIE17469

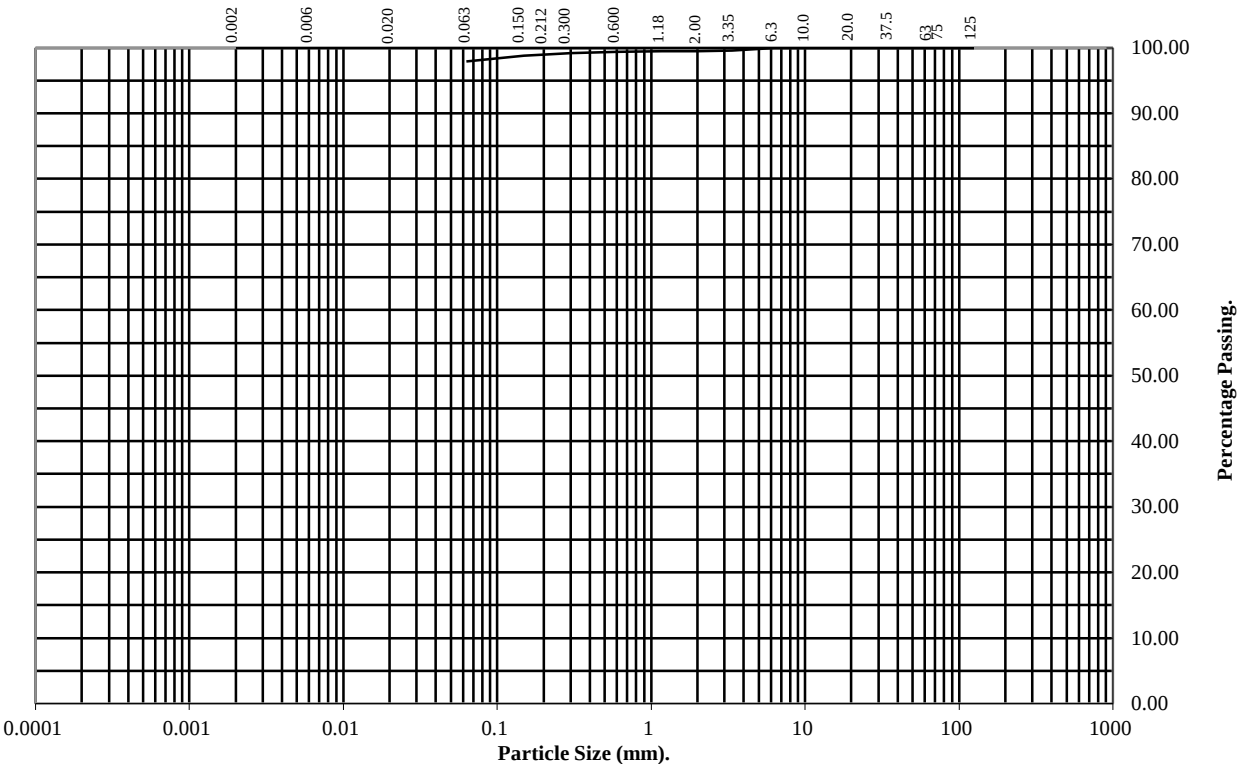
PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990
Wet Sieve, Clause 9.2

Hole Number: WBH115 Top Depth (m): 9.50

Sample Number: Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	99
0.3	99
0.212	99
0.15	99
0.063	98

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	1
Silt/Clay	98

Remarks:
See Summary of Soil Descriptions



Project Otter

Contract No:
PSL23/0045
Client Ref:
WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: WBH115

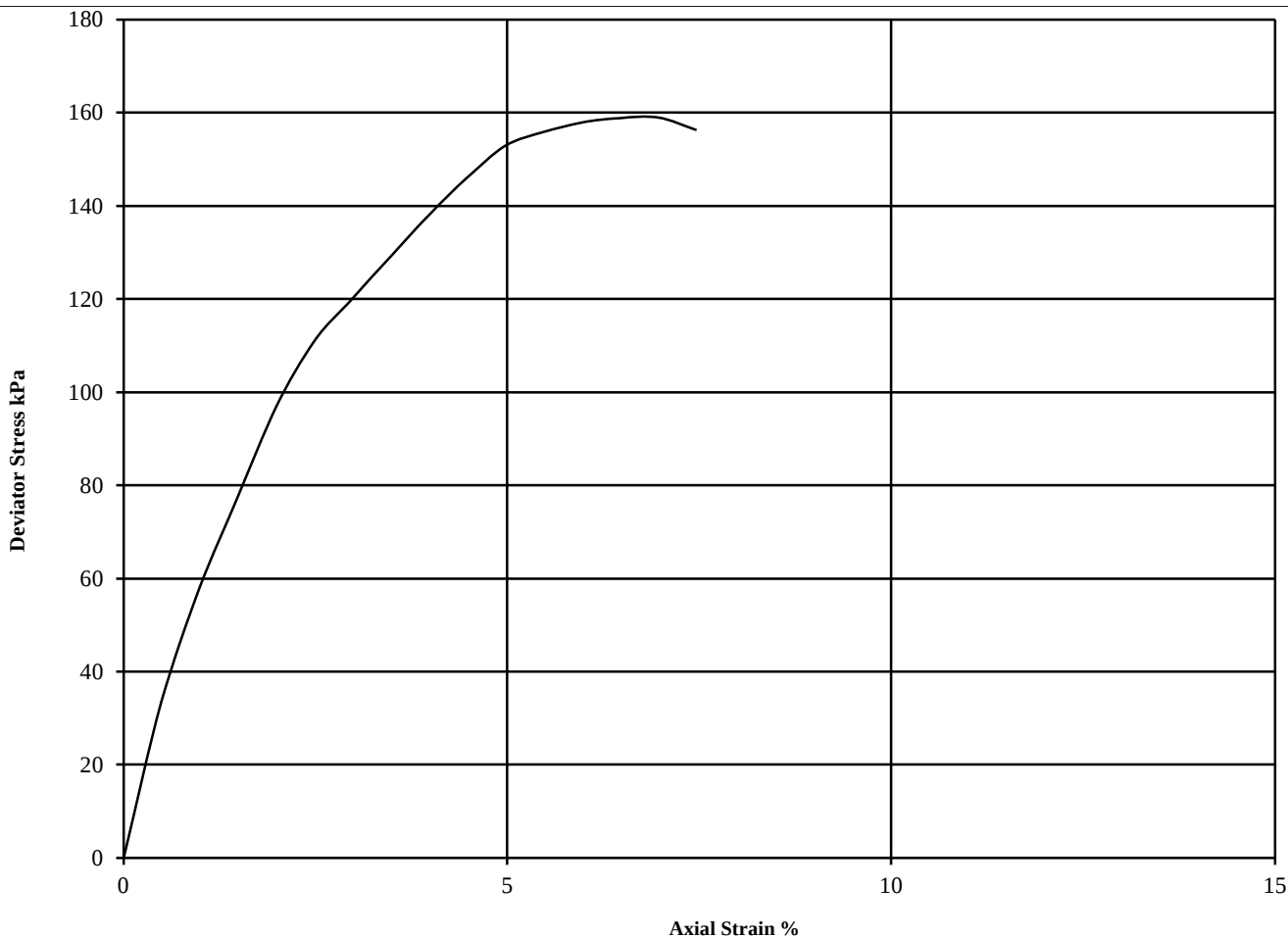
Top Depth (m): 1.50

Sample Number:

Base Depth (m):

Sample Type

U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample
					$(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			Sample taken from top of tube
									Rate of strain = 2 %/min
									Latex Membrane used 0.2 mm thick,
									Correction applied 0.36
1	24	1.91	1.54	30	159	79	7.0	Brittle	See summary of soil descriptions



Project Otter

Contract No:

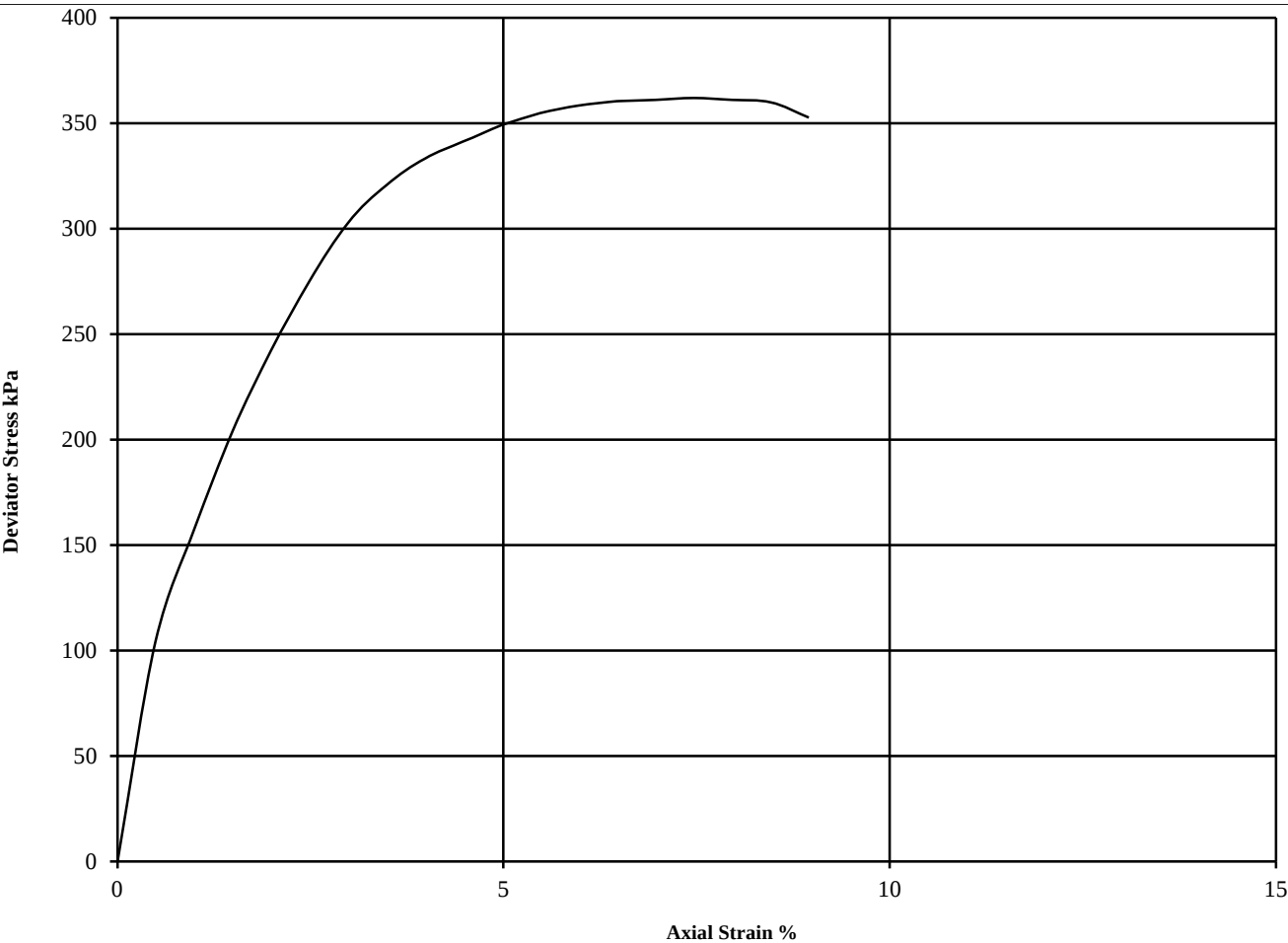
PSL23/0045

Client Ref:

WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION
WITHOUT MEASUREMENT OF PORE PRESSURE
BS1377 : Part7 : 1990: Clause 8

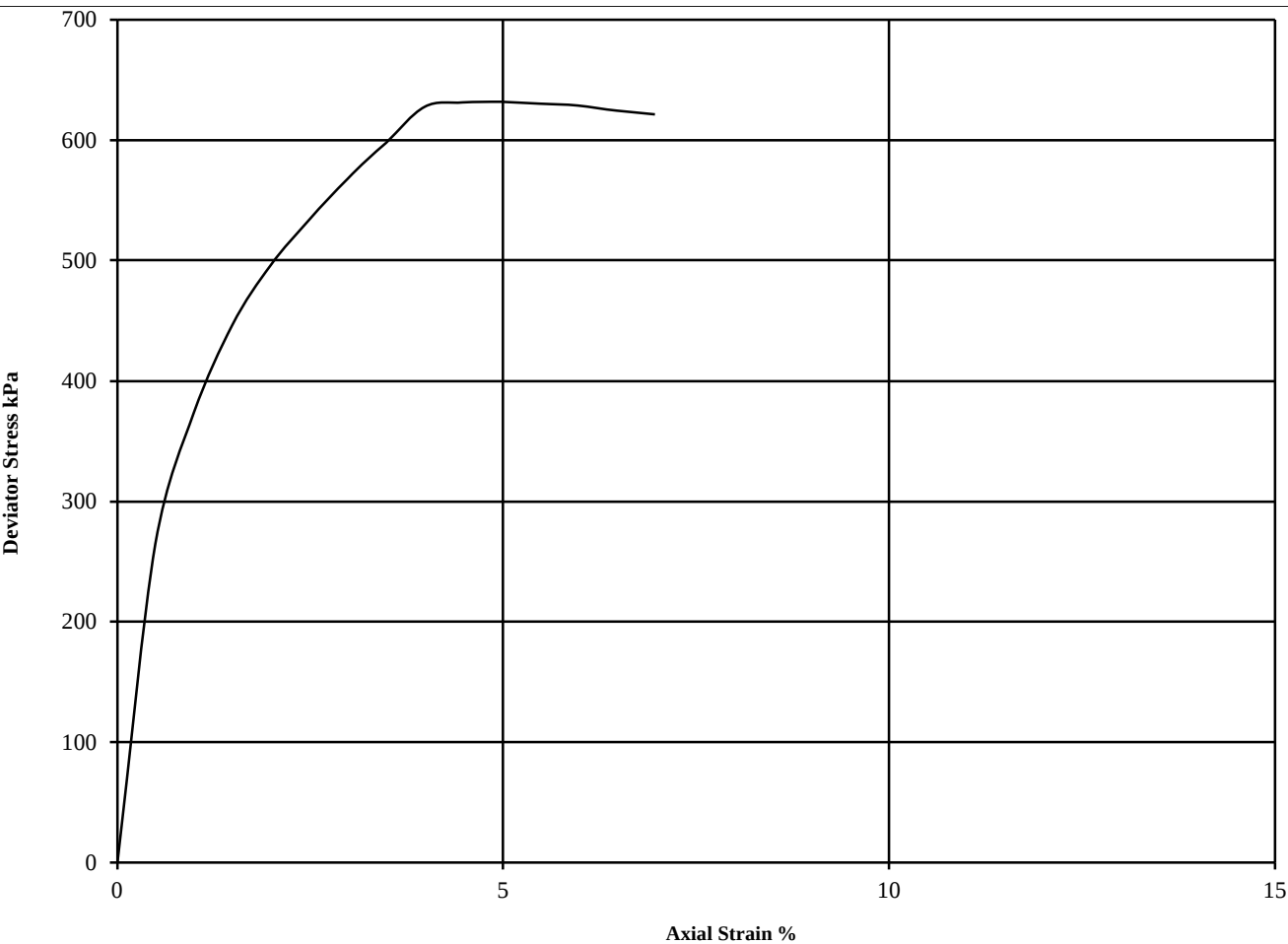
Hole Number: WBH115 Top Depth (m): 9.00
Sample Number: Base Depth (m):
Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36
1	26	1.91	1.52	180	362	181	7.5	Brittle	See summary of soil descriptions

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION
WITHOUT MEASUREMENT OF PORE PRESSURE
BS1377 : Part7 : 1990: Clause 8

Hole Number: WBH115 Top Depth (m): 30.00
Sample Number: Base Depth (m):
Sample Type U



Diameter (mm):		103		Height (mm):		207		Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions		
					$\frac{1}{2}(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$					
1	24	1.95	1.57	600	632	316	5.0	Brittle			



Project Otter

Contract No:
PSL23/0045

Client Ref:
WIE17469



LABORATORY REPORT



4043

Contract Number: PSL22/7580

Report Date: 20 December 2022

Client's Reference: WIE17469-WBH116

Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Michael Berry

Contract Title: Project Otter

Date Received: 28/11/2022

Date Commenced: 28/11/2022

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:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)

M Fennell
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

Project Otter

Contract No:

PSL22/7580

Client Ref:

WIE17469

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



4043

PSL

Professional Soils Laboratory

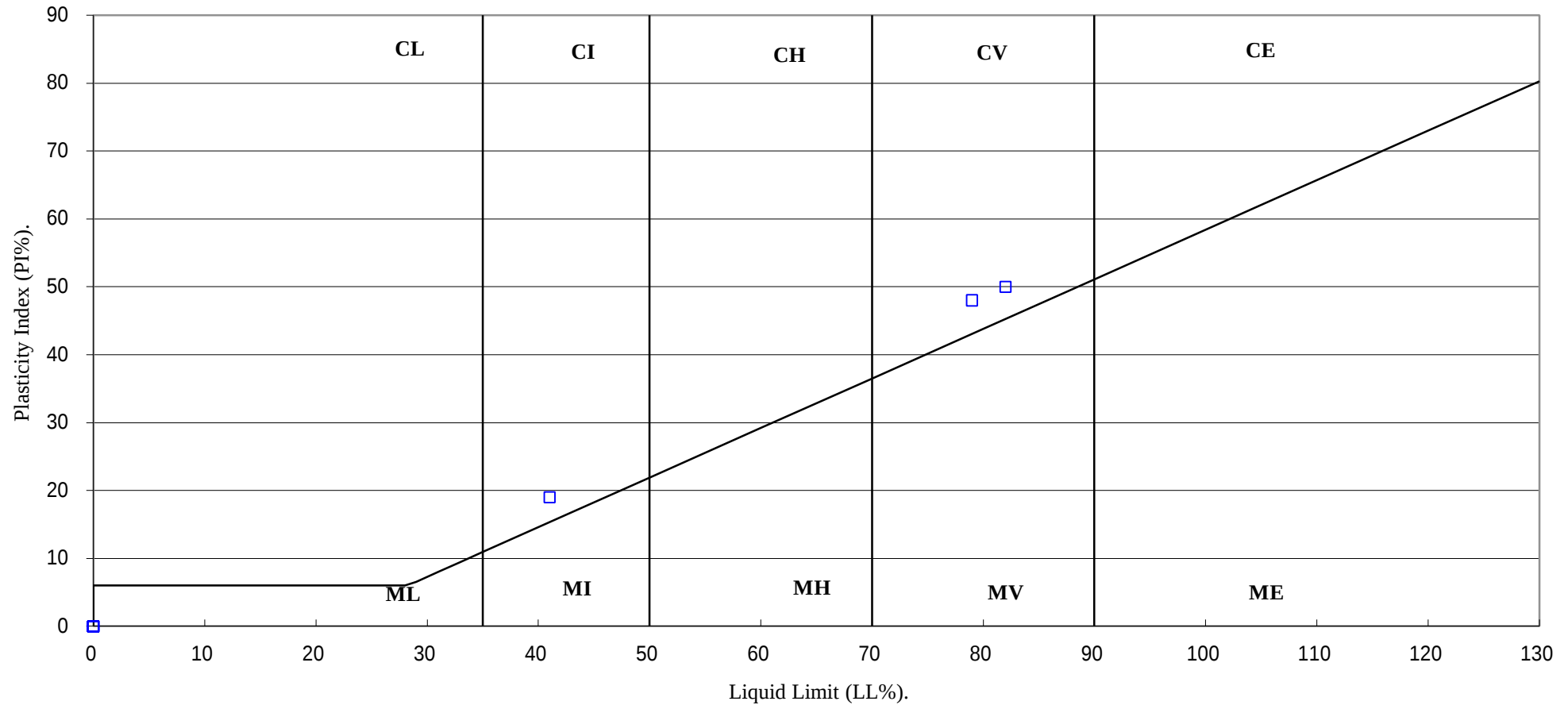
Project Otter

Contract No:

PSL22/7580

Client Ref:**WIE17469**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

Project Otter

Contract No:

PSL22/7580

Client Ref:

WIE17469

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

WBH116

Top Depth (m):

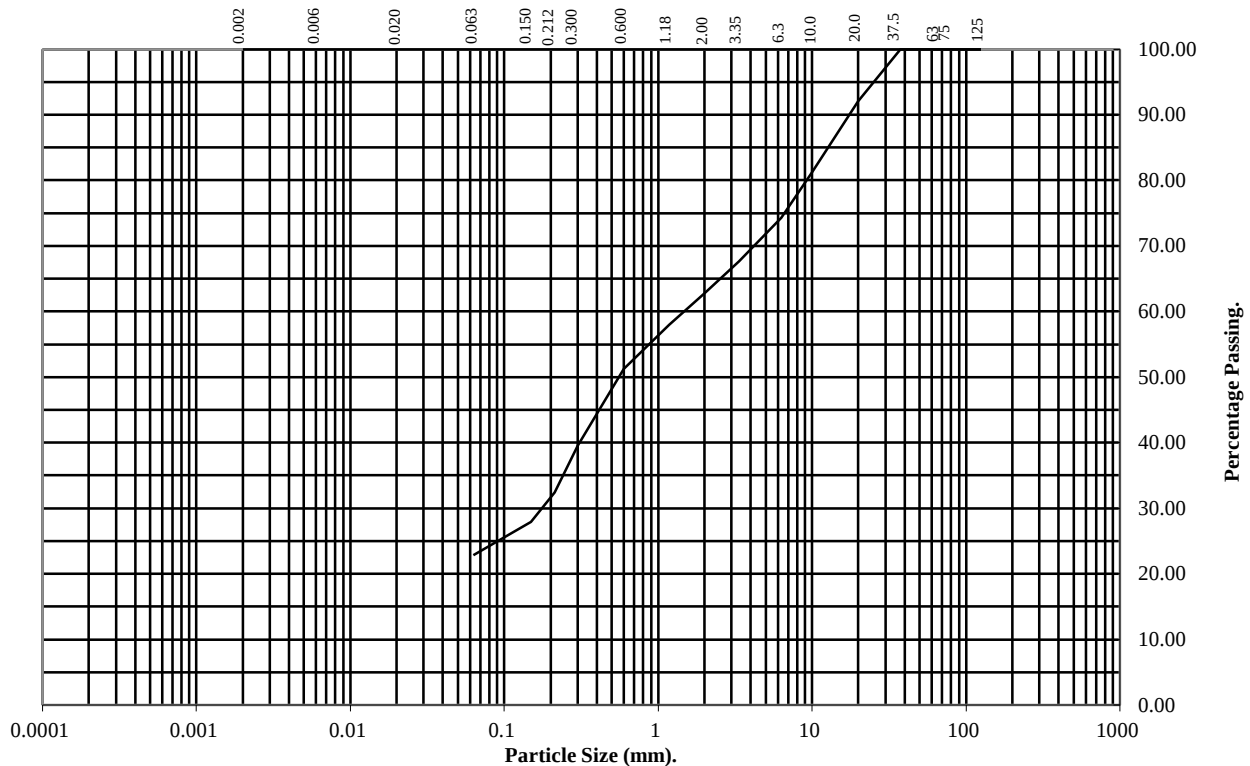
0.20

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	92
10	81
6.3	74
3.35	68
2	63
1.18	58
0.6	51
0.3	39
0.212	32
0.15	28
0.063	23

Soil Fraction	Total Percentage
Cobbles	0
Gravel	37
Sand	40
Silt/Clay	23

Remarks:

See Summary of Soil Descriptions



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Professional Soils Laboratory

Project Otter

Contract No:
PSL22/7580
Client Ref:
WIE17469

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WBH116

Top Depth (m):

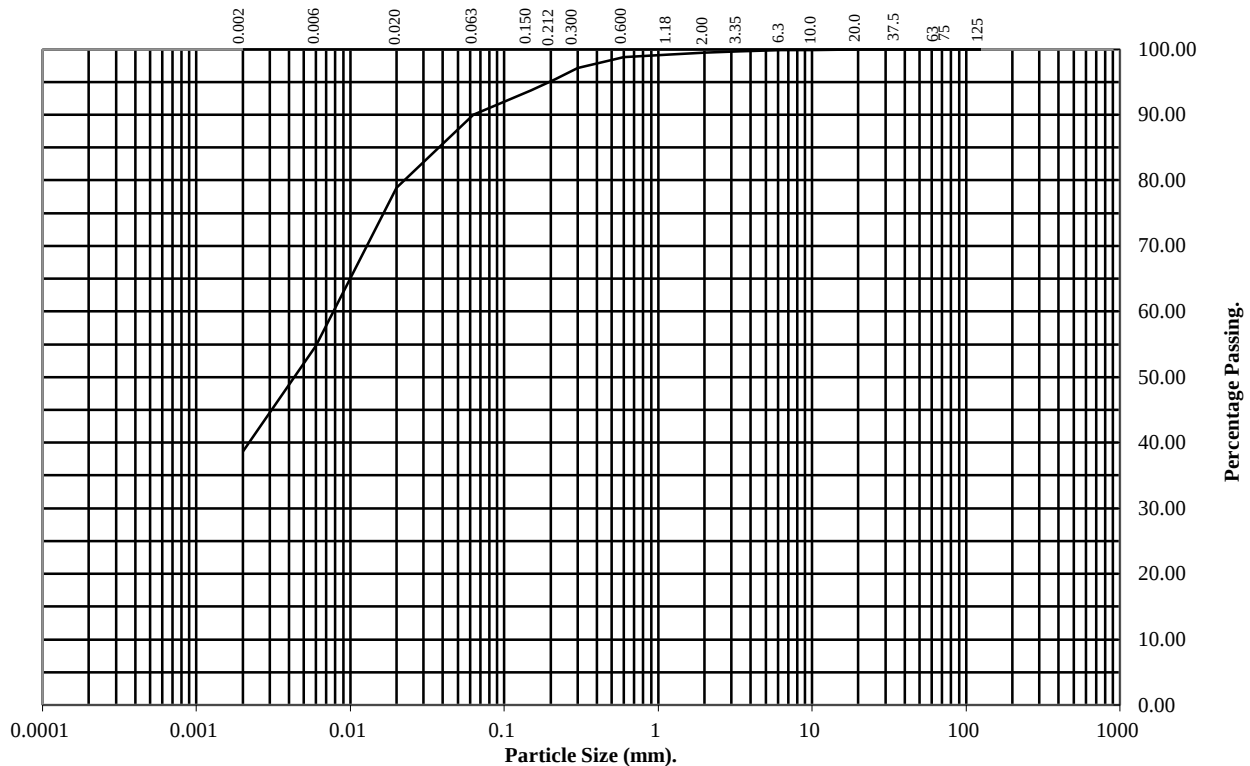
3.00

Sample Number:

Base Depth(m):

Sample Type:

D



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	99
0.3	97
0.212	95
0.15	94
0.063	90

Particle Diameter	Percentage Passing
0.02	79
0.006	55
0.002	39

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	9
Silt	51
Clay	39

Remarks:

See Summary of Soil Descriptions



PSL
Professional Soils Laboratory

Project Otter

Contract No:
PSL22/7580
Client Ref:
WIE17469

PARTICLE SIZE DISTRIBUTION TEST

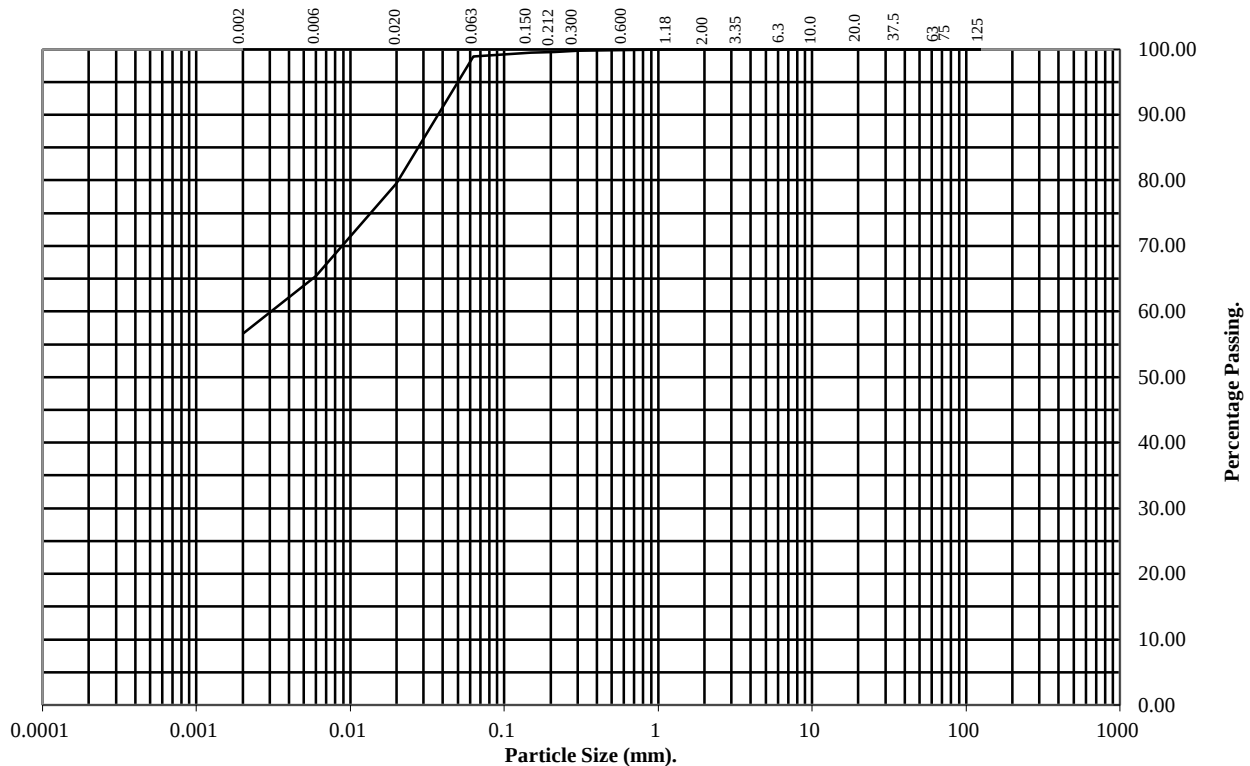
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **WBH116** Top Depth (m): **9.50**

Sample Number: Base Depth(m):

Sample Type: **D**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	100
0.15	99
0.063	99

Particle Diameter	Percentage Passing
0.02	80
0.006	65
0.002	57

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	1
Silt	42
Clay	57

Remarks:

See Summary of Soil Descriptions



PSL
Professional Soils Laboratory

Project Otter

Contract No:
PSL22/7580
Client Ref:
WIE17469

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WBH116

Top Depth (m):

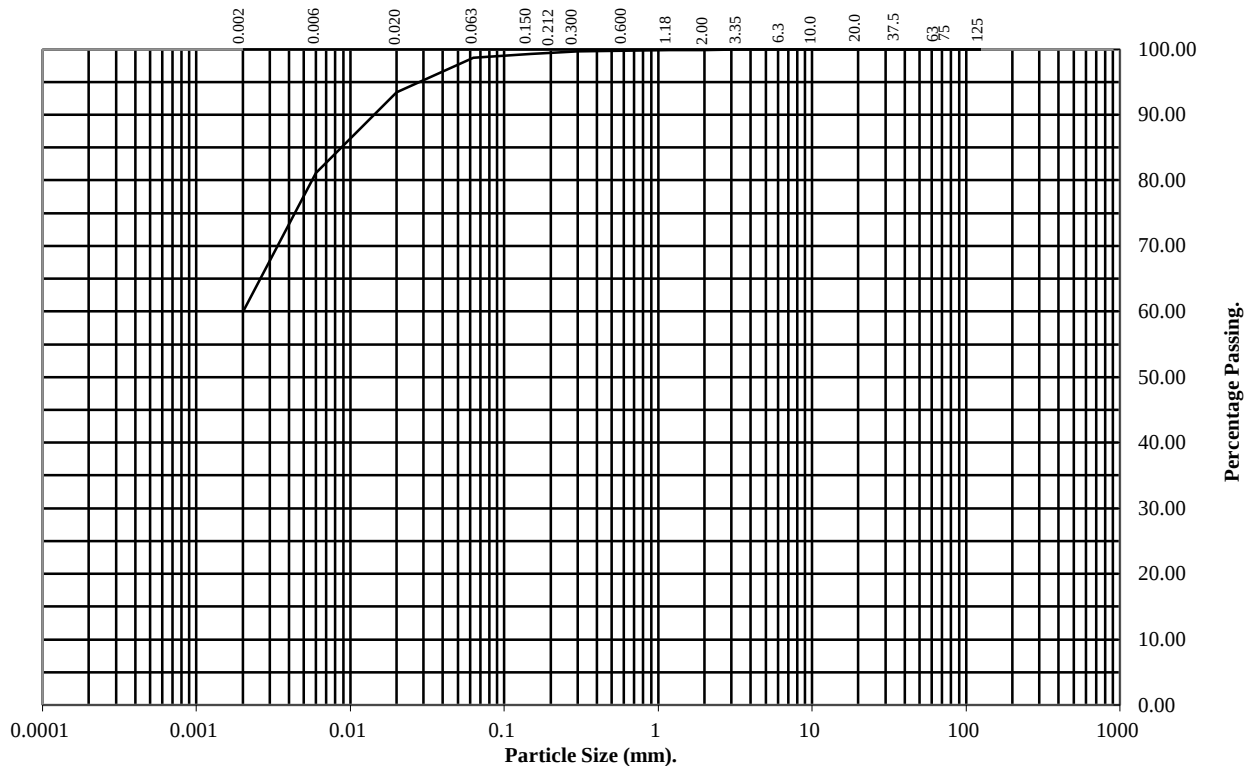
30.50

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	99
0.15	99
0.063	99

Particle Diameter	Percentage Passing
0.02	93
0.006	81
0.002	60

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	1
Silt	39
Clay	60

Remarks:

See Summary of Soil Descriptions



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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

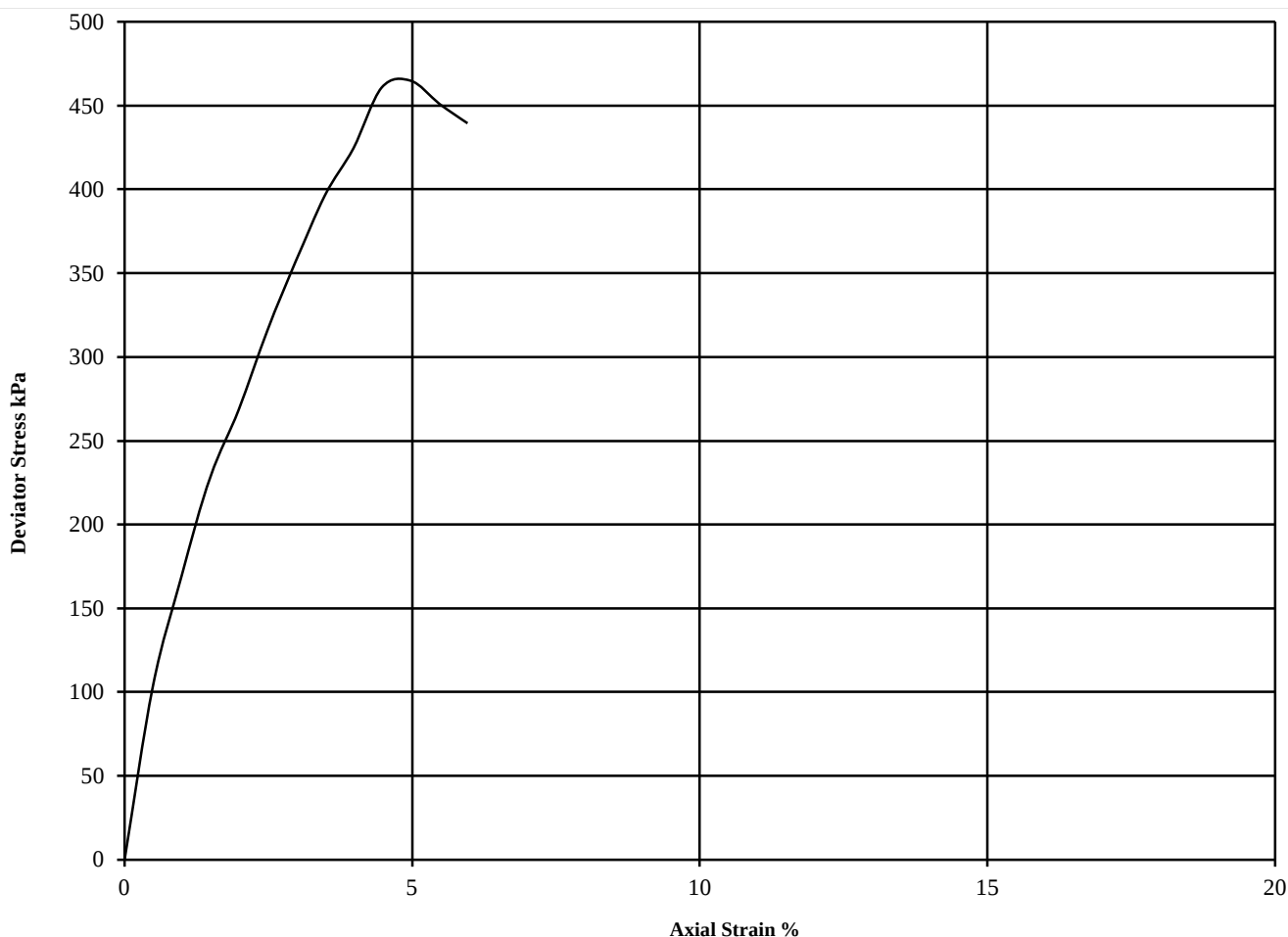
Hole Number: WBH116

Top Depth (m): 9.00

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions
					$(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	26	1.98	1.57	180	465	232	5.0	Brittle	



4043

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