

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co Durham, DH2 2RG - Tel 0191 378 4700 Fax 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel 0177235300 Fax 0177235999

## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	MS\BH16	Sample	UT1	Depth (m)	14.70m
Specimen Type	Undisturbed	Orientation	Vertical	Specific Depth (m)	14.75m
	INITIAL	FINAL			
Height	18.8	17.9	mm	Particle Density (Assumed)	2.70
Diameter	75.02	75.02	mm		
Moisture Content	23.6	23.5	%	Degree of Saturation (%)	97.5
Wet Density	2.02	2.10	Mg/m <sup>3</sup>		
Dry Density	1.63	1.70	Mg/m <sup>3</sup>	Test Duration (Days)	9
				Date Tested	20/08/2021

Square Root of Time Fitting Method				
Pressure Range kN/m <sup>2</sup>	Mv m <sup>2</sup> /MN	Cv m <sup>2</sup> /yr	Temp C	Voids Ratio
Initial				0.653
0 - 100	0.156	.	23	0.627
100 - 200	0.127	3.78	24	0.607
200 - 400	0.093	2.06	24	0.577
400 - 800	0.060	1.79	24	0.539
800 - 1600	0.037	2.01	23	0.493
1600 - 800	0.006	Swelling	23	0.500
800 - 400	0.025	Swelling	23	0.515
400 - 200	0.060	Swelling	23	0.534
200 - 50	0.188	Swelling	23	0.577

For sample description please refer to the Laboratory Sample Description Sheet.

Contract Title: <b>Preliminary Onshore Ground Investigation For NZT</b>			Client: <b>AECOM</b>	
	Signed: <div style="background-color: black; width: 150px; height: 30px; margin: 5px 0;"></div>	Name: <b>M. SELKIRK</b>		Page 1 of 2
	Date of Issue: 06/09/2021	Certificate No: 4339/N	AEG Contract No: 4339	
				 1367

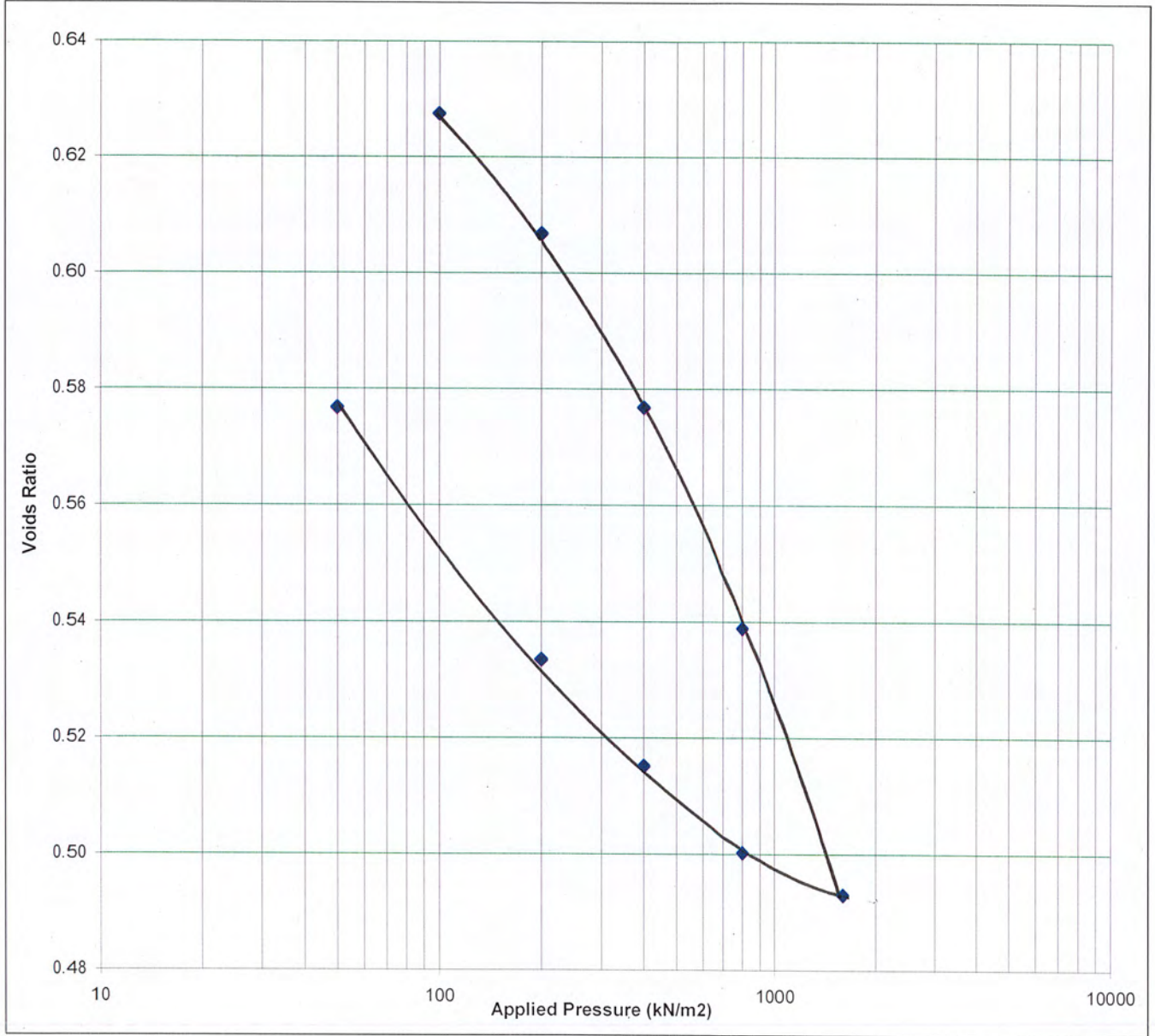
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Regional Office: Unit 20, Business Development Centre, Eaniam Wharf, Blackburn, BB1 5BL - Tel: 01772 735300 Fax: 01772 735999

## ONE DIMENSIONAL CONSOLIDATION PROPERTIES

BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	<b>MS\BH16</b>	Sample	<b>UT1</b>	Depth (m)	<b>14.70m</b>
Specimen Type	<b>Undisturbed</b>	Orientation	<b>Vertical</b>	Specific Depth (m)	<b>14.75m</b>



Contract Title: <h3 style="text-align: center;">Preliminary Onshore Ground Investigation For NZT</h3>	Client: <h2 style="text-align: center;">AECOM</h2>
--	---

	Signed: <span style="background-color: black; color: black;">[REDACTED]</span>	Name: <b>M. SELKIRK</b>	Page 2 of 2
	Date of Issue: <b>06/09/2021</b>	Certificate No: <b>4339/N</b>	AEG Contract No: <b>4339</b>





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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel 01772735300 Fax: 01772735999

## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

<b>Exploratory Hole No</b>	<b>MS\BH17</b>	<b>Sample</b>	<b>UT2</b>	<b>Depth (m)</b>	<b>17.70m</b>
<b>Specimen Type</b>	<b>Undisturbed</b>	<b>Orientation</b>	<b>Vertical</b>	<b>Specific Depth (m)</b>	<b>17.70m</b>
	INITIAL	FINAL			
Height	18.7	17.4	mm	Particle Density (Assumed)	2.70
Diameter	75.07	75.07	mm	Degree of Saturation (%)	95.7
Moisture Content	25.6	26.2	%	Test Duration (Days)	9
Wet Density	1.97	2.08	Mg/m <sup>3</sup>	Date Tested	26/08/2021
Dry Density	1.57	1.65	Mg/m <sup>3</sup>		

Square Root of Time Fitting Method				
Pressure Range kN/m <sup>2</sup>	Mv m <sup>2</sup> /MN	Cv m <sup>2</sup> /yr	Temp C	Voids Ratio
Initial				0.722
0 - 100	0.141	.	23	0.698
100 - 200	0.129	6.54	23	0.676
200 - 400	0.098	5.36	23	0.644
400 - 800	0.073	5.10	23	0.596
800 - 1600	0.048	4.77	23	0.535
1600 - 800	0.008	Swelling	23	0.544
800 - 400	0.024	Swelling	23	0.559
400 - 200	0.062	Swelling	24	0.578
200 - 100	0.138	Swelling	24	0.600

For sample description please refer to the Laboratory Sample Description Sheet.

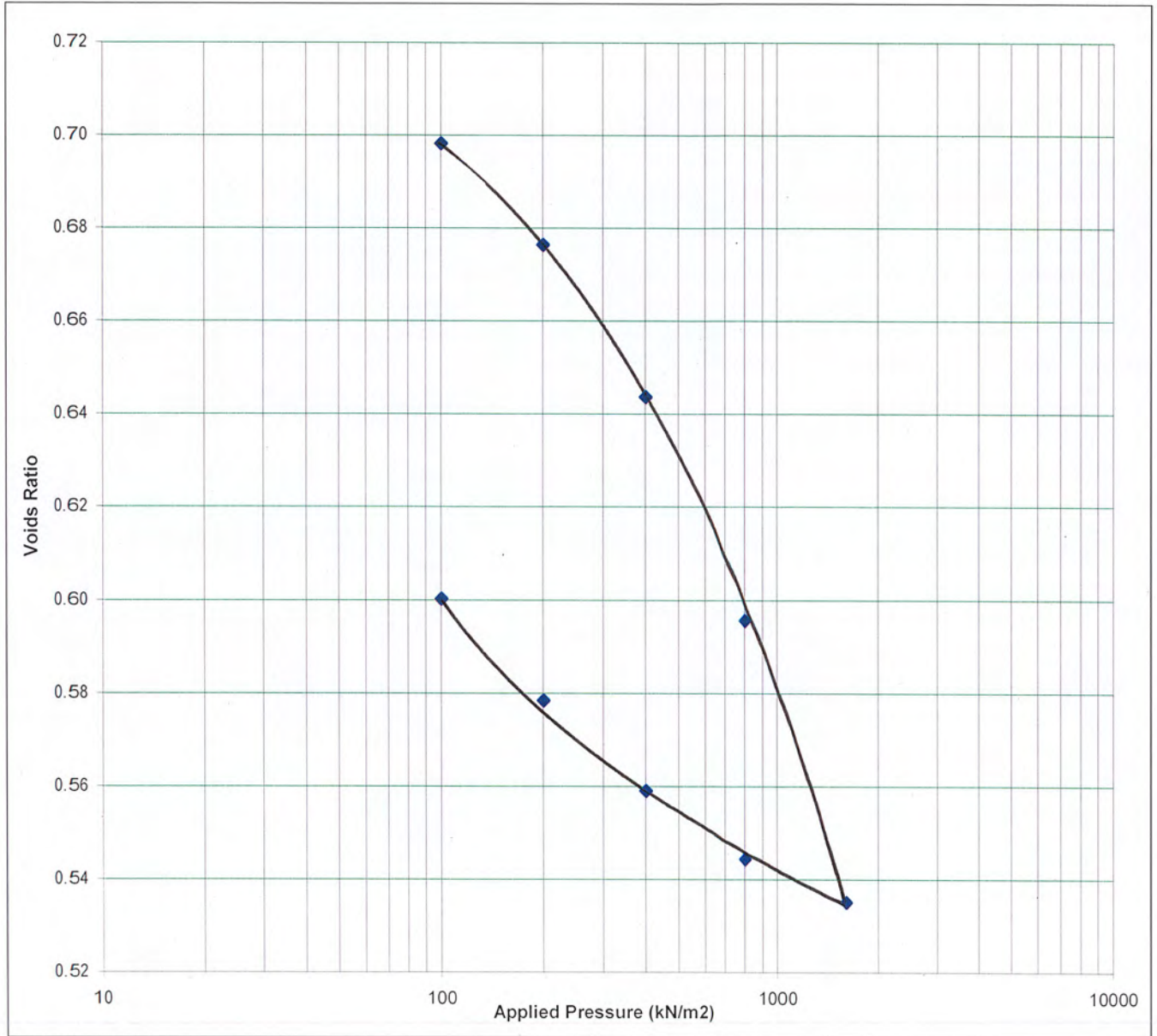
Contract Title:		Client:	
<b>Preliminary Onshore Ground Investigation For NZT</b>		<b>AECOM</b>	
	Signed:	Name:	Page 1 of 2
		M. SELKIRK	
Date of Issue:	Certificate No:	AEG Contract No:	
09/09/2021	4339/R	4339	1367

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## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	MS\BH17	Sample	UT2	Depth (m)	17.70m
Specimen Type	Undisturbed	Orientation	Vertical	Specific Depth (m)	17.70m



Contract Title:  
**Preliminary Onshore Ground Investigation For NZT**

Client:  
**AECOM**



Signed: [REDACTED]  
Date of Issue:  
09/09/2021

Name:  
**M. SELKIRK**  
Certificate No:  
4339/R

Page 2 of 2  
AEG Contract No:  
4339



## Shear Strength by Direct Shear





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Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.** 4339

**Borehole:** LF\BH01

**Sample:** B28

**Depth:** 8.70 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	24.3	24.5	25.0
Initial Moisture Content	%	19.6	19.6	19.6
Initial Wet density	mg/m <sup>3</sup>	1.71	1.70	1.70
Initial Dry density	mg/m <sup>3</sup>	1.43	1.42	1.42
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	65	130	260
Height at end of Stage	mm	23.7	23.5	23.9
Duration	Day(s)	0.5	0.5	0.5

### SHEARING

Rate of Strain	mm/min	0.309	0.320	0.316
Peak Shear Stress	kPa	23.5	59.1	130.1
Displacement at Peak Stress	mm	3.48	8.32	8.56
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	23.1	23.0	22.8
Final Wet Density	mg/m <sup>3</sup>	1.80	1.82	1.82
Final Dry Density	mg/m <sup>3</sup>	1.46	1.48	1.49

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	0
Angle of Shearing Resistance phi'	Deg	26°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi'r	Deg	N/A

### REMARKS:

DATE TESTED 07/09/2021

DATE OF ISSUE 15/09/2021

NAME

Michelle Selkirk

APPROVED BY





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1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

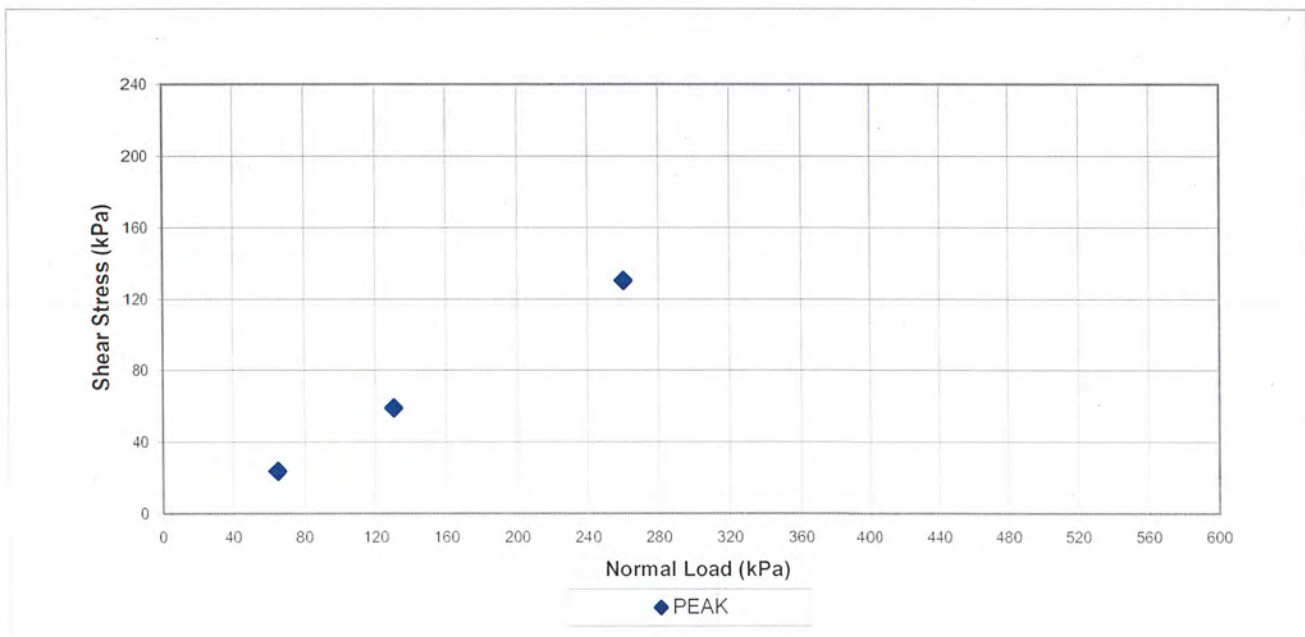
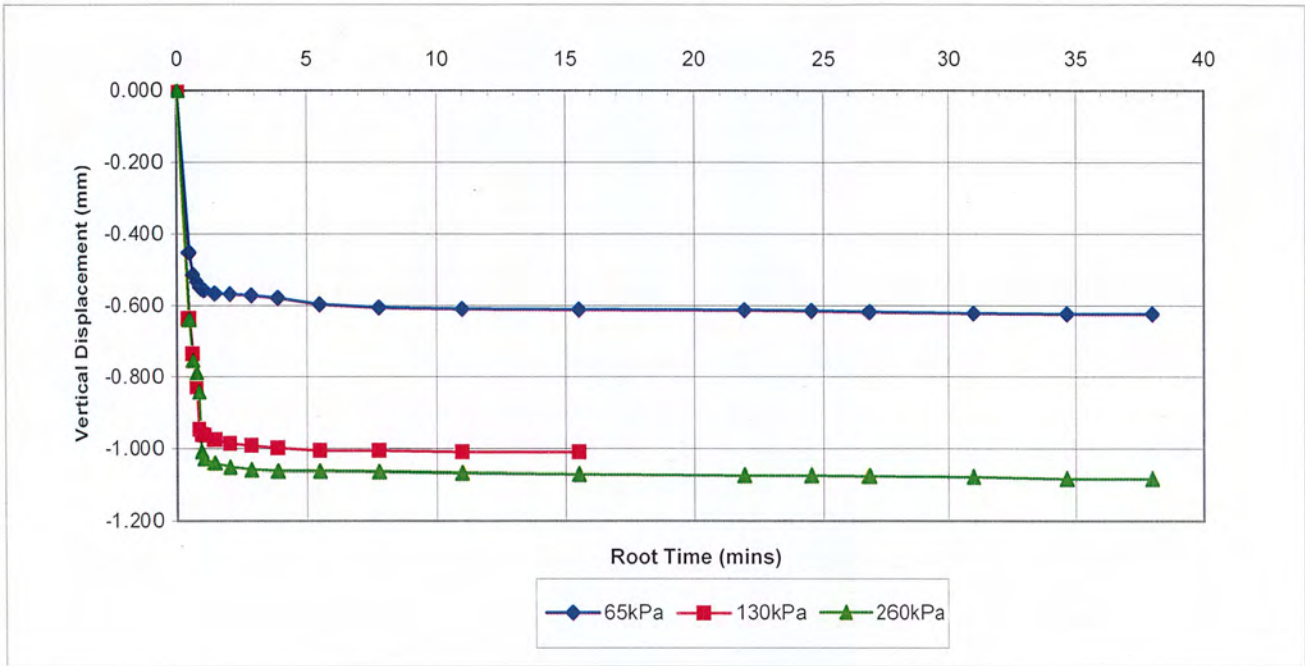
**Client:** AECOM

**Job No.** 4339

**Borehole:** LF\BH01

**Sample:** B28

**Depth:** 8.70 m.







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BS 1377 : PART 7 : 1990 Clause 4  
 (Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

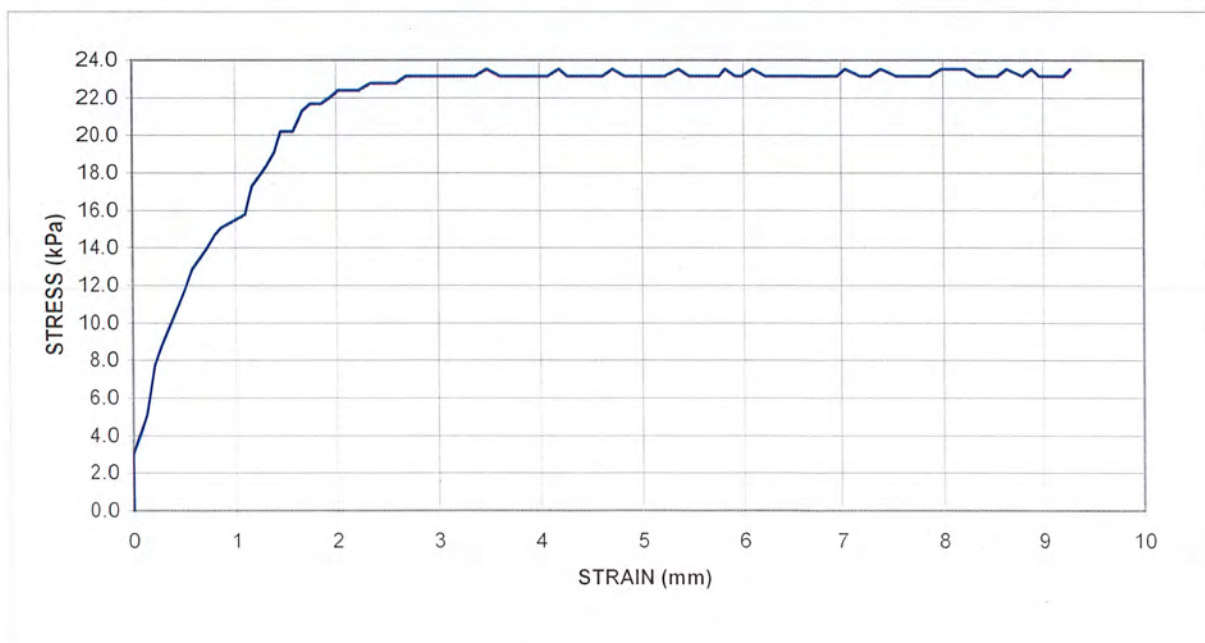
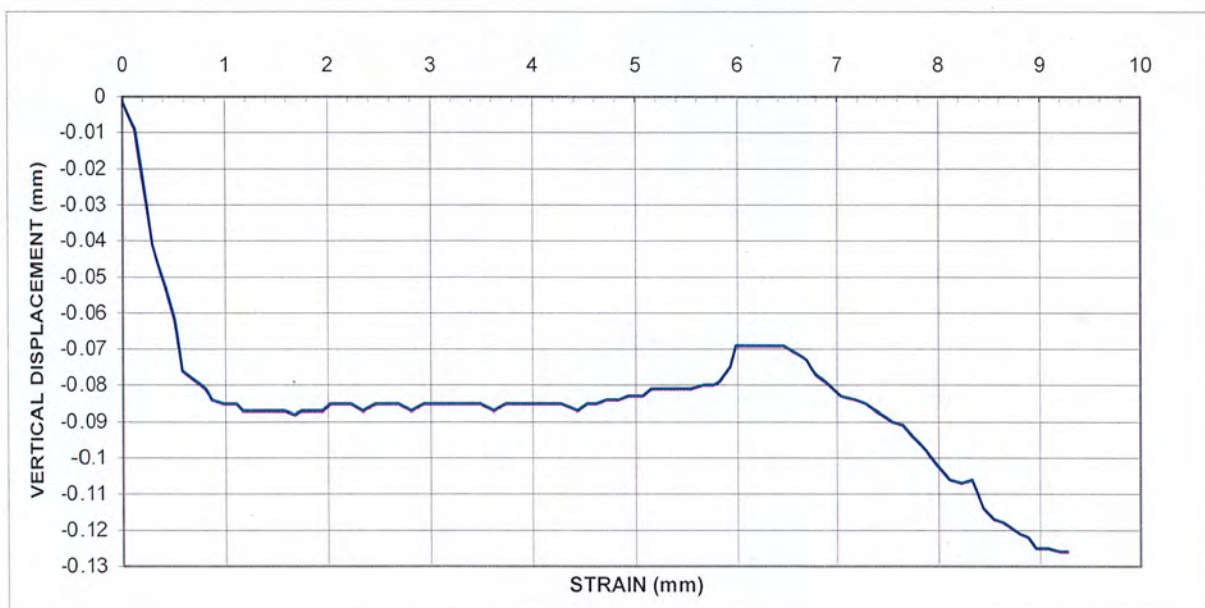
**Job No.:** 4339

**Borehole:** LF\BH01

**Sample:** B28

**Depth:** 8.70 m.

**Stage Number** 1 **Pressure** 65 kPa







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a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

**Borehole:** LF\BH01

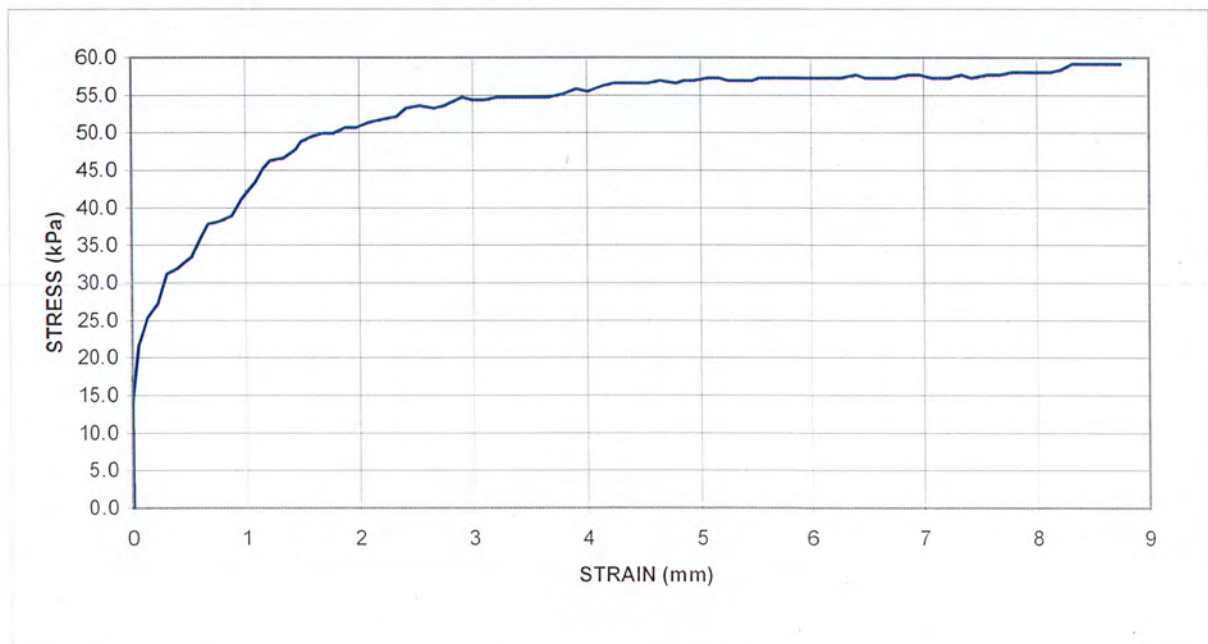
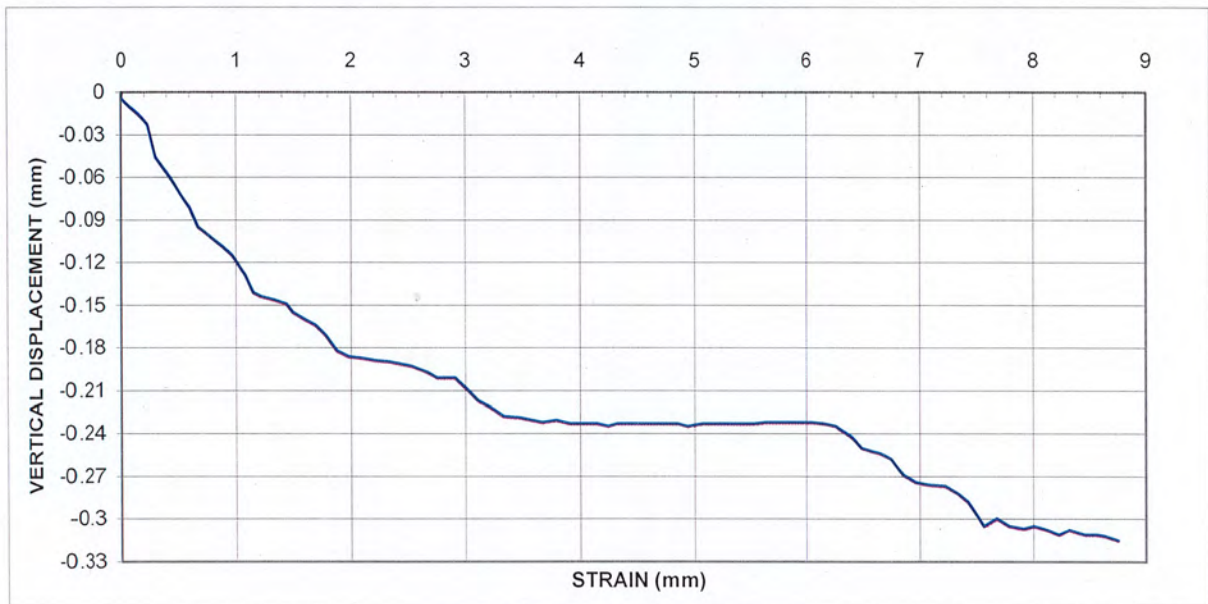
**Sample:** B28

**Depth:** 8.70 m.

**Stage Number** 2

**Pressure** 130 kPa

130 kPa





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## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

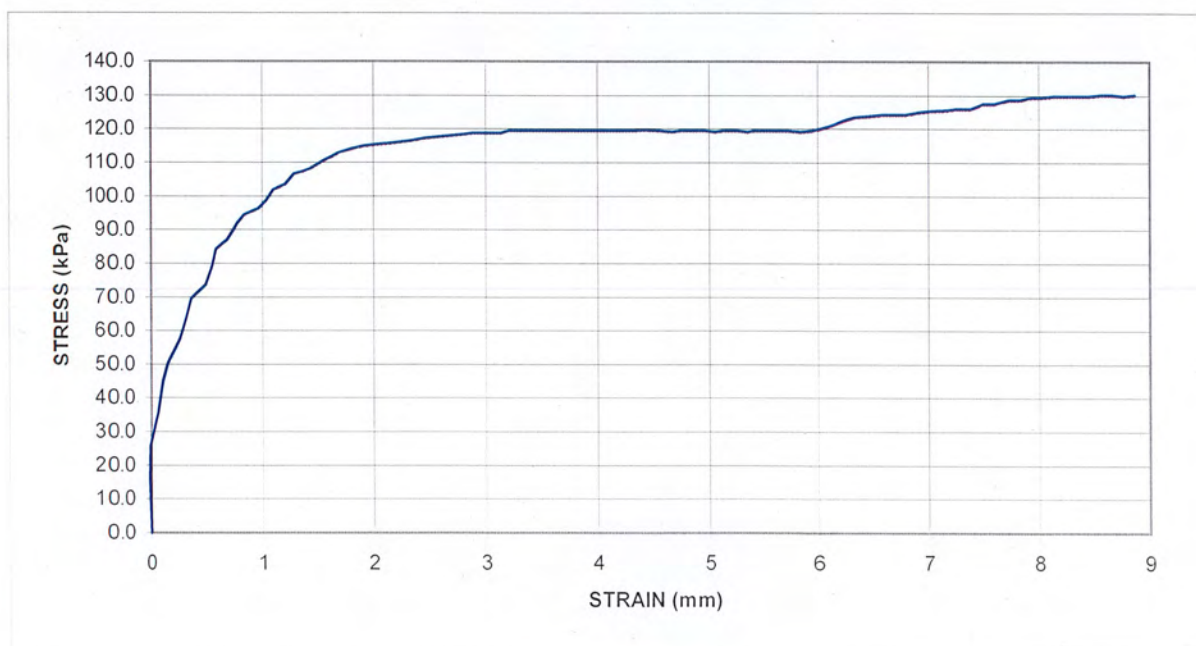
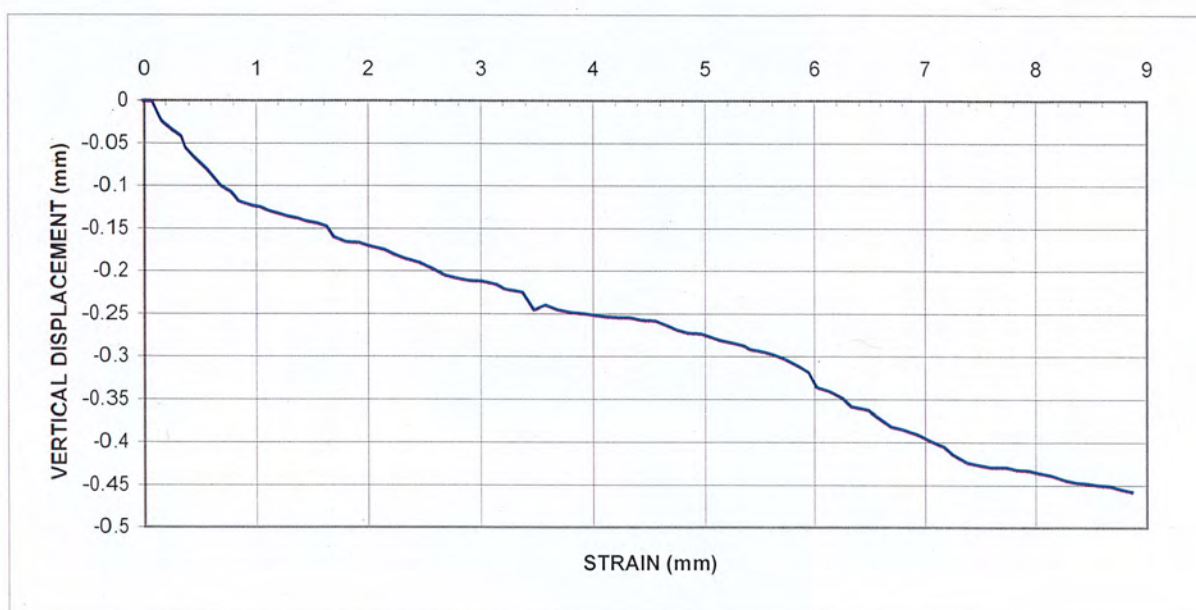
**Borehole:** LF\BH01

**Sample:** B28

**Depth:** 8.70 m.

**Stage Number** 3

**Pressure** 260 kPa







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 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.** 4339

**Borehole:** LF\BH02

**Sample:** B29

**Depth:** 9.00 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	22.3	22.2	23.6
Initial Moisture Content	%	16.4	16.4	16.4
Initial Wet density	mg/m <sup>3</sup>	1.62	1.64	1.66
Initial Dry density	mg/m <sup>3</sup>	1.39	1.41	1.43
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	65	130	260
Height at end of Stage	mm	21.8	21.5	22.9
Duration	Day(s)	0.5	0.5	0.5

### SHEARING

Rate of Strain	mm/min	0.491	0.486	0.483
Peak Shear Stress	kPa	29.7	71.2	140.7
Displacement at Peak Stress	mm	8.71	9.11	6.91
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	22.3	22.6	22.0
Final Wet Density	mg/m <sup>3</sup>	1.74	1.79	1.81
Final Dry Density	mg/m <sup>3</sup>	1.42	1.46	1.48

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	0
Angle of Shearing Resistance phi 'r	Deg	29°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi 'r	Deg	N/A

### REMARKS:

**DATE TESTED** 03/09/2021

**DATE OF ISSUE** 14/09/2021

**NAME**

**APPROVED BY**

Michelle Selkirk







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

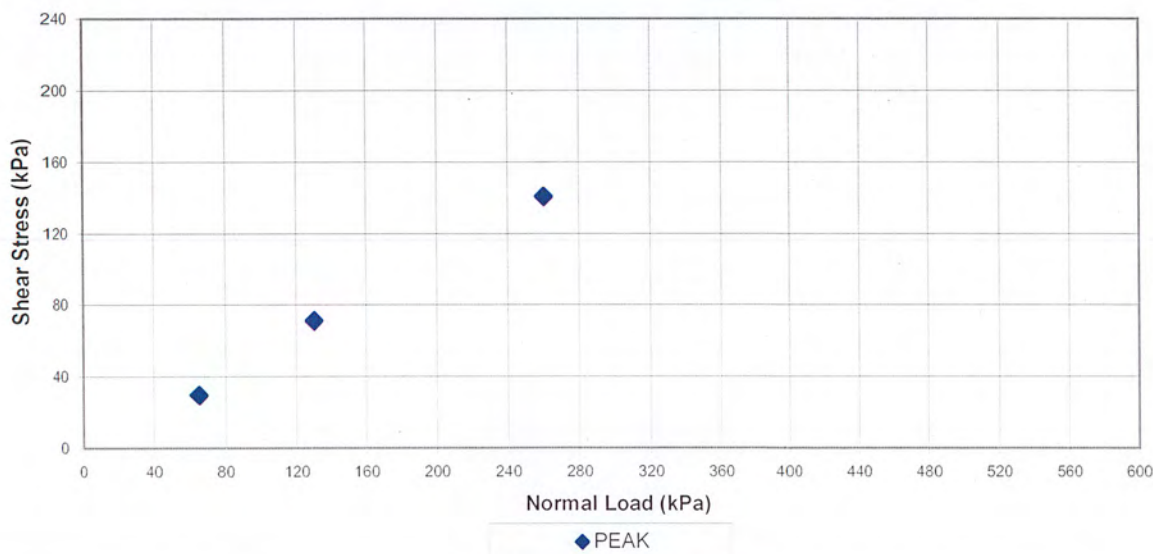
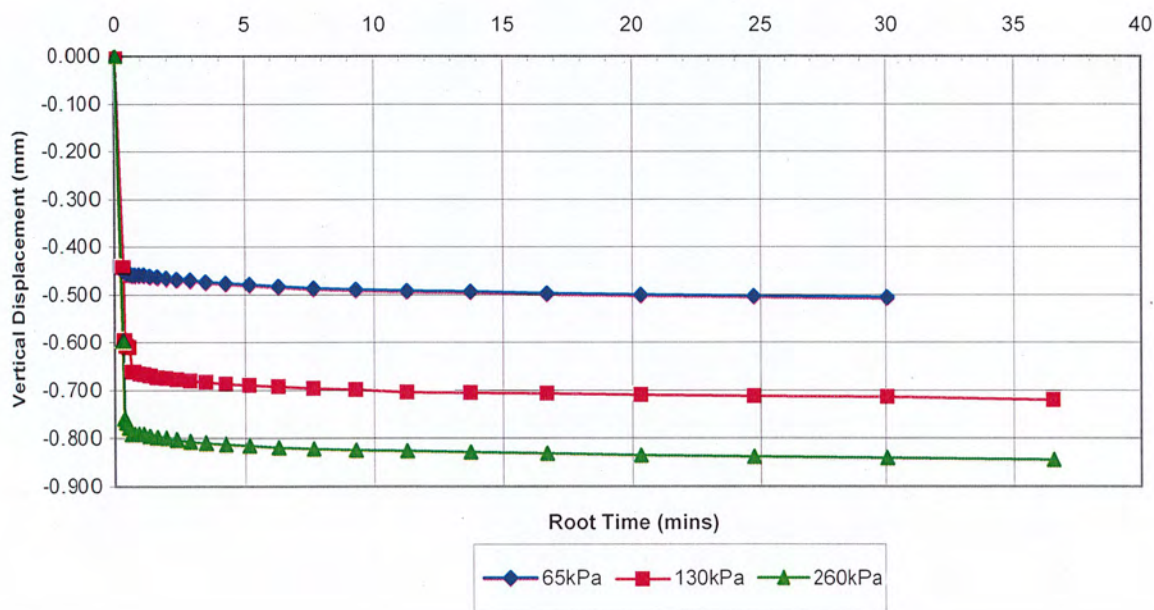
**Client:** AECOM

**Job No.** 4339

**Borehole:** LFBH02

**Sample:** B29

**Depth:** 9.00 m.





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Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No.:** 4339

**Borehole:** LF\BH02

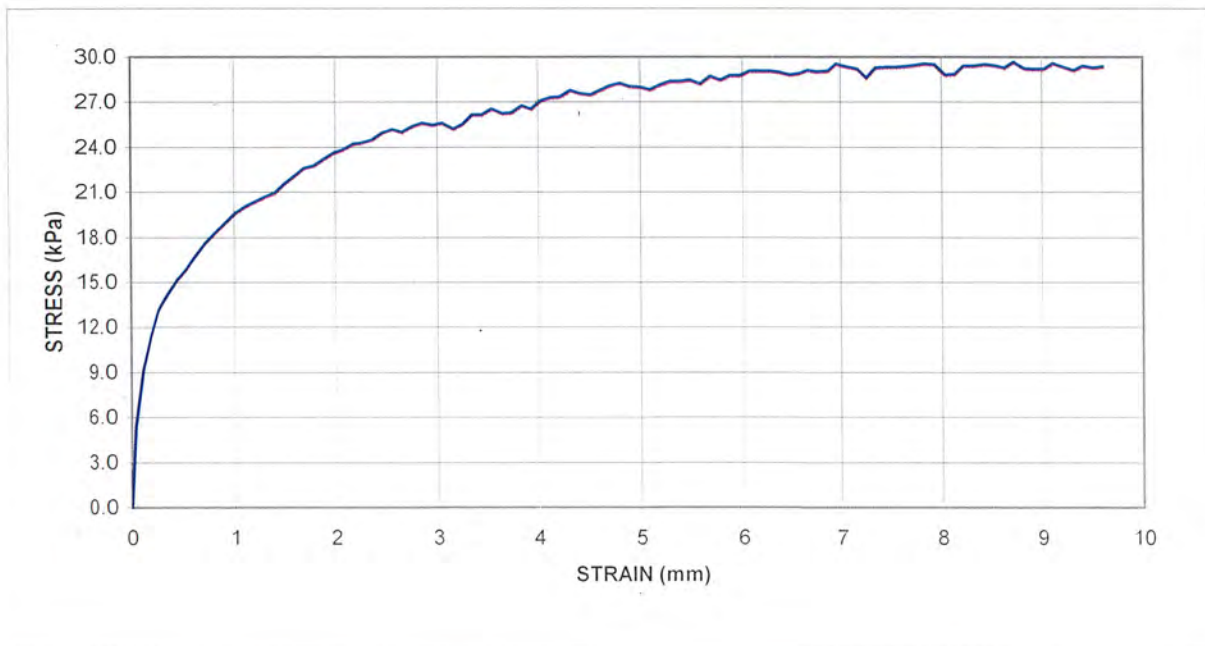
**Sample:** B29

**Depth:** 9.00 m.

**Stage Number** 1

**Pressure** 65 kPa

65 kPa







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## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4  
 (Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No.:** 4339

**Borehole:** LF\BH02

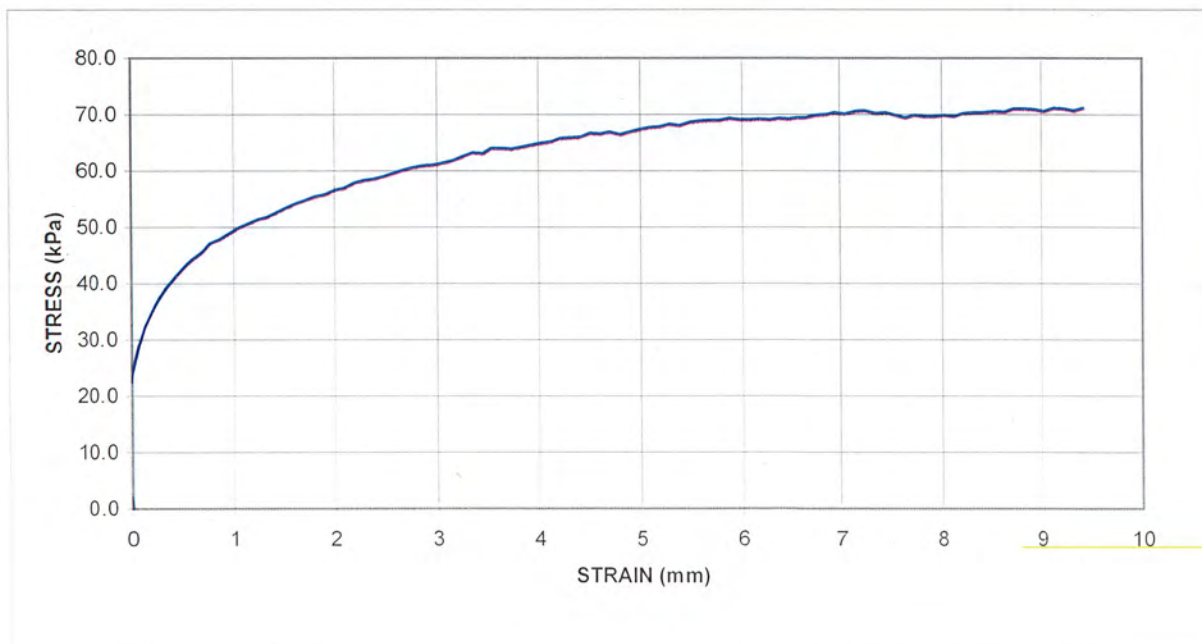
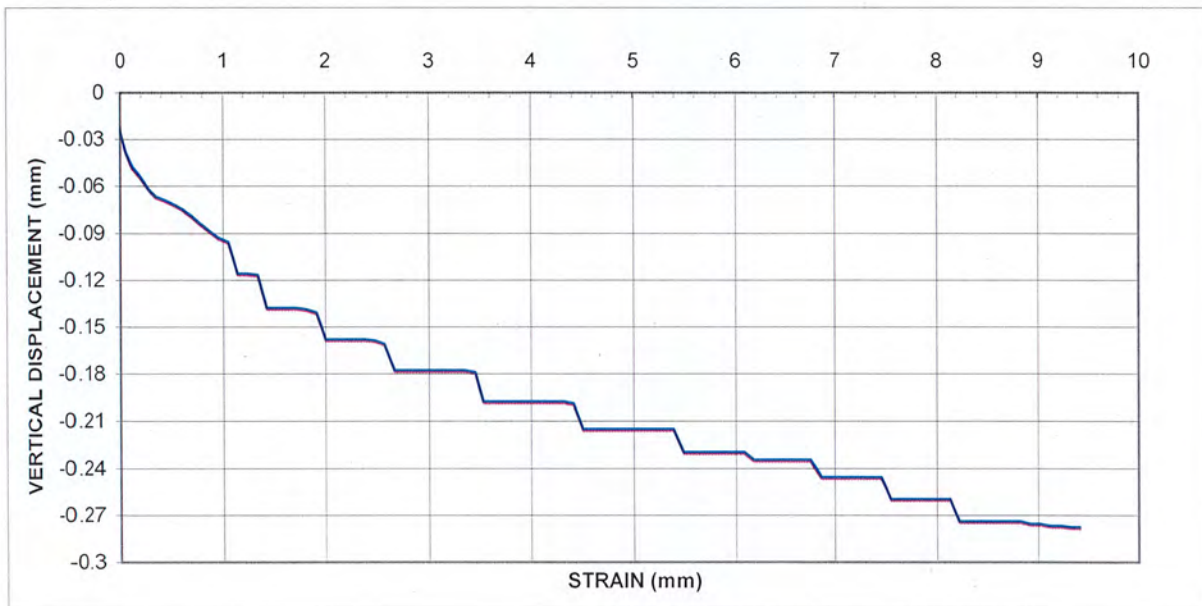
**Sample:** B29

**Depth:** 9.00 m.

**Stage Number** 2

**Pressure** 130 kPa

130 kPa







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## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No.:** 4339

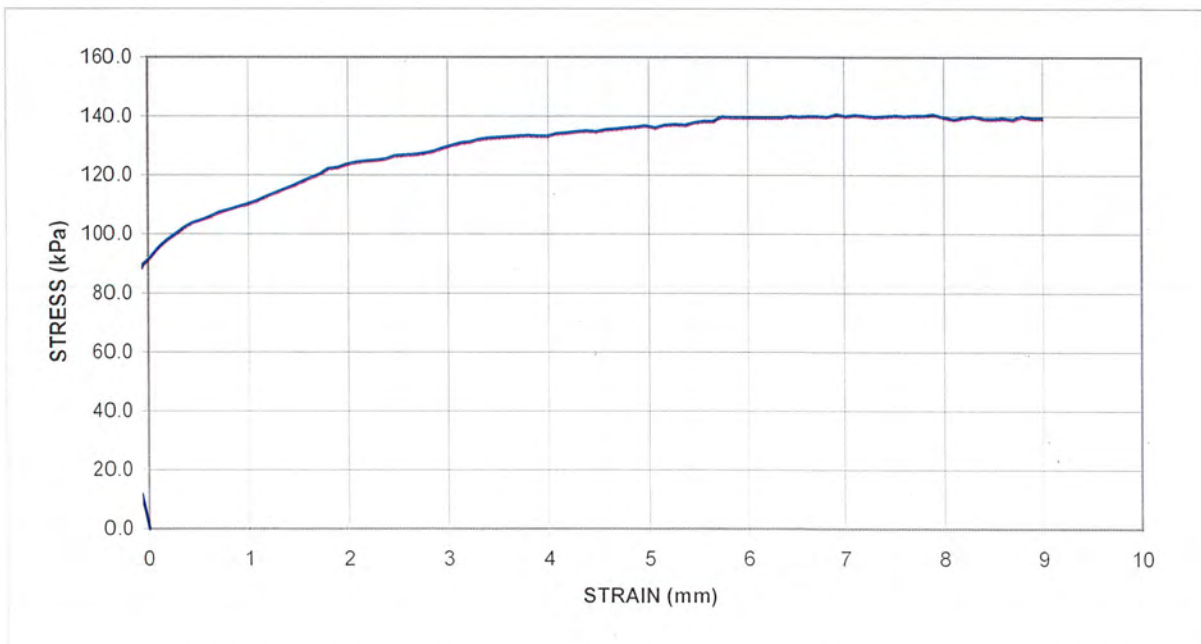
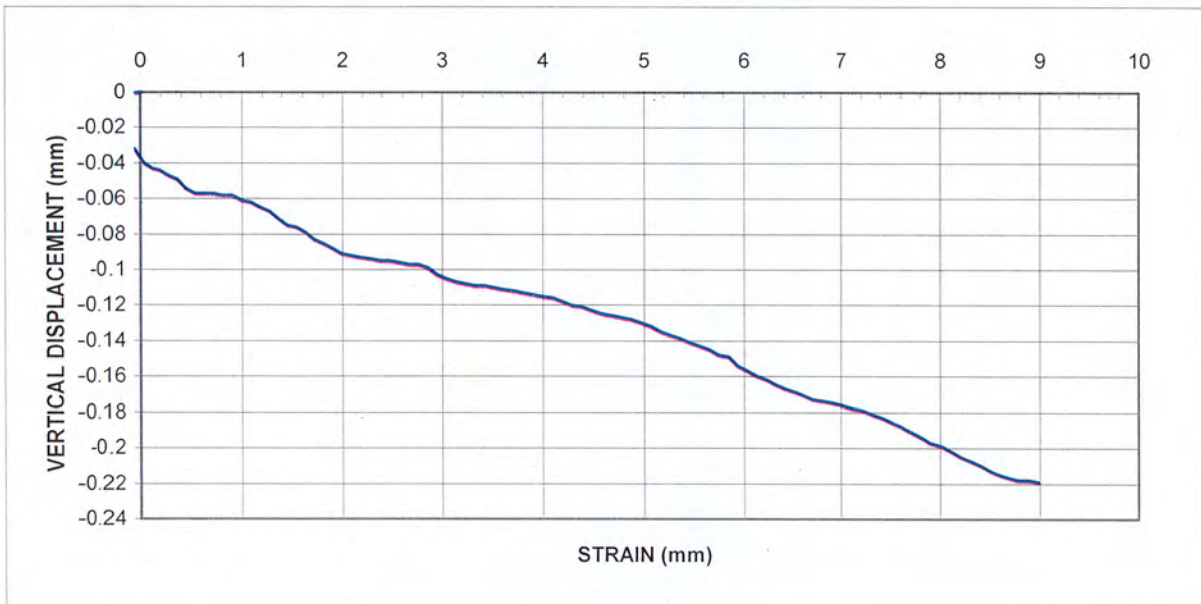
**Borehole:** LFBH02

**Sample:** B29

**Depth:** 9.00 m.

**Stage Number** 3

**Pressure** 260 kPa





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Unit 25 Stella Gill Industrial Estate, Pelton Fell  
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 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No:** 4339

**Borehole:** MS\BH02

**Sample:** B21

**Depth:** 4.95 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	24.7	24.8	24.7
Initial Moisture Content	%	16.1	16.1	16.1
Initial Wet density	mg/m <sup>3</sup>	1.64	1.62	1.63
Initial Dry density	mg/m <sup>3</sup>	1.42	1.39	1.40
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	50	100	200
Height at end of Stage	mm	24.3	24.3	24.1
Duration	Day(s)	0.5	0.5	0.5

### SHEARING

Rate of Strain	mm/min	0.307	0.307	0.310
Peak Shear Stress	kPa	26.0	57.2	114.4
Displacement at Peak Stress	mm	2.51	3.04	4.39
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	23.4	23.5	23.0
Final Wet Density	mg/m <sup>3</sup>	1.78	1.75	1.77
Final Dry Density	mg/m <sup>3</sup>	1.44	1.42	1.44

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	0
Angle of Shearing Resistance phi '	Deg	30°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi 'r	Deg	N/A

### REMARKS:

DATE TESTED 28/09/2021

DATE OF ISSUE 14/10/2021

NAME

Michelle Selkirk

APPROVED BY







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test BS 1377 : PART 7 : 1990 Clause 4 (Specimen(s) Tested Submerged)

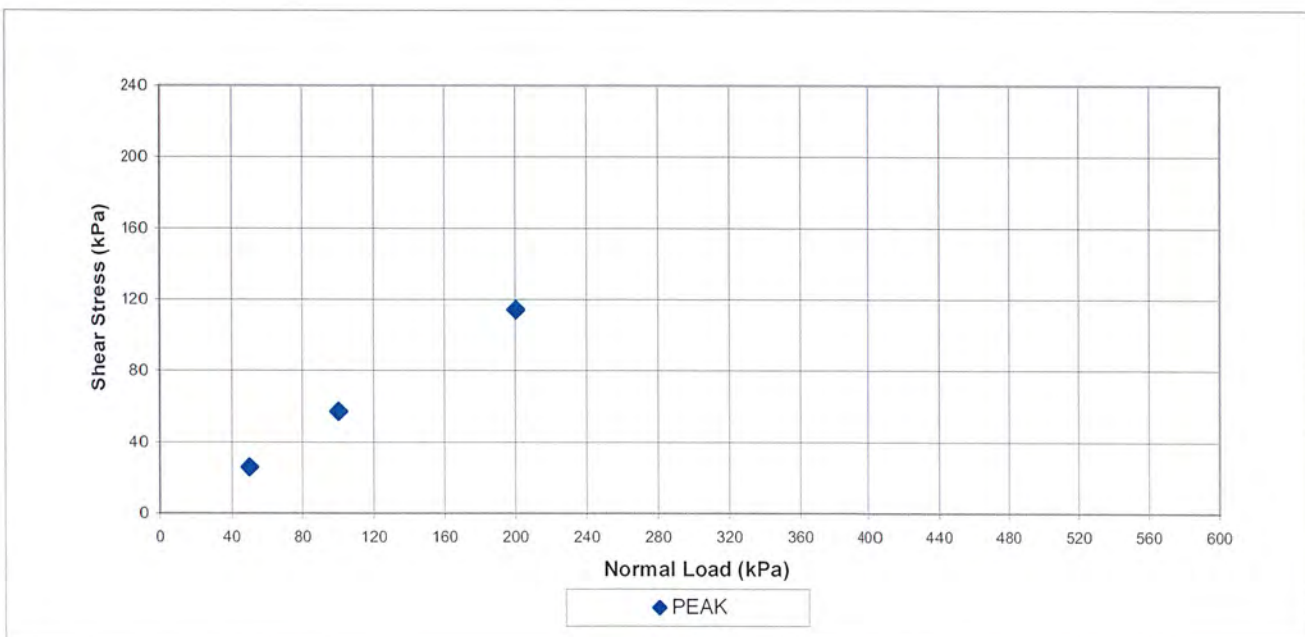
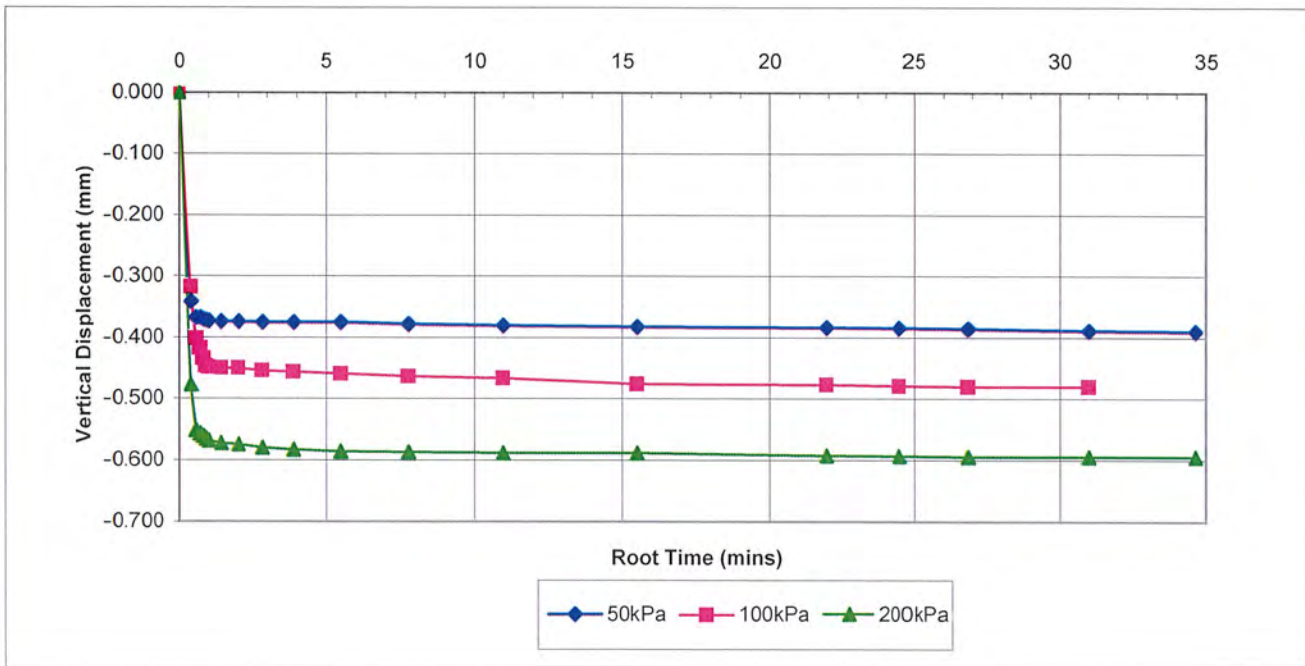
**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No:** 4339

**Borehole:** MS\BH02

**Sample:** B21

**Depth:** 4.95 m.







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Unit 25 Stella Gill Industrial Estate, Pelton Fell  
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 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS\BH02

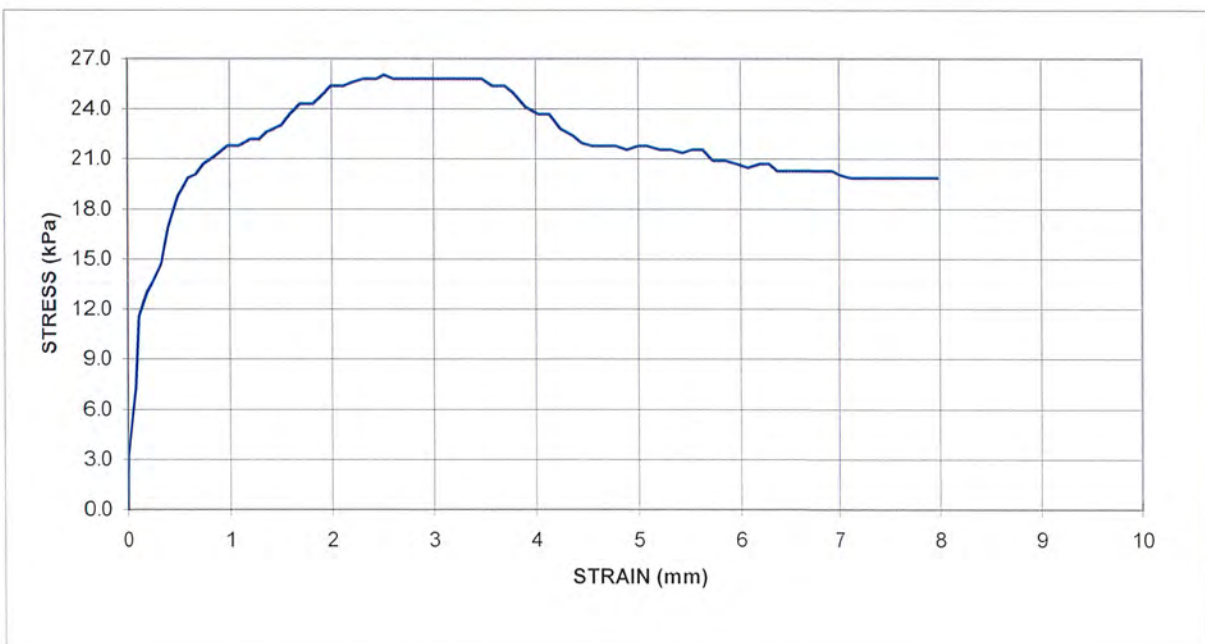
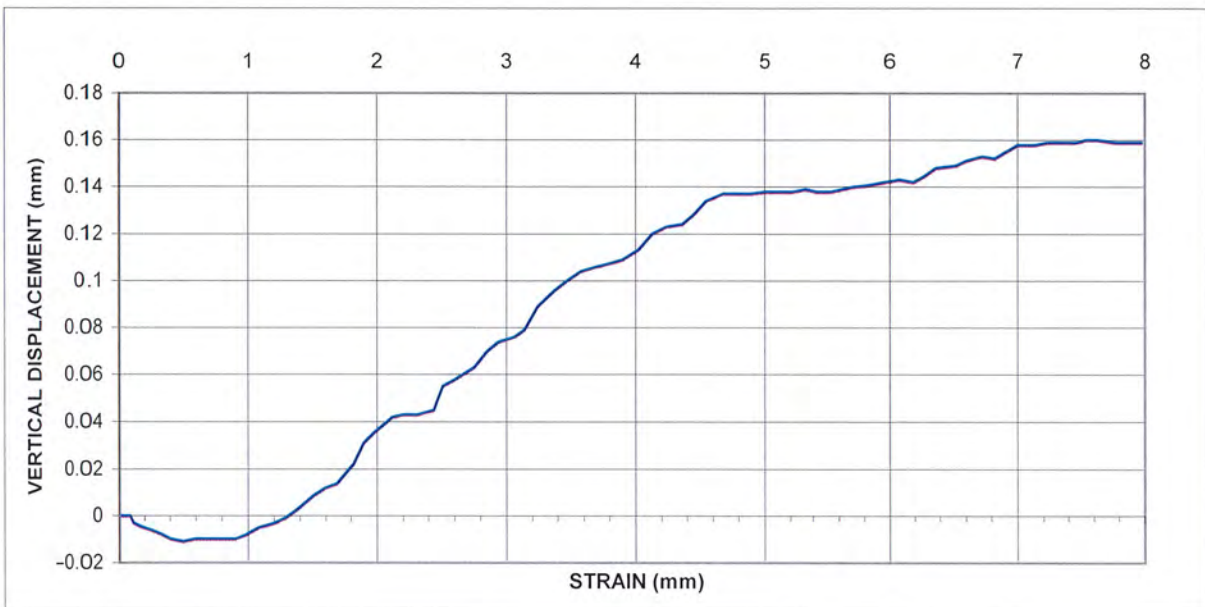
**Sample:** B21

**Depth:** 4.95 m.

**Stage Number** 1

**Pressure** 50 kPa

50 kPa





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 a UKAS LABORATORY Testing No. 1367



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BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS\BH02

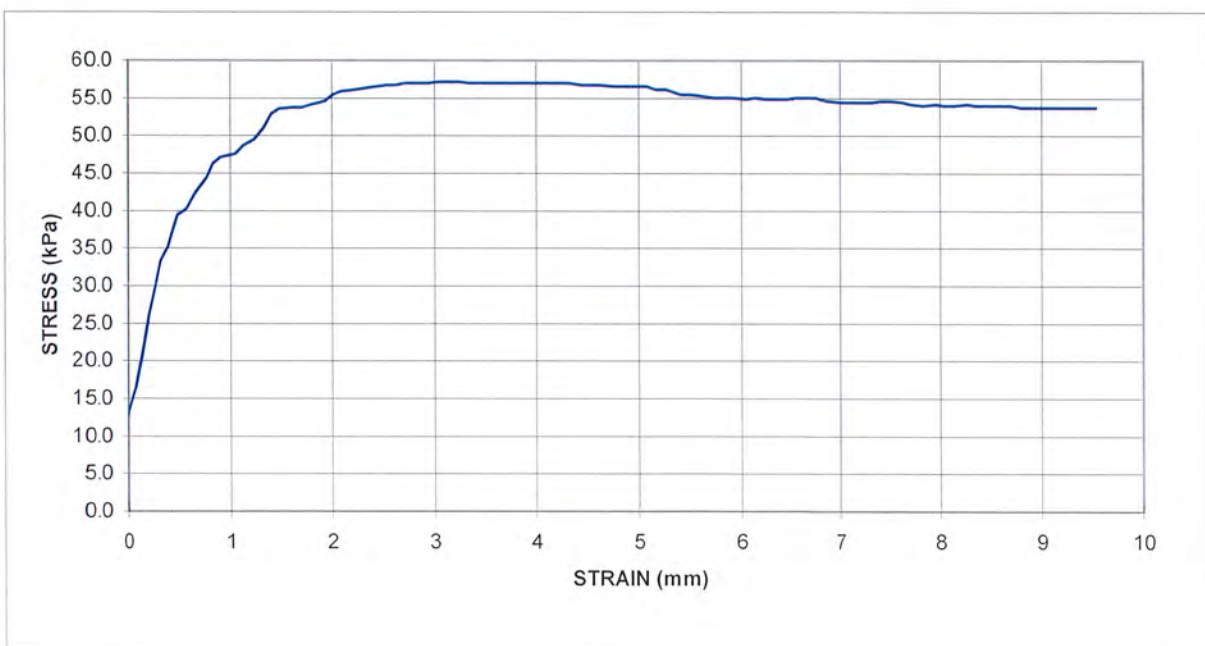
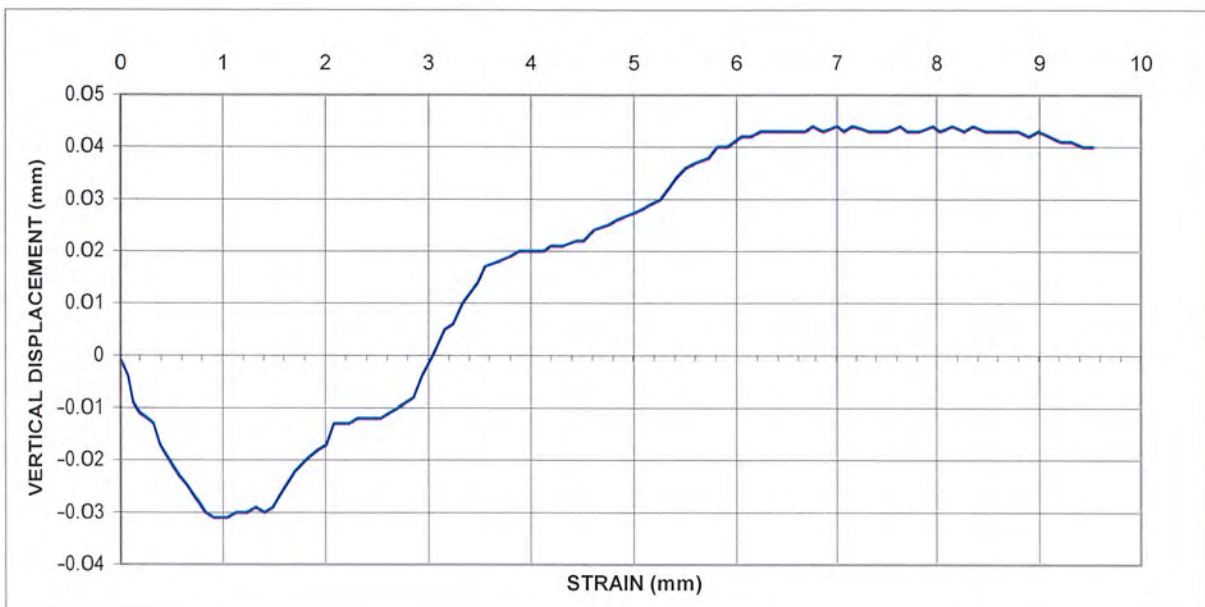
**Sample:** B21

**Depth:** 4.95 m.

**Stage Number** 2

**Pressure** 100 kPa

100 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS\BH02

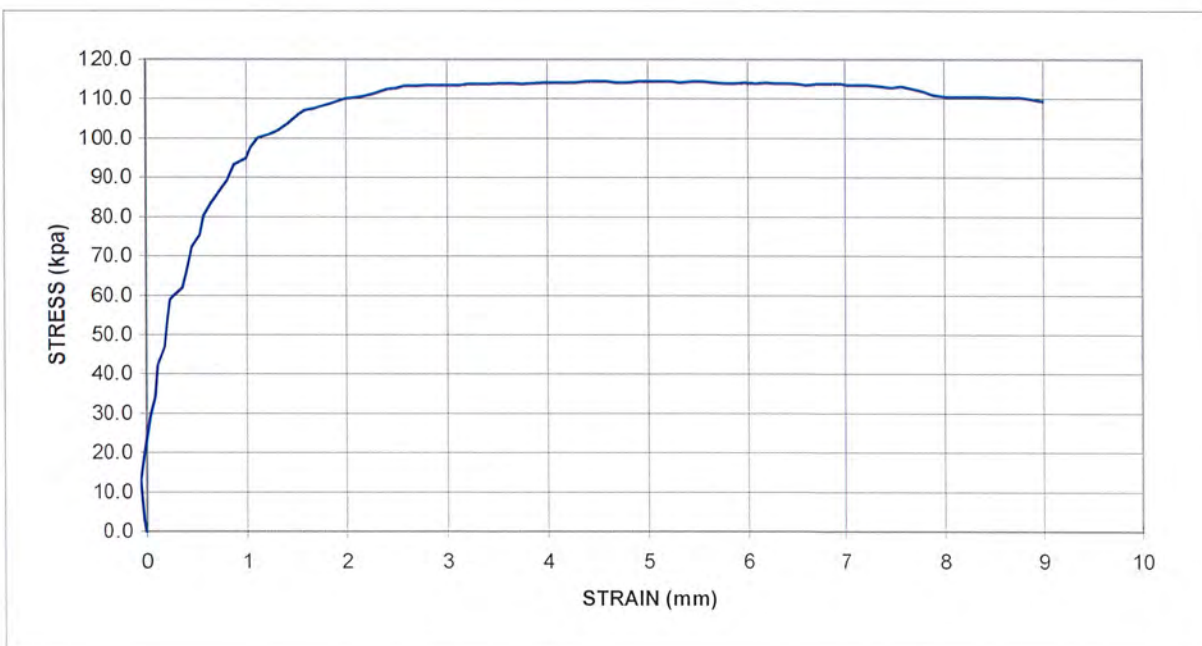
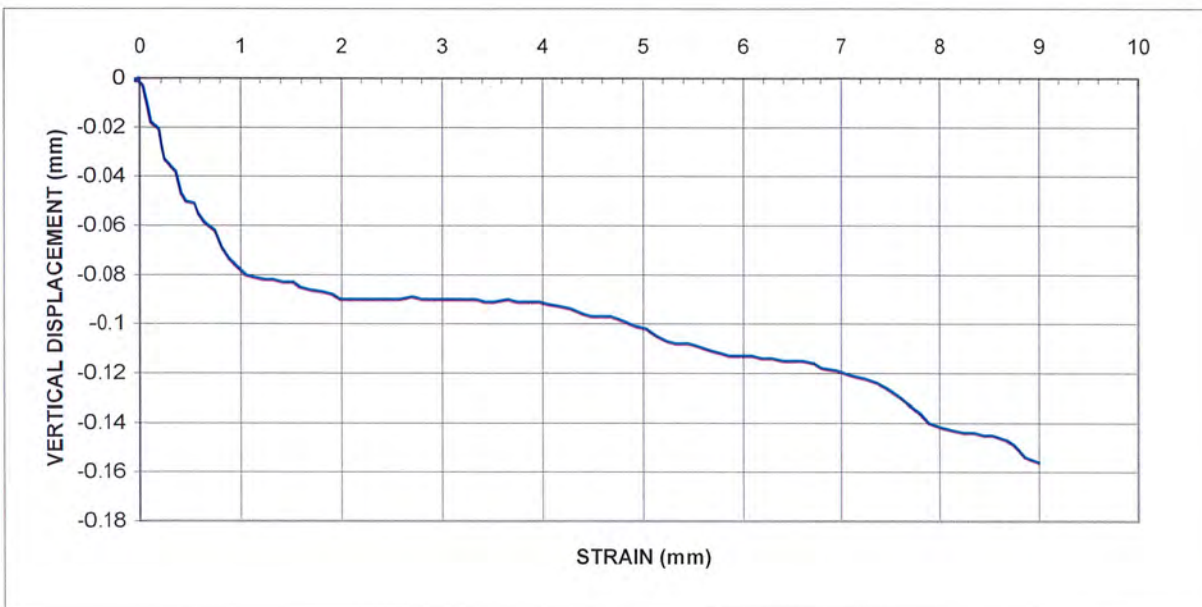
**Sample:** B21

**Depth:** 4.95 m.

**Stage Number** 3

**Pressure** 200 kPa

200 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.** 4339

**Borehole:** MS1BH02

**Sample:** B41

**Depth:** 10.40 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	21.7	22.4	22.4
Initial Moisture Content	%	15.1	15.1	15.1
Initial Wet density	mg/m <sup>3</sup>	1.63	1.63	1.64
Initial Dry density	mg/m <sup>3</sup>	1.41	1.42	1.42
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	105	210	420
Height at end of Stage	mm	21.0	21.7	21.3
Duration	Day(s)	0.5	0.5	0.5

### SHEARING

Rate of Strain	mm/min	0.312	0.310	0.308
Peak Shear Stress	kPa	64.4	105.9	230.5
Displacement at Peak Stress	mm	8.99	7.97	8.22
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	23.3	22.6	22.4
Final Wet Density	mg/m <sup>3</sup>	1.81	1.79	1.83
Final Dry Density	mg/m <sup>3</sup>	1.46	1.46	1.50

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	0
Angle of Shearing Resistance phi 'r	Deg	29°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi 'r	Deg	N/A

### REMARKS:

DATE TESTED 14/09/2021  
 DATE OF ISSUE 28/09/2021

NAME Michelle Selkirk  
 APPROVED BY [REDACTED]



# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

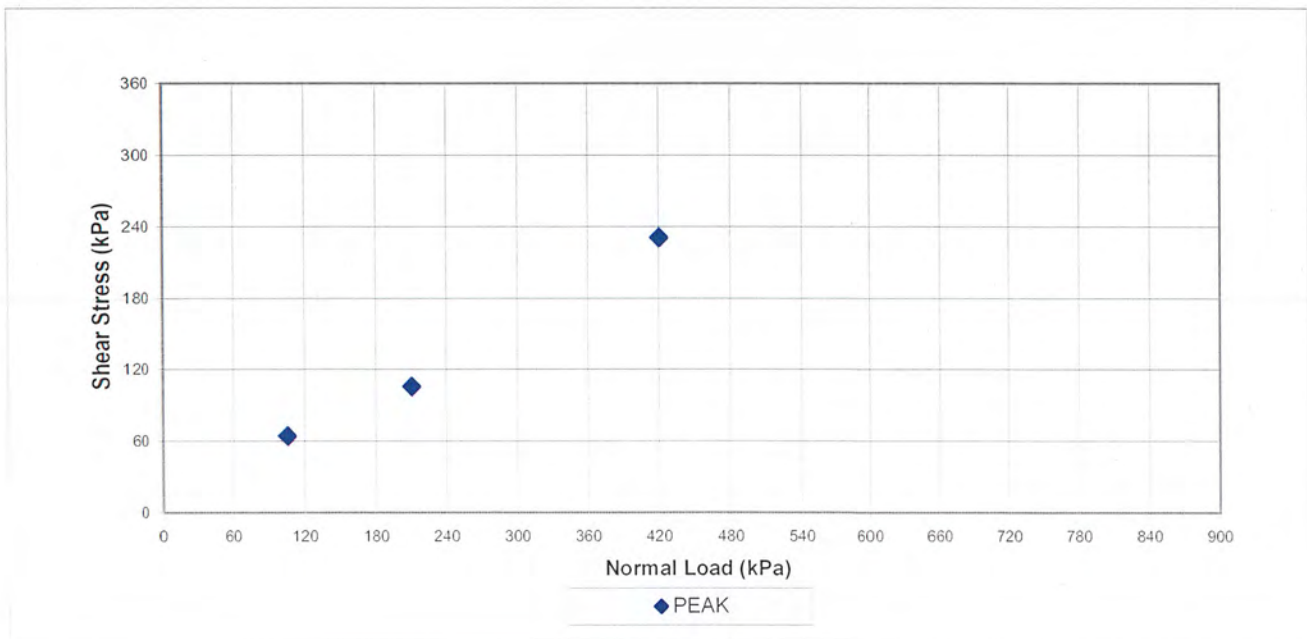
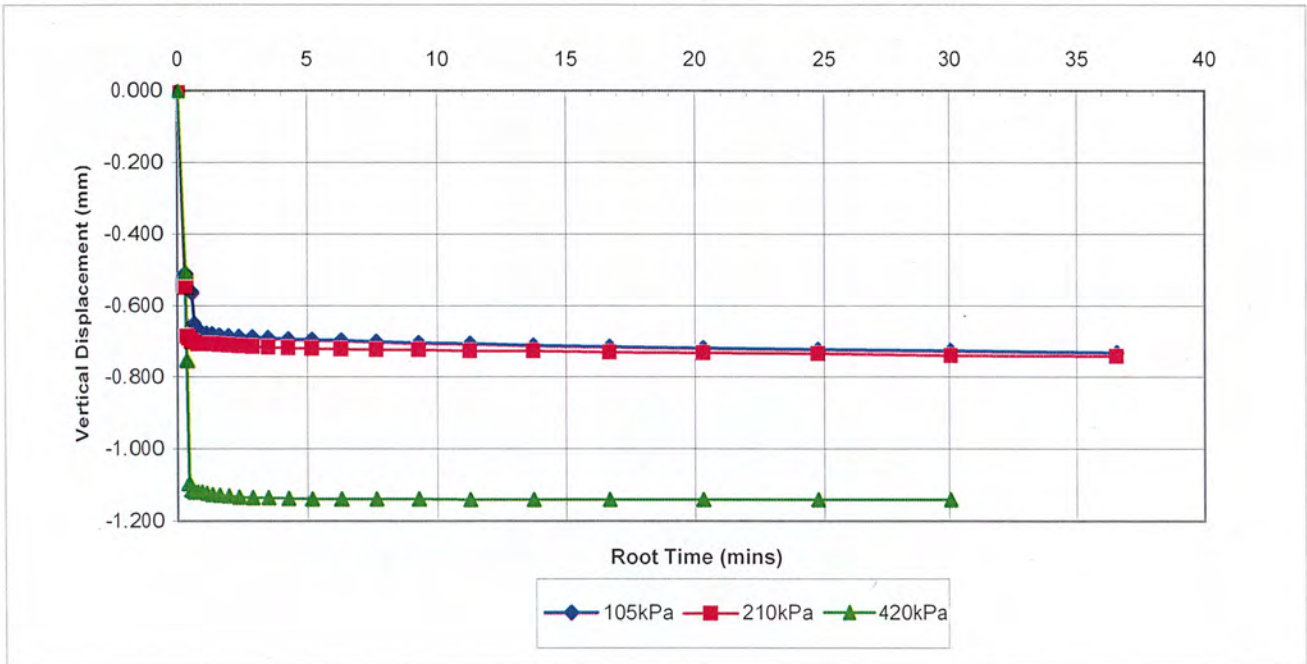
**Client:** AECOM

**Job No.** 4339

**Borehole:** MS\BH02

**Sample:** B41

**Depth:** 10.40 m.







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS\BH02

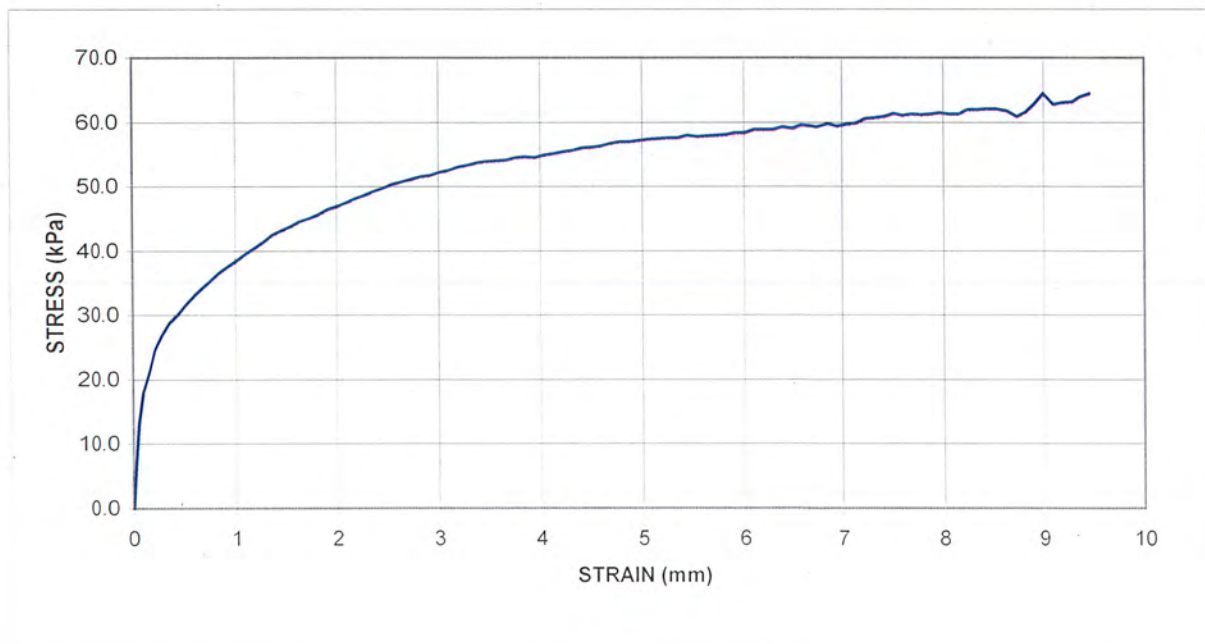
**Sample:** B41

**Depth:** 10.40 m.

**Stage Number** 1

**Pressure** 105 kPa

105 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS1BH02

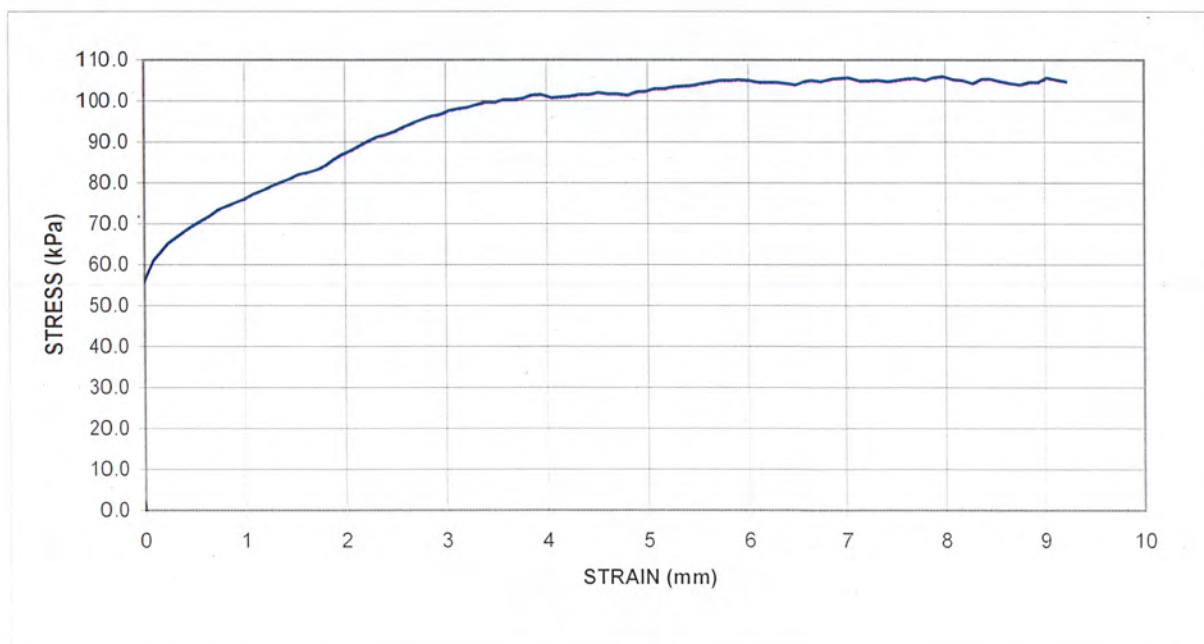
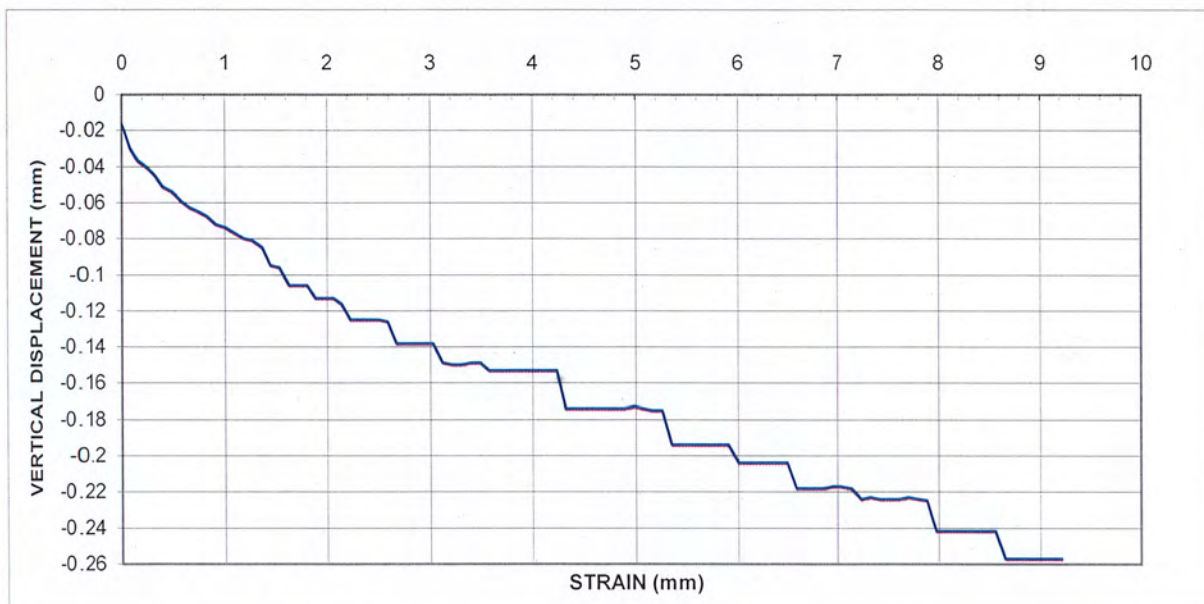
**Sample:** B41

**Depth:** 10.40 m.

**Stage Number** 2

**Pressure** 210 kPa

210 kPa







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Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co. Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS\BH02

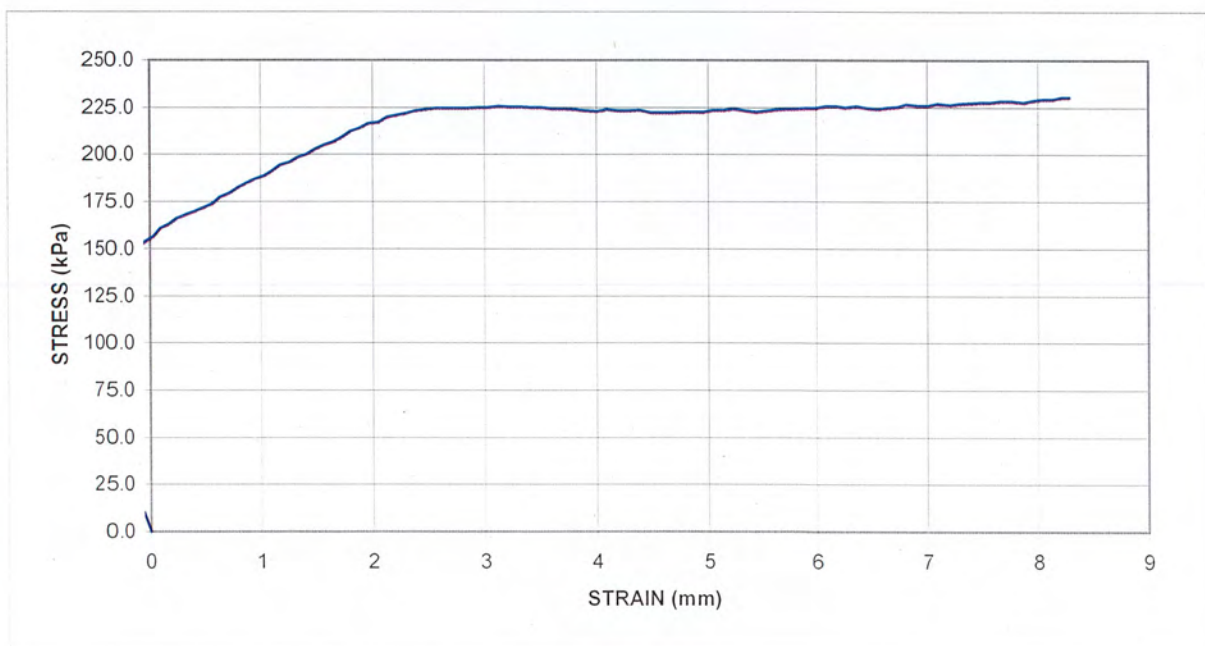
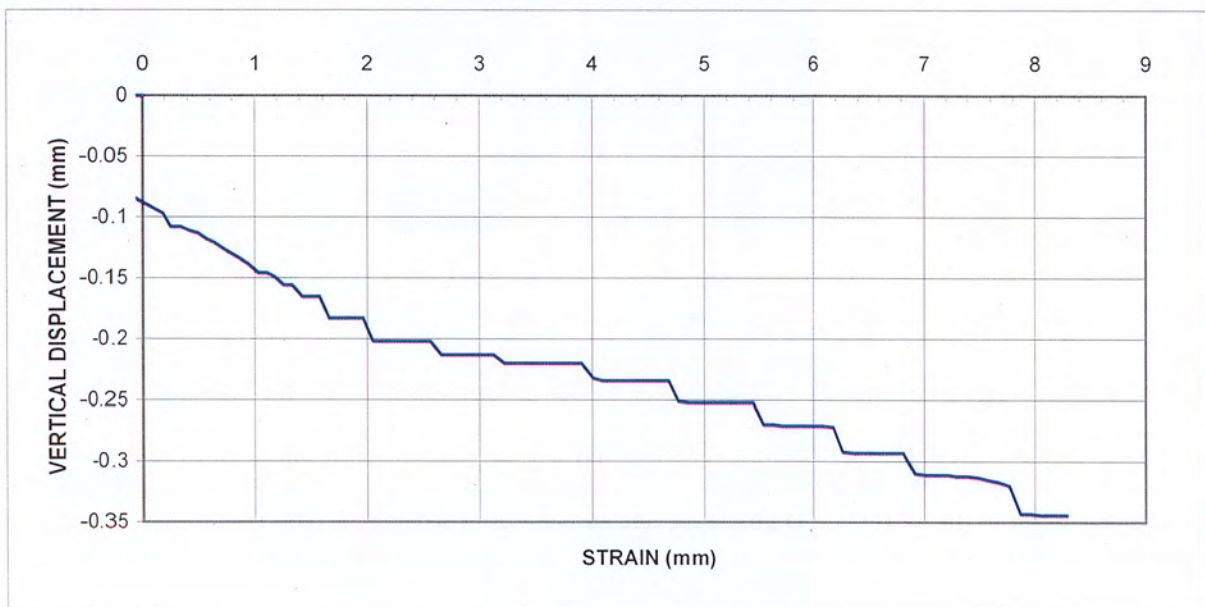
**Sample:** B41

**Depth:** 10.40 m.

**Stage Number** 3

**Pressure** 420 kPa

420 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.** 4339

**Borehole:** MS\BH03

**Sample:** B32

**Depth:** 7.95 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	24.6	25.0	24.4
Initial Moisture Content	%	19.7	19.7	19.7
Initial Wet density	mg/m <sup>3</sup>	1.69	1.68	1.72
Initial Dry density	mg/m <sup>3</sup>	1.41	1.41	1.44
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	50	100	200
Height at end of Stage	mm	24.1	24.2	22.1
Duration	Day(s)	0.5	1.0	1.0

### SHEARING

Rate of Strain	mm/min	0.148	0.146	0.136
Peak Shear Stress	kPa	16.9	45.9	95.5
Displacement at Peak Stress	mm	8.50	8.14	2.20
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	23.7	24.1	23.8
Final Wet Density	mg/m <sup>3</sup>	1.79	1.80	1.97
Final Dry Density	mg/m <sup>3</sup>	1.45	1.45	1.59

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	0
Angle of Shearing Resistance phi'	Deg	27°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi'r	Deg	N/A

### REMARKS:

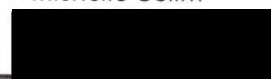
DATE TESTED 07/10/2021

DATE OF ISSUE 18/10/2021

NAME

Michelle Selirk

APPROVED BY







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

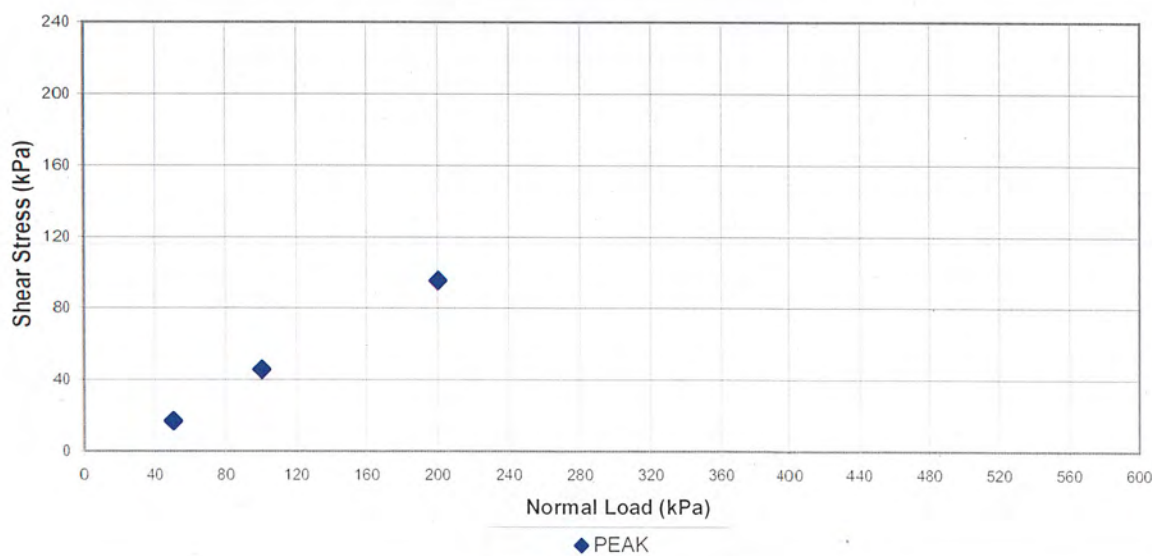
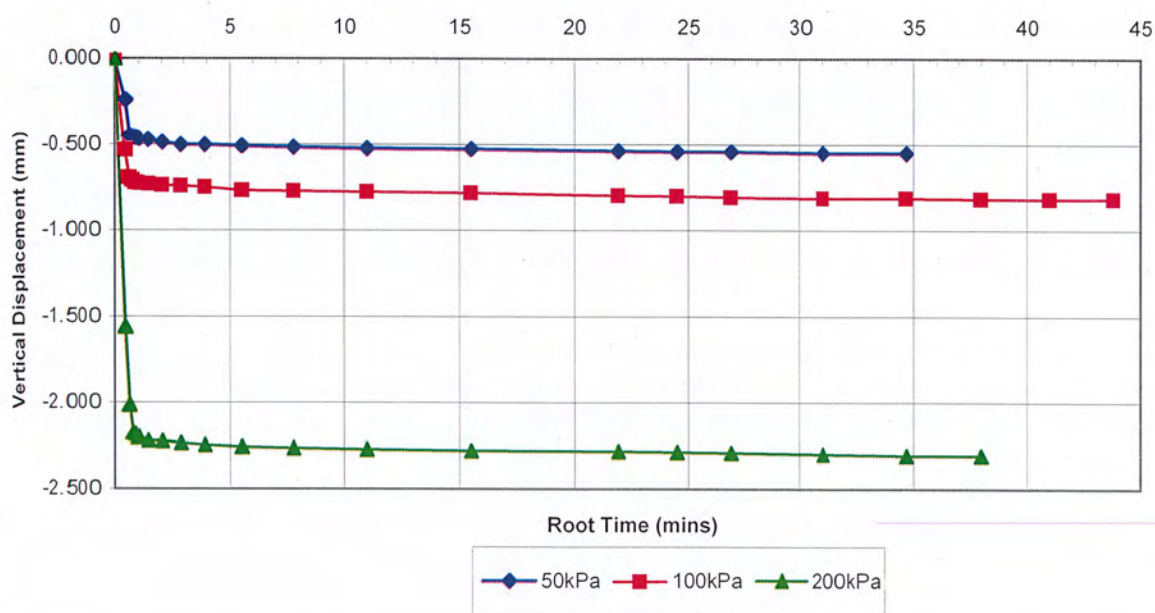
**Client:** AECOM

**Job No.** 4339

**Borehole:** MS\BH03

**Sample:** B32

**Depth:** 7.95 m.





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4  
 (Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS\BH03

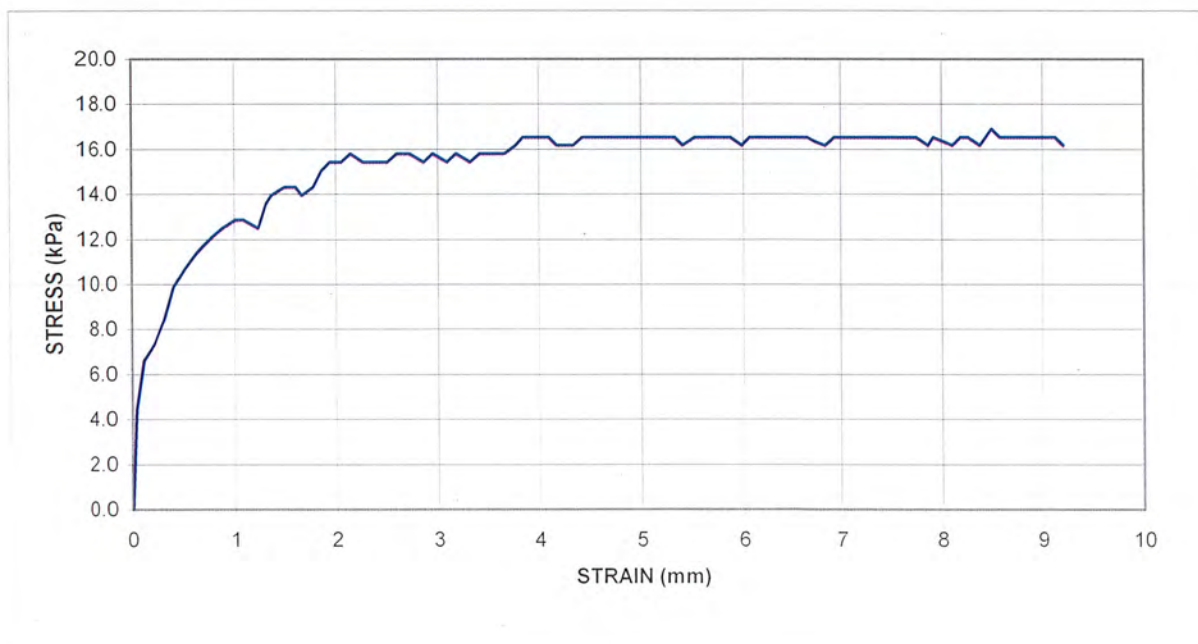
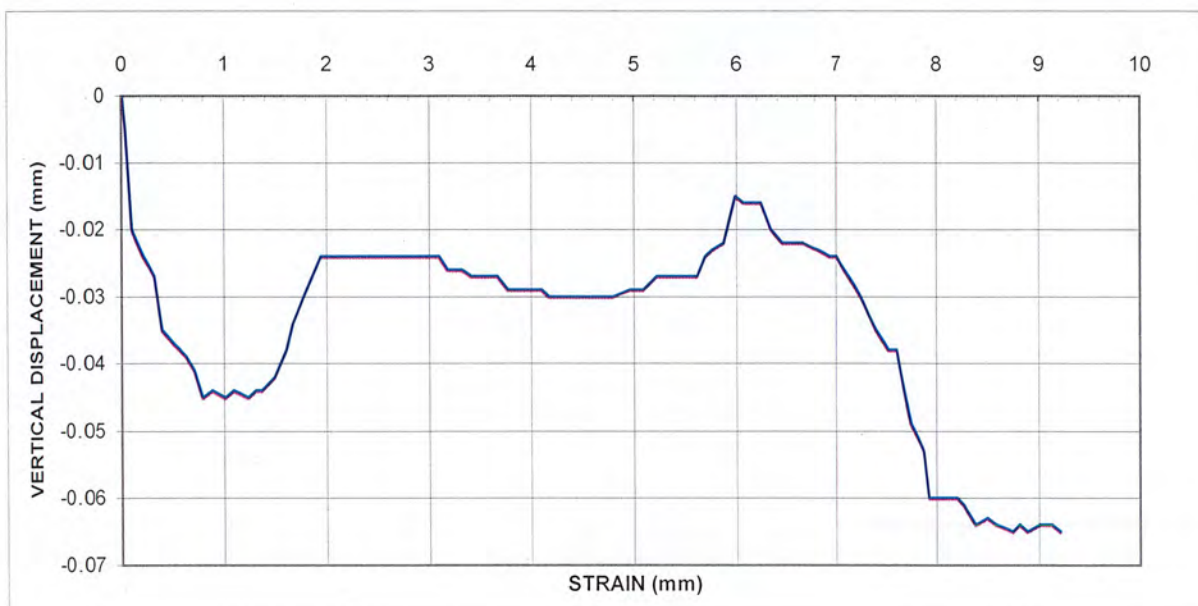
**Sample:** B32

**Depth:** 7.95 m.

**Stage Number** 1

**Pressure** 50 kPa

50 kPa







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Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

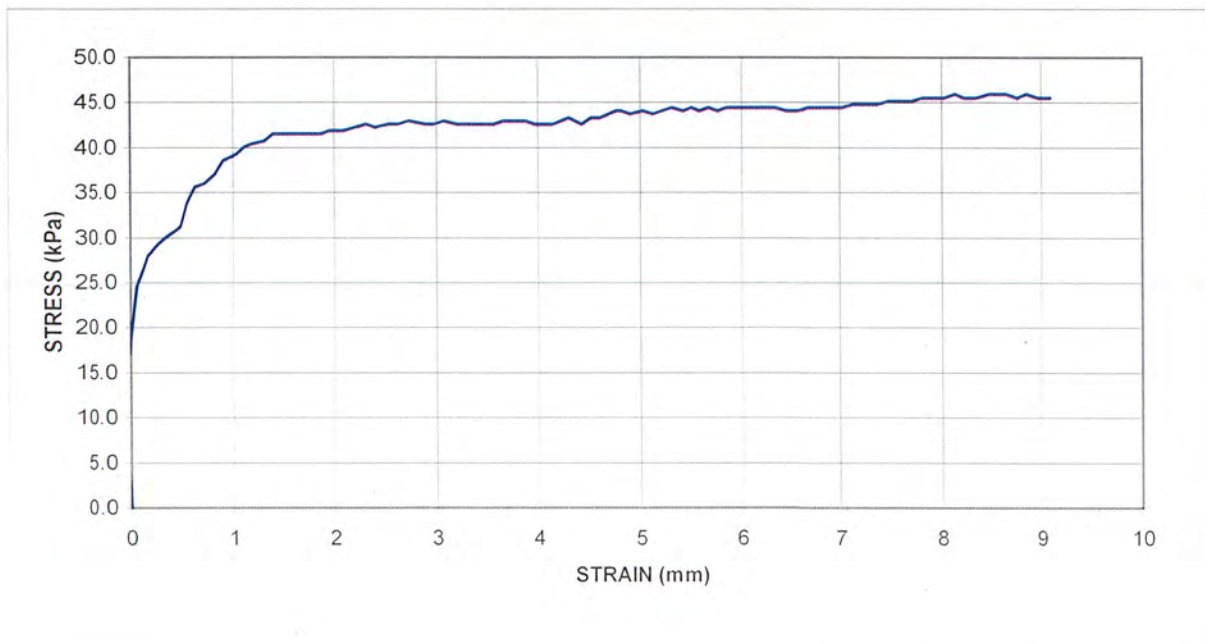
**Borehole:** MS\BH03

**Sample:** B32

**Depth:** 7.95 m.

**Stage Number** 2

**Pressure** 100 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co. Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4  
 (Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No.:** 4339

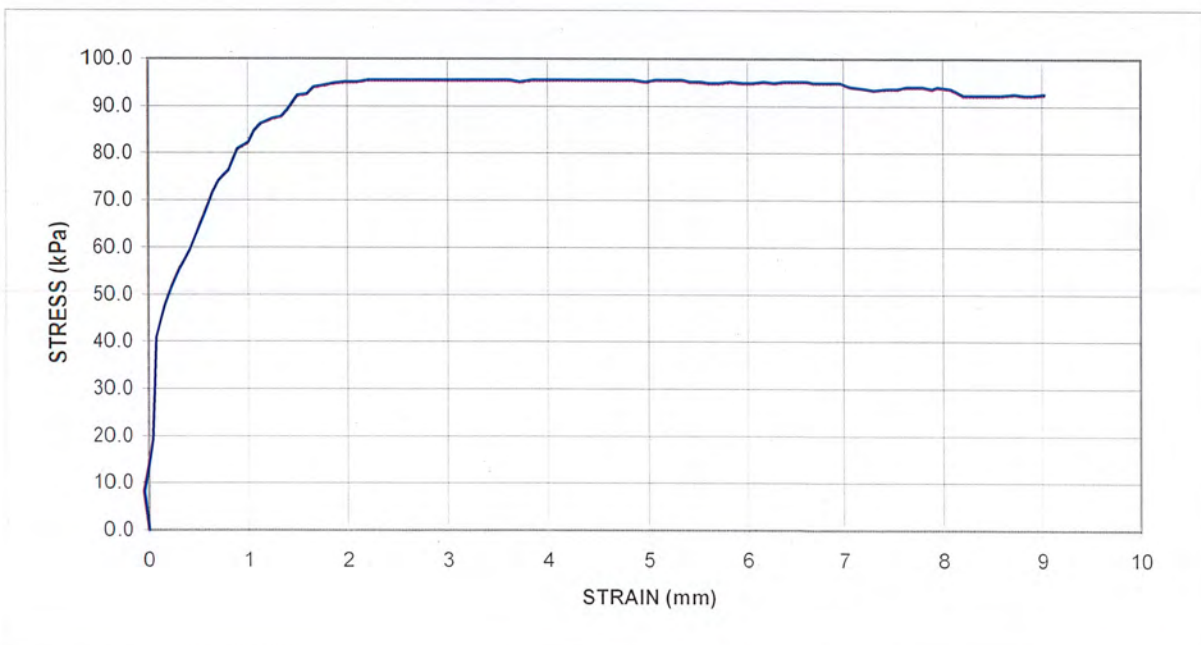
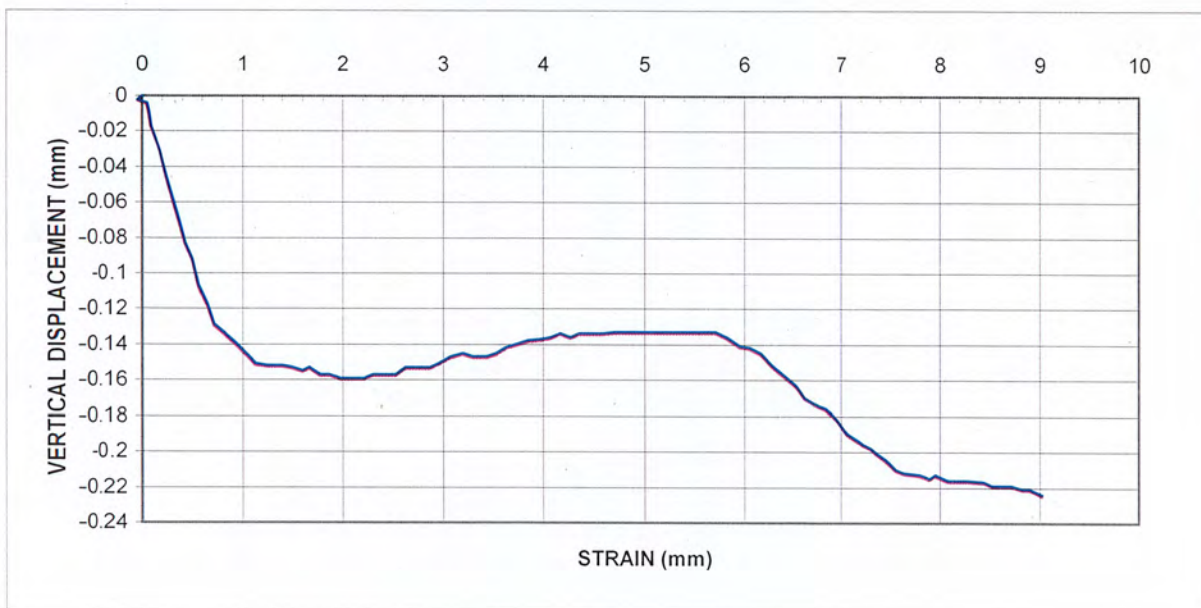
**Borehole:** MS\BH03

**Sample:** B32

**Depth:** 7.95 m.

**Stage Number** 3

**Pressure** 200 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.** 4339

**Borehole:** MS\BH03

**Sample:** B37

**Depth:** 9.35 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	23.7	23.5	23.8
Initial Moisture Content	%	20.8	20.8	20.8
Initial Wet density	mg/m <sup>3</sup>	1.72	1.71	1.71
Initial Dry density	mg/m <sup>3</sup>	1.42	1.42	1.42
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	60	120	240
Height at end of Stage	mm	23.2	23.0	23.0
Duration	Day(s)	0.5	0.5	0.5

### SHEARING

Rate of Strain	mm/min	0.314	0.313	0.311
Peak Shear Stress	kPa	31.6	63.2	127.5
Displacement at Peak Stress	mm	4.86	9.31	9.08
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	23.7	23.3	23.6
Final Wet Density	mg/m <sup>3</sup>	1.80	1.79	1.81
Final Dry Density	mg/m <sup>3</sup>	1.46	1.45	1.47

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	0
Angle of Shearing Resistance phi '	Deg	28°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi 'r	Deg	N/A

### REMARKS:

**DATE TESTED** 28/09/2021  
**DATE OF ISSUE** 15/10/2021

**NAME**  
**APPROVED BY**

Michelle Selkirk



# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

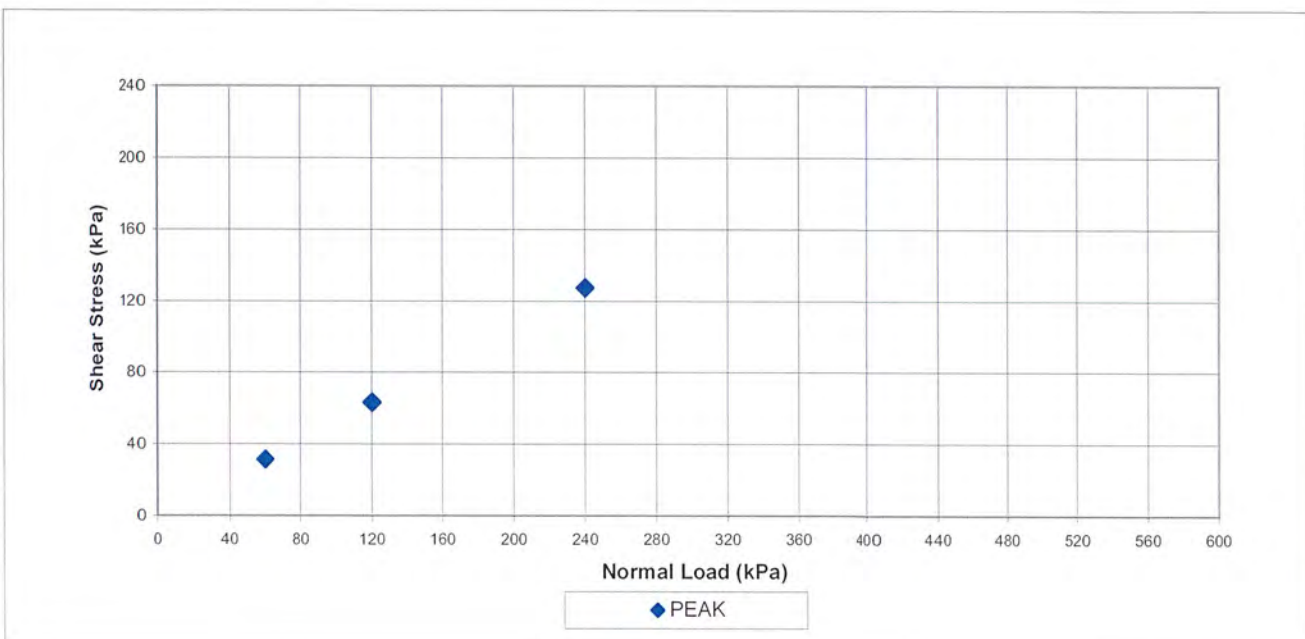
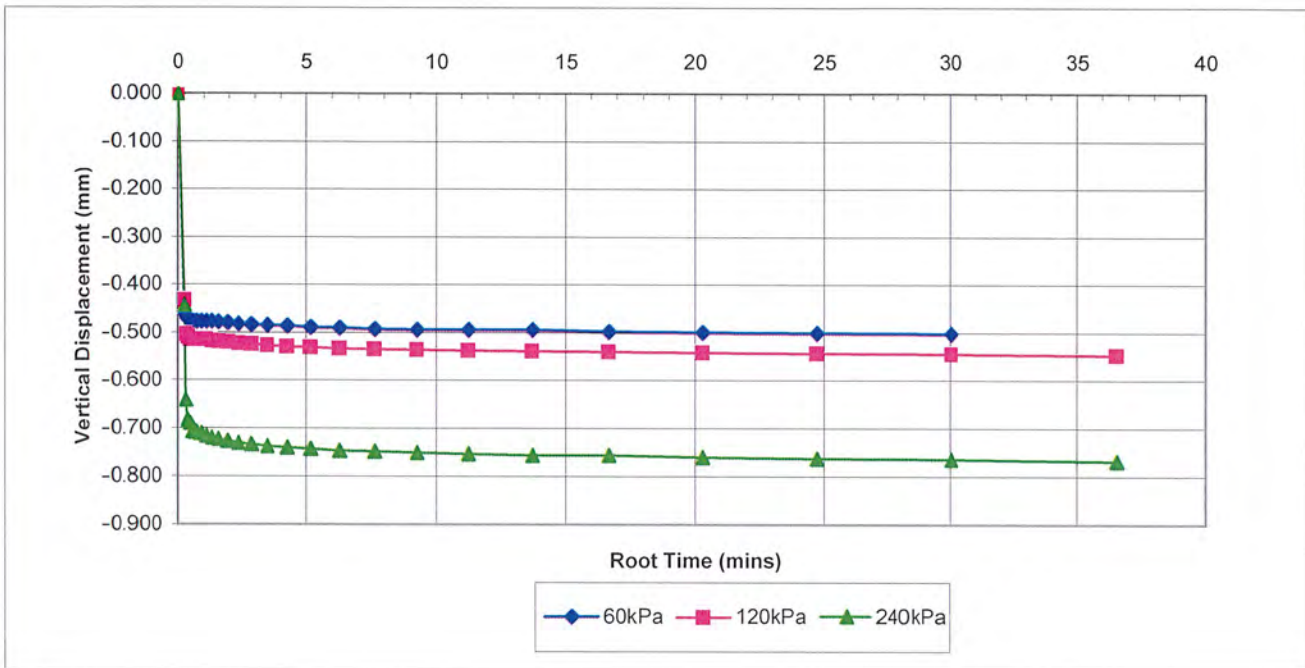
**Client:** AECOM

**Job No.** 4339

**Borehole:** MS\BH03

**Sample:** B37

**Depth:** 9.35 m.







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

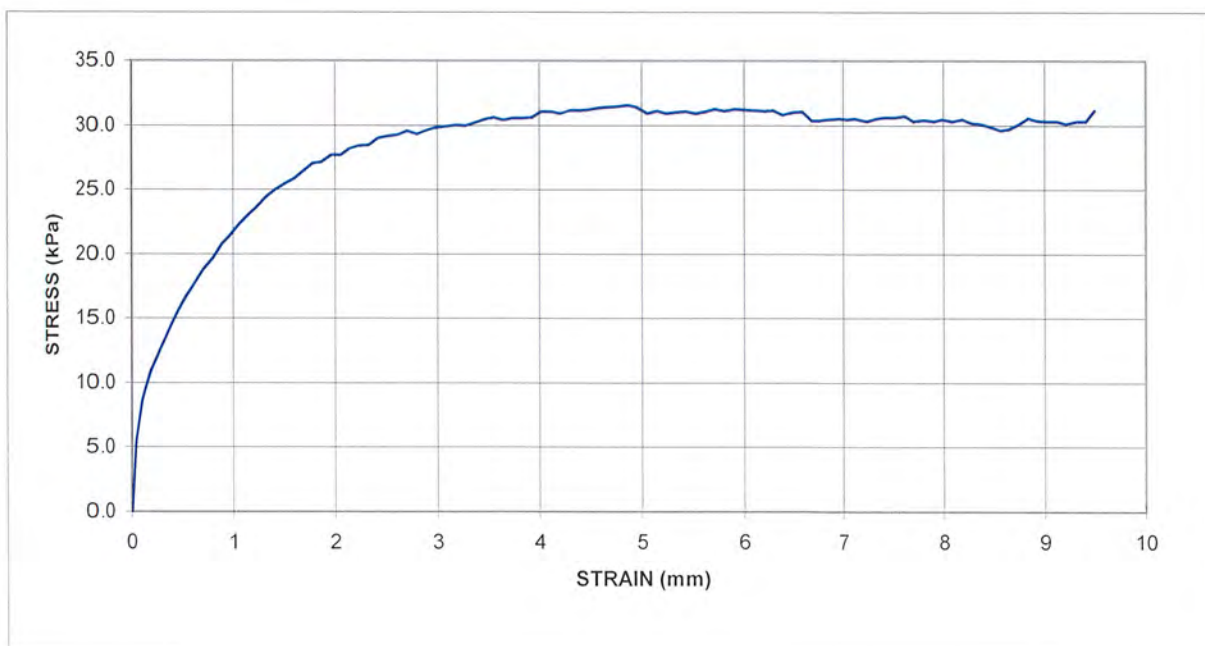
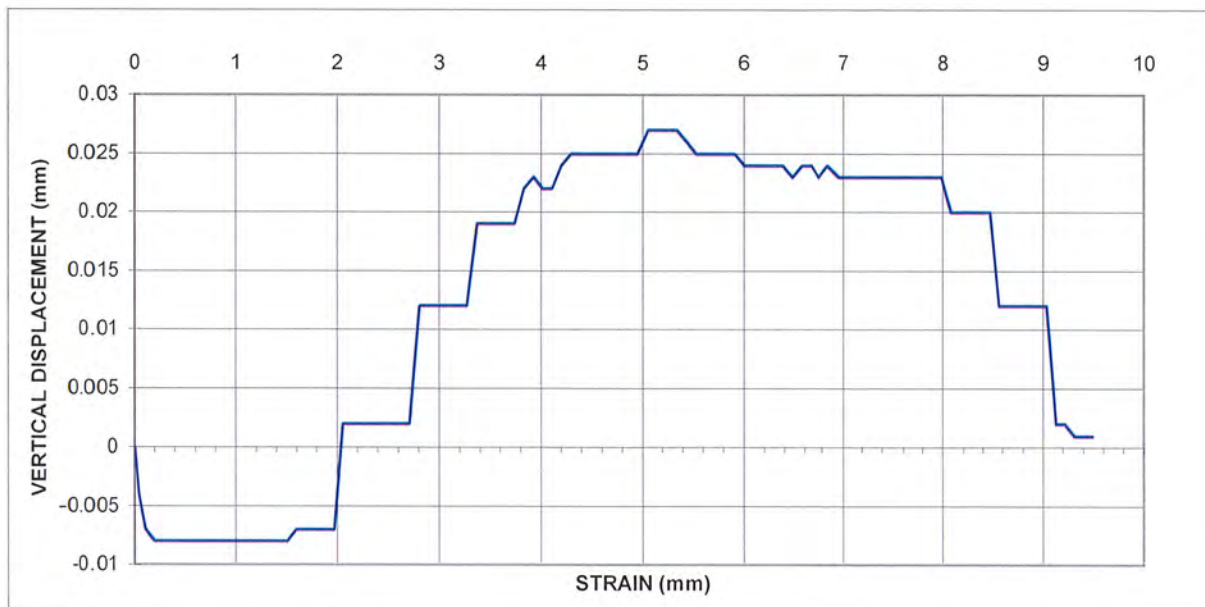
**Borehole:** MS\BH03

**Sample:** B37

**Depth:** 9.35 m.

**Stage Number** 1

**Pressure** 60 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

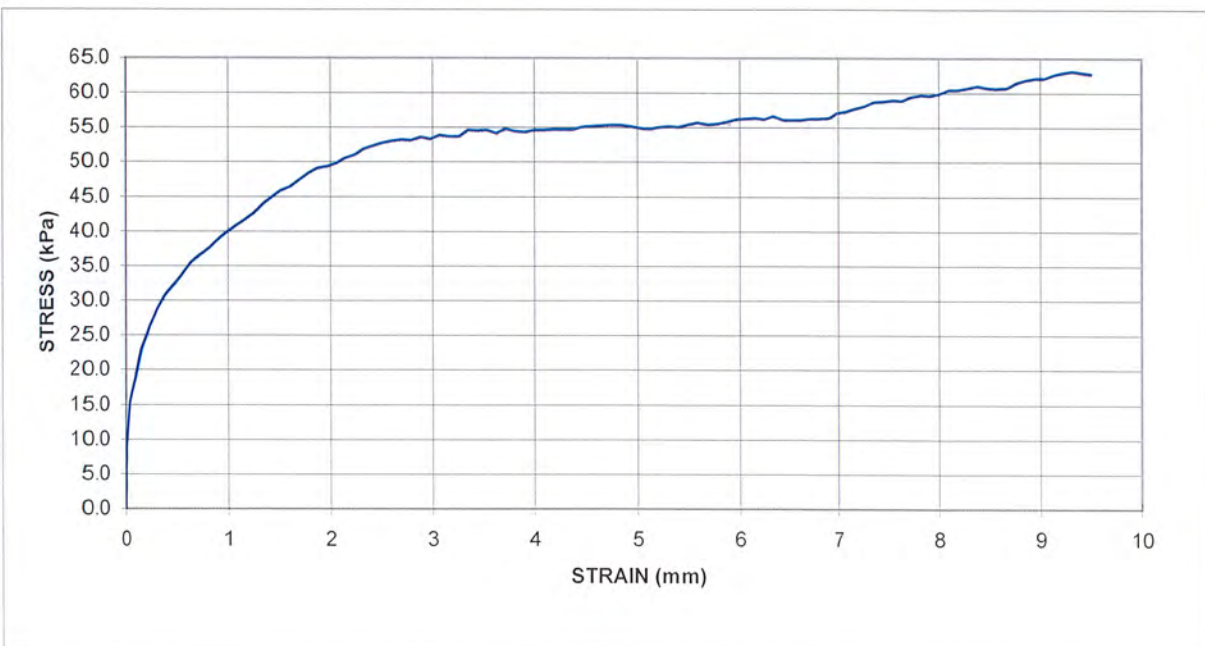
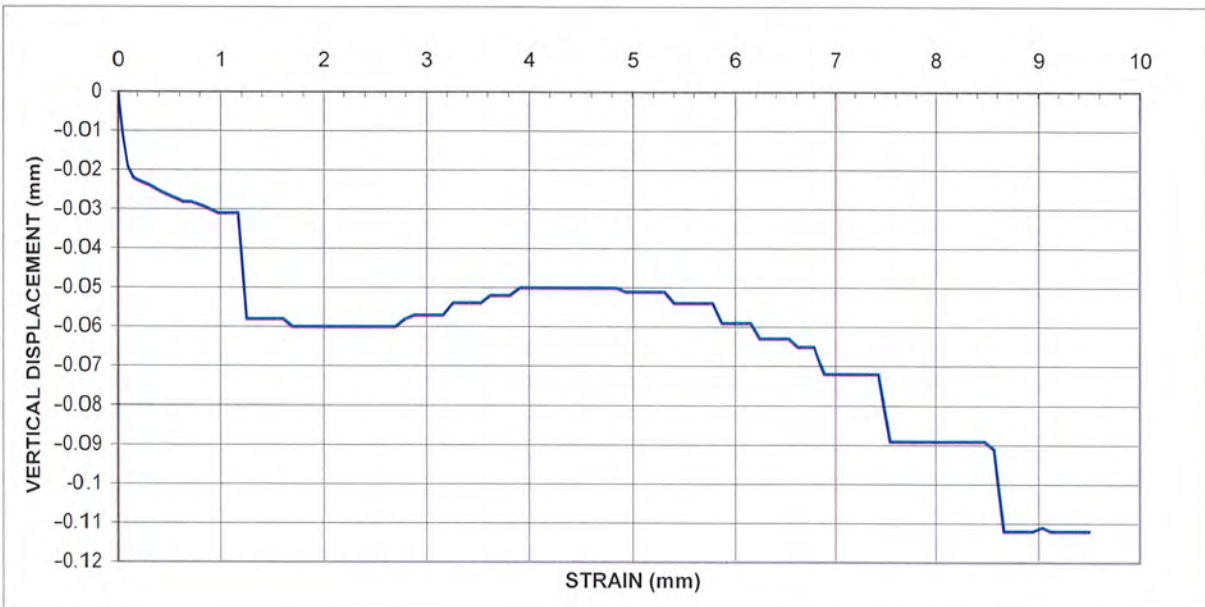
**Borehole:** MS\BH03

**Sample:** B37

**Depth:** 9.35 m.

**Stage Number** 2

**Pressure** 120 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS1BH03

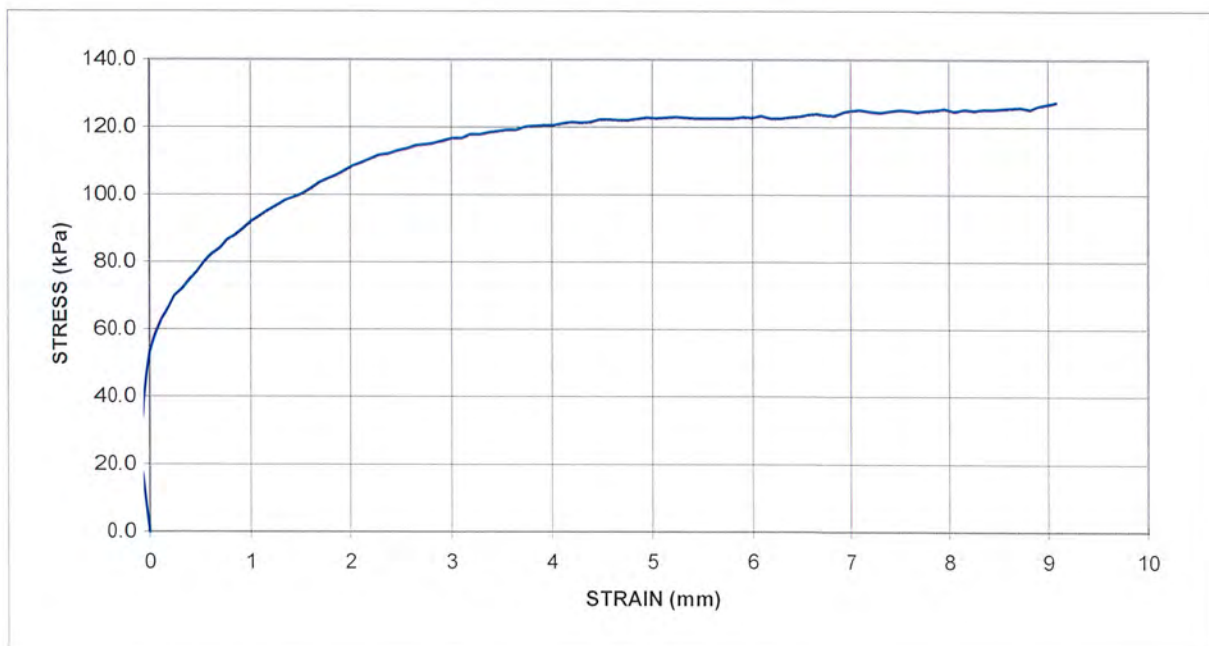
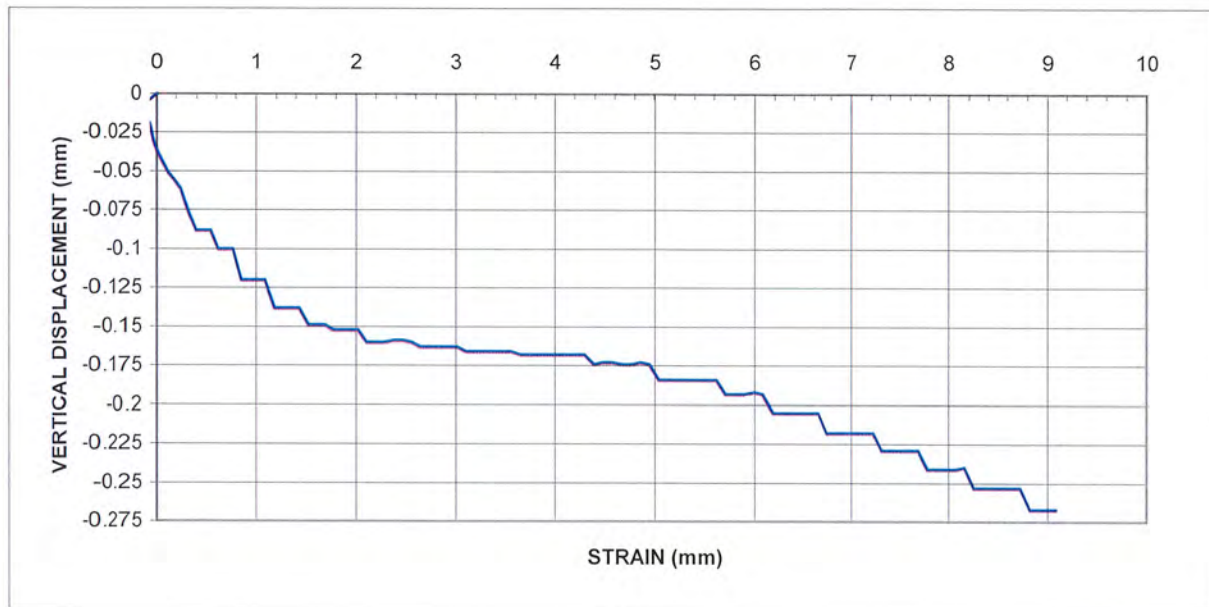
**Sample:** B37

**Depth:** 9.35 m.

**Stage Number** 3

**Pressure** 240 kPa

240 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.** 4339

**Borehole:** MSIBH04

**Sample:** B14

**Depth:** 3.45 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	21.0	21.9	21.9
Initial Moisture Content	%	18.7	18.7	18.7
Initial Wet density	mg/m <sup>3</sup>	1.66	1.69	1.69
Initial Dry density	mg/m <sup>3</sup>	1.40	1.42	1.43
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	35	70	140
Height at end of Stage	mm	20.5	21.4	21.2
Duration	Day(s)	0.5	1.0	1.0

### SHEARING

Rate of Strain	mm/min	0.314	0.312	0.310
Peak Shear Stress	kPa	19.5	39.2	79.0
Displacement at Peak Stress	mm	9.19	6.37	5.29
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	23.4	23.1	23.4
Final Wet Density	mg/m <sup>3</sup>	1.76	1.79	1.82
Final Dry Density	mg/m <sup>3</sup>	1.43	1.45	1.47

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	0
Angle of Shearing Resistance phi'	Deg	29°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi'r	Deg	N/A

### REMARKS:

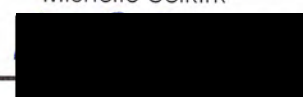
DATE TESTED 27/08/2021

DATE OF ISSUE 09/09/2021

NAME

Michelle Selkirk

APPROVED BY







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

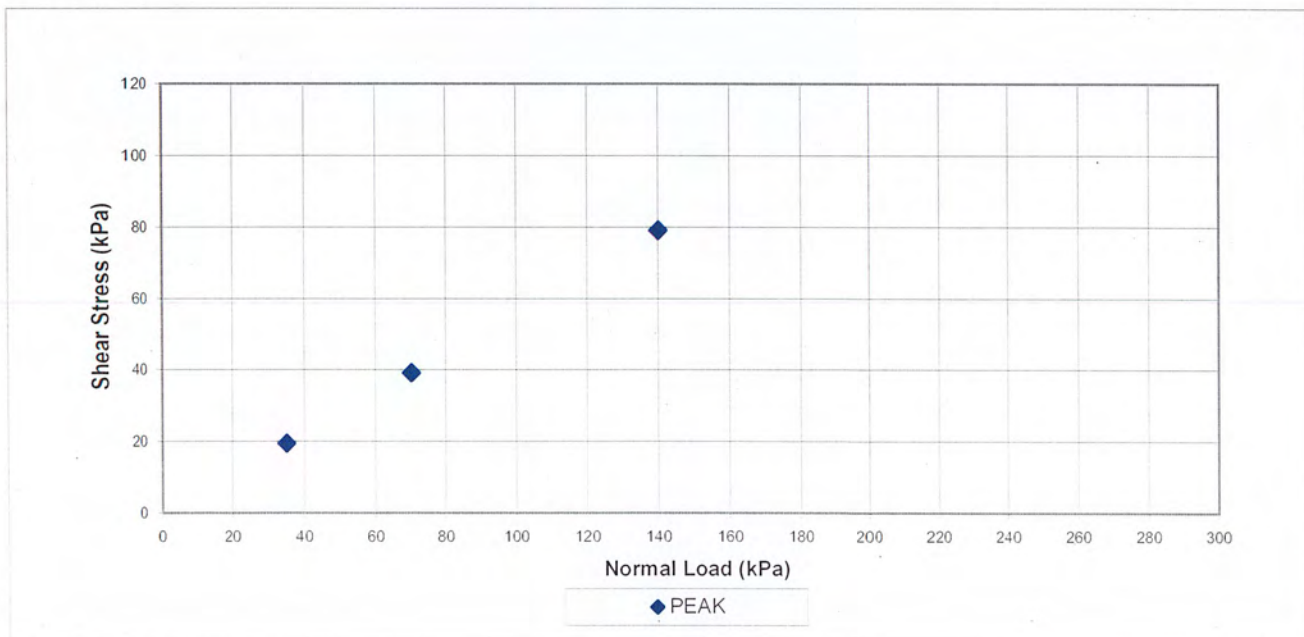
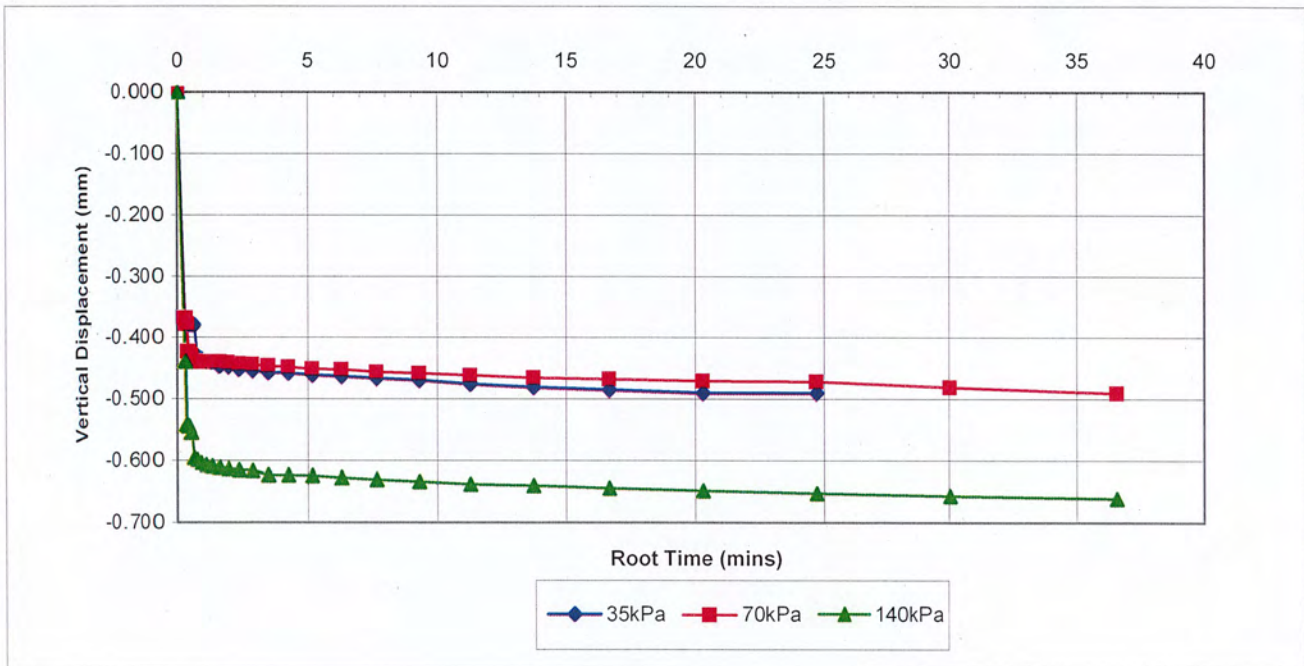
**Client:** AECOM

**Job No.** 4339

**Borehole:** MS\BH04

**Sample:** B14

**Depth:** 3.45 m.





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

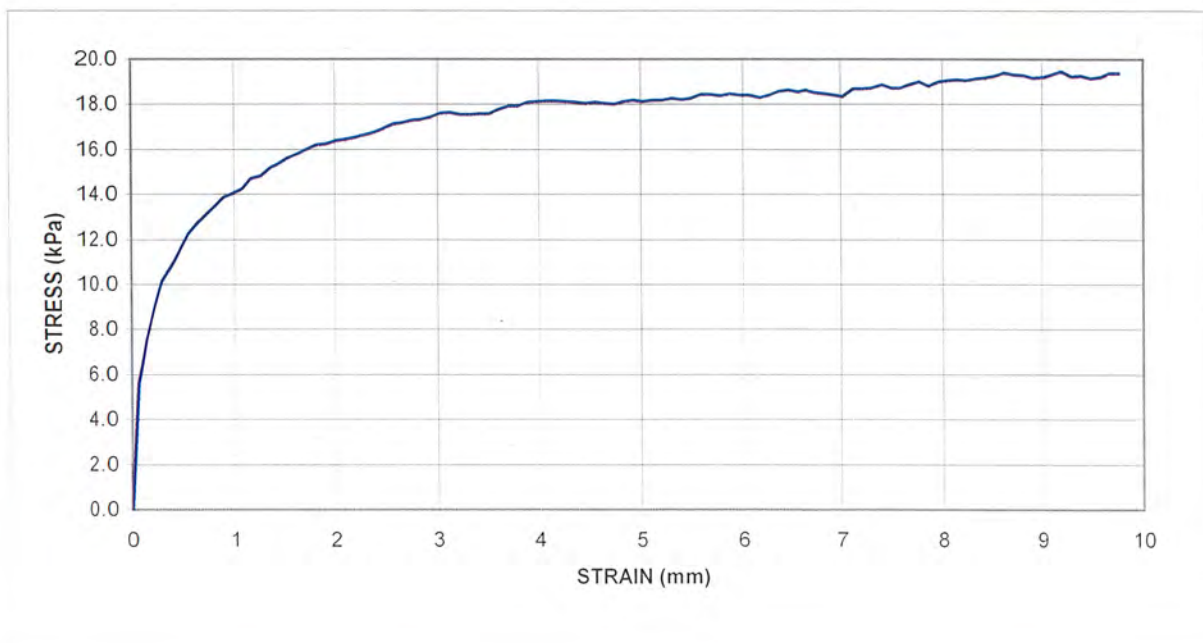
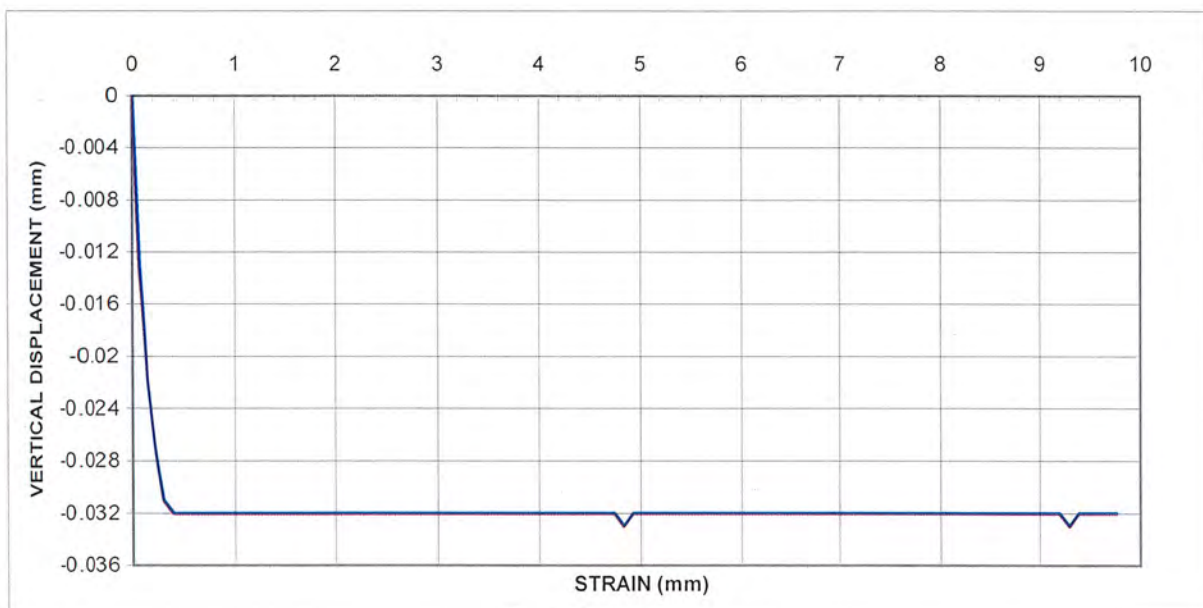
**Borehole:** MS\BH04

**Sample:** B14

**Depth:** 3.45 m.

**Stage Number** 1

**Pressure** 35 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS\BH04

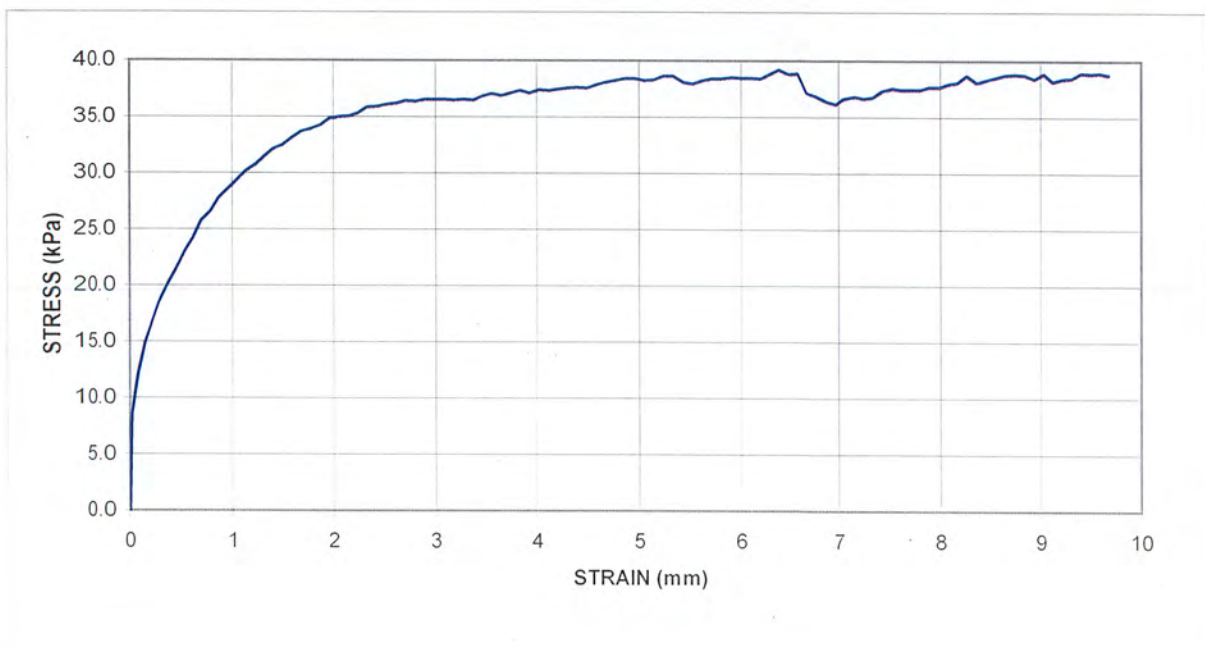
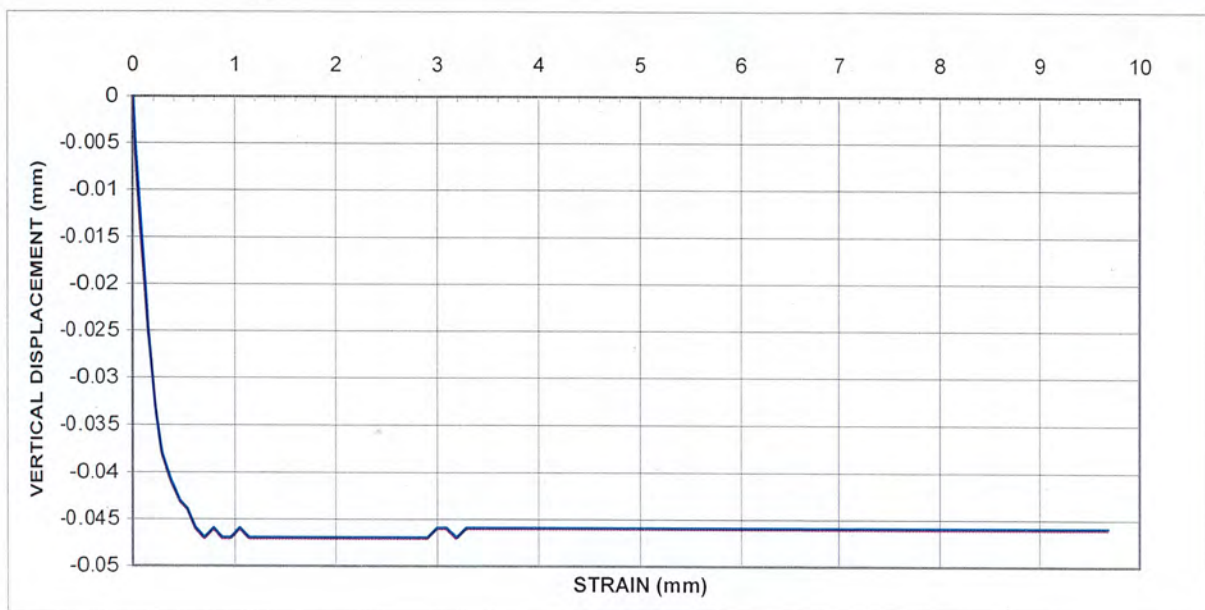
**Sample:** B14

**Depth:** 3.45 m.

**Stage Number** 2

**Pressure** 70 kPa

70 kPa





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## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No.:** 4339

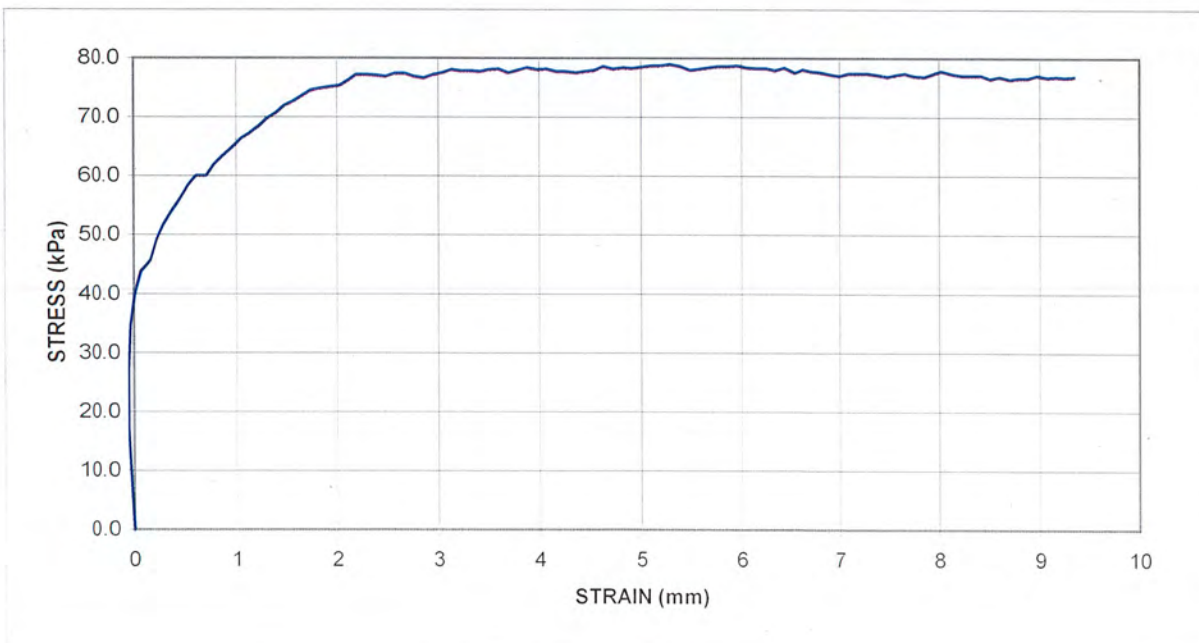
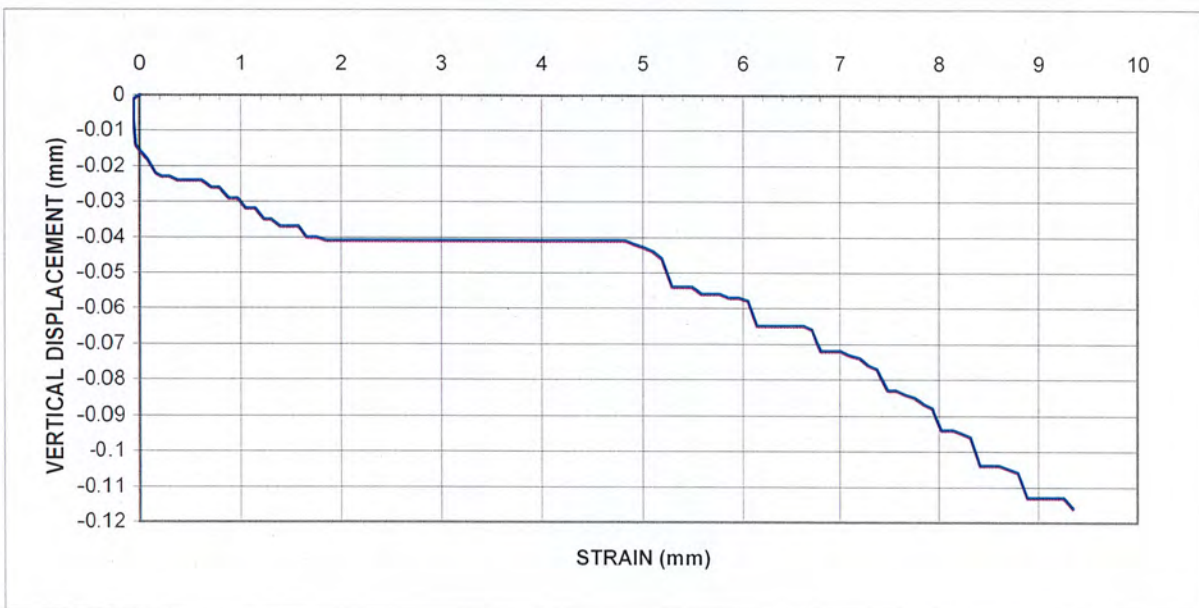
**Borehole:** MS\BH04

**Sample:** B14

**Depth:** 3.45 m.

**Stage Number** 3

**Pressure** 140 kPa







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1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No:** 4339

**Borehole:** MS\BH04

**Sample:** B36

**Depth:** 11.70 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	26.6	24.6	24.2
Initial Moisture Content	%	22.5	22.5	22.5
Initial Wet density	mg/m <sup>3</sup>	2.05	2.10	2.12
Initial Dry density	mg/m <sup>3</sup>	1.67	1.71	1.73
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	80	160	320
Height at end of Stage	mm	25.1	22.9	22.3
Duration	Day(s)	0.5	0.5	0.5

### SHEARING

Rate of Strain	mm/min	0.063	0.063	0.063
Peak Shear Stress	kPa	56.8	114.0	223.3
Displacement at Peak Stress	mm	3.23	3.43	4.41
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	19.2	18.6	18.2
Final Wet Density	mg/m <sup>3</sup>	2.12	2.18	2.22
Final Dry Density	mg/m <sup>3</sup>	1.77	1.84	1.88

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	3
Angle of Shearing Resistance phi '	Deg	34°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi 'r	Deg	N/A

### REMARKS:

**DATE TESTED** 27/08/2021  
**DATE OF ISSUE** 08/09/2021

**NAME**  
**APPROVED BY**

Michelle Selkirk



# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test BS 1377 : PART 7 : 1990 Clause 4 (Specimen(s) Tested Submerged)

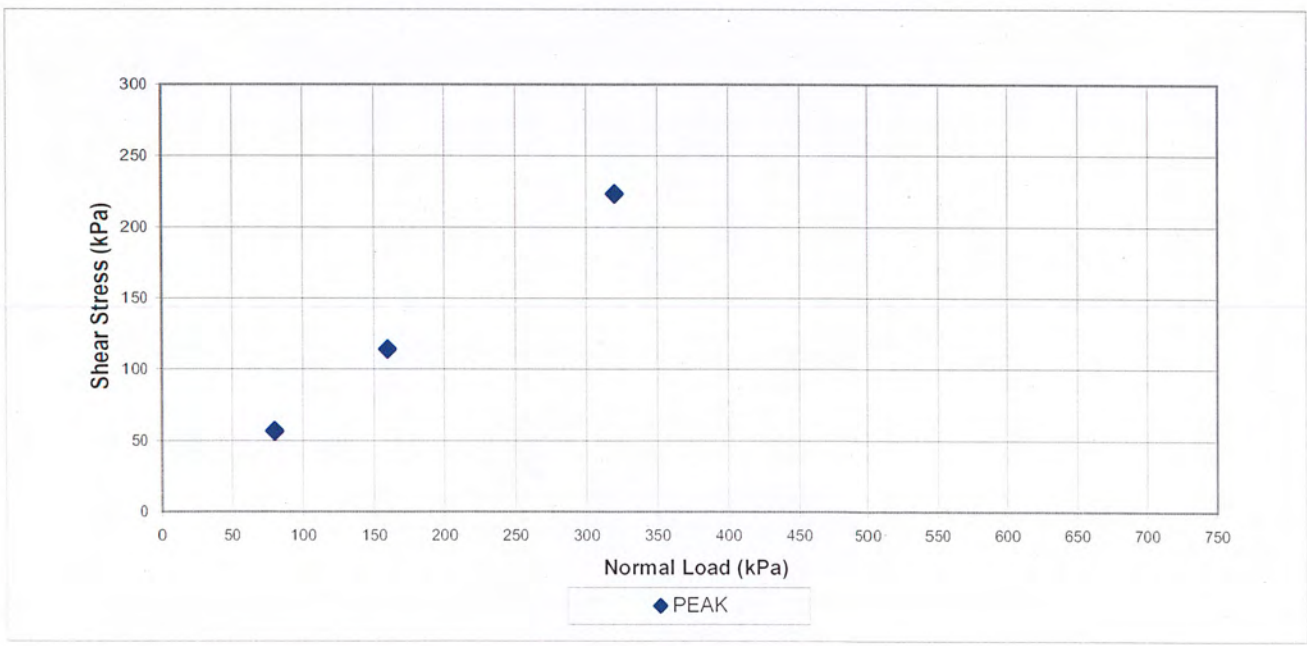
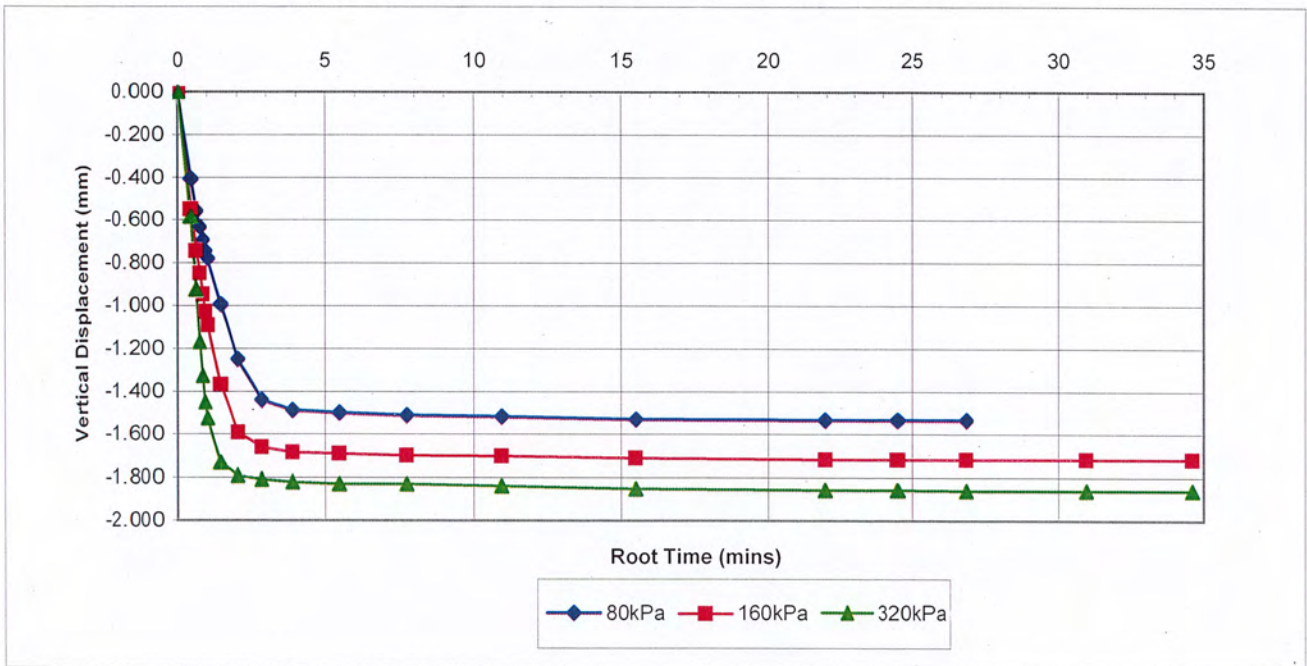
**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No:** 4339

**Borehole:** MS\BH04

**Sample:** B36

**Depth:** 11.70 m.







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4  
 (Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT  
**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS\BH04

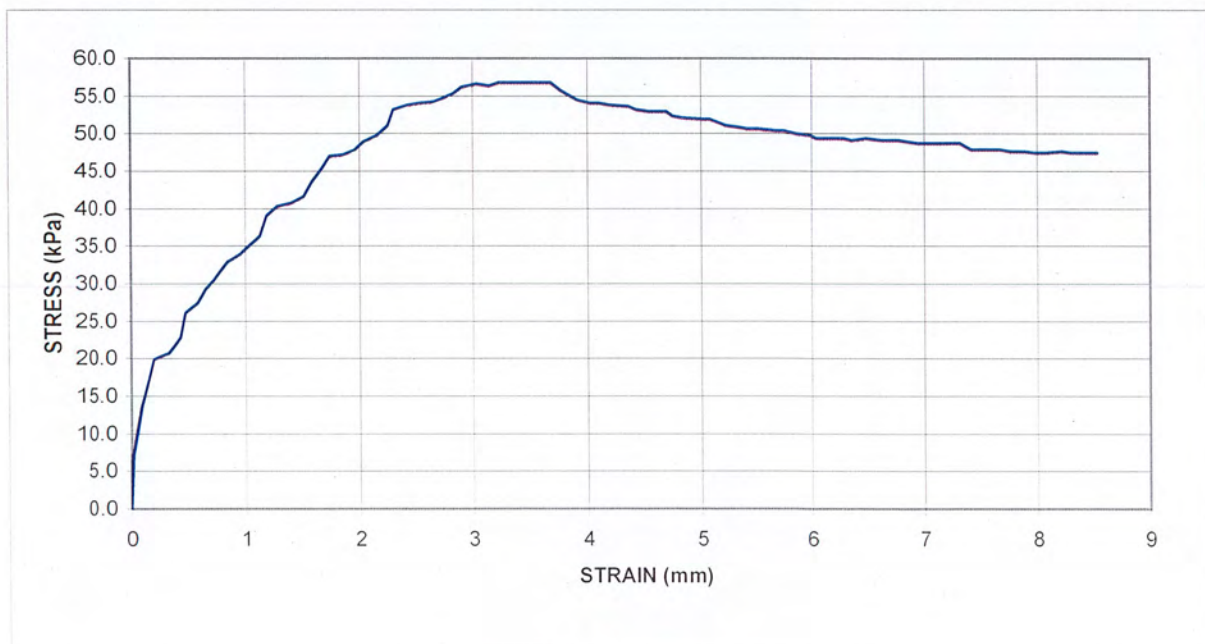
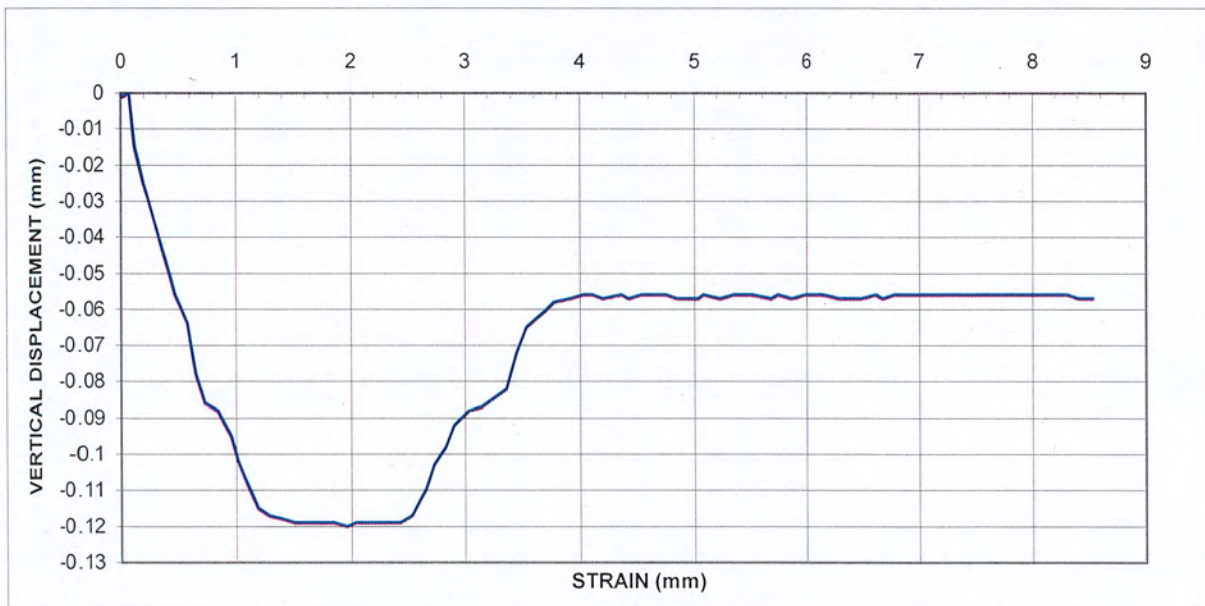
**Sample:** B36

**Depth:** 11.70 m.

**Stage Number** 1

**Pressure** 80 kPa

80 kPa





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## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

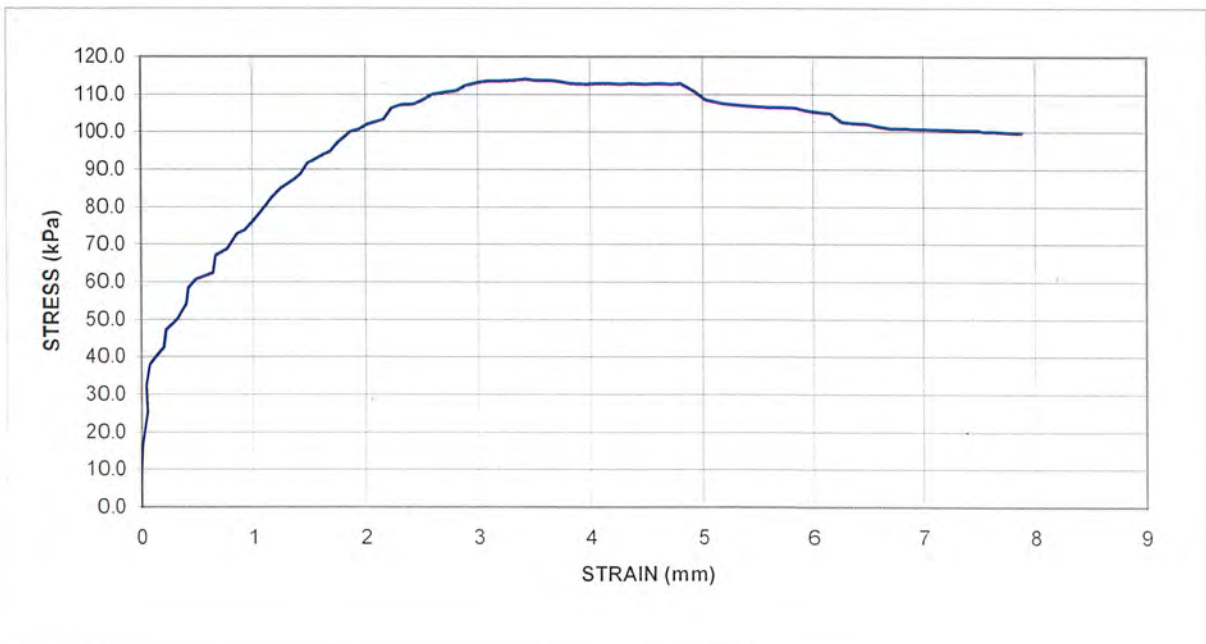
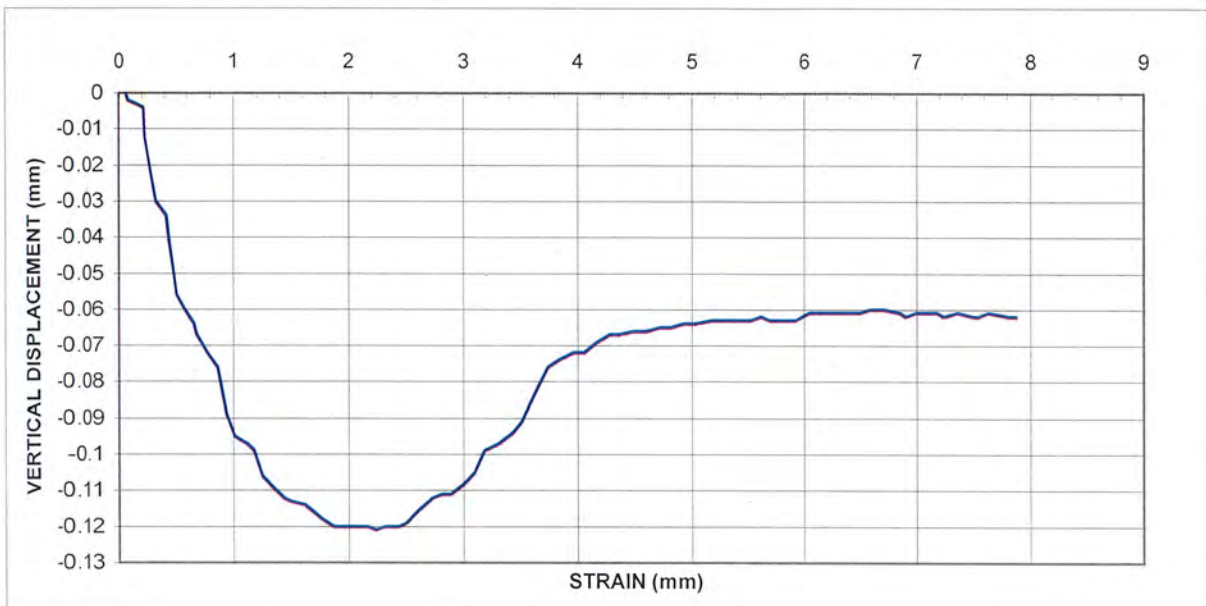
**Borehole:** MS1BH04

**Sample:** B36

**Depth:** 11.70 m.

**Stage Number** 2

**Pressure** 160 kPa







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1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** Preliminary Onshore Ground Investigation for NZT

**Client:** AECOM

**Job No.:** 4339

**Borehole:** MS\BH04

**Sample:** B36

**Depth:** 11.70 m.

**Stage Number** 3

**Pressure** 320 kPa

