

**Determination of Thermal Conductivity of Soil and Soft Rock
by Thermal Needle Probe Procedure ASTM D 5334 - 00**

Borehole Number: BH1
Sample No: 2.0
Depth (m) 1.90 - 2.10

Description:
Firm grey silty SAND with rare
fine gravel, glass, tile and brick

Sample preparation: Sample compacted by vibrating hammer method in 5 layers
according to procedures detailed in BS1377 : Part 4 :
Clause 3.7 : 1990, to produce a cylindrical specimen

Sample diameter: 101.7 mm

Sample length: 170.0 mm

Bulk Density 1.72 Mg/m³

Dry Density 1.25 Mg/m³

Moisture Content 38 %

Thermal Conductivity **0.431** W/(m.k)

Remarks:

Checked and
Approved

Initials:
SB

Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3

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**Determination of Thermal Conductivity of Soil and Soft Rock
by Thermal Needle Probe Procedure ASTM D 5334 - 00**

Borehole Number: BH3A
Sample No: 2.0
Depth (m) 1.80 - 2.00

Description:
Firm grey and brown silty CLAY with
occasional black organic silt and rare fine gravel

Sample preparation: Sample compacted by vibrating hammer method in 5 layers
according to procedures detailed in BS1377 : Part 4 :
Clause 3.7 : 1990, to produce a cylindrical specimen

Sample diameter: 101.1 mm

Sample length: 177.1 mm

Bulk Density 1.67 Mg/m³

Dry Density 1.39 Mg/m³

Moisture Content 20 %

Thermal Conductivity **1.087** W/(m.k)

Remarks:

Checked and
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**Determination of Thermal Conductivity of Soil and Soft Rock
by Thermal Needle Probe Procedure ASTM D 5334 - 00**

Borehole Number: BH3A
Sample No: U1
Depth (m) 2.00 - 2.45

Description:
Firm brown slightly organic silty CLAY

Sample preparation: Sample tested as undisturbed specimen direct from sampling tube

Sample diameter: 100.8 mm

Sample length: 202.3 mm

Bulk Density 1.73 Mg/m³

Dry Density 1.16 Mg/m³

Moisture Content 50 %

Thermal Conductivity **1.159** W/(m.k)

Remarks:

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**Determination of Thermal Conductivity of Soil and Soft Rock
by Thermal Needle Probe Procedure ASTM D 5334 - 00**

Borehole Number: BH5
Sample No: U1
Depth (m) 2.20 - 2.60

Description:
Firm brown silty CLAY

Sample preparation: Sample tested as undisturbed specimen direct from sampling tube

Sample diameter: 101.9 mm

Sample length: 203.3 mm

Bulk Density 1.64 Mg/m³

Dry Density 1.08 Mg/m³

Moisture Content 52 %

Thermal Conductivity **1.044** W/(m.k)

Remarks:

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Initials:

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Date: 03/06/2013

Project Number:

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Project Name:

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Determination of Thermal Conductivity of Soil and Soft Rock by Thermal Needle Probe Procedure ASTM D 5334 - 00

Borehole Number: BH6
Sample No: 2.0
Depth (m) 1.80 - 2.20

Description:
Black medium SAND

Sample preparation: Sample compacted by vibrating hammer method in 5 layers according to procedures detailed in BS1377 : Part 4 : Clause 3.7 : 1990, to produce a cylindrical specimen

Sample diameter: 101.1 mm

Sample length: 201.1 mm

Bulk Density 1.08 Mg/m³

Dry Density 0.90 Mg/m³

Moisture Content 20 %

Thermal Conductivity **0.808** W/(m.k)

Remarks:

Checked and
Approved

Initials:
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Date: 03/06/2013

Project Number:

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Project Name:

TOTTENHAM MARSH 3

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PROJECT NAME	TOTTENHAM MARSH 3	Date	03/06/2013
PROJECT NO:	GEO / 19628	Approved	<i>Simon Burke</i>
		Page	1 of 4

Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
Borehole No.	Depth (m)	No.	Type		MC (%)	LL (%)	PL (%)	PI (%)	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	
BH3A	2.00 - 2.45	U1	U	Firm brown slightly organic CLAY	50					1.68	1.12	20 40 80	95 89 101	47				Thermal Resistivity Insufficient for Hand Vane
BH3A	3.00 - 3.45	U2	U	Firm brownish grey slightly organic CLAY with rare fine gravel	51					1.75	1.15	30 60 120	81 94 99	46				Hand Vane = 62, 58, 62 kPa
BH3A	5.00 - 5.45	U3	U	Soft black well converted clayey PEAT	186					1.23	0.43	50 100 200	71 56 22	25				Hand Vane = 12, 13, 17 kPa
BH3A	7.50 - 7.95	U4	U	Stiff brown fine sandy very gravelly CLAY	22					2.17	1.78	75 150 300	180 219 239	107				Hand Vane = 161, 164, 167 kPa
BH3A	9.50 - 9.95	U5	U	Stiff grey silty CLAY	27					1.87	1.47	95 190 380	246 276 230	125				Hand Vane = >188 kPa
BH3A	11.50 - 11.95	U6	U	Stiff greyish brown CLAY	26					2.00	1.58	115 230 460	198 379 380	159				Hand Vane = >188 kPa
BH1	5.30 - 5.75	U1	U	Very soft grey slightly organic very gravelly CLAY	39					1.90	1.36	53 106 212	21 23 30	12				Insufficient for Hand Vane
BH1	8.00 - 8.45	U2	U	Firm brown gravelly CLAY with rare gypsum	29					1.93	1.49	80 160 320	92 102 111	51				Hand Vane = 186, 186, 178 kPa
BH1	10.45 - 10.90	U3	U	Stiff fissured grey CLAY	29					1.91	1.48	104 208 416	373 344 258	163				Hand Vane = 132, 134, 132 kPa
BH1	12.00 - 12.45	U4	U	Very stiff fissured brown CLAY	26					1.96	1.55	120 240 480	326 269 548	191				Hand Vane = >188 kPa
BH5	2.20 - 2.65	U1	U	Firm brown silty CLAY	53					1.67	1.09	25 50 100	87 90 85	44				Thermal Resistivity Hand Vane = 71, 67, 67 kPa
BH5	3.20 - 3.65	U2	U	Soft to firm dark grey slightly organic sandy CLAY	63					1.55	0.95	32 64 128	47 72 94	36				Hand Vane = 43, 32, 35 kPa

SUMMARY OF GEOTECHNICAL TESTING



Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ J Sturges (Ops Mgr) ☒ Simon Burke (Snr Tech) ☐ J J M Powell (Tech Dir)

Client: Worley Parsons, 27 Great West Road, Brentford, Middlesex TW8 9BW

(Ref5428.361042)

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PROJECT NAME	TOTTENHAM MARSH 3	Date	03/06/2013
PROJECT NO:	GEO / 19628	Approved	<i>Simon Burke</i>
		Page	2 of 4

Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
Borehole No.	Depth (m)	No.	Type		MC (%)	LL (%)	PL (%)	PI (%)	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	
BH5	8.60 - 9.05	U3	U	Stiff fissured grey CLAY	26					1.95	1.54	86 172 344	219 278 348	141				Hand Vane = >188 kPa
BH5	10.10 - 10.55	U4	U	Stiff fissured grey CLAY	28					1.97	1.53	100 200 400	379 391 287	176				Insufficient for Hand Vane
BH5	11.60 - 12.05	U5	U	Very stiff fissured grey silty CLAY	22					1.96	1.60	116 232 464	199 318 459	163				Hand Vane = >188 kPa
BH6	3.20 - 3.65	U1	U	Soft grey slightly organic CLAY	49					1.88	1.27	32 64 128	35 45 53	22				Hand Vane = 34, 43, 38 kPa
BH6	4.20 - 4.65	U2	U	Firm grey slightly gravelly sandy CLAY	24					2.11	1.70	42 84 168	144 32 284	77				Hand Vane = 27, 27, 20 kPa
BH6	8.80 - 9.25	U3	U	Stiff fissured grey CLAY	24					2.01	1.62	90 180 360	293 249 398	157				Hand Vane = 144, 148, 145 kPa
BH6	11.40 - 11.85	U4	U	Very stiff fissured dark brown CLAY	23					2.04	1.65	115 230 460	380 568 425	229				Hand Vane = >188 kPa
BH1	1.90 - 2.10	-	B	Firm grey silty SAND with rare fine gravel, glass, tile and brick														Thermal Resistivity
BH6	1.80 - 2.20	-	B	Black medium SAND														Thermal Resistivity
BH3A	1.80 - 2.00	-	B	Firm grey and brown silty CLAY with occasional black organic silt and rare fine gravel														Thermal Resistivity
BH7	13.40 - 13.85	Y	D	Dark brownish grey silty CLAY	27													
BH7	14.90 - 15.35	Z	D	Dark brownish grey silty CLAY	27													

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

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PROJECT NAME

TOTTENHAM MARSH 3

PROJECT NO:

GEO / 19628

Date

03/06/2013

Approved

Simon Burke

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Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
Borehole	Depth	No.	Type		MC	LL	PL	PI	<425 mic	Bulk	Dry	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	Ground Water SO4	
No.	(m)				(%)	(%)	(%)	(%)	(%)	(Mg/m³)	(Mg/m³)	(kPa)	(kPa)	(kPa)		(g/l)	(g/l)	
BH1	2.00 - 2.45	B	D	Dark grey silty SAND with rare gravel. Gravel is sandstone.	29													
BH1	6.70 - 7.15	D	D	Brown silty SAND and GRAVEL	11													
BH1	10.45 - 10.90	F	D	Brownish grey slightly organic silty CLAY	75													
BH1	14.30 - 14.75	H	D	Dark brownish grey silty CLAY	38													
BH6	0.50 - 0.60	A	D	Dark grey silty SAND with occasional gravel, concrete and brick	18													
BH6	1.00 - 1.10	B	D	Dark grey silty SAND with occasional gravel, concrete and brick	13													
BH6	1.20 - 1.65	C	D	Dark grey silty SAND with rare fine to to medium gravel	30													
BH6	3.65 - 3.75	E	D	Mottled grey and dark grey slightly sandy silty CLAY	29													
BH6	5.20 - 5.65	H	D	Grey sandy flint GRAVEL	7.1													
BH6	7.60 - 8.05	J	D	Brownish grey silty CLAY with rare fine to medium gravel	21													
BH6	10.30 - 10.75	L	D	Brownish grey silty CLAY with rare fine to medium gravel	21													
BH5	0.50 - 0.60	A	D	Dark grey silty clayey SAND with rare gravel and brick	19													

SUMMARY OF GEOTECHNICAL TESTING

PROJECT NAME	TOTTENHAM MARSH 3	Date	03/06/2013
PROJECT NO:	GEO / 19628	Approved	<i>Simon Burke</i>
		Page	4 of 4

Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
Borehole	Depth	No.	Type		MC	LL	PL	PI	<425 mic	Bulk	Dry	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	Ground Water SO4	
No.	(m)				(%)	(%)	(%)	(%)	(%)	(Mg/m³)	(Mg/m³)	(kPa)	(kPa)	(kPa)		(g/l)	(g/l)	
BH5	1.00 - 1.10	B	D	Dark grey silty SAND with rare glass and brick	22													
BH5	2.75 - 3.20	D	D	Dark brownish grey silty CLAY with rare brick and glass	46													
BH5	3.75 - 4.20	F	D	Dark brownish grey sandy CLAY with rare fine to medium flint gravel	20													
BH5	7.30 - 7.75	H	D	Dark brownish grey silty CLAY	31													
BH5	10.55 - 11.00	J	D	Dark brownish grey silty CLAY	24													
BH5	13.10 - 13.55	L	D	Dark brownish grey silty CLAY	24													
BH3A	2.45 - 2.55	A	D	Mottled dark grey and orange brown slightly sandy silty CLAY	48													
BH3A	3.55 - 4.00	D	D	Grey silty CLAY with pockets of dark grey organic clay	85													
BH3A	4.55 - 5.00	F	D	Dark grey slightly organic CLAY	61													
BH3A	6.00 - 6.45	H	D	Grey silty SAND with occasional fine to medium gravel	16													
BH3A	8.05 - 8.50	J	D	Grey silty CLAY	32													
BH3A	11.95 - 12.40	L	D	Grey silty CLAY	25													

SUMMARY OF GEOTECHNICAL TESTING

Quick Undrained Triaxial Compression Test

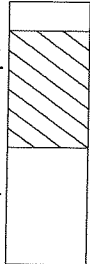
Borehole Number: BH3A
 Sample Number: U1
 Depth (m): 2.00 - 2.45

Description:
 Firm brown slightly organic CLAY

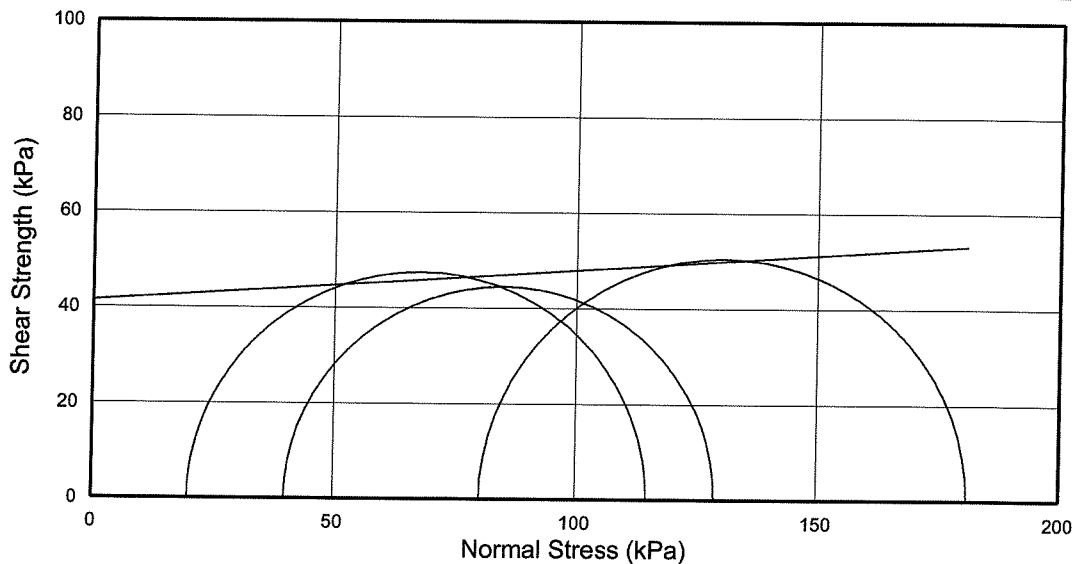
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	75.3	75.2	75.1
Diameter (mm):	37.9	37.8	38.0
Moisture Content (%):	50	50	50
Bulk Density (Mg/m ³):	1.68	1.68	1.67
Dry Density (Mg/m ³):	1.12	1.12	1.12
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.3	1.1	2.3
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	20	40	80
Strain at failure (%):	6.6	5.3	14.0
Maximum Deviator Stress (kPa):	95	89	101
Shear Stress τ_c (kPa):	47	44	50

Orientation and
position of sample



Mode of failure:



$$c = 41 \text{ kPa} \quad \phi = 3.5^\circ$$

Checked and
Approved

Initials:

SB

Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

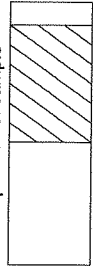
Borehole Number: BH3A
 Sample Number: U2
 Depth (m): 3.00 - 3.45

Description:
 Firm brownish grey slightly organic CLAY
 with rare fine gravel

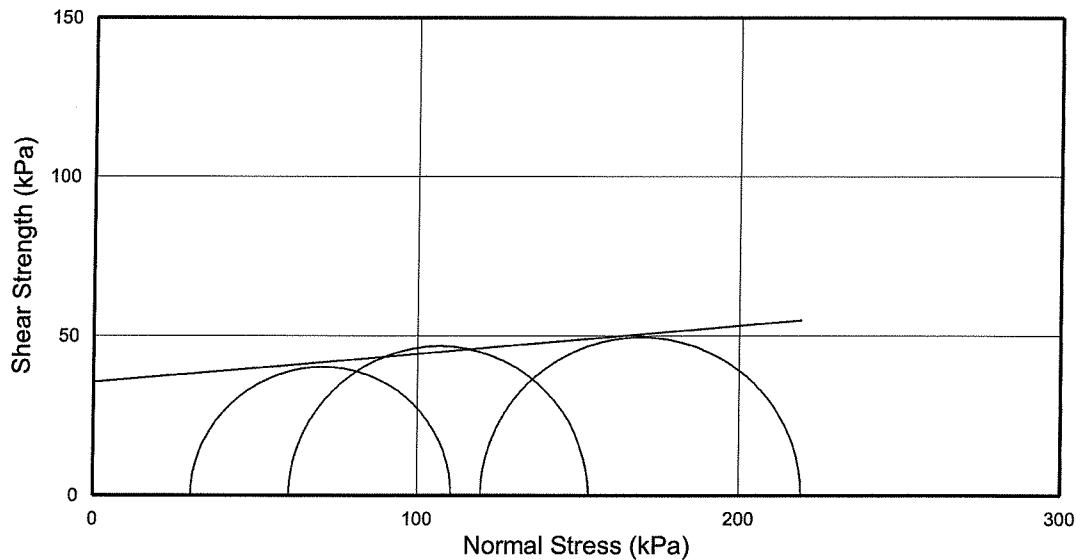
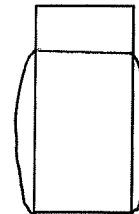
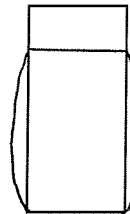
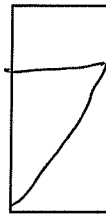
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	61.3	63.9	72.9
Diameter (mm):	39.0	36.9	37.6
Moisture Content (%):	49	53	51
Bulk Density (Mg/m ³):	1.70	1.77	1.78
Dry Density (Mg/m ³):	1.14	1.15	1.17
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.7	3.7	3.2
Axial displacement rate (%/min):	2.5	2.4	2.1
Cell pressure (kPa):	30	60	120
Strain at failure (%):	9.8	24.3	21.3
Maximum Deviator Stress (kPa):	81	94	99
Shear Stress τ_c (kPa):	40	47	50

Orientation and
position of sample



Mode of failure:



$$c = 36 \text{ kPa} \quad \phi = 5^\circ$$

Checked and
Approved

Initials:

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Date: 03/06/2013

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Project Name:

TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

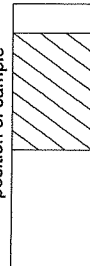
Borehole Number: BH3A
 Sample Number: U3
 Depth (m): 5.00 - 5.45

Description:
 Soft black well converted clayey PEAT

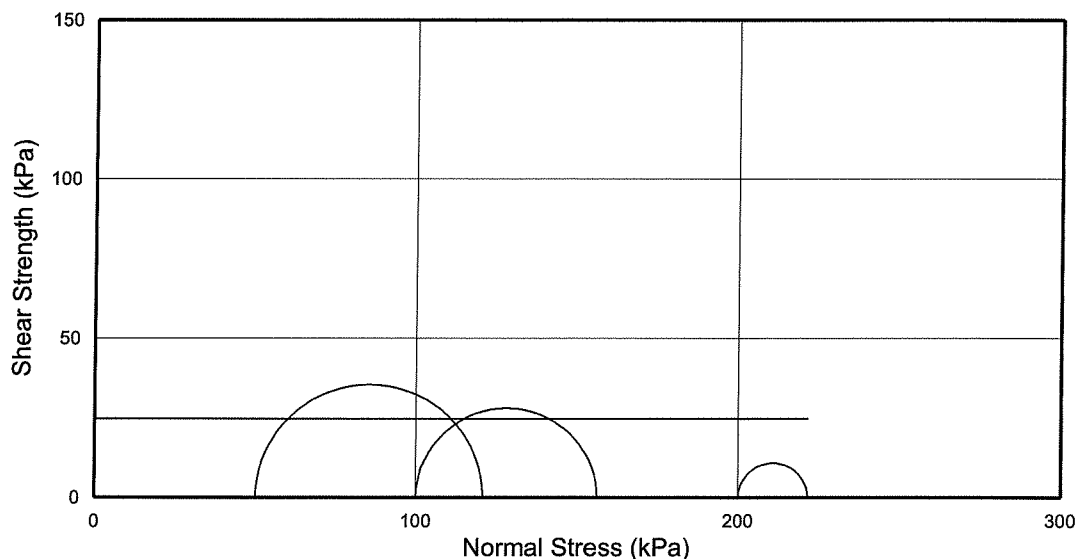
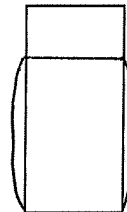
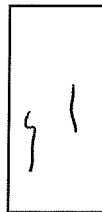
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	76.9	60.4	68.6
Diameter (mm):	37.0	37.5	37.2
Moisture Content (%):	242	234	82
Bulk Density (Mg/m ³):	1.16	1.16	1.38
Dry Density (Mg/m ³):	0.34	0.35	0.76
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	2.1	3.9	0.7
Axial displacement rate (%/min):	2.0	2.5	2.2
Cell pressure (kPa):	50	100	200
Strain at failure (%):	11.7	25.6	2.9
Maximum Deviator Stress (kPa):	71	56	22
Shear Stress τ_c (kPa):	35	28	11

Orientation and
position of sample



Mode of failure:



$$c = 25 \text{ kPa} \quad \phi = 0^\circ$$

Checked and
Approved

Initials:

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Date: 03/06/2013

Project Number:

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Project Name:

TOTTENHAM MARSH 3



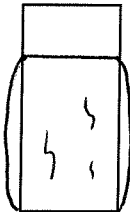
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Quick Undrained Triaxial Compression Test

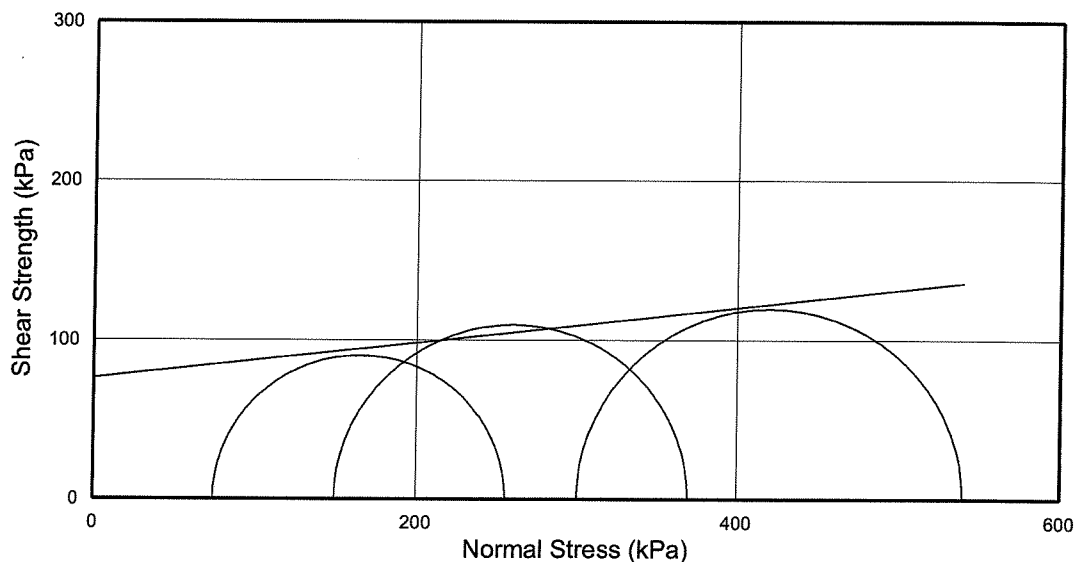
Borehole Number: BH3A
 Sample Number: U4
 Depth (m): 7.50 - 7.95

Description:
 Stiff brown fine sandy very gravelly CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	203.7		
Diameter (mm):	102.2		
Moisture Content (%):	22		
Bulk Density (Mg/m³):	2.17		
Dry Density (Mg/m³):	1.78		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.8	0.9	1.1
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	12.3	15.7	19.1
Maximum Deviator Stress (kPa):	180	219	239
Shear Stress C_u (kPa):	90	110	120
Mode of failure:			

Orientation and
position of sample



$$c = 76 \text{ kPa} \quad \phi = 6.5^\circ$$

Checked and
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Initials:

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GEO / 19628

Project Name:

TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

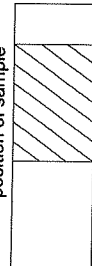
Borehole Number: BH3A
 Sample Number: U5
 Depth (m): 9.50 - 9.95

Description:
 Stiff grey silty CLAY

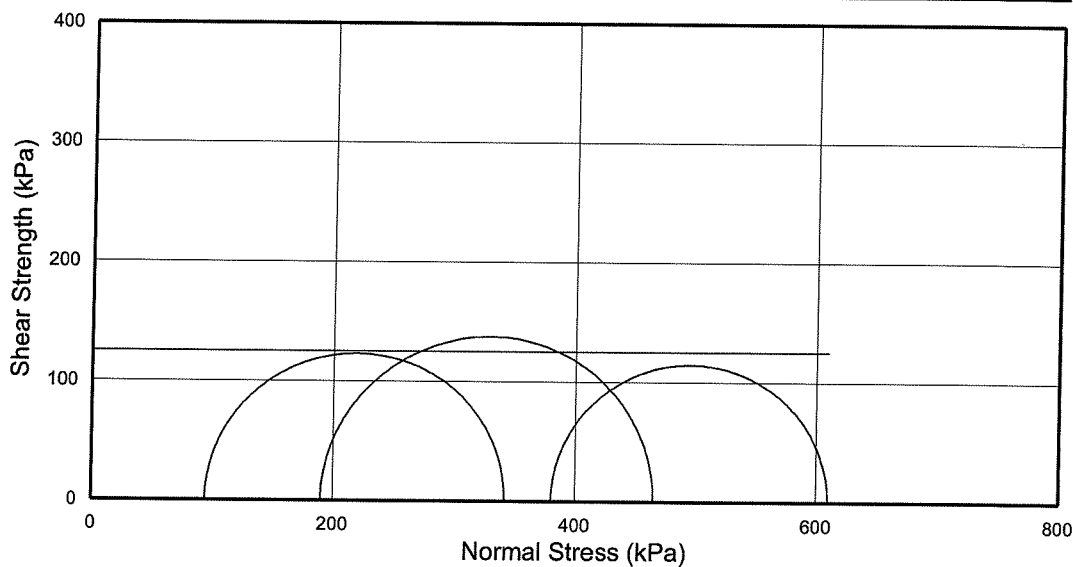
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	65.8	76.8	57.4
Diameter (mm):	38.6	38.0	37.7
Moisture Content (%):	28	25	27
Bulk Density (Mg/m ³):	1.82	1.94	1.84
Dry Density (Mg/m ³):	1.43	1.55	1.45
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	2.6	1.3	1.9
Axial displacement rate (%/min):	2.3	2.0	2.6
Cell pressure (kPa):	95	190	380
Strain at failure (%):	16.7	6.5	10.5
Maximum Deviator Stress (kPa):	246	276	230
Shear Stress c_u (kPa):	123	138	115

Orientation and
position of sample



Mode of failure:



$$c = 125 \text{ kPa} \quad \phi = 0^\circ$$

Checked and
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Quick Undrained Triaxial Compression Test

Borehole Number: BH3A
 Sample Number: U6
 Depth (m): 11.50 - 11.95

Description:
 Stiff greyish brown CLAY

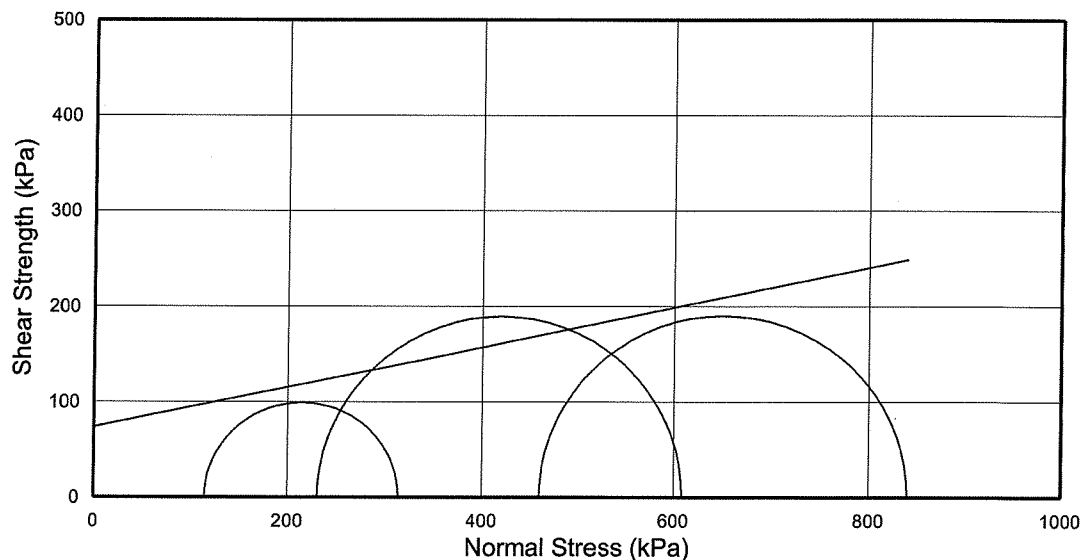
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	72.3	75.5	74.8
Diameter (mm):	38.0	38.0	38.0
Moisture Content (%):	31	23	23
Bulk Density (Mg/m ³):	2.07	1.96	1.96
Dry Density (Mg/m ³):	1.58	1.59	1.59
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	2.4	1.8	1.6
Axial displacement rate (%/min):	2.1	2.0	2.0
Cell pressure (kPa):	115	230	460
Strain at failure (%):	15.2	9.9	8.7
Maximum Deviator Stress (kPa):	198	379	380
Shear Stress τ_c (kPa):	99	189	190

Orientation and
position of sample



Mode of failure:



$$c = 73 \text{ kPa} \quad \phi = 12^\circ$$

Checked and
Approved

Initials:

SB

Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



GEOLABS®

Quick Undrained Triaxial Compression Test

Borehole Number: BH1
 Sample Number: U1
 Depth (m): 5.30 - 5.75

Description:
 Very soft grey slightly organic very gravelly CLAY

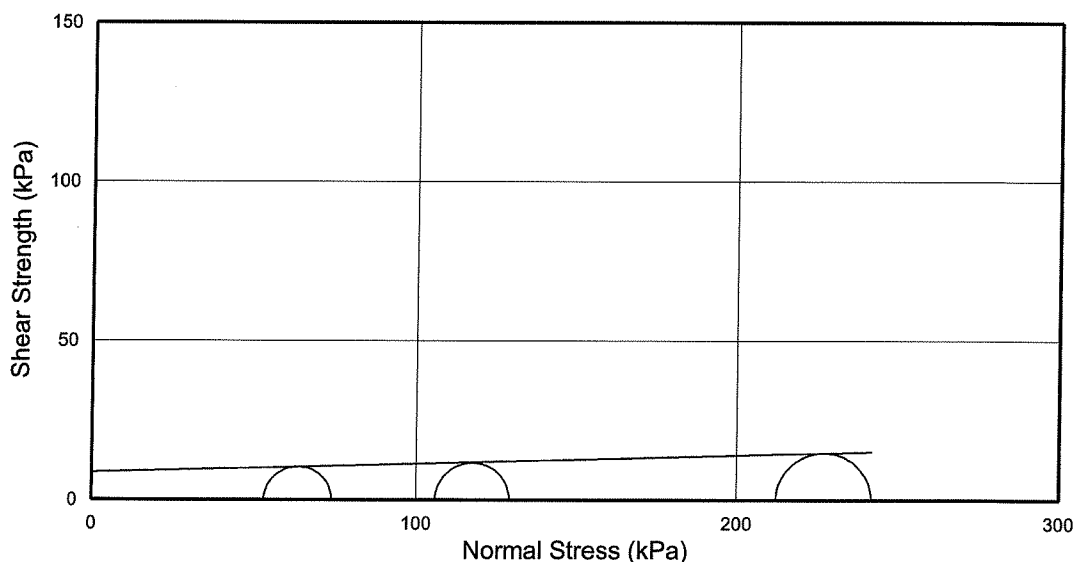
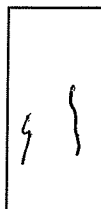
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	204.7		
Diameter (mm):	97.3		
Moisture Content (%):	39		
Bulk Density (Mg/m ³):	1.90		
Dry Density (Mg/m ³):	1.36		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.1	0.3	0.9
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	53	106	212
Strain at failure (%):	1.5	3.4	13.7
Maximum Deviator Stress (kPa):	21	23	30
Shear Stress Cu (kPa):	10	12	15

Orientation and
position of sample



Mode of failure:



$$c = 9 \text{ kPa} \quad \phi = 1.5^\circ$$

Checked and
Approved

Initials:

SB

Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



GEOLABS®

Quick Undrained Triaxial Compression Test

Borehole Number: BH1
 Sample Number: U2
 Depth (m): 8.00 - 8.45

Description:
 Firm brown gravelly CLAY with rare gypsum

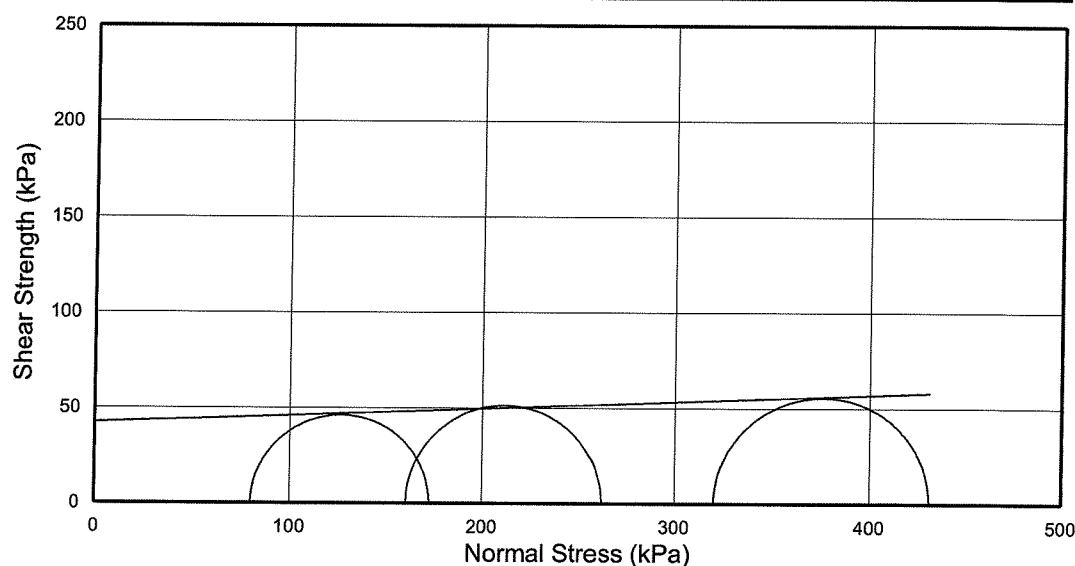
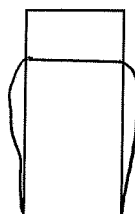
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	202.5		
Diameter (mm):	103.0		
Moisture Content (%):	29		
Bulk Density (Mg/m ³):	1.93		
Dry Density (Mg/m ³):	1.49		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.7	0.9	1.1
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	80	160	320
Strain at failure (%):	11.9	15.8	19.8
Maximum Deviator Stress (kPa):	92	102	111
Shear Stress τ_c (kPa):	46	51	55

Orientation and
position of sample



Mode of failure:



$$c = 42 \text{ kPa} \quad \phi = 2^\circ$$

Checked and
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Initials:

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Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



GEOLABS®

Quick Undrained Triaxial Compression Test

Borehole Number: BH1
 Sample Number: U3
 Depth (m): 10.45 - 10.90

Description:
 Stiff fissured grey CLAY

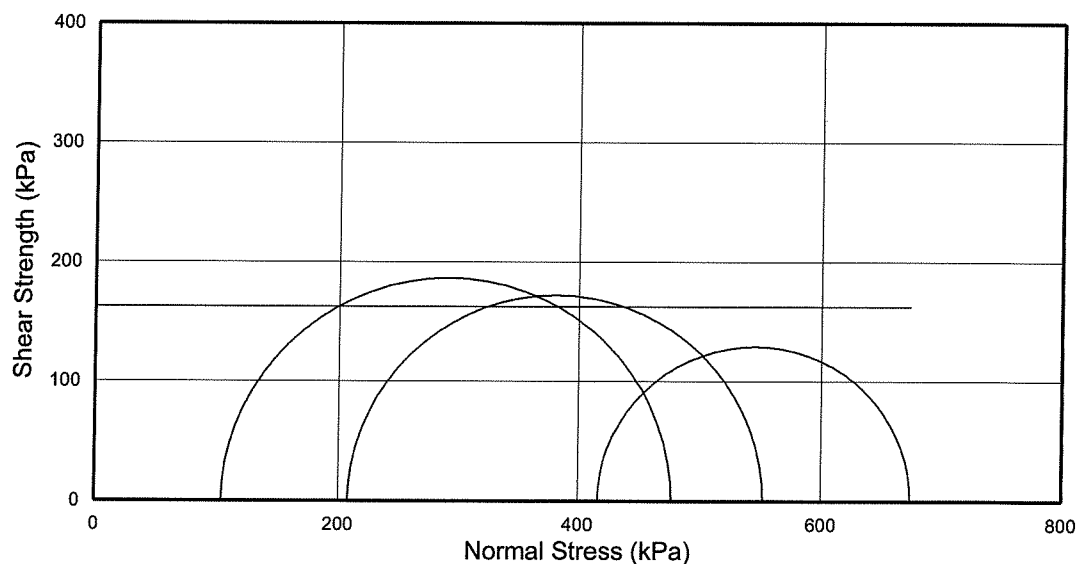
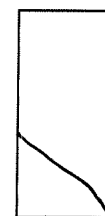
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	76.6	77.0	75.5
Diameter (mm):	37.9	37.6	38.0
Moisture Content (%):	29	29	29
Bulk Density (Mg/m ³):	1.90	1.92	1.92
Dry Density (Mg/m ³):	1.47	1.49	1.49
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.7	1.9	1.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	104	208	416
Strain at failure (%):	9.1	11.0	6.0
Maximum Deviator Stress (kPa):	373	344	258
Shear Stress τ_c (kPa):	187	172	129

Orientation and
position of sample



Mode of failure:



$$c = 163 \text{ kPa} \quad \phi = 0^\circ$$

Checked and
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Initials:

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Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



GEOLABS®

Quick Undrained Triaxial Compression Test

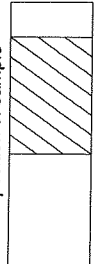
Borehole Number: BH1
 Sample Number: U4
 Depth (m): 12.00 - 12.45

Description:
 Very stiff fissured brown CLAY

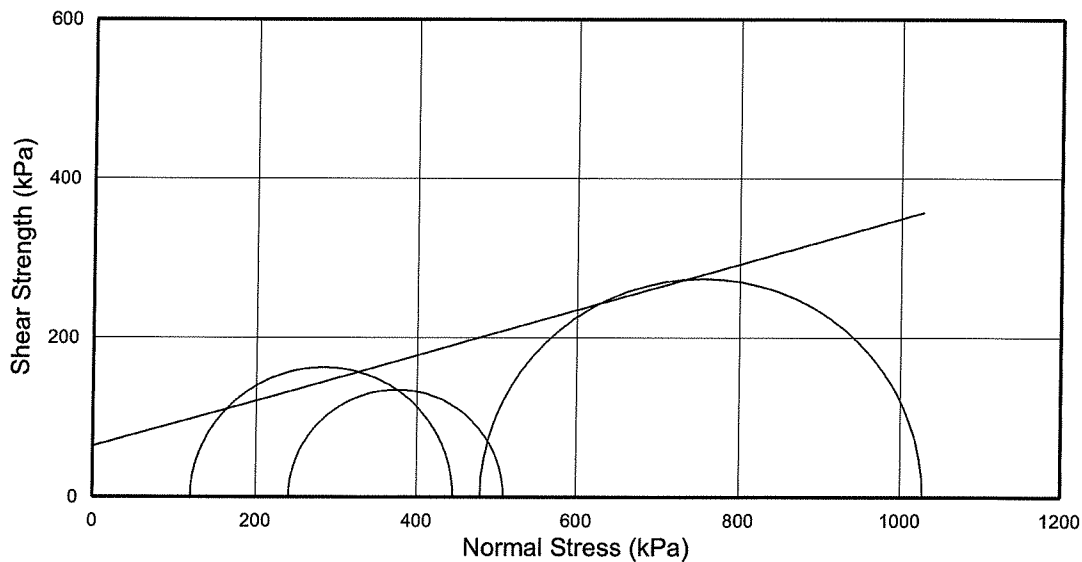
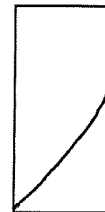
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	62.9	72.7	74.8
Diameter (mm):	38.6	38.1	38.0
Moisture Content (%):	34	23	22
Bulk Density (Mg/m ³):	1.88	2.01	2.00
Dry Density (Mg/m ³):	1.41	1.63	1.64
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	2.0	1.5	1.8
Axial displacement rate (%/min):	2.4	2.1	2.0
Cell pressure (kPa):	120	240	480
Strain at failure (%):	11.9	8.3	10.0
Maximum Deviator Stress (kPa):	326	269	548
Shear Stress τ_c (kPa):	163	135	274

Orientation and
position of sample



Mode of failure:



$$c = 64 \text{ kPa} \quad \phi = 16^\circ$$

Checked and
Approved

Initials:

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Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



GEOLABS®

Quick Undrained Triaxial Compression Test

Borehole Number: BH5
 Sample Number: U1
 Depth (m): 2.20 - 2.65

Description:
 Firm brown silty CLAY

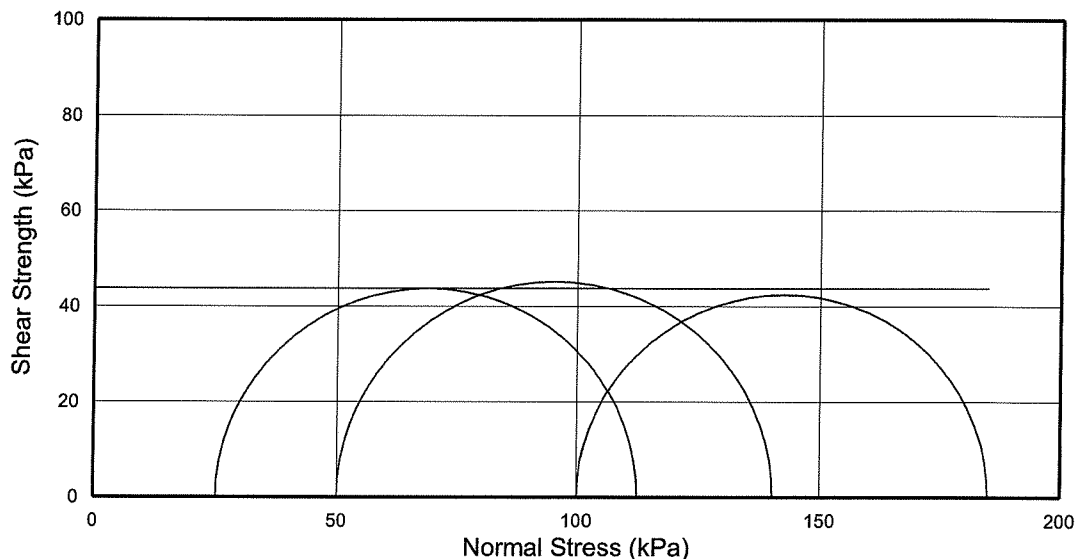
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	75.1	75.1	75.1
Diameter (mm):	38.0	37.9	37.9
Moisture Content (%):	55	52	51
Bulk Density (Mg/m ³):	1.65	1.67	1.68
Dry Density (Mg/m ³):	1.06	1.11	1.11
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.1	1.2	1.3
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	25	50	100
Strain at failure (%):	5.3	6.0	6.7
Maximum Deviator Stress (kPa):	87	90	85
Shear Stress τ_c (kPa):	44	45	42

Orientation and
position of sample



Mode of failure:



$$c = 44 \text{ kPa} \quad \phi = 0^\circ$$

Checked and
Approved

Initials:

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Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

Borehole Number: BH5
 Sample Number: U2
 Depth (m): 3.20 - 3.65

Description:
 Soft to firm dark grey slightly organic sandy CLAY

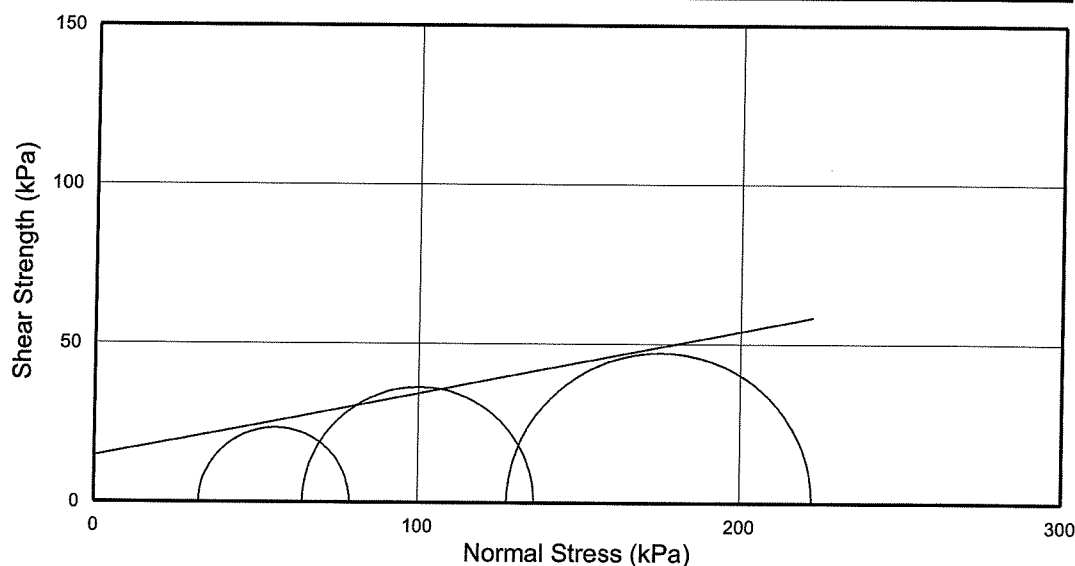
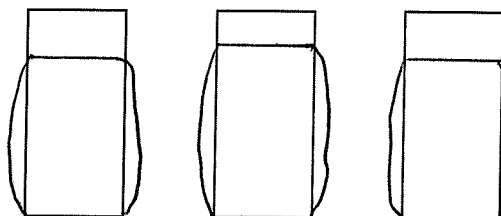
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	76.5	73.8	76.2
Diameter (mm):	36.6	37.2	37.7
Moisture Content (%):	81	61	48
Bulk Density (Mg/m ³):	1.59	1.58	1.48
Dry Density (Mg/m ³):	0.88	0.98	1.00
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	3.2	2.8	3.1
Axial displacement rate (%/min):	2.0	2.1	2.0
Cell pressure (kPa):	32	64	128
Strain at failure (%):	20.3	17.6	20.3
Maximum Deviator Stress (kPa):	47	72	94
Shear Stress τ_c (kPa):	23	36	47

Orientation and
position of sample



Mode of failure:



$$c = 15 \text{ kPa} \quad \phi = 11^\circ$$

Checked and
Approved

Initials:

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Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



GEOLABS®

Quick Undrained Triaxial Compression Test

Borehole Number: BH5
 Sample Number: U3
 Depth (m): 8.60 - 9.05

Description:
 Stiff fissured grey CLAY

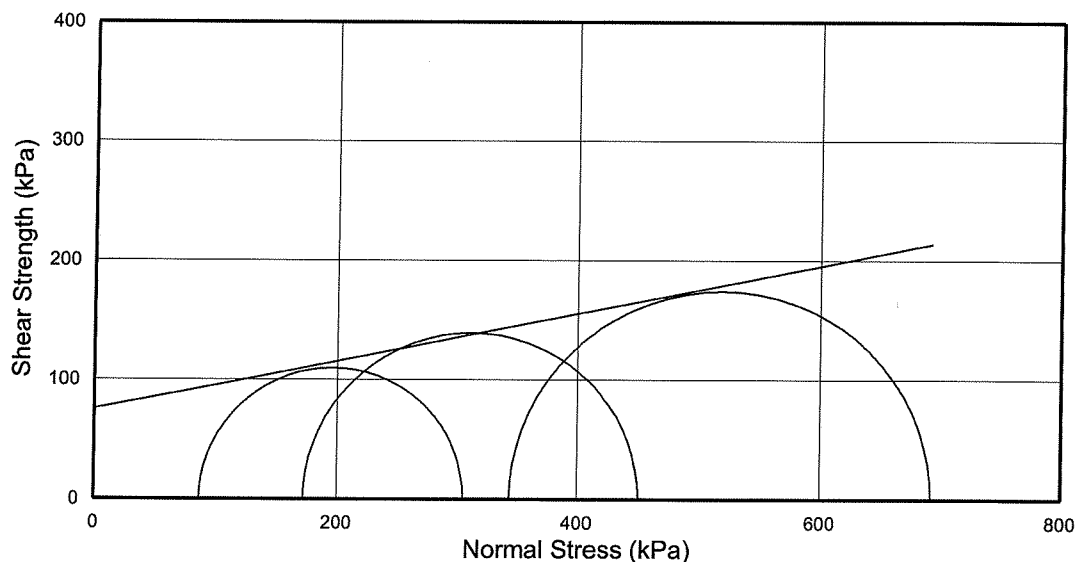
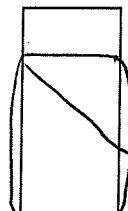
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	75.5	75.8	75.5
Diameter (mm):	37.8	37.3	38.1
Moisture Content (%):	27	27	26
Bulk Density (Mg/m ³):	1.95	2.00	1.88
Dry Density (Mg/m ³):	1.55	1.57	1.50
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	2.4	3.1	1.7
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	86	172	344
Strain at failure (%):	15.2	20.4	9.3
Maximum Deviator Stress (kPa):	219	278	348
Shear Stress τ_c (kPa):	110	139	174

Orientation and
position of sample



Mode of failure:



$$c = 75 \text{ kPa} \quad \phi = 11.5^\circ$$

Checked and
Approved

Initials:

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Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

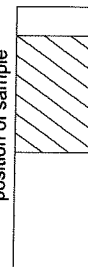
Borehole Number: BH5
 Sample Number: U4
 Depth (m): 10.10 - 10.55

Description:
 Stiff fissured grey CLAY

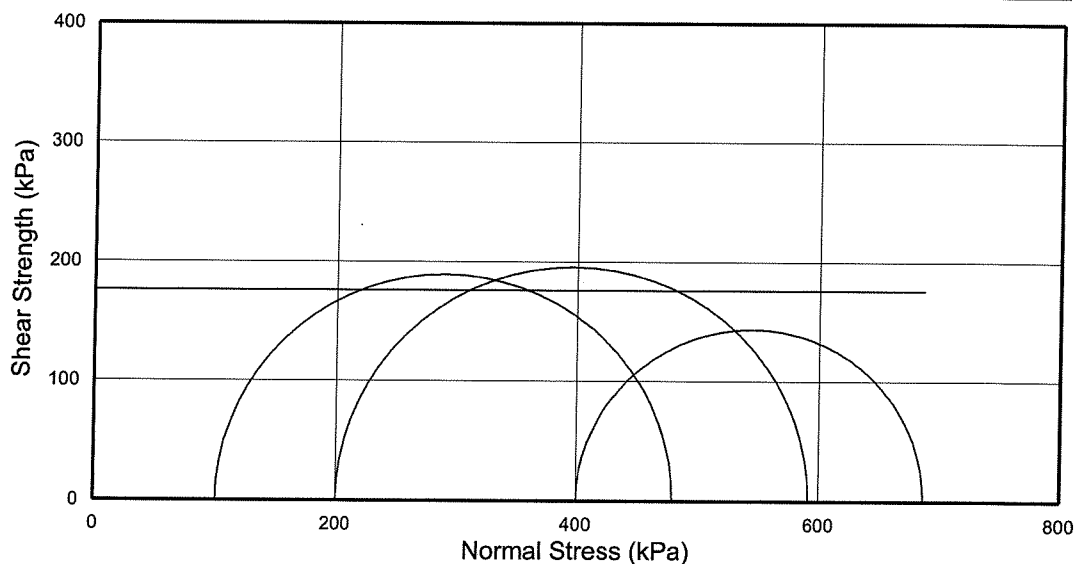
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	75.5	75.9	75.4
Diameter (mm):	37.9	37.8	38.0
Moisture Content (%):	28	28	28
Bulk Density (Mg/m ³):	1.96	1.99	1.95
Dry Density (Mg/m ³):	1.53	1.55	1.52
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.1	1.0	1.0
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	5.3	4.6	4.6
Maximum Deviator Stress (kPa):	379	391	287
Shear Stress τ_c (kPa):	189	196	144

Orientation and
position of sample



Mode of failure:



$$c = 176 \text{ kPa} \quad \phi = 0^\circ$$

Checked and
Approved

Initials:

SB

Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

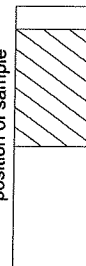
Borehole Number: BH5
 Sample Number: U5
 Depth (m): 11.60 - 12.05

Description:
 Very stiff fissured grey silty CLAY

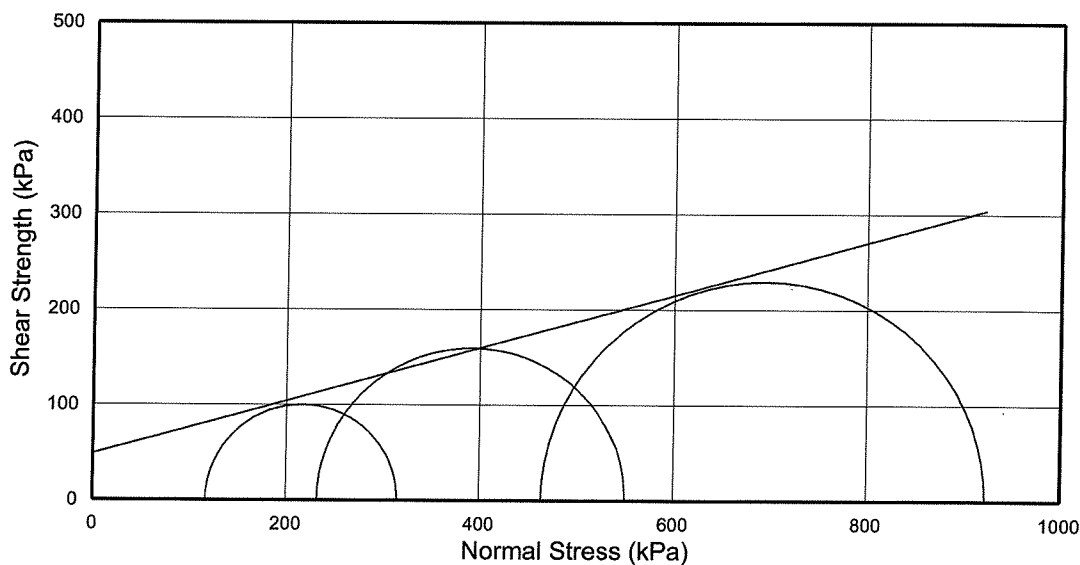
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	75.9	77.5	77.4
Diameter (mm):	37.2	37.5	38.4
Moisture Content (%):	21	23	22
Bulk Density (Mg/m ³):	2.02	1.99	1.86
Dry Density (Mg/m ³):	1.67	1.62	1.52
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	2.9	2.2	2.1
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	116	232	464
Strain at failure (%):	19.1	12.9	12.9
Maximum Deviator Stress (kPa):	199	318	459
Shear Stress τ_c (kPa):	100	159	229

Orientation and
position of sample



Mode of failure:



$$c = 49 \text{ kPa} \quad \phi = 15.5^\circ$$

Checked and
Approved

Initials:

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Date: 03/06/2013

Project Number:

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Project Name:

TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

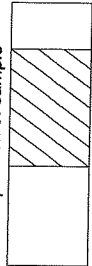
Borehole Number: BH6
 Sample Number: U1
 Depth (m): 3.20 - 3.65

Description:
 Soft grey slightly organic CLAY

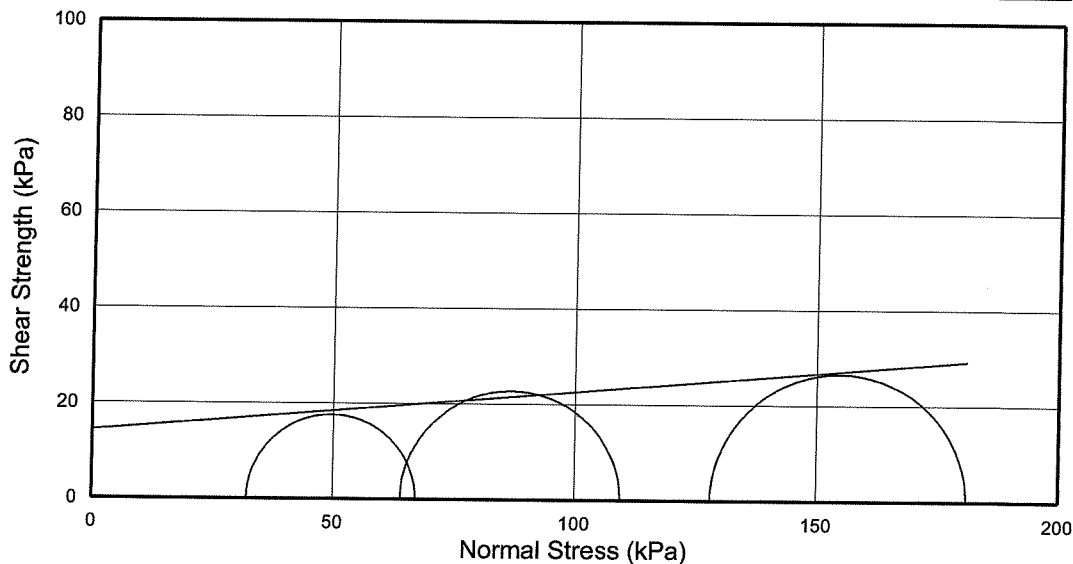
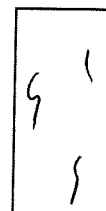
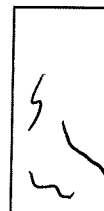
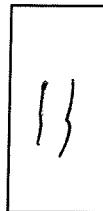
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	75.5	70.8	74.5
Diameter (mm):	36.4	36.6	37.3
Moisture Content (%):	72	44	30
Bulk Density (Mg/m ³):	1.84	1.90	1.91
Dry Density (Mg/m ³):	1.07	1.32	1.46
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.7	2.6	2.4
Axial displacement rate (%/min):	2.0	2.1	2.0
Cell pressure (kPa):	32	64	128
Strain at failure (%):	8.6	15.5	14.8
Maximum Deviator Stress (kPa):	35	45	53
Shear Stress c_u (kPa):	18	23	27

Orientation and
position of sample



Mode of failure:



$$c = 14 \text{ kPa} \quad \phi = 4.5^\circ$$

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Initials:

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Date: 03/06/2013

Project Number:

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Project Name:

TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

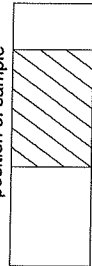
Borehole Number: BH6
 Sample Number: U2
 Depth (m): 4.20 - 4.65

Description:
 Firm grey slightly gravelly sandy CLAY

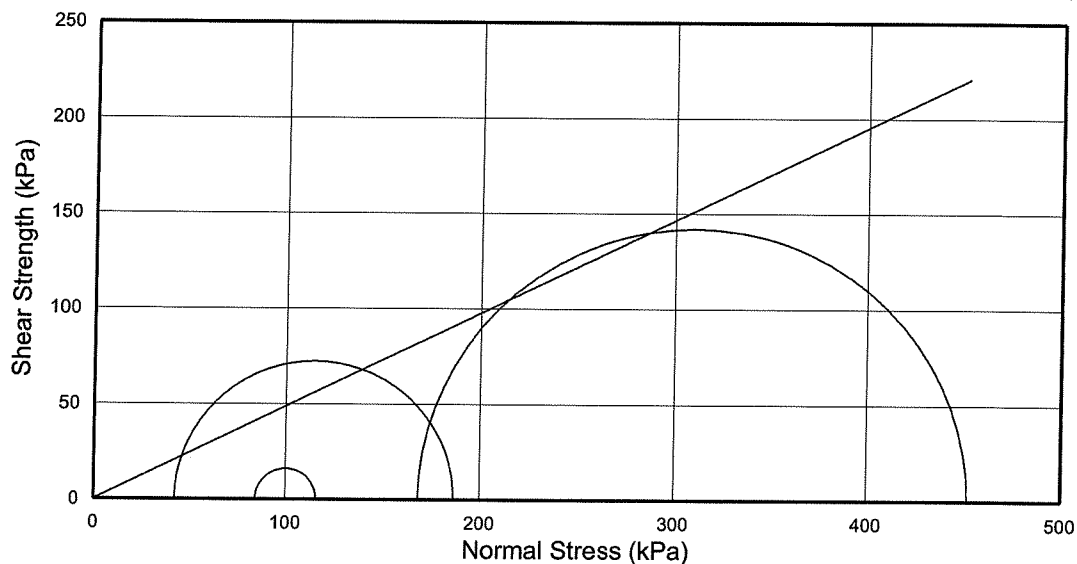
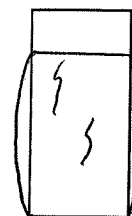
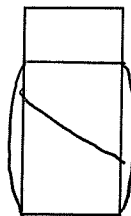
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	77.3	74.1	83.4
Diameter (mm):	36.8	36.7	34.9
Moisture Content (%):	21	25	26
Bulk Density (Mg/m ³):	2.08	2.14	2.12
Dry Density (Mg/m ³):	1.72	1.71	1.68
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	3.1	3.2	3.1
Axial displacement rate (%/min):	2.0	2.1	1.8
Cell pressure (kPa):	42	84	168
Strain at failure (%):	20.1	20.9	18.6
Maximum Deviator Stress (kPa):	144	32	284
Shear Stress c_u (kPa):	72	16	142

Orientation and
position of sample



Mode of failure:



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TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

Borehole Number: BH6
 Sample Number: U3
 Depth (m): 8.80 - 9.25

Description:
 Stiff fissured grey CLAY

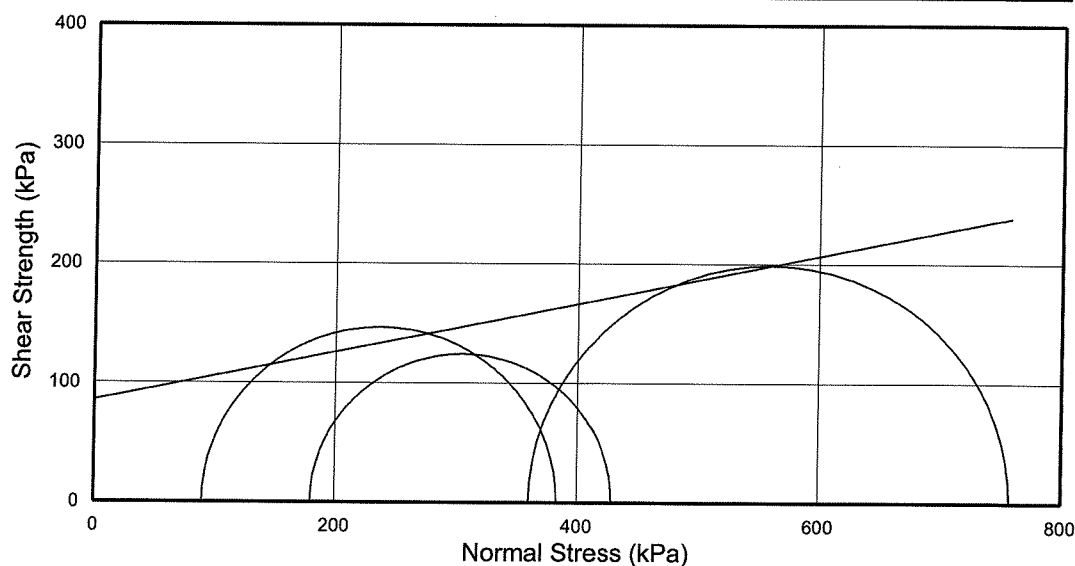
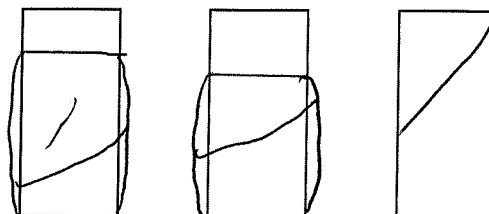
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	75.7	75.4	75.9
Diameter (mm):	37.9	37.9	38.2
Moisture Content (%):	24	24	24
Bulk Density (Mg/m ³):	2.02	2.02	1.98
Dry Density (Mg/m ³):	1.63	1.64	1.59
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	2.3	3.1	1.6
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	90	180	360
Strain at failure (%):	13.9	20.6	8.6
Maximum Deviator Stress (kPa):	293	249	398
Shear Stress τ_c (kPa):	147	124	199

Orientation and
position of sample



Mode of failure:



$$c = 86 \text{ kPa} \quad \phi = 11.5^\circ$$

Checked and
Approved

Initials:

SB

Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



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Quick Undrained Triaxial Compression Test

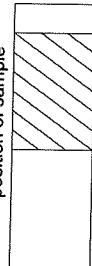
Borehole Number: BH6
 Sample Number: U4
 Depth (m): 11.40 - 11.85

Description:
 Very stiff fissured dark brown CLAY

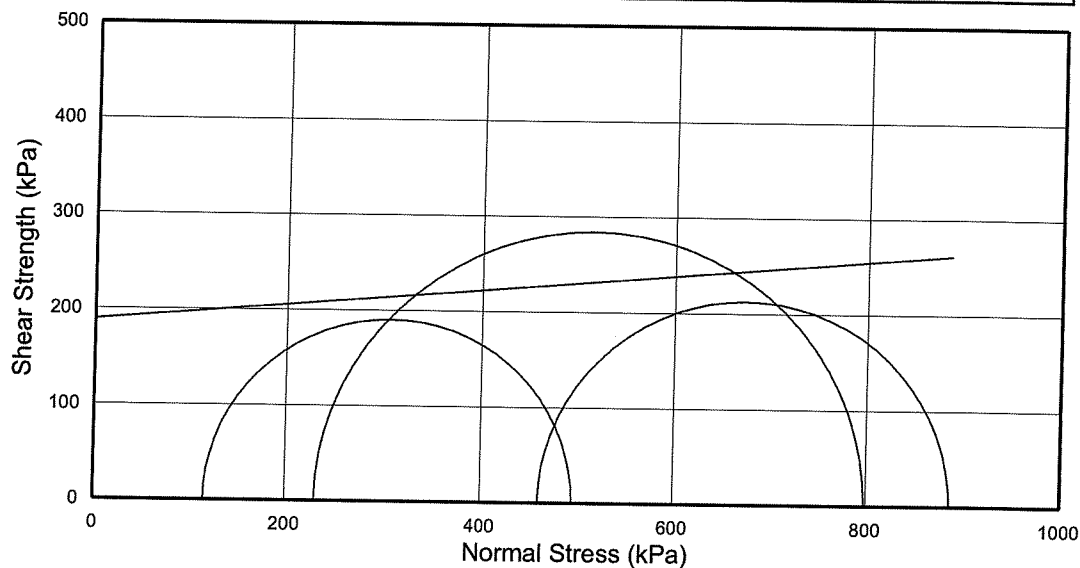
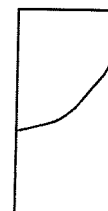
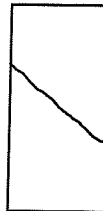
Set of 3 Specimens

Specimen details	Specimen 1	Specimen 2	Specimen 3
Specimen conditions:	Undisturbed	Undisturbed	Undisturbed
Length (mm):	75.1	75.1	75.6
Diameter (mm):	37.4	38.0	37.8
Moisture Content (%):	23	23	23
Bulk Density (Mg/m ³):	2.06	2.03	2.03
Dry Density (Mg/m ³):	1.67	1.64	1.65
Test details	Specimen 1	Specimen 2	Specimen 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.0	1.4	1.8
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	115	230	460
Strain at failure (%):	4.7	7.3	9.9
Maximum Deviator Stress (kPa):	380	568	425
Shear Stress τ_c (kPa):	190	284	213

Orientation and
position of sample



Mode of failure:



$$c = 189 \text{ kPa} \quad \phi = 4.5^\circ$$

Checked and
Approved

Initials:

SB

Date: 03/06/2013

Project Number:

GEO / 19628

Project Name:

TOTTENHAM MARSH 3



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