Job No. GEOTLCOV23589AA
BH206
DEPTH: 3.62m – 8m

drawn	MT		client:	**THIESS PTY LTD**
approved	**DS**		project:	**ROYAL NORTH SHORE HOSPITAL REDEVELOPMENT, ST LEONARDS**
date	**09/09/2008**			
scale	**Not to scale**		title:	**ROCK CORE PHOTOGRAPH – BH206**
original size	**A4**		project no: **GEOTLCOV23589AA**	Photo no: **BH206** **1 of 1**

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH207**

Sheet 1 of 3

Project No: **GEOTLCOV23589AA**

Client: ***THIESS PTY LTD***

Date started: ***4.9.2008***

Principal:

Date completed: ***4.9.2008***

Project: ***ROYAL NORTH SHORE HOSPITAL REDEVELOPMENT***

Logged by: ***AVS***

Borehole Location: ***ST LEONARDS (SEE SITE PLAN)***

Checked by: ***PJW***

drill model and mounting: P160 Truck | Easting: 332742.026 | slope: -90° | R.L. Surface: 85.0

hole diameter: 100 mm | Northing 6256254.198 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADT			None observed while augering						**ASPHALT**	M			ASPHALT
					84	1			**FILL: SANDY CLAYEY SILT:** Grey, brown, fine to coarse grained sand, some fine to coarse grained gravel.				FILL
					83	2		CH	**SILTY CLAY:** High plasticity, brown, orange with some fine to coarse grained gravel.				RESIDUAL SOIL
									SHALE: Extremely weathered, pale grey, some iron, staining, very low strength				BEDROCK
					82	3			Borehole BH207 continued as cored hole				
					81	4							
					80	5							
					79	6							
					78	7							
					77	8							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH207**
Sheet 2 of 3
Project No: **GEOTLCOV23589AA**

Client: ***THIESS PTY LTD*** Date started: ***4.9.2008***
Principal: Date completed: ***4.9.2008***
Project: ***ROYAL NORTH SHORE HOSPITAL REDEVELOPMENT*** Logged by: ***AVS***
Borehole Location: ***ST LEONARDS (SEE SITE PLAN)*** Checked by: ***PJW***

drill model & mounting: P160 Truck | Easting: 332742.026 | slope: -90° | R.L. Surface: 85.0
hole diameter: 100 mm | Drilling fluid: Water | Northing: 6256254.198 | bearing: | datum: AHD

drilling information | **material substance** | **rock mass defects**

method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
		None observed while augering	84	1								
			83	2		Continued from non-cored borehole						
NMLC		Not monitored while coring	82	3		**SHALE:** Pale grey and dark grey. Thinly laminated at 0-10°: about 80% Shale, 20% Sandstone with siderite bands. Rock is iron stained.	HW		D 0.22 A 0.7			SM, White clay and gravel, 20mm 0°
												Jt, 40°, UN, RO, SN, iron
												SM, White clay and gravel 30mm
												SM, Claystone, white 30mm
												Jt, 10°, UN, RO, SN, iron
												Band of XW Shale 15mm
			81	4								Jt, 70-80°, IR, RO, SN, iron
												SM, white clay, 5mm-10mm, 0°
												Jt, 90°, RO, SN, iron
									D 0.59 A 0.66			Jt, 30-40°, PL, SO-RO, SN, iron
												SM, white clay, 2m, 0°
												SM, white clay, 0°, 3mm
												Jt, 40-50°, ST, RO, SN, iron
												Jt, 40°, ST, RO, clay infill
			80	5								Jt. 30°, IR, RO, SN, iron
												Drill fracture
							XW					Jt, 30-40°, IR, RO, SN, iron
							HW					XW Shale, 20mm
												XW Shale, 30mm
												Jt, 30-40°, UN, RO, SN
									D 0.45 A 1.23			Jt, 10-20°, UN, RO, SN
												Jt, 30-40°, PL, SO-RO, SN
			79	6								Jt, 20-30°, PL, SO-RO, SN, iron
												XW Shale, 4mm
												SM, clay, 6mm, iron
							XW					Jt, 30-40°, PL, SO-RO infill with sidentic clay 4mm
						SHALE: Black, flat bedded at 0-5°, with rare pale grey clay layers.	SW					Jt, 40-50°, IR, RO
												Gravelly clay seam, 40mm of contact of SW SHALE 40-50°
									D 0.34 A 1.27			Jt, 40-50°, PL, SO, CN
			78	7								SM, claystone, 2mm
												SM, claystone, 2-5mm
												Jt, 40-50°, PL, SO, SN, iron
												Jt, 50-60°, PL, SO-RO, SN, iron
			77	8					D A			

RQD %: 25 | 39 | 74

All defects are: PT, 0-10°, PL, SO-RO, SN, iron - unless described.

method
DT diatube; AS auger screwing; AD auger drilling; RR roller/tricone; CB claw or blade bit; NMLC NMLC core; NQ, HQ, PQ wireline core

core-lift
casing used; barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material; no core recovered

water
10/1/98 water level on date shown; water inflow; partial drill fluid loss; complete drill fluid loss; water pressure test result (lugeons) for depth interval shown (25)

weathering
FR fresh; SW slightly weathered; MW moderately weathered; HW highly weathered; XW extremely weathered; DW distinctly weathered (covers MW and HW)

strength
VL very low; L low; M medium; H high; VH very high; EH extremely high

defect type
JT joint; PT parting; SM seam; SZ sheared zone; SS sheared surface; CS crushed seam

planarity
PL planar; CU curved; UN undulating; ST stepped; IR irregular

roughness
VR very rough; RO rough; SO smooth; SL slickensided

coating
CN clean; SN stained; VN veneer; CO coating

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Engineering Log - Cored Borehole

Borehole No. **BH207**
Sheet 3 of 3
Project No: **GEOTLCOV23589AA**

Client: ***THIESS PTY LTD*** Date started: ***4.9.2008***

Principal: Date completed: ***4.9.2008***

Project: ***ROYAL NORTH SHORE HOSPITAL REDEVELOPMENT*** Logged by: ***AVS***

Borehole Location: ***ST LEONARDS (SEE SITE PLAN)*** Checked by: ***PJW***

drill model & mounting: P160 Truck | Easting: 332742.026 | slope: -90° | R.L. Surface: 85.0

hole diameter: 100 mm | Drilling fluid: Water | Northing: 6256254.198 | bearing: | datum: AHD

drilling information					material substance					rock mass defects		
method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength VL L M H VH EH	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
NMLC			76	9		**SHALE:** Black, flat bedded at 0-5°, with rare pale grey clay layers. *(continued)*	FR		0.42 0.96			Jt, 60-70°, PL, SO, SN, iron
									D A 0.08 0.97			Jt, 40-50°, PL, SO, CN
												Jt, 40-50°, PL, SO, CN
												Jt, 70-80°
			75	10		**SANDSTONE AND SHALE:** Pale grey, grey, thinly bedded at 0-10° (80% Sandstone, 20% Shale) and is fine to medium grained with rare coalified plant roots.			D A 0.2 0.71	81		
									D A 0.41 1.07			SM, Clay, 10mm, 0°
			74	11		**SHALE AND SANDSTONE:** Fine grained, grey to pale grey, interlaminated at 0-5° (80% Shale, 20% Sandstone). Flaser bedding - convulate until 10.55 beddings flat 0-10°. At 10.70m burrow structures.						
						SANDSTONE AND SHALE: Fine to medium grained, interbedded 0-10° (60% Sandstone, 40% Shale). At 11.14 - 11.2m lenses of coal. Interlaminated at 11.2 - 11.3m. 11.3 - 11.56m: SANDSTONE: coarse grained, pale grey, wavy bedded.			D A 0.75 1.49	55		
			73	12		**SANDSTONE:** Medium to coarse grained, pale grey, cross bedded 10-20°. BH207 terminated at 12m						SM: Clay 50mm
												SM: Clay 20mm
			72	13								
			71	14								
			70	15								
			69	16								

General: PT, 0-10°, PL, SO-RO, CN.

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

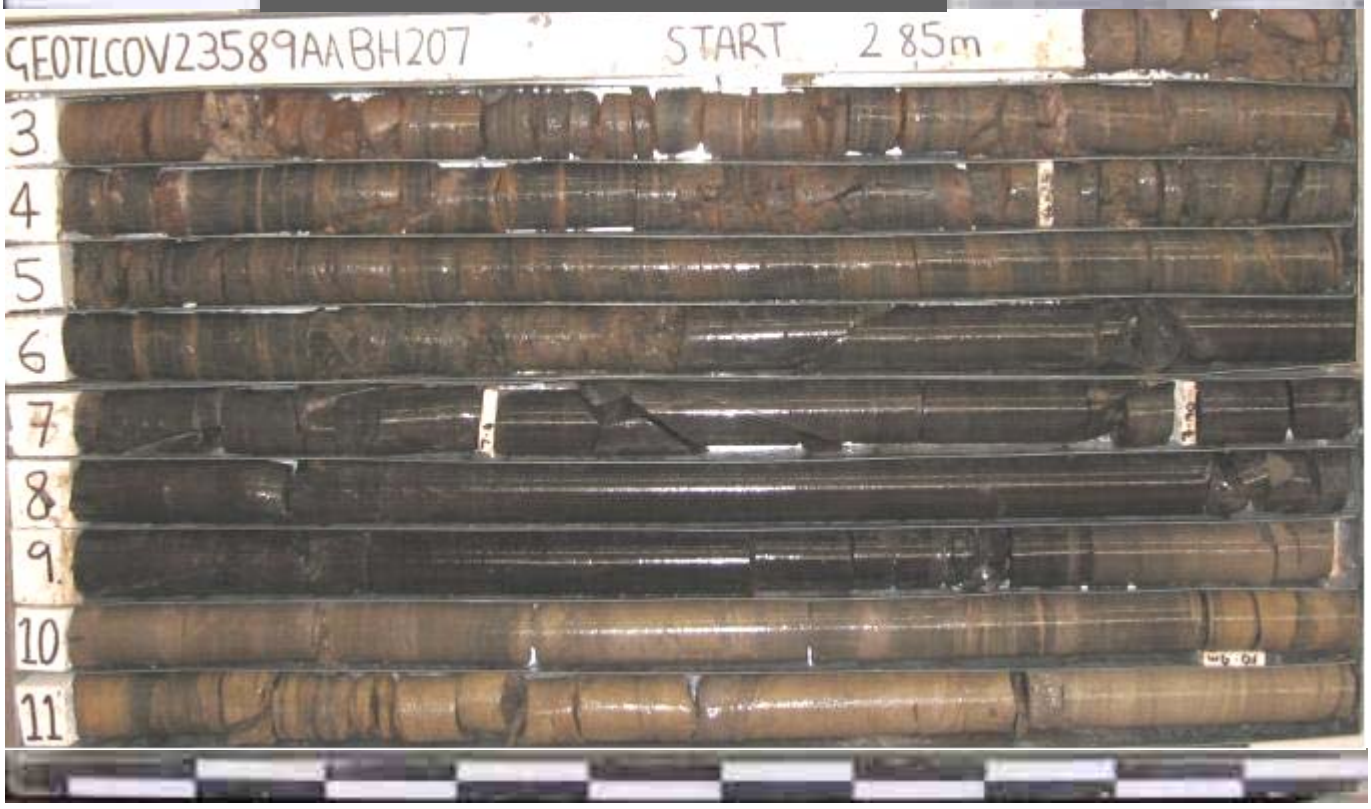
defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

Job No. GEOTLCOV23589AA
BH207
DEPTH: 2.85m – 12m



drawn	MT	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	**THIESS PTY LTD**
approved	**DS**		project:	**ROYAL NORTH SHORE HOSPITAL REDEVELOPMENT, ST LEONARDS**
date	**09/09/2008**			
scale	**Not to scale**		title:	**ROCK CORE PHOTOGRAPH – BH207**
original size	**A4**		project no: **GEOTLCOV23589AA**	Photo no: **BH207** **1 of 1**

Appendix B

Uniaxial Compressive Strength Test Results

coffey Information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Unit 8/12 Mars Road Lane Cove West NSW 2066
ph: (61 2) 9911 1000 Fax: (61 2) 9911 1003
ABN: 92 114 364 046

uniaxial compressive strength

client:	COFFEY GEOTECHNICS - LANE COVE WEST	job no:	INFOLCOV 00049AA
principal:	THIESS PTY LTD	laboratory:	Lane Cove West
project:	GEOTLCOV 23589AA - ROYAL NORTH SHORE HOSPITAL	report date:	22 September 2008
location:	ST LEONARDS	borehole:	BH201
test procedure:	AS 4133.1.1.1 and 4133.4.2	date received:	10 September 2008
test apparatus:	Avery with 200 kN CAS load cell S/N 080LSOO602001		page: 1 of 7

We received the samples on the 10th September, 2008. They were in galvanised coreboxes and had been covered with wet newspaper. The samples were tested in an "as received" condition.

QESTLAB work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	comments / failure mechanism
LCOV08W00719 BH201 15.12 to 15.30 m LCOV08S-03002	12 Sep 08 12.37 min	148 mm 51.9 mm 2.84:1	7.59	2.6 t/m³ 4.3 %	siltstone Bedding planes are at an angle of 80° to the axis of loading	failed along defect
LCOV08W00719 BH201 21.36 to 21.51 m LCOV08S-03003	11 Sep 08 10.60 min	146 mm 51.5 mm 2.83:1	9.86	2.3 t/m³ 8.6 %	sandstone Bedding planes are at an angle of 60° to the axis of loading	axial


LCOV08S-03002


LCOV08S-03003

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Authorised Signature:
Alan Cocks
Associate Geotechnician
Date: 22 Sep 2008

coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Unit 8/12 Mars Road Lane Cove West NSW 2066
ph: (61 2) 9911 1000 Fax: (61 2) 9911 1003
ABN: 92 114 364 046

uniaxial compressive strength

client:	COFFEY GEOTECHNICS - LANE COVE WEST	job no:	INFOLCOV 00049AA
principal:	THIESS PTY LTD	laboratory:	Lane Cove West
project:	GEOTLCOV 23589AA - ROYAL NORTH SHORE HOSPITAL	report date:	22 September 2008
location:	ST LEONARDS	borehole:	BH202
test procedure:	AS 4133.1.1.1 and 4133.4.2	date received:	10 September 2008
test apparatus:	Avery with 200 kN CAS load cell S/N 080LSOO602001	page:	2 of 7

We received the samples on the 10th September, 2008. They were in galvanised coreboxes and had been covered with wet newspaper. The samples were tested in an "as received" condition.

QESTLAB work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	comments / failure mechanism
LCOV08W00719 BH202 15.28 to 15.43 m LCOV08S-03004	11 Sep 08 9.93 min	154 mm 51.5 mm 2.98:1	4.73	2.4 t/m³ 6.6 %	sandstone Cross-bedded	 shear
LCOV08W00719 BH202 21.07 to 21.22 m LCOV08S-03005	12 Sep 08 5.02 min	150 mm 51.6 mm 2.91:1	26.1	2.6 t/m³ 2.1 %	sandstone/siltstone Bedding planes are at an angle of 80° to the axis of loading	 axial and cone

LCOV08S-03004

LCOV08S-03005

F:\TEST\INFO\... Job Files\INFOLCOV 00049AA - ...\BH202 ...graph

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The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/national standards.

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Authorised Signature:
Alan Cocks
Associate Geotechnician

Date: 22 Sep 2008

STD-102-002 2007

coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Unit 8/12 Mars Road Lane Cove West NSW 2066
ph: (61 2) 9911 1000 Fax: (61 2) 9911 1003
ABN: 92 114 364 046

uniaxial compressive strength

client:	COFFEY GEOTECHNICS - LANE COVE WEST	job no:	INFOLCOV 00049AA
principal:	THIESS PTY LTD	laboratory:	Lane Cove West
project:	GEOTLCOV 23589AA - ROYAL NORTH SHORE HOSPITAL	report date:	22 September 2008
location:	ST LEONARDS	borehole:	BH203
test procedure:	AS 4133.1.1.1 and 4133.4.2	date received:	10 September 2008
test apparatus:	Avery with 200 kN CAS load cell S/N 080LSOO602001		page: 3 of 7

We received the samples on the 10th September, 2008. They were in galvanised coreboxes and had been covered with wet newspaper. The samples were tested in an "as received" condition.

QESTLAB work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	comments / failure mechanism
LCOV08W00719 BH203 10.81 to 10.96 m LCOV08S-03006	11 Sep 08 13.62 min	145 mm 51.5 mm 2.81:1	10.6	2.6 t/m³ 3.0 %	siltstone Flat bedded	 shear

LCOV08S-03006

SYD-F2-002 2007

[illegible]

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Authorised Signature:
Alan Cocks
Associate Geotechnician

Date: 22 Sep 2008

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SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Unit 8/12 Mars Road Lane Cove West NSW 2066
ph: (61 2) 9911 1000 Fax: (61 2) 9911 1003
ABN: 92 114 364 046

uniaxial compressive strength

client:	COFFEY GEOTECHNICS - LANE COVE WEST	job no:	INFOLCOV 00049AA
principal:	THIESS PTY LTD	laboratory:	Lane Cove West
project:	GEOTLCOV 23589AA - ROYAL NORTH SHORE HOSPITAL	report date:	22 September 2008
location:	ST LEONARDS	borehole:	BH204
test procedure:	AS 4133.1.1.1 and 4133.4.2	date received:	10 September 2008
test apparatus:	Avery with 200 kN CAS load cell S/N 080LSOO602001	page: 4 of 7	

We received the samples on the 10th September, 2008. They were in galvanised coreboxes and had been covered with wet newspaper. The samples were tested in an "as received" condition.

QESTLAB work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	comments / failure mechanism
LCOV08W00719 BH204 9.00 to 9.17 m LCOV08S-03007	11 Sep 08 7.15 min	151 mm 51.7 mm 2.91:1	2.29	2.6 t/m³ 5.0 %	sandstone/siltstone Bedding planes are at an angle of 90° to the axis of loading	end failure

LCOV08S-03007

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Authorised Signature:
Alan Cocks
Associate Geotechnician

Date: 22 Sep 2008

coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

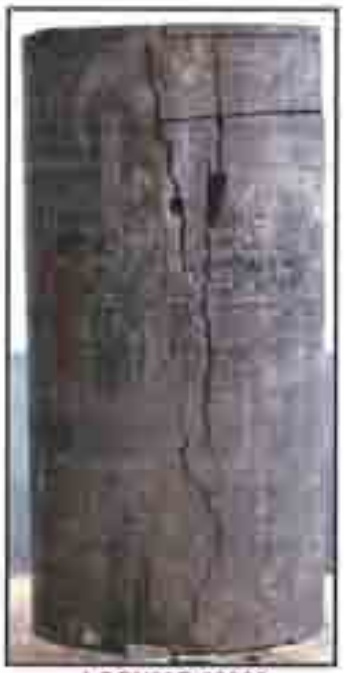
Unit 8/12 Mars Road Lane Cove West NSW 2065
ph: (61 2) 9911 1000 Fax: (61 2) 9911 1003
ABN: 92 114 364 046

uniaxial compressive strength

client:	COFFEY GEOTECHNICS - LANE COVE WEST	job no:	INFOLCOV 00049AA
principal:	THIESS PTY LTD	laboratory:	Lane Cove West
project:	GEOTLCOV 23589AA - ROYAL NORTH SHORE HOSPITAL	report date:	22 September 2008
location:	ST LEONARDS	borehole:	BH205
	test procedure: AS 4133.1.1.1 and 4133.4.2	date received:	10 September 2008
	test apparatus: Avery with 200 kN CAS load cell S/N 080LSOO602001	page:	5 of 7

We received the samples on the 10th September, 2008. They were in galvanised coreboxes and had been covered with wet newspaper.
The samples were tested in an "as received" condition.
The test specimen was shorter than the requirement specified in the standard.

GESTLAB work order ID	date tested	height	uniaxial compressive strength	wet density	sample description	comments
depth		average diameter		moisture content	bedding/foliation	
GESTLab sample ID	test duration	height/dia ratio	MPa			failure mechanism
LCOV08W00719		124 mm	14.5	2.5 t/m³	sublitharenite	
BH205 13.21 to 13.33 m	12 Sep 08	51.5 mm		2.5 %	Flat-bedded	
LCOV08S-03008	14.67 min	2.40:1				axial



LCOV08S-03008

coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Unit 8/12 Mars Road Lane Cove West NSW 2065
ph: (61 2) 9911 1000 Fax: (61 2) 9911 1003
ABN: 92 114 364 046

uniaxial compressive strength

client:	COFFEY GEOTECHNICS - LANE COVE WEST	job no:	INFOLCOV 00049AA
principal:	THIESS PTY LTD	laboratory:	Lane Cove West
project:	GEOTLCOV 23589AA - ROYAL NORTH SHORE HOSPITAL	report date:	22 September 2008
location:	ST LEONARDS	borehole:	BH206
	test procedure: AS 4133.1.1.1 and 4133.4.2	date received:	10 September 2008
	test apparatus: Avery with 200 kN CAS load cell S/N 080LSOC602001	page: 6 of 7	

We received the samples on the 10th September, 2008. They were in galvanised corebboxes and had been covered with wet newspaper.
The samples were tested in an "as received" condition.
The test specimen was selected from outside the original requested depth in order to comply with the size requirements specified in the standard.

QESTLAB work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength	wet density / moisture content	sample description / bedding/foliation	comments / failure mechanism
LCOV08W00719 BH206 7.21 to 7.48 m LCOV08S-03009	15 Sep 08 5.80 min	139 mm 51.5 mm 2.70:1	11.8 MPa	2.4 t/m³ 7.8 %	sandstone Wavy bedding	 sheared at one end

NATA Accredited Laboratory No. 431

Authorised Signature:

Alan Cocks
Associate Geotechnician

Date: 22 Sep 2008

coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Unit 8/12 Mars Road Lane Cove West NSW 2066
ph: (61 2) 9911 1000 Fax: (61 2) 9911 1003
ABN: 92 114 364 046

uniaxial compressive strength

client:	COFFEY GEOTECHNICS - LANE COVE WEST	job no:	INFOLCOV 00049AA
principal:	THIESS PTY LTD	laboratory:	Lane Cove West
project:	GEOTLCOV 23589AA - ROYAL NORTH SHORE HOSPITAL	report date:	22 September 2008
location:	ST LEONARDS	borehole:	BH207
test procedure:	AS 4133.1.1.1 and 4133.4.2	date received:	10 September 2008
test apparatus:	Avery with 200 kN CAS load cell S/N 080LSOO602001	page:	7 of 7

We received the samples on the 10th September, 2008. They were in galvanised coreboxes and had been covered with wet newspaper. The samples were tested in an "as received" condition.

QESTLAB work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	comments / failure mechanism
LCOV08W00719 BH207 11.57 to 11.71 m LCOV08S-03010	15 Sep 08 6.20 min	145 mm 51.5 mm 2.82:1	16.6	2.4 t/m³ 7.6 %	sandstone Massive	 sheared at one end

LCOV08S-03010

SYD-RS-002 2007

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Authorised Signature:
Alan Cocks
Associate Geotechnician

Date: 22 Sep 2008