CARDINAL FREEMAN VILLAGE

Supporting Documentation

Appendix R

Structural & Geotechnical Assessment

Prepared by **Robert Bird Group**

aevum LIMITED

RobertBirdGroup

Reference: PA:MEL CER/S 09162

10th September 2009

Robert Bird Group Pty Ltd
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Aevum Health
Level 6
25-35 O'Connell Street
SYDNEY NSW 2000

Attention: Jon Spencer

Dear Sir

RE: ASHFIELD CARDINAL FREEMAN VILLAGE- SITE MASTERPLAN

This is to certify that we have been commissioned by Aevum Health to carry out structural design on the above project.

We further certify that the structural design will be checked by a corporate engineer who will not be involved in the original design. This check will ensure conformance of the design with Australian Standards and Codes relevant to the structural component, as referenced in the Building Code of Australia, and accepted engineering principles.

Yours faithfully

Paul Aust

PAUL AUSTIN
Principal
Signing for and on behalf of
ROBERT BIRD GROUP PTY LTD

RobertBirdGroup

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Reference: PA:CS LTR/S 09162

20th May 2009

NSW Department of Planning
Ground Floor, 23-33 Bridge Street
SYDNEY NSW 2000

Attention: Mr Giovanni Cirillo
(as Delegate for the Director General)

Dear Sir

RE: REFURBISHMENT AND EXPANSION OF EXISTING AGED CARE FACILITY, VICTORIA STREET, ASHFIELD (MP08_0245)

Robert Bird Group has been engaged by Aevum to provide civil and structural engineering advice in relation to masterplanning for the Cardinal Freeman Village site at Ashfield in Sydney.

The Department of Planning's Director General Requirements issued for the proposed development on the 31st of March 2009 for MP_0245 advises in point 6 that a geotechnical report is to be prepared by a recognised professional which assesses the risk of failure on the site and identifies design solutions and works to be carried out to ensure stability of the land and structures and safety of persons. Specifically, the geotechnical risks on the site as identified in the reports are maintaining slope stability resulting from excavations, and appropriate design of foundations.

A number of geotechnical investigations have been undertaken to date. The two primary investigations are summarised in the following reports:

1. Geotechnical Investigation, Additional Self Care Units at 8-10 Clissold Street Ashfield, by Coffey Geotechnics Pty Ltd, dated 24th October 2003.
2. Geotechnical investigation, Cardinal Freeman Retirement Village Block F at Clissold Street Ashfield, by Coffey Geotechnics Pty Ltd, dated 31st October 2006.

The information provided within these reports has been of sufficient detail for the purpose of the civil and structural engineering design development at the masterplan stage of the project.

With respect to maintaining slope stability, the geotechnical reports advise that either permanent batters or shoring walls should be used to provide permanent support to excavation faces and to mitigate the risk of slope failures. Specific geometrical limits are provided for batters in each of the soil and rock materials found on the site. Where a shoring wall is required due to either existing conditions and or design requirements, a soldier pile wall has been recommended by the geotechnical engineer, and they have also provided geotechnical design parameters.

In addition to slope stability advice the geotechnical engineer has provided design bearing capacities for the various soil and rock materials found on the site, and has recommended foundation solutions to suit these various materials.

Robert Bird Group has adopted the geotechnical advice as provided by Coffey Geotechnics Pty Ltd in relation to the civil and structural design prepared for the masterplan. Furthermore, Robert Bird Group is satisfied that the use of this geotechnical advice has adequately addressed the Director General's requirements in relation to geotechnical engineering as identified in Point 6 of the Director General's Requirements.

Yours faithfully
ROBERT BIRD GROUP PTY LTD

Paul Austin

PAUL AUSTIN
Associate

Encls.

1. Geotechnical Investigation, Additional Self Care Units at 8-10 Clissold Street Ashfield, by Coffey Geotechnics Pty Ltd, dated 24th October 2003
2. Geotechnical investigation, Cardinal Freeman Retirement Village Block F at Clissold Street Ashfield, by Coffey Geotechnics Pty Ltd, dated 31st October 2006

APP CORPORATION PTY LTD

GEOTECHNICAL INVESTIGATION
ADDITIONAL SELF CARE UNITS

8-10 Clissold Street, Ashfield

S21643/1-AD

24 October 2003

S21643/1-AD DS
24 October 2003

APP Corporation Pty Ltd
APP House Level 1
53 Berry Street
NORTH SYDNEY NSW 2060

Attention: Mr Adam Castro

Dear Sir,

**RE: GEOTECHNICAL INVESTIGATION
ADDITIONAL SELF CARE UNITS
8-10 CLISSOLD STREET, ASHFIELD**

Coffey Geosciences Pty Ltd is pleased to present our report on the geotechnical investigation carried out for the proposed additional self care units located at 8-10 Clissold Street, Ashfield.

If you have any questions regarding the report please contact Delfa Sarabia or the undersigned on 9888 7444.

For and on behalf of

COFFEY GEOSCIENCES PTY LTD

PETER WADDELL

Associate

Distribution:

Original held by Coffey Geosciences Pty Ltd

1 copy held by Coffey Geosciences Pty Ltd

3 copies to APP Corporation Pty Ltd

TABLE OF CONTENTS

1. INTRODUCTION

Coffey Geosciences Pty Ltd was commissioned by APP Corporation Pty Ltd to undertake a geotechnical investigation for proposed additional self care units located at 8-10 Clissold Street, Ashfield. The investigation was carried out generally in accordance with the scope provided in Coffey proposal Reference S21643/1P-AA, dated 11 September 2003.

We understand that the development comprises demolition of two single storey houses followed by the construction of three buildings, ranging from 2-3 storeys, and a single level basement car park.

This report presents the results of investigation including borehole logs, subsurface conditions and a geotechnical model. It also includes discussion and recommendations on relevant aspects such as excavation conditions and foundation parameters.

2. FIELDWORK

Fieldwork for the investigation was carried out on 13 October 2003. Four boreholes (BH1 to BH4) were drilled using an 8WD mounted Gemco drilling rig. The boreholes were drilled to depths ranging from 1.20m to 5.80m.

The boreholes were drilled using solid flight augers and a steel V-bit in soils. Standard penetrations tests were carried out in soil to assess strength. Rock was cored to depths of 5.8m and 4m in BH2 and BH3, respectively. On completion, the boreholes were backfilled to the ground surface with cuttings.

A geotechnical engineer from Coffey set out the borehole locations, directed sampling and testing, and logged the materials encountered.

The boreholes were observed for groundwater while augering in soil. During coring water was used as a drilling fluid and groundwater could not be observed. Rock core samples from BH2 and BH3 were boxed, colour photographed and point load strength index tests were carried out. The results of the point load strength index tests are shown on the engineering logs.

The locations of the boreholes are shown on Figure 1 and were obtained using tape measurements from the existing site features shown on the client supplied drawings. Surface level at the boreholes were interpolated from site survey levels shown ion the client supplied drawings. Engineering logs of the boreholes, together with Explanation Sheets describing the terms and symbols used in the preparation of the logs are presented in Appendix A.

3. RESULTS OF INVESTIGATION

3.1 Site Conditions

The project site is located at the corner of Clissold and Queen Streets, Ashfield. The site is approximately 2,200 square meters in area and bounded by a stone wall fence on the street sides. The area is generally sloping downward to the northeast. At the time of investigation, two single storey houses and a carport occupied the site.

3.2 Subsurface Conditions

The Sydney 1:100,000 Geology Sheet indicates that the site is underlain by Ashfield Shale of the Wianamatta Group, described as black to dark grey shale and laminate.

All boreholes were drilled to V-bit refusal, with BH2 and BH3 drilled by rock coring techniques into rock. V-bit refusals were encountered at depths ranging from 1.1m to 1.6m below the ground surface.

The subsurface conditions and geotechnical model inferred from the boreholes is summarised in Table 1.

TABLE 1: SUMMARY OF SUBSURFACE CONDITIONS AND INFERRED GEOTECHNICAL MODEL

Unit	Top of Unit Depth (m)	Thickness (m)	Top of Unit RL (m AHD)	Description
1. Topsoil/ Fill	0	0.15 to 0.5	42 to 43.45	Sandy Clay, low plasticity, sand fine to medium grained, firm.
2. Residual Soil	0.15 to 0.5	0.35 to 0.95	41.5 to 43.25	Silty Clay, high plasticity, stiff to very stiff
3. Class V Shale*	0.5 to 1.45	1.50 to 3.00	40.58 to 42.35	Extremely to Highly Weathered Shale, very low strength, some iron stone bands.
4. Class IV Shale	2 to 3	1 to 2.5	38.47 to 40	Highly Weathered Shale, very low to low strength, some iron stone bands.
5. Class III Shale	3 to 5.5	Not penetrated	36.97 to 39	Moderately Weathered Shale, low to medium strength, iron stained.

**Classified in accordance with Pells et al, "Foundations on Sandstone and Shale in the Sydney Region, Australian Geomechanics Journal, December 1998.*

Groundwater was not encountered during augering of the boreholes. No long term groundwater monitoring has been carried out. Water introduced to the borehole during coring did not allow an assessment of groundwater within the rock in BH2 and BH3.

4. DISCUSSION AND RECOMMENDATIONS

4.1 Excavation Conditions

Basement construction to reduced level RL 41m will require excavation in Units 1 to 3 and possibly Unit 4 at the south west corner where Apartment Type C will be located. The soils and the extremely weathered shale should be able to be excavated with an excavator fitted with rock teeth. Use of hydraulic rock breaker may be required to loosen the low strength shale and the high strength iron stone bands present in the highly weathered shale. It should be noted that given vibration levels induced by rock breaker equipment, rock excavation near neighbouring structures may require lower vibration methods such as a rock grinder, line drilling or rock saw.

Although water was not encountered in the boreholes during the investigation, groundwater may not have flowed into the boreholes due to the low permeability of the residual soils and shale. During excavation inflows are likely to be concentrated at the soil/bedrock interface and in structures in the rock such as joints, bedding planes and weathered seams. We would anticipate that seepage into open excavations should be able to be controlled by pumping from sumps.

4.2 Excavation Support Requirements

4.2.1 Temporary Unsupported Cuts

Dependent on the proposed excavation footprint, there may be sufficient space for excavations to be battered. Temporary and permanent batters given in Table 2 are recommended.

TABLE 2: TEMPORARY AND PERMANENT BATTERS

Unit	Temporary Batter	Permanent Batter
Unit 1 – Topsoil / Fill	2H:1V	3H:1V
Unit 2 – Residual Soil	1.5H:1V	2H:1V
Unit 3 – Class V Shale	1H:1V	2H:1V
Unit 4 – Class IV Shale	1H:1V (1)	1.5H:1V (1)
Unit 5 – Class III Shale	Vertical(2)	Vertical(2)

(1) Steeper or vertical batters are possible if structural support is provided e.g. soil nailing and reinforced shotcrete.

(2) Localised rock bolting or shotcreting may be required, subject to geotechnical inspection during construction.

Temporary batters in Units 1 to 3 may be excavated only in anticipated prolonged dry periods and remain open for no more than say two weeks. Waterproof sheeting should be available to cover the batter slope in the event of prolonged wet weather. Batters in soil and Class V Shale could require surface protection with hessian/plastic membrane or similar if they are to be left exposed. It should be noted that shotcreting of the Unit 4 and 5 may also be appropriate to provide protection if batters are to be left for more than say 2 months.

The above recommendations assume that groundwater seepages are slight and surcharge loads are kept well clear of the crest of the cut, otherwise shallower cuts may be required.

If there is inadequate space for battering, then shoring is required as discussed in Section 4.2.2.

4.2.2 Shoring

Units 1 to 3 may be supported using a conventional tied back soldier pile wall comprising double channel steel soldier piles, horizontal steel walers, and vertical timber lagging or shotcrete and mesh infill panels. The soldier piles should be concreted in a predrilled rock socket founded within Unit 4 rock. A typical spacing for the soldier piles would be about 2.5m, and they should be tied back using rock anchors. The vertical timber lagging should extend to the base of Unit 3, or alternatively they may terminate at the top of Unit 4 provided this unit is protected by mesh and shotcrete.

For shoring construction, soldier piles should be installed and the top of the piles anchored before bulk excavation proceeds adjacent to shoring. Additional rows of anchors should be installed progressively as bulk excavation continues. When the toes of the soldier piles are exposed by excavation, careful attention will need to be given to the quality of the rock upon which the soldiers are bearing, in case remedial dental concrete or rock bolting is required to ensure adequate toe stability.

For cantilevered retaining walls or a propped wall with a single row of anchors, a triangular earth pressure distribution should be adopted where the horizontal active earth pressure, p, is calculated using the following:

$$p = K\gamma H$$

where K = design earth pressure coefficient

γ = unit weight (kN/m^3)

H = height of excavation (m)

Table 3 provides appropriate values of earth pressure coefficient K for the following cases:

- Case 1 = temporary retention, no adjacent footing
- Case 2 = permanent retention, no adjacent footing
- Case 3 = adjacent footing , requirement to limit lateral movement

TABLE 3: EARTH PRESSURE COEFFICIENTS

Material Stratum	**Value of Lateral Earth Pressure Coefficient, K (1)**			**Passive Earth Pressure Coeff, Kp (1,2)**	**Bulk Density (kN/m^3)**
	Case 1	Case 2	Case 3		
Units 1 – 2 Topsoil/Fill and Residual Soils	0.3	0.35	0.5	2.5	18
Units 3 – 4 Class V and IV Shale	0.2	0.3	0.5	2.5	20
Units 5 – Class III Shale	0.15	0.2	0.25	3	22

(1) These values are only applicable for a horizontal ground surface.

(2) Passive earth pressure coefficients for rock have been reduced to allow for potential defects in rock mass

Temporary anchors should be inclined downwards to anchor in Unit 4 Class IV Shale or Unit 5 Class III Shale. Preliminary design of anchors could be based using a working bond stress of 100kPa in Unit 4 and 300kPa in Unit 5.

Anchor designs should be based on allowing effective bonding to be developed behind an 'active zone' determined by drawing a line at 45° from the base of the soldier pile to intersect the ground surface behind the excavated face.

4.2.3 Rock Face Support

Vertical excavations in Units 4 to 5 may be feasible with support in the form of shotcreting and rock bolting. Specific support requirements can only be assessed during excavation. An experienced geotechnical engineer/engineering geologist should carry out regular inspections as excavation progresses (at least every 2m depth of excavation).

A summary of typical rock face support requirements is presented in Table 4.

TABLE 4: ASSESSMENT OF ROCK FACE SUPPORT REQUIREMENTS

Rock Class	Support
Unit 3 - Class V Shale	• Shoring Wall comprising soldier piles, walers and timber lagging or shotcrete infill panels (Section 4.2.2)
Unit 4 and 5 - Class IV and III Shale	• Pattern bolting of fractured zones. • Mesh supported by 0.5m long dowels and shotcrete (minimum 75 mm thick) or fibre reinforced shotcrete of fractured zones. • Isolated bolting of potential wedges.

Rock bolt lengths need to be assessed depending on excavation depth and rock defects. Where long-term support is required in excavations rock bolts must be provided with a high level of corrosion protection if they cannot be maintained (i.e. inspected and replaced, if necessary). Multiple layers of corrosion protection such as encapsulating bolts in both grout and PVC sheaths may be required.

4.3 Foundations

The base of the excavation RL41m is expected to expose Units 2 and 3 where Apartment Type A will be located, Unit 3 at Apartment Type B and Unit 4 at Apartment Type C. For pad and strip footing design, allowable bearing pressures presented in Table 5 may be assigned. Higher bearing pressures may be achieved if pad or strip footings are extended below the proposed excavation floor to better material.

Alternatively, bored piles can be used to reach into better shale. Allowable design parameters for bored piles are also presented in Table 5.

TABLE 5: ALLOWABLE FOUNDATION DESIGN PARAMETERS

Unit	Allowable End Bearing Pressures(1) (kPa)	Allowable Shaft Adhesion for Bored Piles(2) (kPa)
Unit 2 – Residual Soil	150	-
Unit 3 – Class V Shale	700	50
Unit 4 – Class IV Shale	1,000	150
Unit 5 – Class III Shale	3,500	250

1. *Allowable bearing pressures assume a minimum embedment of 0.3m into the relevant material. The recommended end bearing pressures should result in settlement of <1% of minimum footing dimension. Spoon testing would be required to assess allowable bearing pressures greater than 1,000kPa.*
2. *Assumes a clean socket roughness category R2 or better. Shaft adhesion should only be assigned where the socket length is at least 2 pile diameters. The socket should be cleaned and roughened by a suitable scraper such as a tooth, orientated perpendicular to the auger shaft. The base of the pile should be cleaned using a suitable bucket to remove spoil, as open flight augers often cannot remove sufficient spoil to expose the majority of the site base. If seepage occurs, piles should be dewatered prior to pouring concrete.*

5. LIMITATIONS

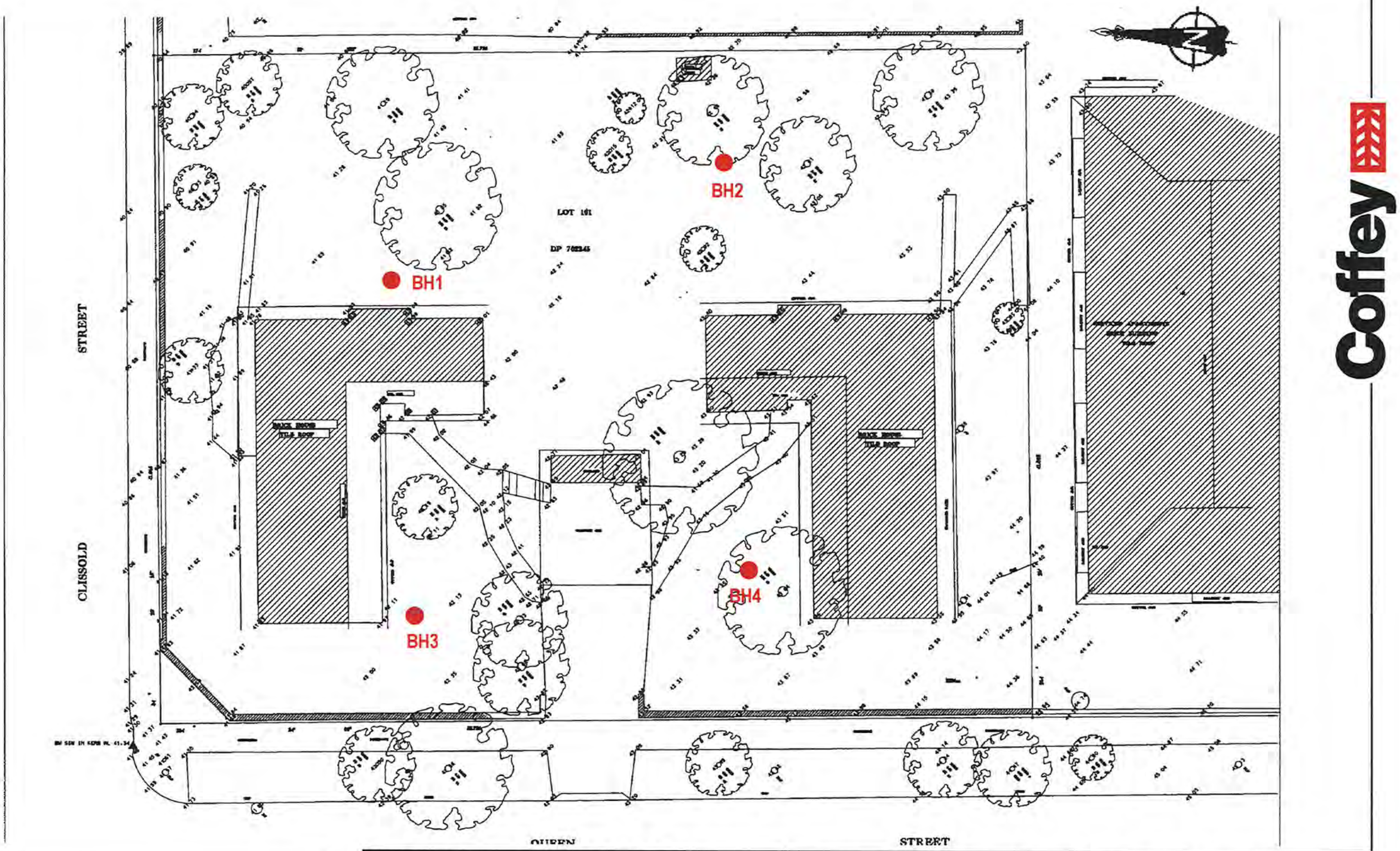
The geotechnical model has been inferred from a limited number of boreholes. The subsurface conditions described at the borehole locations may not be representative of subsurface conditions across the site. The document entitled "Important Information about your Coffey Report" presents additional information on the uses and limitations of this report.

For and on behalf of

COFFEY GEOSCIENCES PTY LTD

PETER WADDELL

Principal



LEGEND

● BH1 BOREHOLE LOCATION

Coffey Geosciences Pty Ltd ACN 056 335 516

Geotechnical I **Resources** I Environmental I **Technical** I Project Management

Drawn	DS
Approved	PJW
Date	24/10/2003
Scale	NTS

APP CORPORATION PTY LTD
ADDITIONAL SELF CARE UNITS
8-10 CLISSOLD STREET, ASHFIELD

BOREHOLE LOCATION PLAN

FIGURE 1

Job no S21643/1

APPENDIX A

ENGINEERING LOGS OF BOREHOLES

Coffey Geosciences Pty Ltd ACN 056 335 516

Engineering Log - Borehole

Borehole No.	*BH1*
Sheet	1 of 1
Office Job No.:	*S21643/1*
Client:	*APP CORPORATION PTY LTD*
Principal:	
Project:	*ADDITIONAL SELF CARE UNITS*
Borehole Location:	*8-10 CLISSOLD ST, ASHFIELD*
Date started:	*13.10.2003*
Date completed:	*13.10.2003*
Logged by:	*DS*
Checked by:	*PJW*

drill model and mounting:	GEMCO 8WD	Easting:		slope:	-90°	R.L. Surface:	42.03
hole diameter:	100 mm	Northing		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 penetro-meter kPa 100 200 300 400	structure and additional observations
ADV		N	None observed						**TOPSOIL: SANDY CLAY**Low plasticity, dark grey, sand fine grained, with roots.	M	F		TOPSOIL
									FILL: SANDY CLAY Low plasticity, dark brown, sand fine to medium grained.				FILL
					41.5	0.5		CH	**SILTY CLAY:**High plasticity, dark brown.		St		RESIDUAL
				SPT 3,4,4 N*=8	41.0	1.0			Becoming orange-brown, some roots.		St/VSt	×	
					40.5	1.5		CH	**SHALY CLAY:**High plasticity, pale grey. 1.60m V-bit refusal.		H		EXTREMELY WEATHERED SHALE
									Borehole BH1 terminated at 1.7m				
					40.0	2.0							
					39.5	2.5							
					39.0	3.0							
					38.5	3.5							
						4.0							

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 Geosciences Pty Ltd ACN 056 335 516

Engineering Log - Borehole

Borehole No.	***BH2***
Sheet	1 of 2
Office Job No.:	***S21643/1***
Client:	***APP CORPORATION PTY LTD***
Principal:	
Project:	***ADDITIONAL SELF CARE UNITS***
Borehole Location:	***8-10 CLISSOLD ST, ASHFIELD***
Date started:	***13.10.2003***
Date completed:	***13.10.2003***
Logged by:	***DS***
Checked by:	***PJW***

drill model and mounting:	GEMCO 8WD	Easting:		slope:	-90°	R.L. Surface:	42.47
hole diameter:	100 mm	Northing		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 penetro-meter kPa 100 200 300 400	structure and additional observations
ADV		C							**TOPSOIL: SANDY CLAY**Low plasticity, dark grey, with roots.	M	F		TOPSOIL
					42				**FILL: SANDY CLAY:**Low plasticity, dark brown, sand fine to medium grained.		VSt/H		FILL
								CH	**SILTY CLAY:**High plasticity, orange-brown, mottled pale grey, some roots.				RESIDUAL
				SPT 6,10/140,- N*=R		1		CH	**SHALY CLAY:**High plasticity, pale grey mottled orange-brown.		H	600	EXTREMELY WEATHERED SHALE
									1.10m V-bit refusal.				
					41				Borehole BH2 continued as cored hole				
						2							
					40								
						3							
					39								
						4							
					38								
						5							
					37								
						6							
					36								
						7							
					35								
						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 Geosciences Pty Ltd ACN 056 335 516

Engineering Log - Cored Borehole

Borehole No. ***BH2***
Sheet 2 of 2
Office Job No.: ***S21643/1***

Client:	*APP CORPORATION PTY LTD*	Date started:	***13.10.2003***
Principal:		Date completed:	***13.10.2003***
Project:	*ADDITIONAL SELF CARE UNITS*	Logged by:	***DS***
Borehole Location:	*8-10 CLISSOLD ST, ASHFIELD*	Checked by:	***PJW***

drill model & mounting:	GEMCO 8WD	Easting:		slope:	-90°	R.L. Surface:	42.47
hole diameter:	100 mm	Drilling fluid:	Northing:	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
			42	1		Continued from non-cored borehole						
		None observed	41			**NO CORE:** 0.45m.						
				2		**SHALE:** Pale grey, with orange-brown ironstone bands.	HW			0		1.64-5.8 Highly fractured.
			40			**NO CORE:** 0.54m.						
			39	3		**SHALE:** Pale grey, with orange-brown to purple ironstone bands.	HW		D 0.03 A 0.04	0		
			38	4								
			37	5		**SHALE:** Grey, iron stained.	MW		A 0 D 0.06 A 0.08	20		JT, 90°, PL, SO, Fe SN. 5.2-5.4m JT, 80°, UN, SO, Fe SN. JT, 60°, PL, SO, Fe CO. JT, 60°, IR, SO, Fe CO. JT, 10°, PL, SO, Fe SN.
			36	6		BH2 terminated at 5.8m						
			35	7								
				8								

CORED BOREHOLE S21643.1.GPJ COFFEY.GDT 24.10.03

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

Form GEO 5.5 Issue 3 Rev. 3

Coffey Geosciences Pty Ltd ACN 056 335 516

Coffey

Engineering Log - Borehole

Borehole No.	*BH3*
Sheet	1 of 2
Office Job No.:	*S21643/1*
Client:	*APP CORPORATION PTY LTD*
Principal:	
Project:	*ADDITIONAL SELF CARE UNITS*
Borehole Location:	*8-10 CLISSOLD ST, ASHFIELD*
Date started:	*13.10.2003*
Date completed:	*13.10.2003*
Logged by:	*DS*
Checked by:	*PJW*

drill model and mounting:	GEMCO 8WD	Easting:		slope:	-90°	R.L. Surface:	42.00
hole diameter:	100 mm	Northing		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 penetro-meter kPa 100 200 300 400	structure and additional observations
ADV	▒	C					▨		**TOPSOIL: SANDY CLAY**High plasticity, dark grey, sand fine grained, with roots.	M	F		TOPSOIL
	▒						▨	CH	**SILTY CLAY:**High plasticity, red-brown.		VSt		RESIDUAL
	▒						▨	CH	**SHALY CLAY:**High plasticity, red-brown, mottled pale grey, shale fragments gravel sized.		H		EXTREMELY WEATHERED SHALE
	▒			SPT 6,11,11/70 N*=R	41	1	▨		Becoming pale grey and purple in colour.			600	SPT hammer bouncing.
									1.30m V-bit refusal.				
									Borehole BH3 continued as cored hole				
					40	2							
					39	3							
					38	4							
					37	5							
					36	6							
					35	7							
					34	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 Geosciences Pty Ltd ACN 056 335 516

Coffey

Engineering Log - Cored Borehole

Client:	*APP CORPORATION PTY LTD*	Borehole No.	*BH3*
Principal:		Sheet	2 of 2
Project:	*ADDITIONAL SELF CARE UNITS*	Office Job No.:	*S21643/1*
Borehole Location:	*8-10 CLISSOLD ST, ASHFIELD*	Date started:	*13.10.2003*
		Date completed:	*13.10.2003*
		Logged by:	*DS*
		Checked by:	*PJW*

drill model & mounting:	GEMCO 8WD	Easting:		slope:	-90°	R.L. Surface:	42.00
hole diameter:	100 mm	Drilling fluid:	Northing:	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
			41	1		Continued from non-cored borehole							
NMLC		None observed	40	2		**SHALE:** Pale grey, with orange-brown, high strength ironstone bands.	HW	VL-L	A 2.76 A 0.14	0		1.37-4m Highly fractured.	SM, 0°, clay, 3-20mm.
			39	3		**SHALE:** Grey and brown, iron stained.	MW	L-M	A 0.34	0		JT, 50°, SN, closed.	
			38	4		BH3 terminated at 4m							
			37	5									
			36	6									
			35	7									
			34	8									

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

roughness

VR	very rough
RO	rough
SO	smooth
SL	slickensided

planarity

PL	planar
CU	curved
UN	undulating
ST	stepped
IR	irregular

coating

CN	clean
SN	stained
VN	veneer
CO	coating

Coffey Geosciences Pty Ltd ACN 056 335 516

Engineering Log - Borehole

Borehole No. **BH4**
Sheet 1 of 1
Office Job No.: *S21643/1*

Client: *APP CORPORATION PTY LTD*
Principal:
Project: *ADDITIONAL SELF CARE UNITS*
Borehole Location: *8-10 CLISSOLD ST, ASHFIELD*

Date started: *13.10.2003*
Date completed: *13.10.2003*
Logged by: *DS*
Checked by: *PJW*

Coffey

drill model and mounting:	GEMCO 8WD	Easting:	slope: -90°	R.L. Surface:	43.45
hole diameter:	100 mm	Northing	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 penetro-meter kPa 100 200 300 400	structure and additional observations
ADV		N	None observed						**TOPSOIL: SANDY CLAY**Low plasticity, dark grey, sand fine grained, with roots.	M	F		TOPSOIL
					43.0	0.5		CH	**SILTY CLAY:**High plasticity, pale brown mottled red and pale grey.		VSt		RESIDUAL
				SPT 10,10/50,- N*=R	42.5	1.0			1.10m V-bit refusal.			×	SPT hammer bouncing.
									SHALY CLAY: High plasticity, pale grey and orange brown.		H	600	EXTREMELY WEATHERED SHALE
									Borehole BH4 terminated at 1.2m				
					42.0	1.5							
					41.5	2.0							
					41.0	2.5							
					40.5	3.0							
					40.0	3.5							
					39.5	4.0							

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

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▼ 10/1/98 water level on date shown
► water inflow
◄ water outflow

notes, samples, tests

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VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

GEOTECHNICAL INVESTIGATION CARDINAL FREEMAN RETIREMENT VILLAGE BLOCK F

Taylor Thomson Whitting Pty Ltd
Clissold Street, Ashfield

GEOTLCOV23105AA-AD
31 October 2006

Coffey Geotechnics Pty Ltd ABN 93 056 929 483
8/12 Mars Road Lane Cove West NSW 2066 Australia

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

31 October 2006

Taylor Thomson Whitting Pty Ltd
48 Chandos Street
St Leonards NSW 2065

Attention: David Carolan

Dear David,

RE: Geotechnical Investigation

Cardinal Freeman Retirement Village Block F

This report presents the results of the geotechnical investigation carried out by Coffey Geotechnics Pty Ltd at Cardinal Freeman Retirement Village – Block F located at Clissold Street, Ashfield.

Should you require further clarification on any aspect of this report, please contact the undersigned on 9911 1000.

For and on behalf of Coffey Geotechnics Pty Ltd

Delfa Sarabia

Geotechnical Engineer

Distribution:	Original held by Coffey Geotechnics Pty Ltd
	1 copy held by Coffey Geotechnics Pty Ltd
	2 hard copies to Taylor Thomson Whitting Pty Ltd
	1 electronic copy to Taylor Thomson Whitting Pty Ltd

Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Important information about your **Coffey** Report

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.
Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

---

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical Information in Construction Contracts" published by the Institution of Engineers Australia, National Headquarters, Canberra, 1987.

CONTENTS

Tables

Figures

1 INTRODUCTION

Coffey Geotechnics Pty Ltd (Coffey) was commissioned by Taylor Thomson Whitting Pty Ltd (TTW) to carry out a geotechnical investigation for the proposed additions and alterations to the Cardinal Freeman Retirement Village – Block F located at the corner of Clissold and Victoria Streets, Ashfield.

The geotechnical investigation was undertaken in general accordance with Coffey proposal (Reference: GEOTLCOV230105AA-AA, dated 27 September 2006). The scope of fieldwork was increased as additional test pits were requested by TTW following the initial investigation on 5 October 2006. The additional test pits were excavated on 20 October 2006.

Earlier this year, Coffey carried out similar investigation for Blocks A and B within the property and the results were presented in report S22516/1-AC, dated 5 June 2006. Coffey also carried out an earlier geotechnical investigation at this site and the results were presented in report S21643/1-AD, dated 24 October 2003.

This report presents the results of investigation including subsurface conditions at test pit locations. It also includes an assessment of materials underlying the existing footing and recommendations on ultimate bearing capacity and elastic modulus of the underlying materials.

2 FIELDWORK

The initial fieldwork was carried out on 5 October 2006 and comprised the excavation of two test pits (TP1 and TP2) at locations nominated by TTW representative on site. An obstruction was encountered in TP2 and additional test pits were requested by TTW. The additional test pits (TP3 and TP4) were excavated on 20 October 2006.

The test pits were excavated, using a mini excavator, adjacent to the existing footings, and exposing the founding materials. Disturbed samples were collected from the test pits. Pocket penetrometer tests were undertaken in cohesive materials encountered in the test pits.

The fieldwork was undertaken in the full-time presence of a Coffey Geotechnical Engineer, who directed the excavation, testing and sampling, and logged the subsurface conditions. A TTW representative was present during the fieldwork, who nominated the test pit locations.

The test pits were located adjacent to the Block F building. Figure 1 presents the location of test pits. Sketches of the test pits, shown as cross sections are presented in Figures 2 to 5.

3 RESULTS OF INVESTIGATION

3.1 Site Description

The Cardinal Freeman Retirement Village is located at the corner of Clissold and Victoria Streets, Ashfield. The village is bounded by Clissold, Victoria, Seaview and Queen Streets. The structures within the village include a nursing home, chapel, convent, hostel structures, an activity centre and a number of residential units.

The Block F building is located in the middle north side of village and comprises a two storey brick building with a garage level on the northern side.

3.2 Geology

Our previous investigations undertaken on the site indicated the subsurface ground conditions comprise residual soils overlying shale bedrock. The shale was described as relatively weathered and assessed as Class V Shale as classified in accordance with Pells et al (1998) "Foundations on Sandstone and Shale in the Sydney Region" Australian Geomechanics Journal December 1998 to depths in excess of 3m.

3.3 Subsurface conditions

During the initial investigation, TP2 was obstructed by a concrete slab at the 1.7m depth. Discussions with the client and site owner indicated that a swimming pool was previously located in Block F. Drawings provided by client showed that the swimming pool covered about two thirds (west side) of the building. The approximate location of the previous swimming pool is shown in Figure 1.

The other investigation locations (TP1, TP3 and TP4) were confined to the east end of the building. The subsurface profile adjacent to the existing footings comprises fill materials overlying residual soil, overlying shale bedrock. The fill was observed from ground surface to between 1.2m to 1.6m depth and described as gravelly silty clays, contains bricks and tile fragments, wood pieces, and tree roots.

In TP2, the fill layer was deeper and described as gravely silty clay and shaley clay and contains brick and tile fragments, fabric and roots. At depths below 1m, the fill consists mainly of bricks, concrete rubble and wood pieces in sandy and clayey materials.

The residual soil was observed below the fill layer and is high plasticity silty clay, orange brown and red brown in colour with ironstones. Pocket penetrometer tests on residual soils indicated the material is very stiff or hard.

Shale bedrock was encountered in test pits TP1 and TP4, described as extremely to highly weathered shale, pale grey, orange and dark red, very low to low strength, with high strength ironstone bands.

Groundwater was observed at the base of TP2. The groundwater observed may be trapped water on the surface of the concrete slab. Previous investigations indicated that no groundwater was observed. It should be noted that groundwater levels may vary seasonally with rainfall and other factors and seepage could be expected at the soil bedrock interface.

The existing building footings were observed as consisting of a concrete footing. In TP4, the base of footing was observed to be at 1.85m below the existing ground level. Due to the plan size limitations of the test pits it is unknown whether the footings exposed are individual mass concrete piers or strip footings. However, the client's supplied drawings indicated that the footings are bored piers.

A summary of the test pit observations is presented in Table 1.

Table 1: Summary of Test Pit Observations

Test Pit Number	Test Pit Depth (m)	Subsurface profile	Observed depth to top of Shale (m)	Observed depth to base of Footing (m)	Comments
TP1	2.2	0-1.6m depth Fill 1.6m-1.8m depth Residual Soil 1.8m-2.2m EW to HW* Shale	1.8	Observed down to 1.9m	Base of pier not observed
TP2	1.7	0-1.7m depth Fill Groundwater at 1.7m	Not Observed	Not Observed	Test pit obstructed by concrete slab at 1.7m depth
TP3	1.7	0-1.2m depth Fill 1.2m-1.7m depth Residual Soil	Not Observed	Not Observed	Test pit terminated due to service steel pipe encountered at 1m depth
TP4	2.2	0-1.4m depth Fill 1.4m-1.85m depth Residual Soil 1.85m-2.2m depth EW to HW Shale	1.85	1.85	

*Extremely weathered to highly weathered.

3.4 Ground Conditions Below Building Footings

Due to the extent of the previous swimming pool in Block F, the ground conditions below the building footing were investigated only on the eastern side of the building.

In TP1 located on the south east of the building, the excavation revealed a concrete footing extending down to 1.9m below ground level. However, the base of the footing was not observed. The test pit revealed extremely to highly weathered shale, very low to low strength, with high strength ironstone bands from 1.8m depth to the base of excavation at 2.2m depth. This material is consistent with Class V Shale, in accordance with the Pells classification (see earlier reference).

In TP4 located on the north east of the building, the excavation revealed the base of the concrete footing is at 1.85m below the ground level and underlain by material that is consistent with Class V Shale.

The observations in test pits TP2 and TP3 were inconclusive due to both test pits being obstructed before reaching either the base of the concrete footing or the top of shale bedrock.

4 DISCUSSIONS AND RECOMMENDATIONS

4.1 Subsurface Bearing Capacity

The investigation was confined on the eastern side of the building and has revealed that the founding material below the footings is Class V Shale. No assessment was carried anywhere else due to the extent of the location of the previous swimming pool in Block F.

Class V Shale is typically assigned an allowable bearing capacity of 700kPa with expected settlement of about less than 1% of the least footing width. For limit state design an Ultimate Bearing Capacity of 3MPa and a Geotechnical Strength Reduction Factor (ϕ_g) of 0.75 may be adopted. Settlements should be checked for an elastic modulus ranging from 50MPa to 300MPa.

The assessment of the founding materials has been based on test pits located at the eastern end of the building only. We recommend that further investigation should be carried out on other areas of the building and may involve penetrating through the fill and concrete slab of the swimming pool previously located in Block F.

Footings taken a minimum of 0.3m into Class V Shale may be designed for an allowable bearing pressure of 700kPa or a limit state approach could be adopted to justify higher serviceability bearing pressure if greater settlements can be tolerated.

5 LIMITATION

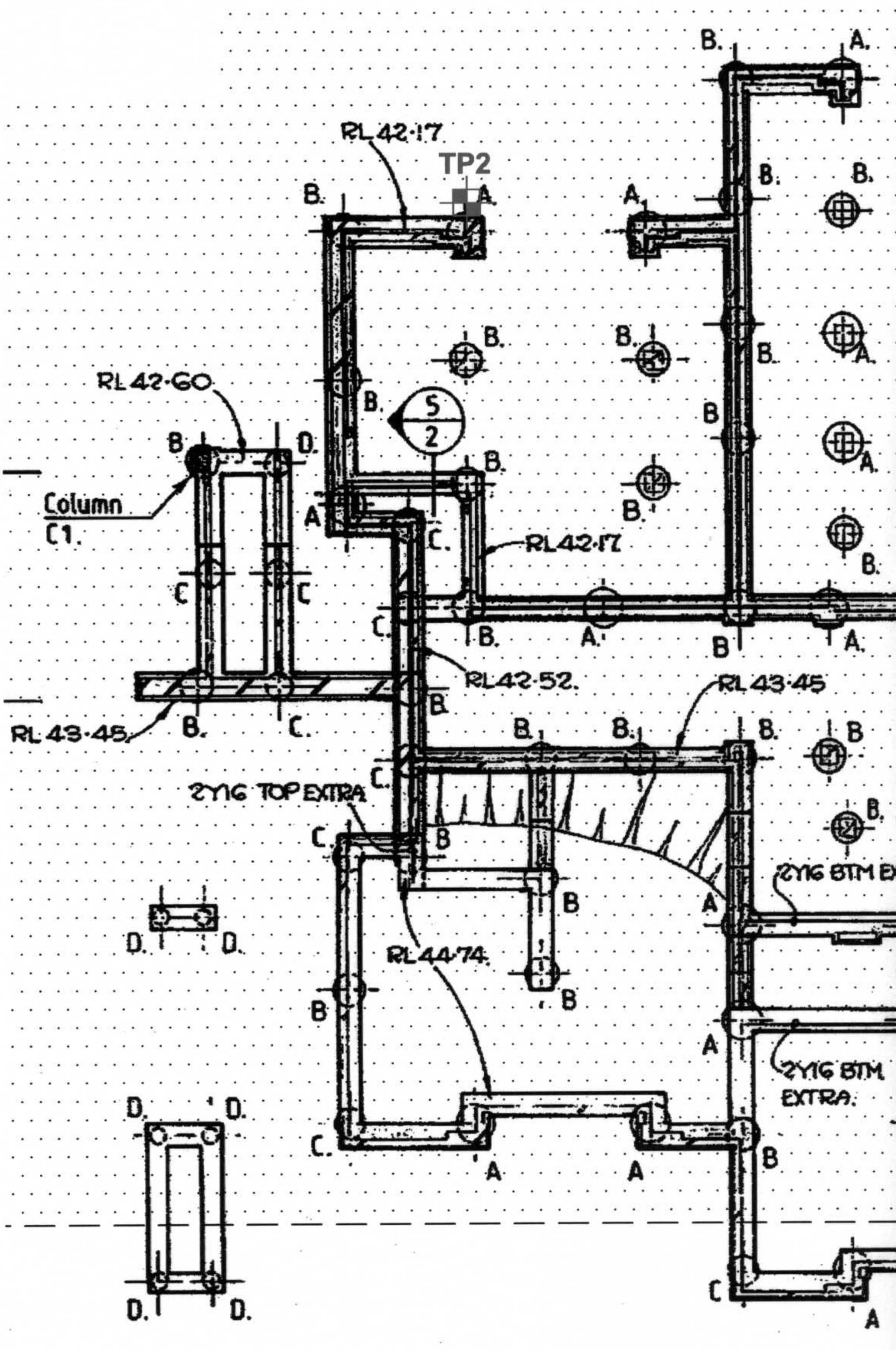
The geotechnical model and recommendations presented in this report are based on a limited number of test pits. Variation in ground conditions can occur over relatively short distances and a Geotechnical Engineer should be engaged during construction to assess whether exposed conditions are consistent with the design assumptions. The attached document entitled "Important Information about your Coffey Report" presents additional information on the uses and limitations of this report.

For and on behalf of Coffey Geotechnics Pty Ltd

Delfa Sarabia

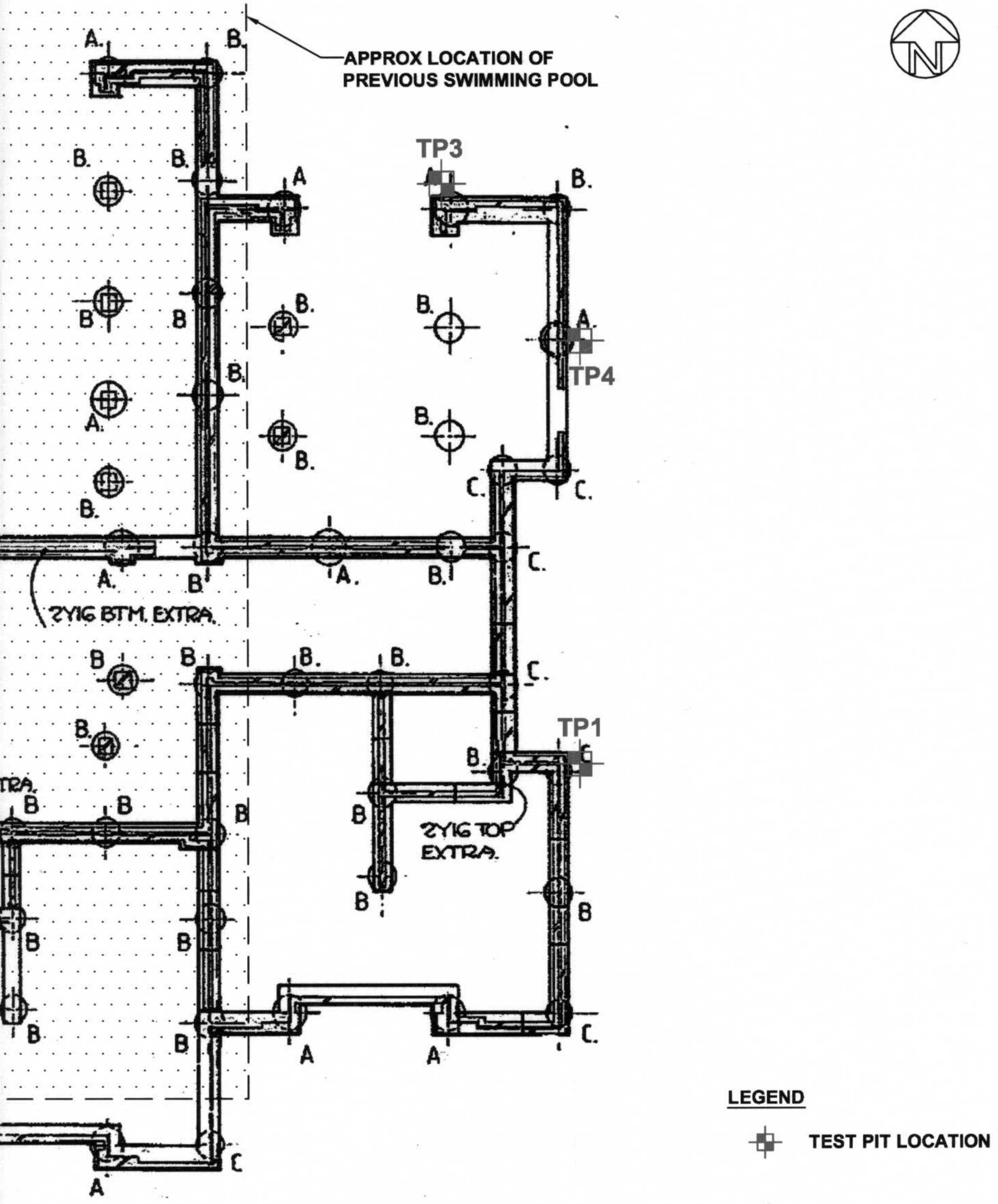
Geotechnical Engineer

Figures



revision	description	drawn	approved	date

Approx Scale (metres)



drawn	DS/SW
approved	DS
date	31/10/06
scale	AS SHOWN
original size	A3

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: TAYLOR THOMSON WHITTING (NSW) PTY LTD

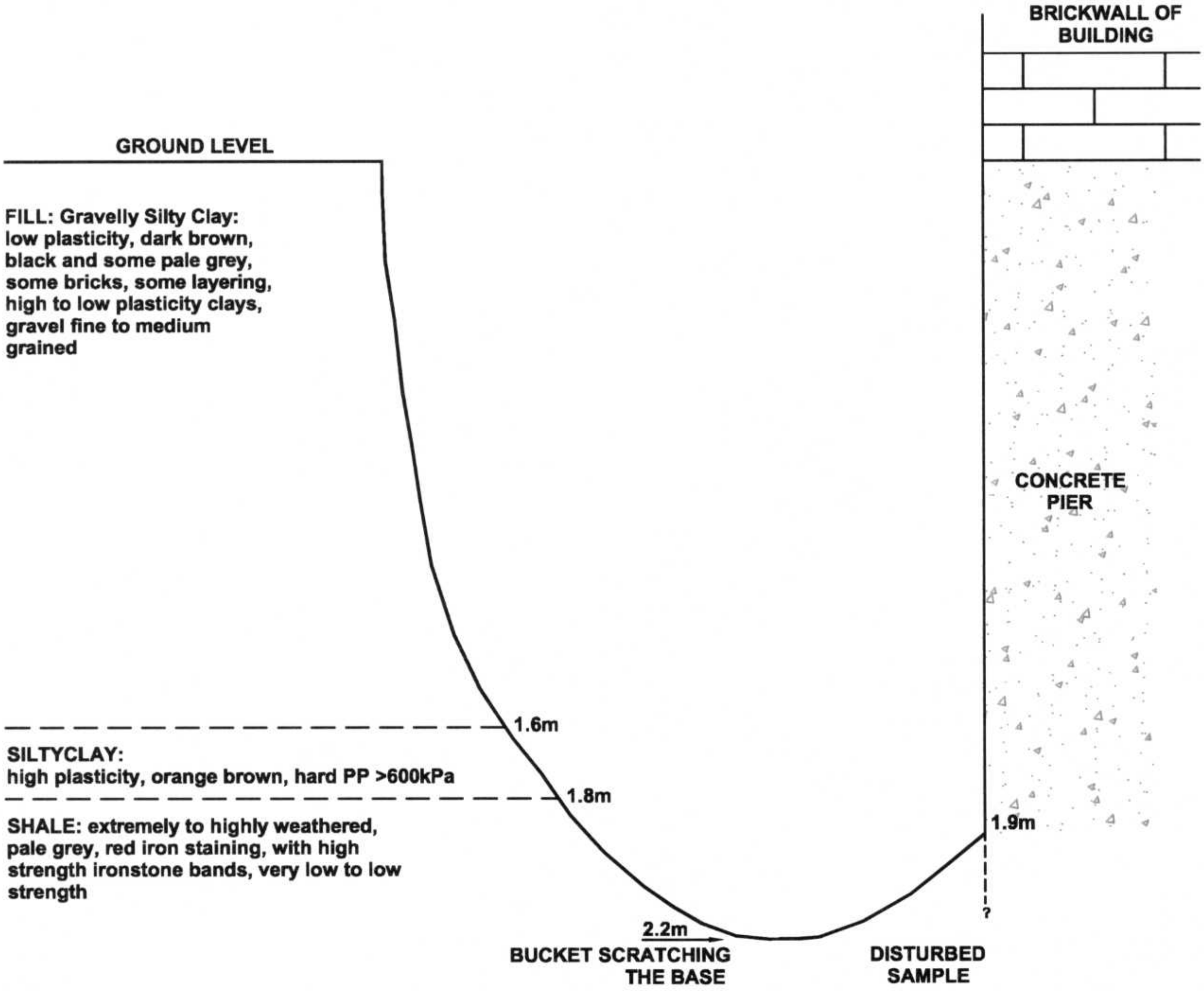
project: CARDINAL FREEMAN RETIREMENT VILLAGE - BLOCK F
CLISSOLD STREET, ASHFIELD

title: TEST PIT LOCATION PLAN

project no: GEOTLCOV23105AA

figure no: FIGURE 1

TP1



NOTE: BASE OF PIER NOT OBSERVED

drawn	DS/AW
approved	DS
date	31/10/06
scale	1:20
original size	A4

coffey
geotechnics
SPECIALISTS MANAGING THE EARTH

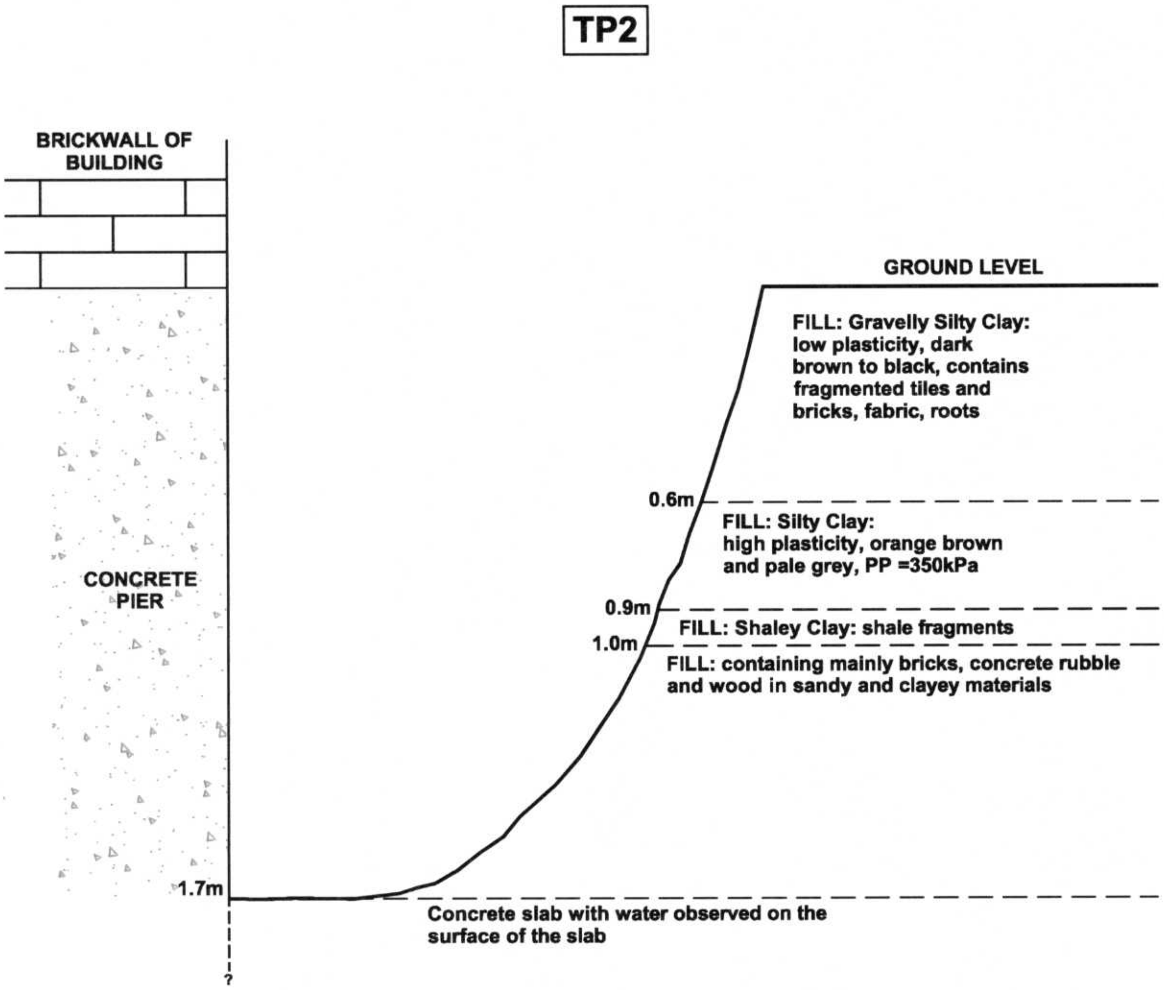
client: TAYLOR THOMSON WHITTING (NSW) PTY LTD

project: CARDINAL FREEMAN RETIREMENT VILLAGE - BLOCK F
CLISSOLD STREET, ASHFIELD

title: SECTION THROUGH TEST PIT TP1

project no: GEOTLCOV23105AA

figure no: FIGURE 2



NOTE: TEST PIT TERMINATED AT 1.7m DUE TO CONCRETE SLAB ENCOUNTERED AT THE BASE

drawn	DS/AW
approved	DS
date	31/10/06
scale	1:20
original size	A4

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

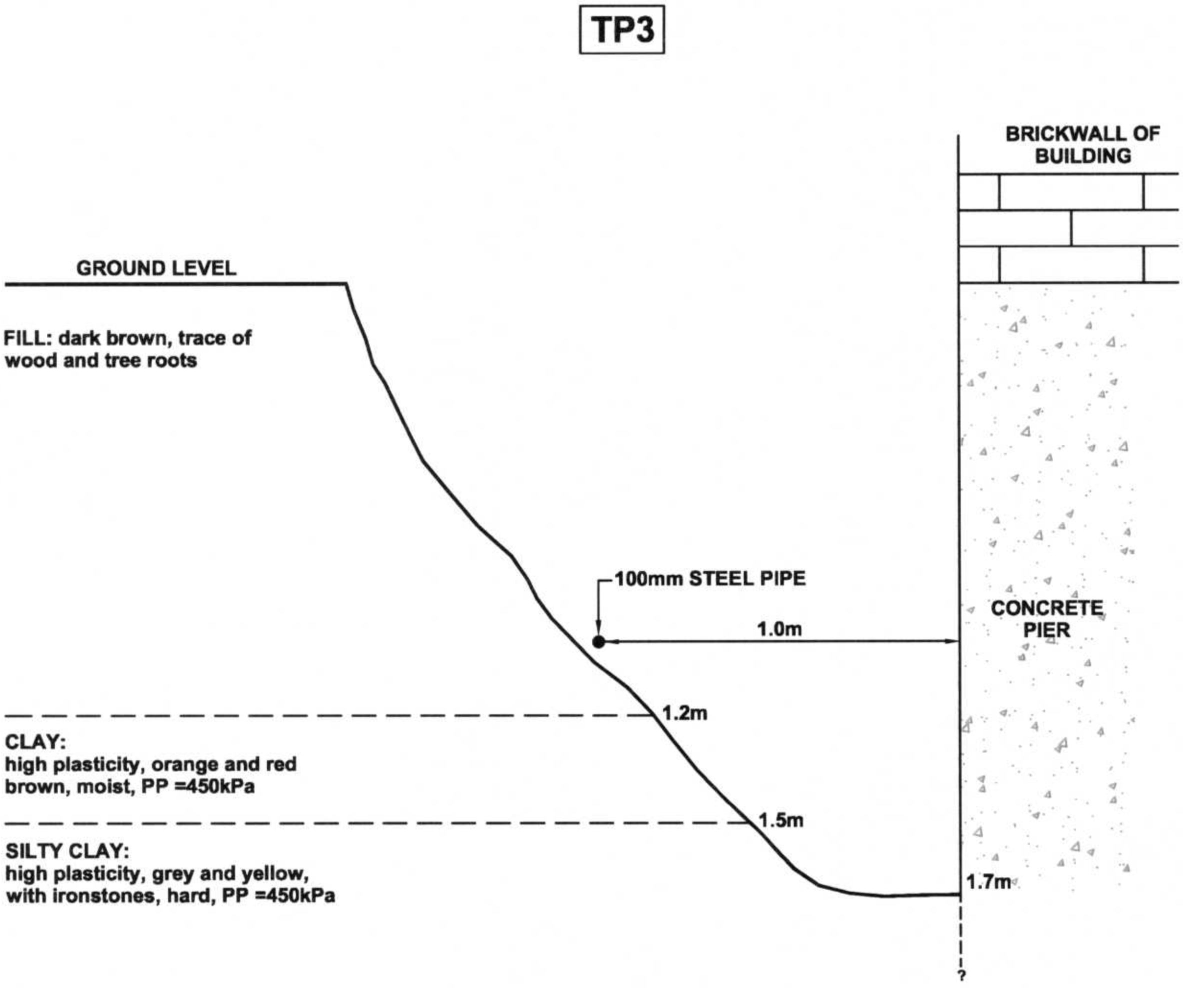
client: TAYLOR THOMSON WHITTING (NSW) PTY LTD

project: CARDINAL FREEMAN RETIREMENT VILLAGE - BLOCK F
CLISSOLD STREET, ASHFIELD

title: SECTION THROUGH TEST PIT TP2

project no: GEOTLCOV23105AA

figure no: FIGURE 3



NOTE: BASE OF PIER NOT OBSERVED, TEST PIT TERMINATED AT 1.7m DUE TO STEEL PILE ENCOUNTERED IN THE PIT

drawn	DS/AW
approved	DS
date	31/10/06
scale	1:20
original size	A4

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: TAYLOR THOMSON WHITTING (NSW) PTY LTD

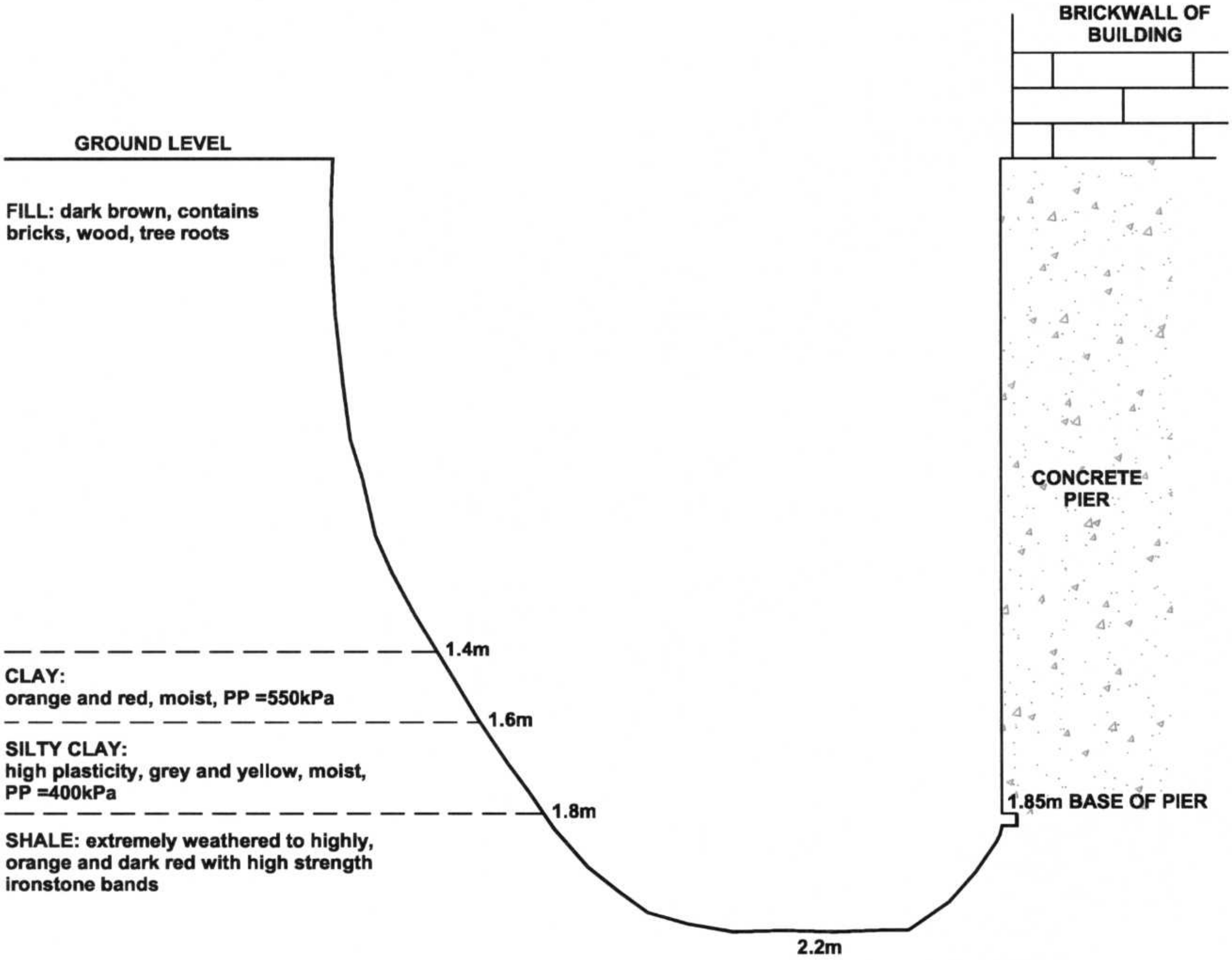
project: CARDINAL FREEMAN RETIREMENT VILLAGE - BLOCK F
CLISSOLD STREET, ASHFIELD

title: SECTION THROUGH TEST PIT TP3

project no: GEOTLCOV23105AA

figure no: FIGURE 4

TP4



drawn	DS/AW
approved	DS
date	31/10/06
scale	1:20
original size	A4

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: **TAYLOR THOMSON WHITTING (NSW) PTY LTD**

project: **CARDINAL FREEMAN RETIREMENT VILLAGE - BLOCK F**
CLISSOLD STREET, ASHFIELD

title: **SECTION THROUGH TEST PIT TP4**

project no: **GEOTLCOV23105AA**

figure no: **FIGURE 5**