

17 August 2009

Mr R Harvey
Waitemata District Health Board Oral Health Services
Private Bag 93115
Henderson
Waitakere 0650

Dear Rodney

RE: Foundation Investigation Report on Proposed Dental Facility at Glenfield Intermediate School, Chivalry Road, Glenfield.

1 INTRODUCTION

This report presents the results of geotechnical investigations carried out by Coffey Geotechnics (NZ) Limited (Coffey) for Waitemata District Health Board for a proposed new dental facility at Glenfield Intermediate School, Glenfield. Coffey was commissioned for investigations which were carried out in accordance with our scope of works outlined in our proposal SILV0047 dated 16 July 2009.

The purpose of the investigation was to assess the subsurface conditions at the site of the proposed building, leading to determination of bearing capacity and AS2870 expansive soil Class, together with pertinent comments pertaining to site preparation.

Our report will be used to support an application for Building Consent with North Shore Council.

2 SITE DESCRIPTION AND DEVELOPMENT PROPOSALS

The proposed site for the new facility is located in the south eastern corner of the school grounds, 15 metres from the eastern boundary and north of an existing carpark, as indicated in the Woods Topographic Survey Background Report, referenced 60541 and dated 4 August 2009. The proposed site is essentially level and is currently occupied by two classrooms. However, the area between the existing classrooms and the eastern boundary slopes toward the east at gradients of approximately 1(v) in 5(h). A buried stormwater line pass beneath and parallel to this batter.

The preliminary drawings supplied to us depict the construction of a 4 chair facility approximately 8 metres wide by 30 metres long. The floor of the majority of the building is to be supported on shallow senton piles, except the plant room that will be constructed with a slab-on-grade concrete floor. Cladding and roofing will comprise lightweight materials and the building will be constructed generally in accordance with NZS 3604: 1999.

3 FIELDWORK AND FINDINGS

Our fieldwork was undertaken on 7 August 2009 and involved the drilling of 4 hand auger boreholes to depths of up to 3.2 metres in the positions indicated on the appended site plan. A soil sample was also recovered for subsequent laboratory examination and testing.

Results of all insitu soil tests and groundwater readings, together with detailed descriptions and depths of strata encountered during the drilling of the boreholes are appended and are summarised as follows:

- Topsoil depths ranged from 0.15 to 0.3 metres;
- Filling was encountered in boreholes GIHA01, GIHA02 and GIHA04 within the proposed building platform to depths between 1.0 and 1.3 metres. However, further topsoil (approximately 100mm thick) was noted beneath the filling in boreholes GIHA02 and GIHA04, which indicates that filling is not likely to be engineer certified. GIHA03, located adjacent to the proposed clinic site, encountered filling to a depth of 2.8 metres as it was drilled above an existing stormwater line. The fill material comprised stiff to hard deposits of clayey silt.
- The natural strata encountered comprised stiff to hard deposits of Waitemata Group origin.
- The water table was not encountered during our time on site.

4 LABORATORY TESTING AND RESULTS

A sample was retrieved from between 0.4 and 0.6 metres depth in borehole GIHA04 and was returned to the laboratory. Water Content, Cone Penetration Limit and Linear Shrinkage tests were carried out on the sample in accordance with NZS 4402, "Methods of Testing Soils for Civil Engineering Purposes" test section 2 to assist in assessing the Expansive Class of the site materials.

Results are appended and report a water content of 32.6%, cone penetration limit of 60 and a linear shrinkage of 13%.

5 CONCLUSIONS AND RECOMMENDATIONS

The geotechnical ultimate bearing capacity for the proposed shallow foundations may be taken as 300 kPa (as required by NZS 3604), provided that the surficial filling is penetrated by the foundations at all locations so that they bear entirely upon the underlying natural ground.

For the design of piles where the pile depth exceeds 3 times the pile diameter, a geotechnical end bearing capacity of 450 kPa may be assumed for design, provided the bases of the piles are located in competent natural ground. No allowance should be made for the contribution of side adhesion.

As required by Section B1/VM4 of the New Zealand Building Code Handbook, a strength reduction factor of 0.50 or 0.80 must be applied to all recommended geotechnical ultimate soil capacities in conjunction with their use in ultimate limit state design load cases for static and earthquake overload conditions respectively.

On the basis of our experience, visual-tactile appraisal of the soils encountered and the supporting laboratory test results, the assessed AS 2870 expansive site Class in this case is S (slight).

On this basis, apart from the areas requiring piles, foundation design may be carried out in accordance with AS 2870 or in accordance with NZS 3604 provided that in this latter case the minimum foundation

depth below cleared ground level following topsoil removal and benching of building platform areas is 450mm.

Apart from piles required to penetrate filling, some portions of the building will also require piling to avoid loading several stormwater and sanitary sewer lines that pass beneath the vicinity of the building platform. It is usual for piles to be required where any part of the building lies within the 45 degree line of influence from the invert of any pipe.

The structural designer should attend to all details of pile type, spacing, diameter and load capacity and must also ensure that the design allows for any differential movement that may occur between the piled and unpiled portions of the building.

The opinions, recommendations and comments given in this report result from the application of normal methods of site investigation. As factual evidence has been obtained solely from boreholes, which by their nature only provide information about a relatively small volume of subsoils, there may be special conditions pertaining to this site which have not been disclosed by the investigation and which have not been taken into account in the report.

Therefore, it is important that we are given the opportunity to examine the site during foundation construction, so that the nature and quality of the exposed subsoils can be related to the report assumptions. In all circumstances however, if variations in the subsoils occur from those described or assumed to exist then the matter should be referred back to us immediately.

Upon satisfactory completion of these aspects of the works, we would then be in a position to issue the appropriate Producer Statement Construction Review to Council.

We require at least 24 hours notice for site inspections.

6 LIMITATION

This report has been prepared solely for the use of our client, Waitemata District Health Board, their professional advisers and the relevant Territorial Authorities in relation to the specific project described herein. No liability is accepted in respect of its use for any other purpose or by any other person or entity.

For and on behalf of Coffey Geotechnics (NZ) Limited



RJ Knowles

Associate Geotechnical Engineer

Distribution:	WDHB	2 copies
	Coffey Geotechnics Archives	1 copy

Figures

 Hand Auger Borehole

Lot 13
DP 49471

CONCRETED AREA

SEALED
CARPARK

revision	description	drawn	approved	date	<div><div><div>05.010.015.0</div><div>Horizontal Scale (metres)</div></div><div><div>05.010.015.0</div><div>Vertical Scale (metres)</div></div></div>	drawn	PD	<div><div><div><div>coffey</div><div>geotechnics</div><div>SPECIALISTS MANAGING THE EARTH</div></div><div><div></div></div></div></div>	client:	WAITEMATA DISTRICT HEALTH BOARD		
						approved	LS		project:	DENTAL FACILITY ROLLOUT - GLENFIELD INTERMEDIATE		
						date	11/08/09		title:	SITE PLAN		
						scale	1:250		project no:	GENZSILV14388AA-GI	figure no:	01
						original size	A3					

Appendix 1

Laboratory Test Results

CLASSIFICATION TEST RESULTS

Test Methods: NZS 4402:1986 Tests 2.1, 2.5 & 2.6



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

B.E. Coker Approved Signatory

JOB NO

INNZNWP80327

PROJECT

Dental Facility Roll-out
Glenfield Intermediate School

CLIENT

Chivalry Rd, Glenfield
Coffey Geotechnics (NZ) Ltd
(Ref 14388AA-GI)

Borehole No

GIHA04

Sample No

S1 7.08.09

Depth

0.4 - 0.6 m

Water Content

%

32.6

Samples prepared from 'As Received' Natural Water Content

Soil fraction used

Whole soil

Cone Penetration Limit

60

Linear Shrinkage

%

13



information

SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

10 Lion Place
Newmarket 1023
www.coffey.com

DATE

12.8.09

CHECKED

Appendix 2

Field Investigation Data

Engineering Log - Hand Auger

Client: **WAITEMATA DISTRICT HEALTH BOARD**

Principal:

Project: **DENTAL FACILITY - GLENFIELD INTERMEDIATE**

Hand Auger Location: **Refer to site plan**

Hand Auger No. **GIHA01**

Sheet 1 of 1








Project No: **GENZSILV14388AA-GI**

Date started: **7.8.2009**

Date completed: **7.8.2009**

Logged by: **LS**

Checked by: **LS**

drilling information				material substance							
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components, additional information.	moisture condition	consistency/ density index	vane shear (remoulded 100 (peak) kPa)	structure and additional observations
Fill			50.5	0.5		ML	Slightly clayey SILT; light brown/light grey streaked orange, medium plasticity with minor rootlets and minor gravels, angular	M	H		
			50.0	1.0		ML	Clayey SILT; light brown streaked orange, medium plasticity				
Residual Waitemata Group			49.5	1.5		ML	Fine sandy slightly clayey SILT; light brown/light grey streaked orange, low plasticity				
			49.0	2.0		SC	Clayey SAND; light grey streaked orange, medium plasticity, fine grained				
			48.5	2.5		CL	Sandy CLAY; light grey streaked orange/dark orange, low plasticity				
			48.0	3.0		CL	Slightly fine sandy silty CLAY; light grey streaked orange and pink, medium plasticity				
						ML	Slightly fine sandy clayey SILT; light grey/light brown streaked orange and pink, medium plasticity				
			47.5	3.5			Borehole GIHA01 terminated at 3.2 metres.				
			47.0	4.0							

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
● remoulded
x peak
>>x peak greater than 200kPa
UTP unable to penetrate

water
10/1/98 water level on date shown
water inflow
water outflow

moisture
D dry
M moist
W wet
S saturated

consistency/ density index
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
VL very loose
L loose
MD medium dense
D dense
VD very dense

Engineering Log - Hand Auger

Client: **WAITEMATA DISTRICT HEALTH BOARD**

Principal:

Project: **DENTAL FACILITY - GLENFIELD INTERMEDIATE**

Hand Auger Location: **Refer to site plan**

Hand Auger No. **GIHA02**

Sheet 1 of 1

Project No: **GENZSILV14388AA-GI**

Date started: **7.8.2009**

Date completed: **7.8.2009**

Logged by: **LS**

Checked by: **LS**

Vane No: 486/iii		Easting: m		Slope: -90°		R.L. Surface: 50.77 m					
Hole diameter: 50 mm		Northing: m		Bearing:		Datum:					
drilling information				material substance							
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components, additional information.	moisture condition	consistency/ density index	vane shear (remoulded peak) kPa	structure and additional observations
Fill				50.5		ML	TOPSOIL	M	St		
				0.5		ML	Clayey SILT; brown/light brown streaked orange, medium plasticity with minor rootlets and trace gravels				
Residual Waitemata Group				50.0		ML	Clayey SILT; light brown streaked orange, medium plasticity				
				1.0		ML	TOPSOIL	W	H		
				49.5		ML	Slightly clayey SILT; light grey/grey streaked orange, medium plasticity	M			
				1.5		ML	Clayey SILT; brown/light brown streaked orange, medium plasticity		VSt		
				49.0		ML	Slightly fine sandy clayey SILT; grey streaked light brown, medium to low plasticity	W			
				2.0		ML	Clayey SILT; light grey streaked light brown/orange, medium plasticity				
			48.5		ML	Clayey SILT; light grey streaked light brown/orange, medium plasticity					
			48.0		ML	Clayey SILT; light grey streaked light brown/orange, medium plasticity					
			47.5				Borehole GIHA02 terminated at 3.2 metres.				
				3.5							
				47.0							
				4.0							

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
● remoulded
x peak
>>x peak greater than 200kPa
UTP unable to penetrate

water
10/1/98 water level on date shown
water inflow
water outflow

moisture
D dry
M moist
W wet
S saturated

consistency/ density index
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
VL very loose
L loose
MD medium dense
D dense
VD very dense

Engineering Log - Hand Auger

Client: **WAITEMATA DISTRICT HEALTH BOARD**

Principal:

Project: **DENTAL FACILITY - GLENFIELD INTERMEDIATE**

Hand Auger Location: **Refer to site plan**

Hand Auger No. **GIHA03**

Sheet 1 of 1

Project No: **GENZSILV14388AA-GI**

Date started: **7.8.2009**

Date completed: **7.8.2009**

Logged by: **LS**

Checked by: **LS**

Vane No: 486/iiii		Easting: m		Slope: -90°		R.L. Surface: 49.37 m					
Hole diameter: 50 mm		Northing: m		Bearing:		Datum:					
drilling information				material substance							
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components, additional information.	moisture condition	consistency/ density index	vane shear (remoulded peak) kPa	structure and additional observations
Fill							TOPSOIL	M	H		
				49.0	0.5	MH	Clayey SILT; light brown/light grey streaked orange and pink, medium plasticity with minor rootlets				>>X
				48.5	1.0	ML	Slightly clayey SILT; brown/light brown streaked orange, medium plasticity, with minor gravel inclusions, angular				>>X
				48.0	1.5	ML	with minor limonite gravels and staining	VSt			X
				47.5	2.0	ML	Slightly clayey SILT; brown/light brown streaked orange, medium plasticity, with minor limonite staining and minor wood inclusions	St		X	
			47.0	2.5	MH	Clayey SILT; light grey/light brown streaked orange, medium plasticity	W			X	
			46.5	3.0			Unable to penetrate due to stormwater line hardfill Borehole GIHA03 terminated at 2.8 metres.				
			46.0	3.5							
			45.5	4.0							
classification symbols and soil description based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005				vane shear (kPa) ● remoulded X peak >>X peak greater than 200kPa UTP unable to penetrate		water ▽ 10/1/98 water level on date shown ▶ water inflow ◀ water outflow		moisture D dry M moist W wet S saturated		consistency/ density index VS very soft VL very loose S soft L loose F firm MD medium dense St stiff D dense VSt very stiff VD very dense H hard	

Engineering Log - Hand Auger

Client: **WAITEMATA DISTRICT HEALTH BOARD**

Principal:

Project: **DENTAL FACILITY - GLENFIELD INTERMEDIATE**

Hand Auger Location: **Refer to site plan**

Hand Auger No. **GIHA04**

Sheet 1 of 1

Project No: **GENZSILV14388AA-GI**

Date started: **7.8.2009**

Date completed: **7.8.2009**

Logged by: **LS/GS**

Checked by: **LS**

Vane No: 817/xviv		Easting: m		Slope: -90°		R.L. Surface: 49.37 m					
Hole diameter: 50 mm		Northing: m		Bearing:		Datum:					
drilling information				material substance							
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components, additional information.	moisture condition	consistency/ density index	vane shear 100 (remoulded /peak) kPa	structure and additional observations
Fill			49.0	0.5		ML	TOPSOIL	M	VSt		
			48.5	1.0		ML	Clayey SILT; light brown/orange, medium plasticity, with minor rootlets				
			48.0	1.5		ML	Fine sandy slightly clayey SILT; light grey mottled orange, low plasticity	W			
			47.5	2.0		ML	TOPSOIL				
Residual Waitemata Group			47.0	2.5		ML	Slightly clayey SILT; light brown, mottled orange, low plasticity	M			
			46.5	3.0		ML	Fine sandy clayey SILT; light brown streaked orange, low plasticity becoming light brown/light grey				
			46.0	3.5		ML	Clayey SILT; light brown/light grey streaked orange, medium plasticity	St			
			45.5	4.0			Borehole GIHA04 terminated at 3.2 metres.		VSt		
classification symbols and soil description based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005				vane shear (kPa) ● remoulded x peak >>x peak greater than 200kPa UTP unable to penetrate		water 10/1/98 water level on date shown water inflow water outflow		moisture D dry M moist W wet S saturated		consistency/ density index VS very soft S soft F firm St stiff VSt very stiff H hard VL very loose L loose MD medium dense D dense VD very dense	