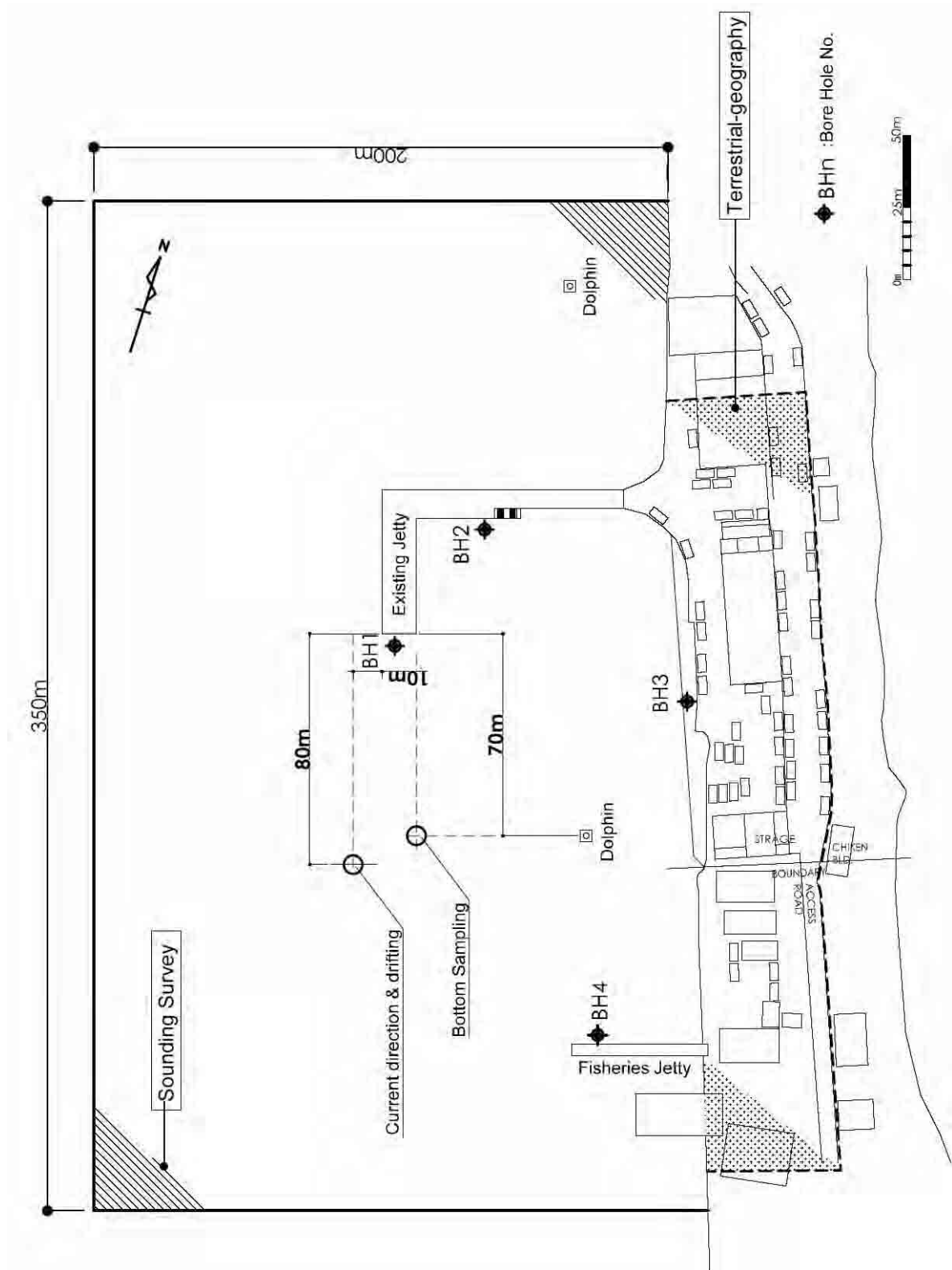


## 5. References

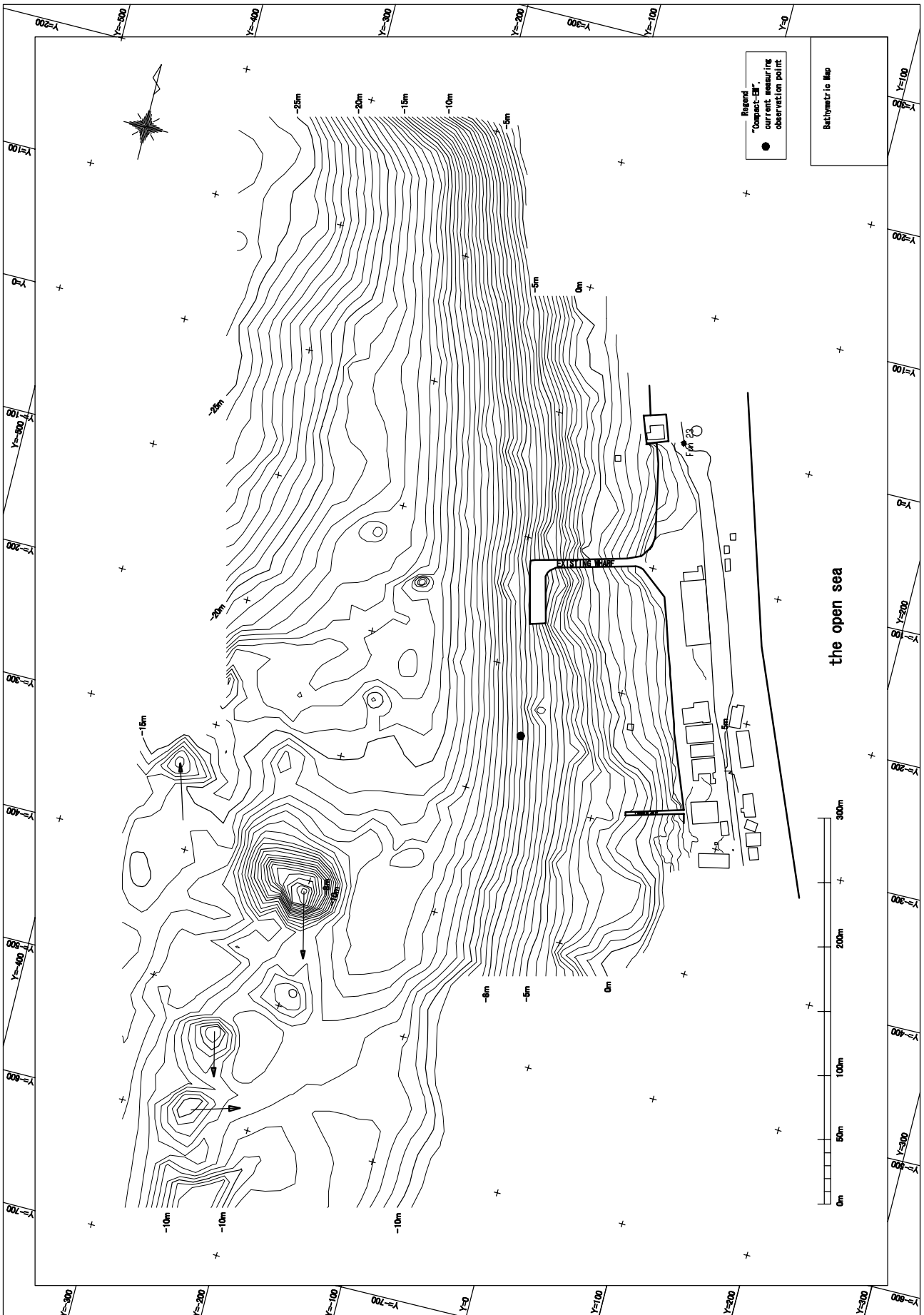
1	National Building Code for Tuvalu	1990	Government of Tuvalu, AusAid
2	Bathymetric Map of Tuvalu - Funafuti Lagoon	1992	South Pacific Applied Geosciences Commission, Fiji
3	Tidal Predictions For Tuvalu, Funafuti, South Pacific Sea Level & Climate Monitoring Project	2006	AusAid (Australian Government's Overseas Aid Program)
4	Report on Deepwater Wharf Development at Funafuti, Gilbert & Ellice Islands Colony	1975	Wilton & Bell Consulting Engineers, Ministry of Overseas Development
5	Household Income and Expenditure Survey (HIES) 2004/3005	2006	Central Statistics Division, Ministry of Finance, Economic Planning & Industries
6	Tuvalu 2002 Population and Housing Census	2002	Ditto
7	The Contribution of Fisheries to the Economies of Pacific Island Countries	2002	Asian Development Bank
8	FAO Fishery Country Profile - Tuvalu	2002	Food and Agriculture Organization
9	National Strategies For Sustainable Development	2004	The Government of Tuvalu
10	Wave Climate of Tuvalu	1994	Oceanographic Company of Norway
11	Domestic Tuna Industries Development in the Pacific Islands	2003	Forum Fisheries Agency
	Community Fisheries Countries' Profile - Tuvalu	—	Secretariat of the Pacific Community
12	Economic Statistics	2006	Tuvalu Central Statistics Division
13	Tuvalu Transport Infrastructure Development Project	1996	Asian Development Bank

## 6. Results of Natural Condition Survey

6-1 Location Map of Natural Condition Survey



6-2 Topographic and Sounding Survey Map





**TONKIN & TAYLOR LTD**  
**DRILL HOLE LOG**

DRILL HOLE No: BH1  
Hole Location: See site plan  
SHEET...1... OF...1...

PROJECT: Proposed Port Upgrade		LOCATION: Funafuti Port, Tuvalu		JOB No: 750541															
CO-ORDINATES mN mE		DRILL TYPE: Helirig		HOLE STARTED: 18/12/06															
DIRECTION: °		DATUM:		HOLE FINISHED: 19/12/06															
ANGLE FROM HORIZ.: °		R.L. GROUND: m		DRILLED BY: Webster Drilling Ltd															
		R.L. COLLAR: m		LOGGED BY: MDC CHECKED:															
DESCRIPTION OF CORE				ROCK DEFECTS															
GEOLOGICAL UNIT	ROCK OR SOIL TYPE, WEATHERING, HARDNESS, STRENGTH, COLOUR, LITHOLOGICAL FEATURES (bedding, cement, foliation, mineralogy, texture, etc...):	ROCK WEATHERING	ROCK STRENGTH	PT LOAD/UCS TEST (MPa)	CORE LOSS / LIFT (%)	METHOD, CORE & CASING	TEST SYMBOL	DEPTH (m)	GRAPHIC LOG	DEFECT LOG	FRACTURE LOG spacing of natural fractures (cm)	SIGNIFICANT JOINTS, BEDDING, CRUSHED AND SHEARED ZONES/SEAMS	DEFECT TYPE, SHAPE, ROUGHNESS, APERTURE, INFILLING, SPACING	ANGLES ARE NORMAL TO CORE AXIS	DATE / DEPTH	ROD (%)	WATER	DRILL WATER LOSS (%)	CORE BOX RL (m)
Coral	CORAL, weak to moderately strong, white / yellowish white, slightly porous, voids present.					HQ Triple tube core barrel		1							18/12/2006	0			
	CORAL, strong to very strong, white / yellowish white, slightly porous, voids present.							2				Sample 15 (100mm long)				40			
	Lost sample or large void.							3				Sample 16 (150mm long)				80			
	CORAL, very strong, white / yellowish white.							4				Sample 17 (200mm long)			19/12/2006	36			
	CORAL, weak, white / yellowish white, porous, abundant voids.							5				Sample 18 (150mm long)				50			
	CORAL, very strong, white / yellowish white, slightly porous.							6				Sample 19 (130mm long)				45			
	CORAL, weak, white / yellowish white, porous, abundant voids.							7				Sample 20 (130mm long)				41			
	CORAL, very strong, white / yellowish white, slightly porous, minor voids							8				Sample 21 (250mm long)				36			
	CORAL, weak to moderately strong, white / yellowish white, slightly porous, abundant voids.							9								0			
									10							11			

ROCKLG\_TT 750541.GPJ 9/1/07



TONKIN & TAYLOR LTD

DRILL HOLE LOG

DRILL HOLE No: BH2  
 Hole Location: See site plan  
 SHEET 1 OF 1

PROJECT: Proposed Port Upgrade	LOCATION: Funafuti Port, Tuvalu	JOB No: 750541
CO-ORDINATES mN mE	DRILL TYPE: Helwig	HOLE STARTED: 16/12/06
DIRECTION: °	DATUM:	HOLE FINISHED: 17/12/06
ANGLE FROM HORIZ.: °	R.L. GROUND: m	DRILLED BY: Webster Drilling Ltd
	R.L. COLLAR: m	LOGGED BY: MDC CHECKED:

DESCRIPTION OF CORE										ROCK DEFECTS										
GEOLOGICAL UNIT	ROCK OR SOIL TYPE, WEATHERING, HARDNESS, STRENGTH, COLOUR, LITHOLOGICAL FEATURES (bedding, cement, foliation, mineralogy, texture, etc.):	ROCK WEATHERING	ROCK STRENGTH	PT LOAD / UCS TEST (MPa)	CORE LOSS / LIFT (%)	METHOD, CORE & CASING	TEST SYMBOL	DEPTH (m)	GRAPHIC LOG	DEFECT LOG	FRACTURE LOG spacing of natural fractures (cm)	SIGNIFICANT JOINTS, BEDDING, CRUSHED AND SHEARED ZONES/SEAMS	DEFECT TYPE, SHAPE, ROUGHNESS, APERTURE, INFILLING, SPACING	ANGLES ARE NORMAL TO CORE AXIS	DATE / DEPTH	RDD (%)	WATER	DRILL WATER LOSS (%)	CORE BOX	RL (m)
Coral	CORAL, weak, reddish brown and black stained, porous, some voids. White / yellowish white from 0.15m.					HQ TRIPLE TUBE CORE BARREL		0						16/12/2006	22					
	CORAL, strong to very strong, white / yellowish white.						1				Sample 8 (120mm long)				17					
	CORAL, weak, white / yellowish white, porous, some voids.						2				Sample 9 (100mm long)				23					
	CORAL, strong to very strong, white / yellowish white, minor voids.						3				Sample 10 (120mm long)				48					
	CORAL, weak to moderately strong, white / yellowish white, slightly porous in places, minor voids.						4				Sample 11 (100mm long)				38					
	CORAL, weak to moderately strong, white / yellowish white, porous, voids.						5								18					
	CORAL, strong to very strong, white / yellowish white.						6								10					
	CORAL, moderately strong, white / yellowish white, porous, some voids.						7								0					
	CORAL, moderately strong, white / yellowish white, slightly porous, voids.						8								0					
								9							0					
	Base of Borehole at 10.0m (target depth)						10													



# TONKIN & TAYLOR LTD

## DRILL HOLE LOG

DRILL HOLE No: BH3  
 Hole Location: See site plan  
 SHEET... 1 ... OF ... 1 ...

PROJECT: Proposed Port Upgrade		LOCATION: Funafuti Port, Tuvalu		JOB No: 750541																	
CO-ORDINATES mN mE		DRILL TYPE: Helirig		HOLE STARTED: 12/12/06																	
DIRECTION: °		DATUM:		HOLE FINISHED: 15/12/06																	
ANGLE FROM HORIZ.: °		R.L. GROUND: m		DRILLED BY: Webster Drilling Ltd																	
		R.L. COLLAR: m		LOGGED BY: MDC CHECKED:																	
DESCRIPTION OF CORE			ROCK DEFECTS																		
GEOLOGICAL UNIT	ROCK OR SOIL TYPE, WEATHERING, HARDNESS, STRENGTH, COLOUR, LITHOLOGICAL FEATURES (bedding, cement, foliation, mineralogy, texture, etc.):	ROCK WEATHERING	ROCK STRENGTH	PT LOAD / UCS TEST (MPa)	CORE LOSS / LIFT (%)	METHOD, CORE & CASING	TEST SYMBOL	DEPTH (m)	GRAPHIC LOG	DEFECT LOG	FRACTURE LOG (Spacing of normal fractures, etc.)	SIGNIFICANT JOINTS, BEDDING, CRUSHED AND SHEARED ZONES/SEAMS	DEFECT TYPE, SHAPE, ROUGHNESS, APERTURE, INFILLING, SPACING	ANGLES ARE NORMAL TO CORE AXIS	DATE / DEPTH	ROD (%)	WATER	DRILL WATER LOSS (%)	CORE BOX	RL (m)	
Coral	CORAL, moderately strong to very strong, white / yellowish white, slightly porous in layers, minor voids.					HQ TRIPLE TUBE CORE BARREL		0							13/12/06	73					
	CORAL, weak to moderately strong, white / yellowish white, voids.							1													
	CORAL, strong to very strong, white / yellowish white, minor voids.							2													
	CORAL, moderately strong to strong, white / yellowish white, voids, dark brown staining on void surfaces.							3							14/12/06	65					
	CORAL, moderately strong, white / yellowish white, slightly porous, voids							4								0					
								5								10					
								6								10					
								7								15/12/06	0				
								8								0					
								9								0					
	Base of Borehole at 10.0m (target depth)							10													



# TONKIN & TAYLOR LTD


## BOREHOLE LOG

BOREHOLE No: BH4  
 Hole Location: See site plan  
 SHEET 1 OF 1

PROJECT: Proposed Port Upgrade	LOCATION: Funafuti, Tuvalu	JOB No: 750541
CO-ORDINATES mN mE	DRILL TYPE: Hellrig	HOLE STARTED: 22/12/06
R.L. m	DRILL METHOD:	HOLE FINISHED: 23/12/06
DATUM	DRILL FLUID:	DRILLED BY: Webster Drilling Ltd
		LOGGED BY: Webster DGH/CKRD

GEOLOGICAL	ENGINEERING DESCRIPTION																		
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSION STRENGTH (MPa)	DEFECT SPACING (mm)	SOIL DESCRIPTION Soil type, minor components, plasticity or particle size, colour.	ROCK DESCRIPTION Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
Marine Sediments / Coral			0%	HQ CORE			28		0	X				L				Loose fine to medium coral SAND and SILT, light brown, minor shell fragments.	
						SPT1		1	X										
						2		2	X										
						7 N=9		3	X										
						3		4	X										
						5 N=8		5	X					MD				- medium dense	
						7		6	X										
						13		7	X										
						11 N=24		8	X										
				35%	HQ CORE			22	3	X									
							23	4	X					D				- dense - contains minor fine to medium coral GRAVEL.	
Coral			45%	HQ CORE			23	4	X					R3				CORAL, weak to moderately strong, white / yellowish white, voids, porous.	
			0%	HQ CORE			28		5	*									
							20		6	*									
			60%	HQ CORE			24		7	*									
							20		8	*									
			35%	HQ CORE			25		9	*									
							25		10	*									
			25%	HQ CORE			26		11	*									
							26		12	*									
			0%	HQ CORE			27		13	*									
							27		14	*									
							27		15	*									
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							27		96	*									
							27												

② Summary of Laboratory Test Results (water content, bulky density and solid density)

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Page 1 of 2									
<b>T&amp;T CONTACT:</b>	<b>CJF</b>	<b>JOB NAME:</b>	<b>Funafuti</b>	<b>YOUR JOB NO.:</b>	<b>750541</b>				
<b>PROJECT MANAGER:</b>	<b>CJF</b>	<b>SITE:</b>	<b>Funafuti, Tuvalu</b>	<b>OUR JOB NO.:</b>	<b>614086.000</b>				
				<b>DATE:</b>	<b>22.01.2007</b>				
<b>TEST RESULTS SUMMARY</b>									
<b>BOREHOLE No.:</b>		1	1	1	2	2	2	3	3
<b>SAMPLE No.:</b>		A	17	21	8	12	13	1	2
<b>DEPTH (m)</b>		Sea Bed	3.0-4.0	7.0-8.0	0.0-1.0	4.45-5.6	5.6-7.0	0.0-1.0	1.0-2.0
<b>WATER CONTENT (%)</b>		44.7							
<b>ATTERBERG LIMITS</b>	LL								
	PL								
	PI								
<b>BULK DENSITY (t/m<sup>3</sup>)</b>			1.93	2.34	2.19	2.02	2.08	2.25	2.09
<b>DRY DENSITY (t/m<sup>3</sup>)</b>									
<b>SOLID DENSITY (t/m<sup>3</sup>)</b>		2.82	2.22	2.44	2.54	2.51	---	2.50	2.50
<b>LABORATORY VANE (kPa)</b>	Peak								
	Residual								
<b>MAXIMUM DRY DENSITY (Kg/m<sup>3</sup>)</b>									
<b>MINIMUM DRY DENSITY (Kg/m<sup>3</sup>)</b>									
<b>ORGANIC CONTENT (%)</b>									
<b>ALLOPHANE CONTENT (%)</b>									
<b>GRADING - SIEVE (wet)</b>		✓							
<b>GRADING - HYDROMETER</b>									
<b>COMPACTION</b>									
<b>CBR</b>									
<b>ONE DIMENSIONAL CONSOLIDATION</b>									
<b>DIRECT SHEAR</b>									
<b>UNCONFINED COMP. STRENGTH</b>			✓	✓	✓	✓	✓	✓	✓
<b>TRIAXIAL (UU)</b>									
<b>TRIAXIAL (CUP / CD)</b>									
<b>TRIAXIAL PERMEABILITY</b>									
<b>PINHOLE DISPERSION</b>									
<b>Entered by:</b> ST		<b>Date:</b> 22/1/07		<b>Checked by:</b> JPH		<b>Date:</b> 22/1/07			





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Page 2 of 2


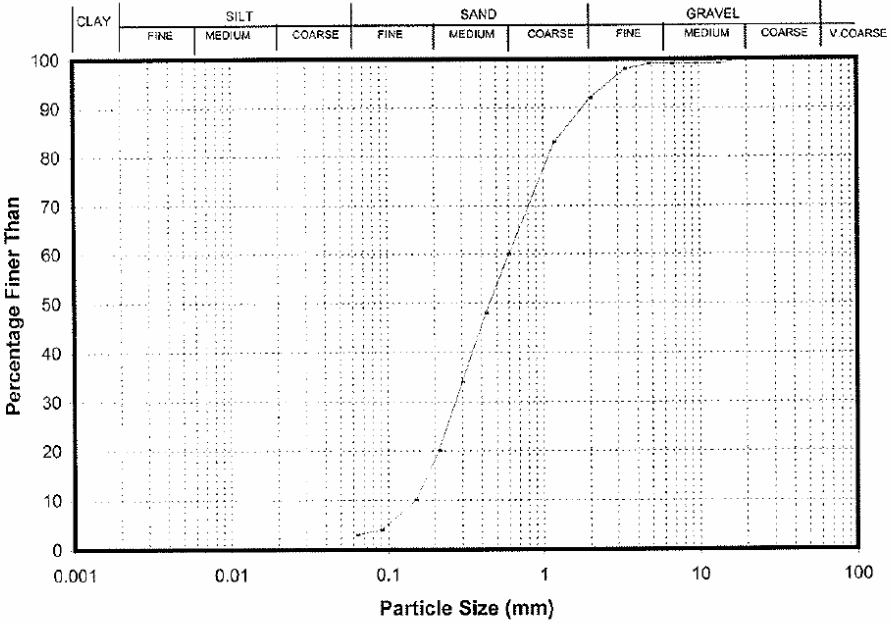
T&T CONTACT: CJF      JOB NAME: Funafuti      YOUR JOB NO.: 750541  
PROJECT MANAGER: CJF      SITE: Funafuti, Tuvalu      OUR JOB NO.: 614086.000  
DATE: 22.01.2007

**TEST RESULTS SUMMARY**

BOREHOLE No.:	4	4	4	4	4			
SAMPLE No.:	SPT1	8	24	27	28			
DEPTH (m)	1.0	Sea Bed	6.0-7.0	9.6-10.5	0.2			
WATER CONTENT (%)	26.0	28.4			34.2			
ATTERBERG LIMITS	LL							
	PL							
	PI							
BULK DENSITY (t/m <sup>3</sup> )			2.40	2.68				
DRY DENSITY (t/m <sup>3</sup> )								
SOLID DENSITY (t/m <sup>3</sup> )		2.82	2.57	---	2.82			
LABORATORY VANE (kPa)	Peak							
	Residual							
MAXIMUM DRY DENSITY (Kg/m <sup>3</sup> )								
MINIMUM DRY DENSITY (Kg/m <sup>3</sup> )								
ORGANIC CONTENT (%)								
ALLOPHANE CONTENT (%)								
GRADING - SIEVE (wet)	✓	✓			✓			
GRADING - HYDROMETER								
COMPACTION								
CBR								
ONE DIMENSIONAL CONSOLIDATION								
DIRECT SHEAR								
UNCONFINED COMP. STRENGTH			✓					
TRIAXIAL (UU)								
TRIAXIAL (CUP / CD)								
TRIAXIAL PERMEABILITY								
PINHOLE DISPERSION								

Entered by: SF      Date: 22/1/07      Checked by: JPH      Date: 22/1/07

③ Results of Particle Size Analysis

 <b>GEOTECHNICS</b>	23 Morgan Street, Newmarket Auckland 1023, New Zealand p. +64 9 356 3510 w. www.geotechnics.co.nz	③ 粒度分析結果(1/4)	Form No.: 85 Form Date: JANUARY 2004 File: M:\sieve\614086.000\BH1_A_Sea Bed.xls																																										
	Plate No.: Site : <b>Funafuti, Tuvalu</b> Your Job No.: <b>750541</b> BH No.: <b>BH1</b> Sample No.: <b>A</b> Test Method Used : NZS 4402 : 1986 Test 2.8.1 Wet Sieve		Page    of Our Job No.: <b>614086.000</b> Depth : <b>Sea Bed</b>																																										
<b>PARTICLE SIZE ANALYSIS</b>																																													
																																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sieve (mm)</th> <th>Total % Passing</th> </tr> </thead> <tbody> <tr><td>63.0</td><td>---</td></tr> <tr><td>53.0</td><td>---</td></tr> <tr><td>37.5</td><td>---</td></tr> <tr><td>26.5</td><td>---</td></tr> <tr><td>19.0</td><td>100</td></tr> <tr><td>13.2</td><td>99</td></tr> <tr><td>9.50</td><td>99</td></tr> <tr><td>6.70</td><td>99</td></tr> <tr><td>4.75</td><td>99</td></tr> <tr><td>3.35</td><td>98</td></tr> </tbody> </table>		Sieve (mm)	Total % Passing	63.0	---	53.0	---	37.5	---	26.5	---	19.0	100	13.2	99	9.50	99	6.70	99	4.75	99	3.35	98	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sieve (mm)</th> <th>Total % Passing</th> </tr> </thead> <tbody> <tr><td>2.00</td><td>92</td></tr> <tr><td>1.18</td><td>83</td></tr> <tr><td>0.600</td><td>60</td></tr> <tr><td>0.425</td><td>48</td></tr> <tr><td>0.300</td><td>34</td></tr> <tr><td>0.212</td><td>20</td></tr> <tr><td>0.150</td><td>10</td></tr> <tr><td>0.090</td><td>4</td></tr> <tr><td>0.063</td><td>3</td></tr> </tbody> </table>		Sieve (mm)	Total % Passing	2.00	92	1.18	83	0.600	60	0.425	48	0.300	34	0.212	20	0.150	10	0.090	4	0.063	3
Sieve (mm)	Total % Passing																																												
63.0	---																																												
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0.090	4																																												
0.063	3																																												
Sample history : As received at natural water content. Description : CORAL mixed with shell fragments.  Remarks:    Percentage passing the finest sieve was obtained by difference.																																													
Entered by : <i>SS</i>		Date : <i>22/1/07</i>																																											
Checked by : <i>JRC</i>		Date : <i>22/1/07</i>																																											

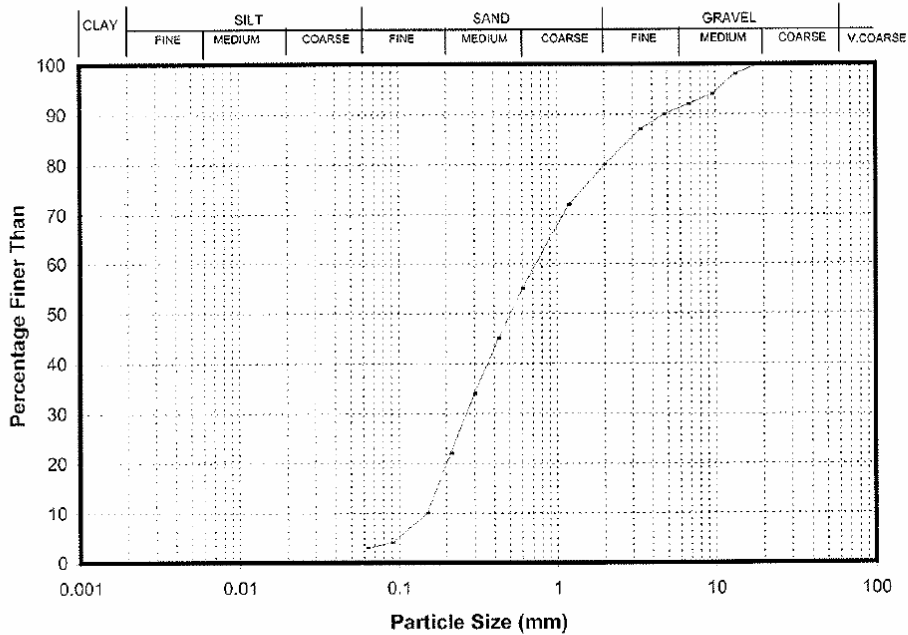


23 Morgan Street, Newmarket ③ 粒度分析結果(2/4)  
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Form No.: S5  
 Form Date: JANUARY 2004  
 File: M:\sieve\614086.000\BH4\_SPT1\_1.0m.xls

Plate No.: \_\_\_\_\_ Page of \_\_\_\_\_  
 Site : **Funafuti, Tuvalu** Your Job No.: **750541** Our Job No.: **614086.000**  
 BH No.: **BH4** Sample No.: **SPT1** Depth : **1.0 m**  
 Test Method Used : NZS 4402 : 1986 Test 2.8.1 Wet Sieve

**PARTICLE SIZE ANALYSIS**



Sieve (mm)	Total % Passing
63.0	---
53.0	---
37.5	---
26.5	---
19.0	100
13.2	98
9.50	94
6.70	92
4.75	90
3.35	87

Sieve (mm)	Total % Passing
2.00	80
1.18	72
0.600	55
0.425	45
0.300	34
0.212	22
0.150	10
0.090	4
0.063	3

Sample history : As received at natural water content.

Description : CORAL mixed with shell fragments.

Remarks: Percentage passing the finest sieve was obtained by difference.

Entered by : *ST*

Date : *22/01/04*

Checked by : *JMC*

Date : *22/1/04*



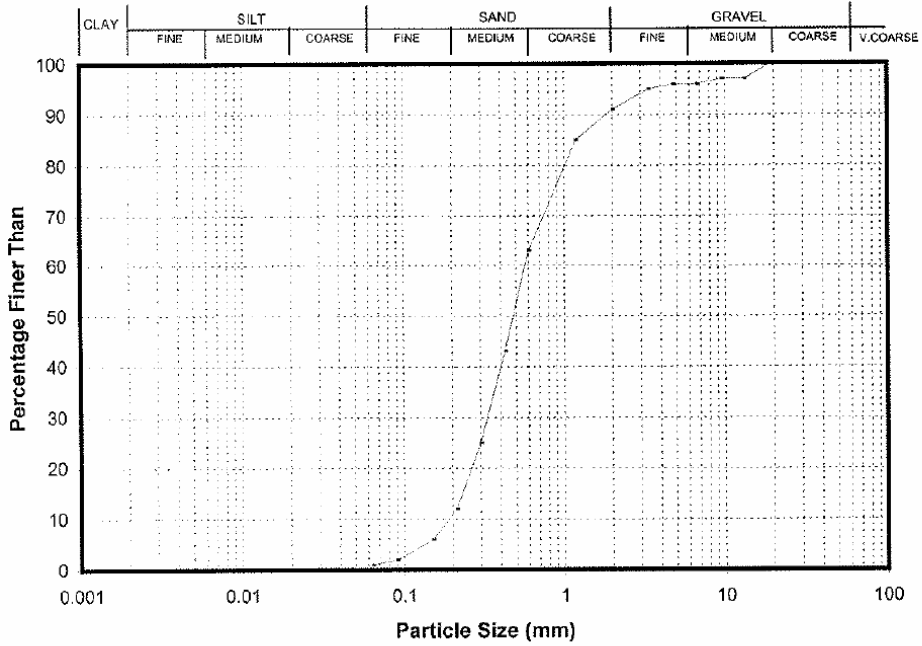
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③ 粒度分析結果(3/4)

Form No.: S5  
Form Date: JANUARY 2004  
File: M:\sieve\614086.000\BH4\_8\_Sea Bed.xls

Plate No.: \_\_\_\_\_ Page of \_\_\_\_\_  
Site : **Funafuti, Tuvalu** Your Job No.: **750541** Our Job No.: **614086.000**  
BH No.: **BH4** Sample No.: **8** Depth : **Sea Bed**  
Test Method Used : NZS 4402 : 1986 Test 2.8.1 Wet Sieve

**PARTICLE SIZE ANALYSIS**



Sieve (mm)	Total % Passing
63.0	---
53.0	---
37.5	---
26.5	---
19.0	100
13.2	97
9.50	97
6.70	96
4.75	96
3.35	95

Sieve (mm)	Total % Passing
2.00	91
1.18	85
0.600	63
0.425	43
0.300	25
0.212	12
0.150	6
0.090	2
0.063	1

Sample history : As received at natural water content.

Description : CORAL mixed with shell fragments.

Remarks: Percentage passing the finest sieve was obtained by difference.

Entered by : ST Date : 22/01/07 Checked by : JDC Date : 22/1/07



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③ 粒度分析結果(4/4)

Form No.: S5  
Form Date: JANUARY 2004  
File: M:\sieve\614086.000\BH4\_28\_0.2m.xls

Plate No.:

Site : Funafuti, Tuvalu

BH No.: BH4

Test Method Used : NZS 4402 : 1986 Test 2.8.1 Wet Sieve

Your Job No.: 750541

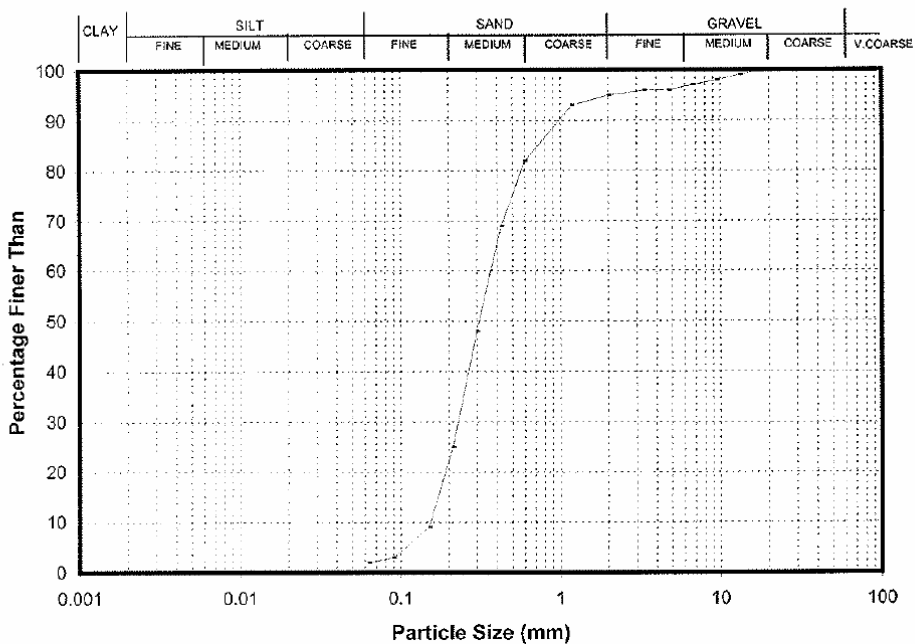
Sample No.: 28

Page of

Our Job No.: 614086.000

Depth : 0.2 m

### PARTICLE SIZE ANALYSIS



Sieve (mm)	Total % Passing
63.0	---
53.0	---
37.5	---
26.5	---
19.0	100
13.2	99
9.50	98
6.70	97
4.75	96
3.35	96

Sieve (mm)	Total % Passing
2.00	95
1.18	93
0.600	82
0.425	69
0.300	48
0.212	25
0.150	9
0.090	3
0.063	2

Sample history : As received at natural water content.

Description : CORAL mixed with shell fragments.

Remarks: Percentage passing the finest sieve was obtained by difference.


Entered by : SG

Date : 22/01/07

Checked by : JHL

Date : 22/1/07

④ Results of Unconfined Compressive Strength Test

 <b>GEOTECHNICS</b>	23 Morgan Street, Newmarket Auckland 1023, New Zealand p. +64 9 356 3510 w. www.geotechnics.co.nz	Form No.: S17a Form Date: Jan-04 <small>File: M:\Unconfm\614086.000\BH1_17_3.0-4.0m.xls</small>																	
	Plate No.: _____ Page of _____ Site: <b>Funafuti, Tuvalu</b> Your Job No.: <b>750541</b> Our Job No.: <b>614086.000</b> BH No. <b>1</b> Sample No.: <b>17</b> Depth: <b>3.0-4.0 (m)</b> Test Method Used: NZS 4402 :1986 TEST 6.3.1 Determination of the unconfined compressive strength of cohesive soil																		
<h3>UNCONFINED COMPRESSIVE STRENGTH TEST</h3>																			
<p><b>Sample Parameters:</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Sample Height:</td> <td style="width: 20%;">121.00 mm</td> <td style="width: 30%;">Bulk Density:</td> <td style="width: 20%;">1.91 t/m<sup>3</sup></td> </tr> <tr> <td>Sample Diameter:</td> <td>60.38 mm</td> <td>Dry Density:</td> <td>1.45 t/m<sup>3</sup></td> </tr> <tr> <td>Test Height:</td> <td>121.00 mm</td> <td>Water Content:</td> <td>32.3 %</td> </tr> <tr> <td>Test H/D Ratio:</td> <td>2.00</td> <td></td> <td></td> </tr> </table>				Sample Height:	121.00 mm	Bulk Density:	1.91 t/m <sup>3</sup>	Sample Diameter:	60.38 mm	Dry Density:	1.45 t/m <sup>3</sup>	Test Height:	121.00 mm	Water Content:	32.3 %	Test H/D Ratio:	2.00		
Sample Height:	121.00 mm	Bulk Density:	1.91 t/m <sup>3</sup>																
Sample Diameter:	60.38 mm	Dry Density:	1.45 t/m <sup>3</sup>																
Test Height:	121.00 mm	Water Content:	32.3 %																
Test H/D Ratio:	2.00																		
<p><b>Failure Value:</b></p> <p style="text-align: center;">Unconf. Compressive Strength <math>q_u</math> (kPa) <b>14390</b></p>																			
<p><b>Mode of Failure:</b> Shear</p>																			
<p><b>Sample History:</b> Undisturbed core trimmed at natural water content.</p>																			
<p><b>Description:</b> White, weak, CORAL</p>																			
<p><b>Test Remarks:</b> The sample was tested in a concrete machine because of high strength, therefore strain could not be measured. <b>The UCS test results are reported to the nearest 1 kPa.</b></p>																			
Entered by: <u>ST</u> Date: <u>19/1/07</u> Checked by: <u>JAC</u> Date: <u>22/1/07</u>																			



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Plate No.: \_\_\_\_\_ Page of \_\_\_\_\_  
 Site: **Funafuti, Tuvalu** Your Job No.: **750541** Our Job No.: **614086.000**  
 BH No. **1** Sample No.: **21** Depth: **7.0-8.0 (m)**  
 Test Method Used: NZS 4402 :1986 TEST 6.3.1 Determination of the unconfined compressive strength of cohesive soil

**UNCONFINED COMPRESSIVE STRENGTH TEST**

**Sample Parameters:**

Sample Height:	100.73 mm	Bulk Density:	2.25 t/m <sup>3</sup>
Sample Diameter:	60.95 mm	Dry Density:	2.03 t/m <sup>3</sup>
Test Height:	100.73 mm	Water Content:	10.7 %
Test H/D Ratio:	1.65		

**Failure Value:**

Unconf. Compressive  
Strength  $q_u$  (kPa)  
**15700**

**Mode of Failure:** Shear

**Sample History:** Undisturbed core trimmed at natural water content.

**Description:** White, weak, CORAL

**Test Remarks:** The sample was tested in a concrete machine because of high strength, therefore strain could not be measured.  
 The sample height to diameter ratio is less than the required 2. The strength may be lower, due to the h/d ratio. We advised the engineer and it was decided to continue with testing.  
 The presence of voids = 5mm - 15mm  
**The UCS test results are reported to the nearest 1 kPa and provided as indicative only.**

Entered by: **SS** Date: **22/1/04** Checked by: **JNL** Date: **22/1/04**



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Form Date:	Jan-04
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Plate No.: \_\_\_\_\_ Page of \_\_\_\_\_  
 Site: **Funafuti, Tuvalu** Your Job No.: **750541** Our Job No.: **614086.000**  
 BH No. **2** Sample No.: **8** Depth: **0.0-1.0 (m)**  
 Test Method Used: NZS 4402 :1986 TEST 6.3.1 Determination of the unconfined compressive strength of cohesive soil

### UNCONFINED COMPRESSIVE STRENGTH TEST

**Sample Parameters:**

Sample Height:	93.85 mm	Bulk Density:	2.15 t/m <sup>3</sup>
Sample Diameter:	60.98 mm	Dry Density:	1.83 t/m <sup>3</sup>
Test Height:	93.85 mm	Water Content:	17.6 %
Test H/D Ratio:	1.54		

**Failure Value:**

Unconf. Compressive  
Strength  $q_u$  (kPa)  
**27910**

**Mode of Failure:** Shear

**Sample History:** Undisturbed core trimmed at natural water content.

**Description:** White, moderately strong, CORAL

**Test Remarks:** The sample was tested in a concrete machine because of high strength, therefore strain could not be measured.  
 The sample height to diameter ratio is less than the required 2. The strength may be lower, due to the h/d ratio. We advised the engineer and it was decided to continue with testing.  
**The UCS test results are reported to the nearest 1 kPa and provided as indicative only.**

Entered by: ST Date: 19/1/07 Checked by: JMC Date: 22/1/07





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Form Date:	Jan-04
File: M:\Unconf\1814086.000\BH2_12_4.45-5.6m.xls	

Plate No.: \_\_\_\_\_ Page of \_\_\_\_\_  
 Site: **Funafuti, Tuvalu** Your Job No.: **750541** Our Job No.: **614086.000**  
 BH No. **2** Sample No.: **12** Depth: **4.45-5.6 (m)**  
 Test Method Used: NZS 4402 :1986 TEST 6.3.1 Determination of the unconfined compressive strength  
 of cohesive soil

**UNCONFINED COMPRESSIVE STRENGTH TEST**

**Sample Parameters:**

Sample Height:	123.30 mm	Bulk Density:	1.97 t/m <sup>3</sup>
Sample Diameter:	60.68 mm	Dry Density:	1.53 t/m <sup>3</sup>
Test Height:	123.30 mm	Water Content:	28.5 %
Test H/D Ratio:	2.03		

**Failure Value:**

Unconf. Compressive  
Strength  $q_u$  (kPa)  
**22860**

**Mode of Failure:** Shear

**Sample History:** Undisturbed core trimmed at natural water content.

**Description:** White, moderately strong, CORAL

**Test Remarks:** The sample was tested in a concrete machine because of high strength, therefore strain could not be measured.  
**The UCS test results are reported to the nearest 1 kPa.**

Entered by: ST Date: 19/1/07 Checked by: JTC Date: 22/1/09

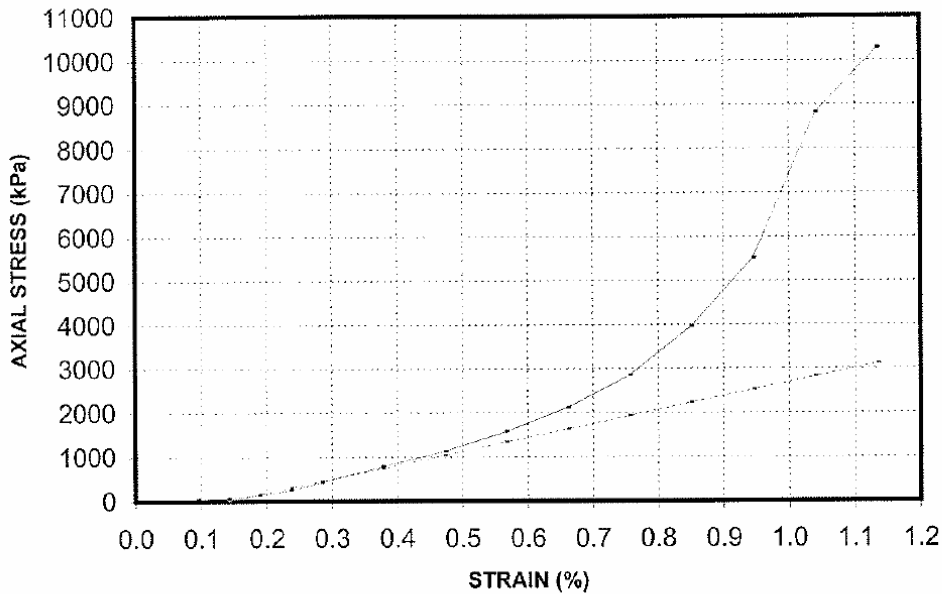


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Plate No.: \_\_\_\_\_ Page of \_\_\_\_\_  
 Site: **Funafuti, Tuvalu** Your Job No.: **750541** Our Job No.: **614086.000**  
 BH No.: **2** Sample No.: **13** Depth: **5.6-7.0 (m)**  
 Test Method Used: NZS 4402 :1986 TEST 6.3.1 Determination of the unconfined compressive strength of cohesive soil

**UNCONFINED COMPRESSIVE STRENGTH TEST  
AXIAL STRESS VS STRAIN**



**Sample Parameters:**

Sample Height:	105.80 mm	Bulk Density:	2.01 t/m <sup>3</sup>
Sample Diameter:	60.60 mm	Dry Density:	1.89 t/m <sup>3</sup>
Test Height:	105.80 mm	Water Content:	6.0 %
Test H/D Ratio:	1.75		

**Failure Value:**

Axial Strain (%)	Unconf. Compressive Strength $q_u$ (kPa)	Rate of Compression (mm/min)	Modulus of Elasticity (MPa)
1.13	10283	0.16	312

**Mode of Failure:** Shear

**Sample History:** Undisturbed core trimmed at natural water content.

**Description:** White, weak, CORAL

**Test Remarks:** The sample height to diameter ratio is less than the required 2. The strength may be lower, due to the h/d ratio. We advised the engineer and it was decided to continue with testing.  
 The presence of voids = 5mm - 35mm  
**The UCS test results are reported to the nearest 1 kPa and provided as indicative only.**

Entered by: ST Date: 22/1/07 Checked by: JMC Date: 22/1/07

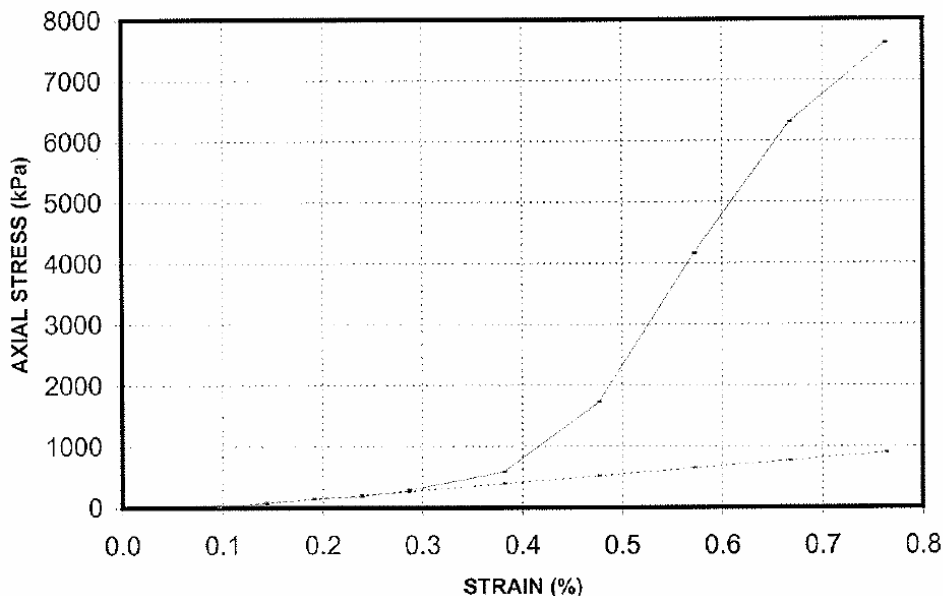


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Plate No.: \_\_\_\_\_ Page of \_\_\_\_\_  
 Site: **Funafuti, Tuvalu** Your Job No.: **750541** Our Job No.: **614086.000**  
 BH No.: **3** Sample No.: **1** Depth: **0.0-1.0 (m)**  
 Test Method Used: NZS 4402 :1986 TEST 6.3.1 Determination of the unconfined compressive strength of cohesive soil

**UNCONFINED COMPRESSIVE STRENGTH TEST  
AXIAL STRESS VS STRAIN**



**Sample Parameters:**

Sample Height:	104.93 mm	Bulk Density:	2.17 t/m <sup>3</sup>
Sample Diameter:	60.98 mm	Dry Density:	2.08 t/m <sup>3</sup>
Test Height:	104.93 mm	Water Content:	4.5 %
Test H/D Ratio:	1.72		

**Failure Value:**

Axial Strain %	Unconf. Compressive Strength $q_u$ (kPa)	Rate of Compression (mm/min)	Modulus of Elasticity (MPa)
0.76	7613	0.15	131

**Mode of Failure:** Shear

**Sample History:** Undisturbed core trimmed at natural water content.

**Description:** White, weak, CORAL

**Test Remarks:** The sample height to diameter ratio is less than the required 2. The strength may be lower, due to the h/d ratio. We advised the engineer and it was decided to continue with testing.  
 The presence of voids = 5mm - 15mm  
**The UCS test results are reported to the nearest 1 kPa and provided as indicative only.**

Entered by: *ST* Date: *22/1/07* Checked by: *JRC* Date: *22/1/07*



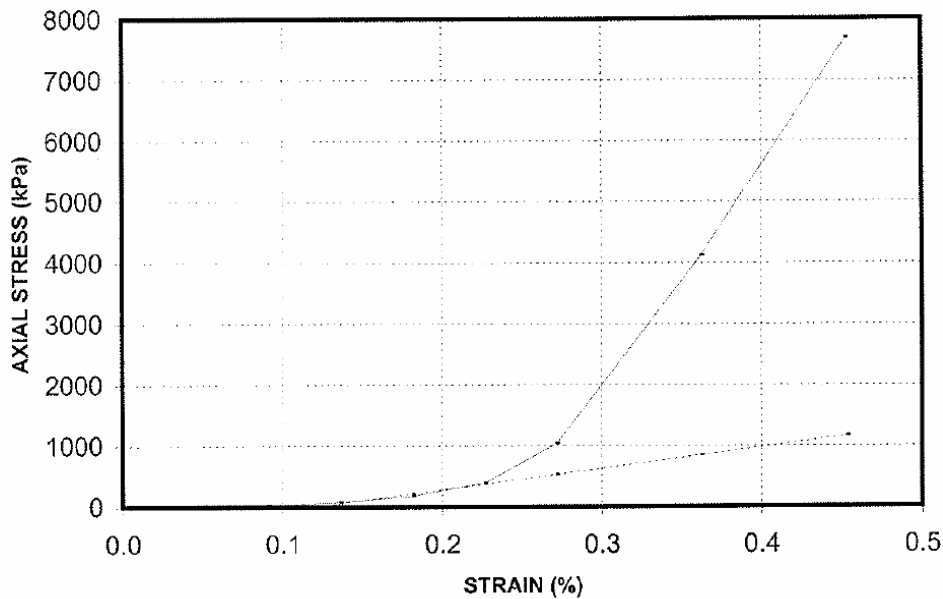
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Form Date:	Jan-04
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Plate No.: \_\_\_\_\_ Page of \_\_\_\_\_  
 Site: **Funafuti, Tuvalu** Your Job No.: **750541** Our Job No.: **614086.000**  
 BH No.: **3** Sample No.: **2** Depth: **1.0-2.0 (m)**  
 Test Method Used: NZS 4402 :1986 TEST 6.3.1 Determination of the unconfined compressive strength of cohesive soil

**UNCONFINED COMPRESSIVE STRENGTH TEST  
AXIAL STRESS VS STRAIN**



**Sample Parameters:**

Sample Height:	110.40 mm	Bulk Density:	2.04 t/m <sup>3</sup>
Sample Diameter:	60.93 mm	Dry Density:	1.97 t/m <sup>3</sup>
Test Height:	110.40 mm	Water Content:	4.0 %
Test H/D Ratio:	1.81		

**Failure Value:**

Axial Strain (%)	Unconf. Compressive Strength $q_u$ (kPa)	Rate of Compression (mm/min)	Modulus of Elasticity (MPa)
0.45	7690	0.14	348

**Mode of Failure:** Shear

**Sample History:** Undisturbed core trimmed at natural water content.

**Description:** White, weak, CORAL

**Test Remarks:** The sample height to diameter ratio is less than the required 2. The strength may be lower, due to the h/d ratio. We advised the engineer and it was decided to continue with testing.  
 The presence of voids = 5mm - 55mm  
**The UCS test results are reported to the nearest 1 kPa and provided as indicative only.**

Entered by: **SS** Date: **22/1/07** Checked by: **JRE** Date: **22/1/07**



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Plate No.: \_\_\_\_\_ Page of \_\_\_\_\_  
 Site: **Funafuti, Tuvalu** Your Job No.: **750541** Our Job No.: **614086.000**  
 BH No. **4** Sample No.: **24** Depth: **6.0-7.0 (m)**  
 Test Method Used: NZS 4402 :1986 TEST 6.3.1 Determination of the unconfined compressive strength of cohesive soil

**UNCONFINED COMPRESSIVE STRENGTH TEST**

**Sample Parameters:**

Sample Height:	57.18 mm	Bulk Density:	2.32 t/m <sup>3</sup>
Sample Diameter:	60.68 mm	Dry Density:	2.26 t/m <sup>3</sup>
Test Height:	57.18 mm	Water Content:	2.8 %
Test H/D Ratio:	0.94		

**Failure Value:**

Unconf. Compressive  
Strength qu (kPa)  
**27360**

**Mode of Failure:** Shear

**Sample History:** Undisturbed core trimmed at natural water content.

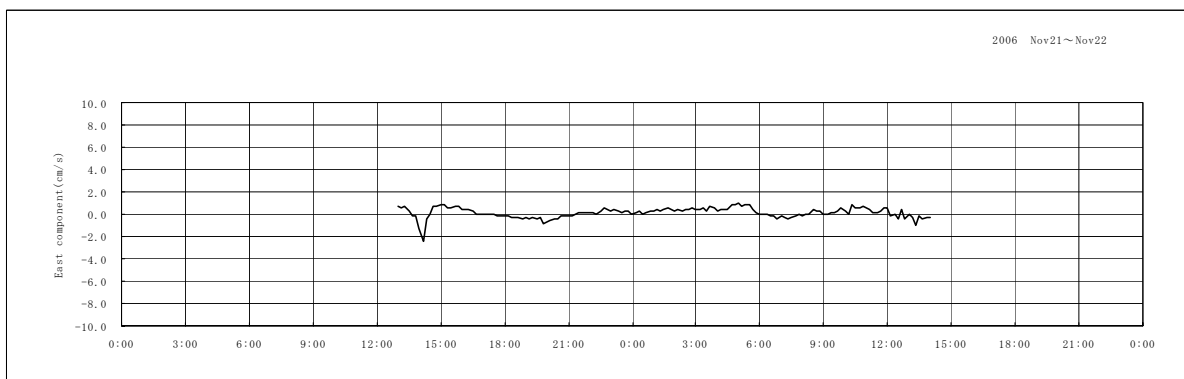
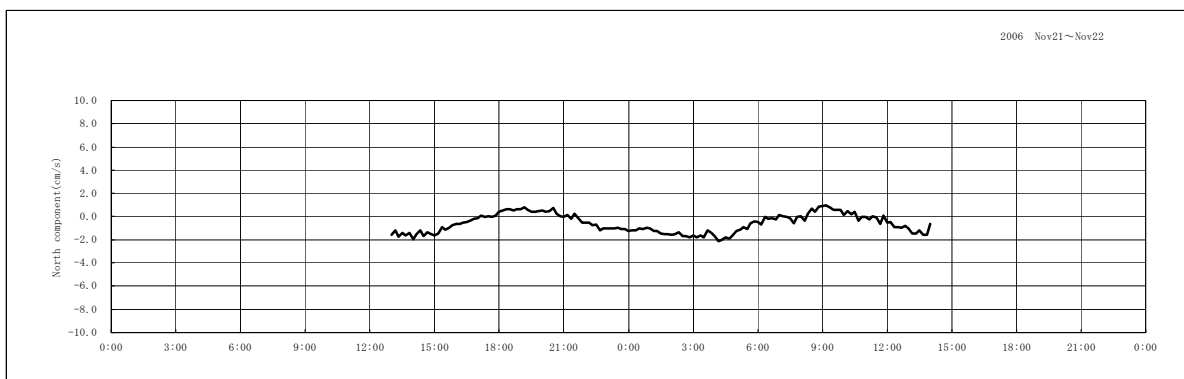
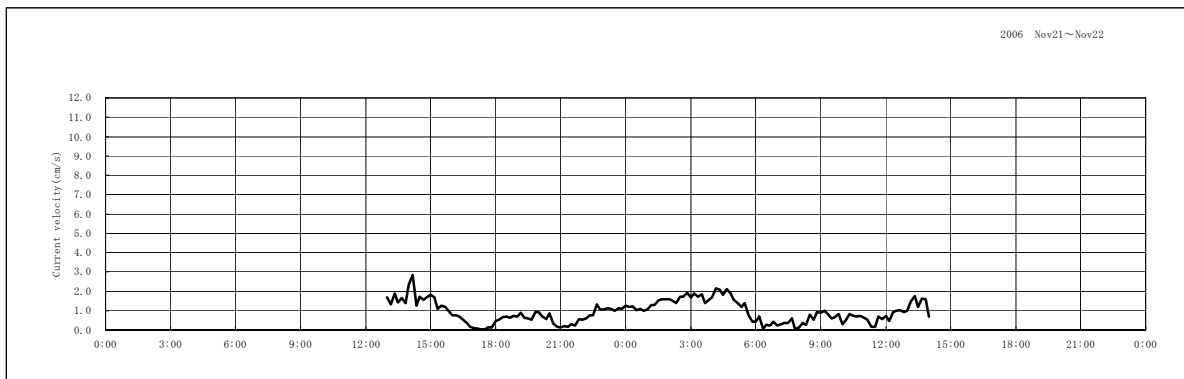
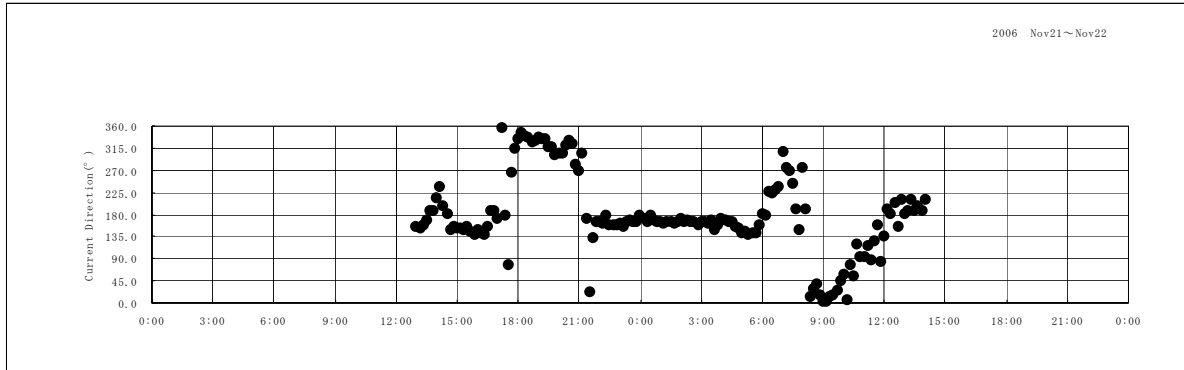
**Description:** White, moderately strong, CORAL

**Test Remarks:** The sample was tested in a concrete machine because of high strength, therefore strain could not be measured.  
 The sample height to diameter ratio is less than the required 2. The strength may be lower, due to the h/d ratio. We advised the engineer and it was decided to continue with testing.  
**The UCS test results are reported to the nearest 1 kPa and provided as indicative only.**

Entered by: *ST* Date: *19/1/07* Checked by: *JRC* Date: *22/1/07*

## 6-4 Tidal Current Survey Results

(1) At - 4 m depth (25 hours continuous observation)



(2) At - 6 m depth (16 hours continuous observation)

