THE REPUBLIC OF FIJI

MINISTRY OF AGRICULTURE, RURAL AND MARITIME DEVELOPMENT AND NATIONAL DISASTER MANAGEMENT

THE PROJECT FOR THE PLANNING OF THE NADI RIVER FLOOD CONTROL STRUCTURES

VOLUMEⅢ DATA BOOK

PARTⅡ: DATA BOOK (2)

JULY 2016

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

YACHIYO ENGINEERING CO., LTD.
CTI ENGINEERING INTERNATIONAL CO., LTD.

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THE REPUBLIC OF FIJI
THE PROJECT FOR THE PLANNING OF
THE NADI RIVER FLOOD CONTROL STRUCTURES

COMPOSITION OF FINAL REPORT

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Part Ⅱ **FEASIBILITY STUDY**

VOLUME Ⅰ Ⅲ **DATA BOOK**

Part Ⅰ **DATA BOOK (1)**

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THE REPUBLIC OF FIJI

THE PROJECT FOR THE PLANNING OF THE NADI RIVER FLOOD CONTROL STRUCTURES

FINAL REPORT

VOLUMEⅢ DATA BOOK

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Data Book-15

Result of Boring and Soil Test

Geotechnical Engineering Investigation Report for Nadi River Basin Project

1.0 INTRODUCTION

Entec Limited, Engineering & Science Consultants of Suva, Fiji (Entec) were engaged by Japan International Cooperation Agency (JICA) Study Team to carry out the geotechnical engineering investigation and laboratory testing for the Nadi River Basin Project as per Entec proposal (Ref:P1920815.L01) dated 22 September 2015. Entec were granted authority to carry out the geotechnical engineering investigation as per the signed contract agreement between JICA and ENTEC Limited, 'GEOTECHNICAL INVESTIGATION IN NADI RIVER BASIN', dated 01 October 2015.

Further details of the required drilling works and laboratory testing were advised by Mr Toyoda of JICA during a site meeting on 6 October 2010 and confirmed via email dated 8 October 2015. A summary is provided below:

- Maximum borehole depth to be the nominated 20m or 30m as per the Terms of Reference (ToR) (Dated 2 September 2015) regardless of soil/rock conditions encountered at final depth.
- Laboratory schedule and laboratory testing of samples to be determined and selected by Entec.

The investigation, laboratory testing and reporting was completed in general accordance with our proposal and further confirmation and correspondence with the JICA.

2.0 FIELDWORK SUMMARY

The fieldwork for the investigation was completed between 7 October 2015 and 27 October 2015 and comprised the drilling of thirteen (13No.) boreholes at thirteen individual sites as designated and directed by JICA. The approximate location of the thirteen (13 No.) sites of borehole drilling investigation is shown below on Figure 1 Sites Location Plan with Borehole Test Locations for each individual site shown in the respective Site Appendix 'b'.

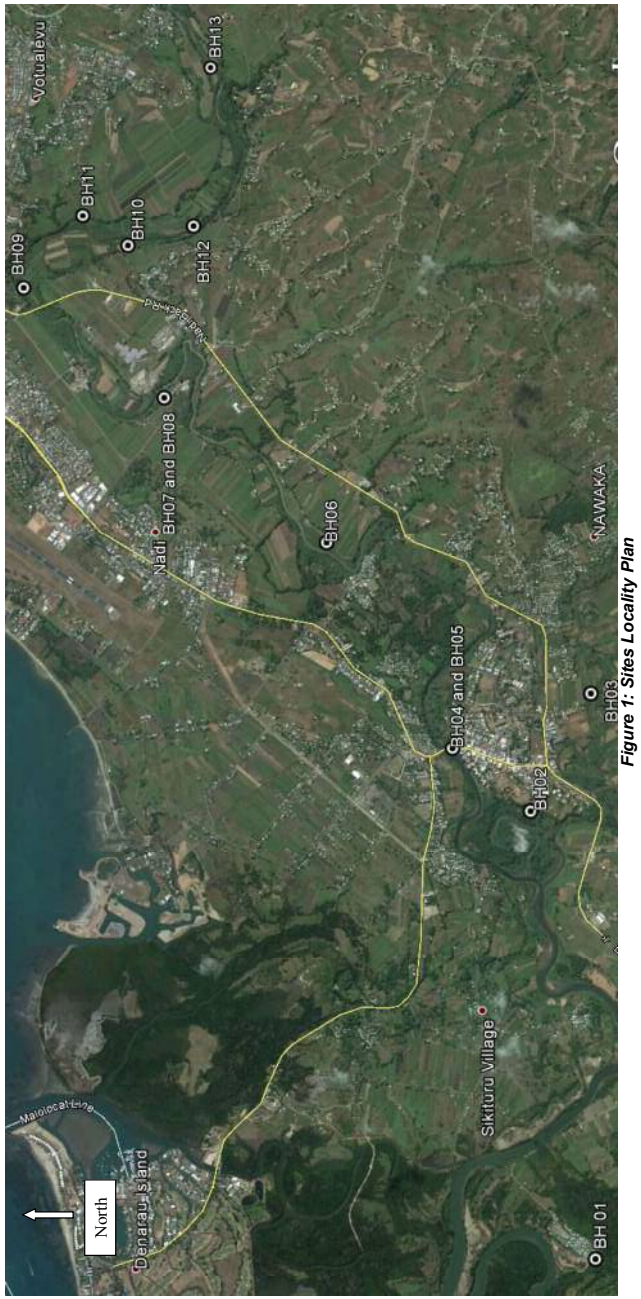


Figure 1: Sites Locality Plan

1920815
January 2016
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

2.1 Geotechnical Investigation Borehole Drilling

The fieldwork completed at each site comprised the machine borehole drilling of one (1No.) borehole and the following scope of in-situ testing and sampling within the borehole:

- Standard Penetrometer Testing (SPT) was completed initially at 1.0m or 1.5m, 2.0m and at 1.5m intervals thereafter.
- Undisturbed samples were obtained using U60 push tubes at selected depths as an alternative to SPT testing within the soil profile, where appropriate.
- The core sample, disturbed and undisturbed samples were returned to the Entec Laboratory (Nadi).

A summary of the geotechnical investigation completed at each site is provided below with the borehole location shown on the 'Test Locality Plan", the Engineering Borehole Log (including in-situ test results) and photos of the core return provided in the respective attached Appendix for each site.

SITE 1 – Moala Village, Nadi, Fiji.

The fieldwork for the Site 1 investigation was completed on 7 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH01 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 27.5m with the final SPT test extended to a depth of 27.95m below existing surface level.

Brief Site Description

Site 1 is located approximately 800m from the coastline and on the southern side of Nadi River adjacent to a mangrove area. Nadi River meanders from the ocean inlet on the western side of the site towards the east of the site. Mangroves are located on the western side of the site, adjacent to the borehole location, where a narrow water channel extends to the Nadi River. The edge of the mangroves extends along the western side of the Moala village boundary and connects with Nadi River.

At the time of the investigation the site was occupied by small shrubs and mango trees. Single storey concrete houses with wooden shed extensions generally surrounded the site.

SITE 2 - Navo, Nadi, Fiji.

The fieldwork for the Site 2 investigation was completed on 8 October 2015 and comprised the following scope of work:

- One (1No.) borehole was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 27.93m below existing surface level.

Brief Site Description

The site is located near Navo village off Nadi Back Road approximately 400m to the south. The site is situated on the northern riverbank of a Nadi River tributary river. Nadi town is approximately 4km to the north east of the site.

The site is located on the northern riverbank of a Nadi River tributary river. Floodplain farming area surrounds the site to the north. At the time of the investigation the site was vegetated with grass and shrubs.

SITE 3 - Qeleloa, Nadi, Fiji.

The fieldwork for the Site 3 investigation was completed on 8 and 27 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH03 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 26.0m with the final SPT test extended to a depth of 26.45m below existing surface level.

Brief Site Description

The site is located of the main Nadi Back Road approximately 650m south east of Nadi town, Viti Levu, Fiji. The site is located on farm land on the northern side of a river. At the time of the investigation the site was generally occupied by farming crops and sparse trees and shrubs. Residential houses were located to the northern and eastern sides from the site.

SITE 4 - Nadi Bridge Queens Road, Namotomoto, Nadi, Fiji.

The fieldwork for the investigation was undertaken on 12 and 13 October 2015 and comprised the following scope of work:

- One (1No.) borehole, designated BH04, was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 30.0m with the final SPT test extended to a depth of 30.39m below existing surface level.

Brief Site Description

Site 4 is located on the northern bank of the main Nadi town bridge, north-west from Nadi town, Viti Levu, Fiji.

SITE 5 - Nadi Bridge, Queens Road, Namotomoto, Fiji.

The fieldwork for the Site 5 investigation was completed on 13 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH01 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 30.0m with the final SPT test extended to a depth of 30.45m below existing surface level.

Brief Site Description

Site 5 is located on the southern side of Nadi Bridge, Queens Road, Nadi, Fiji. At the time of the investigation farming plantations extended along the river bank to the north east and retail shops, restaurants and supermarkets were located to the south.

SITE 6 – Moala Saunaka Village Fiji.

The fieldwork for the Site 6 investigation was completed on 9 October 2015 and comprised the following scope of work:

- One (1No.) borehole, designated BH06, was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 20.0m with the final SPT test extended to a depth of 20.5m below existing surface level.

Brief Site Description

The site is located on the eastern side of Nadi River, approximately750m off Nadi Back Road. The site is accessed through Nadi Back Road opposite Flame Tree office followed by a dirt road. At the time of the investigation vegetation consisted mostly of sugar cane. The Nadi river ran along the northern side of the site boundary.

SITE 7 – Old Nadi Back Road Bridge (south west), Nadi, Fiji.

The fieldwork for the Site 7 investigation was completed on 14 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH01 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 20.0m with the final SPT test extended to a depth of 20.45m below existing surface level.

Brief Site Description

The site is located on the Old Nadi Back Road on the south western side of the Old Nadi Back Road Bridge. At the time of the investigation vegetation consisted of small shrubs, tall grass and trees extending towards the river bank. On the south eastern side of the site, infrastructure was mostly of single storey houses, yards for mechanical works and sugar cane fields. Nadi River was approximately 50m to 60m east and north east of the site.

SITE 8 – Old Nadi Back Road Bridge (north east), Nadi, Fiji.

The fieldwork for the Site 8 investigation was undertaken on 14 and 15 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH08 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 23.0m with the final SPT test extended to a depth of 23.5m below existing surface level.

Brief Site Description

The site is located on the north eastern side of Nadi River, adjacent to the northern side of the Old Nadi Back Road Bridge. At the time of the investigation the site was vegetated by of small shrubs and tall grass. Adjacent to the site to the north was the Standard Concrete Industries site.

SITE 9 –Nadi Back Road Bridge Tobacco Farm Opposite Tanoa Apartment, Nadi, Fiji.

The fieldwork for the Site 9 investigation was undertaken on 15 and 16 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH09 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 30.50m with the final SPT test extended to a depth of 31.00m below existing surface level.

Brief Site Description

Site 9 is located approximately 600m off the Nadi Back Road. At the time of the investigation vegetation was considered dense and consisted of tobacco plants, tall grass and few trees. The topography of the site was generally flat with housing located towards the western and eastern side of the site.

SITE 10 –Nadi Back Road Bridge Export Farm, Nadi, Fiji.

The fieldwork for the investigation was undertaken on 19 and 21 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH10 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 29.00m with the final SPT test extended to a depth of 29.50m below existing surface level.

Brief Site Description

Site 10 is located adjacent to the Nadi River which extends along the eastern side of the site. At the time of the investigation vegetation was considered dense and consisted of small shrubs and crop plantations of tomatoes and pawpaw.

SITE 11 –Votualevu Sugar Cane Farm Opposite Nasau, Nadi, Fiji.

The fieldwork for the Site 11 investigation was undertaken on 21 and 22 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH11 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 24.00m with the final SPT test extended to a depth of 24.50m below existing surface level.

Brief Site Description

The site located on a cane field adjacent to the Nadi River which ran along the site boundary towards the northwestern end. At the time of the investigation vegetation consisted of small shrubs, burnt sugar cane and few trees.

SITE 12 –Votualevu Tobacco Farm Opposite Nasau, Nadi, Fiji.

The fieldwork for the investigation was undertaken on 22 and 23 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH12 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 27.50m with the final SPT test extended to a depth of 28.00m below existing surface level.

Brief Site Description

Site 12 is located in Votualevu, approximately 1.4km of Carreras Road. The site is located within a tobacco plantation. At the time of the investigation vegetation was dense and consisted of small shrubs, tobacco plants and few trees. Nadi River extended along the southern site boundary.

SITE 13 – Votualevu Vegetable Farm Opposite Nasau, Nadi, Fiji.

The fieldwork for the investigation was undertaken on 26 October 2015 and comprised the following scope of work:

- One (1No.) borehole designated BH13 was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 18.5m with the final SPT test extended to a depth of 19.0m below existing surface level.

Brief Site Description

Site 13 is located approximately 600m off Carrers Road on the northern side of Nadi River.

3.0 LABORATORY TESTING

The following laboratory testing was undertaken on samples recovered from the boreholes;

- Permeability Testing
- Bulk Density Testing
- Natural Moisture Content (NMC) Tests
- Particle Size Distribution (PSD) Testing
- Atterberg Limits Determinations
- Unconfined Compressive Strength (UCS) Testing
- Oedometer consolidation testing

The Laboratory testing schedule and associated laboratory test certificates for each borehole/site are provided in the respective Appendix.

5.0 APPLICABILITY

This factual report has been prepared solely for the benefit in accordance with the project brief only, which is based on information provided directed by the client JICA. All data contained in it may not be used in other contexts or for any other purpose without our prior review and agreement. It does not provide a complete assessment of the geotechnical engineering status of the site and it is limited to the scope defined herein.

Whilst every care has been taken in the investigation, testing program and compilation of this report, it is to be known that the report presents conditions on the day of the investigation. No responsibility or liability is accepted for consequences arising from either errors or omissions in that data.

ENTEC LIMITED
Engineering & Science Consultants

pp: Daniel McCartney.

Pratarp Singh, B.E, F.F.I.E, AIAMA, FIEAust;
Managing Director

APPENDIX ATTACHMENT LIST:

Appendix 1: Site 1, Maolo Village, BH1
Appendix 1a. - Site Information and Fieldwork Detail
Appendix 1b. - BH01 Test Location Plan
Appendix 1c. - Borehole Engineering Log and Core Photos
Appendix 1d. - Laboratory Test Schedule and Test Results

Appendix 2: Site 2, Navo Village, BH2
Appendix 2a. - Site Information and Fieldwork Detail
Appendix 2b. - BH02 Test Location Plan
Appendix 2c. - Borehole Engineering Log and Core Photos
Appendix 2d. - Laboratory Test Schedule and Test Results

Appendix 3: Site 3, Qeleloa, Nadi, BH3
Appendix 3a. - Site Information and Fieldwork Detail
Appendix 3b. - BH03 Test Location Plan
Appendix 3c. - Borehole Engineering Log and Core Photos
Appendix 3d. - Laboratory Test Schedule and Test Results

Appendix 4: Site 4 - Nadi Bridge Queens Road, Namotomoto, Nadi, Fiji.
Appendix 4a. - Site Information and Fieldwork Detail
Appendix 4b. - BH03 Test Location Plan
Appendix 4c. - Borehole Engineering Log and Core Photos
Appendix 4d. - Laboratory Test Schedule and Test Results

Appendix 5: Site 5 -Nadi Bridge, Queens Road, Namotomoto, Fiji.
Appendix 5a. - Site Information and Fieldwork Detail
Appendix 5b. - BH03 Test Location Plan
Appendix 5c. - Borehole Engineering Log and Core Photos
Appendix 5d. - Laboratory Test Schedule and Test Results

Appendix 6: Site 6,– Moala Saunaka Village Fiji.
Appendix 6a. - Site Information and Fieldwork Detail
Appendix 6b. - BH03 Test Location Plan
Appendix 6c. - Borehole Engineering Log and Core Photos
Appendix 6d. - Laboratory Test Schedule and Test Results

Appendix 7: Site 7, Old Nadi Back Road Bridge (south west), Nadi, Fiji.
Appendix 7a. - Site Information and Fieldwork Detail
Appendix 7b. - BH03 Test Location Plan
Appendix 7c. - Borehole Engineering Log and Core Photos
Appendix 7d. - Laboratory Test Schedule and Test Results

Appendix 8: Site 8, Old Nadi Back Road Bridge (north east), Nadi, Fiji.
Appendix 8a. - Site Information and Fieldwork Detail
Appendix 8b. - BH03 Test Location Plan
Appendix 8c. - Borehole Engineering Log and Core Photos
Appendix 8d. - Laboratory Test Schedule and Test Results

Appendix 9: Site 9, Nadi Back Road Bridge Tobacco Farm Opposite Tanoa Apartment, Nadi, Fiji.
Appendix 9a. - Site Information and Fieldwork Detail
Appendix 9b. - BH03 Test Location Plan
Appendix 9c. - Borehole Engineering Log and Core Photos
Appendix 9d. - Laboratory Test Schedule and Test Results

Appendix 10: Site 10, Nadi Back Road Bridge Export Farm, Nadi, Fiji.
- ***Appendix 10a. - Site Information and Fieldwork Detail***
- ***Appendix 10b. - BH03 Test Location Plan***
- ***Appendix 10c. - Borehole Engineering Log and Core Photos***
- ***Appendix 10d. - Laboratory Test Schedule and Test Results***

Appendix 11: Site 11, Votualevu Sugar Cane Farm Opposite Nasau, Nadi, Fiji.
- ***Appendix 11a. - Site Information and Fieldwork Detail***
- ***Appendix 11b. - BH03 Test Location Plan***
- ***Appendix 11c. - Borehole Engineering Log and Core Photos***
- ***Appendix 11d. - Laboratory Test Schedule and Test Results***

Appendix 12: Site 12, Votualevu Tobacco Farm Opposite Nasau, Nadi, Fiji.
- ***Appendix 12a. - Site Information and Fieldwork Detail***
- ***Appendix 12b. - BH03 Test Location Plan***
- ***Appendix 12c. - Borehole Engineering Log and Core Photos***
- ***Appendix 12d. - Laboratory Test Schedule and Test Results***

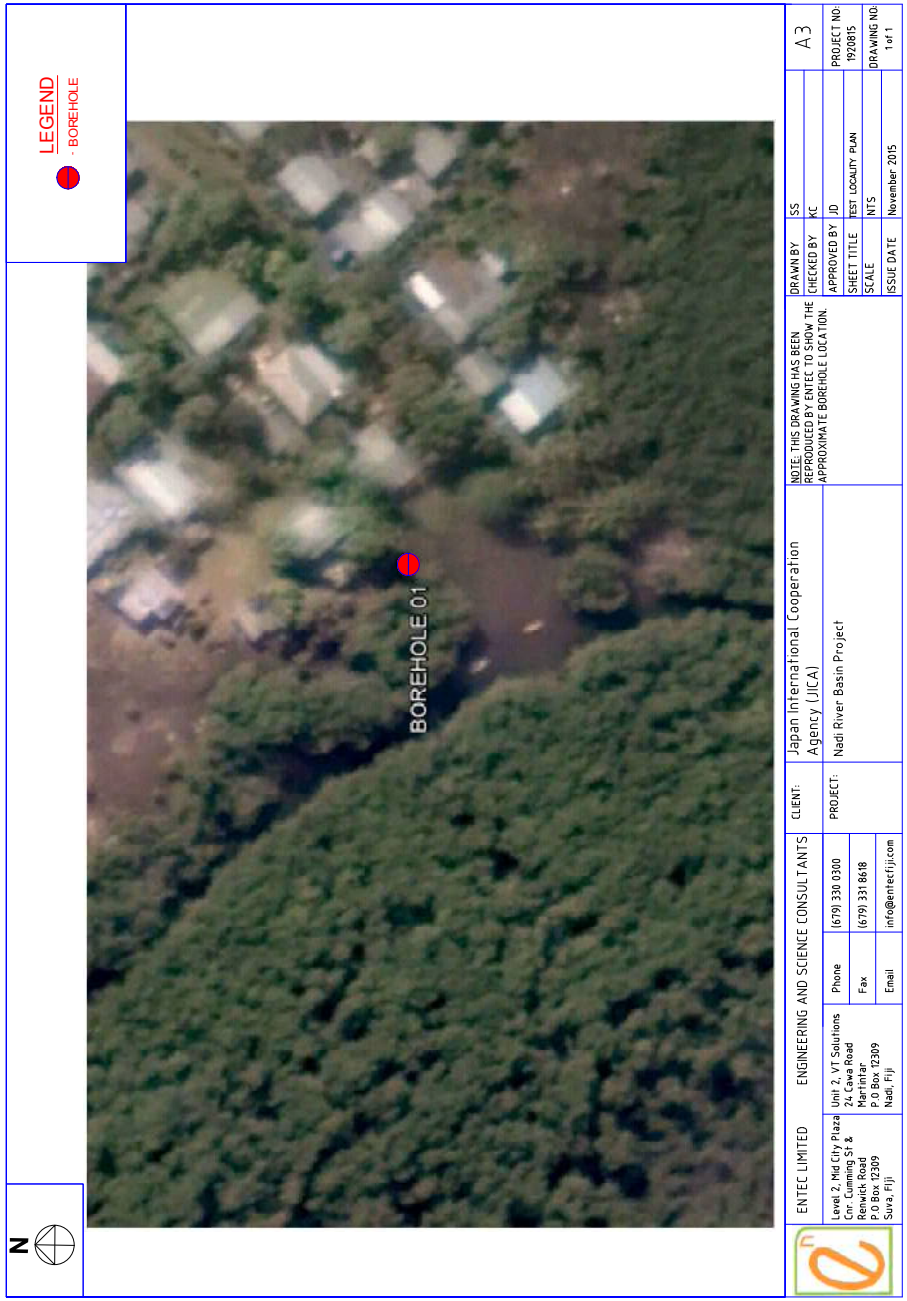
Appendix 13: Site 13, Votualevu Vegetable Farm Opposite Nasau, Nadi, Fiji.
- ***Appendix 13a. - Site Information and Fieldwork Detail***
- ***Appendix 13b. - BH03 Test Location Plan***
- ***Appendix 13c. - Borehole Engineering Log and Core Photos***
- ***Appendix 13d. - Laboratory Test Schedule and Test Results***

APPENDIX 1

SITE 1 – Moala Village, Nadi, Fiji.

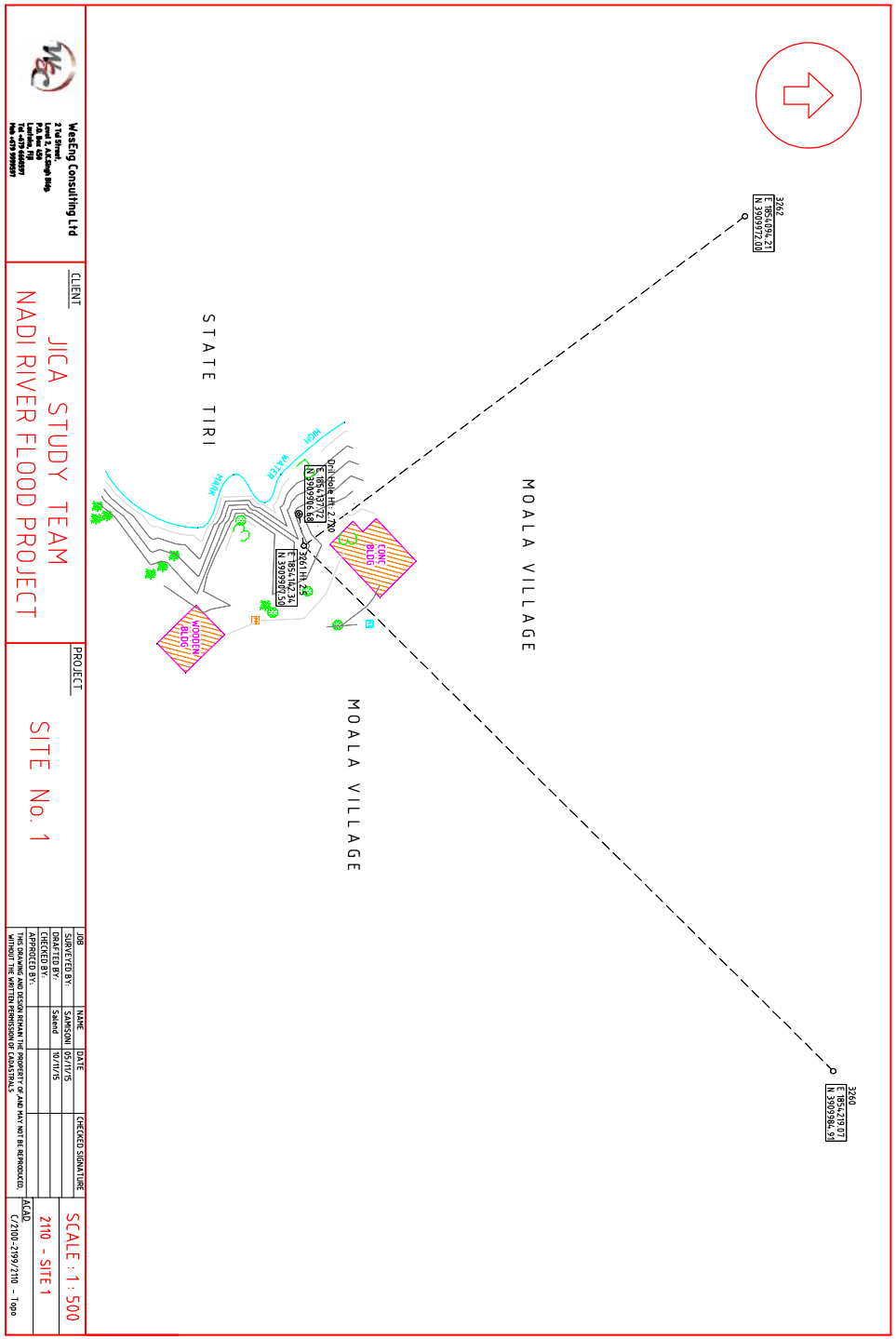
APPENDIX 1a

Test Locality Plan



APPENDIX 1b

Engineering Borehole Log and Core Photos



DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Moalo Village	No.: **BH01**
Job No.: 1920815	Start Date: 07-10-2015 Finish Date: 07-10-2015	Ground Level (m): 2.72	Co-Ordinates (): E 1854137.7 N 3909906.7
Client: JICA Study Team	Hole Depth: 27.50 m		Sheet: 1 of 6

Column headings: Type | Run | Fluid & Water | Piezometer | Geological Description (Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.) | Legend | Weathering (RS CW HW MW SW UW) | Field Strength (VS/VL S/L F/MD St/D VSt/VD H/EW VW W MS S VS ES) | Elevation (m) | Depth (m) | Symbolic Log | Defect Spacing (mm) (500 100) | Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc) | TCR (SCR) RQD (%) | Samples | Tests

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to Coarse SAND with minor silt and trace to minor medium gravel, dark grey brown, loose to medium dense		1	41	1.50	SPT 1.50 m N=11
SILT with trace of fine sand, dark grey, very loose	+0.72	2	70	2.00	SPT 2.00 m N= 0
Fine SAND with some silt, grey, very loose	+0.22				
Silty fine SAND, dark grey, very loose	-0.28	3		3.50	
		4	67		
SILT with trace of fine sand, very soft to soft	-1.98				

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH01.GPJ <<DrawingFile>> 27-04-2016 10:27 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Moalo Village	No.: **BH01**
Job No.: 1920815	Start Date: 07-10-2015 Finish Date: 07-10-2015	Ground Level (m): 2.72	Co-Ordinates (): E 1854137.7 N 3909906.7
Client: JICA Study Team	Hole Depth: 27.50 m		Sheet: 2 of 6

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with trace of fine sand, very soft to soft *(continued)*				5.00	SPT 5.00 m N= 0
NO RECOVERY	-2.78	6	0		
SILT with trace of clay, dark grey, very soft to soft, medium to high plasticity		7	73	6.50	
at 8.00m with trace of shell fragments	-5.28	8		8.00	SPT 8.00 m N= 3
at 8.80m with occasional fine siltstone nodules	-6.08	9	85		
			80	9.50	

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH01.GPJ <<DrawingFile>> 27-04-2016 10:27 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Moalo Village	No.:
Job No.: 1920815	Start Date: 07-10-2015 Finish Date: 07-10-2015	Ground Level (m): 2.72	Co-Ordinates (): E 1854137.7 N 3909906.7	**BH01**
Client: JICA Study Team	Hole Depth: 27.50 m		Sheet: 3 of 6

Columns: Type | Run | Fluid & Water | Piezometer | Geological Description (Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.) | Legend | Weathering | Field Strength | Elevation (m) | Depth (m) | Symbolic Log | Defect Spacing (mm) | Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc) | TCR (SCR) RQD (%) | Samples | Tests

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
at 8.80m with occasional fine siltstone nodules *(continued)*			80		
at 11.0m with trace of fine sand	-8.28	11		11.00	SPT 11.00 m N= 0
			93		
		12			
				12.50	SPT 12.50 m N= 0
		13	53		
SILT with some clay, fine sand and trace of organics, pale grey, firm, high plasticity	-11.28	14		14.00	SPT 14.00 m N= 7
			67		

Explanations:
Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

● Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
■ U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks
N = Standard Penetration Test
Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC	Checked by: DMC

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Moalo Village	No.:
Job No.: 1920815	Start Date: 07-10-2015 Finish Date: 07-10-2015	Ground Level (m): 2.72	Co-Ordinates (): E 1854137.7 N 3909906.7	**BH01**
Client: JICA Study Team	Hole Depth: 27.50 m		Sheet: 4 of 6

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with some clay, fine sand and trace of organics, pale grey, firm, high plasticity *(continued)*			67		
NO RECOVERY	-12.78			15.50	SPT 15.50 m N= 0
		16	0		
SILT with trace of minor clay and trace of organics, grey brown, firm, medium plasticity		17		17.00	SPT 17.00 m N= 8
			87		
		18			
				18.50	SPT 18.50 m N= 7
		19	100		

Explanations:
Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
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● Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
■ U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks
N = Standard Penetration Test
Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC	Checked by: DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Moalo Village	BH01

Job No.:	Start Date: 07-10-2015 Finish Date: 07-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		2.72	E 1854137.7 N 3909906.7

Client:	Hole Depth:	Sheet:
JICA Study Team	27.50 m	5 of 6

Column headings: Type; Run; Fluid & Water; Piezometer; Geological Description (Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.); Legend; Weathering (RS CW HW MW SW UW); Field Strength (VS/VL S/L F/MD St/D VSt/VD H/EW VW W MS S VS ES); Elevation (m); Depth (m); Symbolic Log; Defect Spacing (mm) (500 100); Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc); TCR (SCR) RQD (%); Samples; Tests

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with trace of minor clay and trace of organics, grey brown, firm, medium plasticity *(continued)*			100	20.00	SPT 20.00 m N= 5
Silty CLAY, pale grey, soft to firm, high plasticity	-18.18	21			
at 21.5m becoming firm to stiff		22	100	21.50	SPT 21.50 m N= 16
Silty CLAY, pale brown, stiff, medium to high plasticity	-19.78	23	40	23.00	SPT 23.00 m N= 10
		24			
Sandy fine to coarse GRAVEL with trace of silt, very dense, gravel is sub rounded to angular	-21.78		30	24.50	SPT 24.50 m N= 50

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

● Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
■ U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH01.GPJ <<DrawingFile>> 27-04-2016 10:27 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Moalo Village	BH01

Job No.:	Start Date: 07-10-2015 Finish Date: 07-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		2.72	E 1854137.7 N 3909906.7

Client:	Hole Depth:	Sheet:
JICA Study Team	27.50 m	6 of 6

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Sandy fine to coarse GRAVEL with trace of silt, very dense, gravel is sub rounded to angular *(continued)*			30		
Sandy fine to coarse GRAVEL in silty clay matrix, pale brown, dense	-23.28	26	40	26.00	SPT 26.00 m N= 42
		27			
Hole Terminated at 27.50 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005	-24.78	28		27.50	SPT 27.50 m N= 50
		29			

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

● Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
■ U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH01.GPJ <<DrawingFile>> 27-04-2016 10:27 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

Borehole 1 Core Photos (0.00m to 27.5m)

0.00m to 4.70m

4.70m to 8.80m

8.80m to 11.50m

11.50m to 14.90m

14.90m to 19.10m

19.10m to 21.95m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 1, Moala Village, Nadi, Fiji.

21.95m to 26.00m

26.00m to 27.5m

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1920815.01

APPENDIX 1c

Laboratory Test Schedule and Laboratory Test Results

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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : Site one, Moala Village (BH 01)
PROJECT NUMBER :1920815

Date: 08.10.2015

Laboratory Test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required							
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	Remarks
1920815.01	Site one, Moala Village	Sandy GRAVEL	SPT	1.5-1.60								
		Clayey SAND	SPT	2.0-2.50			1					
		Clayey SAND	U	3.50-4.00	1	1		1		1	1	
		Clayey SAND	SPT	5.0-5.5								
		Silty CLAY w/ shell and sand	U	6.5-6.70				1	1			
		Silty CLAY w/ shell and sand	SPT	8.0-8.45			1					
		Silty CLAY w/ shell and sand	U	9.5-9.8		1	1			1	1	
		Silty CLAY w/ shell and sand	SPT	11.0-11.50			1					
		Sandy SILT w/ clay and shell	SPT	12.5-13.00			1		1			
		Sandy SILT w/ clay, shell and orgainc	SPT	14.0-14.45			1	1				
		Silty CLAY w/ sand and organic	SPT	17.0-17.45				1	1			
		Sandy SILT w/ clay and organic	SPT	18.5-18.95			1					
		Sandy SILT w/ clay and organic	SPT	20.0-20.45			1					
		Clayey SILT w/ sand	SPT	21.5-21.95								
		Clayey SILT w/ sand	SPT	23.0-23.45			1	1				
		Sandy GRAVEL w/ silt	SPT	24.50-24.89			1					
		GRAVEL	SPT	26.00-26.45				1				
		Silty GRAVEL	SPT	27.50 - 27.93								Total
	TOTALS				1	2	10	6	3	2	2	26
	Bill of Quanatity				1	3	10	6	3	3	3	29

Lab Test Schedule checked by: DMC

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: SILT with trace clay, dark grey, very soft to soft, medium to high plasticity with trace of sand	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N501 BH01 12.50m - 13.00m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.		77	17				
Mass of Container	g	99.34	31.75				
Mass of Container + Wet Soil	g	144.09	75.83				
Mass of Container + Dry Soil	g	128.48	60.55				
Mass of Dry Soil	g	29.14	28.80				
Mass of Moisture	g	15.61	15.28				
Moisture Content	%	53.57	53.06				53.31

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		171	172				
Mass of Container	g	11.80	12.35				
Mass of Container + Wet Soil	g	16.26	16.28				
Mass of Container + Dry Soil	g	15.05	15.17				
Mass of Dry Soil	g	3.25	2.82				
Mass of Moisture	g	1.21	1.11				
Moisture Content	%	37.23	39.36				38.30

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	24	20	14
Container No.		165	166	167	168	169	170
Mass of Container	g	11.75	11.72	11.84	11.54	11.36	12.05
Mass of Container + Wet Soil	g	24.02	23.58	26.69	27.24	26.38	28.35
Mass of Container + Dry Soil	g	20.07	19.56	21.60	21.76	21.09	22.51
Mass of Dry Soil	g	8.32	7.84	9.76	10.22	9.73	10.46
Mass of Moisture	g	3.95	4.02	5.09	5.48	5.29	5.84
Moisture Content	%	47.48	51.28	52.15	53.62	54.37	55.83

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				110.00		
% Shrinkage				12.00		12.00

Sample Preparation

as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

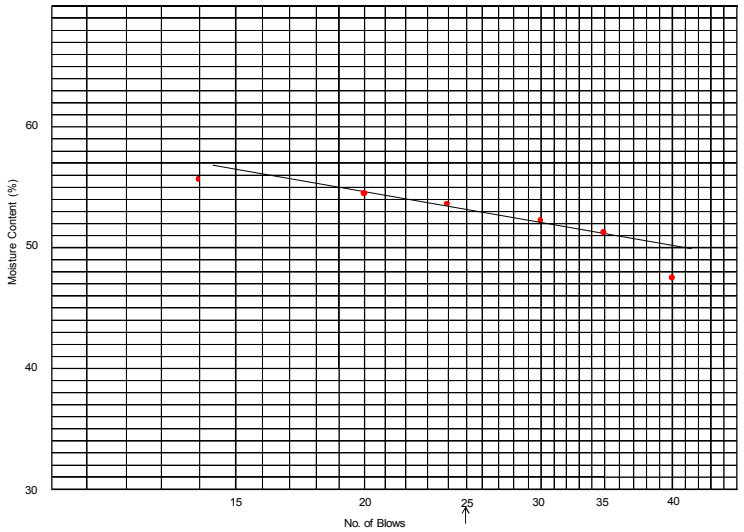
Liquid Limit	53.00 %
Plastic Limit	38.30 %
Plasticity Index	14.70 %
Shrinkage Limit	12.00 %

Tested By:LN
Date: 13 October 2015

Q.A. Checked By: MK
Date: 18 October 2015

Approved By:IG
Date: 18 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N501

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 12 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace of minor clay and trace of organics, grey brown, firm, medium plasticity.	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N503 BH01 17.00m -17.40m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	77	67				
Mass of Container	g	99.38	72.09				
Mass of Container + Wet Soil	g	133.03	114.18				
Mass of Container + Dry Soil	g	121.51	99.59				
Mass of Dry Soil	g	22.13	27.50				
Mass of Moisture	g	11.52	14.59				
Moisture Content	%	52.06	53.05				52.56

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		44	36				
Mass of Container	g	14.58	14.09				
Mass of Container + Wet Soil	g	20.37	20.42				
Mass of Container + Dry Soil	g	18.56	18.45				
Mass of Dry Soil	g	3.98	4.36				
Mass of Moisture	g	1.81	1.97				
Moisture Content	%	45.48	45.18				45.33

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	16
Container No.		30	37	29	35	42	41
Mass of Container	g	13.44	14.66	14.28	14.29	14.52	14.34
Mass of Container + Wet Soil	g	20.46	23.51	23.44	22.79	23.62	22.92
Mass of Container + Dry Soil	g	17.70	20.02	19.78	19.35	19.91	19.34
Mass of Dry Soil	g	4.26	5.36	5.50	5.06	5.39	5.00
Mass of Moisture	g	2.76	3.49	3.66	3.44	3.71	3.58
Moisture Content	%	64.79	65.11	66.55	67.98	68.83	71.60

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample		125.00				
Final length of Sample after Shrinkage		109.00				
% Shrinkage		12.80				12.80

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

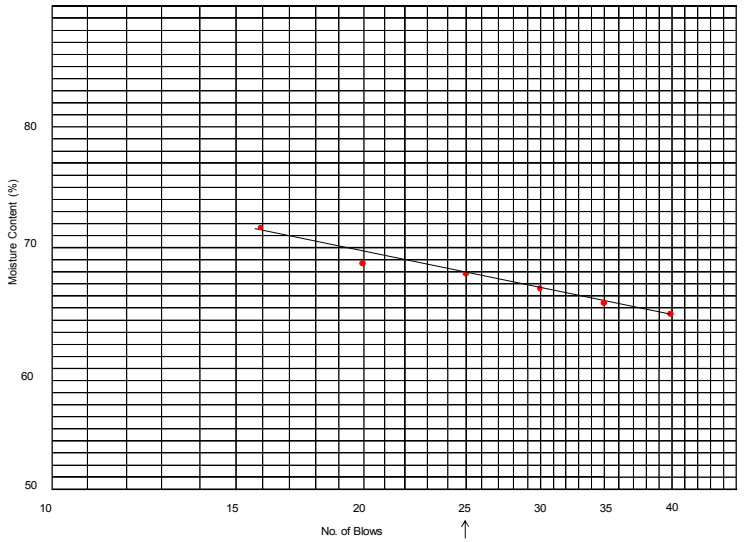
Liquid Limit	67.90 %
Plastic Limit	45.33 %
Plasticity Index	22.57 %
Shrinkage Limit	12.80 %

Tested By: KB
Date: 12 October 2015

Q.A. Checked By: MK
Date: 18 October 2015

Approved By: IG
Date: 18 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N 503

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	:1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	:12 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	:LN
MATERIAL TYPE & DESCRIPTION	: SILT with trace of clay, dark grey, very soft to soft, medium to high plasticity.	**TEST METHOD**	:NZS 4402:1986 (amended version)
		SAMPLE No.	N509 BH01 6.50m - 7.00m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.		20	130				
Mass of Container	g	14.12	11.64				
Mass of Container + Wet Soil	g	27.80	24.74				
Mass of Container + Dry Soil	g	22.84	20.09				
Mass of Dry Soil	g	8.72	8.45				
Mass of Moisture	g	4.96	4.65				
Moisture Content	%	56.88	55.03				55.96

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		133	129				
Mass of Container	g	11.27	11.53				
Mass of Container + Wet Soil	g	16.27	16.09				
Mass of Container + Dry Soil	g	15.27	15.16				
Mass of Dry Soil	g	4.00	3.63				
Mass of Moisture	g	1.00	0.93				
Moisture Content	%	25.00	25.62				25.31

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	29	26	20	15
Container No.		120	119	118	117	116	115
Mass of Container	g	11.66	11.41	11.76	11.21	11.69	11.73
Mass of Container + Wet Soil	g	28.65	28.82	32.70	26.90	27.33	28.55
Mass of Container + Dry Soil	g	24.07	24.12	26.93	22.51	22.78	23.57
Mass of Dry Soil	g	12.41	12.71	15.17	11.30	11.09	11.84
Mass of Moisture	g	4.58	4.70	5.77	4.39	4.55	4.98
Moisture Content	%	36.91	36.98	38.04	38.85	41.03	42.06

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample	140.00					
Final length of Sample after Shrinkage	129.00					
% Shrinkage	7.86					7.86

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

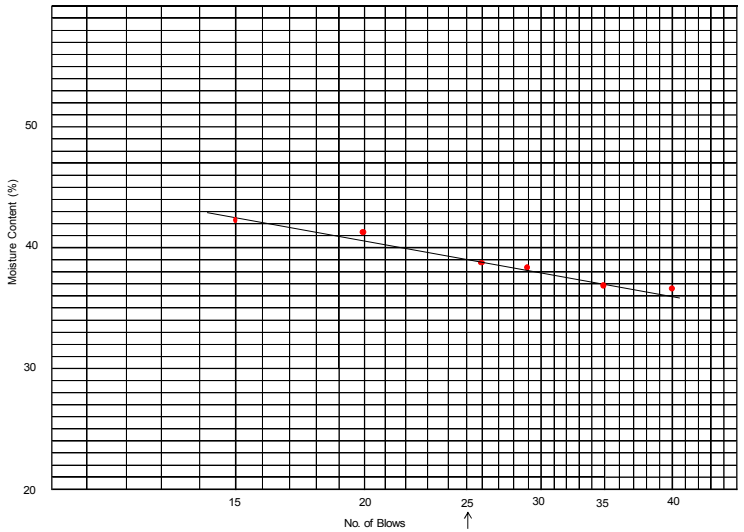
Liquid Limit	39.00 %
Plastic Limit	25.31 %
Plasticity Index	13.69 %
Shrinkage Limit	7.86 %

Tested By:LN
Date:13 October 2015

Q.A. Checked By: MK
Date: 18 October 2015

Approved By: IG
Date: 18 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N509

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	13 October 2015
SITE ADDRESS :	Site 01, Moala Village	**TECHNOLOGIST** :	RK/IG
SAMPLE LOCATION :	BH01 3.50m - 4.00m	**MATERIAL TYPE** :	Silty fine SAND, dark grey, very loose.
TEST NUMBER :	N496		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	90		
	Mass of Container	g	118.07		
	Mass of Container + Wet Soil	g	493.11		
	Mass of Container + Dry Soil	g	383.09		
	Mass of Dry Soil	g	265.02		
	Mass of Moisture	g	110.02		
	Moisture Content	%	41.51		41.51

Bulk Density	Sample No.	-	N496
	Diameter of Specimen	mm	53.10
	Initial area of specimen Ao (π/4 d²)	mm²	2213.39
	Initial length of specimen Lo	mm	93.25
	Initial mass of specimen Mi	g	375.99
	Bulk Density ρ	t/m³	1.82
	Dry Density ρd	t/m³	1.29

Tested by : RK/IG	Q.A. Check by : MK	Approved by : IG
Date : 13 October 2015	Date : 18 October 2015	Date : 18 November 2015

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	15 October 2015
SITE ADDRESS :	Site 01, Moala Village.	**TECHNOLOGIST** :	RK/IG
SAMPLE LOCATION :	BH01 9.50m - 10.00m	**MATERIAL TYPE** :	SILT with trace clay, dark grey, very soft to soft, medium to high plasticity with trace of occasionally fine siltstone.
TEST NUMBER :	N499		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	62	76	
	Mass of Container	g	72.21	86.38	
	Mass of Container + Wet Soil	g	189.87	256.66	
	Mass of Container + Dry Soil	g	150.43	200.16	
	Mass of Dry Soil	g	78.22	113.78	
	Mass of Moisture	g	39.44	56.50	
	Moisture Content	%	50.42	49.66	50.04

Bulk Density	Sample No.	-	N499
	Diameter of Specimen	mm	52.50
	Initial area of specimen Ao (π/4 d²)	mm²	2163.66
	Initial length of specimen Lo	mm	75.24
	Initial mass of specimen Mi	g	288.46
	Bulk Density ρ	t/m³	1.77
	Dry Density ρd	t/m³	1.18

Tested by : RK/IG	Q.A. Check by : MK	Approved by : IG
Date :15 October 2015	Date : 18 October 2015	Date : 18 November 2015

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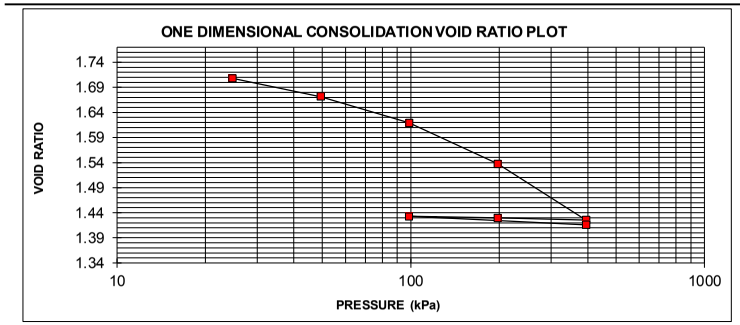
Determination of The One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Project Name:	Geotechnical Investigation for Nadi River Basin Drilling Works	**Sample No:**	N496
Client Name:	Japan International Cooperation Agency (JICA)	**Depth:**	3.5m - 4.0m
Job No:	1920815	**Tested By:**	IG
Site Address :	Moala Village	**Date Tested:**	09 October 2015
Sample Location:	BH01 (Site 1)		

Sample Description: Silty fine SAND,dark grey, very loose.
Sample History: Undisturbed / ~~Remoulded / Compacted / Slurried / Unknown~~
Date Sample Collected: 07/10/15 **Temperature:** Max: 27°C Min: 25°C
Loading Cycle: 24 hrs 0 mins **Height of ring:** 23.8 mm
Diameter of ring *(D)* : 44.96 mm **Area of ring *(A)* :** 1587.61 mm²
Solid density of soil particles *(Q_s)* : 2.65 t/m³ (~~Measured /~~ Assumed)
Method used: Square root of time fitting method



			Initial		Final
Measured thickness of specimen, H		mm	H_i	23.8	H_f 20.74
Mass of ring + ~~watch glass~~ + wet specimen		g	M_3	258.85	M_4 256.03
Mass of ring + ~~watch glass~~ + dry specimen	M_5	g		242.18	
Mass of ring	M_1	g		206.07	
Mass of watch glass	M_2	g		0	
Mass of dry specimen	$M_s = M_5 - M_1 - M_2$	g		36.11	
Mass of water		g	$M_3 - M_5$	16.67	$M_4 - M_5$ 13.85
Water content, w		%	w_i	46.16	w_f 38.36
Dry density, Q_d		t/m³	Q_{di}	0.96	Q_{df} 1.10
Height of soil particles, H_s		mm		8.58	
Voids ratio, e			e_i	1.77	e_f 1.42
Degree of saturation, S			S_i	69.00	S_f 71.77

Applied Pressure *kPa*	Incremental deflection *(ΔH) mm*	Thickness of specimen *mm*	% Change in thickness *%*	Height of voids *mm*	Voids ratio	Coefficient of consolidation C_v *(m^2/yr)*	Coefficient of compressibility M_v *(m^2/MN)*
24.7	0.558	23.242	0.024	14.66	1.71	59.96	
49.4	0.870	22.930	0.038	14.35	1.67	162.12	1.48
98.8	1.322	22.478	0.059	13.89	1.62	155.79	1.12
197.6	2.018	21.782	0.093	13.20	1.54	82.29	0.86
395.2	2.980	20.820	0.143	12.24	1.43	192.46	0.63
197.6	2.944	20.856	0.141	12.27	1.43	0.00	-0.63
98.6	2.920	20.880	0.140	12.30	1.43	0.00	-1.24
395.2	3.062	20.738	0.148	12.15	1.42	298.36	0.43
0	0.00	23.800	0.000	15.22	1.77	0.00	

Tested by: IG
Date: 09 October 2015

Q.A. Check By: MK
Date: 27 October 2015

Approved By: IG
Date: 18 November 2015

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Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Loading Date & Time		09/10/2015 @ 10:45hrs		10/10/2015 @ 10:47hrs		11/10/2015 @ 10:49hrs		12/10/2015 @ 11:15hrs		13/10/2015 @ 11:35hrs		14/10/15 @ 12:02hrs	
Hanger Load		400g		800g		1600g		3200g		6400g		3200g	
Effective Pressure		24.7kPa		49.4kPa		98.8kPa		197.6kPa		395.2kPa		197.6kPa	
Time Elapsed hrs	Time Elapsed min	Clock Time/4	Dial Gauge	H x10 mm	Clock Time/5	Dial Gauge	H x10 mm	Clock Time/4	Dial Gauge	H x10 mm	Clock Time/4	Dial Gauge	H x10 mm	Clock Time/4	Dial Gauge	H x10 mm
	0.00	10:45:00	2211	0.000	10:49:00	1740	0.000	11:15:00	1503	0.000	11:35:00	1128	0.000	12:02:00	590	0.000
	0.100	10:45:06	2090	0.242	10:49:06	1620	0.240	11:15:06	1340	0.326	11:35:06	910	0.436	12:02:06	598	0.016
	0.250	10:45:15	2019	0.384	10:49:15	1605	0.270	11:15:15	1290	0.426	11:35:15	890	0.476	12:02:15	604	0.028
	0.500	10:45:30	1965	0.492	10:49:30	1598	0.284	11:15:30	1282	0.442	11:35:30	871	0.514	12:02:30	605	0.030
1	1.000	10:46:00	1946	0.530	10:50:00	1589	0.302	11:16:00	1270	0.466	11:36:00	860	0.536	12:03:00	606	0.032
2	1.500	10:47:15	1943	0.536	10:51:15	1581	0.318	11:17:15	1255	0.496	11:37:15	845	0.566	12:04:15	608	0.036
4	2.000	10:49:00	1940	0.542	10:53:00	1573	0.334	11:19:00	1245	0.516	11:39:00	838	0.580	12:06:00	609	0.038
6	2.500	10:51:15	1937	0.548	10:55:15	1567	0.346	11:21:15	1236	0.534	11:41:15	827	0.602	12:08:15	610	0.040
9	3.000	10:54:00	1935	0.552	10:58:00	1567	0.346	11:24:00	1229	0.548	11:44:00	815	0.626	12:11:00	610.5	0.041
16	4.000	11:01:00	1931	0.560	11:03:00	1780	0.250	11:31:00	1218	0.570	11:51:00	794	0.668	12:18:00	610.5	0.041
30	5.480	11:15:00	1927	0.568	11:17:00	1774	0.262	11:45:00	1205	0.596	12:05:00	762	0.732	12:32:00	610.5	0.041
1 60.00	7.750	11:45:00	1921	0.580	11:47:00	1768	0.274	11:49:00	1536	0.408	12:15:00	1190	0.626	12:35:00	721	0.814	13:02:00	610.5	0.041
2 120.0	10.950	12:45:00	1916	0.590	12:47:00	1760	0.290	12:49:00	1527	0.426	13:15:00	1175	0.656	13:35:00	679	0.898	14:02:00	610.6	0.041
4 240.0	15.49	14:45:00	1912	0.598	14:47:00	1754	0.302	14:49:00	1518	0.444	15:15:00	1160	0.686	15:35:00	640	0.976	16:02:00	610.7	0.041
8 480.0	21.91	18:45:00	1909	0.604	18:47:00	1747	0.316	18:49:00	1511	0.458	19:15:00	1151	0.704	19:35:00	616	1.024	20:02:00	610.9	0.042
24 1440	37.95	10:45:00	1905	0.612	10:47:00	1740	0.330	10:49:00	1503	0.474	11:15:00	1128	0.750	11:35:00	590	1.076	12:02:00	610	0.040
																	UNLOADING		
Machine Correction			0.054			0.018			0.022			0.054			0.114			0.004	
Δ H (Corrected)			0.558			0.312			0.452			0.696			0.962			0.036	
Net Total Settlement			0.558			0.870			1.322			2.018			2.980			2.944	

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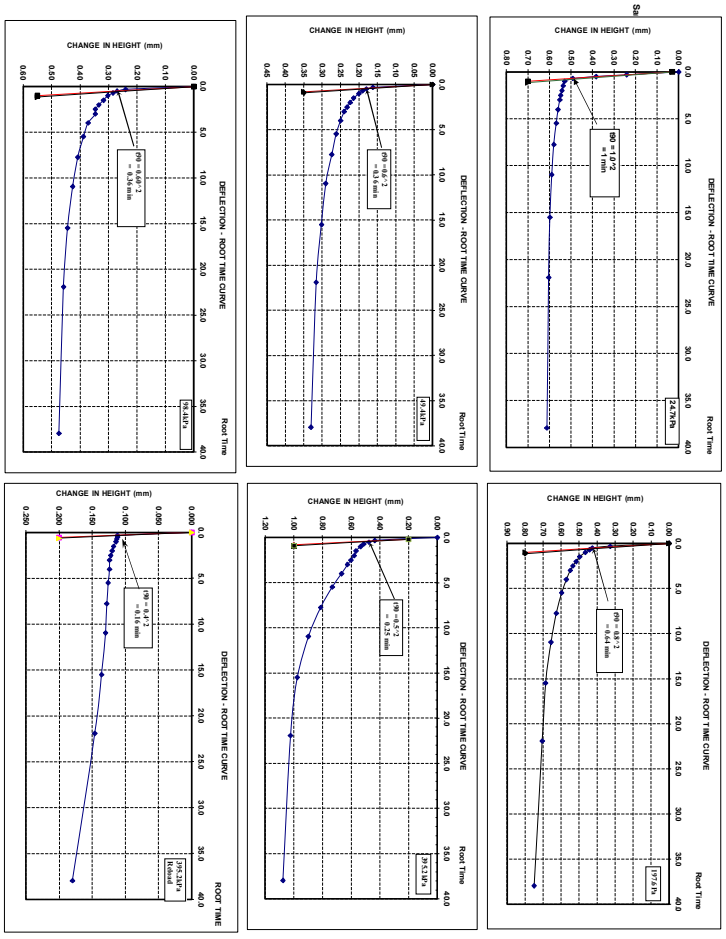
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Loading Date and Time					15/10/2015 @ 12:22hrs			16/10/2015 @ 12:40hrs														
Hanger Load					1600g			6400g														
Effective Pressure					98.6kPa			395.2kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	sec	t min	√t min	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm
		0	0	0	12:22:00	611	0.000	12:40:00	637	0.000												
		6	0.100	0.316	12:22:06	626	0.030	12:40:06	581	0.112												
		15	0.250	0.500	12:22:15	628	0.034	12:40:15	581	0.112												
		30	0.500	0.707	12:22:30	630	0.038	12:40:30	581	0.113												
	1		1.000	1.000	12:23:00	630	0.038	12:41:00	580	0.114												
	2	15	2.250	1.500	12:24:15	630.2	0.038	12:42:15	578	0.118												
	4		4.000	2.000	12:26:00	630.3	0.039	12:44:00	577	0.120												
	6	15	6.250	2.500	12:28:15	630.4	0.039	12:46:15	576	0.122												
	9		9.000	3.000	12:31:00	630.5	0.039	12:49:00	575	0.124												
	16		16.00	4.000	12:38:00	630.6	0.039	12:56:00	575	0.124												
	30		30.00	5.480	12:52:00	630.7	0.039	13:10:00	574	0.126												
1			60.00	7.750	13:22:00	630.7	0.039	13:40:00	573	0.128												
2			120.0	10.950	14:22:00	631	0.040	14:40:00	572	0.130												
4			240.0	15.49	16:22:00	634	0.046	16:40:00	569	0.136												
8			480.0	21.91	20:22:00	635	0.048	20:40:00	564	0.146												
24			1440	37.95	12:22:00	637	0.052	12:40:00	547	0.180												
								RELOADING														
Machine Correction					0.028			0.038														
△ H (Corrected)					0.024			0.142														
Net Total Settlement					2.920			3.062														

D15-19



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Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

ENTEC LIMITED
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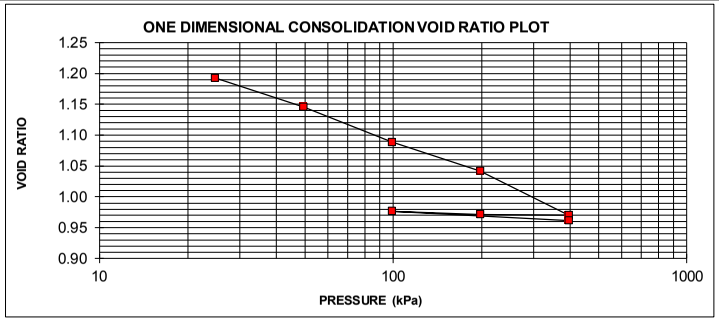
Determination of The One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Project Name:	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**Sample No:**	N 499
Client Name:	Japan International Cooperation Agency (JICA)	**Depth:**	9.50m-10.0m
Job No:	1920815	**Tested By:**	IG
Site Address :	Moala Village	**Date Tested:**	18 October 2015
Sample Location:	BH 01		

Sample Description: Silty CLAY with trace of fine shell fragments and fine sand, grey, soft, moist, medium plasticity
Sample History: Undisturbed / ~~Remoulded / Compacted / Slurried / Unknown~~
Date Sample Collected: 07/10/15 **Temperature:** Max: 27°C Min: 25°C
Loading Cycle: 24 hrs 0 mins **Height of ring:** 23.8 mm
Diameter of ring *(D)*: 44.96 mm **Area of ring *(A)*:** 1587.61 mm²
Solid density of soil particles (Q_s): 2.65 t/m³ (~~Measured~~ / Assumed)
Method used: Square root of time fitting method



			Initial		Final
Measured thickness of specimen, H		mm	H_i	23.8	H_f 20.43
Mass of ring + ~~watch glass~~ + wet specimen		g	M_3	272.73	M_4 266.41
Mass of ring + ~~watch glass~~ + dry specimen	M_5	g	249.88		
Mass of ring	M_1	g	206.07		
~~Mass of watch glass~~	M_2	g	0		
Mass of dry specimen	$M_s = M_5 - M_1 - M_2$	g	43.81		
Mass of water		g	$M_3 - M_5$	22.85	$M_4 - M_5$ 16.53
Water content, w		%	w_i	52.16	w_f 37.73
Dry density, Q_d		t/m³	Q_{di}	1.16	Q_{df} 1.35
Height of soil particles, H_s		mm	10.41		
Voids ratio, e			e_i	1.29	e_f 0.96
Degree of saturation, S			S_i	107.51	S_f 103.97

Applied Pressure *kPa*	Incremental deflection *(ΔH) mm*	Thickness of specimen *mm*	% Change in thickness *%*	Height of voids *mm*	Voids ratio	Coefficient of consolidation C_v *(m^2/yr)*	Coefficient of compressibility M_v *(m^2/MN)*
24.7	0.966	22.834	0.042	12.42	1.19	6.43	
49.4	1.454	22.346	0.065	11.93	1.15	8.87	2.47
98.8	2.050	21.750	0.094	11.34	1.09	8.40	1.74
197.6	2.536	21.264	0.119	10.85	1.04	22.31	1.08
395.2	3.282	20.518	0.160	10.10	0.97	14.42	0.70
197.6	3.268	20.532	0.159	10.12	0.97	0.00	-0.69
98.8	3.214	20.586	0.156	10.17	0.98	0.00	-1.37
395.2	3.372	20.428	0.165	10.01	0.96	72.38	0.48
0	0.00	23.800	0.000	13.39	1.29	0.00	

Tested by: IG
Date: 18 October 2015

Q.A. Check By: MK
Date: 27 October 2015

Approved By: IG
Date: 18 November 2015

ENTEC LIMITED
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Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Loading Date & Time			18/10/20135 @ 09:09hrs				19/10/2015 @ 09:37hrs				20/10/2015 @ 09:46hrs				21/10/2015 @ 09:49hrs				22/10/2015 @ 10:07hrs				23/10/2015 @ 10:21hrs			
Hanger Load			400g				800g				1600g				3200g				6400g				3200g			
Effective Pressure			24.7kPa				49.4kPa				98.8kPa				197.6kPa				395.2kPa				197.6kPa			
Time Elapsed			Clock	Dial	H		Clock	Dial	H		Clock	Dial	H		Clock	Dial	H		Clock	Dial	H		Clock	Dial	H	
hrs	min	√t min	Time/4	Gauge	x10 mm		Time/4	Gauge	x10 mm		Time/4	Gauge	x10 mm		Time/4	Gauge	x10 mm		Time/4	Gauge	x10 mm		Time/4	Gauge	x10 mm	
	0	0.00	09:09	2350	0.000		09:37	1840	0.000		9:46	1586	0.000		9:49	1276	0.000		10:07	1016	0.000		10:21	625	0.000	
	6	0.100	09:09:06	2210	0.280		09:37:06	1793	0.094		09:46:06	1540	0.092		09:49:06	1220	0.112		10:07:06	945	0.142		10:21:06	634	0.018	
	15	0.250	09:09:15	2190	0.320		09:37:15	1784	0.112		09:46:15	1520	0.132		09:49:15	1200	0.152		10:07:15	912	0.208		10:21:15	633	0.016	
	30	0.500	09:09:30	2170	0.360		09:37:30	1774	0.132		09:46:30	1506	0.160		09:49:30	1175	0.202		10:07:30	885	0.262		10:21:30	632	0.014	
	1	1.000	09:10:00	2146	0.408		09:38:00	1759	0.162		09:47:00	1484	0.204		09:50:00	1144	0.264		10:08:00	854	0.324		10:22:00	631.5	0.013	
	2	1.500	09:11:15	2086	0.528		09:39:15	1737	0.206		09:48:15	1451	0.270		09:51:15	1109	0.334		10:09:15	814	0.404		10:23:15	631	0.012	
	4	2.000	09:13:00	2044	0.612		09:41:00	1715	0.250		09:50:00	1426	0.320		09:53:00	1100	0.352		10:11:00	774	0.484		10:25:00	631.5	0.013	
	6	2.500	09:15:15	2010	0.680		09:43:15	1700	0.280		09:52:15	1405	0.362		09:55:15	1096	0.360		10:13:15	756	0.520		10:27:15	630	0.010	
	9	3.000	09:18:00	1956	0.788		09:46:00	1680	0.320		09:55:00	1390	0.392		09:58:00	1092	0.368		10:16:00	741	0.550		10:30:00	630	0.010	
	16	4.000	09:25:00	1910	0.880		09:53:00	1670	0.340		10:02:00	1371	0.430		10:05:00	1089	0.374		10:23:00	721	0.590		10:37:00	630	0.010	
	30	5.480	09:39:00	1889	0.922		10:07:00	1654	0.372		10:16:00	1353	0.466		10:19:00	1084	0.384		10:37:00	703	0.626		10:51:00	630	0.010	
1		7.750	10:09:00	1874	0.952		10:37:00	1638	0.404		10:46:00	1335	0.502		10:49:00	1080	0.392		11:07:00	680	0.672		11:21:00	630	0.010	
2		10.950	11:09:00	1865	0.970		11:37:00	1623	0.434		11:46:00	1320	0.532		11:49:00	1063	0.426		12:07:00	665	0.702		12:21:00	630	0.010	
4		15.49	13:09:00	1856	0.988		13:37:00	1608	0.464		13:46:00	1305	0.562		13:49:00	1047	0.458		14:07:00	643	0.746		14:21:00	630.5	0.011	
8		21.91	17:09:00	1850	1.000		17:37:00	1596	0.488		17:46:00	1292	0.588		17:49:00	1032	0.488		18:07:00	633	0.766		18:21:00	632	0.014	
24		37.95	09:09:00	1840	1.020		09:37:00	1586	0.508		09:46:00	1276	0.620		09:49:00	1016	0.520		10:07:00	625	0.782		10:21:00	634	0.018	
																							UNLOADING			
Machine Correction				0.054				0.020				0.024				0.034				0.036				0.004		
Δ H (Corrected)				0.966				0.488				0.596				0.486				0.746				0.014		
Net Total Settlement				0.966				1.454				2.050				2.536				3.282				3.268		

ENTEC LIMITED
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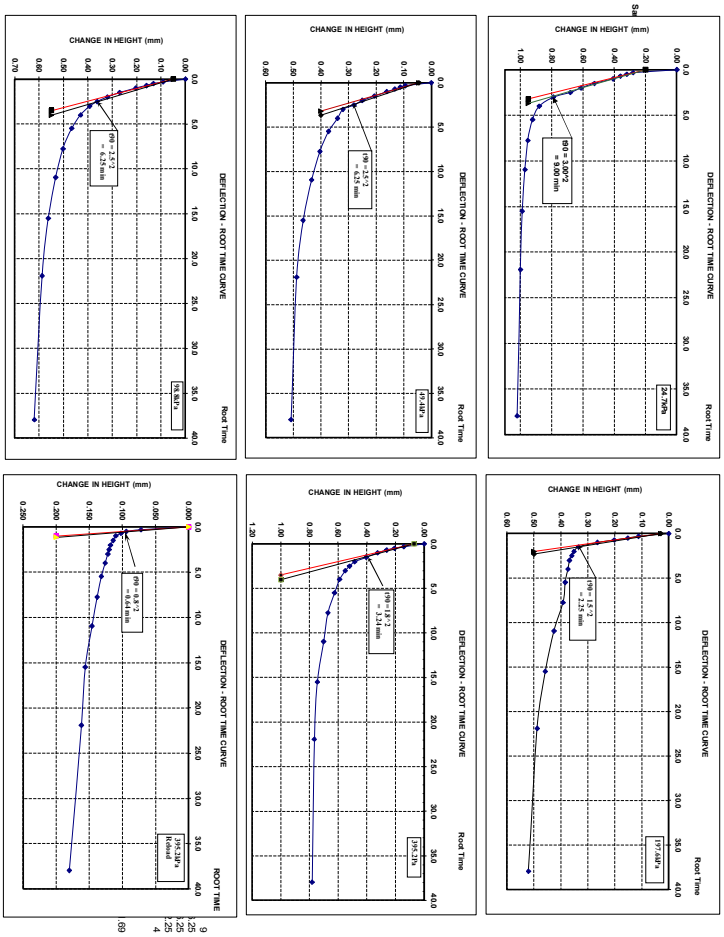
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Loading Date and Time					24/10/2015 @ 10:29hrs			25/10/2015 @ 1058hrs															
Hanger Load					1600g			6400g															
Effective Pressure					98.8kPa			395.2kPa															
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	
hrs	min	sec	t min	√t min	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	
		0	0	0	10:29	634	0.000	10:58	666	0.000													
		6	0.100	0.316	10:29:06	645	0.022	10:58:06	630	0.072													
		15	0.250	0.500	10:29:15	647	0.026	10:58:15	619	0.094													
		30	0.500	0.707	10:29:30	649	0.030	10:58:30	615	0.102													
	1		1.000	1.000	10:30:00	651	0.034	10:59:00	611	0.110													
	2	15	2.250	1.500	10:31:15	653	0.038	11:00:15	609	0.114													
	4		4.000	2.000	10:33:00	654	0.040	11:02:00	607	0.118													
	6	15	6.250	2.500	10:35:15	654.5	0.041	11:04:15	606	0.120													
	9		9.000	3.000	10:38:00	655	0.042	11:07:00	605	0.122													
	16		16.00	4.000	10:45:00	656	0.044	11:14:00	603	0.126													
	30		30.00	5.480	10:59:00	656.5	0.045	11:28:00	600	0.132													
1			60.00	7.750	11:29:00	658	0.048	11:58:00	597	0.138													
2			120.0	10.950	12:29:00	658.5	0.049	12:58:00	593	0.146													
4			240.0	15.49	14:29:00	660	0.052	14:58:00	588	0.156													
8			480.0	21.91	18:29:00	661	0.054	18:58:00	585	0.162													
24			1440	37.95	10:29:00	666	0.064	10:58:00	576	0.180													
					UNLOADING			RELOADING															
Machine Correction					0.01			0.022															
△ H (Corrected)					0.054			0.158															
Net Total Settlement					3.214			3.372															



ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand, dark grey, very loose	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N510 BH01 2.00m - 2.50m

Moisture Content	%						
Container No.	g	27	26				
Mass of Container	g	14.28	15.01				
Mass of Container + Wet Soil	g	27.31	21.92				
Mass of Container + Dry Soil	g	23.95	20.09				
Mass of Dry Soil	g	9.67	5.08				
Mass of Moisture	g	3.36	1.83				
Moisture Content	%	34.75	36.02				35.39

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace clay, dark grey, very soft to soft, medium to high plasticity with trace of shell fragments	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N498 BH01 8.00m - 8.50m

Moisture Content	%						
Container No.	g	72	78				
Mass of Container	g	86.34	78.57				
Mass of Container + Wet Soil	g	141.89	133.55				
Mass of Container + Dry Soil	g	122.00	113.69				
Mass of Dry Soil	g	35.66	35.12				
Mass of Moisture	g	19.89	19.86				
Moisture Content	%	55.78	56.55				56.16

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace of occassionally fine siltstone nodules, dark grey, very soft to soft, medium to high plasticity.	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N499 BH01 9.50m - 10.00m

Moisture Content	%						
Container No.	g	3	130				
Mass of Container	g	52.42	11.73				
Mass of Container + Wet Soil	g	100.90	25.40				
Mass of Container + Dry Soil	g	83.58	20.68				
Mass of Dry Soil	g	31.16	8.95				
Mass of Moisture	g	17.32	4.72				
Moisture Content	%	55.58	52.74				54.16

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand, dark grey, very soft to soft, medium to high plasticity.	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N 500 BH01 11.00m - 11.50m

Moisture Content	%						
Container No.	g	70	68				
Mass of Container	g	90.10	74.10				
Mass of Container + Wet Soil	g	132.70	134.07				
Mass of Container + Dry Soil	g	117.21	112.00				
Mass of Dry Soil	g	27.11	37.90				
Mass of Moisture	g	15.49	22.07				
Moisture Content	%	57.14	58.23				57.68

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace clay, dark grey, very soft to soft, medium to high plasticity with trace of fine sand.	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N 501 BH01 12.50m - 13.00m

Moisture Content	%						
Container No.	g	77	82				
Mass of Container	g	99.34	90.15				
Mass of Container + Wet Soil	g	144.09	142.90				
Mass of Container + Dry Soil	g	128.48	124.79				
Mass of Dry Soil	g	29.14	34.64				
Mass of Moisture	g	15.61	18.11				
Moisture Content	%	53.57	52.28				52.92

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with some clay, fine sand and trace of organics,pale grey, firm, high plasticity.	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N502 BH01 14.00m - 14.45m

Moisture Content	%						
Container No.	g	63	73				
Mass of Container	g	102.00	70.13				
Mass of Container + Wet Soil	g	139.03	132.49				
Mass of Container + Dry Soil	g	128.00	114.22				
Mass of Dry Soil	g	26.00	44.09				
Mass of Moisture	g	11.03	18.27				
Moisture Content	%	42.42	41.44				41.93

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT trace of minor clay and trace of organics, grey brown, firm, medium plasticity.	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N 504 BH01 18.50m - 18.90m

Moisture Content	%						
Container No.	g	79	65				
Mass of Container	g	86.64	82.05				
Mass of Container + Wet Soil	g	125.14	128.06				
Mass of Container + Dry Soil	g	111.85	112.29				
Mass of Dry Soil	g	25.21	30.24				
Mass of Moisture	g	13.29	15.77				
Moisture Content	%	52.72	52.15				52.43

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT trace of minor clay and trace of organics, grey brown, firm, medium plasticity.	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N 505 BH01 20.00m - 20.50m

Moisture Content	%						
Container No.	g	74	64				
Mass of Container	g	86.64	82.03				
Mass of Container + Wet Soil	g	130.86	129.05				
Mass of Container + Dry Soil	g	112.69	110.00				
Mass of Dry Soil	g	26.05	27.97				
Mass of Moisture	g	18.17	19.05				
Moisture Content	%	69.75	68.11				68.93

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: Silty CLAY, pale brown,stiff, medium to high plasticity.	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N506 BH01 23.00m - 23.50m

Moisture Content	%						
Container No.	g	85	84				
Mass of Container	g	88.75	84.97				
Mass of Container + Wet Soil	g	136.72	130.37				
Mass of Container + Dry Soil	g	124.54	118.95				
Mass of Dry Soil	g	35.79	33.98				
Mass of Moisture	g	12.18	11.42				
Moisture Content	%	34.03	33.61				33.82

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 09 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: Sandy fine to coarse GRAVEL with trace of silt, very dense, gravel is sub rounded to angular	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N507 BH01 24.50m - 25.00m

Moisture Content	%						
Container No.	g	69	67				
Mass of Container	g	90.25	72.11				
Mass of Container + Wet Soil	g	133.66	135.98				
Mass of Container + Dry Soil	g	128.93	128.75				
Mass of Dry Soil	g	38.68	56.64				
Mass of Moisture	g	4.73	7.23				
Moisture Content	%	12.23	12.76				12.50

Tested By:KB
Date:09 October 2015

Q.A. Checked By: UM
Date:13 October 2015

Approved By: IG
Date:18 November 2015

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Determination of Permeability of a Soil
Constant Head Method for Remoulded Sample

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: IG/UM
MATERIAL TYPE & DESCRIPTION	: Silty fine SAND, dark grey, very loose	**TEST METHOD**	: AS 1289.6.7.3-2001
		SAMPLE No.	: N497 (BH01 3.50m - 4.00m)

Total Weight : -
Weight Retained on : -
Percentage retained: : -

MOISTURE CONTENT

Container No.		7
Mass of Container	g	52.76
Mass of Container + Wet	g	82.41
Mass of Container + Dry	g	74.03
Mass of Dry Soil	g	21.27
Mass of Moisture	g	8.38
Moisture Content	%	39.40
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1660
Volume of Speciman	cm^3	869.59
Wet Density	t/m^3	1.91
Dry Density	t/m^3	1.37
Maximum Dry Density	t/m^3	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm^2	113.10
Cross sectional area of soil speciman(8cm)	cm^2	50.27
Length of soil speciman	cm	17.30

Surcharge - 920g

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(°c)	KT cm/min	K_{20} cm/min
1	120	4.00	68	26	0.05	0.04
2	120	4.00	71	26	0.05	0.04
3	120	4.00	71	26	0.05	0.04
4	110	4.00	60	26	0.05	0.04
5	110	4.00	59	26	0.05	0.04
6	110	4.00	58	26	0.05	0.04
7	100	4.00	49	26	0.04	0.04
8	100	4.00	48	26	0.04	0.04
9	100	4.00	47	26	0.04	0.04
10	95	4.00	46	26	0.04	0.04
11	95	4.00	45	26	0.04	0.04
12	95	4.00	43	26	0.04	0.03

Average K_{20} m/s	6.47E-06

Tested By: IG
Date: 13 October 2015

Q.A. Check By: MK
Date: 16 October 2015

Approved By: IG
Date:18 November 2015

Form: GE-L-03

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE TESTED**	: 11 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: IG
SAMPLE LOCATION	: BH 01 3.50m - 4.00m	**MATERIAL TYPE**	: Silty fine SAND, dark grey, very loose.
TEST NUMBER	: N 496		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	92
	Mass of Container	g	91.43
	Mass of Container + Wet Soil	g	529.94
	Mass of Container + Dry Soil	g	391.67
	Mass of Dry Soil	g	300.24
	Mass of Moisture	g	138.27
	Moisture Content	%	46.05

Bulk Density	Sample No.	-	N 496
	Diameter of Specimen	mm	55.00
	Initial area of specimen Ao (π/4 d^2)	mm^2	2374.63
	Initial length of specimen Lo	mm	110.00
	Initial mass of specimen Mi	g	439.15
	Bulk Density ρ	t/m^3	1.68
	Dry Density ρd	t/m^3	1.15

Compression Gauge Reading	**Load Gauge Reading**	**Load**	**Strain ε= Cn - Co / Lo**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference σ1 - σ3 = 1000P/A**
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002375	0.00
0.50	12	0.0240	0.455	0.002385	10.06
1.00	24.0	0.0481	0.909	0.002396	20.07
1.50	28.0	0.0562	1.364	0.002407	23.34
2.00	30.0	0.0602	1.818	0.002419	24.89
2.50	20.0	0.0401	2.273	0.002430	16.50
3.30	0.0	0	3.000	0.002448	0.00

Tested by : IG	Q.A. Check by : LN	Approved by : IG
Date : 11 October 2015	Date : 14 October 2015	Date : 18 November 2015

Form GE-L-10

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DESCRIPTION: Silty fine SAND, dark grey, very loose.
LOCATION: BH 01 3.50m - 4.00m
DATE OF TEST : 11 October 2015

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	10 October 2015
SITE ADDRESS	:	Site one, Moala Village	**TECHNOLOGIST**	:	IG
SAMPLE LOCATION	:	BH 01 9.50m - 10.00m	**MATERIAL TYPE**	:	SILT with trace clay, dark grey, very soft to soft, medium to high plasticity with occassional fine siltstone nodules
TEST NUMBER	:	N 499			

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / OVEN - DRIED / ~~UNKNOWN~~

Moisture Content	Container No.	-	96
	Mass of Container	g	101.34
	Mass of Container + Wet Soil	g	422.01
	Mass of Container + Dry Soil	g	307.75
	Mass of Dry Soil	g	206.41
	Mass of Moisture	g	114.26
	Moisture Content	%	55.36

Bulk Density	Sample No.	-	N 499
	Diameter of Specimen	mm	56.00
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2461.76
	Initial length of specimen Lo	mm	111.00
	Initial mass of specimen Mi	g	413.12
	Bulk Density ρ	t/m³	1.51
	Dry Density ρd	t/m³	0.97

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\varepsilon = \frac{Cn - Co}{Lo}$	Corrected Area $A = Ao / 1-\varepsilon$	Principal Stress Difference σ1 - σ3 = 1000P/A
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002462	0.00
0.50	10.0	0.0200	0.450	0.002473	8.09
1.00	16.0	0.0321	0.901	0.002484	12.92
1.50	21.0	0.0421	1.351	0.002495	16.87
2.00	25.0	0.0502	1.802	0.002507	20.02
2.50	29.0	0.0582	2.252	0.002518	23.11
3.00	33.0	0.0662	2.703	0.002530	26.16
3.50	36.0	0.0722	3.153	0.002542	28.40
4.00	38.0	0.0763	3.604	0.002554	29.88
4.50	40.0	0.0803	4.054	0.002566	31.30
5.00	41.0	0.0823	4.505	0.002578	31.93
5.50	42.0	0.0843	4.955	0.002590	32.55
6.00	43.0	0.0863	5.405	0.002602	33.16
7.00	44.0	0.0883	6.306	0.002627	33.61
7.50	44.5	0.0893	6.757	0.002640	33.82
8.00	44.0	0.0883	7.207	0.002653	33.28
8.50	43.0	0.0863	7.658	0.002666	32.37
9.00	41.0	0.0823	8.108	0.002679	30.72
9.50	40.0	0.0803	8.559	0.002692	29.83
10.00	38.0	0.0763	9.009	0.002705	28.20
10.50	35.0	0.0702	9.459	0.002719	25.82
11.00	32.0	0.0642	9.910	0.002733	23.49

Tested by : IG	Q.A. Check by : LN	Approved by : IG
Date : 10 October 2015	Date : 14 October 2015	Date : 18 November 2015

LOCATION: BH 01 9.50m - 9.80m
DATE OF TEST :10 October 2015

DESCRIPTION: SILT with trace clay, dark grey, very soft to soft, medium to high plasticity with occassional fine siltstone nodules

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	: 13 October 2015
SITE ADDRESS	: BH01, Moala Village, Nadi	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH 01 3.50m - 4.00m	**MATERIAL TYPE & LOCATION**	: Silty fine SAND, dark grey, very loose.
TEST NUMBER	: N 496		

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	56	60	SPLIT SAMPLE
	Mass of Container	g	62.63	62.89	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	96.53	95.73	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	85.59	85.38	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	22.96	22.49	
	Mass of Moisture	g	10.94	10.35	
	Moisture Content	%	47.65	46.02	
	Average Moisture Content	%	46.83		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	348.13
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	237.09

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm		N/A	0.00	100.00	150	200
1.18 mm	0.50	N/A	0.21	99.79	100	200
0.600 mm	1.30	N/A	0.55	99.24	80	200
425 µm	0.90	N/A	0.38	98.86	70	200
300 µm	1.20	N/A	0.51	98.36	60	200
150 µm	3.20	N/A	1.35	97.01	40	200
75 µm	4.90	N/A	2.07	94.94	25	200
Passing 75 µm	225.09	N/A	94.94	0.00	-	-
Pan Total	237.09	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by : RK	Q.A. Checked by : LN	Approved by : IG
Date : 13 October 2015	Date :15 October 2015	Date : 18 November 2015

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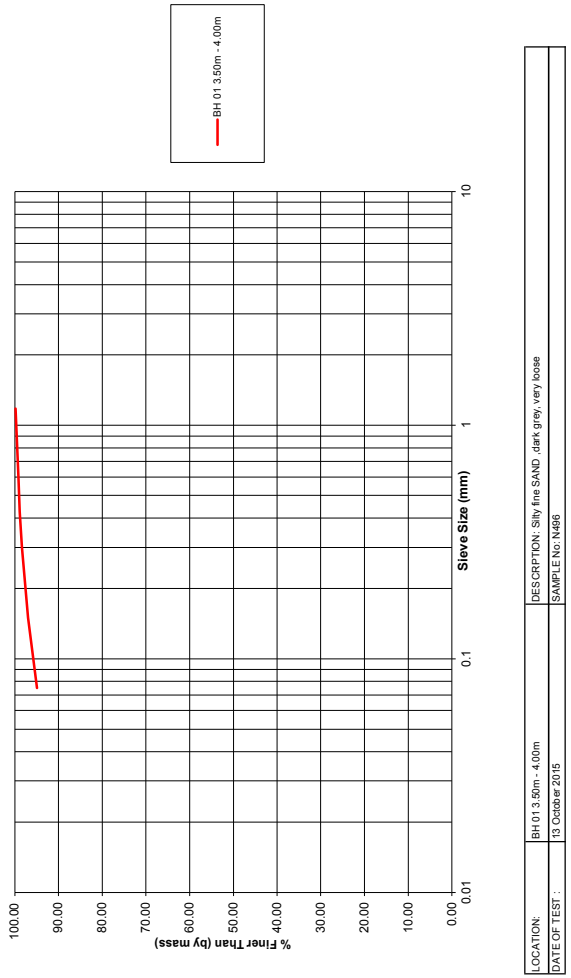
Geotechnical Engineering Investigation for Nadi River Basin



LOCATION:	BH 01 3.50m - 4.00m
DATE OF TEST :	13 October 2015
DESCRIPTION:	Silty fine SAND, dark grey, very loose
SAMPLE No:	N486

Form GE-L-06

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	10 October 2015
SITE ADDRESS	:	BH01, Moala Village, Nadi	**TECHNOLOGIST**	:	KB/TL
SAMPLE LOCATION	:	BH 01 6.50m - 7.00m	**MATERIAL TYPE & LOCATION**	:	Silt with trace of clay, dark grey, very soft to soft, medium to high plasticity.
TEST NUMBER	:	N 509			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	57	58	SPLIT SAMPLE
	Mass of Container	g	63.42	62.66	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	115.13	113.69	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	96.72	95.45	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	33.30	32.79	
	Mass of Moisture	g	18.41	18.24	
	Moisture Content	%	55.29	55.63	
	Average Moisture Content	%	55.46		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil	
Total Wet Weight (M_w)	g	353.45	
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
	M_T =	227.36	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm	0.51	N/A	0.22	99.78	250	200
2.36 mm	0.94	N/A	0.41	99.36	150	200
1.18 mm	1.09	N/A	0.48	98.88	100	200
0.600 mm	1.55	N/A	0.68	98.20	80	200
425 µm	1.27	N/A	0.56	97.64	70	200
300 µm	1.92	N/A	0.84	96.80	60	200
150 µm	11.14	N/A	4.90	91.90	40	200
75 µm	35.66	N/A	15.68	76.21	25	200
Passing 75 µm	173.28	N/A	76.21	0.00	-	-
Pan Total	227.36	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by : KB	Q.A. Checked by :LN	Approved by : IG
Date : 10 October 2015	Date :14 October 2015	Date : 18 November 2015

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Geotechnical Engineering Investigation for Nadi River Basin

Form GE-L-06

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	09 October 2015
SITE ADDRESS	:	BH01, Moala Village, Nadi	**TECHNOLOGIST**	:	TL/KB
SAMPLE LOCATION	:	BH 01 14.00m - 14.45m	**MATERIAL TYPE & LOCATION**	:	Silt with some clay, fine sand, trace of organics, pale grey, firm, high plasticity.
TEST NUMBER	:	N 502			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	59	61	SPLIT SAMPLE
	Mass of Container	g	63.69	62.22	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	96.71	96.82	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	85.58	85.00	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	21.89	22.78	
	Mass of Moisture	g	11.13	11.82	
	Moisture Content	%	50.85	51.89	
	Average Moisture Content	%	51.37		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	360.72
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	238.31	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm	6.64	N/A	2.79	97.21	250	200
2.36 mm	2.51	N/A	1.05	96.16	150	200
1.18 mm	2.66	N/A	1.12	95.04	100	200
0.600 mm	3.96	N/A	1.66	93.38	80	200
425 µm	4.10	N/A	1.72	91.66	70	200
300 µm	7.84	N/A	3.29	88.37	60	200
150 µm	32.33	N/A	13.57	74.81	40	200
75 µm	46.31	N/A	19.43	55.37	25	200
Passing 75 µm	131.96	N/A	55.37	0.00	-	-
Pan Total	238.31	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by : TL/KB	Q.A. Checked by : LN	Approved by : IG
Date : 09 October 2015	Date :15 October 2015	Date :18 November 2015

LOCATION:	BH 01 14.00m - 14.45m	DESCRIPTION:	Silt with some clay, fine sand,trace of organics,pale grey,firm, high plasticity.
DATE OF TEST :	09 October 2015	SAMPLE No:	N 502

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Geotechnical Engineering Investigation for Nadi River Basin

Form GE-L-06

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	09 October 2015
SITE ADDRESS	:	BH01, Moala Village, Nadi	**TECHNOLOGIST**	:	KB/TL
SAMPLE LOCATION	:	BH 01 17.00m - 17.40m	**MATERIAL TYPE & LOCATION**	:	Silt with trace of minor clayand trace of organics, grey brown, firm, medium plasticity
TEST NUMBER	:	N 503			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

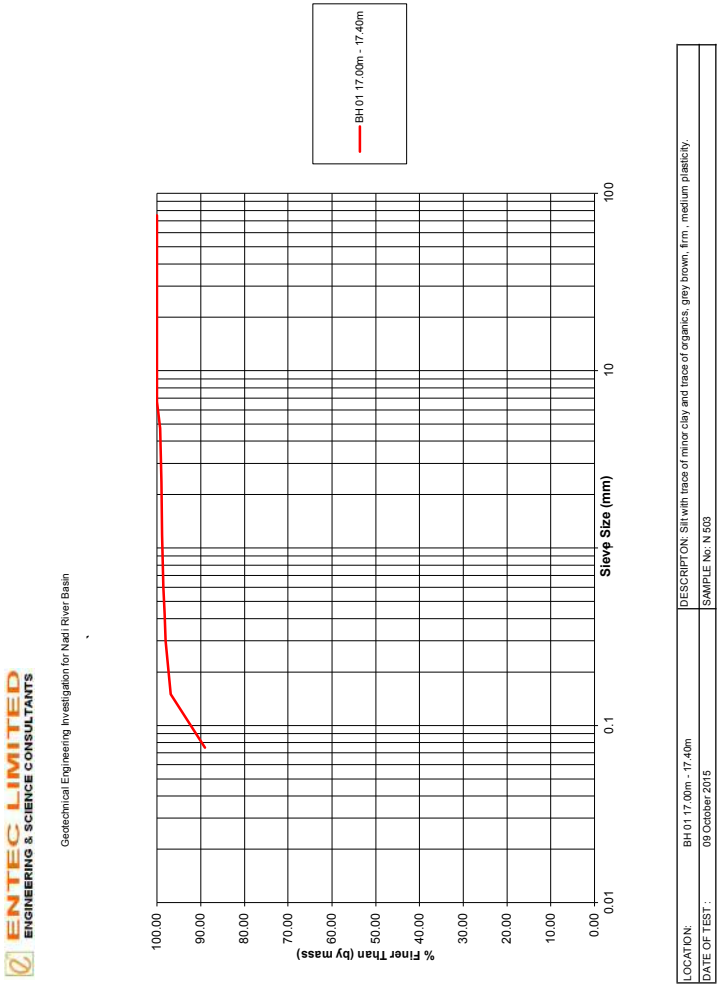
Moisture Content (Material passing 19mm)	Container No.	-	66	81	SPLIT SAMPLE
	Mass of Container	g	90.96	87.45	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	133.68	130.89	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	118.95	115.90	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	27.99	28.45	
	Mass of Moisture	g	14.73	14.99	
	Moisture Content	%	52.63	52.69	
	Average Moisture Content	%	52.66		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)		g	Nil
Total Wet Weight (M_w)		g	364.65
Total Mass of dry sample (M_T)		$M_T = \frac{100M_w}{100 + w}$	
	M_T =	238.87	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm	1.81	N/A	0.76	99.24	250	200
2.36 mm	0.76	N/A	0.32	98.92	150	200
1.18 mm	0.24	N/A	0.10	98.82	100	200
0.600 mm	0.67	N/A	0.28	98.54	80	200
425 µm	0.59	N/A	0.25	98.30	70	200
300 µm	0.81	N/A	0.34	97.96	60	200
150 µm	2.65	N/A	1.11	96.85	40	200
75 µm	18.78	N/A	7.86	88.99	25	200
Passing 75 µm	212.56	N/A	88.99	0.00	-	-
Pan Total	238.87	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :KB	Q.A. Checked by :LN	Approved by : IG
Date : 09 October 2015	Date :15 October 2015	Date :18 November 2015



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Geotechnical Engineering Investigation for Nadi River Basin

Form GE-L-06

ENTEC LIMITED
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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	09 October 2015
SITE ADDRESS	:	BH01, Moala Village, Nadi	**TECHNOLOGIST**	:	KB/TL
SAMPLE LOCATION	:	BH 01 23.00m - 23.50m	**MATERIAL TYPE & LOCATION**	:	Silty CLAY, pale brown ,stiff, medium to high plasticity.
TEST NUMBER	:	N 506			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	60	56	SPLIT SAMPLE
	Mass of Container	g	62.90	62.60	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	98.90	97.19	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	90.09	88.57	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	27.19	25.97	
	Mass of Moisture	g	8.81	8.62	
	Moisture Content	%	32.40	33.19	
	Average Moisture Content	%	32.80		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	365.99
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	275.60

Test Sieve Size mm	Mass of Dry Soil Retained (M_5)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm	0.57	N/A	0.21	99.79	150	200
1.18 mm	1.48	N/A	0.54	99.26	100	200
0.600 mm	1.70	N/A	0.62	98.64	80	200
425 µm	0.93	N/A	0.34	98.30	70	200
300 µm	3.56	N/A	1.29	97.01	60	200
150 µm	29.15	N/A	10.58	86.43	40	200
75 µm	35.05	N/A	12.72	73.72	25	200
Passing 75 µm	203.16	N/A	73.72	0.00	-	-
Pan Total	275.60	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :KB	Q.A. Checked by :LN	Approved by : IG
Date : 09 October 2015	Date :14 October 2015	Date :18 November 2015

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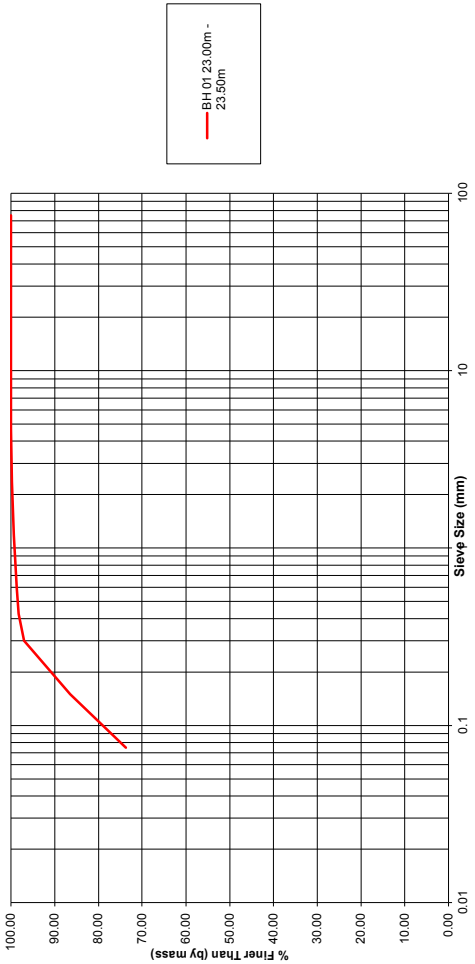
Geotechnical Engineering Investigation for Nadi River Basin



LOCATION:	BH 01 23.00m - 23.50m
DATE OF TEST :	09 October 2015
DESCRIPTION:	Silty CLAY,pale brown, stiff, medium to high plasticity
SAMPLE No:	N 506

Form GE-L-06

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	12 October 2015
SITE ADDRESS	:	BH01, Moala Village, Nadi	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH 01 26.00m - 26.50m	**MATERIAL TYPE & LOCATION**	:	Sandy fine to coarse GRAVEL in silty clay matrix, pale brown, dense
TEST NUMBER	:	N 508			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

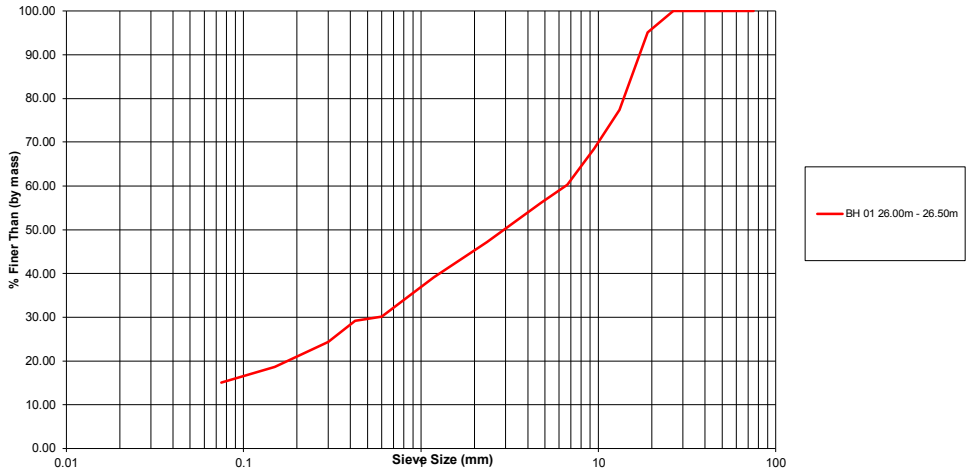
Moisture Content (Material passing 19mm)	Container No.	-	14	15	SPLIT SAMPLE
	Mass of Container	g	53.54	52.65	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	77.52	78.98	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	73.73	75.22	Spliting Factor M_3 / M_4
	Mass of Dry Soil	g	20.19	22.57	
	Mass of Moisture	g	3.79	3.76	
	Moisture Content	%	18.77	16.66	
	Average Moisture Content	%	17.72		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	294.78
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	250.42

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm	12.26	N/A	4.90	95.10		200
13.2 mm	44.49	N/A	17.77	77.34	600	300
9.50 mm	22.14	N/A	8.84	68.50	450	300
6.70 mm	20.57	N/A	8.21	60.28	300	300
4.75 mm	10.46	N/A	4.18	56.11	250	200
2.36 mm	22.25	N/A	8.89	47.22	150	200
1.18 mm	20.30	N/A	8.11	39.11	100	200
0.600 mm	22.43	N/A	8.96	30.16	80	200
425 µm	2.46	N/A	0.98	29.17	70	200
300 µm	12.09	N/A	4.83	24.35	60	200
150 µm	14.37	N/A	5.74	18.61	40	200
75 µm	8.85	N/A	3.53	15.07	25	200
Passing 75 µm	37.75	N/A	15.07	0.00	-	-
Pan Total	250.42	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by :LN	Approved by : IG
Date : 12 October 2015	Date :14 October 2015	Date : 18 November 2015



LOCATION:	BH 01 26.00m - 26.50m	DESCRIPTION:Sandy fine to coarse GRAVEL in silty clay matrix, pale brown, dense
DATE OF TEST :	12 October 2015	SAMPLE No: N 508

APPENDIX 1d
Site Photos

APPENDIX 2

SITE 2 - Navo, Nadi, Fiji.

APPENDIX 2a

Test Locality Plan

APPENDIX 2b

Engineering Borehole Log and Core Photos

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Navo Nadi Town	**BH02**
Job No.: 1920815	Start Date: 08-10-2015 Finish Date: 08-10-2015	Ground Level (m): 4.90	Co-Ordinates (): E 1858075.5 N 3910289.7
Client: JICA Study Team		Hole Depth: 20.00 m	Sheet: 1 of 5

Column headings: Type | Run | Fluid & Water | Piezometer | Geological Description (Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.) | Legend | Weathering (RS CW HW MW SW UW) | Field Strength (VS/VL S/L F/MD St/D VSt/VD H/EW VW W MS S VS ES) | Elevation (m) | Depth (m) | Symbolic Log | Defect Spacing (mm) (500 100) | Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc) | TCR (SCR) RQD (%) | Samples | Tests

Geological Description	Elevation (m, base of layer)
Gravelly SILT trace of clay, soft, moist, low to medium plasticity	+3.00
Silty CLAY minor traces of root fibres, brown, firm, moist, high plasticity	+1.90
Silty CLAY , pale brown, firm, moist, high plasticity	+1.40
Silty CLAY traces of root fibres, brown, firm, moist, high plasticity	+0.90
Silty CLAY with trace of root fibres, red brown, medium to high plasticity	+0.60
Silty CLAY with trace of ironstone, brown molted grey	-0.10

Depth (m): 1, 2, 3, 4

TCR (SCR) RQD (%)	Samples	Tests
60		P= 25 kPa
		P= 10 kPa
	1.00	SPT 1.00 m N=7
60		P= 10 kPa
	2.00	SPT 2.00 m N=1
		P= 80 kPa
70		P= 100 kPa
		P= 100 kPa
	3.50 - 4.00 PT	P= 60 kPa
85		P= 60 kPa
		P= 120 kPa

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH02.GPJ <<DrawingFile>> 04-12-2015 10:56 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Navo Nadi Town	**BH02**
Job No.: 1920815	Start Date: 08-10-2015 Finish Date: 08-10-2015	Ground Level (m): 4.90	Co-Ordinates (): E 1858075.5 N 3910289.7
Client: JICA Study Team		Hole Depth: 20.00 m	Sheet: 2 of 5

Geological Description	Elevation (m, base of layer)
Clayey SILT with traces of fine sand, pale brown, very soft to soft, moist, medium plasticity	-0.60
SILT with fine sand, plae brown	-1.10
Clayey SILT, black, soft to very soft, low to medium plasticity	-1.30
Clayey organic SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity	-5.10

Depth (m): 6, 7, 8, 9

TCR (SCR) RQD (%)	Samples	Tests
	5.00	SPT 5.00 m N=0
		P= 10 kPa
97		P= 25 kPa
		P= 25 kPa
	6.50 - 7.00 PT	P= 10 kPa
90		P= 5 kPa
		P= 15 kPa
	8.00	SPT 8.00 m N=0
		P= 10 kPa
83		P= 15 kPa
		P= 15 kPa
100	9.50 - 10.00 PT	

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH02.GPJ <<DrawingFile>> 04-12-2015 10:56 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Navo Nadi Town	BH02

Job No.:	Start Date: 08-10-2015 Finish Date: 08-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		4.90	E 1858075.5 N 3910289.7

Client:	Hole Depth:	Sheet:
JICA Study Team	20.00 m	3 of 5

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity, sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.		RS CW MW SW FW	VL L M S VS H	-5.70	11		500 100		100		P= 35 kPa
				Silty CLAY with trace of siltstone nodles, dark grey											P= 155 kPa
				Silty CLAY, red brown molted grey, medium to high plasticity											P= 195 kPa SPT 11.00 m N=22
								-7.30	12				72		P= 180 kPa
															P= 195 kPa
				Silty CLAY, red brown molted grey with iron stain, medium to high plasticity				-8.60	13				72		P= 200 kPa SPT 12.50 m N=25
															P= 100 kPa
				Silty CLAY with trace of some gravel, organic brown molted grey, medium to high plasticity				-9.10	14				80		P= 75 kPa
				Clayey fine to medium SAND with trace of some gravel, brown black				-10.10							P= 150 kPa SPT 14.00 m N=52

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Navo Nadi Town	BH02

Job No.:	Start Date: 08-10-2015 Finish Date: 08-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		4.90	E 1858075.5 N 3910289.7

Client:	Hole Depth:	Sheet:
JICA Study Team	20.00 m	4 of 5

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity, sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.		RS CW MW SW FW	VL L M S VS H	-11.10	16		500 100		80		SPT 15.50 m N=50
				Highly to completely weathered CONGLOMERATE, extremely weak to very weak, brown (silty fine to medium sand with some fine to medium gravel, subangular)											
				Fine to medium SANDSTONE , grey green, weak to very weak				-13.00	17				100 (60) 87		SPT 17.00 m N=50
				Fine to medium SANDSTONE with trace of gravel, grey green, weak to very weak				-13.80	18				93 (82) 40		SPT 18.50 m N=50
				Sandstone CONGLOMERATE, fine to medium gravel, highly to moderately weathered, very weak to weak				-15.10	19				100 (87) 27		

Hole Terminated at 20.00 m
N = Standard Penetration Test
Logged to NZGS 'Field description of soil & rock' December 2005

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

Borehole 2 Core Photos (0.00m to 20.0m)

0.00m to 3.50m

3.50m to 6.10m

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Navo Nadi Town	No.: **BH02**
Job No.: 1920815	Start Date: 08-10-2015 Finish Date: 08-10-2015	Ground Level (m): 4.90	Co-Ordinates (): E 1858075.5 N 3910289.7
Client: JICA Study Team	Hole Depth: 20.00 m		Sheet: 5 of 5

Geological Description

Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit.
Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.

Weathering: RS, XW, HW, MW, SW, FW

Field Strength: VL, L, M, H, VH, EH

Defect Spacing (mm): 500, 100

TCR SCR RQD (%)

Depth (m): 21, 22, 23, 24

Samples: 20.00

Tests: SPT 20.00 m N=50

Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

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6.10m to 9.30m

9.30m to 12.2m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 2,Navo Nadi Town, Fiji.

12.20m to 15.50m

15.50m to 18.30m

18.30m to 20.00m

APPENDIX 2c

Laboratory Test Schedule and Laboratory Test Results

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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : Site 02, Navo Area
PROJECT NUMBER :1920815
TEST RESTULTS REQUIRED BY:

Lab test Schedule

Project No.	Site	Soil Type	Sample type	SPT N value	Depth (m)	Lab Tests Required				
						Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation
1920815.02	Site 2	Gravelly SILT	SPT	11	1.0-1.5			1	1			
		Silty Clay	SPT	11	2.0 - 2.5					1		
		Silty Clay	U		3.5 - 4.0		1	1	1		1	1
		Silty Clay	SPT	0	5.0-5.5							
		Silty Clay	U		6.5 - 7.0		1	1	1	1	1	1
		Silty Clay	U		9.5-10.0		1	1	1		1	1
		Completely weathered limestone, Clay	SPT	22	11.0-11.5			1	1			
		Silty Clay	SPT	30	12.5-13.0			1		1		
		Completely weathered limestone	SPT	52	14.0-14.5			1	1			
		Completely weathered limestone	SPT	R	15.5-16.0	1		1	1			
		Unweathered, sedimentary, volcanic	SPT	R	16.55 - 17.0							
		Unweathered conglemate	SPT	R	18.05 - 18.5			1				
		Unweathered conglemate	SPT	R	19.55 - 20.0							
			core sample		19 - 19.3						1	
	TOTALS				BOQ	1	3	10	6	3	4	3
						1	3	10	6	3	3	3

Turn around time for results - Two Bore hole results per week except consolidation test results

Lab Testing Schedule to be sent with samples

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	:1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	:13 October 2015
SITE ADDRESS	: BH02, Navo Nadi Town	**TECHNOLOGIST**	:RK
MATERIAL TYPE & DESCRIPTION	: Silty, CLAY, minor traces of root fibres, brown, firm, moist, high plasticity.	**TEST METHOD**	:NZS 4402:1986 (amended version)
		SAMPLE No.	N512 (BH02 2.00m - 2.50m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	92	95				
Mass of Container	g	91.40	89.87				
Mass of Container + Wet Soil	g	128.64	122.22				
Mass of Container + Dry Soil	g	120.58	115.31				
Mass of Dry Soil	g	29.18	25.44				
Mass of Moisture	g	8.06	6.91				
Moisture Content	%	27.62	27.16				27.39

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		38	39				
Mass of Container	g	14.79	14.21				
Mass of Container + Wet Soil	g	20.58	20.46				
Mass of Container + Dry Soil	g	19.00	18.74				
Mass of Dry Soil	g	4.21	4.53				
Mass of Moisture	g	1.58	1.72				
Moisture Content	%	37.53	37.97				37.75

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	36	30	25	20	15
Container No.		18	19	22	23	24	25
Mass of Container	g	14.60	14.85	14.40	14.73	14.61	14.44
Mass of Container + Wet Soil	g	24.74	23.75	22.98	21.52	21.25	21.31
Mass of Container + Dry Soil	g	20.82	20.30	19.63	18.83	18.57	18.51
Mass of Dry Soil	g	6.22	5.45	5.23	4.10	3.96	4.07
Mass of Moisture	g	3.92	3.45	3.35	2.69	2.68	2.80
Moisture Content	%	63.02	63.30	64.05	65.61	67.68	68.80

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				101.00		
% Shrinkage				19.20		19.20

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

Liquid Limit	65.30 %
Plastic Limit	37.75 %
Plasticity Index	27.55 %
Shrinkage Limit	19.20 %

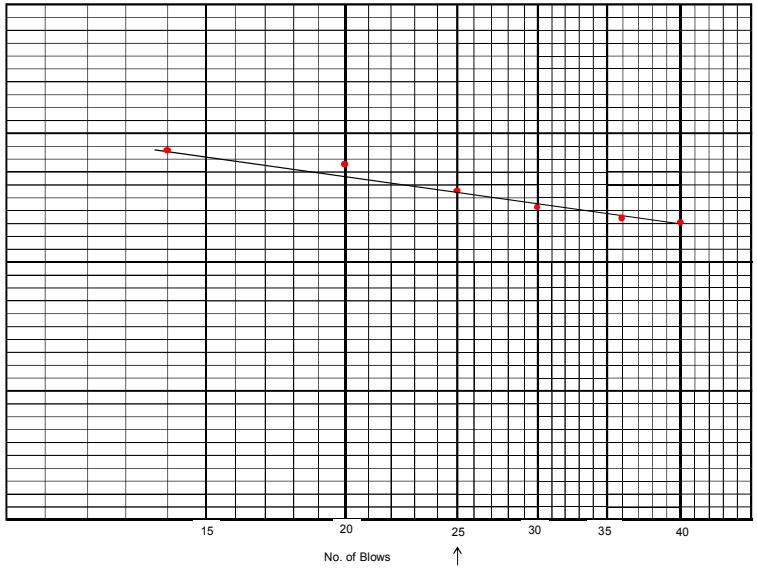
Tested By:RK
Date:13 October 2015

Q.A. Checked By: TL
Date: 15 October 2015

Approved By:IG
Date: 18 November 2015

Form: GE-L-03

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N512

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: Site 2, Navo Nadi Town	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: Clayey SILT with traces of fine sand, pale brown, very soft-soft, moist, medium plasticity.	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N514 (BH02 5.00m - 5.50m)

NATURAL MOISTURE CONTENT								
TEST No.		**1**	**2**				**Average**
Container No.	g	65	79				
Mass of Container	g	87.16	87.10				
Mass of Container + Wet Soil	g	113.47	114.14				
Mass of Container + Dry Soil	g	106.02	106.30				
Mass of Dry Soil	g	18.86	19.20				
Mass of Moisture	g	7.45	7.84				
Moisture Content	%	39.50	40.83				40.17

PLASTIC LIMIT							
TEST No.		**1**	**2**				**Average**
Container No.		149	150				
Mass of Container	g	11.75	10.77				
Mass of Container + Wet Soil	g	16.55	14.86				
Mass of Container + Dry Soil	g	15.56	14.01				
Mass of Dry Soil	g	3.81	3.24				
Mass of Moisture	g	0.99	0.85				
Moisture Content	%	25.98	26.23				26.11

LIQUID LIMIT							
TEST No.		**1**	**2**	**3**	**4**	**5**	**6**
Number of Blows		40	35	30	25	20	15
Container No.		151	152	160	159	158	157
Mass of Container	g	12.00	11.50	11.93	12.17	12.13	11.92
Mass of Container + Wet Soil	g	21.99	22.74	26.95	26.12	22.31	22.14
Mass of Container + Dry Soil	g	18.80	19.09	21.91	21.41	18.70	18.36
Mass of Dry Soil	g	6.80	7.59	9.98	9.24	6.57	6.44
Mass of Moisture	g	3.19	3.65	5.04	4.71	3.61	3.78
Moisture Content	%	46.91	48.09	50.50	50.97	54.95	58.70

LINEAR SHRINKAGE TEST						
Mould No.	**1**	**2**	**3**	**4**	**5**	**Average**
Initial length of Sample					125.00	
Final length of Sample after Shrinkage					104.00	
% Shrinkage					16.80	16.80

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

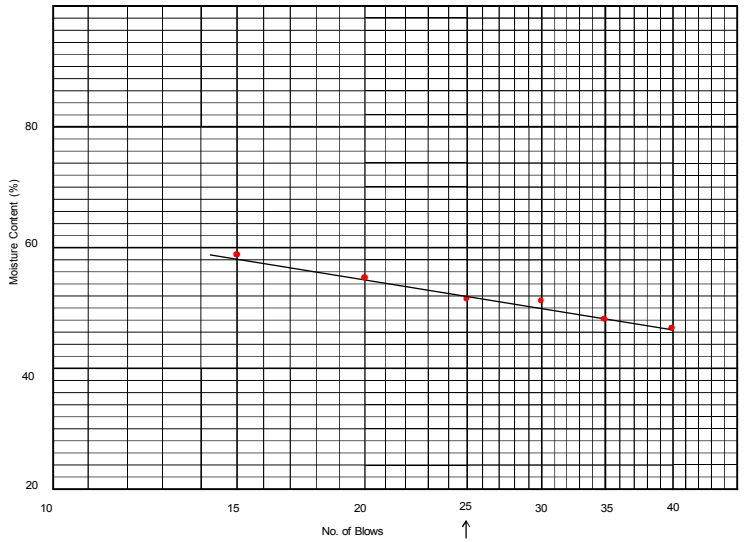
Liquid Limit	52.00 %
Plastic Limit	26.11 %
Plasticity Index	25.89 %
Shrinkage Limit	16.80 %

Tested By: KB
Date:15 October 2015

Q.A. Checked By: TL
Date: 16 October 2015

Approved By:IG
Date: 18 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N 514

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 15 October 2015
SITE ADDRESS	: Site 2 Navo, Nadi	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Silty CLAY, red brown mottled grey with iron stain, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N518 (BH02 12.50m -13.00m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	81	82				
Mass of Container	g	87.45	90.15				
Mass of Container + Wet Soil	g	117.97	117.91				
Mass of Container + Dry Soil	g	110.75	111.71				
Mass of Dry Soil	g	23.30	21.56				
Mass of Moisture	g	7.22	6.20				
Moisture Content	%	30.99	28.76				29.87

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		105	106				
Mass of Container	g	11.58	12.04				
Mass of Container + Wet Soil	g	16.03	15.97				
Mass of Container + Dry Soil	g	15.00	15.05				
Mass of Dry Soil	g	3.42	3.01				
Mass of Moisture	g	1.03	0.92				
Moisture Content	%	30.12	30.56				30.34

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	29	25	20	16
Container No.		121	122	123	124	125	126
Mass of Container	g	11.63	11.70	11.60	11.75	11.88	12.83
Mass of Container + Wet Soil	g	24.92	25.60	27.37	28.83	25.49	27.54
Mass of Container + Dry Soil	g	20.89	21.31	22.46	23.44	21.10	22.76
Mass of Dry Soil	g	9.26	9.61	10.86	11.69	9.22	9.93
Mass of Moisture	g	4.03	4.29	4.91	5.39	4.39	4.78
Moisture Content	%	43.52	44.64	45.21	46.11	47.61	48.14

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				104.00		
% Shrinkage				16.80		16.80

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

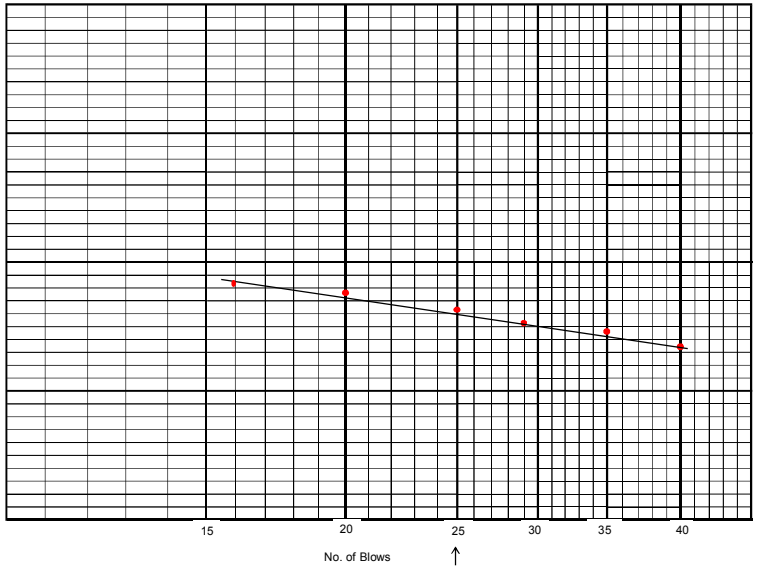
Liquid Limit	46.00 %
Plastic Limit	30.34 %
Plasticity Index	15.66 %
Shrinkage Limit	16.80 %

Tested By: LN
Date:15 October 2015

Q.A. Checked By: TL
Date: 16 October 2015

Approved By:*IG*
Date: 18 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N518

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	16 October 2015
SITE ADDRESS :	BH02, Navo, Nadi Town	**TECHNOLOGIST** :	LN/IG
SAMPLE LOCATION :	BH02 3.50m - 4.00m	**MATERIAL TYPE** :	Silty, CLAY traces of root fibres, brown, firm, moist, high plasticity.
TEST NUMBER :	N513		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / O~~VEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	65	79	
	Mass of Container	g	87.17	87.13	
	Mass of Container + Wet Soil	g	214.36	208.59	
	Mass of Container + Dry Soil	g	179.6	175.67	
	Mass of Dry Soil	g	92.43	88.54	
	Mass of Moisture	g	34.76	32.92	
	Moisture Content	%	37.61	37.18	37.39

Bulk Density	Sample No.	-	N513
	Diameter of Specimen	mm	53.82
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2273.83
	Initial length of specimen Lo	mm	59.85
	Initial mass of specimen Mi	g	248.77
	Bulk Density ρ	t/m³	1.83
	Dry Density ρd	t/m³	1.33

Tested by : LN/IG	Q.A. Check by : MK	Approved by : IG
Date : 16 October 2015	Date : 18 October 2015	Date : 18 November 2015

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	16 October 2015
SITE ADDRESS :	BH02, Navo, Nadi Town	**TECHNOLOGIST** :	IG/LN/TL
SAMPLE LOCATION :	BH02 6.50m - 7.00m	**MATERIAL TYPE** :	Clayey organic SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity
TEST NUMBER :	N515		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	89	90	
	Mass of Container	g	121.44	118.14	
	Mass of Container + Wet Soil	g	210.63	216.78	
	Mass of Container + Dry Soil	g	179.79	182.77	
	Mass of Dry Soil	g	58.35	64.63	
	Mass of Moisture	g	30.84	34.01	
	Moisture Content	%	52.85	52.62	52.74

Bulk Density	Sample No.	-	N515
	Diameter of Specimen	mm	53.05
	Initial area of specimen Ao (π/4 d²)	mm²	2209.23
	Initial length of specimen Lo	mm	52.69
	Initial mass of specimen Mi	g	189.23
	Bulk Density ρ	t/m³	1.63
	Dry Density ρd	t/m³	1.06

Tested by : IG/LN/TL	Q.A. Check by : MK	Approved by : IG
Date : 16 October 2015	Date : 18 October 2015	Date : 18 November 2015

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE / TESTED** :	16 October 2015
SITE ADDRESS :	BH02, Navo, Nadi Town	**TECHNOLOGIST** :	IG/TL
SAMPLE LOCATION :	BH02 9.50m -10.00m	**MATERIAL TYPE** :	Clayey organic SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity
TEST NUMBER :	N516		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

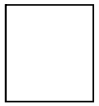
Moisture Content	Container No.	-	70	77	
	Mass of Container	g	90.08	91.32	
	Mass of Container + Wet Soil	g	195.82	196.13	
	Mass of Container + Dry Soil	g	166.00	165.95	
	Mass of Dry Soil	g	75.92	74.63	
	Mass of Moisture	g	29.82	30.18	
	Moisture Content	%	39.28	40.44	39.86

Bulk Density	Sample No.	-	N516
	Diameter of Specimen	mm	53.43
	Initial area of specimen Ao (π/4 d²)	mm²	2240.99
	Initial length of specimen Lo	mm	56.34
	Initial mass of specimen Mi	g	210.20
	Bulk Density ρ	t/m³	1.66
	Dry Density ρd	t/m³	1.19

Tested by : IG/TL	Q.A. Check by : MK	Approved by : IG
Date : 16 October 2015	Date : 18 October 2015	Date : 18 November 2015

Oedometer Settlement Test

Sample Details



sketch showing specimen location in original sample

Depth			3.50m - 3.76m
Description			Sample 1 of 3 from Borehole B2
Type			Default
Initial Height	L_n	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	66.4
Bulk Density	ρ_0	(Mg/m3)	1.69
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	39
Initial Dry Density	ρ_{di}	(Mg/m3)	1.22
Initial Voids Ratio	e_i	.	1.180
Initial Degree of Saturation	S_i	(%)	87.8
Initial Swelling	S_S	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	0.00
Dry Density	ρ_{df}	(Mg/m3)	1.30
Voids Ratio	e_f	.	1.035
Saturation	S_f	(%)	0
Height Settlement	ΔL_s	(mm)	1.325

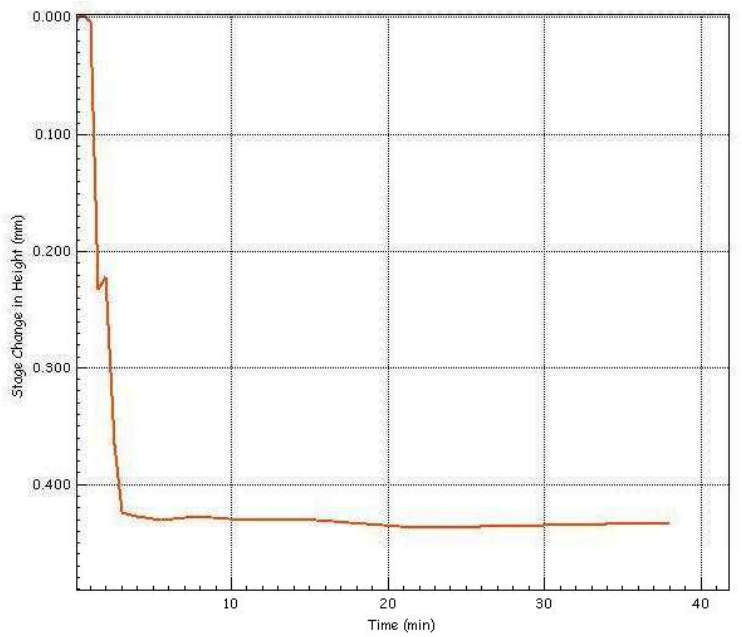
Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
30	1.133	0.433	3.2	0.722	27.0	0.0	3.171		0.0087
60	1.118	0.564	3.1	0.223	27.0	0.0	3.171		0.0087
120	1.090	0.826	3.1	0.225	27.0	0.0	3.171		0.0087
240	1.035	1.325	2.9	0.217	27.0	0.0	3.171		0.0087
480	0.993	1.715	2.8	0.087	27.0	0.0	3.171		0.0087
120	1.010	1.555			27.0	0.0			
30	1.035	1.325			27.0	0.0			

Notes

Test Method	AS 1289.6.6.1-1998		Test Name	ODO-01	
			Database: .\SQLEXPRESS \ ENTEC		
Site Reference	1920815		Test Date	10/27/2015	
Jobfile	Geotechnical Engineering Investigation		Sample	N513	
Client	Japan International Cooperation Agency		Borehole	BH02	
Operator	IG/MK	Checked DMC		Approved	DMC

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	30
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.433
Voids Ratio	e_f	.	1.133
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	3.171
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	3.2
Compressibility	m_V	(m2/MN)	0.722
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

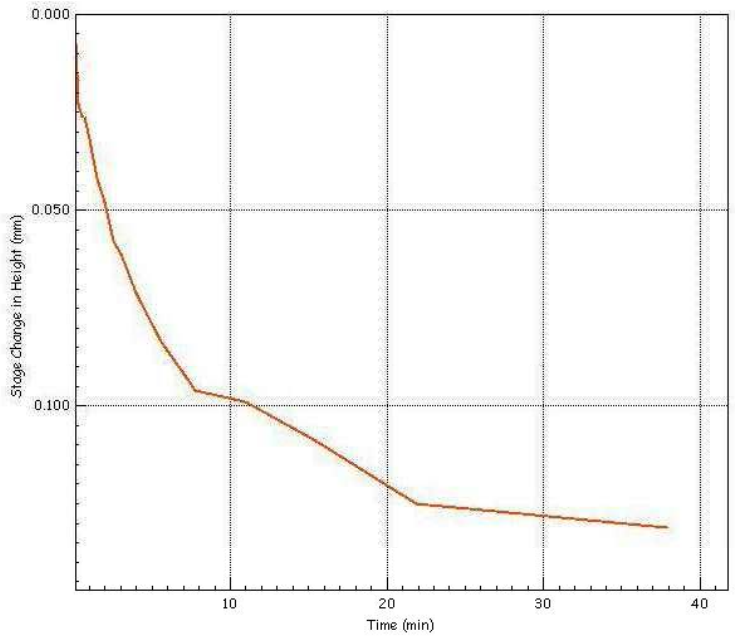


Test Method	AS 1289.6.6.1-1998		Test Name	ODO-01	
			Database: .\SQLEXPRESS \ ENTEC		
Site Reference	1920815		Test Date	10/27/2015	
Jobfile	Geotechnical Engineering Investigation		Sample	N513	
Client	Japan International Cooperation Agency		Borehole	BH02	
Operator	IG/MK	Checked DMC		Approved	DMC

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	60
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.564
Voids Ratio	e_f	.	1.118
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	3.171
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	3.1
Compressibility	m_V	(m2/MN)	0.223
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

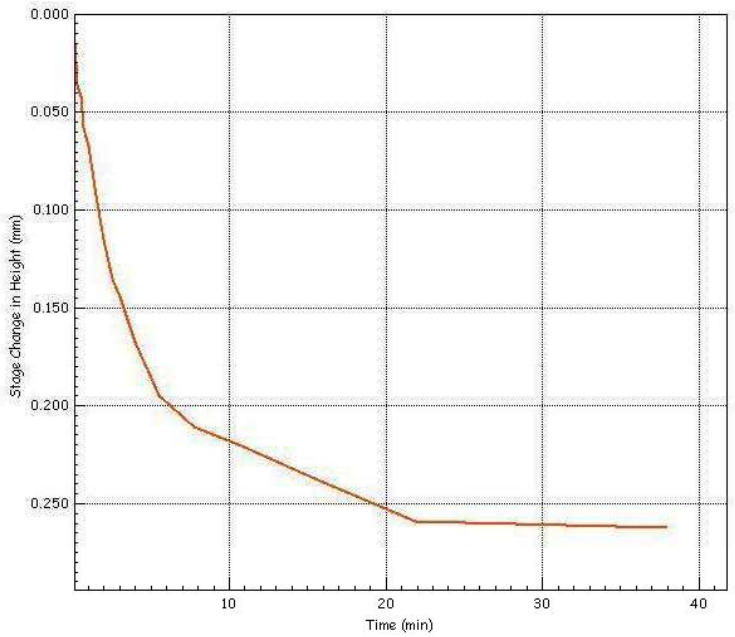


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator IG/MK	Checked DMC	Approved DMC	

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	120
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.826
Voids Ratio	e_f	.	1.090
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	3.171
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	3.1
Compressibility	m_V	(m2/MN)	0.225
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

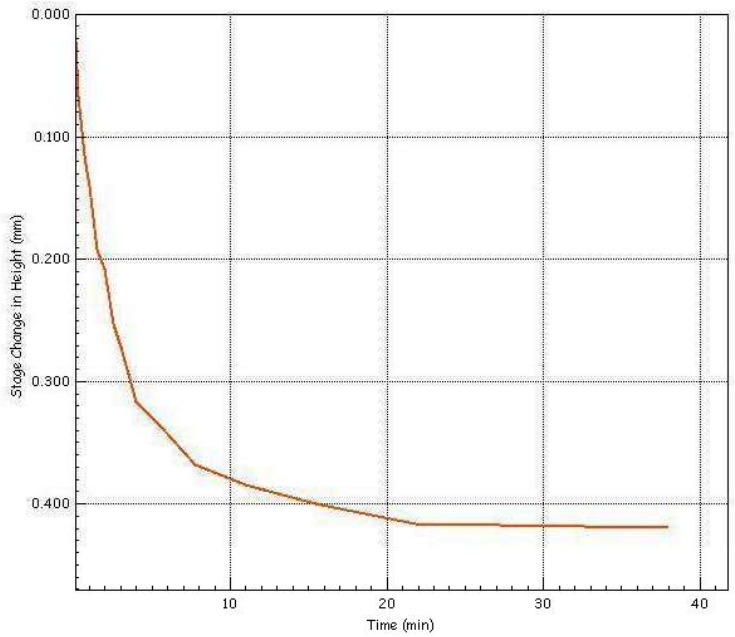


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator IG/MK	Checked DMC	Approved DMC	

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	240
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.325
Voids Ratio	e_f	.	1.035
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	3.171
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	2.9
Compressibility	m_V	(m2/MN)	0.217
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

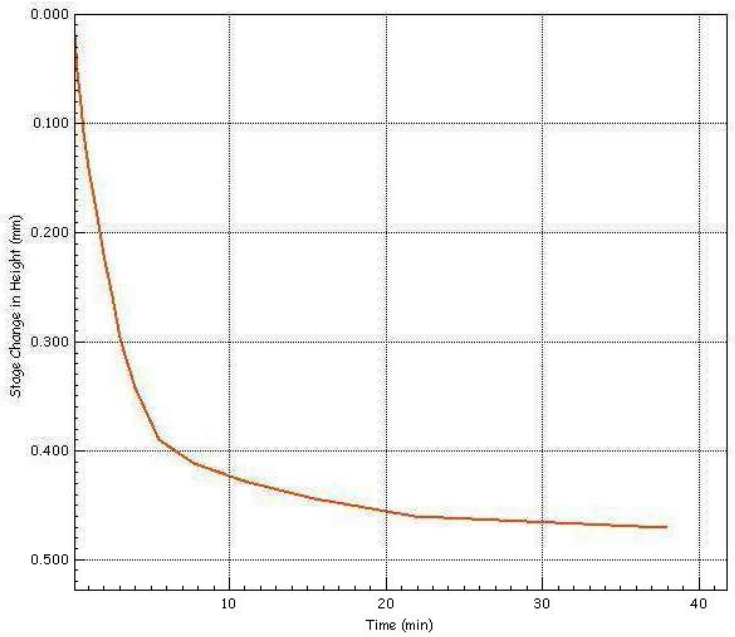


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator IG/MK	Checked DMC	Approved DMC	

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	480
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.715
Voids Ratio	e_f	.	0.993
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	3.171
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	2.8
Compressibility	m_V	(m2/MN)	0.086
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

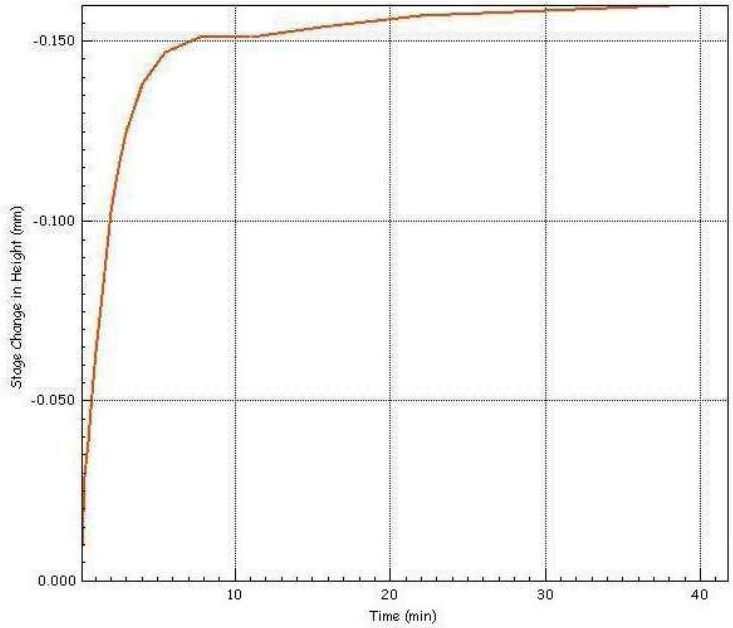


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator IG/MK	Checked DMC	Approved DMC	

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	120
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.555
Voids Ratio	e_f	.	1.010
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

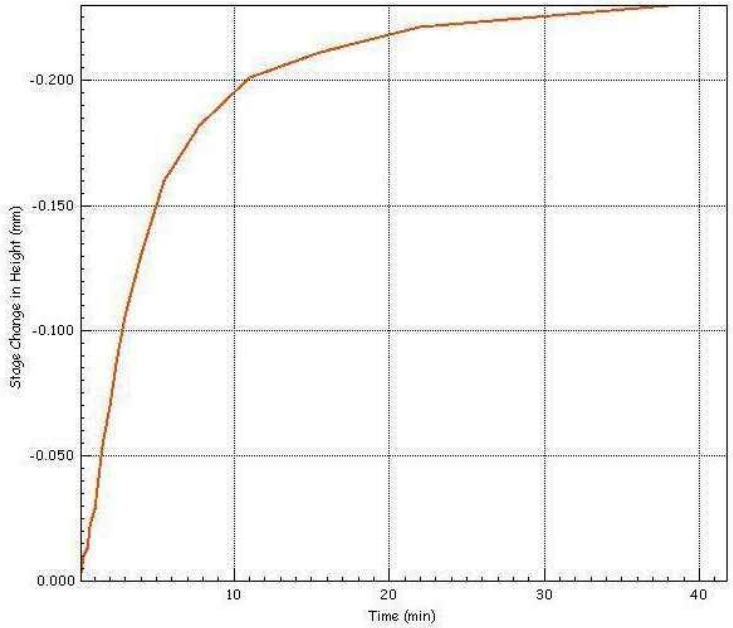


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator IG/MK	Checked DMC	Approved DMC	

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	30
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.325
Voids Ratio	e_f	.	1.035
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator IG/MK	Checked DMC	Approved DMC	

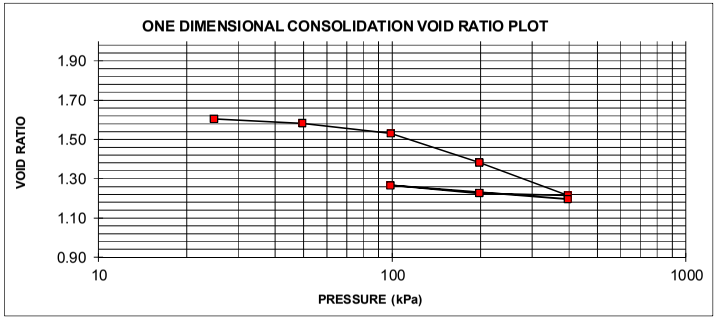
Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Determination of The One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Project Name:	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**Sample No:**	N 515
Client Name:	Japan International Cooperation Agency (JICA)	**Depth:**	6.50m-7.0m
Job No:	1920815	**Tested By:**	IG
Site Address :	Navo, Nadi	**Date Tested:**	27 October 2015
Sample Location:	BH 02		

Sample Description: Clayey SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity
Sample History: Undisturbed / ~~Remoulded / Compacted / Slurried / Unknown~~
Date Sample Collected: 08/10/15 **Temperature:** Max: 27°C Min: 25°C
Loading Cycle: 24 hrs 0 mins **Height of ring:** 23.8 mm
Diameter of ring *(D)* : 44.96 mm **Area of ring *(A)* :** 1587.61 mm²
Solid density of soil particles *(Q_s)* : 2.65 t/m³ (~~Measured /~~ Assumed)
Method used: Square root of time fitting method



			Initial		Final
Measured thickness of specimen, H		mm	H_i	23.8	H_f 19.96
Mass of ring + ~~watch glass~~ + wet specimen		g	M_3	265.81	M_4 261.13
Mass of ring + ~~watch glass~~ + dry specimen	M_5	g	244.29		
Mass of ring	M_1	g	206.07		
~~Mass of watch glass~~	M_2	g	0		
Mass of dry specimen	$M_s = M_5 - M_1 - M_2$	g	38.22		
Mass of water		g	$M_3 - M_5$	21.52	$M_4 - M_5$ 16.84
Water content, w		%	w_i	56.31	w_f 44.06
Dry density, Q_d		t/m³	Q_{di}	1.01	Q_{df} 1.21
Height of soil particles, H_s		mm	9.08		
Voids ratio, e			e_i	1.62	e_f 1.20
Degree of saturation, S			S_i	92.11	S_f 97.55

Applied Pressure *kPa*	Incremental deflection *(ΔH) mm*	Thickness of specimen *mm*	% Change in thickness *%*	Height of voids *mm*	Voids ratio	Coefficient of consolidation C_v *(m^2/yr)*	Coefficient of compressibility M_v *(m^2/MN)*
24.7	0.122	23.678	0.005	14.59	1.61	127.00	
49.4	0.328	23.472	0.014	14.39	1.58	42.47	0.56
98.8	0.804	22.996	0.035	13.91	1.53	48.51	0.68
197.6	2.148	21.652	0.099	12.57	1.38	52.04	0.91
395.2	3.668	20.132	0.182	11.05	1.22	26.62	0.78
197.6	3.562	20.238	0.176	11.15	1.23	0.00	-0.76
98.6	3.206	20.594	0.156	11.51	1.27	0.00	-1.36
395.2	3.842	19.958	0.193	10.87	1.20	19.65	0.54
0	0.00	23.800	0.000	14.72	1.62	0.00	

Tested by: IG
Date: 27 October 2015

Q.A. Check By: MK
Date: 27 October 2015

Approved By: IG
Date: 18 November 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

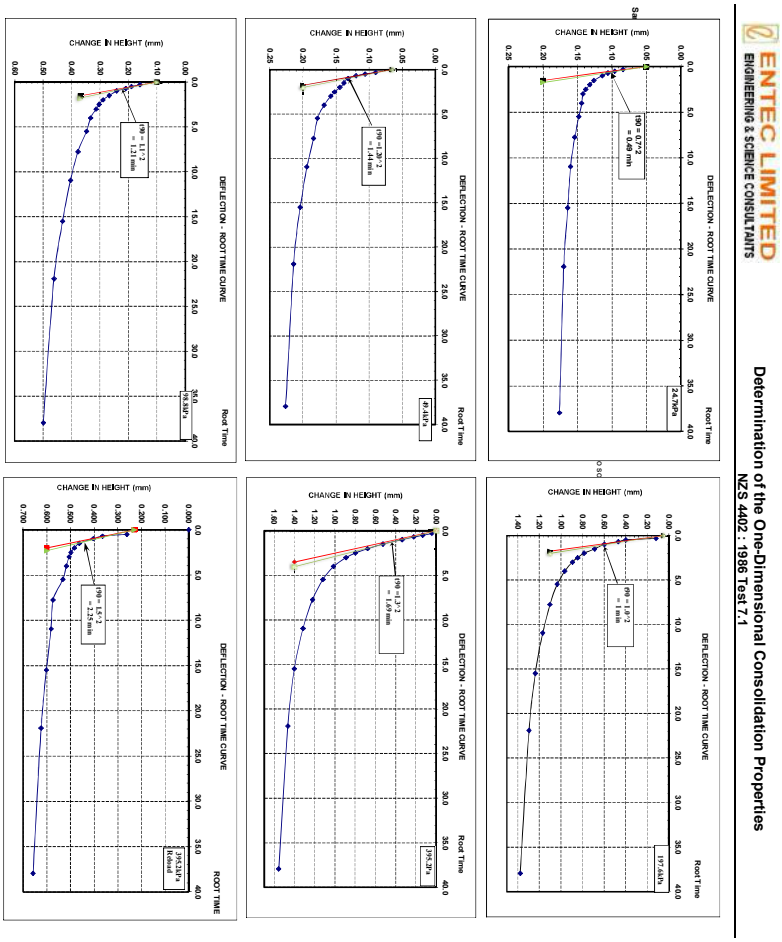
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Loading Date & Time		27/10/20135 @ 09:33hrs			28/10/2015 @ 09:39hrs			29/10/2015 @ 09:41hrs			30/10/2015 @ 10:46hrs			31/10/2015 @ 10:50hrs			01/11/2015 @ 10:53hrs		
Hanger Load		400g			800g			1600g			3200g			6400g			3200g		
Effective Pressure		24.7kPa			49.4kPa			98.8kPa			197.6kPa			395.2kPa			197.6kPa		
Time Elapsed		Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm
	0	dark grey, very soft t	2251		9:39:00	2163		9:41:00	2050		10:46	1800	0.000	10:50	1111	0.000	11:53	333	0.000
	0.100	09:33:06	2209	0.084	09:39:06	2118	0.090	09:41:06	1970	0.160	10:46:06	1740	0.120	10:50:06	1090	0.042	11:53:06	353	0.040
	0.250	09:33:15	2203	0.096	09:39:15	2110	0.106	09:41:15	1955	0.190	10:46:15	1600	0.400	10:50:15	1045	0.132	11:53:15	357	0.048
	0.500	09:33:30	2198	0.106	09:39:30	2103	0.120	09:41:30	1945	0.210	10:46:30	1565	0.470	10:50:30	1000	0.222	11:53:30	362	0.058
1	1.000	09:34:00	2194	0.114	09:40:00	2097	0.132	09:42:00	1929	0.242	10:47:00	1500	0.600	10:51:00	942	0.338	11:54:00	366	0.066
2	2.250	09:35:15	2188	0.126	09:41:15	2094	0.138	09:43:15	1916	0.268	10:48:15	1456	0.688	10:52:15	849	0.524	11:55:15	371	0.076
4	4.000	09:37:00	2185	0.132	09:43:00	2091	0.144	09:45:00	1905	0.290	10:50:00	1407	0.786	10:54:00	773	0.676	11:57:00	373	0.080
6	6.250	09:39:15	2182	0.138	09:45:15	2087	0.152	09:47:15	1898	0.304	10:52:15	1377	0.846	10:56:15	712	0.798	11:59:15	375	0.084
9	9.000	09:42:00	2180	0.142	09:48:00	2084	0.158	09:50:00	1893	0.314	10:55:00	1353	0.894	10:59:00	666	0.890	12:02:00	376	0.086
16	16.00	09:49:00	2179	0.144	09:55:00	2079	0.168	09:57:00	1883	0.334	11:02:00	1318	0.964	11:06:00	604	1.014	12:09:00	377	0.088
30	30.00	10:03:00	2177	0.148	10:09:00	2074	0.178	10:11:00	1876	0.348	11:16:00	1283	1.034	11:20:00	551	1.120	12:23:00	378	0.090
1	60.00	10:33:00	2174	0.154	10:39:00	2071	0.184	10:41:00	1861	0.378	11:46:00	1249	1.102	11:50:00	500	1.222	12:53:00	380	0.094
2	120.0	11:33:00	2171	0.160	11:39:00	2066	0.194	11:41:00	1848	0.404	12:46:00	1216	1.168	12:50:00	453	1.316	13:53:00	382	0.098
4	240.0	13:33:00	2169	0.164	13:39:00	2061	0.204	13:41:00	1834	0.432	14:46:00	1181	1.238	14:50:00	410	1.402	15:53:00	383	0.100
8	480.0	17:33:00	2166	0.170	17:39:00	2056	0.214	17:41:00	1819	0.462	18:46:00	1152	1.296	18:50:00	378	1.466	19:53:00	386	0.106
24	1440	09:33:00	2163	0.176	09:39:00	2050	0.226	09:41:00	1800	0.500	10:46:00	1111	1.378	10:50:00	333	1.556	11:53:00	388	0.110
																	UNLOADING		
Machine Correction			0.054			0.020			0.024			0.034			0.036			0.004	
Δ H (Corrected)			0.122			0.206			0.476			1.344			1.520			0.106	
Net Total Settlement			0.122			0.328			0.804			2.148			3.668			3.562	

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Loading Date and Time					02/11/2015 @ 11:54hrs			03/11/2015 @ 11:56hrs			N 515											
Hanger Load					1600g			6400g			6.50m-7.0m											
Effective Pressure					98.8kPa			395.2kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	BH 010	t min	√t min	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm
		0	0	0	11:54	388	0.000	11:56	571	0.000												
		6	dark grey, very so		11:54:06	390	0.004	11:56:06	500	0.142												
		15	0.250	0.500	11:54:15	407	0.038	11:56:15	440	0.262												
		30	0.500	0.707	11:54:30	413	0.050	11:56:30	389	0.364												
	1		1.000	1.000	11:55:00	419	0.062	11:57:00	369	0.404												
	2	15	2.250	1.500	11:56:15	428	0.080	11:58:15	340	0.462												
	4		4.000	2.000	11:58:00	433	0.090	12:00:00	329	0.484												
	6	15	6.250	2.500	12:00:15	436	0.096	12:02:15	322	0.498												
	9		9.000	3.000	12:03:00	440	0.104	12:05:00	318	0.506												
	16		16.00	4.000	12:10:00	443	0.110	12:12:00	312	0.518												
	30		30.00	5.480	12:24:00	446	0.116	12:26:00	305	0.532												
1			60.00	7.750	12:54:00	450	0.124	12:56:00	284	0.574												
2			120.0	10.950	13:54:00	454	0.132	13:56:00	280	0.582												
4			240.0	15.49	15:54:00	559	0.342	15:56:00	270	0.602												
8			480.0	21.91	19:54:00	564	0.352	19:56:00	259	0.624												
24			1440	37.95	11:54:00	571	0.366	11:56:00	242	0.658												
					UNLOADING			RELOADING														
Machine Correction					0.01			0.022														
△ H (Corrected)					0.356			0.636														
Net Total Settlement					3.206			3.842														



ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth			9.50m - 10.00m
Description			Sample 3 of 3 from Borehole B2
Type			Silty CLAY with trace of organic
Initial Height	L_0	(mm)	18.7
Initial Diameter	D_0	(mm)	49.9
Initial Weight	W_0	(gr)	57.9
Bulk Density	ρ_0	(Mg/m3)	1.58
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	40
Initial Dry Density	ρ_{di}	(Mg/m3)	1.13
Initial Voids Ratio	e_i	.	1.343
Initial Degree of Saturation	S_i	(%)	78.9
Initial Swelling	S_S	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	32
Dry Density	ρ_{df}	(Mg/m3)	1.45
Voids Ratio	e_f	.	0.824
Saturation	S_f	(%)	100
Height Settlement	ΔL_s	(mm)	4.138

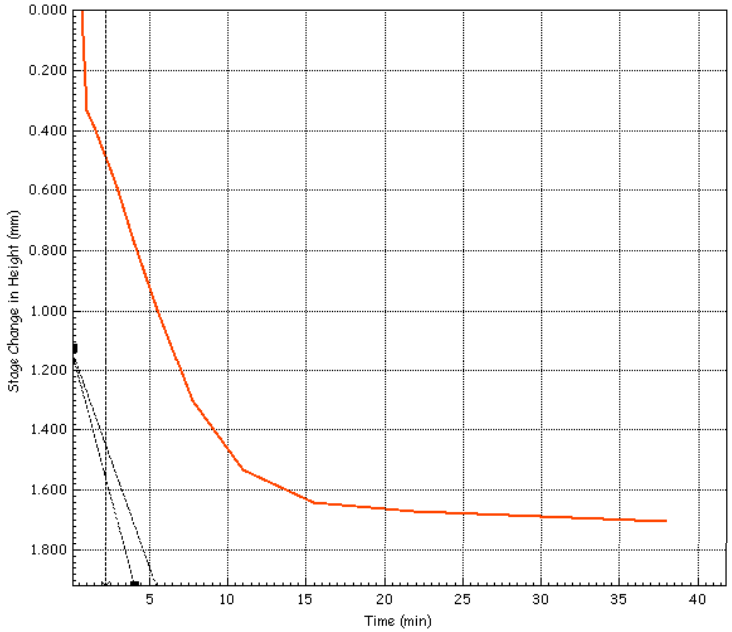
Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
40	1.129	1.707	2.6	2.282	27.0	29.0	3.171		0.0087
100	0.999	2.742	2.2	1.015	27.0	29.0	3.171		0.0087
200	0.879	3.700	2.0	0.600	27.0	29.0	3.171		0.0087
450	0.731	4.884	1.7	0.316	27.0	29.0	3.171		0.0087
200	0.756	4.684			27.0	0.0			
100	0.783	4.468			27.0	0.0			
40	0.824	4.138			27.0	0.0			

Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-02
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	40
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.707
Voids Ratio	e_f	.	1.129
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	3.171
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	2.6
Compressibility	m_V	(m2/MN)	2.282
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

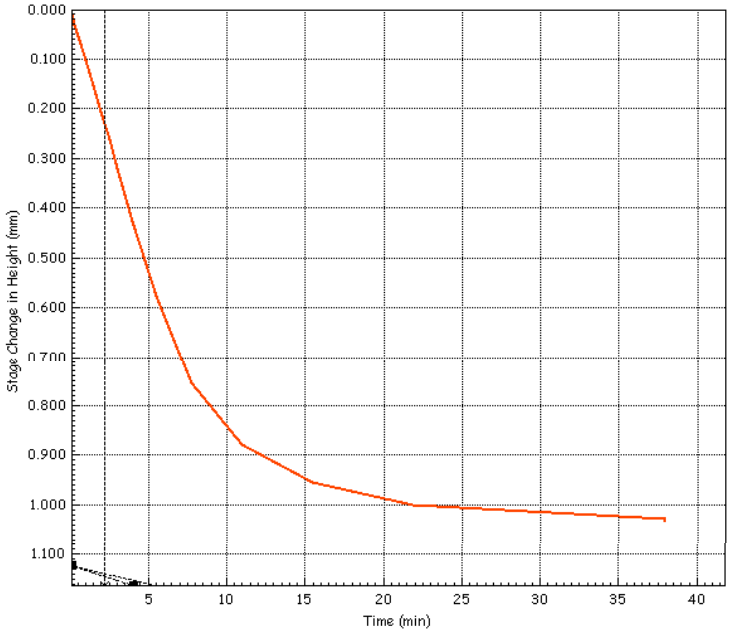


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-02
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.742
Voids Ratio	e_f	.	0.999
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	3.171
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	2.2
Compressibility	m_V	(m2/MN)	1.015
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

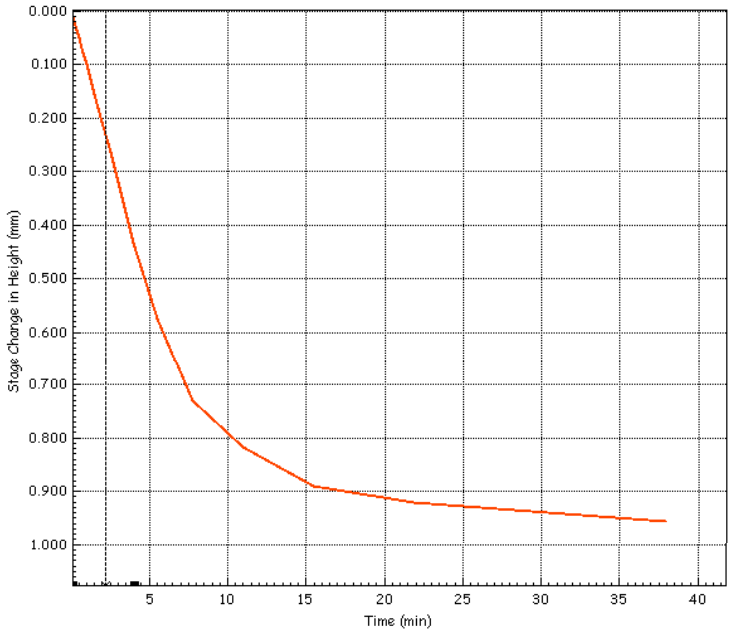


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-02
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	3.700
Voids Ratio	e_f	.	0.879
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	3.171
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	2.0
Compressibility	m_V	(m2/MN)	0.600
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

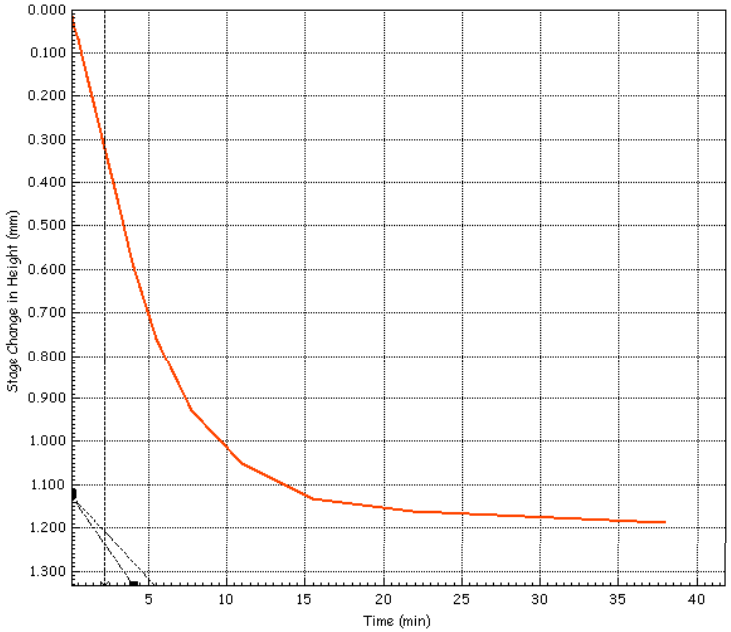


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-02
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	450
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	4.884
Voids Ratio	e_f	.	0.731
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	3.171
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	1.7
Compressibility	m_V	(m2/MN)	0.316
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

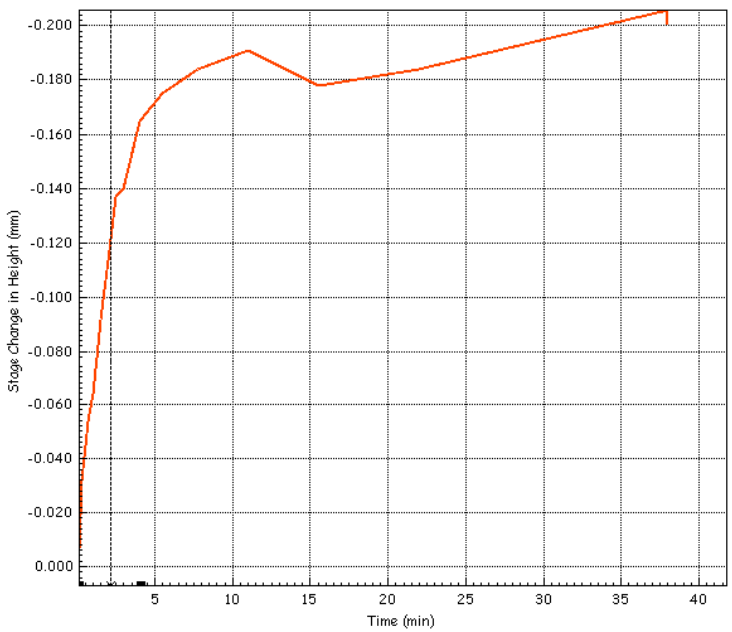


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-02
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	4.684
Voids Ratio	e_f	.	0.756
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

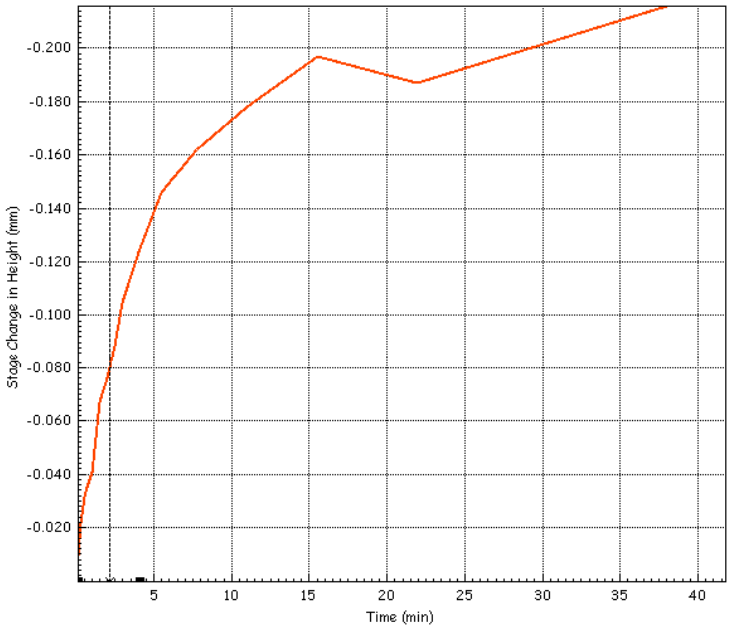


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-02
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	4.468
Voids Ratio	e_f	.	0.783
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

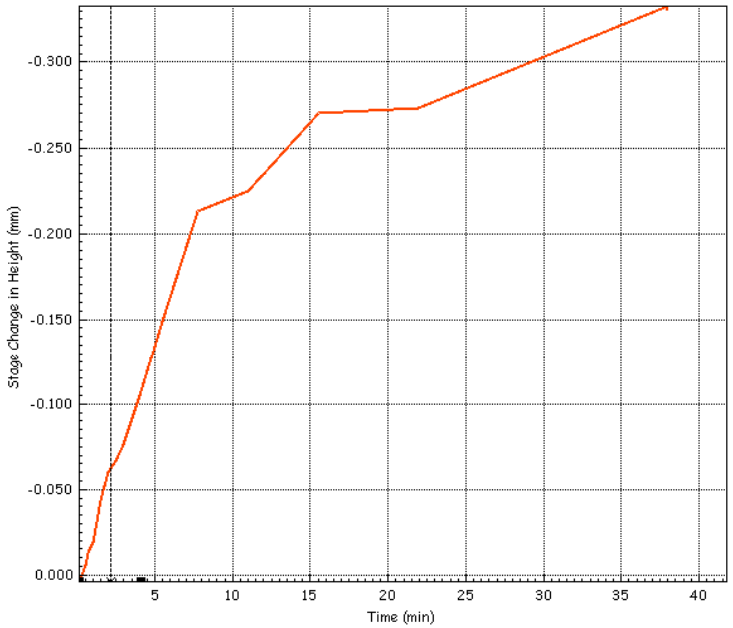


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-02
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	40
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	4.138
Voids Ratio	e_f	.	0.824
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-02
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Gravel, SILT traces of clay, soft, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N511 BH02 1.00m - 1.50m

Moisture Content	%						
Container No.	g	40	45				
Mass of Container	g	14.53	14.43				
Mass of Container + Wet Soil	g	21.09	23.38				
Mass of Container + Dry Soil	g	19.52	21.20				
Mass of Dry Soil	g	4.99	6.77				
Mass of Moisture	g	1.57	2.18				
Moisture Content	%	31.46	32.20				31.83

Tested By:LN
Date: 13 October 2015

Q.A. Checked By: TL
Date:15 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 10 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Silty, CLAY traces of root fibres, brown, firm, moist, high plasticity.	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N 513 BH02 3.50m - 4.00m

Moisture Content	%						
Container No.	g	10	6				
Mass of Container	g	52.26	53.09				
Mass of Container + Wet Soil	g	109.91	119.98				
Mass of Container + Dry Soil	g	93.83	101.23				
Mass of Dry Soil	g	41.57	48.14				
Mass of Moisture	g	16.08	18.75				
Moisture Content	%	38.68	38.95				38.82

Tested By:IG
Date:10 October 2015

Q.A. Checked By: LN
Date:15 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Clayey SILT with traces of fine sand, pale brown, very soft-soft, moist, medium plasticity.	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N 514 BH02 5.00m - 5.50m

Moisture Content	%						
Container No.	g	46	34				
Mass of Container	g	14.71	14.89				
Mass of Container + Wet Soil	g	29.25	27.35				
Mass of Container + Dry Soil	g	25.11	23.78				
Mass of Dry Soil	g	10.40	8.89				
Mass of Moisture	g	4.14	3.57				
Moisture Content	%	39.81	40.16				39.98

Tested By:LN
Date: 13 October 2015

Q.A. Checked By: TL
Date:15 October 2015

Approved By: IG
Date:18 November 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 10 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: IG
MATERIAL TYPE & DESCRIPTION	: Clayey SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N 515 BH02 6.50m - 7.00m

Moisture Content	%						
Container No.	g	5	7				
Mass of Container	g	53.34	52.76				
Mass of Container + Wet Soil	g	87.27	90.12				
Mass of Container + Dry Soil	g	74.50	76.35				
Mass of Dry Soil	g	21.16	23.59				
Mass of Moisture	g	12.77	13.77				
Moisture Content	%	60.35	58.37				59.36

Tested By:IG
Date:10 October 2015

Q.A. Checked By: LN
Date:15 October 2015

Approved By: IG
Date:18 November 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 10 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: IG
MATERIAL TYPE & DESCRIPTION	: Clayey organic SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N 516 BH02 9.50m - 10.00m

Moisture Content	%						
Container No.	g	4	11				
Mass of Container	g	52.62	52.76				
Mass of Container + Wet Soil	g	114.83	120.33				
Mass of Container + Dry Soil	g	97.01	101.23				
Mass of Dry Soil	g	44.39	48.47				
Mass of Moisture	g	17.82	19.10				
Moisture Content	%	40.14	39.41				39.77

Tested By:IG
Date:10 October 2015

Q.A. Checked By: LN
Date:15 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Silty CLAY, red brown, mottled grey, medium to high plasticty	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N517 BH02 11.00m - 11.50m

Moisture Content	%						
Container No.	g	31	43				
Mass of Container	g	14.52	14.86				
Mass of Container + Wet Soil	g	22.23	22.91				
Mass of Container + Dry Soil	g	20.38	20.96				
Mass of Dry Soil	g	5.86	6.10				
Mass of Moisture	g	1.85	1.95				
Moisture Content	%	31.57	31.97				31.77

Tested By:LN
Date: 13 October 2015

Q.A. Checked By: TL
Date:15 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Silty CLAY, red brown mottled grey with iron stain, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N518 BH02 12.50 - 13.00m

Moisture Content	%						
Container No.	g	32	33				
Mass of Container	g	14.53	14.46				
Mass of Container + Wet Soil	g	26.90	26.94				
Mass of Container + Dry Soil	g	23.65	23.71				
Mass of Dry Soil	g	9.12	9.25				
Mass of Moisture	g	3.25	3.23				
Moisture Content	%	35.64	34.92				35.28

Tested By:LN
Date: 13 October 2015

Q.A. Checked By: TL
Date:15 October 2015

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Clayey fine to medium SAND with trace of some gravel, brown black	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N519 BH02 14.00m - 14.50m

Moisture Content	%						
Container No.	g	51	52				
Mass of Container	g	3.56	3.54				
Mass of Container + Wet Soil	g	16.29	14.43				
Mass of Container + Dry Soil	g	13.74	12.26				
Mass of Dry Soil	g	10.18	8.72				
Mass of Moisture	g	2.55	2.17				
Moisture Content	%	25.05	24.89				24.97

Tested By:LN
Date: 13 October 2015

Q.A. Checked By: TL
Date:15 October 2015

Approved By: IG
Date:18 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Highly to completely weathered conglomerate, extreamly weak to very weak, brown (silty fine to medium sand with some fine to medium gravel, subangular)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N520 BH02 15.50 - 16.00m

Moisture Content	%						
Container No.	g	49	53				
Mass of Container	g	3.62	3.52				
Mass of Container + Wet Soil	g	14.66	15.88				
Mass of Container + Dry Soil	g	12.85	13.84				
Mass of Dry Soil	g	9.23	10.32				
Mass of Moisture	g	1.81	2.04				
Moisture Content	%	19.61	19.77				19.69

Tested By:LN
Date: 13 October 2015

Q.A. Checked By: TL
Date:15 October 2015

Approved By: IG
Date:18 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 13 October 2015
SITE ADDRESS	: BH 02, Navo Nadi Town	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Fine to medium SANDSTONE with trace of gravel, grey green, weak to very weak	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N521 BH02 18.50m - 19.00m

Moisture Content	%						
Container No.	g	50	54				
Mass of Container	g	3.61	3.55				
Mass of Container + Wet Soil	g	15.20	13.36				
Mass of Container + Dry Soil	g	13.57	11.90				
Mass of Dry Soil	g	9.96	8.35				
Mass of Moisture	g	1.63	1.46				
Moisture Content	%	16.37	17.49				16.93

Tested By:LN
Date: 13 October 2015

Q.A. Checked By: TL
Date:15 October 2015

Approved By: IG
Date:18 November 2015

Form GE-L-07

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Determination of Permeability of a Soil
Constant Head Method for Remoulded Sample

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	:	15 October 2015
SITE ADDRESS	:	BH02, Navo Nadi Town	**TECHNOLOGIST**	:	IG
			TEST METHOD	:	AS 1289.6.7.3-2001
MATERIAL TYPE & DESCRIPTION	:	Highly to completely weathered conglomerate, extreamly weak to very weak, brown (silty fine to medium sand with some fine to medium gravel, subangular)	**SAMPLE No.**	:	N520 (BH02 15.50m - 16.00m)

Total Weight : -
Weight Retained on 19mm : -
Percentage retained: : -

MOISTURE CONTENT

Container No.		14
Mass of Container	g	53.55
Mass of Container + Wet	g	89.42
Mass of Container + Dry	g	84.14
Mass of Dry Soil	g	30.59
Mass of Moisture	g	5.28
Moisture Content	%	17.26
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1550
Volume of Speciman	cm^3	869.59
Wet Density	t/m^3	1.78
Dry Density	t/m^3	1.52
Maximum Dry Density	t/m^3	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm^2	113.10
Cross sectional area of soil	cm^2	50.27
Length of soil speciman	cm	17.30

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(^{o}c)	KT cm/min	K_{20} cm/min
1	120	5.00	22	26	0.013	0.011
2	120	5.00	21	26	0.012	0.011
3	120	5.00	20	26	0.011	0.010
4	110	5.00	15	26	0.009	0.008
5	110	5.00	14	26	0.009	0.008
6	110	5.00	14	26	0.009	0.008
7	100	5.00	11	26	0.008	0.007
8	100	5.00	10	26	0.007	0.006
9	100	5.00	8	26	0.006	0.005
10	95	5.00	5	26	0.004	0.003
11	95	5.00	4	26	0.003	0.003
12	95	5.00	3	26	0.002	0.002

Average K_{20} m/s	1.11E-06

Tested By: IG
Date: 15 October 2015

Q.A. Check By: UM
Date: 16 October 2015

Approved By: IG
Date:18 November 2015

Form: GE-L-03

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	13 October 2015
SITE ADDRESS	:	Site 2 , Navo Nadi Town	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH 02 1.00m - 1.50m	**MATERIAL TYPE & LOCATION**	:	Gravel, SILT traces of clay, soft, moist, low to medium plasticity
TEST NUMBER	:	N 511			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	76	62	SPLIT SAMPLE
	Mass of Container	g	86.28	72.21	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	115.27	116.84	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	108.45	106.74	Spliting Factor M_3/M_4 =
	Mass of Dry Soil	g	22.17	34.53	
	Mass of Moisture	g	6.82	10.10	
	Moisture Content	%	30.76	29.25	
	Average Moisture Content	%	30.01		

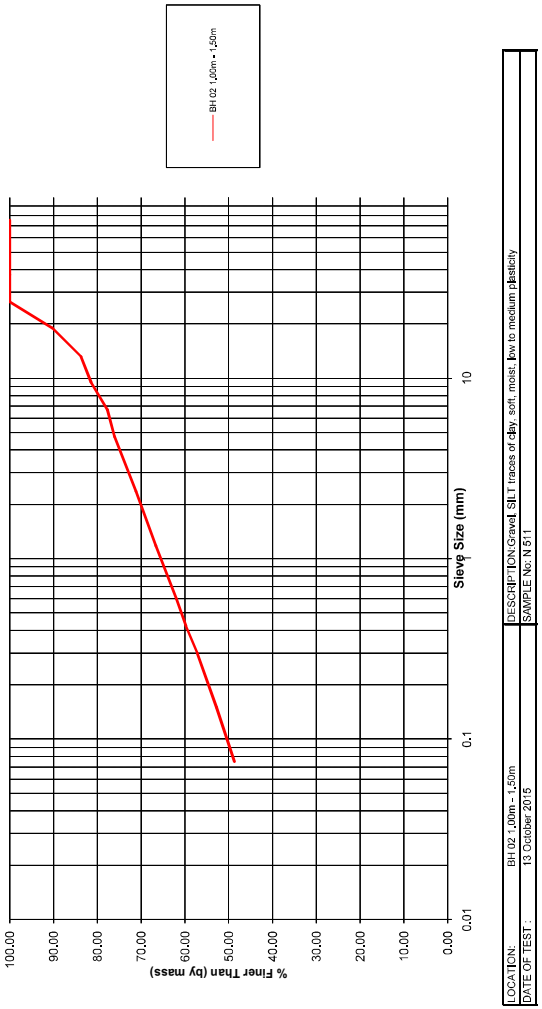
Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	330.98
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	254.59

Test Sieve Size mm	Mass of Dry Soil Retained (M_5)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm	24.62	N/A	9.67	90.33		200
13.2 mm	16.75	N/A	6.58	83.75	600	300
9.50 mm	5.83	N/A	2.29	81.46	450	300
6.70 mm	9.51	N/A	3.74	77.72	300	300
4.75 mm	4.21	N/A	1.65	76.07	250	200
2.36 mm	12.33	N/A	4.84	71.23	150	200
1.18 mm	11.68	N/A	4.59	66.64	100	200
0.600 mm	11.74	N/A	4.61	62.03	80	200
425 µm	5.79	N/A	2.27	59.75	70	200
300 µm	6.50	N/A	2.55	57.20	60	200
150 µm	11.29	N/A	4.43	52.77	40	200
75 µm	10.36	N/A	4.07	48.70	25	200
Passing 75 µm	123.98	N/A	48.70	0.00	-	-
Pan Total	254.59	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :KB	Q.A. Checked by : TL	Approved by : IG
Date : 13 October 2015	Date : 15 October 2015	Date : 18 November 2015

Form GE-L-06



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Form GE-L-06

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	14 October 2015
SITE ADDRESS	:	Site 2 , Navo Nadi Town	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH 02 3.50 - 4.00m	**MATERIAL TYPE & LOCATION**	:	Silty, CLAY traces of root fibres, brown, firm, moist, high plasticity.
TEST NUMBER	:	N 513			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

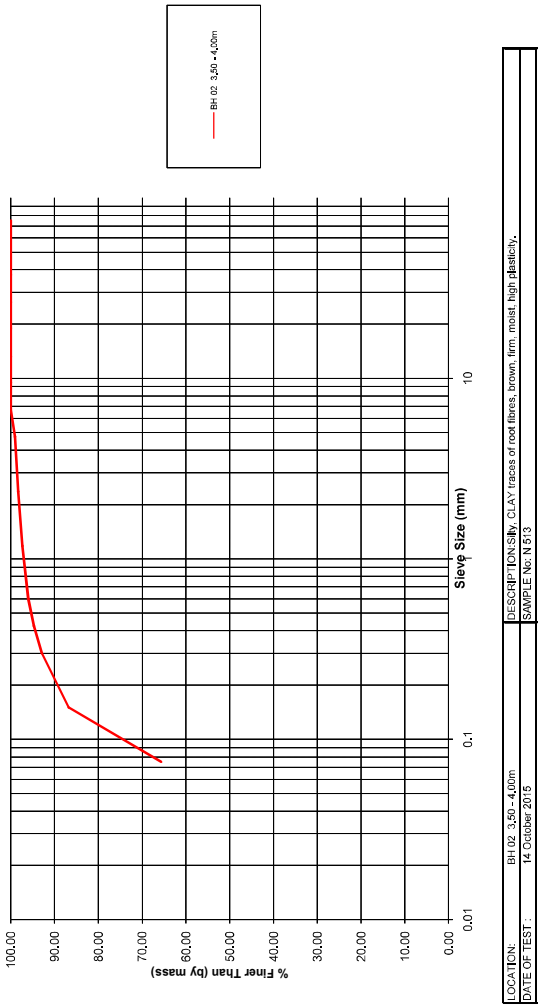
Moisture Content (Material passing 19mm)	Container No.	-	10	6	SPLIT SAMPLE
	Mass of Container	g	52.26	53.04	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	109.91	119.98	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	93.83	101.23	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	41.57	48.19	
	Mass of Moisture	g	16.08	18.75	
	Moisture Content	%	38.68	38.91	
	Average Moisture Content	%	38.80		

Total Mass of Dry Sample				
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil	
	Total Wet Weight (M_w)	g	195.95	
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
		M_T =	141.18	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm	1.27	N/A	0.90	99.10	250	200
2.36 mm	1.06	N/A	0.75	98.35	150	200
1.18 mm	1.44	N/A	1.02	97.33	100	200
0.600 mm	1.87	N/A	1.32	96.01	80	200
425 µm	1.84	N/A	1.30	94.70	70	200
300 µm	2.54	N/A	1.80	92.90	60	200
150 µm	8.63	N/A	6.11	86.79	40	200
75 µm	29.78	N/A	21.09	65.70	25	200
Passing 75 µm	92.75	N/A	65.70	0.00	-	-
Pan Total	141.18	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : TL	Approved by : IG
Date : 14 October 2015	Date : 15 October 2015	Date : 18 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	14 October 2015
SITE ADDRESS	:	Site2 , Navo Nadi Town	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH 02 6.50m - 7.00m	**MATERIAL TYPE & LOCATION**	:	Clayey organic SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity
TEST NUMBER	:	N 515			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

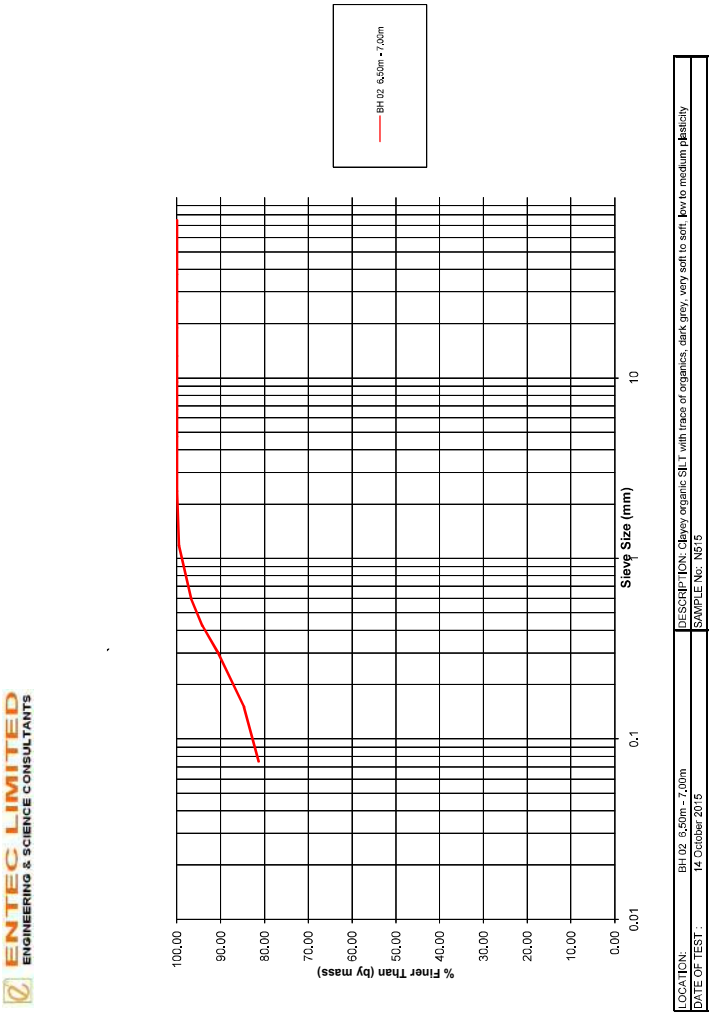
Moisture Content (Material passing 19mm)	Container No.	-	5	7	SPLIT SAMPLE		
	Mass of Container	g	53.34	52.76	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	87.27	90.12	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	74.50	76.35	Spliting Factor = $\frac{M_3}{M_4}$		
	Mass of Dry Soil	g	21.16	23.59			
	Mass of Moisture	g	12.77	13.77			
	Moisture Content	%	60.35	58.37			
	Average Moisture Content	%	59.36				

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)		g	Nil
Total Wet Weight (M_w)		g	335.45
Total Mass of dry sample (M_T)		$M_T = \frac{100M_w}{100 + w}$	
	M_T =	210.50	

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm		N/A	0.00	100.00	150	200
1.18 mm	0.93	N/A	0.44	99.56	100	200
0.600 mm	5.86	N/A	2.78	96.77	80	200
425 µm	5.36	N/A	2.55	94.23	70	200
300 µm	7.57	N/A	3.60	90.63	60	200
150 µm	12.58	N/A	5.98	84.66	40	200
75 µm	6.91	N/A	3.28	81.37	25	200
Passing 75 µm	171.29	N/A	81.37	0.00	-	-
Pan Total	210.50	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by : RK	Q.A. Checked by : TL	Approved by : IG
Date : 14 October 2015	Date : 15 October 2015	Date : 18 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	13 October 2015
SITE ADDRESS	:	Site 2 , Navo, Nadi Town.	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH 02 11.00m - 11.50m	**MATERIAL TYPE & LOCATION**	:	Silty CLAY, red brown, mottled grey, medium to high plasticity
TEST NUMBER	:	N 517			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

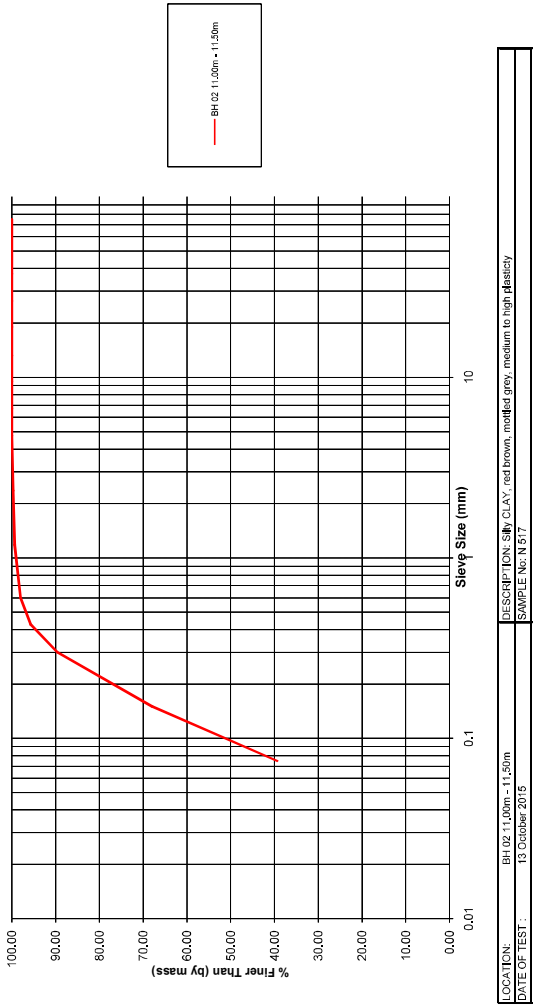
Moisture Content (Material passing 19mm)	Container No.	-	69	83	SPLIT SAMPLE		
	Mass of Container	g	90.25	71.20	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	116.28	108.05	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	109.74	98.75	Spliting Factor $\frac{M_3}{M_4}$ =		
	Mass of Dry Soil	g	19.49	27.55			
	Mass of Moisture	g	6.54	9.30			
	Moisture Content	%	33.56	33.76			
	Average Moisture Content	%	33.66				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	279.76
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	209.31

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm	0.58	N/A	0.28	99.72	150	200
1.18 mm	0.83	N/A	0.40	99.33	100	200
0.600 mm	2.78	N/A	1.33	98.00	80	200
425 µm	5.02	N/A	2.40	95.60	70	200
300 µm	12.58	N/A	6.01	89.59	60	200
150 µm	45.41	N/A	21.69	67.89	40	200
75 µm	59.72	N/A	28.53	39.36	25	200
Passing 75 µm	82.39	N/A	39.36	0.00	-	-
Pan Total	209.31	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : TL	Approved by : IG
Date : 13 October 2015	Date : 15 October 2015	Date : 18 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	13 October 2015
SITE ADDRESS	:	Site2 , Navo Nadi Town	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH 02 14.00m - 14.50m	**MATERIAL TYPE & LOCATION**	:	Clayey fine to medium SAND with trace of some gravel, brown black
TEST NUMBER	:	N 519			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

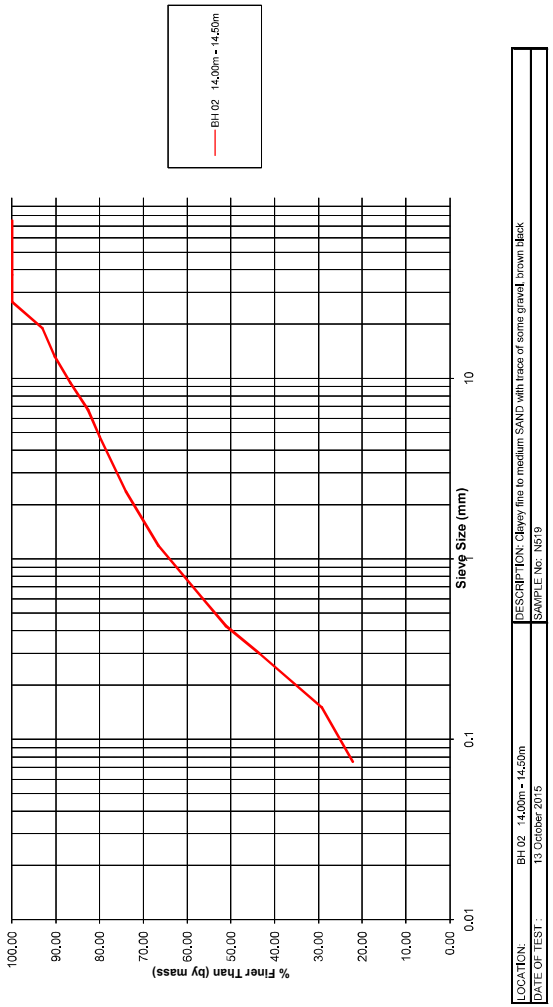
Moisture Content (Material passing 19mm)	Container No.	-	87	89	SPLIT SAMPLE		
	Mass of Container	g	116.49	121.19	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	182.52	183.59	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	171.45	172.46	Spliting Factor = M_3 / M_4		
	Mass of Dry Soil	g	54.96	51.27			
	Mass of Moisture	g	11.07	11.13			
	Moisture Content	%	20.14	21.71			
	Average Moisture Content	%	20.93				

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)		g	Nil
Total Wet Weight (M_w)		g	269.81
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
	M_T =		223.12

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm	15.45	N/A	6.92	93.08		200
13.2 mm	6.23	N/A	2.79	90.28	600	300
9.50 mm	7.79	N/A	3.49	86.79	450	300
6.70 mm	9.19	N/A	4.12	82.67	300	300
4.75 mm	6.05	N/A	2.71	79.96	250	200
2.36 mm	13.28	N/A	5.95	74.01	150	200
1.18 mm	16.63	N/A	7.45	66.56	100	200
0.600 mm	22.68	N/A	10.16	56.39	80	200
425 µm	11.67	N/A	5.23	51.16	70	200
300 µm	16.96	N/A	7.60	43.56	60	200
150 µm	31.94	N/A	14.32	29.24	40	200
75 µm	15.80	N/A	7.08	22.16	25	200
Passing 75 µm	49.45	N/A	22.16	0.00	-	-
Pan Total	223.12	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : TL	Approved by : IG
Date : 13 October 2015	Date : 15 October 2015	Date :18 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	13 October 2015
SITE ADDRESS	:	Site2 , Navo Nadi Town	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH 02 15.50m - 16.00m	**MATERIAL TYPE & LOCATION**	:	Highly to completely weathered conglomerate, extreamly weak to very weak, brown (silty fine to medium sand with some fine to medium gravel, subangular)
TEST NUMBER	:	N 520			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	8	12	SPLIT SAMPLE		
	Mass of Container	g	53.04	53.13	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	75.40	74.86	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	72.23	71.76	Spliting Factor $\frac{M_3}{M_4}$ =		
	Mass of Dry Soil	g	19.19	18.63			
	Mass of Moisture	g	3.17	3.10			
	Moisture Content	%	16.52	16.64			
	Average Moisture Content	%	16.58				

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	267.89
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	229.79

Test Sieve Size mm	Mass of Dry Soil Retained (M_2)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm	7.01	N/A	3.05	96.95	300	300
4.75 mm	10.56	N/A	4.60	92.35	250	200
2.36 mm	14.86	N/A	6.47	85.89	150	200
1.18 mm	15.82	N/A	6.88	79.00	100	200
0.600 mm	24.54	N/A	10.68	68.32	80	200
425 µm	19.17	N/A	8.34	59.98	70	200
300 µm	20.82	N/A	9.06	50.92	60	200
150 µm	34.56	N/A	15.04	35.88	40	200
75 µm	16.40	N/A	7.14	28.74	25	200
Passing 75 µm	66.05	N/A	28.74	0.00	-	-
Pan Total	229.79	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : TL	Approved by : IG
Date :15 October 2015	Date : 16 October 2015	Date : 18 November 2015

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LOCATION:	BH 02 15.50m - 16.00m
DATE OF TEST :	13 October 2015
DESCRIPTION : Highly to completely weathered conglomerate, extremely weak to very weak, brown (silty fine to medium sand with some fine to medium gravel, subangular	
SAMPLE No: N520	

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	PROJECT No.	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works.	DATE TESTED	:	11 October 2015
SITE ADDRESS	:	BH 02, Navo, Nadi Town	TECHNOLOGIST	:	IG
SAMPLE LOCATION	:	BH 02 3.50m -4.00m	MATERIAL TYPE	:	Silty CLAY with trace of root fibres, brown, firm, moist, high plasticity.
TEST NUMBER	:	N513			

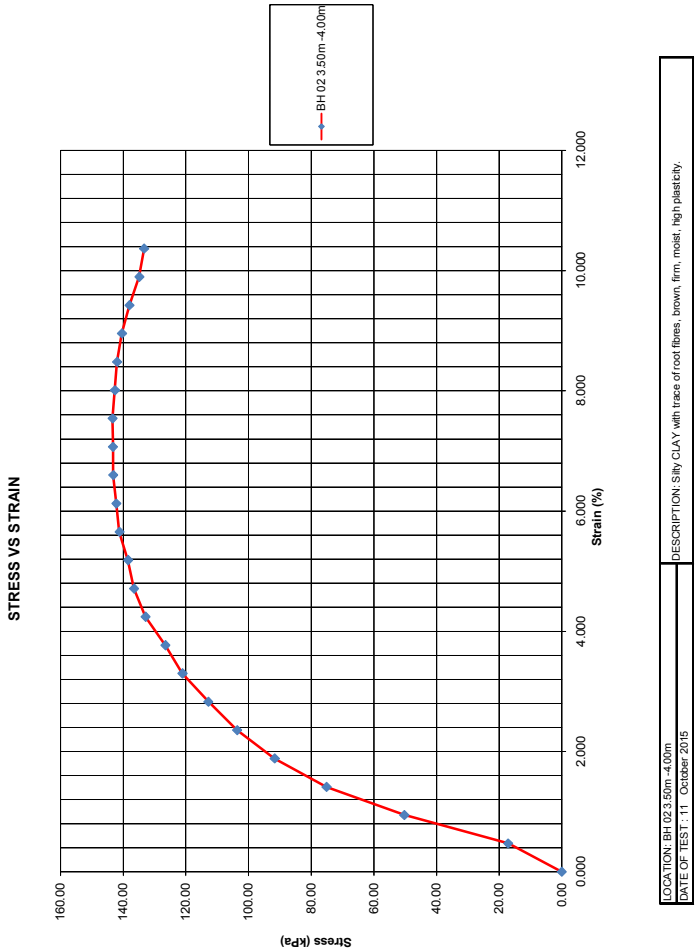
SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	93
	Mass of Container	g	88.60
	Mass of Container + Wet Soil	g	535.79
	Mass of Container + Dry Soil	g	413.31
	Mass of Dry Soil	g	324.71
	Mass of Moisture	g	122.48
	Moisture Content	%	37.72

Bulk Density	Sample No.	-	N 513
	Diameter of Specimen	mm	53.10
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2213.39
	Initial length of specimen Lo	mm	106.10
	Initial mass of specimen Mi	g	447.79
	Bulk Density ρ	t/m³	1.91
	Dry Density ρd	t/m³	1.38

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\varepsilon = \frac{Cn - Co}{Lo}$	Corrected Area $A = \frac{Ao}{1-\varepsilon}$	Principal Stress Difference $\sigma 1 - \sigma 3 = 1000P/A$
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002213	0.00
0.50	19	0.0381	0.471	0.002224	17.13
1.00	56.0	0.1124	0.943	0.002234	50.30
1.50	84.0	0.1686	1.414	0.002245	75.10
2.00	103.0	0.2068	1.885	0.002256	91.67
2.50	117.0	0.2349	2.356	0.002267	103.63
3.00	128.0	0.2570	2.828	0.002278	112.83
3.50	138.0	0.2771	3.299	0.002289	121.06
4.00	145.0	0.2911	3.770	0.002300	126.56
4.50	153.0	0.3072	4.241	0.002311	132.90
5.00	158.0	0.3172	4.713	0.002323	136.56
5.50	161.0	0.3232	5.184	0.002334	138.45
6.00	165.0	0.3313	5.655	0.002346	141.22
6.50	167.0	0.3353	6.126	0.002358	142.21
7.00	169.0	0.3393	6.598	0.002370	143.18
7.50	170.0	0.3413	7.069	0.002382	143.30
8.00	171.0	0.3433	7.540	0.002394	143.41
8.50	171.0	0.3433	8.011	0.002406	142.68
9.00	171.0	0.3433	8.483	0.002419	141.94
9.50	170.0	0.3413	8.954	0.002431	140.39
10.00	168.0	0.3373	9.425	0.002444	138.03
10.50	165.0	0.3313	9.896	0.002456	134.87
11.00	164.0	0.3293	10.368	0.002469	133.35

Tested by : IG	Q.A. Check by : LN	Approved by : IG
Date : 11 October 2015	Date : 14 October 2015	Date : 18 November 2015



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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works.	**DATE TESTED** :	10 October 2015
SITE ADDRESS :	BH 02, Navo, Nadi Town	**TECHNOLOGIST** :	IG
SAMPLE LOCATION :	BH 02 6.50m - 7.00m	**MATERIAL TYPE** :	Clayey organic SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity
TEST NUMBER :	N 515		

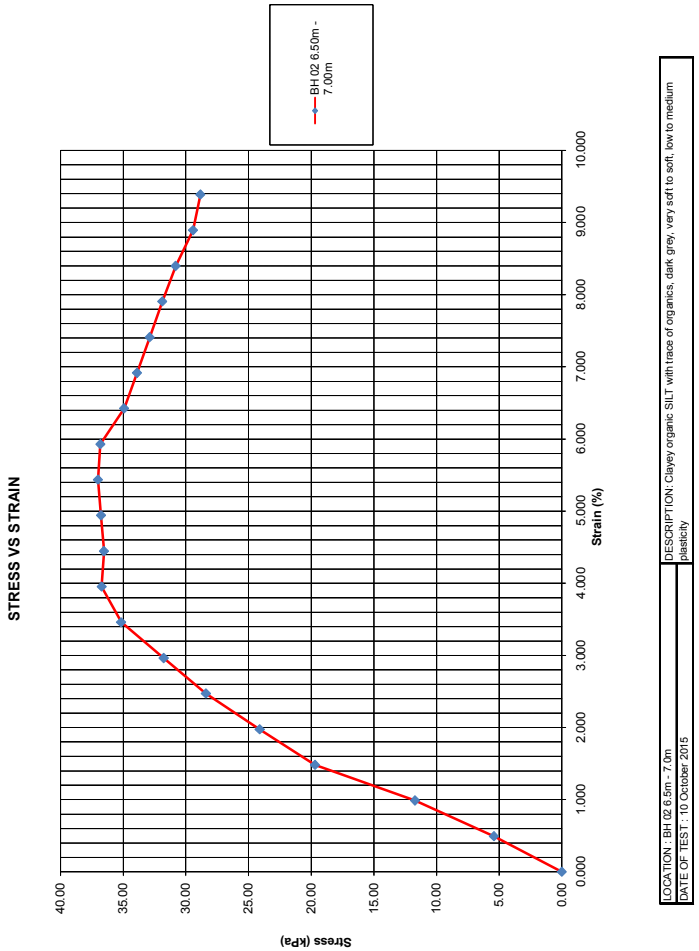
SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	94
	Mass of Container	g	88.03
	Mass of Container + Wet Soil	g	390.02
	Mass of Container + Dry Soil	g	277.14
	Mass of Dry Soil	g	189.11
	Mass of Moisture	g	112.88
	Moisture Content	%	59.69

Bulk Density	Sample No.	-	N 515
	Diameter of Specimen	mm	53.00
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2205.07
	Initial length of specimen Lo	mm	101.20
	Initial mass of specimen Mi	g	375.96
	Bulk Density ρ	t/m³	1.68
	Dry Density ρd	t/m³	1.06

Compression Gauge Reading	Load Gauge Reading	Load	Strain ε= Cn - Co / Lo	Corrected Area A = Ao/ 1-ε	Principal Stress Difference σ1 - σ3 = 1000P/A
mm		(kN)	%	m²	kPa
0.00	0	0	0.000	0.002205	0.00
0.50	6.0	0.0120	0.494	0.002216	5.42
1.00	13.0	0.0261	0.988	0.002227	11.72
1.50	22.0	0.0441	1.482	0.002238	19.70
2.00	27.0	0.0542	1.976	0.002250	24.09
2.50	32.0	0.0642	2.470	0.002261	28.40
3.00	36.0	0.0722	2.964	0.002272	31.77
3.50	40.0	0.0803	3.458	0.002284	35.16
4.00	42.0	0.0843	3.953	0.002296	36.72
4.50	42.0	0.0843	4.447	0.002308	36.53
5.00	42.5	0.0853	4.941	0.002320	36.77
5.50	43.0	0.0863	5.435	0.002332	37.01
6.00	43.0	0.0863	5.929	0.002344	36.82
6.50	41.0	0.0823	6.423	0.002356	34.93
7.00	40.0	0.0803	6.917	0.002369	33.90
7.50	39.0	0.0783	7.411	0.002382	32.88
8.00	38.0	0.0763	7.905	0.002394	31.87
8.50	37.0	0.0742	8.399	0.002407	30.82
9.00	35.5	0.0712	8.893	0.002420	29.42
9.50	35.0	0.0702	9.387	0.002434	28.85
10.00	34.5	0.0692	9.881	0.002447	28.28

Tested by : IG	Q.A. Check by : LN	Approved by : IG
Date : 10 October 2015	Date : 14 October 2015	Date : 18 November 2015



DESCRIPTION: Clayey organic SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity

LOCATION : BH 02 6.5m - 7.0m
DATE OF TEST : 10 October 2015

ENTEC LIMITED
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Form GE-L-10

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works.	**DATE TESTED**	:	10 October 2015
SITE ADDRESS	:	BH 02: Navo, Nadi Town	**TECHNOLOGIST**	:	IG
SAMPLE LOCATION	:	BH 02 9.50m - 10.00m	**MATERIAL TYPE**	:	Clayey organic SILT with trace of organics, dark grey, very soft to soft, low to medium plasticity
TEST NUMBER	:	N 516			

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

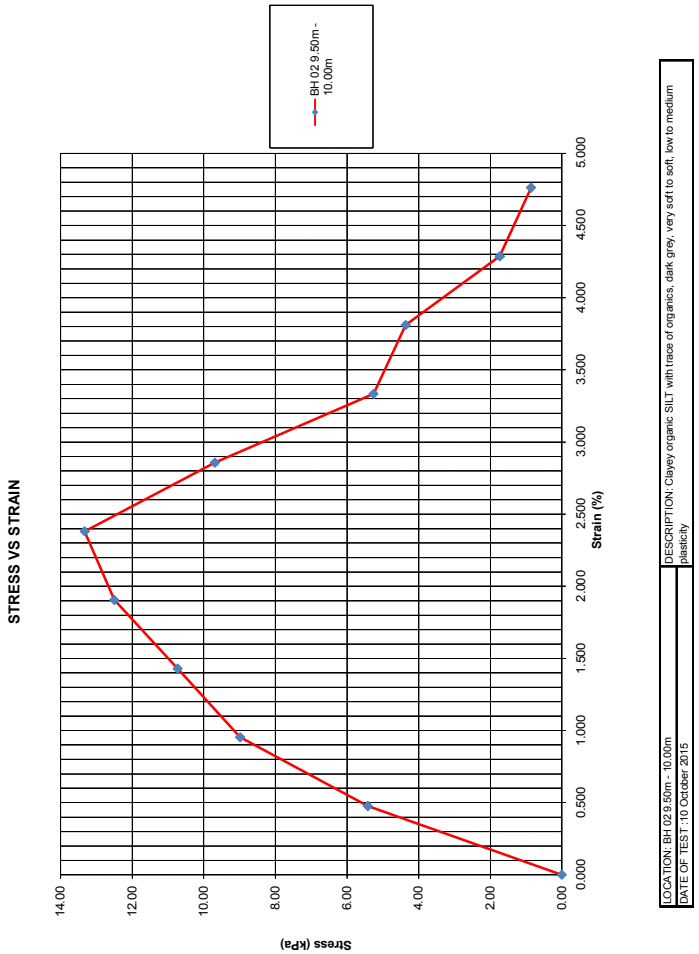
Moisture Content	Container No.	-	95
	Mass of Container	g	89.87
	Mass of Container + Wet Soil	g	396.75
	Mass of Container + Dry Soil	g	309.82
	Mass of Dry Soil	g	219.95
	Mass of Moisture	g	86.93
	Moisture Content	%	39.52

Bulk Density	Sample No.	-	N 516
	Diameter of Specimen	mm	53.00
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2205.07
	Initial length of specimen Lo	mm	105.00
	Initial mass of specimen Mi	g	440.50
	Bulk Density ρ	t/m³	1.90
	Dry Density ρd	t/m³	1.36

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\varepsilon = \frac{Cn - Co}{Lo}$	Corrected Area A = Ao/ 1-ε	Principal Stress Difference σ1 - σ3 = 1000P/A
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002205	0.00
0.50	6.0	0.0120	0.476	0.002216	5.42
1.00	10.0	0.0200	0.952	0.002226	8.98
1.50	12.0	0.0240	1.429	0.002237	10.73
2.00	14.0	0.0281	1.905	0.002248	12.50
2.50	15.0	0.0301	2.381	0.002259	13.33
3.00	11.0	0.0220	2.857	0.002270	9.69
3.50	6.0	0.0120	3.333	0.002281	5.26
4.00	5.0	0.0100	3.810	0.002292	4.36
4.50	2.0	0.0040	4.286	0.002304	1.74
5.00	1.0	0.0020	4.762	0.002315	0.86

Tested by : IG	Q.A. Check by : LN	Approved by : IG
Date : 10 October 2015	Date :14 October 2015	Date :18 November 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS



Form GE-L-10

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works.	**DATE TESTED**	:	21 October 2015
SITE ADDRESS	:	BH 02: Navo, Nadi Town	**TECHNOLOGIST**	:	IG
SAMPLE LOCATION	:	BH 02 19.0m - 19.30m (Core)	**MATERIAL TYPE**	:	Sandstone CONGLORNERATE, fine to medium gravel, highly to moderatly weathered, very weak to weak
TEST NUMBER	:	N 621			

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	90
	Mass of Container	g	118.07
	Mass of Container + Wet Soil	g	784.35
	Mass of Container + Dry Soil	g	742.83
	Mass of Dry Soil	g	624.76
	Mass of Moisture	g	41.52
	Moisture Content	%	6.65

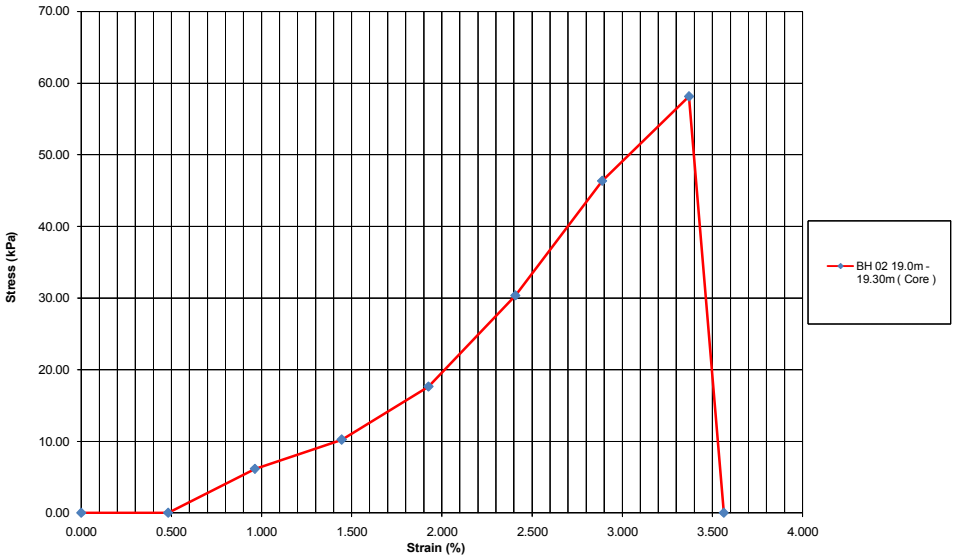
Bulk Density	Sample No.	-	N 612
	Diameter of Specimen	mm	60.79
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2900.91
	Initial length of specimen Lo	mm	103.85
	Initial mass of specimen Mi	g	670.94
	Bulk Density ρ	t/m³	2.23
	Dry Density ρd	t/m³	2.09

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\varepsilon = \frac{Cn - Co}{Lo}$	Corrected Area $A = Ao / 1-\varepsilon$	Principal Stress Difference $\sigma 1 - \sigma 3 = 1000P/A$
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002901	0.00
0.50	0.0	0	0.481	0.002915	0.00
1.00	9.0	0.0180	0.963	0.002929	6.15
1.50	15.0	0.0301	1.444	0.002943	10.23
2.00	26.0	0.0522	1.926	0.002958	17.65
2.50	45.0	0.0903	2.407	0.002972	30.38
3.00	69.0	0.1385	2.889	0.002987	46.36
3.50	87.0	0.1746	3.370	0.003002	58.16
3.70	0.0	0	3.563	0.000108	0.00

Tested by : IG	Q.A. Check by : LN	Approved by : IG
Date : 10 October 2015	Date :14 October 2015	Date : 18 November 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

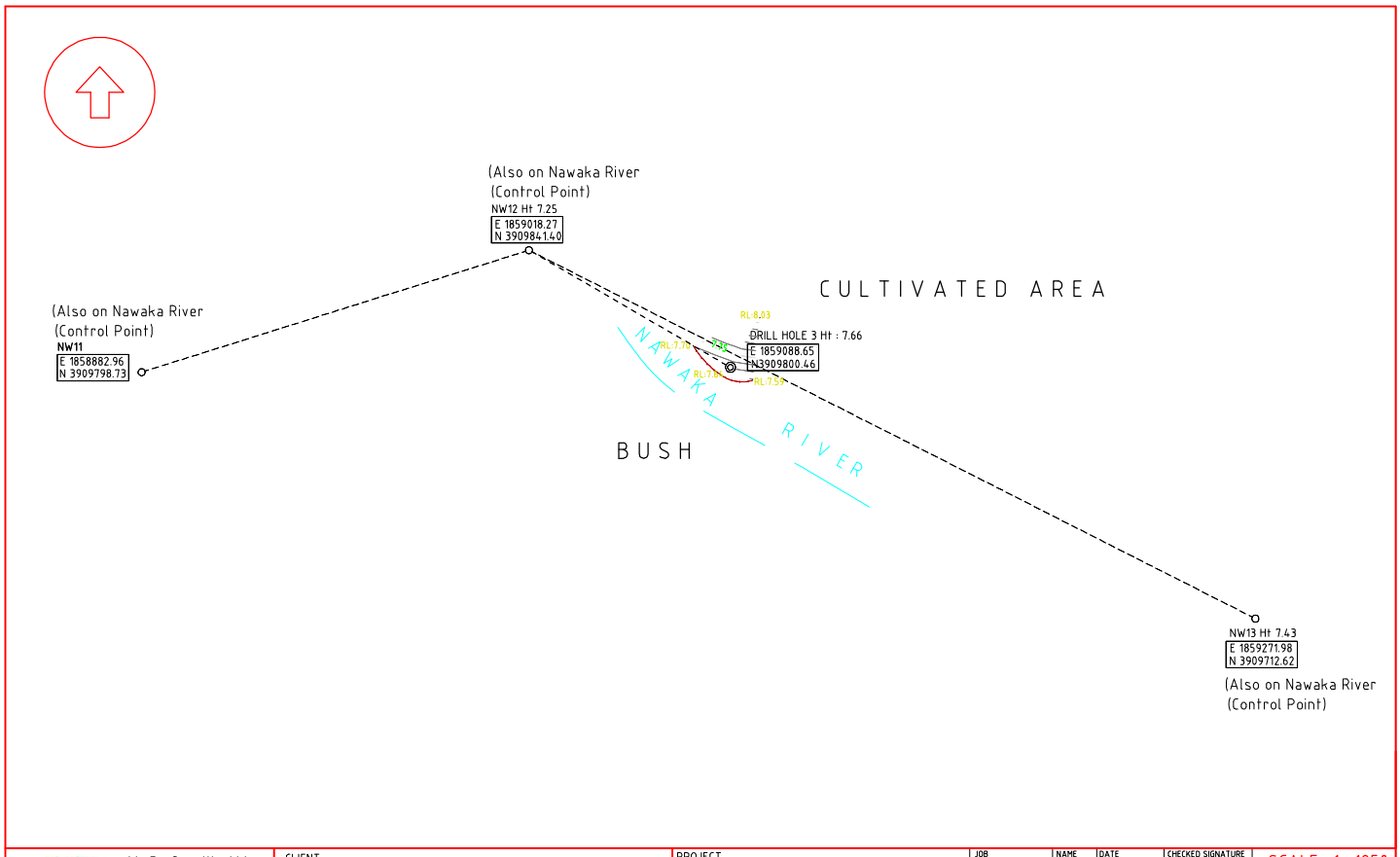
STRESS VS STRAIN



LOCATION: BH 02 19.00m - 19.30m	DESCRIPTION: Sandstone CONGLORNERATE, fine to medium gravel, highly to moderatly weathered, very weak to weak
DATE OF TEST :21 October 2015	

APPENDIX 3

SITE 3 - Qeleloa, Nadi, Fiji.



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2 Tui Street,
Level 2, A.K.Singh Bldg,
P.O. Box 450
Lautoka, Fiji
Tel +679 6668597
Mob +679 9999597

CLIENT
JICA STUDY TEAM
NADI RIVER FLOOD PROJECT

PROJECT
SITE No. 3

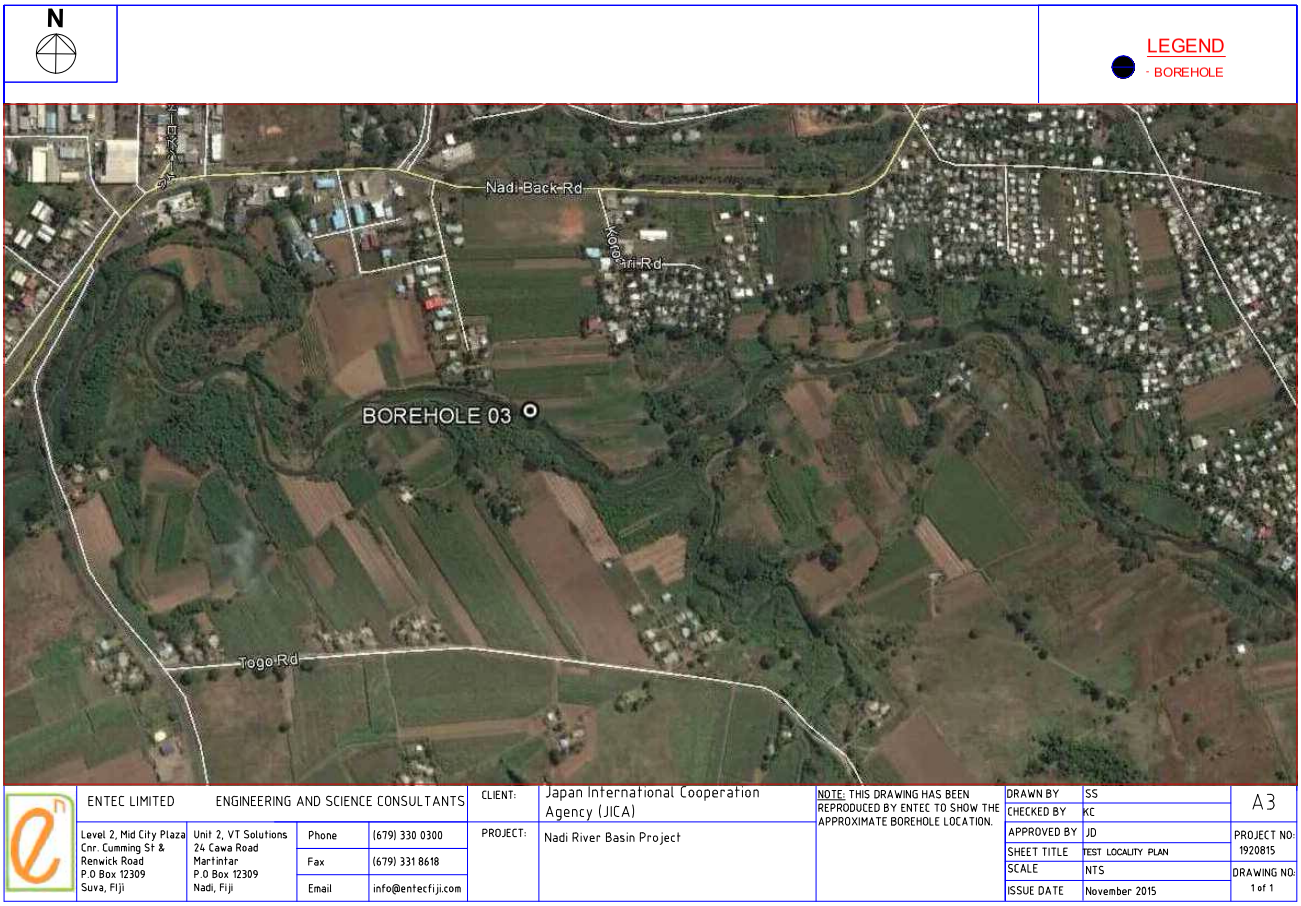
JOB	NAME	DATE	CHECKED SIGNATURE
SURVEYED BY:	SAMISONI	05/11/15	
DRAFTED BY:	Salend	10/11/15	
CHECKED BY:			
APPROCED BY:			

THIS DRAWING AND DESIGN REMAIN THE PROPERTY OF AND MAY NOT BE REPRODUCED, WITHOUT THE WRITTEN PERMISSION OF CADASTRALS

SCALE : 1 : 1250
2110 - SITE 3
ACAD
C/2100-2199/2110 - Topo

D15-75

APPENDIX 3a
Test Locality Plan



ENTEC LIMITED ENGINEERING AND SCIENCE CONSULTANTS				CLIENT:	Japan International Cooperation Agency (JICA)	NOTE: THIS DRAWING HAS BEEN REPRODUCED BY ENTEC TO SHOW THE APPROXIMATE BOREHOLE LOCATION.	DRAWN BY	SS	A3
Level 2, Mid City Plaza Cnr. Cumming St & Renwick Road P.O Box 12309 Suva, Fiji	Unit 2, VT Solutions 24 Cawa Road Martintar P.O Box 12309 Nadi, Fiji	Phone	(679) 330 0300	PROJECT:	Nadi River Basin Project		CHECKED BY	KC	
		Fax	(679) 331 8618				APPROVED BY	JD	PROJECT NO: 1920815
		Email	info@entecfiji.com				SHEET TITLE	TEST LOCALITY PLAN	
							SCALE	NTS	DRAWING NO: 1 of 1
							ISSUE DATE	November 2015	

APPENDIX 3b

Engineering Borehole Log

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Qeleloa Farm	BH03

Job No.:	Start Date: / Finish Date:	Ground Level (m):	Co-Ordinates ():
1920815	08-10-2015 / 27-10-2015	7.66	E 1859088.7 N 3909800.5

Client:	Hole Depth:	Sheet:
JICA Study Team	26.00 m	1 of 6

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR SCR RQD (%)	Samples	Tests
				Silty CLAY with root fibres, red brown, medium plasticity				+6.76					90		P= 10 kPa
				Silty CLAY, red brown, medium plasticity				+6.16	1					1.00	P= 0 kPa friable SPT 1.00 m N=3
				Clayey SILT, red brown, medium plasticity					2				40		P= 75 kPa P= 10 kPa
									3				90	2.00 - 2.50 PT	P= 30 kPa P= 150 kPa
									4					3.50	P= 225 kPa SPT 3.50 m N=9 P= 80 kPa
				Silty CLAY, red brown, medum plasticity				+3.56					71		P= 75 kPa
								+2.66							P= 80 kPa

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres	Contractor:	Rig/Plant Used:	Logged by:	Checked by:
Scale 1:31	GDISL	Drill Rig - TripleTube	KC/TL	DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Qeleloa Farm	BH03

Job No.:	Start Date: / Finish Date:	Ground Level (m):	Co-Ordinates ():
1920815	08-10-2015 / 27-10-2015	7.66	E 1859088.7 N 3909800.5

Client:	Hole Depth:	Sheet:
JICA Study Team	26.00 m	2 of 6

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR SCR RQD (%)	Samples	Tests
				Organic SILT, dark grey, soft to very soft, low to medium plasticity										5.00 - 5.50 PT	P= 15 kPa
													71		P= 15 kPa
									6						P= 20 kPa SPT 6.50 m N=0
														6.50	P= 10 kPa
									7				71		P= 20 kPa P= 20 kPa
				Sandy SILT with organics				-0.04							
				Silty fine to medium SAND, grey				-0.34	8						
														8.00 - 8.50 PT	
				Silty SAND with trace of fine gravel, dark grey brown				-1.24					60		
				Sandy GRAVEL with trace of silt				-1.44	9						
				Silty fine to medium SAND, dark grey				-1.54							
				Organic SILT with trace of fine sand and decomposing organic, dark grey black, medium plasticity				-1.84							P= 20 kPa SPT 9.50 m N=4
													33	9.50	

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres	Contractor:	Rig/Plant Used:	Logged by:	Checked by:
Scale 1:31	GDISL	Drill Rig - TripleTube	KC/TL	DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Qeleloa Farm	BH03

Job No.:	Start Date: / Finish Date:	Ground Level (m):	Co-Ordinates ():	
1920815	08-10-2015 / 27-10-2015	7.66	E 1859088.7 N 3909800.5	

Client:	Hole Depth:	Sheet:
JICA Study Team	26.00 m	3 of 6

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Organic SILT with trace of fine sand and decomposing organic, dark grey black, medium plasticity *(continued)*					11				33		P= 20 kPa P= 20 kPa P= 25 kPa SPT 11.00 m N=2
								-4.84	12				45	11.00	P= 25 kPa
				Organic SILT, grey green, low plasticity					13				36	12.50	P= 20 kPa SPT 12.50 m N=0 -lost -lost
				Organic SILT with trace of fine sand, dark grey, very soft to soft, medium to high plasticity				-6.34	14				60	14.00	P= 20 kPa SPT 14.00 m N=0 P= 20 kPa

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres	Contractor:	Rig/Plant Used:	Logged by:	Checked by:
Scale 1:31	GDISL	Drill Rig - TripleTube	KC/TL	DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Qeleloa Farm	BH03

Job No.:	Start Date: / Finish Date:	Ground Level (m):	Co-Ordinates ():	
1920815	08-10-2015 / 27-10-2015	7.66	E 1859088.7 N 3909800.5	

Client:	Hole Depth:	Sheet:
JICA Study Team	26.00 m	4 of 6

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Organic SILT with trace of fine sand, dark grey, very soft to soft, medium to high plasticity *(continued)*					16				60		P= 20 kPa P= 20 kPa SPT 15.50 m N=0
								-9.34	17				93	15.50	P= 20 kPa P= 20 kPa
				SILT with minor to some fine sand, dark grey, very soft to soft, medium to high plasticity					18				32	17.00	P= 20 kPa SPT 17.00 m N=0 P= 10 kPa
				SILT with some fine sand with minor to some organics				-10.34							P= 25 kPa
				Sub-angular to Sub-rounded, fine to coarse GRAVEL (recovered as potentially with some silt/sand)				-10.84							P= 25 kPa SPT 18.50 m N=38
				Silty fine SAND with trace of some sub-rounded medium to coarse gravel				-11.24	19				17	18.50	

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres	Contractor:	Rig/Plant Used:	Logged by:	Checked by:
Scale 1:31	GDISL	Drill Rig - TripleTube	KC/TL	DMC

ENTEC 1.01 | JB-01.B | Log_BH NZ DRILLHOLE 1 BH03.GPJ | <DrawingFile>> 04-12-2015 11:15 8.30.004 Default Letter(A Size Tool - DGD | Lib: Entec 1.01 2015-09-27.Prj DGD7-P 3.03 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Qeleloa Farm	No.: BH03
Job No.: 1920815	Start Date: 08-10-2015 Finish Date: 27-10-2015	Ground Level (m): 7.66	Co-Ordinates (): E 1859088.7 N 3909800.5
Client: JICA Study Team	Hole Depth: 26.00 m	Sheet: 5 of 6	

Column headings: Type; Run; Fluid & Water; Piezometer; Geological Description (Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.); Legend; Weathering; Field Strength; Elevation (m); Depth (m); Symbolic Log; Defect Spacing (mm); Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc); TCR (SCR) RQD (%); Samples; Tests

Geological Description	Elevation (m)	Depth (m)	TCR (%)	Samples	Tests
Silty fine SAND with trace of some sub-rounded medium to coarse gravel *(continued)*	-12.54				SPT 20.00 m N=0
SILT with trace of fine sand, very soft, wet to saturated	-13.34	21	60	20.00	P= 0 kPa
Silty CLAY, dark grey mottled orange, very soft to soft, medium plasticity	-13.54				
Silty CLAY with some fine to medium sub-angular gravel, medium plasticity	-13.84				P= 20 kPa
Silty CLAY with fine to medium sub-angular to rounded gravel, green grey, medium plasticity	-14.34	22		21.50	SPT 21.50 m N=51
Organic decomposing matter					
Clayey fine sub-angular to angular GRAVEL, dry, medium to high plasticity	-16.84	23, 24	80, 70	23.00	P= 125 kPa; SPT 23.00 m N=50; P= 50 kPa
Fine to coarse GRAVEL, angular to sub-rounded			80	24.50	SPT 24.50 m N=50

Explanations:
Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

● Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
■ U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks:
N = Standard Penetration Test
Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - TripleTube	Logged by: KC/TL	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH03.GPJ <<DrawingFile>> 04-12-2015 11:15 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Qeleloa Farm	No.: BH03
Job No.: 1920815	Start Date: 08-10-2015 Finish Date: 27-10-2015	Ground Level (m): 7.66	Co-Ordinates (): E 1859088.7 N 3909800.5
Client: JICA Study Team	Hole Depth: 26.00 m	Sheet: 6 of 6	

Geological Description	Elevation (m)	Depth (m)	TCR (%)	Samples	Tests
Fine to coarse GRAVEL, angular to sub-rounded *(continued)*	-18.14		80		
Clayey fine to course sub-rounded to sub-angular GRAVEL	-18.34	26		26.00	SPT 26.00 m N=50
Hole Terminated at 26.00 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005		27, 28, 29			

Explanations:
Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

● Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
■ U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks:
N = Standard Penetration Test
Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - TripleTube	Logged by: KC/TL	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH03.GPJ <<DrawingFile>> 04-12-2015 11:15 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

Borehole 3 Core Photos (0.00m to 26.0m)

0.00m to 4.10m

4.10m to 7.40m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 3,Qeleoa, Nadi Town, Fiji.

7.40m to 12.50m

12.50m to 17.00m

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS
1920815.03

17.00m to 20.00m

20.00m to 26.00m

APPENDIX 3c

Laboratory Test Schedule and Laboratory Test Results

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : Site 03, Qeleloa, Nadi
PROJECT NUMBER :1920815
TEST RESTULTS REQUIRED BY:

Lab test Schedule

Date:	
SAMPLES SENT BY: Collected from Site by ENTEC on	
Notes:	

Project No.	Site	Soil Type	SPT N value	Sample type	Depth (m)	Lab Tests Required					
						Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation
1920815.03	Site 3	Silty CLAY	3	SPT	1.00-1.50			1	1			
		Clayey SILT		U	2.0 - 2.5		1	1		1	1	1
		Clayey SILT	9	SPT	3.5 - 4.0					1		
		SILT with fine sand		U	5.0 - 5.50		1	1	1		1	1
		SILT with fine sand	0	SPT	6.50-7.00			1				
		SAND trace of Gravel		U	8.00m - 8.5	1	1	1	1		1	
		SAND trace of Gravel	4	SPT	8.50-9.00m							
		SAND trace of Gravel	1	SPT	10.55 - 11.0m							
		Silty SAND	0	SPT	12.50-13.00			1	1			
		Clayey Silt	0	SPT	13.55 - 14.0							
		Silty CAY	0	SPT	15.50-16.00			1	1			
		Silt/gravel	0	SPT	17.00-17.5			1		1		
		GRAVEL	38	SPT	18.50-19.00			1				
		Sandy GRAVEL	0	SPT	20.00-20.50			1	1			
	TOTALS				BOQ	1	3	10	6	3	3	2

Turn around time for results - Two Bore hole results per week except consolidation test results

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 15 October 2015
SITE ADDRESS	: BH03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Clayey SILT, red brown, medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N523 (BH03 2.00m - 2.50m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	81	82				
Mass of Container	g	87.50	90.16				
Mass of Container + Wet Soil	g	199.00	208.76				
Mass of Container + Dry Soil	g	175.76	184.08				
Mass of Dry Soil	g	88.26	93.92				
Mass of Moisture	g	23.24	24.68				
Moisture Content	%	26.33	26.28				26.30

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		165	175				
Mass of Container	g	11.77	11.32				
Mass of Container + Wet Soil	g	17.53	17.90				
Mass of Container + Dry Soil	g	16.28	16.46				
Mass of Dry Soil	g	4.51	5.14				
Mass of Moisture	g	1.25	1.44				
Moisture Content	%	27.72	28.02				27.87

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	29	26	19	16
Container No.		140	102	164	162	163	128
Mass of Container	g	11.88	12.14	11.84	11.99	11.75	11.85
Mass of Container + Wet Soil	g	22.48	25.87	22.85	21.48	25.58	23.62
Mass of Container + Dry Soil	g	19.55	22.07	19.75	18.78	21.47	20.13
Mass of Dry Soil	g	7.67	9.93	7.91	6.79	9.72	8.28
Mass of Moisture	g	2.93	3.80	3.10	2.70	4.11	3.49
Moisture Content	%	38.20	38.27	39.19	39.76	42.28	42.15

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample			125.00			
Final length of Sample after Shrinkage			113.00			
% Shrinkage			9.60			9.60

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

Liquid Limit	40.10 %
Plastic Limit	27.87 %
Plasticity Index	12.23 %
Shrinkage Limit	9.60 %

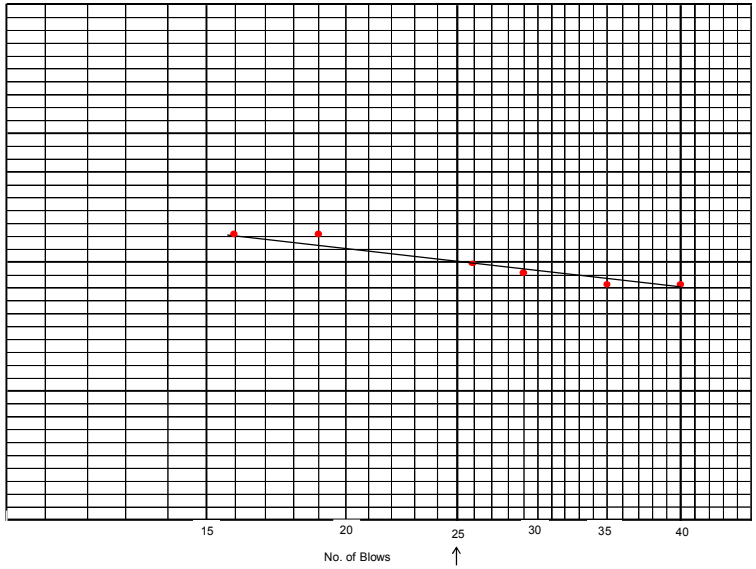
Tested By: UM
Date:13 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

Form: GE-L-03

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample N523

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH03, Qeleloa, Nadi	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: Clayey SILT, red brown, medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N524 (BH03 3.50m - 4.00m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	31	34				
Mass of Container	g	14.55	14.90				
Mass of Container + Wet Soil	g	28.68	31.26				
Mass of Container + Dry Soil	g	25.69	27.79				
Mass of Dry Soil	g	11.14	12.89				
Mass of Moisture	g	2.99	3.47				
Moisture Content	%	26.84	26.92				26.88

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		114	128				
Mass of Container	g	11.92	11.83				
Mass of Container + Wet Soil	g	16.89	17.07				
Mass of Container + Dry Soil	g	15.75	15.86				
Mass of Dry Soil	g	3.83	4.03				
Mass of Moisture	g	1.14	1.21				
Moisture Content	%	29.77	30.02				29.89

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	15
Container No.		107	108	109	110	113	112
Mass of Container	g	11.59	11.28	11.88	11.91	11.89	11.74
Mass of Container + Wet Soil	g	18.49	21.01	22.33	22.10	19.74	19.95
Mass of Container + Dry Soil	g	16.41	18.06	19.17	18.97	17.31	17.36
Mass of Dry Soil	g	4.82	6.78	7.29	7.06	5.42	5.62
Mass of Moisture	g	2.08	2.95	3.16	3.13	2.43	2.59
Moisture Content	%	43.15	43.51	43.35	44.33	44.83	46.09

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample		125.00				
Final length of Sample after Shrinkage		105.00				
% Shrinkage		16.00				16.00

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

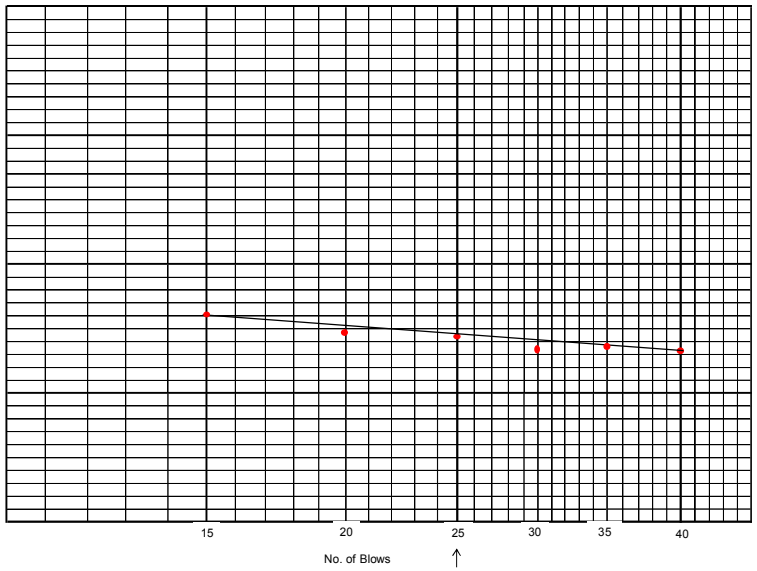
Liquid Limit	44.50 %
Plastic Limit	29.89 %
Plasticity Index	14.61 %
Shrinkage Limit	16.00 %

Tested By:KB
Date:14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N524

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 15 October 2015
SITE ADDRESS	: BH03, Qeleloa, Nadi	**TECHNOLOGIST**	: RK/LN
MATERIAL TYPE & DESCRIPTION	: SILT with minor to some fine sand, dark grey, very soft to soft, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N530 (BH03 17.00m - 17.50m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	45	40				
Mass of Container	g	14.45	14.56				
Mass of Container + Wet Soil	g	39.39	34.59				
Mass of Container + Dry Soil	g	31.41	28.11				
Mass of Dry Soil	g	16.96	13.55				
Mass of Moisture	g	7.98	6.48				
Moisture Content	%	47.05	47.82				47.44

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		173	124				
Mass of Container	g	11.98	12.24				
Mass of Container + Wet Soil	g	16.44	16.96				
Mass of Container + Dry Soil	g	15.53	15.97				
Mass of Dry Soil	g	3.55	3.73				
Mass of Moisture	g	0.91	0.99				
Moisture Content	%	25.63	26.54				26.09

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	19	15
Container No.		140	163	164	102	162	176
Mass of Container	g	11.89	11.77	11.82	12.14	11.97	11.76
Mass of Container + Wet Soil	g	16.08	17.23	18.42	18.33	20.40	20.20
Mass of Container + Dry Soil	g	14.97	15.76	16.62	16.64	18.06	17.87
Mass of Dry Soil	g	3.08	3.99	4.80	4.50	6.09	6.11
Mass of Moisture	g	1.11	1.47	1.80	1.69	2.34	2.33
Moisture Content	%	36.04	36.84	37.50	37.56	38.42	38.13

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample		125.00				
Final length of Sample after Shrinkage		102.00				
% Shrinkage		18.40				18.40

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

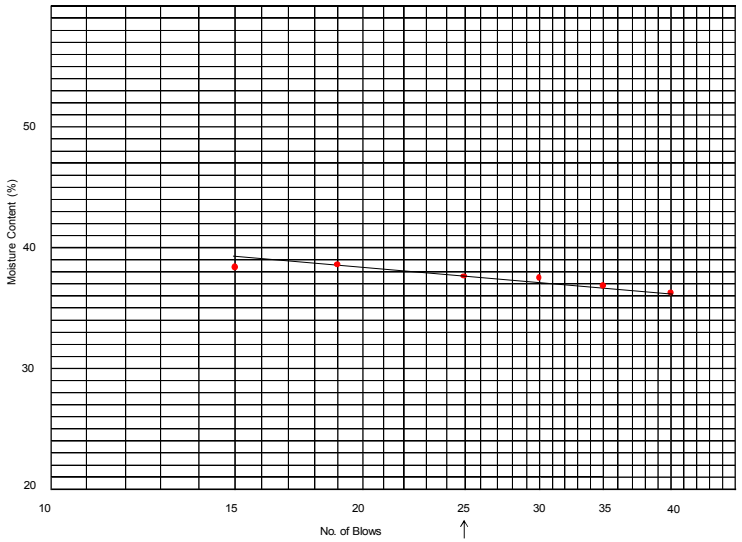
Liquid Limit	37.50 %
Plastic Limit	26.09 %
Plasticity Index	11.41 %
Shrinkage Limit	18.40 %

Tested By:RK/LN
Date:15 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N 530

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	16 October 2015
SITE ADDRESS :	BH03, Qeleloa, Nadi	**TECHNOLOGIST** :	LN
SAMPLE LOCATION :	BH03 2.00m - 2.50m	**MATERIAL TYPE** :	Clayey SILT, red brown, medium plasticity
TEST NUMBER :	N523		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	81	82	
	Mass of Container	g	87.50	90.16	
	Mass of Container + Wet Soil	g	199.00	208.76	
	Mass of Container + Dry Soil	g	175.76	184.08	
	Mass of Dry Soil	g	88.26	93.92	
	Mass of Moisture	g	23.24	24.68	
	Moisture Content	%	26.33	26.28	26.30

Bulk Density	Sample No.	-	N523
	Diameter of Specimen	mm	53.59
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2254.43
	Initial length of specimen Lo	mm	63.52
	Initial mass of specimen Mi	g	230.89
	Bulk Density ρ	t/m³	1.61
	Dry Density ρd	t/m³	1.28

Tested by : LN	Q.A. Check by : MK	Approved by : IG
Date : 16 October 2015	Date : 24 October 2015	Date : 19 November 2015

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	16 October 2015
SITE ADDRESS :	BH03, Qeleloa, Nadi	**TECHNOLOGIST** :	TL
SAMPLE LOCATION :	BH03 5.00m - 5.50m	**MATERIAL TYPE** :	Organic SILT, dark grey, soft to very soft, low to medium plasticity
TEST NUMBER :	N525		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	7	5	
	Mass of Container	g	52.77	53.38	
	Mass of Container + Wet Soil	g	99.72	95.30	
	Mass of Container + Dry Soil	g	86.03	82.93	
	Mass of Dry Soil	g	33.26	29.55	
	Mass of Moisture	g	13.69	12.37	
	Moisture Content	%	41.16	41.86	41.51

Bulk Density	Sample No.	-	N525
	Diameter of Specimen	mm	51.69
	Initial area of specimen Ao (π/4 d²)	mm²	2097.41
	Initial length of specimen Lo	mm	26.44
	Initial mass of specimen Mi	g	88.91
	Bulk Density ρ	t/m³	1.60
	Dry Density ρd	t/m³	1.13

Tested by : TL	Q.A. Check by : MK	Approved by : IG
Date : 16 October 2015	Date : 24 October 2015	Date : 19 November 2015

ENTEC LIMITED
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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	16 October 2015
SITE ADDRESS :	BH03, Qeleloa, Nadi	**TECHNOLOGIST** :	IG
SAMPLE LOCATION :	BH03 8.00m - 8.50m	**MATERIAL TYPE** :	Silty fine to medium SAND, grey
TEST NUMBER :	N527		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	59	96	
	Mass of Container	g	63.70	101.33	
	Mass of Container + Wet Soil	g	169.54	197.77	
	Mass of Container + Dry Soil	g	130.70	161.75	
	Mass of Dry Soil	g	67.00	60.42	
	Mass of Moisture	g	38.84	36.02	
	Moisture Content	%	57.97	59.62	58.79

Bulk Density	Sample No.	-	N527
	Diameter of Specimen	mm	53.12
	Initial area of specimen Ao (π/4 d²)	mm²	2215.06
	Initial length of specimen Lo	mm	57.33
	Initial mass of specimen Mi	g	202.38
	Bulk Density ρ	t/m³	1.59
	Dry Density ρd	t/m³	1.00

Tested by : IG	Q.A. Check by : MK	Approved by : IG
Date : 16 October 2015	Date : 24 October 2015	Date : 19 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Silty CLAY with root fibre, red brown, medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N522 (BH03 1.00m - 1.50m)

Moisture Content	%						
Container No.	g	77	70				
Mass of Container	g	99.34	90.06				
Mass of Container + Wet Soil	g	127.30	118.32				
Mass of Container + Dry Soil	g	122.24	113.19				
Mass of Dry Soil	g	22.90	23.13				
Mass of Moisture	g	5.06	5.13				
Moisture Content	%	22.10	22.18				22.14

Tested By: UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Clayey SILT, red brown, medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N523 (BH03 2.00m - 2.50m)

Moisture Content	%						
Container No.	g	15	6				
Mass of Container	g	52.66	53.04				
Mass of Container + Wet Soil	g	74.19	71.47				
Mass of Container + Dry Soil	g	69.94	67.82				
Mass of Dry Soil	g	17.28	14.78				
Mass of Moisture	g	4.25	3.65				
Moisture Content	%	24.59	24.70				24.65

Tested By: UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Organic SILT, dark grey, soft to very soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N526 (BH03 5.00m - 5.50m)

Moisture Content	%						
Container No.	g	18	19				
Mass of Container	g	14.61	14.85				
Mass of Container + Wet Soil	g	23.19	22.69				
Mass of Container + Dry Soil	g	20.31	20.04				
Mass of Dry Soil	g	5.70	5.19				
Mass of Moisture	g	2.88	2.65				
Moisture Content	%	50.53	51.06				50.79

Tested By:UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 13 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Organic SILT, dark grey, soft to very soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N526 (BH03 6.50m - 7.00m)

Moisture Content	%						
Container No.	g	68	78				
Mass of Container	g	74.11	78.57				
Mass of Container + Wet Soil	g	97.10	104.02				
Mass of Container + Dry Soil	g	88.90	95.14				
Mass of Dry Soil	g	14.79	16.57				
Mass of Moisture	g	8.20	8.88				
Moisture Content	%	55.44	53.59				54.52

Tested By:UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Silty fine to medium SAND, grey	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N527 (BH03 8.00m - 8.50m)

Moisture Content	%						
Container No.	g	108	109				
Mass of Container	g	11.27	11.83				
Mass of Container + Wet Soil	g	18.09	18.41				
Mass of Container + Dry Soil	g	16.90	17.29				
Mass of Dry Soil	g	5.63	5.46				
Mass of Moisture	g	1.19	1.12				
Moisture Content	%	21.14	20.51				20.82

Tested By:UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Organic SILT, grey green, low plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N528 (BH03 12.50m - 13.00m)

Moisture Content	%						
Container No.	g	67	85				
Mass of Container	g	72.12	88.73				
Mass of Container + Wet Soil	g	94.51	112.04				
Mass of Container + Dry Soil	g	85.97	103.14				
Mass of Dry Soil	g	13.85	14.41				
Mass of Moisture	g	8.54	8.90				
Moisture Content	%	61.66	61.76				61.71

Tested By:UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19November 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Organic SILT with trace of fine sand, dark grey, very soft to soft, medium to high plasticity (Core Sample)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N529 (BH03 15.50m - 16.00m)

Moisture Content	%						
Container No.	g	69	73				
Mass of Container	g	90.24	70.13				
Mass of Container + Wet Soil	g	107.13	87.63				
Mass of Container + Dry Soil	g	101.37	81.75				
Mass of Dry Soil	g	11.13	11.62				
Mass of Moisture	g	5.76	5.88				
Moisture Content	%	51.75	50.60				51.18

Tested By:UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: SILT with minor to some fine sand, dark grey, very soft to soft, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N530 (BH03 17.00m - 17.50m)

Moisture Content	%						
Container No.	g	57	84				
Mass of Container	g	63.46	85.00				
Mass of Container + Wet Soil	g	95.95	126.65				
Mass of Container + Dry Soil	g	86.98	115.20				
Mass of Dry Soil	g	23.52	30.20				
Mass of Moisture	g	8.97	11.45				
Moisture Content	%	38.14	37.91				38.03

Tested By:UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Sub-angular to Sub-rounded, fine to course GRAVEL, (recovered as potnetially with some silt/sand)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N531 (BH03 18.50m - 19.00m)

Moisture Content	%						
Container No.	g	33	46				
Mass of Container	g	14.45	14.69				
Mass of Container + Wet Soil	g	42.12	39.29				
Mass of Container + Dry Soil	g	41.15	38.28				
Mass of Dry Soil	g	26.70	23.59				
Mass of Moisture	g	0.97	1.01				
Moisture Content	%	3.63	4.28				3.96

Tested By:UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 October 2015
SITE ADDRESS	: BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: Silt with trace of fine sand, very soft, wet to saturated	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N532 (BH03 20.00m - 20.50m)

Moisture Content	%						
Container No.	g	43	32				
Mass of Container	g	14.86	14.54				
Mass of Container + Wet Soil	g	46.81	45.58				
Mass of Container + Dry Soil	g	39.04	38.05				
Mass of Dry Soil	g	24.18	23.51				
Mass of Moisture	g	7.77	7.53				
Moisture Content	%	32.13	32.03				32.08

Tested By:UM
Date: 14 October 2015

Q.A. Checked By: MK
Date: 24 October 2015

Approved By: IG
Date: 19 November 2015

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Determination of Permeability of a Soil
Constant Head Method for Remoulded Sample

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	:	16 October 2015
SITE ADDRESS	:	BH03, Qeleloa Nadi	**TECHNOLOGIST**	:	IG/TL/LN
MATERIAL TYPE & DESCRIPTION	:	Silty fine to medium SAND, grey (Core Sample)	**TEST METHOD**	:	AS 1289.6.7.3-2001
			SAMPLE No.	:	N527 (BH03 8.50m - 9.00m)

Total Weight : -
Weight Retained on : -
Percentage retained: : -

MOISTURE CONTENT

Container No.		16
Mass of Container	g	114.49
Mass of Container + Wet	g	133.10
Mass of Container + Dry	g	128.56
Mass of Dry Soil	g	14.07
Mass of Moisture	g	4.54
Moisture Content	%	32.27
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1700
Volume of Speciman	cm^3	839.43
Wet Density	t/m^3	2.03
Dry Density	t/m^3	1.53
Maximum Dry Density	t/m^3	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm^2	113.10
Cross sectional area of soil speciman(8cm)	cm^2	50.27
Length of soil speciman	cm	16.70

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(°c)	KT cm/min	K_{20} cm/min
1	102	4.00	90	26	0.07	0.07
2	102	4.00	90	26	0.07	0.07
3	102	4.00	90	26	0.07	0.07
4	94	4.00	88	26	0.08	0.07
5	94	4.00	88	26	0.08	0.07
6	94	4.00	88	26	0.08	0.07
7	83	4.00	78	26	0.08	0.07
8	83	4.00	77	26	0.08	0.07
9	83	4.00	78	26	0.08	0.07
10	65	4.00	69	26	0.09	0.08
11	65	4.00	68	26	0.09	0.08
12	65	4.00	68	26	0.09	0.08

Average K_{20} m/s	1.17E-05

Tested By: IG/TL/LN
Date: 16 October 2015

Q.A. Check By: KB
Date: 19 November 2015

Approved By: IG
Date: 19 November 2015

Form: GE-L-03

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works.	**DATE TESTED**	:	15 October 2015
SITE ADDRESS	:	BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	:	IG
SAMPLE LOCATION	:	BH 03 2.00m - 2.50m	**MATERIAL TYPE**	:	Clayey SILT, red brown, medium plasticity
TEST NUMBER	:	N523			

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	91
	Mass of Container	g	115.01
	Mass of Container + Wet Soil	g	444.91
	Mass of Container + Dry Soil	g	379.12
	Mass of Dry Soil	g	264.11
	Mass of Moisture	g	65.79
	Moisture Content	%	24.91

Bulk Density	Sample No.	-	N523
	Diameter of Specimen	mm	53.00
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2205.07
	Initial length of specimen Lo	mm	102.30
	Initial mass of specimen Mi	g	379.70
	Bulk Density ρ	t/m^3	1.68
	Dry Density ρd	t/m^3	1.35

Compression Gauge Reading	**Load Gauge Reading**	**Load**	**Strain ε= Cn - Co / Lo**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference σ1 - σ3 = 1000P/A**
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002205	0.00
0.50	22.0	0.0441	0.489	0.002216	19.90
1.00	26.0	0.0522	0.978	0.002227	23.44
1.50	21.0	0.0421	1.466	0.002238	18.81
2.00	19.0	0.0381	1.955	0.002249	16.94
2.50	19.5	0.0391	2.444	0.002260	17.30
3.00	20.0	0.0401	2.933	0.002272	17.65
3.50	20.0	0.0401	3.421	0.002283	17.56
4.00	20.5	0.0411	3.910	0.002295	17.91
4.50	21.0	0.0421	4.399	0.002307	18.25
5.00	22.0	0.0441	4.888	0.002318	19.02
6.00	24.5	0.0491	5.865	0.002342	20.96
7.00	26.5	0.0532	6.843	0.002367	22.48
8.00	29.0	0.0582	7.820	0.002392	24.33
9.00	30.0	0.0682	8.798	0.002418	28.21
10.00	24.5	0.0491	9.775	0.002444	20.09
11.00	19.0	0.0381	10.753	0.002471	15.42
12.00	17.0	0.0341	11.730	0.002498	13.65

Tested by : IG	Q.A. Check by : MK	Approved by : IG
Date : 15 October 2015	Date : 25 October 2015	Date : 19 November 2015

Form GE-L-10

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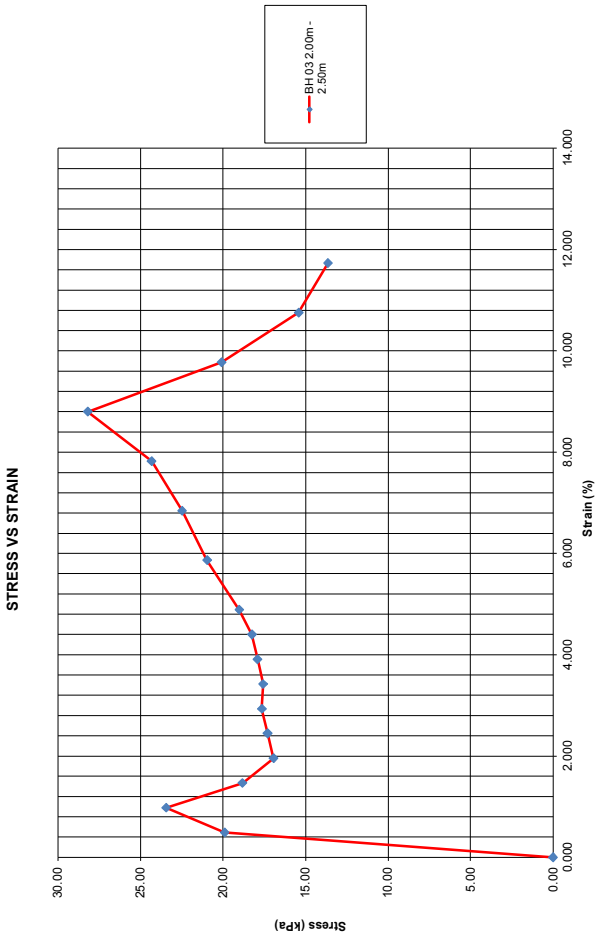

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works.	**DATE TESTED**	:	11 October 2015
SITE ADDRESS	:	BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	:	IG
SAMPLE LOCATION	:	BH 03 5.00m - 5.50m	**MATERIAL TYPE**	:	Organic SILT, dark grey, soft to very soft, low to medium plasticity
TEST NUMBER	:	N525			

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	91
	Mass of Container	g	114.98
	Mass of Container + Wet Soil	g	317.59
	Mass of Container + Dry Soil	g	253.58
	Mass of Dry Soil	g	138.60
	Mass of Moisture	g	64.01
	Moisture Content	%	46.18

Bulk Density	Sample No.	-	N525
	Diameter of Specimen	mm	51.00
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2041.79
	Initial length of specimen Lo	mm	100.20
	Initial mass of specimen Mi	g	386.59
	Bulk Density ρ	t/m³	1.89
	Dry Density ρd	t/m³	1.29

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\varepsilon = \frac{Cn - Co}{Lo}$	Corrected Area $A = Ao / 1-\varepsilon$	Principal Stress Difference $\sigma 1 - \sigma 3 = 1000P/A$
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002042	0.00
0.50	4.0	0.0080	0.499	0.002052	3.90
1.00	6.0	0.0120	0.998	0.002062	5.82
1.50	7.0	0.0140	1.497	0.002073	6.75
2.00	7.0	0.0140	1.996	0.002083	6.72
2.50	7.0	0.0140	2.495	0.002094	6.69
3.00	7.5	0.0150	2.994	0.002105	7.13
3.50	7.5	0.0150	3.493	0.002116	7.09
4.00	7.5	0.0150	3.992	0.002127	7.05
4.50	7.0	0.0140	4.491	0.002138	6.55
5.00	6.5	0.0130	4.990	0.002149	6.05
6.00	6.5	0.0130	5.988	0.002172	5.99
7.00	7.0	0.0140	6.986	0.002195	6.38
8.00	8.5	0.0170	7.984	0.002219	7.66
9.00	10.0	0.0200	8.982	0.002243	8.92
10.00	12.0	0.0240	9.980	0.002268	10.58
11.00	12.0	0.0240	10.978	0.002294	10.46
12.00	17.0	0.0341	11.976	0.002320	14.70
13.00	20.0	0.0401	12.974	0.002346	17.09
14.00	59.0	0.1184	13.972	0.002373	49.89
15.00	98.0	0.1967	14.970	0.002401	81.92
15.50	88.0	0.1767	15.469	0.002415	73.15

Tested by : IG	Q.A. Check by :LN	Approved by : IG
Date : 11 October 2015	Date : 14 October 2015	Date : 19 November 2015

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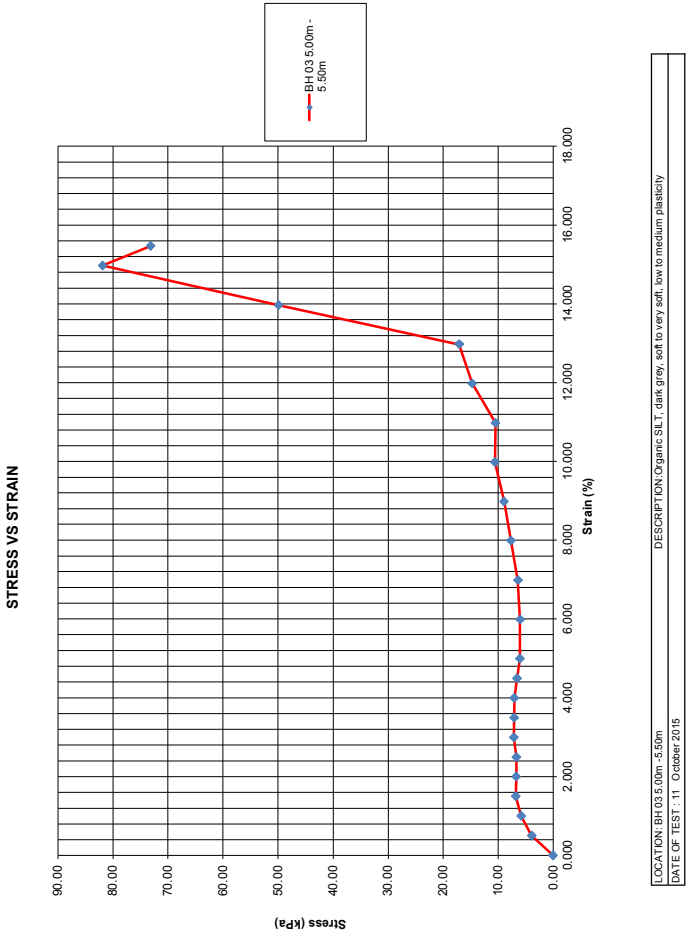
STRESS VS STRAIN



DESCRIPTION:Organic SILT; dark grey, soft to very soft, low to medium plasticity
LOCATION: BH 03 5.00m - 5.50m
DATE OF TEST : 11 October 2015

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works.	**DATE TESTED**	:	16 October 2015
SITE ADDRESS	:	BH 03, Qeleloa, Nadi	**TECHNOLOGIST**	:	IG/LN/TL/KB
SAMPLE LOCATION	:	BH 03 8.00m - 8.50m	**MATERIAL TYPE**	:	Silty fine to medium SAND, grey
TEST NUMBER	:	N527			

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	86
	Mass of Container	g	117.80
	Mass of Container + Wet Soil	g	538.88
	Mass of Container + Dry Soil	g	412.54
	Mass of Dry Soil	g	294.74
	Mass of Moisture	g	126.34
	Moisture Content	%	42.86

Bulk Density	Sample No.	-	N527
	Diameter of Specimen	mm	53.17
	Initial area of specimen Ao (π/4 d²)	mm²	2219.23
	Initial length of specimen Lo	mm	115.99
	Initial mass of specimen Mi	g	422.91
	Bulk Density ρ	t/m³	1.64
	Dry Density ρd	t/m³	1.15

Compression Gauge Reading	**Load Gauge Reading**	**Load**	**Strain ε= Cn - Co / Lo**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference σ1 - σ3 = 1000P/A**
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002219	0.00
0.50	7	0.0140	0.431	0.002229	6.28
1.00	7.5	0.0150	0.862	0.002239	6.70
1.50	5.0	0.0100	1.293	0.002248	4.45
2.00	1.0	0.0020	1.724	0.002258	0.89
2.50	0.0	0	2.155	0.002268	0.00

Tested by : IG/LN/TL/KB	Q.A. Check by : MK	Approved by : IG
Date : 16 October 2015	Date : 25 October 2015	Date :19 November 2015

ENTEC LIMITED
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STRESS VS STRAIN

DESCRIPTION: Silty fine to medium SAND, grey

LOCATION: BH 03 8.00m - 8.50m
DATE OF TEST : 16 October 2015

Form GE-L-10

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Determination of The One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Project Name:	Geotechnical Investigation in Nadi River Basin	**Sample No:**	N 523
Client Name:	JICA	**Depth:**	2.0m - 2.5m
Job No:	1920815	**Tested By:**	IG
Site Address :	Qeleloa Nadi	**Date Tested:**	04/11/15
Sample Location:	BH 03		

Sample Description: Clayey SILT, red brown, medium plasticity

Sample History: Undisturbed / ~~Remoulded / Compacted / Slurried / Unknown~~

Date Sample Collected:	08/10/15	**Temperature:**	Max: 27°C Min: 25°C
Loading Cycle:	24 hrs 0 mins	**Height of ring:**	23.8 mm
Diameter of ring *(D)* :	44.96 mm	**Area of ring *(A)* :**	1587.61 mm^2
Solid density of soil particles *(Q_s)* :	2.65 t/m^3 (~~Measured /~~ Assumed)		

Method used: Square root of time fitting method

			Initial		Final
Measured thickness of specimen, H		mm	H_i	23.8	H_f 21.65
Mass of ring + ~~watch glass~~ + wet specimen		g	M_3	263.81	M_4 259.13
Mass of ring + ~~watch glass~~ + dry specimen	M_5	g		252.58	
Mass of ring	M_1	g		206.07	
Mass of watch glass	M_2	g		0	
Mass of dry specimen	$M_s = M_5 - M_1 - M_2$	g		42.84	
Mass of water		g	$M_3 - M_5$	11.23	$M_4 - M_5$ 6.55
Water content, w		%	w_i	26.21	w_f 15.29
Dry density, Q_d		t/m^3	Q_{di}	1.13	Q_{df} 1.25
Height of soil particles, H_s		mm		10.18	
Voids ratio, e			e_i	1.34	e_f 1.13
Degree of saturation, S			S_i	51.95	S_f 35.97

Applied Pressure *kPa*	Incremental deflection *(ΔH) mm*	Thickness of specimen *mm*	% Change in thickness *%*	Height of voids *mm*	Voids ratio	Coefficient of consolidation C_v (m^2/yr)	Coefficient of compressibility M_v (m^2/MN)
37.1	1.092	22.708	0.048	12.53	1.23	357.73	
74.1	1.980	21.820	0.091	11.64	1.14	107.85	2.25
148.3	2.968	20.832	0.142	10.65	1.05	75.27	1.68
296.6	3.690	20.110	0.183	9.93	0.97	70.14	1.05
414	3.992	19.808	0.202	9.63	0.95	88.88	1.43
296.6	3.976	19.824	0.201	9.64	0.95	0.00	-1.42
148.3	2.050	21.750	0.094	11.57	1.14	0.00	-0.58
414	2.146	21.654	0.099	11.47	1.13	208.19	0.34
0.0	0.00	23.800	0.000	13.62	1.34	0.00	

Tested by: IG
Date: 04 November 2015

Q.A. Check By: KB
Date: 19 November 2015

Approved By: IG
Date: 19 November 2015

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Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Loading Date & Time					05/11/2015 @ 07:11hrs			06/11/2015 @ 07:13hrs			07/11/2015 @ 07:24hrs			08/11/2015 @ 07:29hrs			09/11/2015 @ 07:34hrs			08/09/2013 @ 08:43hrs		
Hanger Load					600g			1200g			2400g			4800g			6,700g			4,800g		
Effective Pressure					37.1kPa			74.1kPa			148.3kPa			296.6kPa			414kPa			296.6kPa		
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	sec	t min	√t min	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm
		0		0.00	07:11	2270	0.000	07:13	1723	0.000	07:24	1270	0.000	07:29	765	0.000	07:34	2127	0.000	07:39	1919	0.000
		6	0.100	0.316	07:11:06	1940	0.660	07:13:06	1490	0.466	07:24:06	1090	0.360	07:29:06	530	0.470	07:34:06	2085	0.084	07:39:06	1925	0.012
		15	0.250	0.500	07:11:15	1890	0.760	07:13:15	1450	0.546	07:24:15	1055	0.430	07:29:15	490	0.550	07:34:15	2070	0.114	07:39:15	1926	0.014
		30	0.500	0.707	07:11:30	1868	0.804	07:13:30	1425	0.596	07:24:30	935	0.670	07:29:30	468	0.594	07:34:30	2062	0.130	07:39:30	1927	0.016
	1		1.000	1.000	07:12	1847	0.846	07:14	1402	0.642	07:25	910	0.720	07:30	436	0.658	07:36:15	2056	0.142	07:40	1927	0.016
	2	15	2.250	1.500	07:13:15	1825	0.890	07:15:15	1375	0.696	07:26:15	884	0.772	07:31:15	407	0.716	07:36:15	2050	0.154	07:41:15	1927.5	0.017
	4		4.000	2.000	07:15	1814	0.912	07:17	1360	0.726	07:28	863	0.814	07:33	382	0.766	07:38	2031	0.192	07:43	1927.5	0.017
	6	15	6.250	2.500	07:17:15	1804	0.932	07:19:15	1350	0.746	07:30:15	840	0.860	07:35:15	368	0.794	07:40:15	2017	0.220	07:45:15	1928	0.018
	9		9.000	3.000	07:20	1798	0.944	07:22	1343	0.760	07:33	828	0.884	07:38	358	0.814	07:43	2006	0.242	07:48	1928	0.018
	16		16.00	4.000	07:27	1787	0.966	07:29	1333	0.780	07:40	821	0.898	07:45	344	0.842	07:50	1991	0.272	07:55	1928	0.018
	30		30.00	5.480	07:41	1777	0.986	07:43	1322	0.802	07:54	815	0.910	07:59	332	0.866	08:04	1979	0.296	08.09	1928	0.018
1			60.00	7.750	08:11	1764	1.012	08:13	1311	0.824	08:24	806	0.928	08:29	320	0.890	08:34	1966	0.322	08:39	1928.2	0.018
2			120.0	10.950	09:11	1752	1.036	09:13	1301	0.844	09:24	795	0.950	09:29	309	0.912	09:34	1954	0.346	09:39	1928.3	0.019
4			240.0	15.49	11:11	1743	1.054	11:13	1291	0.864	11:24	789	0.962	11:29	300	0.930	11:34	1942	0.370	11:39	1928.3	0.019
8			480.0	21.91	15:11	1732	1.076	15:13	1279	0.888	15:24	773	0.994	15:29	289	0.952	15:34	1930	0.394	15:39	1928.8	0.020
24			1440	37.95	07:11	1723	1.094	07:13	1270	0.906	07:24	765	1.010	7:29	277	0.976	7:34	1919	0.416	7:39	1929	0.020
																				UNLOADING		
Machine Correction					0.002			0.018			0.022			0.054			0.114			0.004		
Δ H (Corrected)					1.092			0.888			0.988			0.922			0.302			0.016		
Net Total Settlement					1.092			1.980			2.968			3.890			4.192			4.176		

D15-96

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Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Loading Date and Time					11/11/2015 @ 07:49hrs			12/11/2015 @ 08:00hrs														
Hanger Load					2,400g			6,700g														
Effective Pressure					148.3kPa			414kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	sec	t min	√t min	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm
		0	0	0	07:49	1929	0.000	08:00	1962	0.000												
		6	0.100	0.316		1947	0.036		1923	0.078												
		15	0.250	0.500		1949	0.040		1921	0.082												
		30	0.500	0.707		1950	0.042		1920	0.084												
	1		1.000	1.000	07:50	1951	0.044	08:01	1919	0.086												
	2	15	2.250	1.500	07:51:15	1953	0.048	08:02:15	1917	0.090												
	4		4.000	2.000	07:53	1954	0.050	08:04	1916	0.092												
	6	15	6.250	2.500	07:55:15	1955	0.052	08:06:15	1915	0.094												
	9		9.000	3.000	07:58	1955.3	0.053	08:09	1916	0.092												
	16		16.00	4.000	08:05	1956	0.054	08:16	1914	0.096												
	30		30.00	5.480	08:19	1956.6	0.055	08:30	1911	0.102												
1			60.00	7.750	08:49	1957	0.056	09:00	1908	0.108												
2			120.0	10.950	09:49	1959	0.060	10:00	1906	0.112												
4			240.0	15.49	11:49	1961	0.064	12:00	1902	0.120												
8			480.0	21.91	15:49	1961	0.064	16:00	1899	0.126												
24			1440	37.95	7:49	1962	0.066	8:00	1895	0.134												
					UNLOADING			RELOADING														
Machine Correction					0.028			0.038														
Δ H (Corrected)					0.038			0.096														
Net Total Settlement					2.050			2.146														

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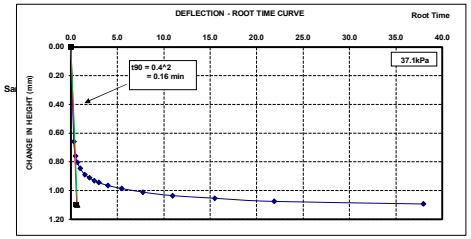
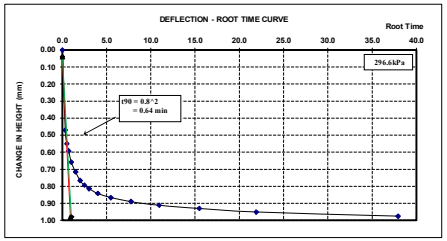
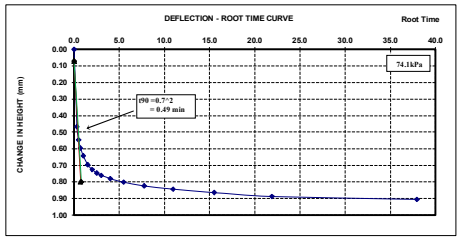
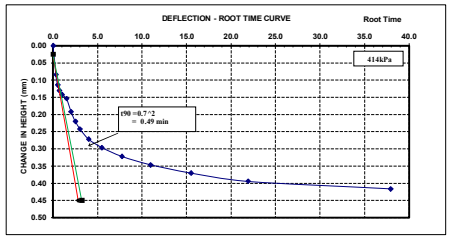
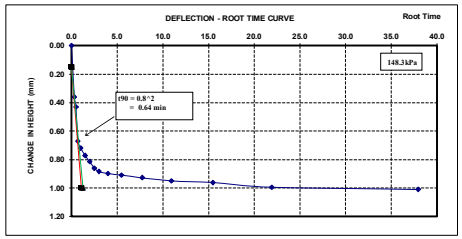
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

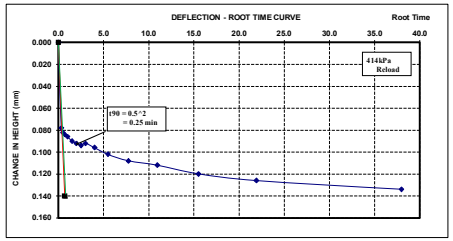












Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth			5.0m - 5.50m
Description			
Type			Organic Silt,dark grey
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	65.9
Bulk Density	ρ_0	(Mg/m3)	1.68
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	46
Initial Dry Density	ρ_{di}	(Mg/m3)	1.15
Initial Voids Ratio	e_i	.	1.308
Initial Degree of Saturation	S_i	(%)	93.5
Initial Swelling	S_s	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	35
Dry Density	ρ_{df}	(Mg/m3)	0.77
Voids Ratio	e_f	.	2.459
Saturation	S_f	(%)	38
Height Settlement	ΔL_s	(mm)	-9.972

Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_v (m2/year)	Compressibility m_v (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
20.0	1.301	0.065	85.9	0.163	29.0	29.0		0.515	0.0087
40	1.285	0.201	8.2	0.341	29.0	29.0		5.360	0.0087
100	2.459	-9.968	19.9	8.560	29.0	29.0		3.455	0.0087
200	2.459	-9.968	7.8		29.0	29.0		12.749	0.0087
400	2.459	-9.968	7.6		29.0	29.0		13.159	0.0087
200	2.459	-9.968			29.0	0.0			
100	2.459	-9.968			29.0	0.0			

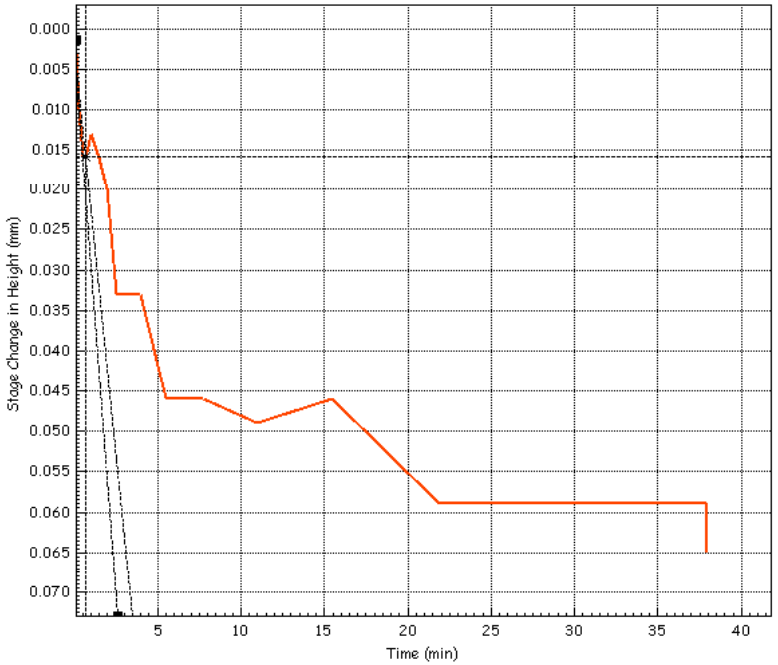
Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-03
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/11/2015
Jobfile	Geotechnical Engineering	Sample	N525
Client	Japan International Cooperation	Borehole	BH03
Operator	IG/MK	Checked	DMC
		Approved	DMC

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	20.0
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.065
Voids Ratio	e_f	.	1.250
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.515
Consolidation	C_V	(m2/year)	84.2
Compressibility	m_V	(m2/MN)	0.164
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-03
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/11/2015
Jobfile	Geotechnical Engineering	Sample	N525
Client	Japan International Cooperation	Borehole	BH03
Operator	IG/MK	Checked	DMC
Approved	DMC		

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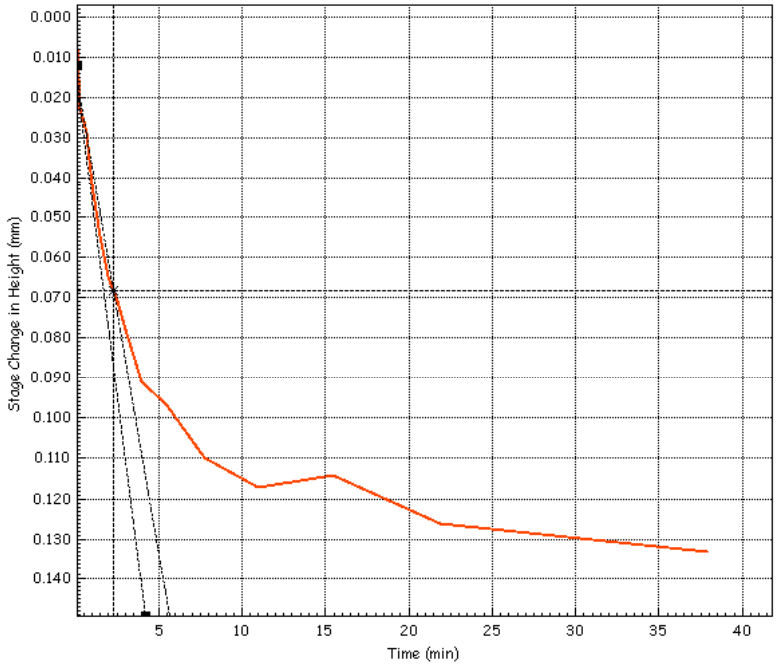
Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	40
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.201
Voids Ratio	e_f	.	1.235
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	5.360
Consolidation	C_V	(m2/year)	8.0
Compressibility	m_V	(m2/MN)	0.345
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

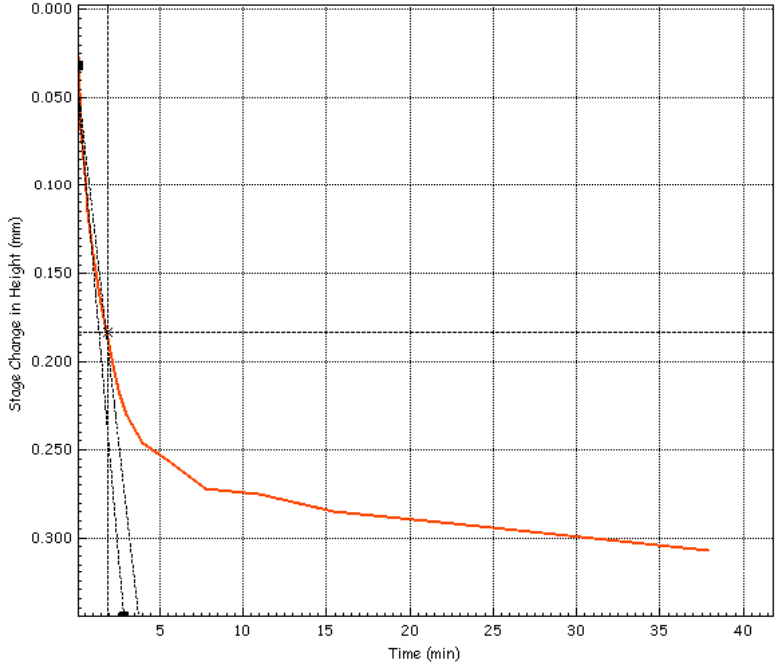


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-03
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/11/2015
Jobfile	Geotechnical Engineering	Sample	N525
Client	Japan International Cooperation	Borehole	BH03
Operator	IG/MK	Checked	DMC
Approved	DMC		

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-11.044
Voids Ratio	e_f	.	2.517
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	3.455
Consolidation	C_V	(m2/year)	20.4
Compressibility	m_V	(m2/MN)	9.563
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

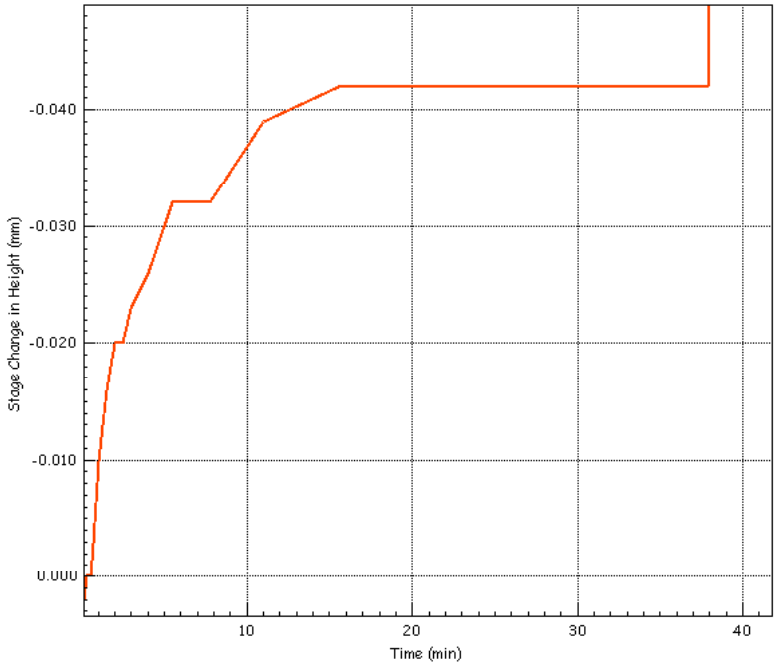


Test Method	AS 1289.6.6.1-1998		Test Name	ODO-03	
			Database: .\SQLEXPRESS \ ENTEC		
Site Reference	1920815		Test Date	11/11/2015	
Jobfile	Geotechnical Engineering		Sample	N525	
Client	Japan International Cooperation		Borehole	BH03	
Operator	IG/MK	Checked	DMC	Approved	DMC

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-10.117
Voids Ratio	e_f	.	2.412
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	



Test Method	AS 1289.6.6.1-1998		Test Name	ODO-03	
			Database: .\SQLEXPRESS \ ENTEC		
Site Reference	1920815		Test Date	11/11/2015	
Jobfile	Geotechnical Engineering		Sample	N525	
Client	Japan International Cooperation		Borehole	BH03	
Operator	IG/MK	Checked	DMC	Approved	DMC

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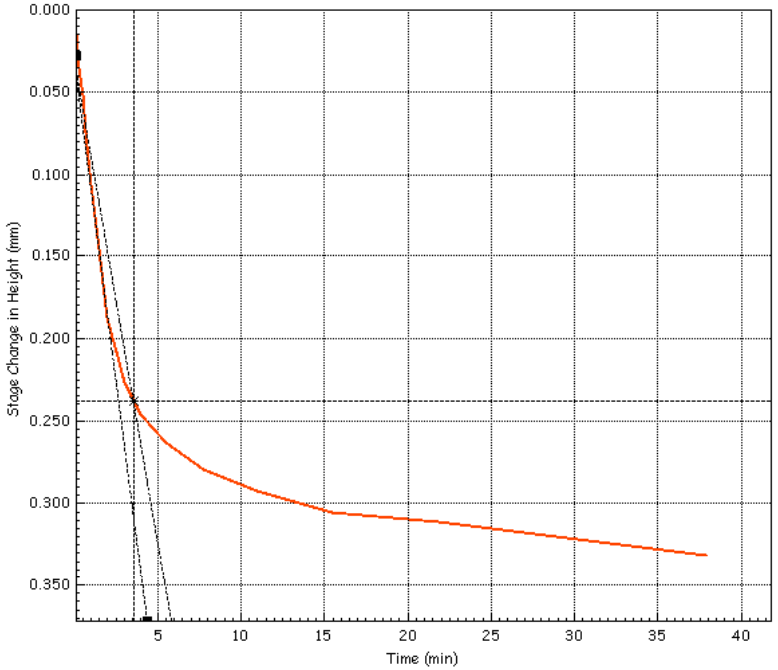
Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-10.263
Voids Ratio	e_f	.	2.428
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	12.749
Consolidation	C_V	(m2/year)	7.9
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-03
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/11/2015
Jobfile	Geotechnical Engineering	Sample	N525
Client	Japan International Cooperation	Borehole	BH03
Operator	IG/MK	Checked	DMC
Approved	DMC		

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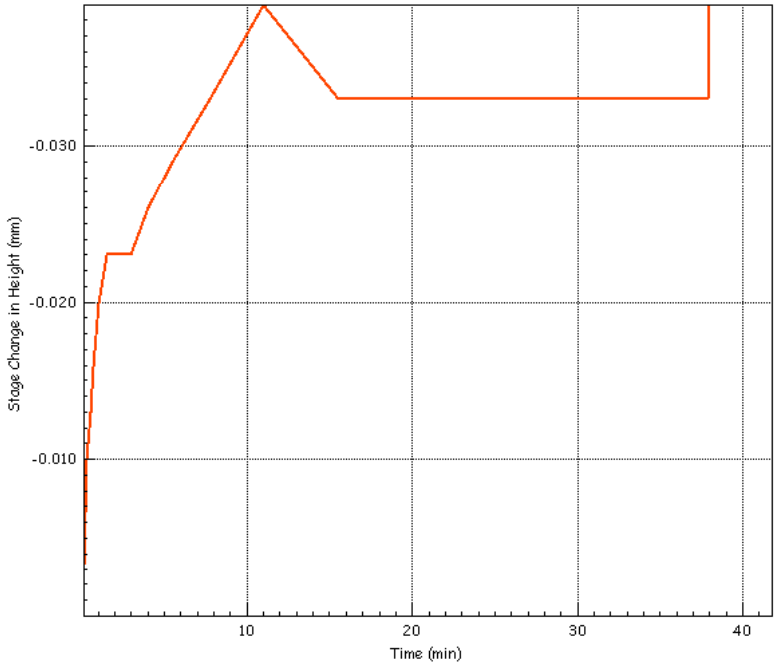
Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-10.146
Voids Ratio	e_f	.	2.415
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

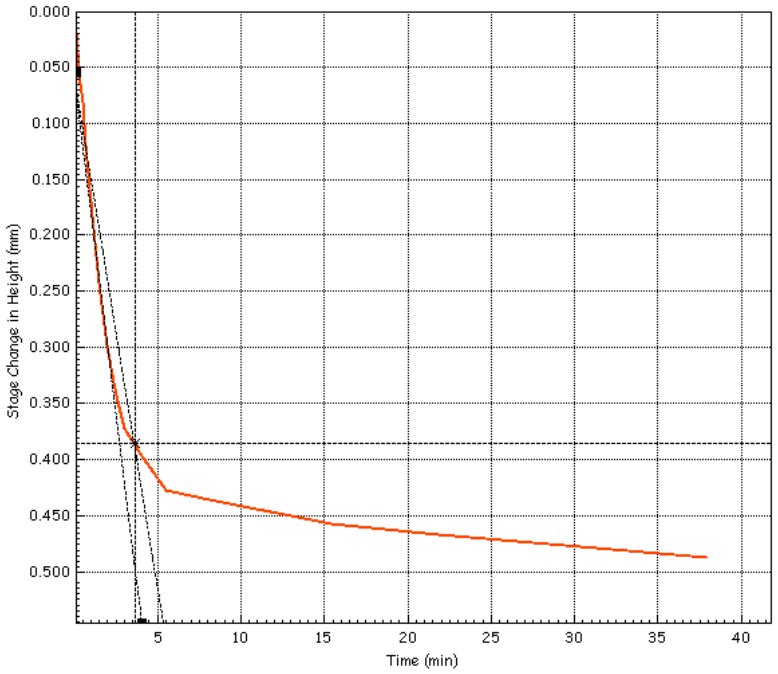


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-03
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/11/2015
Jobfile	Geotechnical Engineering	Sample	N525
Client	Japan International Cooperation	Borehole	BH03
Operator	IG/MK	Checked	DMC
Approved	DMC		

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-10.179
Voids Ratio	e_f	.	2.419
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	13.159
Consolidation	C_V	(m2/year)	7.6
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-03
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/11/2015
Jobfile	Geotechnical Engineering	Sample	N525
Client	Japan International Cooperation	Borehole	BH03
Operator	IG/MK	Checked	DMC
		Approved	DMC

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /** :	15 October 2015
SITE ADDRESS :	BH03, Qeleloa, Nadi	**TECHNOLOGIST** :	RK
SAMPLE LOCATION :	BH03 1.00m - 1.50m	**MATERIAL TYPE & LOCATION** :	Silty CLAY, red brown, medium plasticity
TEST NUMBER :	N522		

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	93	94
	Mass of Container	g	88.60	88.03
	Mass of Container + Wet Soil	g	121.47	120.20
	Mass of Container + Dry Soil	g	115.16	114.26
	Mass of Dry Soil	g	26.56	26.23
	Mass of Moisture	g	6.31	5.94
	Moisture Content	%	23.76	22.65
	Average Moisture Content	%	23.20	

SPLIT SAMPLE

Mass Passing Last Sieve: - gM_3

Mass after Spliting: - gM_4

Spliting Factor $= \frac{M_3}{M_4}$

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	303.17
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	246.08

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm		N/A	0.00	100.00	150	200
1.18 mm	0.30	N/A	0.12	99.88	100	200
600 µm	0.39	N/A	0.16	99.72	80	200
425 µm	0.20	N/A	0.08	99.64	70	200
300 µm	0.24	N/A	0.10	99.54	60	200
150 µm	2.52	N/A	1.02	98.52	40	200
75 µm	13.11	N/A	5.33	93.19	25	200
Passing 75 µm	229.32	N/A	93.19	0.00	-	-
Pan Total	246.08	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by : RK	Q.A. Checked by : MK	Approved by : IG
Date : 15 October 2015	Date : 25 October 2015	Date : 19 November 2015

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Form GE-L-06

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	20 October 2015
SITE ADDRESS	:	BH03, Qeleloa, Nadi	**TECHNOLOGIST**	:	RK/RL
SAMPLE LOCATION	:	BH03 5.00m - 5.50m	**MATERIAL TYPE & LOCATION**	:	Organic SILT, dark grey, soft to very soft, low to medium plasticity
TEST NUMBER	:	N 525			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	18	19	SPLIT SAMPLE
	Mass of Container	g	14.61	14.85	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	23.19	22.69	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	20.31	20.04	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	5.70	5.19	
	Mass of Moisture	g	2.88	2.65	
	Moisture Content	%	50.53	51.06	
	Average Moisture Content	%	50.79		

Total Mass of Dry Sample				
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil	
	Total Wet Weight (M_w)	g	308.62	
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
		M_T =	204.66	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm	0.08	N/A	0.04	99.96	150	200
1.18 mm	0.37	N/A	0.18	99.78	100	200
600 µm	1.13	N/A	0.55	99.23	80	200
425 µm	0.73	N/A	0.36	98.87	70	200
300 µm	1.61	N/A	0.79	98.08	60	200
150 µm	22.23	N/A	10.86	87.22	40	200
75 µm	44.65	N/A	21.82	65.41	25	200
Passing 75 µm	133.86	N/A	65.41	0.00	-	-
Pan Total	204.66	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK/TL	Q.A. Checked by : MK	Approved by : IG
Date :20 October 2015	Date : 25 October 2015	Date : 19 November 2015

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Form GE-L-06

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	16 October 2015
SITE ADDRESS	:	BH03, Qeleloa, Nadi	**TECHNOLOGIST**	:	LN
SAMPLE LOCATION	:	BH03 8.00 - 8.50m	**MATERIAL TYPE & LOCATION**	:	Silty fine to medium SAND, grey
TEST NUMBER	:	N527			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

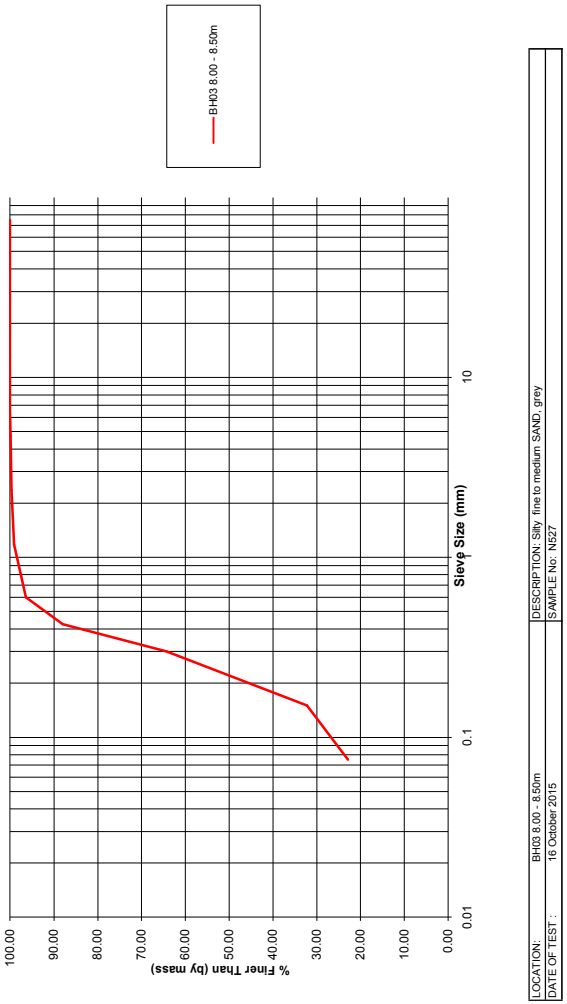
Moisture Content (Material passing 19mm)	Container No.	-	108	109	SPLIT SAMPLE
	Mass of Container	g	11.27	11.83	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	18.09	18.41	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	16.90	17.29	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	5.63	5.46	
	Mass of Moisture	g	1.19	1.12	
	Moisture Content	%	21.14	20.51	
	Average Moisture Content	%	20.82		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	397.25
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	328.78

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm	0.27	N/A	0.08	99.92	250	200
2.36 mm	0.89	N/A	0.27	99.65	150	200
1.18 mm	1.70	N/A	0.52	99.13	100	200
600 µm	8.91	N/A	2.71	96.42	80	200
425 µm	27.81	N/A	8.46	87.96	70	200
300 µm	77.75	N/A	23.65	64.31	60	200
150 µm	105.49	N/A	32.09	32.23	40	200
75 µm	30.93	N/A	9.41	22.82	25	200
Passing 75 µm	75.03	N/A	22.82	0.00	-	-
Pan Total	328.78	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by : LN	Q.A. Checked by : MK	Approved by : IG
Date : 16 October 2015	Date : 28 October 2015	Date : 19 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	15 October 2015
SITE ADDRESS	:	BH03, Qeleloa, Nadi	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03 12.50m - 13.00m	**MATERIAL TYPE & LOCATION**	:	Organic SILT, grey green, low plasticity
TEST NUMBER	:	N 528			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	86	67	SPLIT SAMPLE
	Mass of Container	g	117.70	72.12	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	145.69	94.51	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	135.12	85.97	Spliting Factor M_3/M_4 =
	Mass of Dry Soil	g	17.42	13.85	
	Mass of Moisture	g	10.57	8.54	
	Moisture Content	%	60.68	61.66	
	Average Moisture Content	%	61.17		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil	
Total Wet Weight (M_w)	g	288.87	
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
	M_T =	179.23	

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm	0.16	N/A	0.09	99.91	150	200
1.18 mm	0.88	N/A	0.49	99.42	100	200
600 µm	2.05	N/A	1.14	98.28	80	200
425 µm	1.24	N/A	0.69	97.58	70	200
300 µm	2.10	N/A	1.17	96.41	60	200
150 µm	8.73	N/A	4.87	91.54	40	200
75 µm	23.07	N/A	12.87	78.67	25	200
Passing 75 µm	141.00	N/A	78.67	0.00	-	-
Pan Total	179.23	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : MK	Approved by : IG
Date : 15 October 2015	Date : 25 October 2015	Date : 19 November 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	16 October 2015
SITE ADDRESS	:	BH03, Qeleloa, Nadi	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03 15.50m - 16.00m	**MATERIAL TYPE & LOCATION**	:	Organic SILT with trace of fine sand, dark grey, very soft to soft, medium to high plasticity (Core Sample)
TEST NUMBER	:	N 529			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	50	49	SPLIT SAMPLE
	Mass of Container	g	3.61	3.56	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	5.95	5.87	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	5.10	5.02	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	1.49	1.46	
	Mass of Moisture	g	0.85	0.85	
	Moisture Content	%	57.05	58.22	
	Average Moisture Content	%	57.63		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	163.44
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	103.68

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm	0.40	N/A	0.39	99.61	150	200
1.18 mm	0.22	N/A	0.21	99.40	100	200
600 µm	0.70	N/A	0.68	98.73	80	200
425 µm	0.52	N/A	0.50	98.23	70	200
300 µm	0.70	N/A	0.68	97.55	60	200
150 µm	3.86	N/A	3.72	93.83	40	200
75 µm	7.72	N/A	7.45	86.38	25	200
Passing 75 µm	89.56	N/A	86.38	0.00	-	-
Pan Total	103.68	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : MK	Approved by : IG
Date : 16 October 2015	Date : 25 October 2015	Date : 19 November 2015

DESCRIPTION:	Organic SILT with trace of fine sand, dark grey, very soft to soft, medium to high plasticity
SAMPLE No:	N529
LOCATION:	BH03 15.50m - 16.00m
DATE OF TEST :	16 October 2015

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BH03, Qeleloa, Nadi

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	16 October 2015
SITE ADDRESS	:	BH03, Qeleloa, Nadi	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03 20.00m - 20.50m	**MATERIAL TYPE & LOCATION**	:	Silty fine SAND with trace of some sub-rounded medium to coarse gravel ,Silt with trace of fine sand, very soft, wet to saturated
TEST NUMBER	:	N 532			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	10	11	SPLIT SAMPLE
	Mass of Container	g	52.28	52.88	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	76.46	76.90	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	70.67	71.16	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	18.39	18.28	
	Mass of Moisture	g	5.79	5.74	
	Moisture Content	%	31.48	31.40	
	Average Moisture Content	%	31.44		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_T)	g	Nil
Total Wet Weight (M_w)	g	269.65
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	205.15

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm	2.16	N/A	1.05	98.95	300	300
4.75 mm	2.31	N/A	1.13	97.82	250	200
2.36 mm	2.87	N/A	1.40	96.42	150	200
1.18 mm	8.16	N/A	3.98	92.44	100	200
600 µm	23.63	N/A	11.52	80.93	80	200
425 µm	19.92	N/A	9.71	71.22	70	200
300 µm	22.97	N/A	11.20	60.02	60	200
150 µm	33.92	N/A	16.53	43.48	40	200
75 µm	22.12	N/A	10.78	32.70	25	200
Passing 75 µm	67.09	N/A	32.70	0.00	-	-
Pan Total	205.15	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : MK	Approved by : IG
Date : 16 October 2015	Date : 25 October 2015	Date : 13 November 2015

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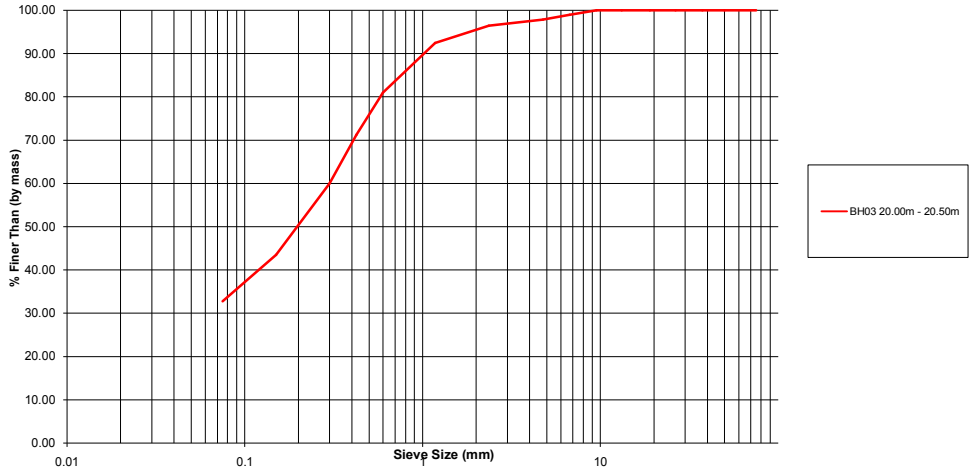


LOCATION:	BH03 20.00m - 20.50m	DESCRIPTION: Silty fine SAND with trace of some sub-rounded medium to coarse gravel ,Silt with trace of fine sand, very soft, wet to saturated
DATE OF TEST :	16 October 2015	SAMPLE No: N532

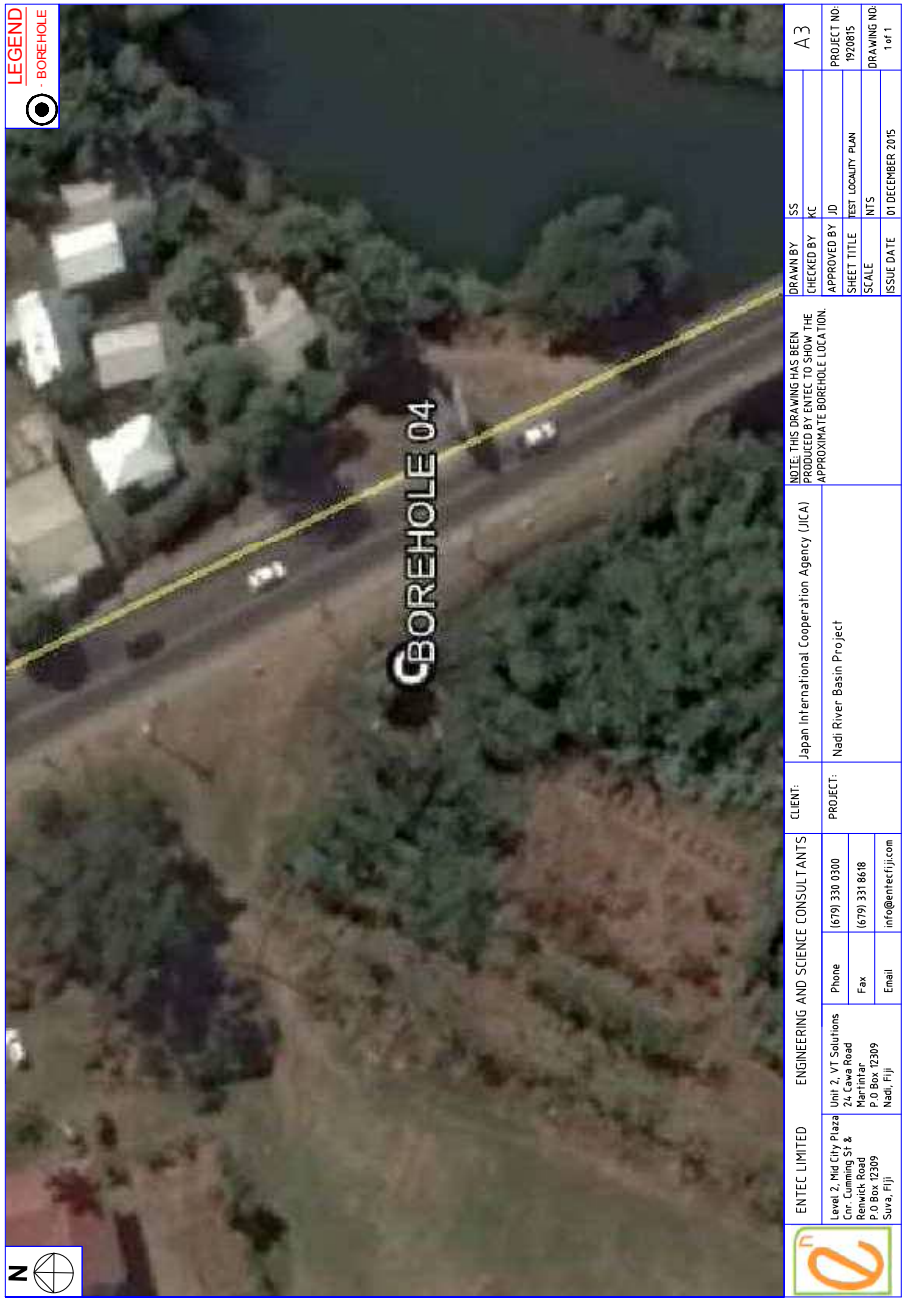
D15-107

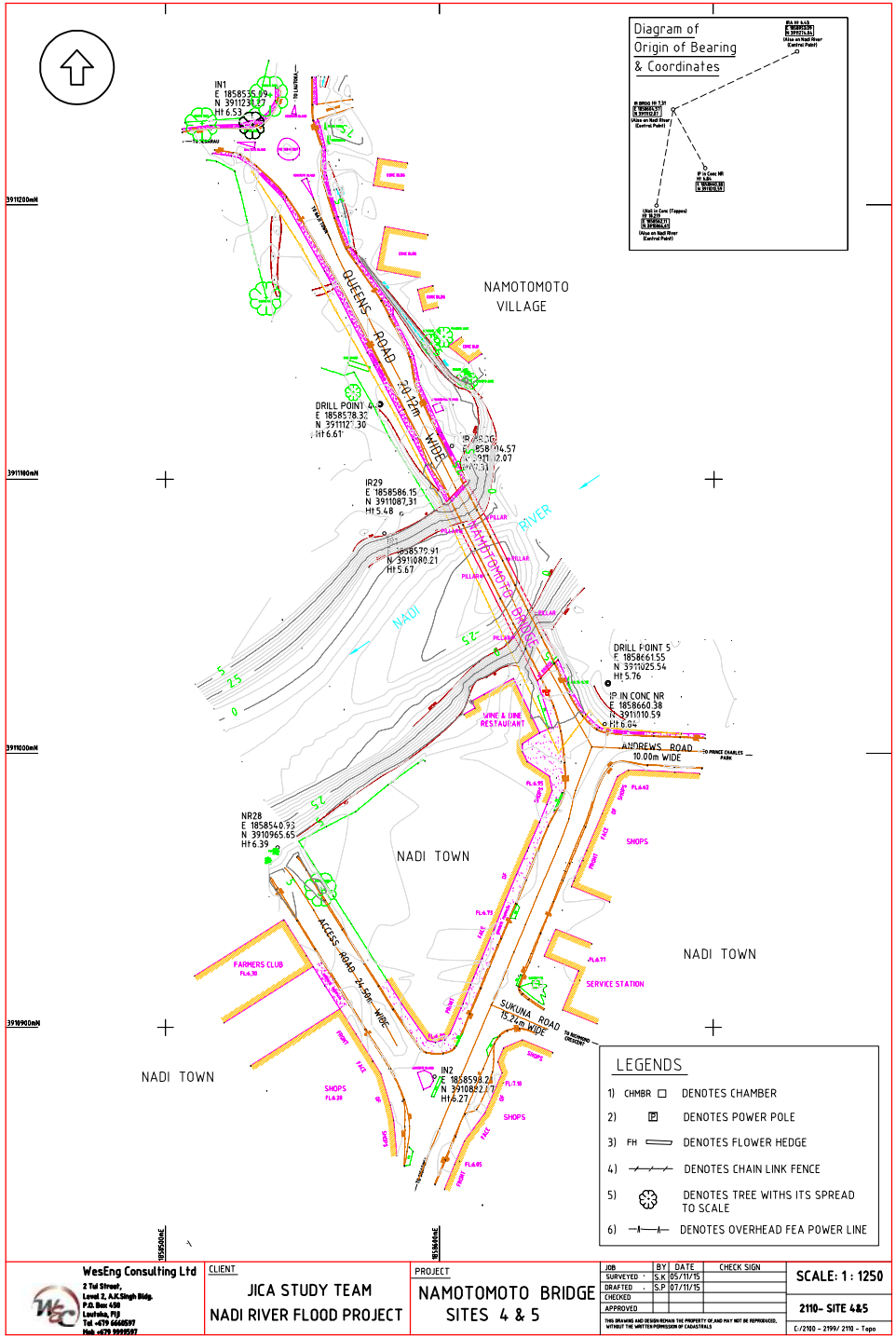
APPENDIX 4

SITE 4 - Nadi Bridge, Queens Road, Namotomoto, Fiji.

APPENDIX 4a

Test Locality Plan





APPENDIX 4b

Engineering Borehole Log

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Nadi Bridge Right Bank	**BH04**

Job No.:	Start Date: 12-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		6.61	E 1858578.3 N 3911127.3

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	1 of 7

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.							500 100				
				Recovered as fine to coarse sub-rounded to sub-angular andesite and basalt GRAVEL									27		
				Sandy SILT with some medium to coarse sub-angular gravel				+5.61	1				49	1.00	SPT 1.00 m N=3
									2				33	2.00	SPT 2.00 m N=9
				Silty fine to medium SAND with trace of some fine to medium sub angular gravel				+3.11	3					3.50	SPT 3.50 m N=0
									4				26		P= 26.5 kPa
															P= 23.5 kPa

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Nadi Bridge Right Bank	**BH04**

Job No.:	Start Date: 12-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		6.61	E 1858578.3 N 3911127.3

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	2 of 7

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Silty fine to medium SAND with trace of some fine to medium sub angular gravel *(continued)*					6				0	5.00	SPT 5.00 m N=4
				Medium to coarse SAND with trace of some fine to medium rounded to sub-rounded gravel				-0.39	7				20	6.50	SPT 6.50 m N=2
				fine to coarse SAND				-1.39	8				0	8.00	SPT 8.00 m N=0
				Sandy SILT with trace of fine to medium sub-rounded to sub-angular gravel, pale brown				-1.89	9				40	9.50	SPT 9.50 m N=0

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Nadi Bridge Right Bank	BH04

Job No.:	Start Date: 12-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		6.61	E 1858578.3 N 3911127.3

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	3 of 7

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Sandy SILT with trace of fine to medium sub-rounded to sub-angular gravel, pale brown *(continued)*											
				Silty CLAY with occassional siltstone, pale brown orange, firm to stiff , low to medium plasticity				-3.89					40		
				Silty CLAY with trace of siltstone nodules with fine gravel, pale brown, soft, low to medium plasticity				-4.39	11						SPT 11.00 m N=0
													11.00		
								-5.29					93		
				Clayey fine to medium GRAVEL with trace of sand, yellow brown, moist, tighly packed, soft to firm, moist, medium to high plasticity					12						P= 57.5 kPa
				Highly weathered conglomerate comprising siltstone and sand stone with trace of subrounded basalt fine to medium basaltic gravel				-5.89							SPT 12.50 m N=0
													12.50 -13.00 PT		
									13						
													72		
				Silty CLAY with some medium sub-angular to sub rounded basaltic gravel with minor fine sand, low to medium plasticity				-6.89							
				Silty fine SAND with trace of fine sub-angular gravel, pale brown				-7.39	14						P= 20 kPa SPT 14.00 m N=38
													14.00		
													40		P= 50 kPa
								-8.39							

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Nadi Bridge Right Bank	BH04

Job No.:	Start Date: 12-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		6.61	E 1858578.3 N 3911127.3

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	4 of 7

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Sandy fine to medium subrounded to subangular GRAVEL with some silt and clay , pale brown											P= 15 kPa
													40		
				Silty CLAY with some sand , pale brown, stiff, low to medium plasticity				-9.19	16						SPT 15.50 m N=0
													15.50		
				Clayey SILT with trace of gravel fragments and fine sand, dark grey black, stiff, low to medium plasticity				-9.69					100		P= 20 kPa
									17						P= 40 kPa
															P= 38.5 kPa
															SPT 17.00 m N=51
													17.00		
															P= 45 kPa
													87		
									18						P= 31.5 kPa
															P= 21.5 kPa
				Clayey SILT with some fine silt stone and trace of fine sand and shell fragments, dark grey black, frable, low plasticity				-11.89							SPT 18.50 m N=50
									19				18.50		
															P= 36.5 kPa
													93		

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Bridge Right Bank	No.: BH04
Job No.: 1920815	Start Date: 12-10-2015 Finish Date: 13-10-2015	Ground Level (m): 6.61	Co-Ordinates (): E 1858578.3 N 3911127.3
Client: JICA Study Team	Hole Depth: 30.50 m		Sheet: 5 of 7

Columns: Type | Run | Fluid & Water | Piezometer | Geological Description (Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.) | Legend | Weathering (RS CW HW MW SW UW) | Field Strength (VS/VL S/L F/MD St/D VSt/VD H/EW VW W MS S VS ES) | Elevation (m) | Depth (m) | Symbolic Log | Defect Spacing (mm) (500, 100) | Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc) | TCR (SCR) RQD (%) | Samples | Tests

Geological Description	Elevation (m) at base	Depth marks (m)	TCR (SCR) RQD (%)	Samples	Tests
Clayey SILT with some fine silt stone and trace of fine sand and shell fragments, dark grey black, frable, low plasticity *(continued)*	-13.89			20.00	SPT 20.00 m N=50; P= 8.5 kPa; P= 225 kPa
Clayey SILT with some fine sand and trace of shell fragments , dark grey, friable	-15.79	21, 22	93; 100	21.50	SPT 21.50 m N=50
Clayey SILT with trace of fine sand and fine gravel with decomposing organic matter, grey green, low plasticity	-17.19	23	69 (53) 27	23.00	SPT 23.00 m N=51
Highly to moderatly weathered SILTSTONE , grey green, very weak to weak	-17.89	24			
Organic SILT with trace of fine sand, dark grey green, low plasticity	-18.39		100	24.50	SPT 24.50 m N=50+

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

● Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
■ U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH04 MAIN.GPJ <<DrawingFile>> 04-12-2015 09:02 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Bridge Right Bank	No.: BH04
Job No.: 1920815	Start Date: 12-10-2015 Finish Date: 13-10-2015	Ground Level (m): 6.61	Co-Ordinates (): E 1858578.3 N 3911127.3
Client: JICA Study Team	Hole Depth: 30.50 m		Sheet: 6 of 7

Geological Description	Elevation (m) at base	Depth marks (m)	TCR (SCR) RQD (%)	Samples	Tests
Highly weathered to moderatly weathered SILTSTONE, grey green, very weak to weak	-18.49				
Silty fine to medium SAND with trace of gravel, greenish grey, loosely packed moist	-19.89	26	100; 40	26.00	P= 85 kPa; SPT 26.00 m N= 50+; P= 151.5 kPa
Sandy SILT with trace of fine to coarse sub-rounded to rounded gravel, dark green grey	-19.99				
Silty fine to medium subrounded to angular GRAVEL with some fine sand, red brown	-21.39	27, 28	30	27.50	P= 275 kPa; SPT 27.50 m N=50; P= 146.5 kPa
Sandy fine to medium GRAVEL with some silt and coarse gravel		29	50	29.00	P= 193 kPa; P= 283 kPa; SPT 29.00 m N=50; P= 121.5 kPa

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

● Small Disturbed Sample
Large Disturbed Sample
Scala Penetrometer - blows/100mm
Permeability Test
■ U100 Undisturbed Sample
Insitu Vane Shear Strength (kPa)
UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH04 MAIN.GPJ <<DrawingFile>> 04-12-2015 09:02 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Nadi Bridge Right Bank	BH04

Job No.:	Start Date: 12-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		6.61	E 1858578.3 N 3911127.3

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	7 of 7

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR SCR RQD (%)	Samples	Tests
				Sandy fine to medium GRAVEL with some silt and coarse gravel *(continued)*									50		P= 300 kPa
				Hole Terminated at 30.50 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005				-23.89	31 32 33 34					30.50	SPT 30.50 m N=50

Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit.
Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.

Weathering: RS EW HW MW SW
Field Strength: VL L M H VH EH
Defect Spacing (mm): 500 100
Defect Description: (type, orientation, spacing, roughness, persistence aperture, infilling etc)

Explanations:

Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge

- Small Disturbed Sample
- Large Disturbed Sample
- Scala Penetrometer - blows/100mm
- Permeability Test
- U100 Undisturbed Sample
- Insitu Vane Shear Strength (kPa)
- UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/TL	Checked by: DMC

ENTEC 131 (A3).GLB Log (E NZ DRILLHOLE 1 BH04 MAIN.GPJ) <<DrawingFile>> 04/12/2015 09:02 8.30.004 Data\Lab and In Situ Test - 0001 Lib: Entec 1.01.0315-04-27 Prj: 0001 Fil: 3.03.2015-04-27

Borehole 4 Core Photos (0.00m to 31.50m)

0.00m to 3.50m

3.50m to 11.90m

11.90m to 15.50m

15.50m to 18.20m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 4,Main Road Bridge Right Bank, Nadi, Fiji.

18.20m to 20.20m

20.20m to 22.40m

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1920815.04

22.40m to 24.50m

24.50m to 29.00m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 4,Main Road Bridge Right Bank, Nadi, Fiji.

29.0m to 31.50m

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APPENDIX 4c

Laboratory Test Schedule and Laboratory Test Results

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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : Nadi Bridge (BH 04),
PROJECT NUMBER :1920815

Date: .13.2015
SAMPLES SENT BY: Collected from Site by ENTEC on 12.10.15
Notes:

Lab test Schedule

Project No.	Site	Soil Type	Sample type	SPT N value	Depth (m)	Lab Tests Required							
						Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	Remarks
1920815.02	Site 4 (BH04), near Denarau junction.	Gravelly Sand	SPT	24	1.00 - 1.40								
		Gravelly Sand	SPT	24	2.00 - 2.5				1				
		Sandy Gravel	SPT	22	3.50 - 4.0			1					
		Sandy Gravel	SPT	11	5.00								no recovery
		Sandy Gravel	SPT	12	6.5								no recovery
		Gravel	SPT	17	8.00 - 8.5			1	1				
		Gravel	SPT	16	9.50 - 9.75								
		Silty Clay	SPT	21	11.00 - 11.50			1		1			
		Clayey Gravel	U		12.50 - 13.00		1	1		1	1	1	
		Gravelly Sand	SPT	53	14.00 - 14.5	1		1	1				
		Clayey Silt	SPT	50	15.5								no recovery
		Silty Sand	SPT	42	17.00 - 17.5			1	1				
		Silty Sand	SPT	50	18.50 - 19.0			1					
		Silty Sand	SPT	50	20.00 - 20.41								
		Silty Sand	SPT	51	21.50 - 22.00			1					
		Silty Sand	SPT	51	23.00 - 23.45								
		Clayey Silt	SPT	50	24.50 - 25.0		1				1		
		Silty Sand	SPT	50	26.00 - 26.5			1	1				
		Gravel	SPT	50	27.50 - 28.0			1					
		Gravel	SPT	50	29.00 - 29.5				1				
		Sandy Silt	SPT	50	31.00 - 31.45					1			
	TOTALS					1	2	10	6	3	1	2	0
	Bill of Qunatity					1	3	10	6	3	3	3	

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH04, Nadi Bridge	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty CLAY with trace of siltstone nodules with fine gravel, pale brown,soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N537 (BH04 11.0 - 11.5m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	173	174				
Mass of Container	g	12.00	12.21				
Mass of Container + Wet Soil	g	19.73	19.29				
Mass of Container + Dry Soil	g	17.42	17.21				
Mass of Dry Soil	g	5.42	5.00				
Mass of Moisture	g	2.31	2.08				
Moisture Content	%	42.62	41.60				42.11

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		27	29				
Mass of Container	g	14.29	14.26				
Mass of Container + Wet Soil	g	20.88	20.37				
Mass of Container + Dry Soil	g	18.82	18.42				
Mass of Dry Soil	g	4.53	4.16				
Mass of Moisture	g	2.06	1.95				
Moisture Content	%	45.47	46.88				46.17

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	16
Container No.		30	35	37	38	39	41
Mass of Container	g	13.46	14.27	14.68	14.78	14.21	14.32
Mass of Container + Wet Soil	g	19.84	20.56	20.29	20.30	20.21	22.38
Mass of Container + Dry Soil	g	17.18	17.92	17.90	17.91	17.57	18.80
Mass of Dry Soil	g	3.72	3.65	3.22	3.13	3.36	4.48
Mass of Moisture	g	2.66	2.64	2.39	2.39	2.64	3.58
Moisture Content	%	71.51	72.33	74.22	76.36	78.57	79.91

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample			125.00			
Final length of Sample after Shrinkage			102.00			
% Shrinkage			18.40			18.40

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

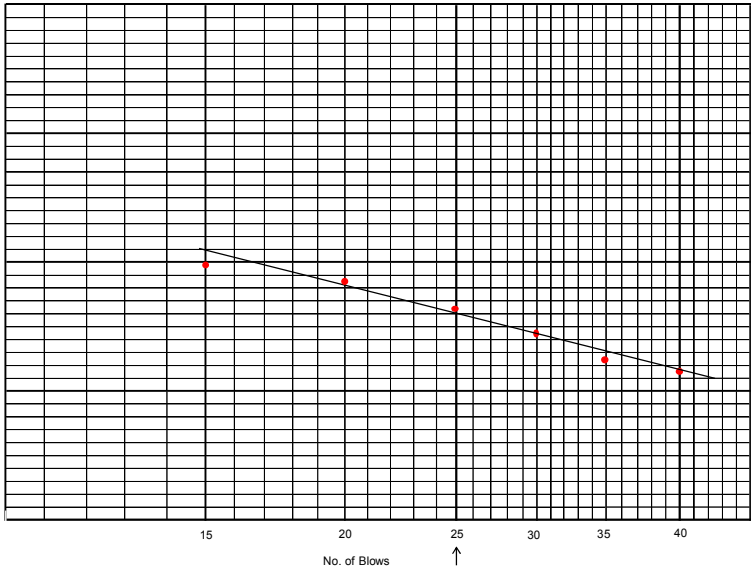
Liquid Limit	76.00 %
Plastic Limit	46.17 %
Plasticity Index	29.83 %
Shrinkage Limit	18.40 %

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date: 25 November 2015

Approved By: *IG*
Date: 25 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N537

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH04, Nadi Bridge	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Highly weathered conglomerate comprising siltstone and sandstone with trace of subrounded fine to medium basaltic gravel	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N538 (BH04 12.50 - 12.90m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.		6	15				
Mass of Container	g	53.15	52.75				
Mass of Container + Wet Soil	g	69.12	69.90				
Mass of Container + Dry Soil	g	63.12	63.49				
Mass of Dry Soil	g	9.97	10.74				
Mass of Moisture	g	6.00	6.41				
Moisture Content	%	60.18	59.68				59.93

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		146	147				
Mass of Container	g	11.63	11.62				
Mass of Container + Wet Soil	g	16.98	16.73				
Mass of Container + Dry Soil	g	15.46	15.29				
Mass of Dry Soil	g	3.83	3.67				
Mass of Moisture	g	1.52	1.44				
Moisture Content	%	39.69	39.24				39.46

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	36	30	25	19	15
Container No.		107	109	110	119	133	176
Mass of Container	g	11.59	11.89	11.93	11.42	11.29	11.80
Mass of Container + Wet Soil	g	21.23	21.74	22.98	21.94	21.80	25.14
Mass of Container + Dry Soil	g	16.85	17.07	17.65	16.66	16.35	18.12
Mass of Dry Soil	g	5.26	5.18	5.72	5.24	5.06	6.32
Mass of Moisture	g	4.38	4.67	5.33	5.28	5.45	7.02
Moisture Content	%	83.27	90.15	93.18	100.76	107.71	111.08

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				99.00		
% Shrinkage				20.80		20.80

Sample Preparation

as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

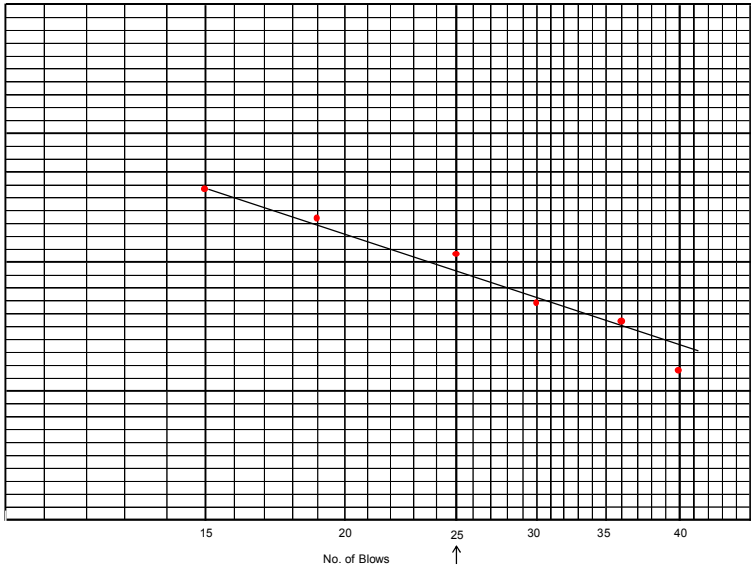
Liquid Limit	98.50 %
Plastic Limit	39.46 %
Plasticity Index	59.04 %
Shrinkage Limit	20.80 %

Tested By: LN
Date: 16 October 2015

Q.A. Checked By: KB
Date: 25 November 2015

Approved By: *IG*
Date: 25 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N538

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	:1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	:16 October 2015
SITE ADDRESS	: BH04, Nadi Bridge	**TECHNOLOGIST**	:RK
MATERIAL TYPE & DESCRIPTION	: Sandy fine to medium GRAVEL with some silt and course gravel	**TEST METHOD**	:NZS 4402:1986 (amended version)
		SAMPLE No.	N547 (BH04 30.50 - 31.00m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	68	84				
Mass of Container	g	74.15	85.05				
Mass of Container + Wet Soil	g	123.09	125.27				
Mass of Container + Dry Soil	g	111.23	115.72				
Mass of Dry Soil	g	37.08	30.67				
Mass of Moisture	g	11.86	9.55				
Moisture Content	%	31.98	31.14				31.56

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		167	171				
Mass of Container	g	11.83	11.80				
Mass of Container + Wet Soil	g	16.32	16.73				
Mass of Container + Dry Soil	g	15.14	15.47				
Mass of Dry Soil	g	3.31	3.67				
Mass of Moisture	g	1.18	1.26				
Moisture Content	%	35.65	34.33				34.99

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	15
Container No.		170	168	172	129	118	115
Mass of Container	g	12.04	11.54	12.35	11.54	11.28	11.74
Mass of Container + Wet Soil	g	18.42	18.35	19.18	19.86	19.19	19.36
Mass of Container + Dry Soil	g	16.43	16.20	17.00	17.16	16.64	16.74
Mass of Dry Soil	g	4.39	4.66	4.65	5.62	5.36	5.00
Mass of Moisture	g	1.99	2.15	2.18	2.70	2.55	2.62
Moisture Content	%	45.33	46.14	46.88	48.04	47.57	52.31

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample			125.00			
Final length of Sample after Shrinkage			102.00			
% Shrinkage			18.40			18.40

Sample Preparation
as received
washed/sieved on 425 µm sieve
air dried/oven dried 105°C
after making a paste cured for 12-16 hrs

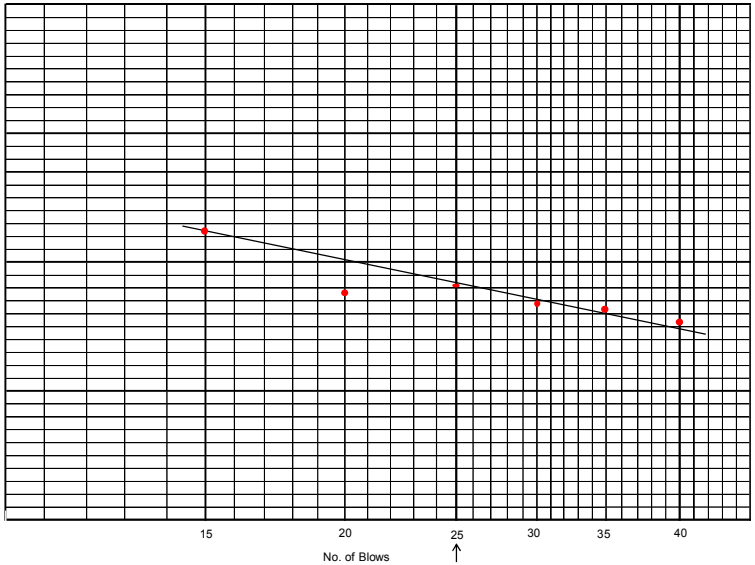
Liquid Limit	48.30 %
Plastic Limit	34.99 %
Plasticity Index	13.31 %
Shrinkage Limit	18.40 %

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date: 25 November 2015

Approved By:*IG*
Date: 25 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N547

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE / TESTED** :	16 October 2015
SITE ADDRESS :	Site04 Nadi Bridge	**TECHNOLOGIST** :	RK
SAMPLE LOCATION :	BH04 12.5m - 12.90m	**MATERIAL TYPE** :	Highly weathered conglomerate comprising siltstone and sandstone with trace of subrounded fine to medium basaltic gravel
TEST NUMBER :	N538		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	14	2	
	Mass of Container	g	53.54	53.95	
	Mass of Container + Wet Soil	g	78.89	77.02	
	Mass of Container + Dry Soil	g	71.98	70.29	
	Mass of Dry Soil	g	18.44	16.34	
	Mass of Moisture	g	6.91	6.73	
	Moisture Content	%	37.47	41.19	39.33

Bulk Density	Sample No.	-	N538
	Diameter of Specimen	mm	51.73
	Initial area of specimen Ao (π/4 d²)	mm²	2100.65
	Initial length of specimen Lo	mm	62.89
	Initial mass of specimen Mi	g	330.42
	Bulk Density ρ	t/m³	2.5
	Dry Density ρd	t/m³	1.80

Tested by : KB	Q.A. Check by : KB	Approved by : IG
Date : 16 October 2015	Date : 25 November 2015	Date : 25 November 2015

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	16 October 2015
SITE ADDRESS :	Site 04 Nadi Bridge	**TECHNOLOGIST** :	TL/LN
SAMPLE LOCATION :	BH04 24.10m -24.40m	**MATERIAL TYPE** :	Highly to moderatly weathered SILTSTONE, grey green, very weak to very weak
TEST NUMBER :	N543		

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	8	14	
	Mass of Container	g	53.07	53.54	
	Mass of Container + Wet Soil	g	73.00	75.37	
	Mass of Container + Dry Soil	g	68.02	70.17	
	Mass of Dry Soil	g	14.95	16.63	
	Mass of Moisture	g	4.98	5.20	
	Moisture Content	%	33.31	31.27	32.29

Bulk Density	Sample No.	-	N543
	Diameter of Specimen	mm	63.45
	Initial area of specimen Ao (π/4 d²)	mm²	3160.33
	Initial length of specimen Lo	mm	28.52
	Initial mass of specimen Mi	g	154.72
	Bulk Density ρ	t/m³	1.72
	Dry Density ρd	t/m³	1.30

Tested by : LN/TL	Q.A. Check by : KB	Approved by : IG
Date : 16 October 2015	Date : 25 November 2015	Date : 25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Sandy SILT with trace of some medium to course sub-angular gravel, pale brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N535 (BH04 2.0m - 2.50m)

Moisture Content	%						
Container No.	g	2	4				
Mass of Container	g	53.97	52.60				
Mass of Container + Wet Soil	g	85.13	85.37				
Mass of Container + Dry Soil	g	80.86	81.01				
Mass of Dry Soil	g	26.89	28.41				
Mass of Moisture	g	4.27	4.36				
Moisture Content	%	15.88	15.35				15.61

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fine to course SAND	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N536 (BH04 8.0m - 8.50m)

Moisture Content	%						
Container No.	g	103	138				
Mass of Container	g	11.31	11.14				
Mass of Container + Wet Soil	g	24.91	25.21				
Mass of Container + Dry Soil	g	23.27	23.59				
Mass of Dry Soil	g	11.96	12.45				
Mass of Moisture	g	1.64	1.62				
Moisture Content	%	13.71	13.01				13.36

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty CLAY with trace of siltstone nodules with fine gravel, pale brown,soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N537 (BH04 11.0m - 11.5m)

Moisture Content	%						
Container No.	g	99	134				
Mass of Container	g	11.83	11.26				
Mass of Container + Wet Soil	g	25.06	23.48				
Mass of Container + Dry Soil	g	21.30	20.01				
Mass of Dry Soil	g	9.47	8.75				
Mass of Moisture	g	3.76	3.47				
Moisture Content	%	39.70	39.66				39.68

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Highly weathered conglomerate comprising siltstone and sandstone with trace of subrounded fine to medium basaltic gravel	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N538 (BH04 12.5m - 12.9m)

Moisture Content	%						
Container No.	g	22	25				
Mass of Container	g	14.39	14.44				
Mass of Container + Wet Soil	g	23.25	25.64				
Mass of Container + Dry Soil	g	21.01	22.79				
Mass of Dry Soil	g	6.62	8.35				
Mass of Moisture	g	2.24	2.85				
Moisture Content	%	33.84	34.13				33.98

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty fine SAND with trace of fine subangular gravel, pale brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N539 (BH04 14.0m - 14.50m)

Moisture Content	%						
Container No.	g	98	139				
Mass of Container	g	11.93	11.34				
Mass of Container + Wet Soil	g	28.66	26.04				
Mass of Container + Dry Soil	g	25.73	23.51				
Mass of Dry Soil	g	13.80	12.17				
Mass of Moisture	g	2.93	2.53				
Moisture Content	%	21.23	20.79				21.01

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey SILT with trace of gravel fragments and fine sand, dark grey black, stiff, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N540 (BH04 17.0m - 17.5m)

Moisture Content	%						
Container No.	g	136	137				
Mass of Container	g	11.77	11.31				
Mass of Container + Wet Soil	g	25.12	28.00				
Mass of Container + Dry Soil	g	21.55	23.54				
Mass of Dry Soil	g	9.78	12.23				
Mass of Moisture	g	3.57	4.46				
Moisture Content	%	36.50	36.47				36.49

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey SILT with some fine siltstone with trace of fine sand and shell fragments, dark grey black, frable, low plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N541 (BH04 18.5m - 19.0m)

Moisture Content	%						
Container No.	g	104	135				
Mass of Container	g	11.90	11.62				
Mass of Container + Wet Soil	g	23.52	23.68				
Mass of Container + Dry Soil	g	20.70	20.67				
Mass of Dry Soil	g	8.80	9.05				
Mass of Moisture	g	2.82	3.01				
Moisture Content	%	32.05	33.26				32.65

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey SILT with some fine sand and trace of shell fragments, dark grey, friable	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N542 (BH04 21.5m - 22.0m)

Moisture Content	%						
Container No.	g	4	2				
Mass of Container	g	52.64	53.97				
Mass of Container + Wet Soil	g	96.52	101.84				
Mass of Container + Dry Soil	g	86.24	90.37				
Mass of Dry Soil	g	33.60	36.40				
Mass of Moisture	g	10.28	11.47				
Moisture Content	%	30.60	31.51				31.05

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty SAND with trace of gravel, greenish grey, fine to medium, loosely packe, moist	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N544 (BH04 26.00m - 26.50m)

Moisture Content	%						
Container No.	g	144	145				
Mass of Container	g	12.02	11.93				
Mass of Container + Wet Soil	g	20.09	19.64				
Mass of Container + Dry Soil	g	18.18	17.79				
Mass of Dry Soil	g	6.16	5.86				
Mass of Moisture	g	1.91	1.85				
Moisture Content	%	31.01	31.57				31.29

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 16 October 2015
SITE ADDRESS	: BH 04, Nadi Bridge Towards Denarau Junction	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty fine to medium subrounded to angular GRAVEL with some fine sand, red brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N545 BH04 27.5m - 28.00m)

Moisture Content	%						
Container No.	g	146	147				
Mass of Container	g	11.75	11.63				
Mass of Container + Wet Soil	g	22.68	23.04				
Mass of Container + Dry Soil	g	20.74	21.07				
Mass of Dry Soil	g	8.99	9.44				
Mass of Moisture	g	1.94	1.97				
Moisture Content	%	21.58	20.87				21.22

Tested By: RK
Date: 16 October 2015

Q.A. Checked By: KB
Date :25 November 2015

Approved By:IG
Date: 25 November 2015

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Determination of Permeability of a Soil
Constant Head Method for Remoulded Sample

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 21 October 2015
SITE ADDRESS	: Site 04, Nadi Bridge,	**TECHNOLOGIST**	: IG
MATERIAL TYPE & DESCRIPTION	: Medium to course SAND with trace of some fine to medium rounded to sub-rounded gravel	**TEST METHOD**	: AS 1289.6.7.3-2001
		SAMPLE No.	: N541a (BH04 7.0m - 7.5m)

Total Weight : -
Weight Retained on : -
Percentage retained: : -

MOISTURE CONTENT

Container No.		2
Mass of Container	g	53.96
Mass of Container + Wet	g	98.11
Mass of Container + Dry	g	95.12
Mass of Dry Soil	g	41.16
Mass of Moisture	g	2.99
Moisture Content	%	7.26
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1250
Volume of Speciman	cm^3	653.45
Wet Density	t/m^3	1.91
Dry Density	t/m^3	1.78
Maximum Dry Density	t/m^3	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm^2	113.10
Cross sectional area of soil	cm^2	50.27
Length of soil speciman	cm	13.00

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(°c)	KT cm/min	K_{20} cm/min
1	81	4.00	61	26	0.049	0.043
2	81	4.00	62	26	0.049	0.044
3	81	4.00	61	26	0.049	0.043
4	89	4.00	70	26	0.051	0.045
5	89	4.00	74	26	0.054	0.048
6	89	4.00	75	26	0.054	0.048
7	94	4.00	86	26	0.059	0.053
8	94	4.00	87	26	0.060	0.053
9	94	4.00	88	26	0.061	0.054
10	102	4.00	101	26	0.064	0.057
11	102	4.00	101	26	0.064	0.057
12	102	4.00	100	26	0.063	0.056

Average K_{20} m/s	8.36E-06

Tested By: IG
Date: 21 October 2015

Q.A. Check By: KB
Date: 25 November 2015

Approved By: IG
Date : 25 November 2015

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	11 October 2015
SITE ADDRESS	:	Site 4 Nadi Bridge	**TECHNOLOGIST**	:	IG/TL
SAMPLE LOCATION	:	BH 04 12.5-13.0m	**MATERIAL TYPE**	:	Highly weathered conglomerate comprising siltstone and sandstone with trace of subrounded fine to medium basaltic gravel
TEST NUMBER	:	N538			

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	2
	Mass of Container	g	53.95
	Mass of Container + Wet Soil	g	77.02
	Mass of Container + Dry Soil	g	70.29
	Mass of Dry Soil	g	16.34
	Mass of Moisture	g	6.73
	Moisture Content	%	41.19

Bulk Density	Sample No.	-	N538
	Diameter of Specimen	mm	51.73
	Initial area of specimen Ao (π/4 d^2)	mm^2	2100.65
	Initial length of specimen Lo	mm	62.89
	Initial mass of specimen Mi	g	330.42
	Bulk Density ρ	t/m^3	2.50
	Dry Density ρd	t/m^3	1.77

Compression Gauge Reading	**Load Gauge Reading**	**Load**	**Strain ε= Cn - Co / Lo**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference σ1 - σ3 = 1000P/A**
mm		(kN)	%	m^2	kPa
0.00			0.000	0.002101	0.00
0.50			0.795	0.002117	0.00
1.00			1.590	0.002135	0.00
1.50			2.385	0.002152	0.00
2.00			3.180	0.002170	0.00
2.50	sample collapse before test		3.975	0.002188	0.00
3.00			4.770	0.002206	0.00
3.50			5.565	0.002224	0.00
4.00			6.360	0.002243	0.00
4.50			7.155	0.002263	0.00
5.00			7.950	0.002282	0.00
5.50			8.745	0.002302	0.00
6.00					
6.50					

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STRESS VS STRAIN

DESCRIPTION: Highly weathered conglomerate comprising siltstone and sandstone with trace of subrounded fine to medium basaltic gravel

LOCATION: BH 04 12.5-13.0m
DATE OF TEST : 16 October 2015

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

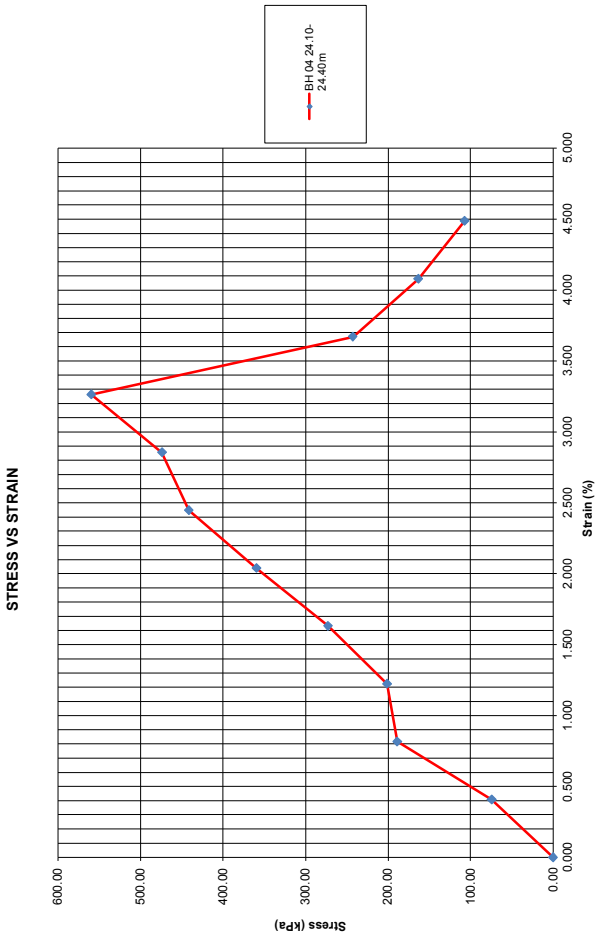
PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	11 October 2015
SITE ADDRESS	:	Site 4 Nadi Bridge	**TECHNOLOGIST**	:	LN/TL
SAMPLE LOCATION	:	BH 04 24.10-24.40m	**MATERIAL TYPE**	:	Highly to moderatly weathered SILTSTONE, grey green, very weak to weak
TEST NUMBER	:	N543			

SAMPLE HISTORY : NATURAL / ~~AIR - DRIED~~ / ~~OVEN - DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	87
	Mass of Container	g	116.47
	Mass of Container + Wet Soil	g	782.25
	Mass of Container + Dry Soil	g	646.25
	Mass of Dry Soil	g	529.78
	Mass of Moisture	g	136.00
	Moisture Content	%	25.67

Bulk Density	Sample No.	-	N543
	Diameter of Specimen	mm	61.29
	Initial area of specimen Ao (π/4 d²)	mm²	2948.82
	Initial length of specimen Lo	mm	122.58
	Initial mass of specimen Mi	g	671.36
	Bulk Density ρ	t/m³	1.86
	Dry Density ρd	t/m³	1.48

Compression Gauge Reading	**Load Gauge Reading**	**Load**	**Strain ε= Cn - Co / Lo**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference σ1 - σ3 = 1000P/A**
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002949	0.00
0.50	110	0.2208	0.408	0.002961	74.57
1.00	280.0	0.5612	0.816	0.002973	188.76
1.50	300.0	0.6007	1.224	0.002985	201.22
2.00	410.0	0.8181	1.632	0.002998	272.91
2.50	544.0	1.0826	2.039	0.003010	359.64
3.00	672.0	1.3346	2.447	0.003023	441.51
3.50	725.0	1.4389	2.855	0.003035	474.02
4.00	860.0	1.7063	3.263	0.003048	559.76
4.50	372.0	0.7430	3.671	0.003061	242.72
5.00	250.0	0.5019	4.079	0.003074	163.26
5.50	165.0	0.3313	4.487	0.003087	107.31



LOCATION: BH 04 24.10-24.40m
DESCRIPTION: Highly to moderatly weathered SILTSTONE, grey green, very weak to weak
DATE OF TEST : 16 October 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	16 October 2015
SITE ADDRESS	:	BH04 Nadi Bridge	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH04 1.00 - 1.50m	**MATERIAL TYPE & LOCATION**	:	Sandy SILT with trace of some medium to course sub-angular gravel, pale brown
TEST NUMBER	:	N 534			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

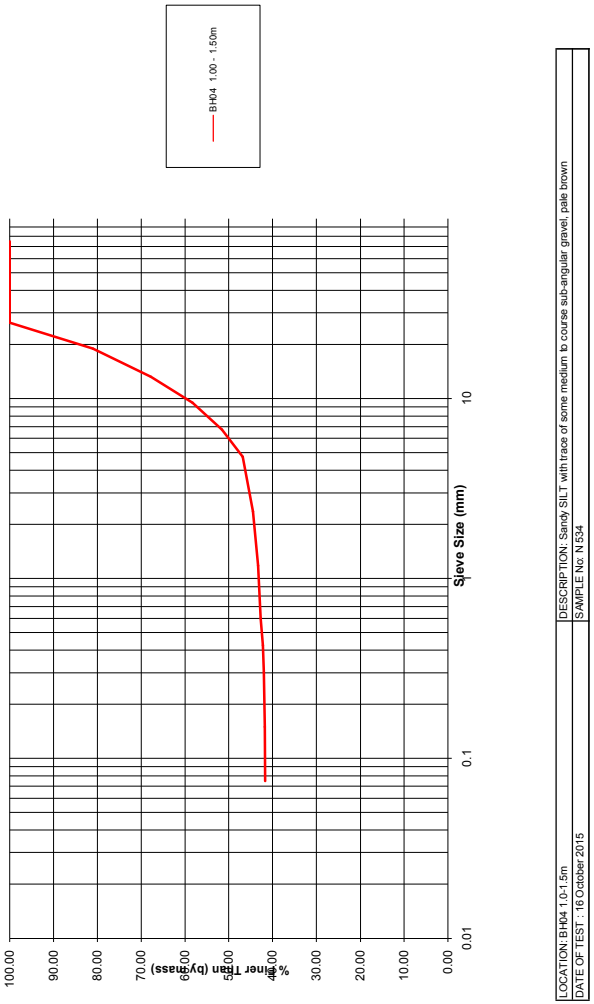
Moisture Content (Material passing 19mm)	Container No.	-	153	154	SPLIT SAMPLE
	Mass of Container	g	11.22	11.27	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	18.37	18.12	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	16.71	16.56	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	5.49	5.29	
	Mass of Moisture	g	1.66	1.56	
	Moisture Content	%	30.24	29.49	
	Average Moisture Content	%	29.86		

Total Mass of Dry Sample				
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil	
	Total Wet Weight (M_w)	g	306.81	
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
		M_T =	236.26	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm	27.04	N/A	11.45	88.55		200
13.2 mm	19.94	N/A	8.44	80.11	600	300
9.50 mm	15.91	N/A	6.73	73.38	450	300
6.70 mm	14.00	N/A	5.93	67.45	300	300
4.75 mm	13.81	N/A	5.85	61.61	250	200
2.36 mm	27.83	N/A	11.78	49.83	150	200
1.18 mm	25.05	N/A	10.60	39.23	100	200
600 µm	19.89	N/A	8.42	30.81	80	200
425 µm	8.22	N/A	3.48	27.33	70	200
300 µm	8.17	N/A	3.46	23.87	60	200
150 µm	12.09	N/A	5.12	18.75	40	200
75 µm	8.55	N/A	3.62	15.13	25	200
Passing 75 µm	35.76	N/A	15.13	0.00	-	-
Pan Total	236.26	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : KB	Approved by : IG
Date : 16 October 2015	Date : 25 November 2015	Date : 25 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	16 October 2015
SITE ADDRESS	:	BH04 Nadi Bridge	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH04 8.0-8.5m	**MATERIAL TYPE & LOCATION**	:	Fine to course SAND
TEST NUMBER	:	N 536			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

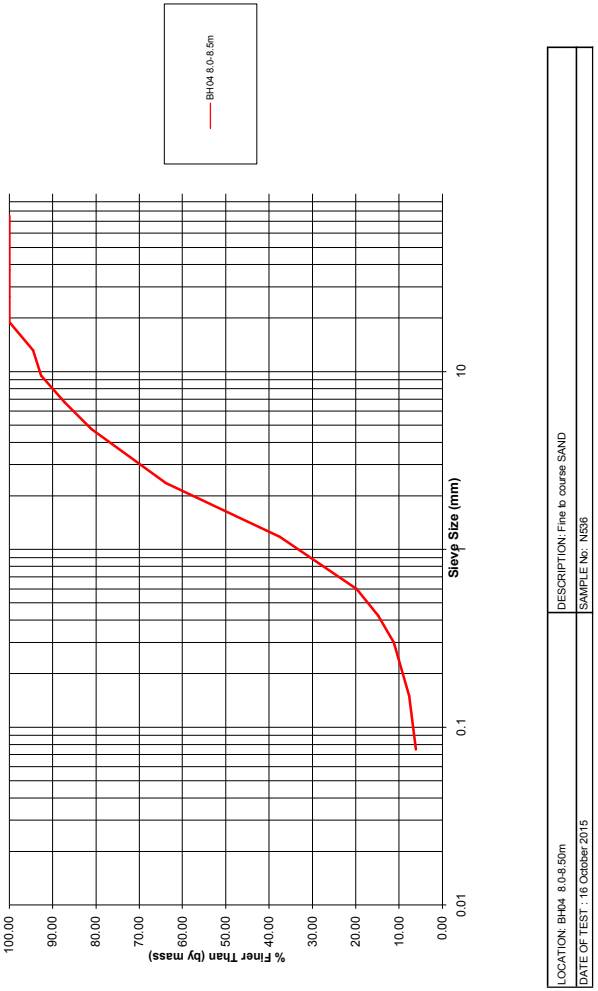
Moisture Content (Material passing 19mm)	Container No.	-	155	156	SPLIT SAMPLE
	Mass of Container	g	11.71	11.86	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	20.60	19.94	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	19.55	19.08	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	7.84	7.22	
	Mass of Moisture	g	1.05	0.86	
	Moisture Content	%	13.39	11.91	
	Average Moisture Content	%	12.65		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	292.95
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	260.05

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm	14.19	N/A	5.46	94.54	600	300
9.50 mm	4.70	N/A	1.81	92.74	450	300
6.70 mm	14.24	N/A	5.48	87.26	300	300
4.75 mm	16.08	N/A	6.18	81.08	250	200
2.36 mm	44.88	N/A	17.26	63.82	150	200
1.18 mm	68.34	N/A	26.28	37.54	100	200
600 µm	46.08	N/A	17.72	19.82	80	200
425 µm	12.93	N/A	4.97	14.85	70	200
300 µm	9.34	N/A	3.59	11.25	60	200
150 µm	9.28	N/A	3.57	7.69	40	200
75 µm	3.99	N/A	1.53	6.15	25	200
Passing 75 µm	16.00	N/A	6.15	0.00	-	-
Pan Total	260.05	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : KB	Approved by : KB
Date : 16 October 2015	Date : 19 November 2015	Date : 19 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	16 October 2015
SITE ADDRESS	:	BH04 Nadi Bridge	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH04 14.0m - 14.50m	**MATERIAL TYPE & LOCATION**	:	Silty fine SAND with trace of fine subangular gravel, pale brown
TEST NUMBER	:	N 539			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

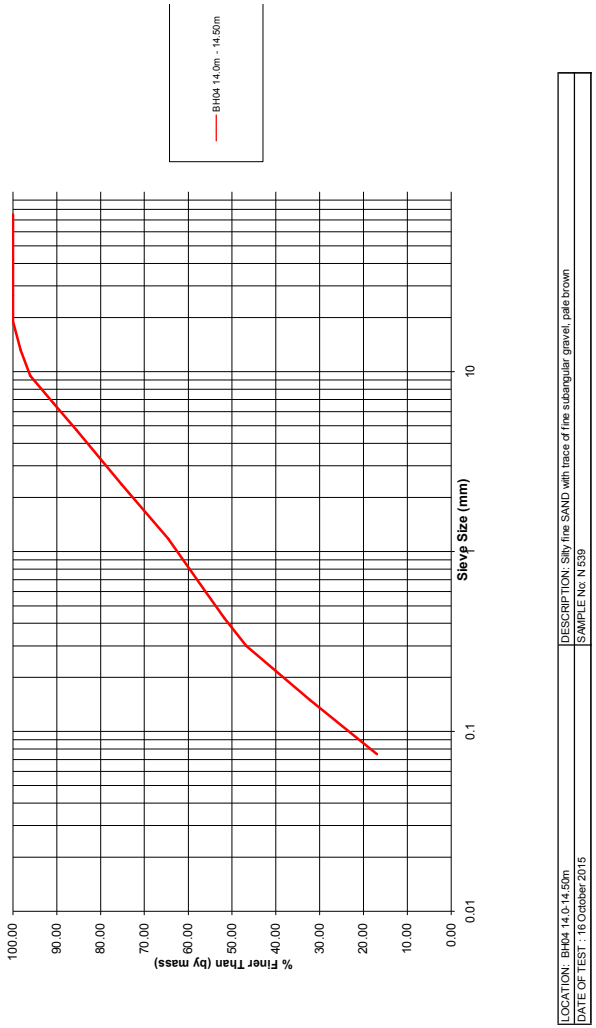
Moisture Content (Material passing 19mm)	Container No.	-	100	101	SPLIT SAMPLE
	Mass of Container	g	11.72	11.64	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	23.76	24.13	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	21.32	21.65	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	9.60	10.01	
	Mass of Moisture	g	2.44	2.48	
	Moisture Content	%	25.42	24.78	
	Average Moisture Content	%	25.10		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	350.47
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	280.16

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm	4.99	N/A	1.78	98.22	600	300
9.50 mm	6.10	N/A	2.18	96.04	450	300
6.70 mm	14.81	N/A	5.29	90.76	300	300
4.75 mm	14.59	N/A	5.21	85.55	250	200
2.36 mm	29.26	N/A	10.44	75.10	150	200
1.18 mm	29.50	N/A	10.53	64.57	100	200
600 µm	24.05	N/A	8.58	55.99	80	200
425 µm	12.13	N/A	4.33	51.66	70	200
300 µm	13.75	N/A	4.91	46.75	60	200
150 µm	40.80	N/A	14.56	32.19	40	200
75 µm	42.69	N/A	15.24	16.95	25	200
Passing 75 µm	47.49	N/A	16.95	0.00	-	-
Pan Total	280.16	-	100.00	-	-	-

NOTES:
1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : KB	Approved by : IG
Date : 16 October 2015	Date : 25 November 2015	Date : 25 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	16 October 2015
SITE ADDRESS	:	BH04 Nadi Bridge	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH04 17.0m - 17.5m	**MATERIAL TYPE & LOCATION**	:	Clayey SILT with trace of gravel fragments and fine sand, dark grey black, stiff, low to medium plasticity
TEST NUMBER	:	N 540			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

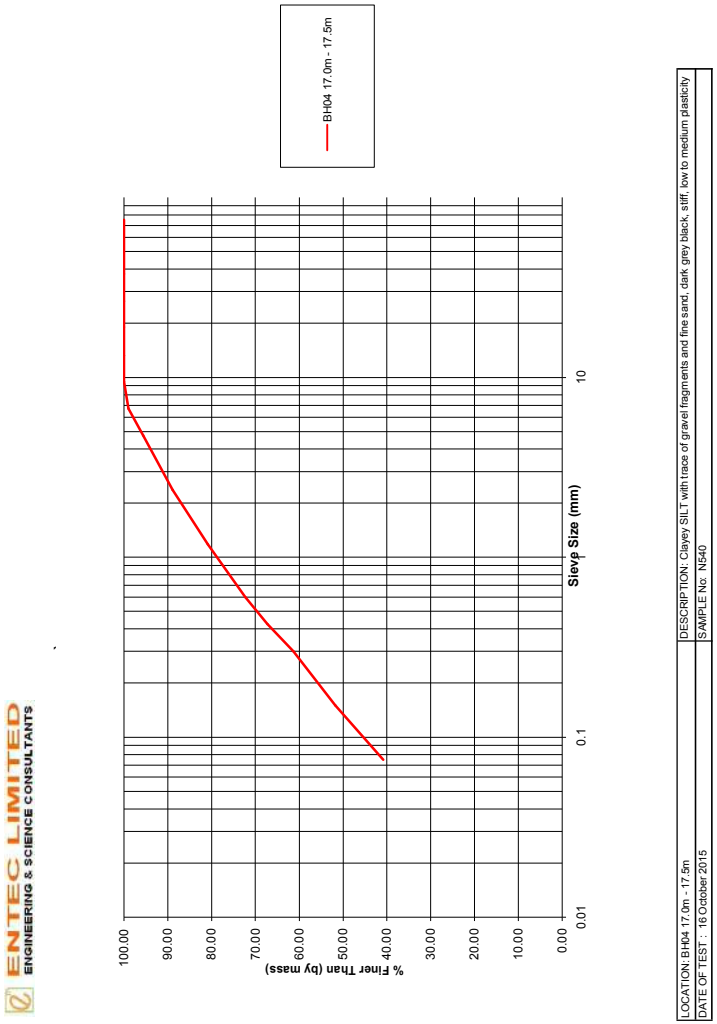
Moisture Content (Material passing 19mm)	Container No.	-	148	161	SPLIT SAMPLE
	Mass of Container	g	11.73	11.76	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	25.00	24.90	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	21.46	21.29	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	9.73	9.53	
	Mass of Moisture	g	3.54	3.61	
	Moisture Content	%	36.38	37.88	
	Average Moisture Content	%	37.13		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	303.03
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	220.98

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm	2.24	N/A	1.01	98.99	300	300
4.75 mm	7.50	N/A	3.39	95.59	250	200
2.36 mm	14.81	N/A	6.70	88.89	150	200
1.18 mm	17.64	N/A	7.98	80.91	100	200
600 µm	18.92	N/A	8.56	72.35	80	200
425 µm	11.25	N/A	5.09	67.25	70	200
300 µm	12.94	N/A	5.86	61.40	60	200
150 µm	21.31	N/A	9.64	51.76	40	200
75 µm	24.01	N/A	10.87	40.89	25	200
Passing 75 µm	90.36	N/A	40.89	0.00	-	-
Pan Total	220.98	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : KB	Approved by : IG
Date : 16 October 2015	Date : 25 November 2015	Date : 25 November 2015



DESCRIPTION: Clayey SILT with trace of gravel fragments and fine sand, dark grey black, stiff, low to medium plasticity
SAMPLE No: N540
LOCATION: BH04 17.0m - 17.5m
DATE OF TEST : 16 October 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	16 October 2015
SITE ADDRESS	:	BH04 Nadi Bridge	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH04 26.0-26.5m	**MATERIAL TYPE & LOCATION**	:	Silty SAND with trace of gravel, greenish grey, fine to medium, loosely packed, moist
TEST NUMBER	:	N 544			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

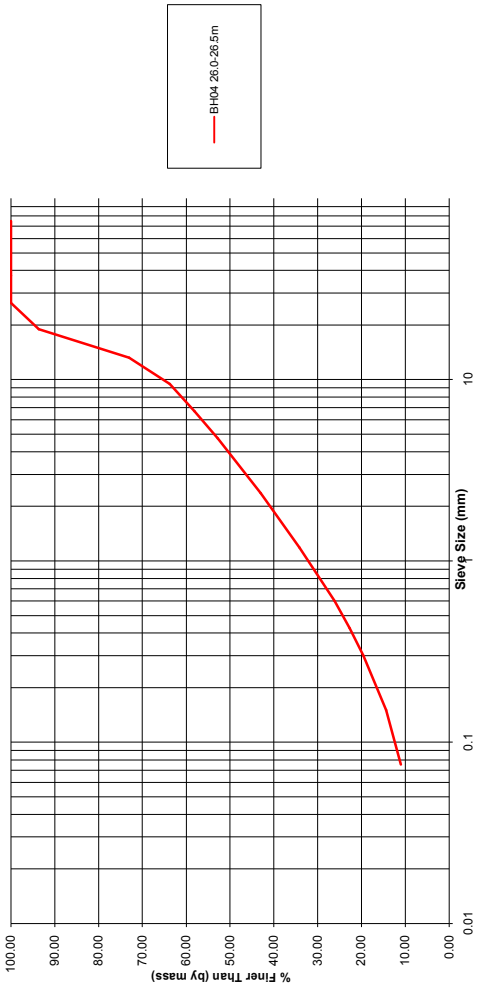
Moisture Content (Material passing 19mm)	Container No.	-	131	132	SPLIT SAMPLE
	Mass of Container	g	11.65	11.78	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	19.02	20.00	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	17.54	18.46	Spliting Factor M_3 / M_4
	Mass of Dry Soil	g	5.89	6.68	
	Mass of Moisture	g	1.48	1.54	
	Moisture Content	%	25.13	23.05	
	Average Moisture Content	%	24.09		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	251.57
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	202.73	

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm	12.83	N/A	6.33	93.67		200
13.2 mm	41.82	N/A	20.63	73.04	600	300
9.50 mm	18.75	N/A	9.25	63.79	450	300
6.70 mm	11.60	N/A	5.72	58.07	300	300
4.75 mm	10.74	N/A	5.30	52.77	250	200
2.36 mm	19.84	N/A	9.79	42.99	150	200
1.18 mm	17.86	N/A	8.81	34.18	100	200
600 µm	16.38	N/A	8.08	26.10	80	200
425 µm	6.84	N/A	3.37	22.73	70	200
300 µm	6.41	N/A	3.16	19.56	60	200
150 µm	10.44	N/A	5.15	14.41	40	200
75 µm	6.83	N/A	3.37	11.04	25	200
Passing 75 µm	22.39	N/A	11.04	0.00	-	-
Pan Total	202.73	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : KB	Approved by : IG
Date : 16 October 2015	Date : 25 November 2015	Date : 25 November 2015



DESCRIPTION Silty SAND with trace of gravel, greenish grey, fine to medium, loosely packe, moist
SAMPLE No: N544
LOCATION: BH04 26.0-26.5m
DATE OF TEST : 16 October 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	16 October 2015
SITE ADDRESS	:	BH04 Nadi Bridge	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH04 29.0m - 29.5m	**MATERIAL TYPE & LOCATION**	:	Sandy fine to medium GRAVEL with some silt and course gravel
TEST NUMBER	:	N 546			

SAMPLE HISTORY : ~~NATURAL / AIR-DRIED /~~ OVEN-DRIED ~~/ UNKNOWN~~

Moisture Content (Material passing 19mm)	Container No.	-	36	44	SPLIT SAMPLE
	Mass of Container	g	14.10	14.59	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	31.86	31.28	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	27.95	27.90	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	13.85	13.31	
	Mass of Moisture	g	3.91	3.38	
	Moisture Content	%	28.23	25.39	
	Average Moisture Content	%	26.81		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	251.07
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	197.98

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm	34.52	N/A	17.44	82.56	600	300
9.50 mm	14.67	N/A	7.41	75.16	450	300
6.70 mm	18.85	N/A	9.52	65.64	300	300
4.75 mm	13.30	N/A	6.72	58.92	250	200
2.36 mm	21.41	N/A	10.81	48.10	150	200
1.18 mm	17.58	N/A	8.88	39.22	100	200
600 µm	14.09	N/A	7.12	32.11	80	200
425 µm	6.41	N/A	3.24	28.87	70	200
300 µm	7.53	N/A	3.80	25.07	60	200
150 µm	13.01	N/A	6.57	18.50	40	200
75 µm	11.51	N/A	5.81	12.68	25	200
Passing 75 µm	25.11	N/A	12.68	0.00	-	-
Pan Total	197.98	-	100.00	-	-	-

NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve
2) The percentage passing the finest sieve was obtained by difference

Tested by :RK	Q.A. Checked by : KB	Approved by : IG
Date : 16 October 2015	Date : 25 November 2015	Date : 25 November 2015

Oedometer Settlement Test

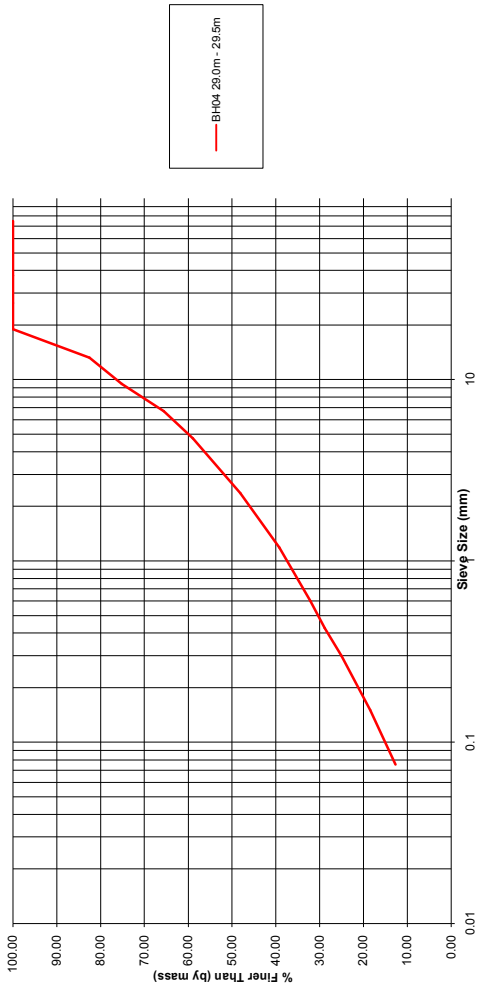
Sample Details			
sketch showing specimen location in original sample	Depth	12.5 - 12.9m	
	Description		
	Type	Clayey Gravel	
	Initial Height	L_0 (mm)	20.0
	Initial Diameter	D_0 (mm)	50.0
	Initial Weight	W_0 (gr)	57.0
	Bulk Density	ρ_0 (Mg/m3)	1.45
	Particle Density	ρ_s (Mg/m3)	2.65

Initial Conditions			
Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	39
Initial Dry Density	ρ_{di}	(Mg/m3)	1.04
Initial Voids Ratio	e_i	.	1.543
Initial Degree of Saturation	S_i	(%)	67.5
Initial Swelling	S_s	(kPa)	0

Final Conditions			
Final Moisture	ω_f%	(%)	39
Dry Density	ρ_{df}	(Mg/m3)	1.10
Voids Ratio	e_f	.	1.401
Saturation	S_f	(%)	73
Height Settlement	ΔL_s	(mm)	1.113

Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
100	1.494	0.385	114.6	0.193	29.0	29.0		0.380	0.0087
200	2.839	-10.199	8.2	5.396	29.0	29.0		8.380	0.0087
400	2.838	-10.189	131.0		29.0	29.0		0.772	0.0087
600	1.395	1.162	11116.9	1.880	29.0	29.0		0.006	0.0087
400	2.838	-10.189			29.0	29.0			
200	1.401	1.113			29.0	0.0			

Notes



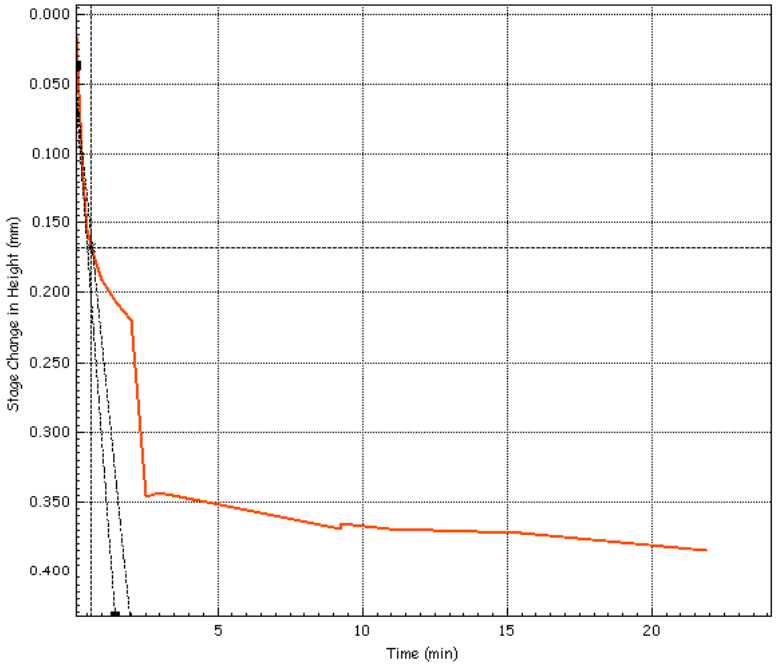
LOCATION: BH04 29.0m - 29.5m
DATE OF TEST : 16 October 2015
DESCRIPTION Sandy fine to medium GRAVEL with some silt and course gravel
SAMPLE No: N546

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-04_001
		Database:	.\SQLEXPRESS \ ENTEC
Site Reference	1920815	Test Date	11/18/2015
Jobfile	Geotechnical Engineering	Sample	N538
Client	Japan International Cooperation	Borehole	BH04
Operator	IG/MK	Checked	DMC
		Approved	DMC

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.385
Voids Ratio	e_f	.	1.494
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.380
Consolidation	C_V	(m2/year)	114.6
Compressibility	m_V	(m2/MN)	0.193
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

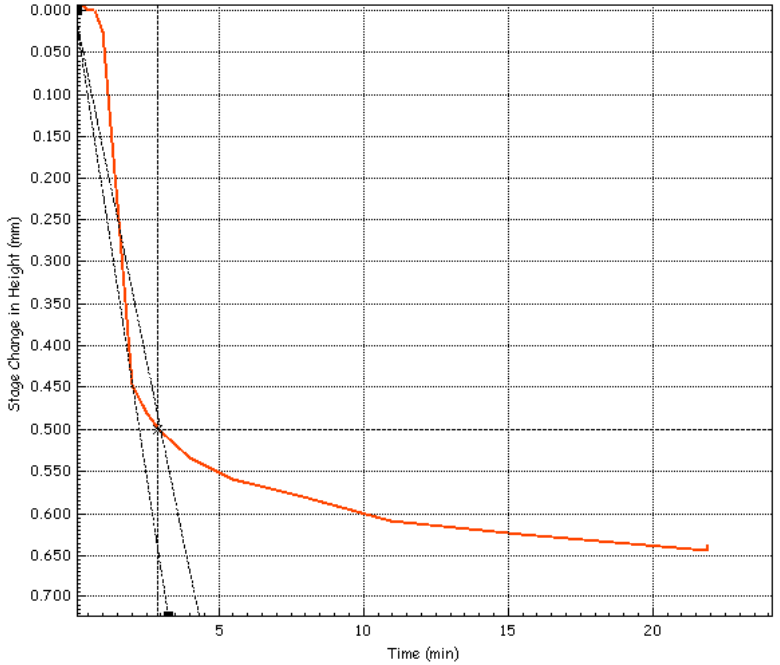


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-04_001
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/18/2015
Jobfile	Geotechnical Engineering	Sample	N538
Client	Japan International Cooperation	Borehole	BH04
Operator	IG/MK	Checked	DMC
Approved	DMC		

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-10.202
Voids Ratio	e_f	.	2.840
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	8.380
Consolidation	C_V	(m2/year)	8.2
Compressibility	m_V	(m2/MN)	5.397
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

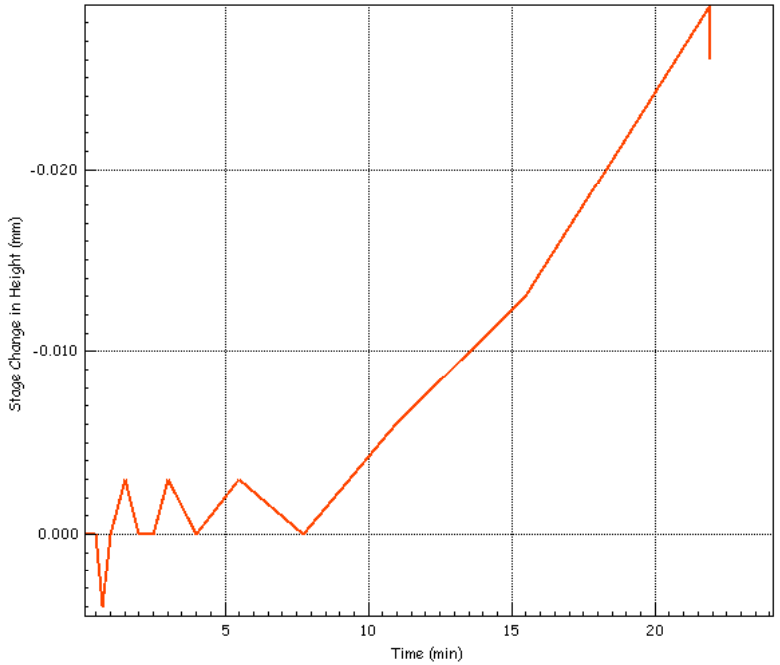


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-04_001
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/18/2015
Jobfile	Geotechnical Engineering	Sample	N538
Client	Japan International Cooperation	Borehole	BH04
Operator	IG/MK	Checked	DMC
Approved	DMC		

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.113
Voids Ratio	e_f	.	1.401
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

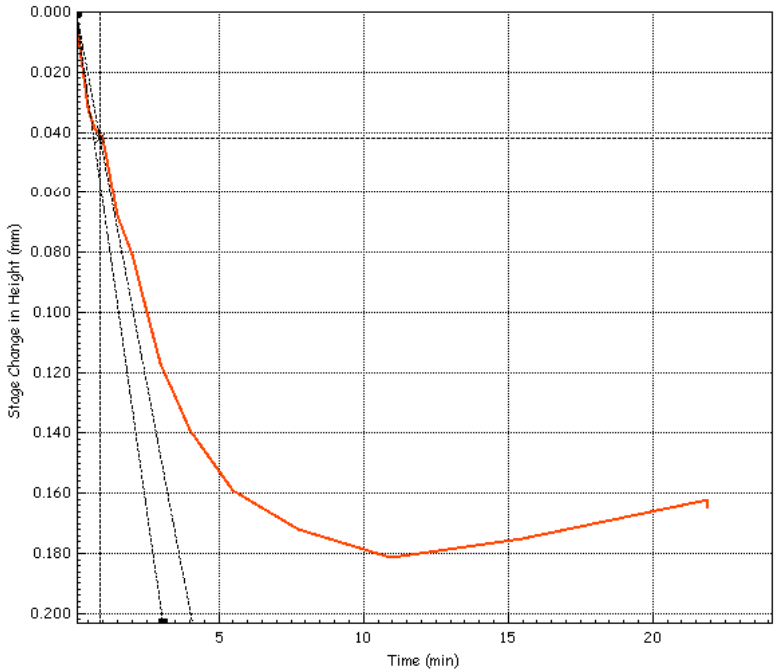


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-04_001
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/18/2015
Jobfile	Geotechnical Engineering	Sample	N538
Client	Japan International Cooperation	Borehole	BH04
Operator	IG/MK	Checked	DMC
Approved	DMC		

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-10.189
Voids Ratio	e_f	.	2.838
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.772
Consolidation	C_V	(m2/year)	131.0
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

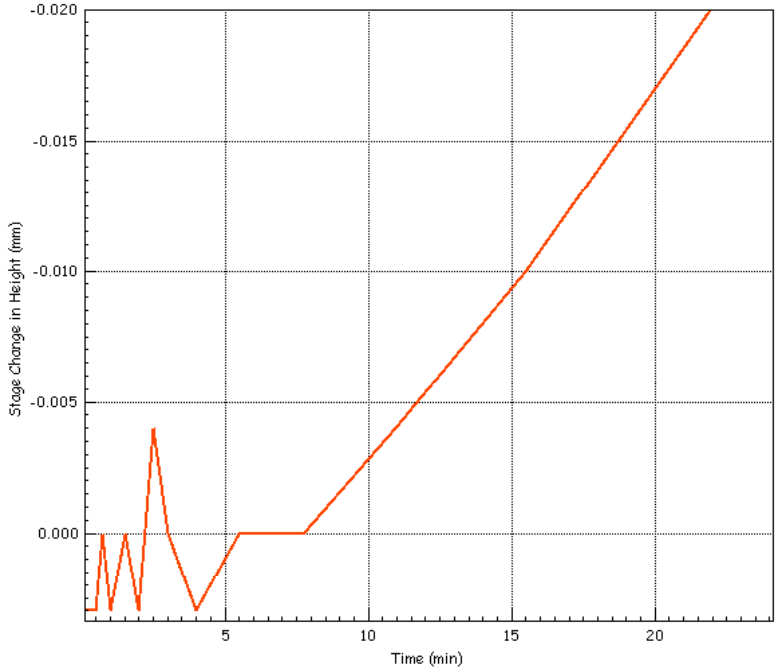


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-04_001
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/18/2015
Jobfile	Geotechnical Engineering	Sample	N538
Client	Japan International Cooperation	Borehole	BH04
Operator	IG/MK	Checked	DMC
Approved	DMC		

Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-10.196
Voids Ratio	e_f	.	2.839
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

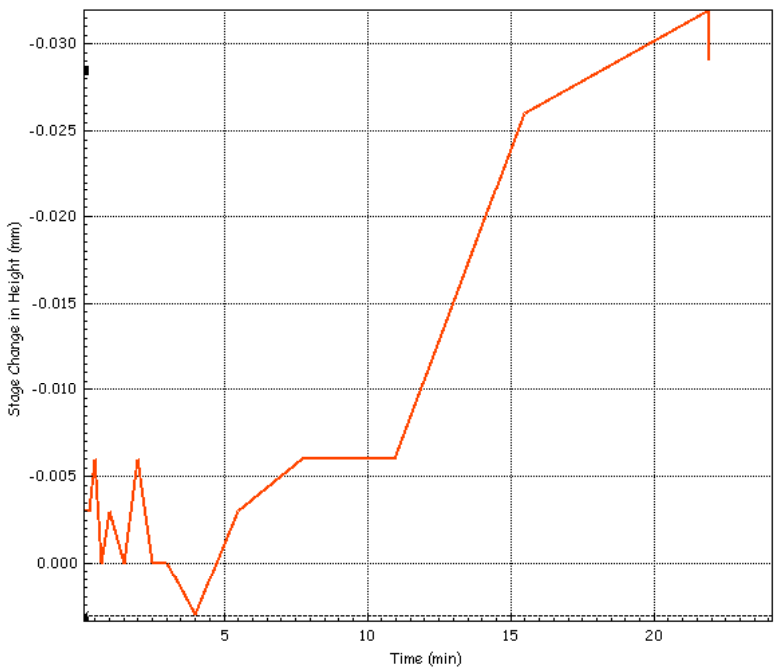


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-04_001
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/18/2015
Jobfile	Geotechnical Engineering	Sample	N538
Client	Japan International Cooperation	Borehole	BH04
Operator	IG/MK	Checked	DMC
Approved	DMC		

Entec Limited, Level 2 Mid Clty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	600
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.162
Voids Ratio	e_f	.	1.395
Final Temperature	T_f	(oC)	29.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.006
Consolidation	C_V	(m2/year)	11118.2
Compressibility	m_V	(m2/MN)	1.880
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



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