APPENDIX 13

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

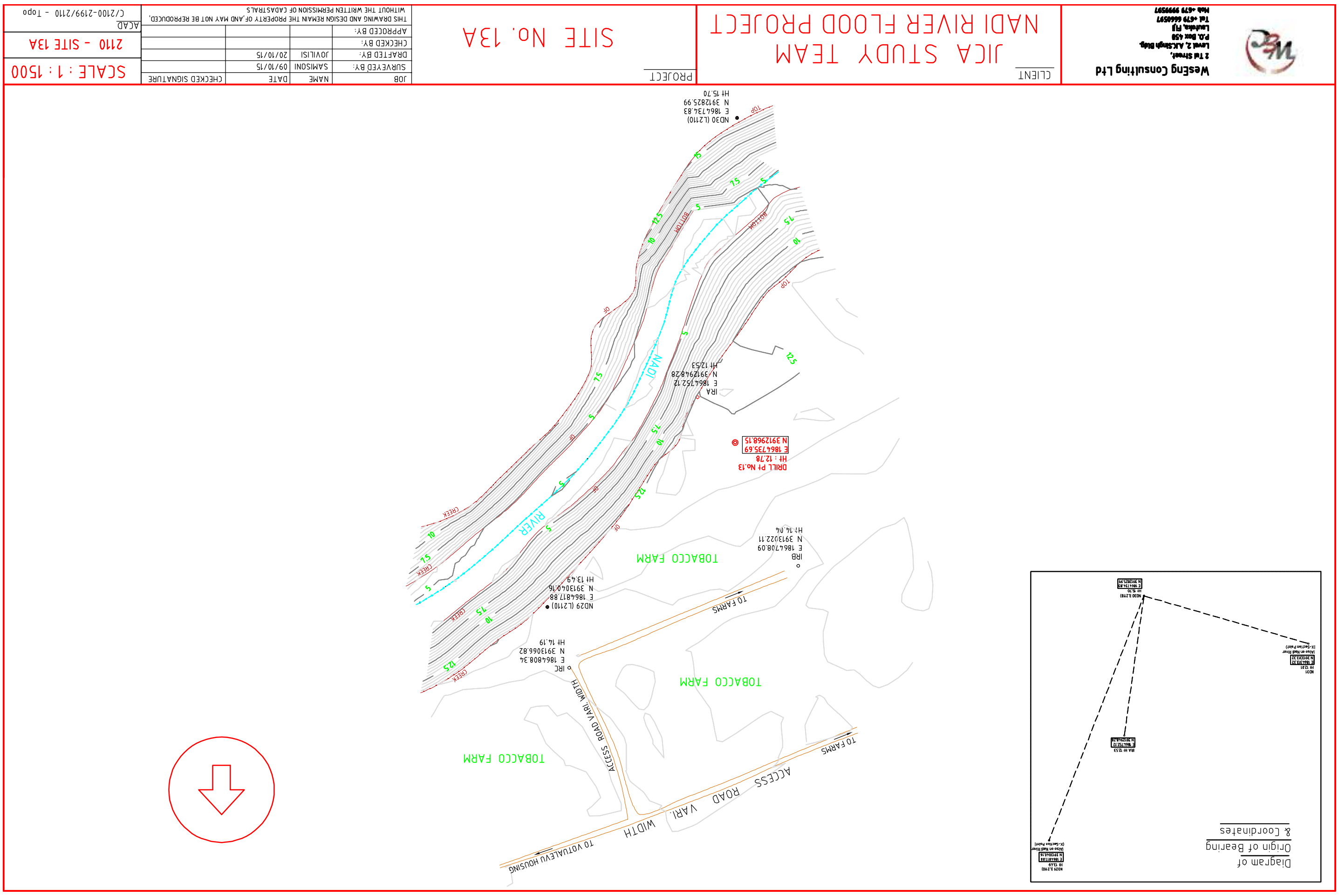
APPENDIX 13a

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.
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 Fax (679) 331 8618 Email info@entecfiji.com	PROJECT:	Nadi River Basin Project	

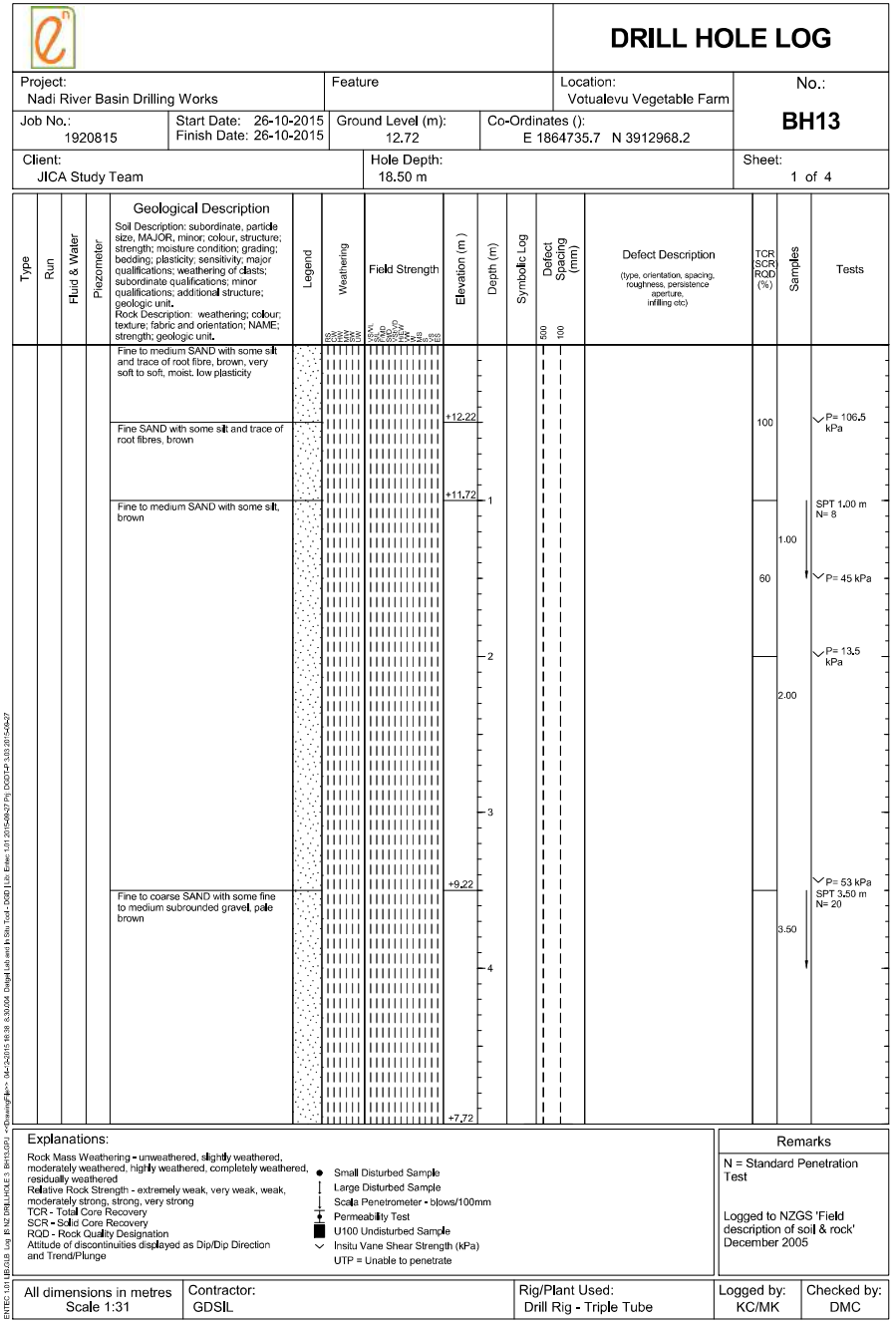
DRAWN BY	SS	A3	
CHECKED BY	KC		
APPROVED BY	JD	PROJECT NO:	1920815
SHEET TITLE	TEST LOCALITY PLAN		
SCALE	NTS	DRAWING NO:	1 of 1
ISSUE DATE	November 2015		

D15-387



APPENDIX 13b

Engineering Borehole Log and Core Photos



DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Votualevu Vegetable Farm	No.: BH13
Job No.: 1920815	Start Date: 26-10-2015 Finish Date: 26-10-2015	Ground Level (m): 12.72	Co-Ordinates (): E 1864735.7 N 3912968.2
Client: JICA Study Team	Hole Depth: 18.50 m		Sheet: 1 of 4

Geological Description	Elevation (m)	Depth (m)	Defect Spacing (mm)	TCR SCR RQD (%)	Samples	Tests
Fine to medium SAND with some silt and trace of root fibre, brown, very soft to soft, moist. low plasticity	+12.22			100		P= 106.5 kPa
Fine SAND with some silt and trace of root fibres, brown	+11.72	1			1.00	SPT 1.00 m N= 8
Fine to medium SAND with some silt, brown		2		60		P= 45 kPa
		3			2.00	P= 13.5 kPa
Fine to coarse SAND with some fine to medium subrounded gravel, pale brown	+9.22	4			3.50	P= 53 kPa SPT 3.50 m N= 20
	+7.72					

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.

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: GDSIL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/MK	Checked by: DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Votualevu Vegetable Farm	**BH13**
Job No.: 1920815	Start Date: 26-10-2015 Finish Date: 26-10-2015	Ground Level (m): 12.72	Co-Ordinates (): E 1864735.7 N 3912968.2
Client: JICA Study Team	Hole Depth: 18.50 m		Sheet: 2 of 4

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 (VSVL S F St VSt 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

Depth (m)	Elevation (m)	Geological Description	TCR (%)	Samples	Tests
5.00 – 8.00		Fine to coarse SAND with some fine to medium subrounded gravel, pale brown	20 / 30	5.00	SPT 5.00 m N= 7
8.00 – 9.50	+4.72	No recovery		8.00	SPT 8.00 m N= 26
9.50 –		Fine sub-angular GRAVEL with some coarse sand, grey pale brown	33	9.50	SPT 9.50 m N= 18

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: GDSIL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/MK	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH13.GPJ <<DrawingFile>> 04-12-2015 16:38 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		Votualevu Vegetable Farm	**BH13**
Job No.: 1920815	Start Date: 26-10-2015 Finish Date: 26-10-2015	Ground Level (m): 12.72	Co-Ordinates (): E 1864735.7 N 3912968.2
Client: JICA Study Team	Hole Depth: 18.50 m		Sheet: 3 of 4

Depth (m)	Elevation (m)	Geological Description	TCR (%)	Samples	Tests
10.00 – 11.00		Fine sub-angular GRAVEL with some coarse sand, grey pale brown *(continued)*	33		P= 80 kPa
11.00 – 12.10	+1.72	SILT with trace of fine sand, orange brown, soft to firm, moist, low to medium plasticity	100	11.00	SPT 11.00 m N= 19; P= 236.5 kPa; P= 163 kPa
12.10 – 12.50	+0.62	SILT with some fine sand and trace of fine sub-angular to sub-rounded gravel, pale brown			
12.50 – 14.00	+0.22	SILT with some fine to medium sub-angular to sub-rounded gravel and trace of coarse sand, brown, very soft to soft, low plasticity	33	12.50	SPT 12.50 m N= 50
14.00 – 14.50	-1.28	Fine to medium GRAVEL with some coarse sand, dark grey	27	14.00	SPT 14.00 m N= 50
14.50 –	-1.78	Fine to medium sub-angular to sub-rounded GRAVEL			

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: GDSIL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/MK	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH13.GPJ <<DrawingFile>> 04-12-2015 16:38 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: Votualevu Vegetable Farm	No.: BH13
Job No.: 1920815	Start Date: 26-10-2015 Finish Date: 26-10-2015	Ground Level (m): 12.72	Co-Ordinates (): E 1864735.7 N 3912968.2
Client: JICA Study Team	Hole Depth: 18.50 m		Sheet: 4 of 4

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 (VSo S F St VSt 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 (%)	Samples	Tests
Fine to medium sub-angular to sub-rounded GRAVEL *(continued)*	-2.78		27		
SILT with trace of fine sand, light green grey, firm to stiff, moist, medium to high plasticity	-3.28	16		15.50	SPT 15.50 m N= 50
Fine to medium sub-rounded to sub-angular GRAVEL with some silt and minor sand (moderately to highly weathered sandstone conglomerate, orange brown, weak to very weak	-4.08		100		
Fine to medium SAND with trace of fine subangular gravel, grey	-4.28	17			
SILT with some fine sand, grey, soft, moist, low plasticity	-4.78			17.00	SPT 17.00 m N= 53; P= 226.5 kPa
Fine SAND with some fine sub-angular gravel and minor silt, grey green	-5.48	18	100		P= 300 kPa
Fine SAND with some fine sub-rounded gravel and some silt, green grey	-5.78				
SILT with some sub-angular gravel and minor fine sand with traces of siltstone nodules, grey white	-6.28	19		18.50	SPT 18.50 m N= 53
Hole Terminated at 18.50 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
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RQD - Rock Quality Designation
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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: GDSIL	Rig/Plant Used: Drill Rig - Triple Tube	Logged by: KC/MK	Checked by: DMC

Borehole 13 Core Photos (0.00m to 18.50m)

0.00m to 11.00m

11.00m to 18.20m

18.20m to 18.50m

APPENDIX 13c

Laboratory Test Schedule and Test Results

ENTEC LIMITED
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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS :Site 13 (BH13), Votualevu Vegetable Farm
DATE: 18 December 2015

Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required						
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	Remarks
1920815	BH13	Sandy SILT	SPT	1.0-1.5			1	1	1			
		Sandy SILT	U	2.0-2.50		1	1		1	1	1	
		Gravelly SAND	SPT	3.5-4.0			1	1				
		Gravelly SAND	SPT	9.5-10.0	1		1					
		Silty CLAY	SPT	11.0-11.5			1	1	1			
		GRAVEL	SPT	12.5-13.0			1					
		GRAVEL	SPT	14.0-14.5			1	1				
		Silty GRAVEL	SPT	15.5-16.0			1	1				
		Silty SAND	SPT	17.0-17.5			1	1				
		Silty SAND	SPT	18.5-18.9			1					Total
Total					1	1	10	6	3	1	1	23
Bill of Quantitiy					1	3	10	6	3	3	3	29

Lab Test Schedule checked by: DMC

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

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**	:	12 November 2015
SITE ADDRESS	:	BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	:	IG
			TEST METHOD	:	AS 1289.6.7.3-2001
MATERIAL TYPE & DESCRIPTION	:	fine to coarse SAND with some fine to medium sub-rounded gravel, pale brown	**SAMPLE No.**	:	N674 (BH13 4.5m - 5.0m)

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

MOISTURE CONTENT

Container No.		5
Mass of Container	g	53.39
Mass of Container + Wet	g	91.27
Mass of Container + Dry	g	87.68
Mass of Dry Soil	g	34.29
Mass of Moisture	g	3.59
Moisture Content	%	10.47
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1810
Volume of Speciman	cm^3	874.62
Wet Density	t/m^3	2.07
Dry Density	t/m^3	1.87
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	17.40

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	95	5.00	15	26	0.01	0.01
2	95	5.00	15	26	0.01	0.01
3	95	5.00	15	26	0.01	0.01
4	104	5.00	16	26	0.01	0.01
5	104	5.00	18	26	0.01	0.01
6	104	5.00	17	26	0.01	0.01
7	115	5.00	18	26	0.01	0.01
8	115	5.00	18	26	0.01	0.01
9	115	5.00	18	26	0.01	0.01
10	124	5.00	22	26	0.01	0.01
11	124	5.00	22	26	0.01	0.01
12	124	5.00	22	26	0.01	0.01

Average K_{20} m/s	1.68E-06

Tested By: IG
Date:12 November 2015

Q.A. Check By: UM
Date: 04 December 2015

Approved By: IG
Date: 04 November 2015

Form: GE-L-03

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 /**	:	06 November 2015
SITE ADDRESS	:	BH13 Votualevu Vegetable Farm (opposite Nasau)	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH 13 1.00m - 1.5m	**MATERIAL TYPE & LOCATION**	:	fine to medium SAND with some silt, brown
TEST NUMBER	:	N 676			

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

Moisture Content (Material passing 19mm)	Container No.	-	153	128	SPLIT SAMPLE		
	Mass of Container	g	11.24	11.84	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	25.02	24.38	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	21.83	21.46	Spliting Factor = M_3/M_4		
	Mass of Dry Soil	g	10.59	9.62			
	Mass of Moisture	g	3.19	2.92			
	Moisture Content	%	30.12	30.35			
	Average Moisture Content	%	30.24				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	209.54
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	160.89	

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	19.44	N/A	12.08	87.92		200
13.2 mm	0.00	N/A	0.00	87.92	600	300
9.50 mm	0.00	N/A	0.00	87.92	450	300
6.70 mm	0.00	N/A	0.00	87.92	300	300
4.75 mm	0.87	N/A	0.54	87.38	250	200
2.36 mm	3.69	N/A	2.29	85.08	150	200
1.18 mm	4.87	N/A	3.03	82.06	100	200
600 µm	9.46	N/A	5.88	76.18	80	200
425 µm	5.68	N/A	3.53	72.65	70	200
300 µm	7.83	N/A	4.87	67.78	60	200
150 µm	22.07	N/A	13.72	54.06	40	200
75 µm	26.00	N/A	16.16	37.90	25	200
Passing 75 µm	60.98	N/A	37.90	0.00	-	-
Pan Total	160.89	-	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 :UM	Approved by : IG
Date : 06 November 2015	Date : 04 December 2015	Date : 04 December 2015

ENTEC LIMITED
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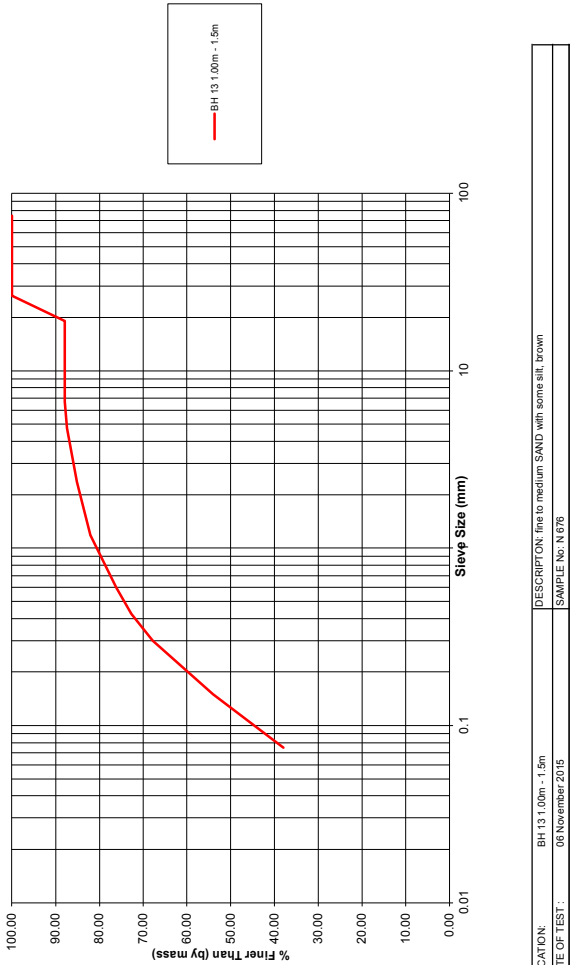
Geotechnical Engineering Investigation for Nadi River Basin



LOCATION: BH 13 1.00m - 1.5m
DESCRIPTION: fine to medium SAND with some silt, brown
DATE OF TEST : 06 November 2015
SAMPLE No: N 676

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 /**	:	9 November 2015
SITE ADDRESS	:	BH13 Votualevu Vegetable Farm (opposite Nasau)	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH 13 3.5m - 3.4m	**MATERIAL TYPE & LOCATION**	:	fine to coarse SAND with some fine to medium sub-rounded gravel, pale brown
TEST NUMBER	:	N 673			

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

Moisture Content (Material passing 19mm)	Container No.	-	15	16
	Mass of Container	g	52.67	52.73
	Mass of Container + Wet Soil	g	72.94	74.68
	Mass of Container + Dry Soil	g	71.71	73.44
	Mass of Dry Soil	g	19.04	20.71
	Mass of Moisture	g	1.23	1.24
	Moisture Content	%	6.46	5.99
	Average Moisture Content	%	6.22	

SPLIT SAMPLE

Mass Passing Last Sieve: - gM_3

Mass after Spliting: - gM_4

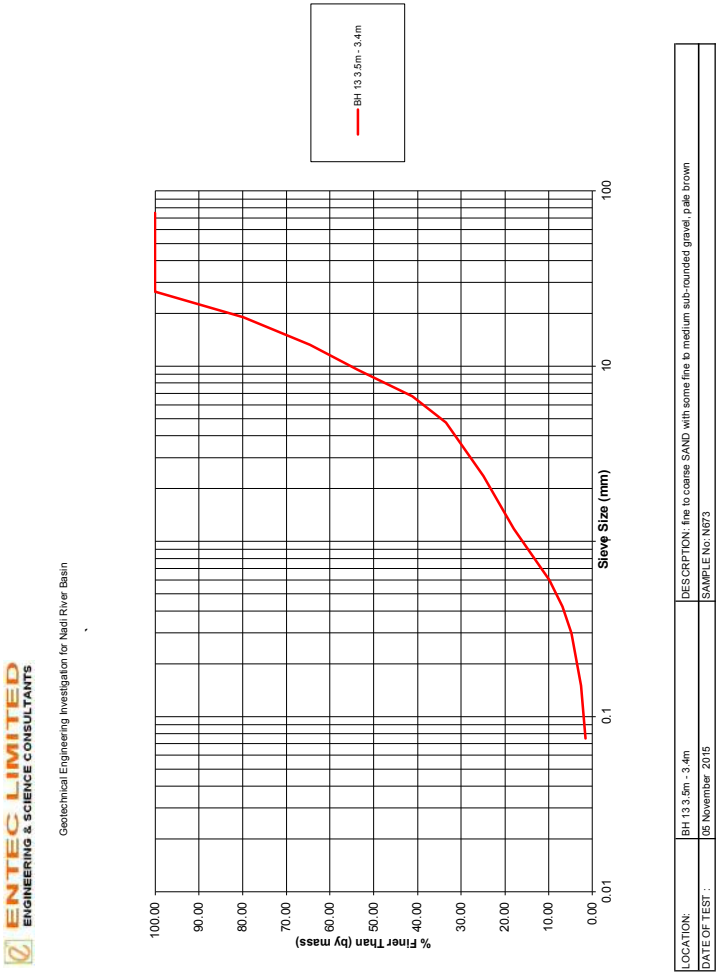
Spliting Factor $\frac{M_3}{M_4}$ =

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	363.10
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	341.83

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	68.73	N/A	20.11	79.89		200
13.2 mm	52.38	N/A	15.32	64.57	600	300
9.50 mm	36.99	N/A	10.82	53.75	450	300
6.70 mm	42.95	N/A	12.56	41.18	300	300
4.75 mm	26.36	N/A	7.71	33.47	250	200
2.36 mm	29.11	N/A	8.52	24.96	150	200
1.18 mm	23.98	N/A	7.02	17.94	100	200
600 µm	27.82	N/A	8.14	9.80	80	200
425 µm	10.34	N/A	3.02	6.78	70	200
300 µm	7.00	N/A	2.05	4.73	60	200
150 µm	7.43	N/A	2.17	2.56	40	200
75 µm	3.41	N/A	1.00	1.56	25	200
Passing 75 µm	5.33	N/A	1.56	0.00	-	-
Pan Total	341.83	-	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 : UM	Approved by : IG
Date :9 November 2015	Date : 04 December 2015	Date : 04 December 2015



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Geotechnical Engineering Investigation for Nadi River Basin

LOCATION:	BH 13 3.5m - 3.4m
DATE OF TEST :	05 November 2015
DESCRIPTION:	fine to coarse SAND with some fine to medium sub-rounded gravel, pale brown
SAMPLE No:	N673

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 /**	:	06 November 2015
SITE ADDRESS	:	BH13 Votualevu Vegetable Farm (opposite Nasau)	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH 13 11.00m - 11.5m	**MATERIAL TYPE & LOCATION**	:	SILT with trace of fine sand, orange brown, soft to firm, moist, low to medium plasticity
TEST NUMBER	:	N 675			

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

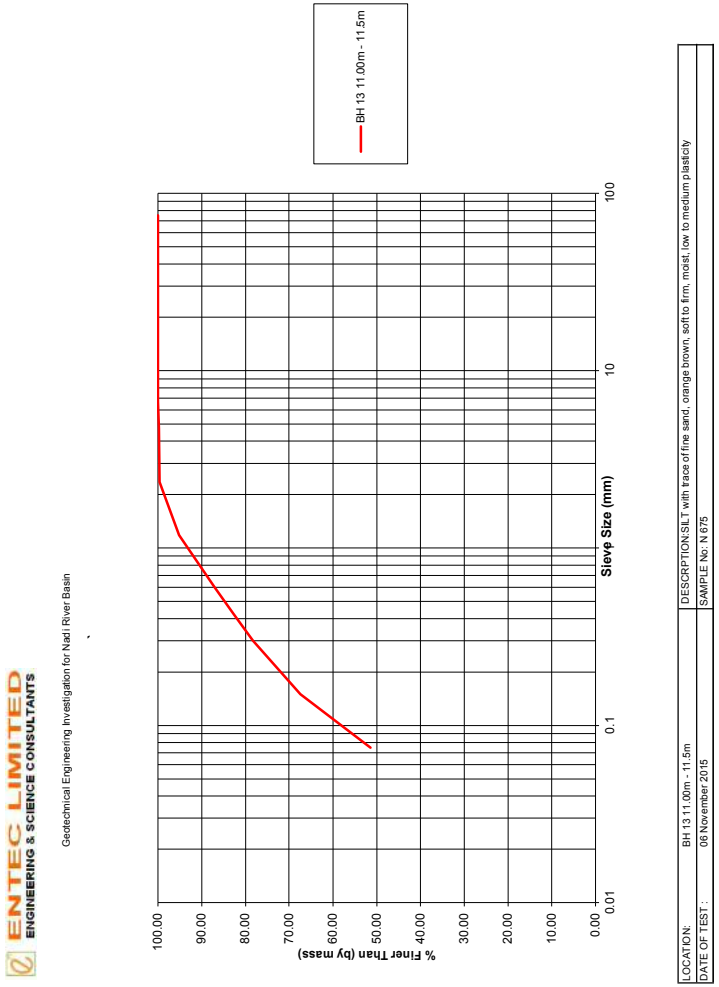
Moisture Content (Material passing 19mm)	Container No.	-	113	104	SPLIT SAMPLE		
	Mass of Container	g	11.89	11.90	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	25.52	25.78	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	21.44	21.60	Spliting Factor = $\frac{M_3}{M_4}$		
	Mass of Dry Soil	g	9.55	9.70			
	Mass of Moisture	g	4.08	4.18			
	Moisture Content	%	42.72	43.09			
	Average Moisture Content	%	42.91				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	251.50
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	175.99

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	0.32	N/A	0.18	99.82	250	200
2.36 mm	0.41	N/A	0.23	99.59	150	200
1.18 mm	7.86	N/A	4.47	95.12	100	200
600 µm	14.22	N/A	8.08	87.04	80	200
425 µm	7.65	N/A	4.35	82.69	70	200
300 µm	7.67	N/A	4.36	78.33	60	200
150 µm	19.23	N/A	10.93	67.41	40	200
75 µm	28.08	N/A	15.96	51.45	25	200
Passing 75 µm	90.55	N/A	51.45	0.00	-	-
Pan Total	175.99	-	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 :UM	Approved by : IG
Date :06 November 2015	Date : 04 December 2015	Date : 04 December 2015



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Geotechnical Engineering Investigation for Nadi River Basin

LOCATION: BH 13 11.00m - 11.5m
DATE OF TEST : 06 November 2015
DESCRIPTION:SILT with trace of fine sand, orange brown, soft to firm, moist, low to medium plasticity
SAMPLE No: N 675

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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	:	BH13 Votualevu Vegetable Farm (opposite Nasau)	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH 13 14.00m - 14.5m	**MATERIAL TYPE & LOCATION**	:	fine to medium GRAVEL with some coarse sand,dark grey
TEST NUMBER	:	N 677			

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

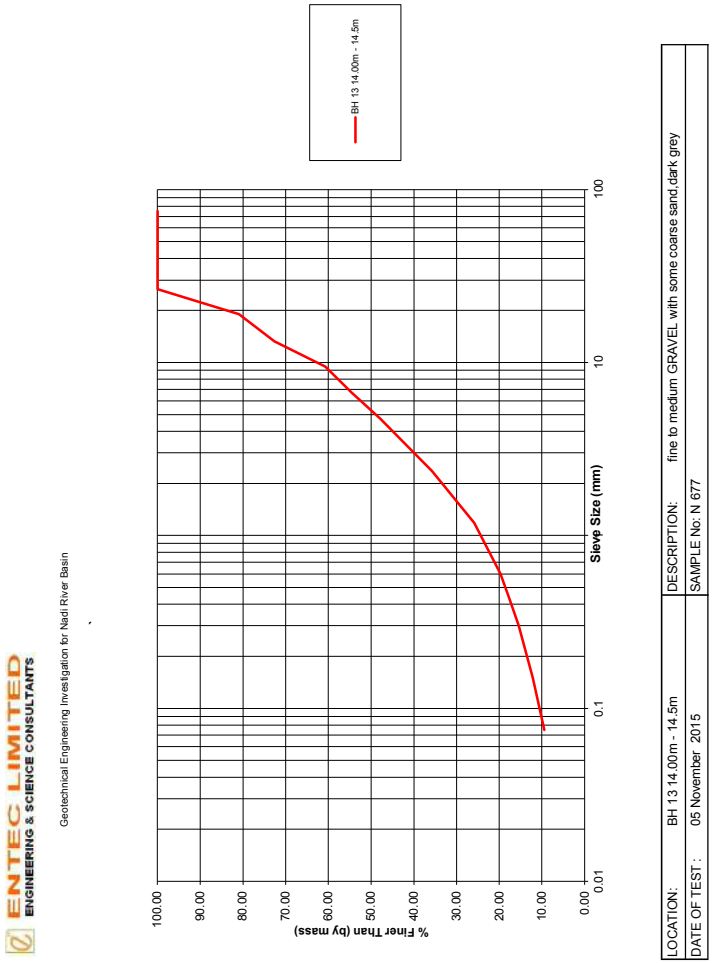
Moisture Content (Material passing 19mm)	Container No.	-	68	64	SPLIT SAMPLE		
	Mass of Container	g	74.11	82.04	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	142.34	128.91	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	133.78	123.38	Spliting Factor =	M_3 / M_4	
	Mass of Dry Soil	g	59.67	41.34			
	Mass of Moisture	g	8.56	5.53			
	Moisture Content	%	14.35	13.38			
	Average Moisture Content	%	13.86				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	253.31
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	222.47

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	42.38	N/A	19.05	80.95		200
13.2 mm	18.43	N/A	8.28	72.67	600	300
9.50 mm	26.53	N/A	11.93	60.74	450	300
6.70 mm	13.92	N/A	6.26	54.48	300	300
4.75 mm	14.61	N/A	6.57	47.92	250	200
2.36 mm	27.07	N/A	12.17	35.75	150	200
1.18 mm	21.94	N/A	9.86	25.89	100	200
600 µm	13.70	N/A	6.16	19.73	80	200
425 µm	4.76	N/A	2.14	17.59	70	200
300 µm	4.82	N/A	2.17	15.42	60	200
150 µm	7.24	N/A	3.25	12.17	40	200
75 µm	5.85	N/A	2.63	9.54	25	200
Passing 75 µm	21.22	N/A	9.54	0.00	-	-
Pan Total	222.47	-	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 : UM	Approved by : IG
Date : 05 November 2015	Date : 04 December 2015	Date : 04 December 2015



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Geotechnical Engineering Investigation for Nadi River Basin

LOCATION:	BH 13 14.00m - 14.5m
DATE OF TEST :	05 November 2015
DESCRIPTION:	fine to medium GRAVEL with some coarse sand,dark grey
SAMPLE No:	N 677

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 /**	:	05 November 2015
SITE ADDRESS	:	BH13 Votualevu Vegetable Farm (opposite Nasau)	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH 13 15.50m - 16.0m	**MATERIAL TYPE & LOCATION**	:	SILT with trace of fine sand, light green grey, firm to stiff, moist, medium to high plasticity
TEST NUMBER	:	N 678			

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

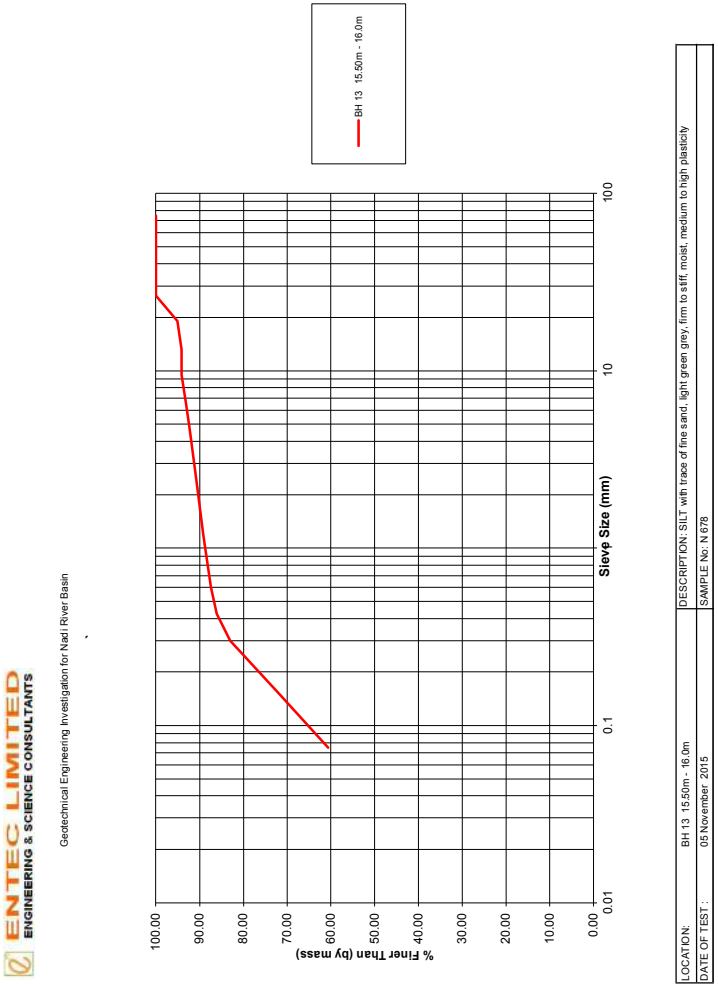
Moisture Content (Material passing 19mm)	Container No.	-	78	76	SPLIT SAMPLE		
	Mass of Container	g	78.54	86.30	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	116.02	118.76	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	105.08	109.39	Spliting Factor = $\frac{M_3}{M_4}$		
	Mass of Dry Soil	g	26.54	23.09			
	Mass of Moisture	g	10.94	9.37			
	Moisture Content	%	41.22	40.58			
	Average Moisture Content	%	40.90				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	354.86
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	251.85

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	12.36	N/A	4.91	95.09		200
13.2 mm	2.62	N/A	1.04	94.05	600	300
9.50 mm	0.00	N/A	0.00	94.05	450	300
6.70 mm	2.28	N/A	0.91	93.15	300	300
4.75 mm	2.16	N/A	0.86	92.29	250	200
2.36 mm	4.05	N/A	1.61	90.68	150	200
1.18 mm	4.00	N/A	1.59	89.09	100	200
600 µm	4.24	N/A	1.68	87.41	80	200
425 µm	3.24	N/A	1.29	86.12	70	200
300 µm	7.83	N/A	3.11	83.01	60	200
150 µm	28.42	N/A	11.28	71.73	40	200
75 µm	27.93	N/A	11.09	60.64	25	200
Passing 75 µm	152.72	N/A	60.64	0.00	-	-
Pan Total	251.85	-	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 :UM	Approved by : IG
Date : 05 November 2015	Date : 04 December 2015	Date : 04 December 2015



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Geotechnical Engineering Investigation for Nadi River Basin

LOCATION:	BH 13 15.50m - 16.0m
DATE OF TEST :	05 November 2015
DESCRIPTION:	SILT with trace of fine sand, light green grey, firm to stiff, moist, medium to high plasticity
SAMPLE No:	N 678

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 /**	:	5 November 2015
SITE ADDRESS	:	BH13 Votualevu Vegetable Farm (opposite Nasau)	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH 13 17.00m - 17.5m	**MATERIAL TYPE & LOCATION**	:	SILT with some fine sand , grey, soft, moist, low plasticity
TEST NUMBER	:	N 679			

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

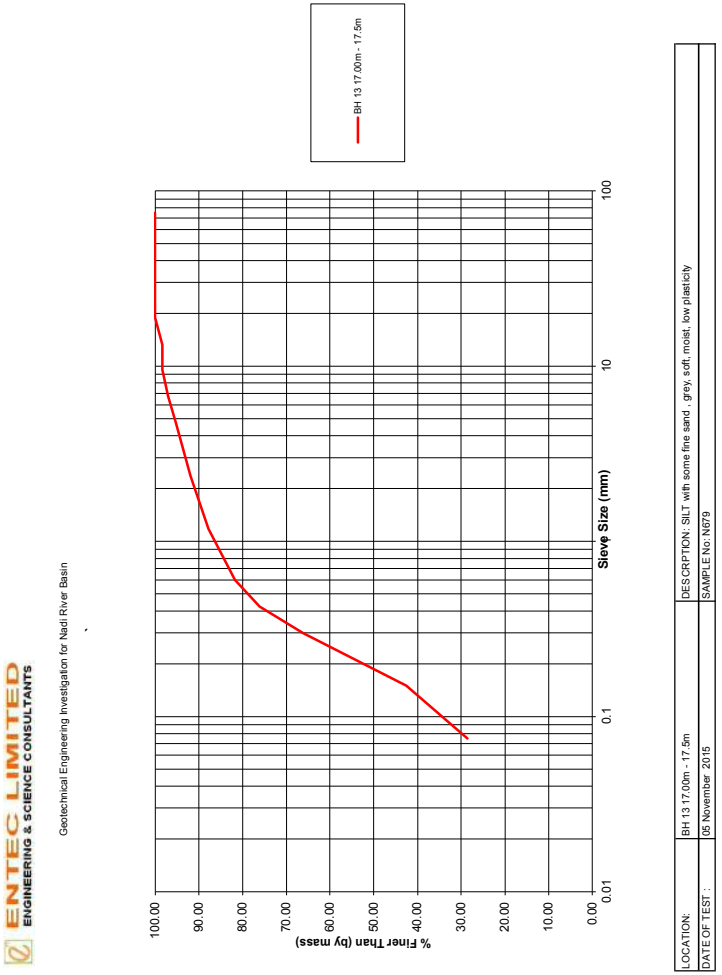
Moisture Content (Material passing 19mm)	Container No.	-	72	66	SPLIT SAMPLE
	Mass of Container	g	86.35	90.96	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	112.67	118.68	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	105.94	111.66	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	19.59	20.70	
	Mass of Moisture	g	6.73	7.02	
	Moisture Content	%	34.35	33.91	
	Average Moisture Content	%	34.13		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	357.20
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	266.30

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	4.35	N/A	1.63	98.37	600	300
9.50 mm	0.00	N/A	0.00	98.37	450	300
6.70 mm	3.55	N/A	1.33	97.03	300	300
4.75 mm	4.48	N/A	1.68	95.35	250	200
2.36 mm	9.07	N/A	3.41	91.95	150	200
1.18 mm	10.96	N/A	4.12	87.83	100	200
600 µm	16.32	N/A	6.13	81.70	80	200
425 µm	15.05	N/A	5.65	76.05	70	200
300 µm	26.35	N/A	9.89	66.15	60	200
150 µm	62.66	N/A	23.53	42.63	40	200
75 µm	37.35	N/A	14.03	28.60	25	200
Passing 75 µm	76.16	N/A	28.60	0.00	-	-
Pan Total	266.30	-	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 : UM	Approved by : IG
Date :05 November 2015	Date : 04 December 2015	Date : 04 December 2015



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Geotechnical Engineering Investigation for Nadi River Basin

LOCATION:	BH 13 17.00m - 17.5m
DATE OF TEST :	05 November 2015
DESCRIPTION:	SILT with some fine sand , grey, soft, moist, low plasticity
SAMPLE No:	N679

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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**	:	05 November 2015
SITE ADDRESS	:	Site 13	**TECHNOLOGIST**	:	LN
SAMPLE LOCATION	:	BH 13 2.0m - 2.5m	**MATERIAL TYPE**	:	fine to medium SAND with some silt, brown
TEST NUMBER	:	N 672			

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

Moisture Content	Container No.	-	61
	Mass of Container	g	62.16
	Mass of Container + Wet Soil	g	88.32
	Mass of Container + Dry Soil	g	83.24
	Mass of Dry Soil	g	21.08
	Mass of Moisture	g	5.08
	Moisture Content	%	24.10

Bulk Density	Sample No.	-	N672
	Diameter of Specimen	mm	53.77
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2269.60
	Initial length of specimen Lo	mm	100.00
	Initial mass of specimen Mi	g	405.17
	Bulk Density ρ	t/m³	1.79
	Dry Density ρd	t/m³	1.44

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\varepsilon = \frac{Cn - Co}{Lo}$	Corrected Area $A = Ao / 1-\varepsilon$	Principal Stress Difference $\sigma1 - \sigma3 = 1000P/A$
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002270	0.00
0.50	20	0.0401	0.500	0.002281	17.58
1.00	16.0	0.0321	1.000	0.002293	14.00
1.50	11.0	0.0220	1.500	0.002304	9.55
2.00	10.0	0.0200	2.000	0.002316	8.64
2.50	9.0	0.0180	2.500	0.002328	7.73
3.00	7.0	0.0140	3.000	0.002340	5.98
3.50	5.0	0.0100	3.500	0.002352	4.25
4.00	5.0	0.0100	4.000	0.002364	4.23
4.50	4.0	0.0080	4.500	0.002377	3.37
5.00	3.5	0.0070	5.000	0.002389	2.93

Tested by : KB	Q.A. Check by :UM	Approved by : IG
Date : 24 October 2015	Date : 04 December 2015	Date : 04 December 2015

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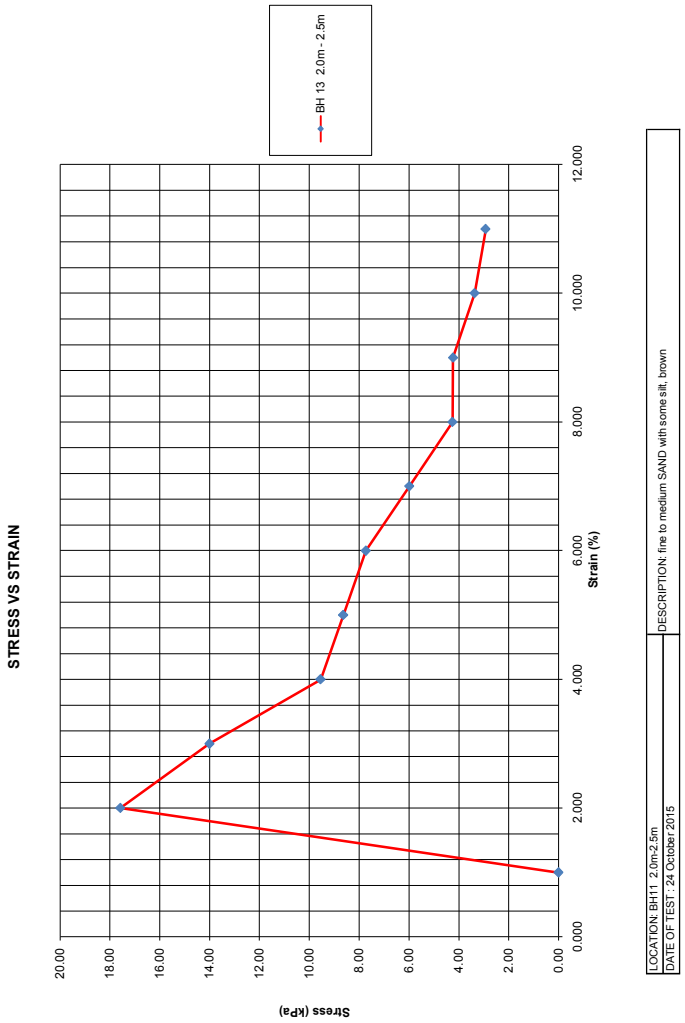

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED**	:	05 November 2015
SITE ADDRESS	:	BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	:	LN/TL
SAMPLE LOCATION	:	BH13 2.0m - 2.5m	**MATERIAL TYPE**	:	fine to medium SAND with some silt, brown
TEST NUMBER	:	N672			

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

Moisture Content	Container No.	-	55	59	
	Mass of Container	g	64.07	63.71	
	Mass of Container + Wet Soil	g	129.97	150.37	
	Mass of Container + Dry Soil	g	121.13	138.89	
	Mass of Dry Soil	g	57.06	75.18	
	Mass of Moisture	g	8.84	11.48	
	Moisture Content	%	15.49	15.27	15.38

Bulk Density	Sample No.	-	N672
	Diameter of Specimen	mm	54.09
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2296.70
	Initial length of specimen Lo	mm	45.17
	Initial mass of specimen Mi	g	152.73
	Bulk Density ρ	t/m³	1.47
	Dry Density ρd	t/m³	1.28

Tested by : LN/TL	Q.A. Check by : UM	Approved by : IG
Date : 05 November 2015	Date : 04 December 2015	Date : 04 December 2014

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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**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: fine to medium SAND with some silt, brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N671 BH13 (1.0m - 1.5m)

Moisture Content	%							
Container No.	g	127	138					
Mass of Container	g	11.55	11.13					
Mass of Container + Wet Soil	g	36.38	36.94					
Mass of Container + Dry Soil	g	29.51	29.95					
Mass of Dry Soil	g	17.96	18.82					
Mass of Moisture	g	6.87	6.99					
Moisture Content	%	38.25	37.14					37.70

Tested By:RK
Date:05 November 2015

Q.A. Checked By:UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 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**	: 16 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: UM
MATERIAL TYPE & DESCRIPTION	: fine to medium SAND with some silt, brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N672 BH13 (2.00m - 2.5m)

Moisture Content	%						
Container No.	g	63	77				
Mass of Container	g	102.02	99.34				
Mass of Container + Wet Soil	g	129.00	122.99				
Mass of Container + Dry Soil	g	123.90	118.60				
Mass of Dry Soil	g	21.88	19.26				
Mass of Moisture	g	5.10	4.39				
Moisture Content	%	23.31	22.79				23.05

Tested By:RK
Date:05 November 2015

Q.A. Checked By:UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 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**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: fine to coarse SAND with some fine to medium sub-rounded gravel, pale brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N673 BH13 3.50m - 4.0m

Moisture Content	%						
Container No.	g	126	137				
Mass of Container	g	12.77	11.32				
Mass of Container + Wet Soil	g	25.01	21.57				
Mass of Container + Dry Soil	g	23.48	20.35				
Mass of Dry Soil	g	10.71	9.03				
Mass of Moisture	g	1.53	1.22				
Moisture Content	%	14.29	13.51				13.90

Tested By:RK
Date:05 November 2015

Q.A. Checked By:UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 2015

Form GE-L-07

Page 1 of 1

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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**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: fine sub-angular GRAVEL with some coarse sand, grey pale brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N674 BH13 (9.50m - 10.0m)

Moisture Content	%						
Container No.	g	141	158				
Mass of Container	g	11.67	12.12				
Mass of Container + Wet Soil	g	37.75	36.38				
Mass of Container + Dry Soil	g	34.45	33.43				
Mass of Dry Soil	g	22.78	21.31				
Mass of Moisture	g	3.30	2.95				
Moisture Content	%	14.49	13.84				14.16

Tested By:RK
Date:05 November 2015

Q.A. Checked By: UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 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**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand, orange brown, soft to firm, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N675 BH13 11.0m - 11.5m

Moisture Content	%						
Container No.	g	101	165				
Mass of Container	g	11.63	11.76				
Mass of Container + Wet Soil	g	36.84	36.96				
Mass of Container + Dry Soil	g	29.53	29.64				
Mass of Dry Soil	g	17.90	17.88				
Mass of Moisture	g	7.31	7.32				
Moisture Content	%	40.84	40.94				40.89

Tested By:RK
Date:05 November 2015

Q.A. Checked By: UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 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**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine to medium sub-angular to sub-rounded gravel and trace of coarse sand, brown, very soft to soft, low plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N676 BH13 12.50m - 13.0m

Moisture Content	%						
Container No.	g	106	164				
Mass of Container	g	12.07	11.81				
Mass of Container + Wet Soil	g	46.14	52.93				
Mass of Container + Dry Soil	g	40.28	46.45				
Mass of Dry Soil	g	28.21	34.64				
Mass of Moisture	g	5.86	6.48				
Moisture Content	%	20.77	18.71				19.74

Tested By:RK
Date:05 November 2015

Q.A. Checked By: UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 2015

Form GE-L-07

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**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: fine to medium GRAVEL with some coarse sand,dark grey	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N677 BH13 14.00m - 14.5m

Moisture Content	%						
Container No.	g	160	124				
Mass of Container	g	11.93	11.74				
Mass of Container + Wet Soil	g	33.01	32.75				
Mass of Container + Dry Soil	g	30.12	29.70				
Mass of Dry Soil	g	18.19	17.96				
Mass of Moisture	g	2.89	3.05				
Moisture Content	%	15.89	16.98				16.44

Tested By:RK
Date:05 November 2015

Q.A. Checked By:UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 2015

Form GE-L-07

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**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand, light green grey, firm to stiff, moist, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N678 BH13 15.50m - 16.0m

Moisture Content	%						
Container No.	g	168	148				
Mass of Container	g	11.55	11.73				
Mass of Container + Wet Soil	g	37.27	37.81				
Mass of Container + Dry Soil	g	29.54	30.07				
Mass of Dry Soil	g	17.99	18.34				
Mass of Moisture	g	7.73	7.74				
Moisture Content	%	42.97	42.20				42.59

Tested By:RK
Date:05 November 2015

Q.A. Checked By: UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 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**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand , grey, soft, moist, low plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N679 BH13 17.00m - 17.5m

Moisture Content	%						
Container No.	g	142	97				
Mass of Container	g	11.82	11.55				
Mass of Container + Wet Soil	g	37.15	37.27				
Mass of Container + Dry Soil	g	30.84	31.08				
Mass of Dry Soil	g	19.02	19.53				
Mass of Moisture	g	6.31	6.19				
Moisture Content	%	33.18	31.69				32.44

Tested By:RK
Date:05 November 2015

Q.A. Checked By: UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 2015

Form GE-L-07

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**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some sub-angular gravel and minor fine sand and trace of silt stone nodules, grey white	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N680 BH13 18.50m - 18.9m

Moisture Content	%						
Container No.	g	136	169				
Mass of Container	g	11.77	11.36				
Mass of Container + Wet Soil	g	34.44	35.18				
Mass of Container + Dry Soil	g	28.95	29.53				
Mass of Dry Soil	g	17.18	18.17				
Mass of Moisture	g	5.49	5.65				
Moisture Content	%	31.96	31.10				31.53

Tested By:RK
Date:05 November 2015

Q.A. Checked By:UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 05 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: TL
MATERIAL TYPE & DESCRIPTION	: fine to medium SAND with some silt, brown	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N671 BH13 1.0m - 1.5m

NATURAL MOISTURE CONTENT							
TEST No.		**1**	**2**				**Average**
Container No.	g	127	138				
Mass of Container	g	11.55	11.13				
Mass of Container + Wet Soil	g	36.38	36.94				
Mass of Container + Dry Soil	g	29.51	29.95				
Mass of Dry Soil	g	17.96	18.82				
Mass of Moisture	g	6.87	6.99				
Moisture Content	%	38.25	37.14				37.70

PLASTIC LIMIT							
TEST No.		**1**	**2**				**Average**
Container No.		18	31				
Mass of Container	g	14.59	14.54				
Mass of Container + Wet Soil	g	17.34	18.03				
Mass of Container + Dry Soil	g	16.78	17.31				
Mass of Dry Soil	g	2.19	2.77				
Mass of Moisture	g	0.56	0.72				
Moisture Content	%	25.57	25.99				25.78

LIQUID LIMIT							
TEST No.		**1**	**2**	**3**	**4**	**5**	**6**
Number of Blows		40	35	30	25	20	15
Container No.		110	144	147	118	132	112
Mass of Container	g	11.94	12.01	11.61	11.77	11.80	11.74
Mass of Container + Wet Soil	g	18.66	18.91	18.16	18.61	20.11	22.42
Mass of Container + Dry Soil	g	17.03	17.22	16.52	16.88	18.00	19.65
Mass of Dry Soil	g	5.09	5.21	4.91	5.11	6.20	7.91
Mass of Moisture	g	1.63	1.69	1.64	1.73	2.11	2.77
Moisture Content	%	32.02	32.44	33.40	33.86	34.03	35.02

LINEAR SHRINKAGE TEST						
Mould No.	**1**	**2**	**3**	**4**	**5**	**Average**
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				114.00		
% Shrinkage				8.80		8.80

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

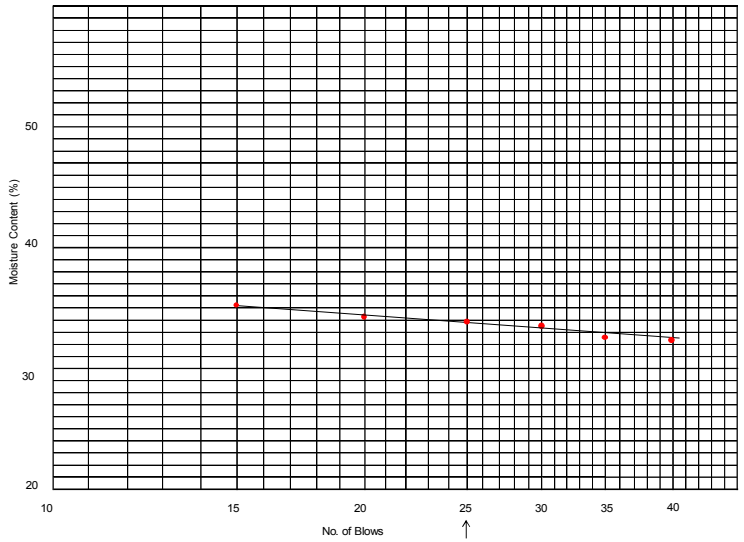
Liquid Limit	33.80 %
Plastic Limit	25.78 %
Plasticity Index	8.02 %
Shrinkage Limit	8.80 %

Tested By:TL
Date: 05 November 2015

Q.A. Checked By: UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N 671

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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**	: 07 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: fine to medium SAND with some silt, brown	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N672 BH13 (2.0m - 2.50m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.		65	67				
Mass of Container	g	87.17	72.23				
Mass of Container + Wet Soil	g	112.98	92.54				
Mass of Container + Dry Soil	g	108.10	88.7				
Mass of Dry Soil	g	20.93	16.47				
Mass of Moisture	g	4.88	3.84				
Moisture Content	%	23.32	23.32				23.32

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		42	35				
Mass of Container	g	14.57	14.26				
Mass of Container + Wet Soil	g	19.55	20.70				
Mass of Container + Dry Soil	g	18.63	19.49				
Mass of Dry Soil	g	4.06	5.23				
Mass of Moisture	g	0.92	1.21				
Moisture Content	%	22.66	23.14				22.90

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	26	21	15
Container No.		165	160	137	126	124	101
Mass of Container	g	11.76	11.92	11.30	12.82	11.74	11.62
Mass of Container + Wet Soil	g	21.05	23.02	23.13	21.14	22.72	24.22
Mass of Container + Dry Soil	g	18.88	20.43	20.38	19.12	20.01	21.04
Mass of Dry Soil	g	7.12	8.51	9.08	6.30	8.27	9.42
Mass of Moisture	g	2.17	2.59	2.75	2.02	2.71	3.18
Moisture Content	%	30.48	30.43	30.29	32.06	32.77	33.76

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

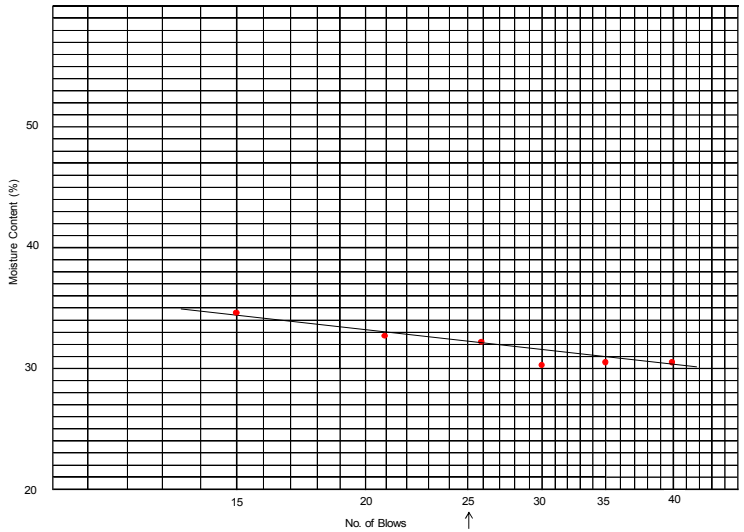
Liquid Limit	32.20 %
Plastic Limit	22.90 %
Plasticity Index	9.30 %
Shrinkage Limit	16.00 %

Tested By:LN
Date:07 November 2015

Q.A. Checked By: UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N672

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 06 November 2015
SITE ADDRESS	: BH13, Votualevu Vegetable farm (opposite Nasau)	**TECHNOLOGIST**	: KC
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand, orange brown, soft to firm, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N675 BH13 (11.0m - 11.5m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	98	99				
Mass of Container	g	11.91	11.82				
Mass of Container + Wet Soil	g	24.04	24.67				
Mass of Container + Dry Soil	g	20.46	20.89				
Mass of Dry Soil	g	8.55	9.07				
Mass of Moisture	g	3.58	3.78				
Moisture Content	%	41.87	41.68				41.77

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		41	32				
Mass of Container	g	14.32	14.53				
Mass of Container + Wet Soil	g	17.36	17.80				
Mass of Container + Dry Soil	g	16.67	17.03				
Mass of Dry Soil	g	2.35	2.50				
Mass of Moisture	g	0.69	0.77				
Moisture Content	%	29.36	30.80				30.08

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	15
Container No.		119	120	135	152	170	135
Mass of Container	g	11.41	11.68	11.61	11.49	12.04	11.26
Mass of Container + Wet Soil	g	18.89	20.45	23.39	22.20	24.38	22.02
Mass of Container + Dry Soil	g	16.59	17.73	19.73	18.83	20.40	18.52
Mass of Dry Soil	g	5.18	6.05	8.12	7.34	8.36	7.26
Mass of Moisture	g	2.30	2.72	3.66	3.37	3.98	3.50
Moisture Content	%	44.40	44.96	45.07	45.91	47.61	48.21

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				111.00		
% Shrinkage				11.20		11.20

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

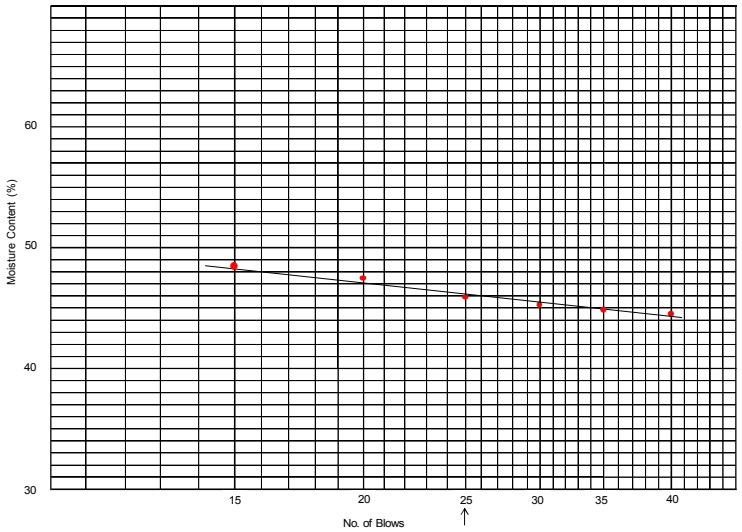
Liquid Limit	45.90 %
Plastic Limit	30.08 %
Plasticity Index	15.82 %
Shrinkage Limit	11.20 %

Tested By:KC
Date:06 November 2015

Q.A. Checked By: UM
Date: 04 December 2015

Approved By: IG
Date: 04 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N675

Form: GE-L-03

Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth			2.0 - 2.5m
Description			
Type			fine to medium SAND with some silt, brown
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	67.3
Bulk Density	ρ_0	(Mg/m3)	1.71
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	22
Initial Dry Density	ρ_{di}	(Mg/m3)	1.40
Initial Voids Ratio	e_i	.	0.890
Initial Degree of Saturation	S_i	(%)	66.2
Initial Swelling	S_S	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	17
Dry Density	ρ_{df}	(Mg/m3)	1.23
Voids Ratio	e_f	.	1.150
Saturation	S_f	(%)	39
Height Settlement	ΔL_s	(mm)	-2.756

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)
50	0.845	0.480	252.0	0.480	29.0	0.0		0.172	0.0087
100	1.150	-2.756	14.3	3.316	29.0	0.0		3.476	0.0087
200	1.150	-2.756	41.2		29.0	0.0		1.396	0.0087
400	1.150	-2.756	7.7		29.0	0.0		7.507	0.0087
800	1.150	-2.756	8.3		29.0	0.0		6.902	0.0087
1600	1.150	-2.756	5.1		29.0	0.0		11.318	0.0087
400	1.150	-2.756			29.0	0.0			
100	1.150	-2.756			29.0	0.0			

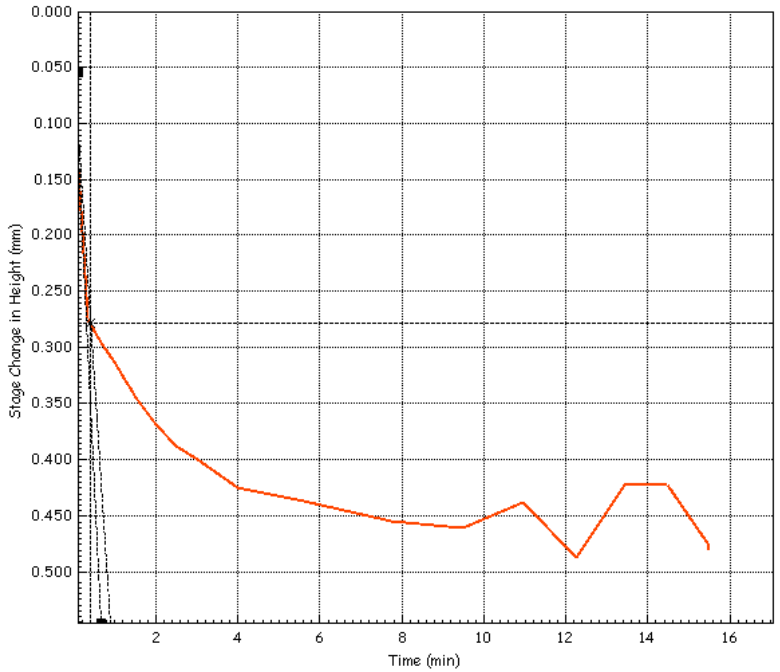
Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database:	.\SQLEXPRESS \ ENTEC
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
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)	50
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.480
Voids Ratio	e_f	.	0.845
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.172
Consolidation	C_V	(m2/year)	252.0
Compressibility	m_V	(m2/MN)	0.480
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

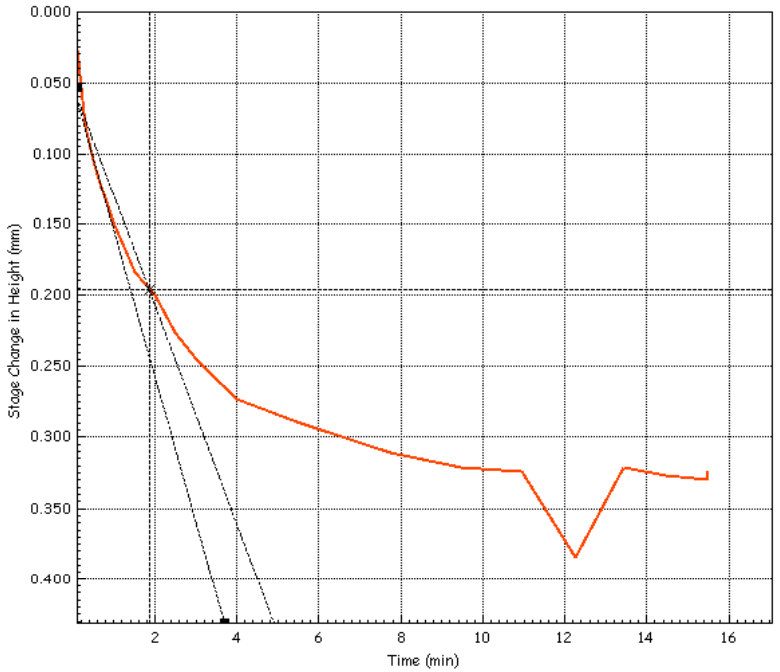


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	-2.756
Voids Ratio	e_f	.	1.150
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	3.476
Consolidation	C_V	(m2/year)	14.3
Compressibility	m_V	(m2/MN)	3.316
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

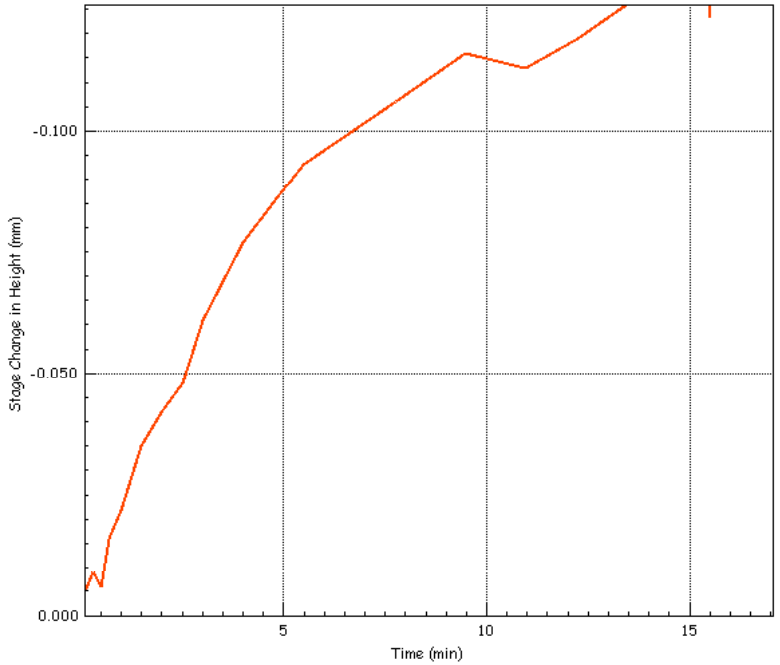


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	-2.756
Voids Ratio	e_f	.	1.150
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)	

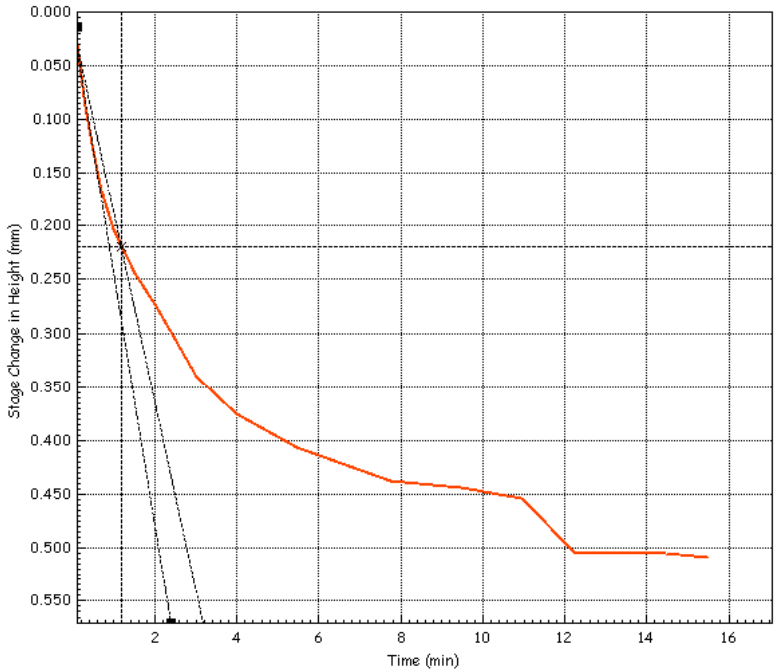


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-2.756
Voids Ratio	e_f	.	1.150
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	1.396
Consolidation	C_V	(m2/year)	41.2
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

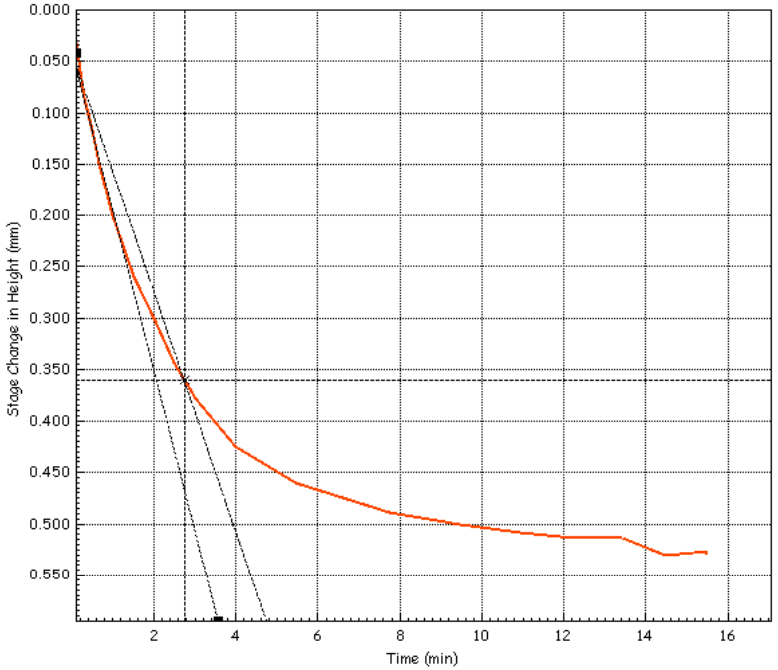


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	-2.756
Voids Ratio	e_f	.	1.150
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	7.507
Consolidation	C_V	(m2/year)	7.7
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

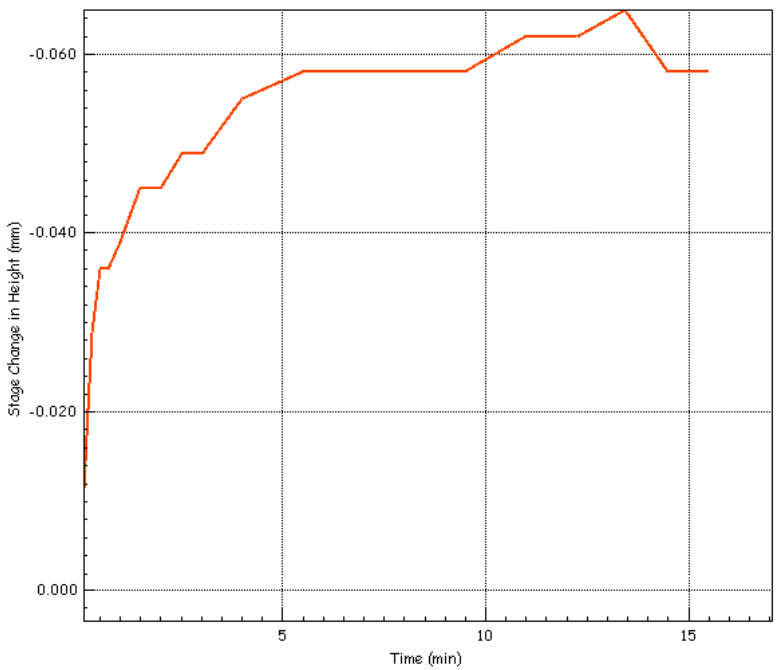


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	-2.756
Voids Ratio	e_f	.	1.150
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)	

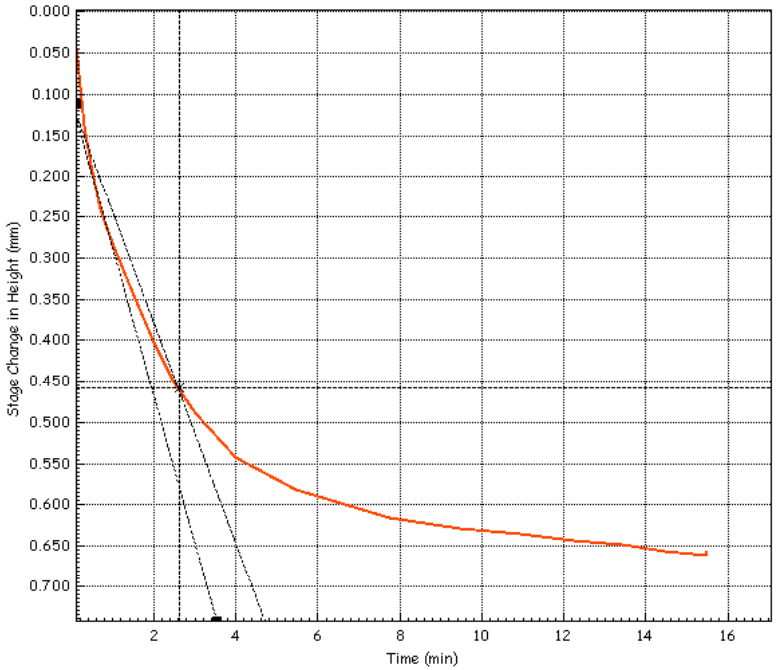


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	800
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-2.756
Voids Ratio	e_f	.	1.150
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	6.902
Consolidation	C_V	(m2/year)	8.3
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

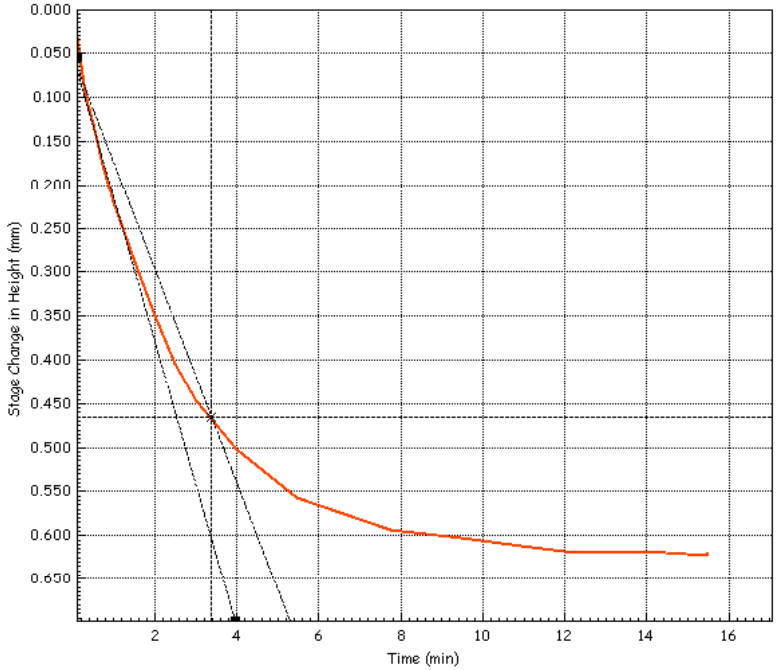


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	1600
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-2.756
Voids Ratio	e_f	.	1.150
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	11.318
Consolidation	C_V	(m2/year)	5.1
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

ENTEC LIMITED ENGINEERING & SCIENCE CONSULTANTS
Level 2 Mid City. Corner Cumming Street & Renwick Road, Suva FIJI
PO Box 12309 Suva FIJI
Phone (+679) 330 0300 Fax: (+679) 331 8618 Email: info@entecfiji.com

Project Ref: 1920815A

5 February 2016

Mr. Takashi TOYODA
The Deputy Team Leader
Nadi River Flood Control Project
JICA Study Team Office
Level 1 Nadi Town Council Complex
Main Street
NADI

Dear Mr. Toyoda,

RE: Additional Geotechnical Engineering Investigation Factual Report, Nadi River Basin Project.

***Additional Borehole (BH3A) at SITE 3* – Qeleloa, Nadi, Fiji.**

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 additional geotechnical engineering investigation and laboratory testing for the Nadi River Basin Project as per Entec proposal (Ref:P1920815.L02) dated 3 December 2015. Entec were granted authority to carry out the additional geotechnical engineering drilling investigation as per the signed contract agreement between the JICA Study Team and ENTEC Limited, 'ADDITIONAL GEOTECHNICAL INVESTIGATION IN NADI RIVER BASIN'.

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

2.0 SITE SETTING

2.1 Site Location

The site is located to the south of Queens Road, Nadi, on the southern side of Sri Siva Subramaniya Swami Temple at the Queens Road and Nadi Back Road junction. A tributary of Nadi River is on the southern side of the site. Nadi River is located at approximately 400 meters North of the site.

The approximate location of the site is shown below in Figure 1.

Figure 1: Site Locality Plan

2.2 Site Description

The site is located at the vicinity of Sri Siva Subramaniya Swami Temple, beside Nadi Town and a tributary river of Nadi River. The borehole 3A was drilled approximately 3m the crest of the river bank over a general level area. The site is generally surrounded by small shrubs, semi-mature and mature trees. At the time of the investigation areas of the site were partly cleared of vegetation.

3.0 FIELDWORK SUMMARY

The fieldwork for the investigation was completed on 05 January 2016 and comprised the following scope of work:

- One (1No.) borehole designated BH03A was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 15.5m with the final SPT test extended to a depth of approximately 15.95m below existing surface level.
- Standard Penetrometer Testing (SPT) was completed initially at 1.0m, 2.0m and at 1.5m intervals thereafter.

The machine borehole location is shown on the 'Test Locality Plan', Appendix 1, with the Engineering Borehole Log (including in-situ test results) and photos of the core return provided in Appendix 2.

The core sample, disturbed and undisturbed samples were returned to the Entec Laboratory (Nadi).

4.0 LABORATORY TESTING

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

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

The Laboratory testing schedule and associated laboratory test certificates are provided in Appendix 3.

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 Study Team. 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

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

APPENDIX 1

Test Locality Plan

APPENDIX 2

Engineering Borehole Log and Core Photos

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Drilling Works		Nadi Temple	BH 03A
Job No.: 1920815	Start Date: 05-01-2016 Finish Date: 05-01-2016	Ground Level (m):	Co-Ordinates ():
Client: JICA Study Team	Hole Depth: 15.50 m		Sheet: 1 of 4

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 S F St VSt H Fb VL L MD D VD 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

Depth (m)	Geological Description	TCR (%)	Samples	Tests
0.00–0.80	FILL: Highly to completely weathered, pale brown, SUVA MARL with some coarse to medium gravel, moist	40		
0.80–1.00	FILL: Sandy SILT with some soarse to fine gravel with trace of organic, dark brown, moist, low plasticity			
1.00–1.85	FILL: Coarse to medium GRAVEL, grey, losely packed, sub angular to rounded	35	1.00	SPT 1.00 m N=5
1.85–2.05	FILL: Gravelly SILT with trace of medium to fine sand, dark brown, moist, medium plasticity			
2.05–3.40	FILL: Angular to sub angular medium to coarse GRAVEL with coarse to fine sand, grey white brown, loosely packed	13	2.00	SPT 2.00 m N=16
3.40–3.50	FILL: CONCRETE			
3.50–5.00	No recovery	0	3.50	SPT 3.50 m N=3

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
PT= Push Tube

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig- Tripple Tube	Logged by: MK/RK/IG	Checked by: DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Drilling Works		Nadi Temple	BH 03A
Job No.: 1920815	Start Date: 05-01-2016 Finish Date: 05-01-2016	Ground Level (m):	Co-Ordinates ():
Client: JICA Study Team	Hole Depth: 15.50 m		Sheet: 2 of 4

Depth (m)	Geological Description	TCR (%)	Samples	Tests
5.00–6.50	FILL: Angular to sub-angular coarse to medium GRAVEL with trace of silt, grey, losely packed	13	5.00	SPT 5.00 m N=4
6.50–8.00	No Recovery	0	6.50	SPT 6.50 m N=22
8.00–8.55	Gravelly SILT with trace of sand, yellow brown, firm to stiff, moist, low plasticity	63	8.00	SPT 8.00 m N=11
8.55–8.95	Highly to completly weathered, orange brown, SANDSTONE, firm to stiff, moist, medium palsticity			
8.95–9.10	Highly weathered, pale yellow grey, SANDSTONE, weak, moist			
9.10–9.35	Clayey silty GRAVEL with some sand, pale yellow orange, moist, tightly packed			
9.35–9.50	Slightly weathered, grey blue, ANDESITE, strong			
9.50–10.00	Highly to completely weathered SANDSTONE with some coarse to medium gravel and trace of sand, very weak, moist	40	9.50	SPT 9.50 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
PT= Push Tube

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig- Tripple Tube	Logged by: MK/RK/IG	Checked by: DMC

DRILL HOLE LOG

Project: Nadi River Drilling Works	Feature	Location: Nadi Temple	No.:
Job No.: 1920815	Start Date: 05-01-2016 Finish Date: 05-01-2016	Ground Level (m): / Co-Ordinates ():	**BH 03A**
Client: JICA Study Team	Hole Depth: 15.50 m		Sheet: 3 of 4

Columns: 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

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.

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

Weathering: RS CW HW MW SW UW

Field Strength: VSVL S F St VSt H / EW VW W MS S VS ES

Defect Spacing (mm): 500 100

Depth (m)	Geological Description	TCR (%)	Samples	Tests
	Highly to completely weathered SANDSTONE with some coarse to medium gravel and trace of sand, very weak, moist *(continued)*	40		
11			11.00	SPT 11.00 m N=50+
		53		
12				
	Completely to highly weathered fine to coarse grained SANDSTONE, brown, extremely to very weak.		12.50	SPT 12.50 m N=50+
13	Gravelly SAND with silt, orange brown, tightly packed, moist	93		
14			14.00	SPT 14.00 m N=50+
		73		

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
PT= Push Tube

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig- Tripple Tube	Logged by: MK/RK/IG	Checked by: DMC

DRILL HOLE LOG

Project: Nadi River Drilling Works	Feature	Location: Nadi Temple	No.:
Job No.: 1920815	Start Date: 05-01-2016 Finish Date: 05-01-2016	Ground Level (m): / Co-Ordinates ():	**BH 03A**
Client: JICA Study Team	Hole Depth: 15.50 m		Sheet: 4 of 4

Depth (m)	Geological Description	TCR (%)	Samples	Tests
	Gravelly SAND with silt, orange brown, tightly packed, moist *(continued)*	73		
	Hole Terminated at 15.50 m N = Standard Penetration Test PT= Push Tube Logged to NZGS 'Field description of soil & rock' December 2005		15.50	SPT 15.50 m N=50+
16				
17				
18				
19				

Explanations: (as sheet 3)

Remarks

N = Standard Penetration Test
PT= Push Tube

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig- Tripple Tube	Logged by: MK/RK/IG	Checked by: DMC

Borehole 3A Core Photos (0.00m to 15.5m)

0.00m to 9.50m

9.50m to 13.10m

13.10m to 15.50m

APPENDIX 3

Laboratory Test Schedule and Laboratory Test Results

ENTEC LIMITED
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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : BH 03A, Nadi Temple
PROJECT NUMBER :1920815A

TEST RESTULTS REQUIRED BY:

Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required						
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation
1920815A	Site 3 , (BH03A)	FILL :GRAVEL	SPT	1.0 - 1.5			1	1			
		FILL :GRAVEL with coarse to fine sand	SPT	2.0 - 2.5			1	1			
		No Recovery	SPT	3.5 - 4.0							
		FILL :GRAVEL with trace of silt	SPT	5.0 - 5.5			1				
		No Recovery	SPT	6.5 - 7.0							
		Gravelly SILT	SPT	8.0 - 8.5			1	1	1		
		Gravelly SILT	Core	8.8 - 9.0		1					
		Slightly weathered rock	Core	9.4 - 9.5			1				
		Highly to completely weathered SOAPSTONE with gravel & trace of sand	SPT	9.5 - 10.0			1		1		
		Highly to completely weathered SANDSTONE	Core	10.8 - 10.9		1	1				
		Highly to completely weathered SOAPSTONE with gravel & trace of sand	SPT	11.0 - 11.5					1		
		Completely to highly weathered SANDSTONE	SPT	12.5 - 13.0			1				
		Completely to highly weathered SANDSTONE	Core	13.1 - 13.2						1	
		Completely to highly weathered SANDSTONE	Core	13.75 - 13.85		1					
		Completely to highly weathered SANDSTONE	SPT	14.0 - 14.5	1		1				
		Completely to highly weathered SANDSTONE	SPT	15.5 - 16.0			1				
TOTALS					1	3	10	3	3	1	
Bill of Quanatity					1	3	10	6	3	3	3

Lab Test Schedule checked by: DMC

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

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	:	22 January 2016
SITE ADDRESS	:	BH03A, Nadi Temple	**TECHNOLOGIST**	:	IG/SL
			TEST METHOD	:	AS 1289.6.7.3-2001
MATERIAL TYPE & DESCRIPTION	:	Gravelly SAND with silt, orange brown, tightly packed, moist (SPT)	**SAMPLE No.**	:	N32 (BH03A 14.00m - 14.50m)

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

MOISTURE CONTENT

Container No.		14
Mass of Container	g	53.53
Mass of Container + Wet Soil	g	124.71
Mass of Container + Dry Soil	g	112.54
Mass of Dry Soil	g	59.01
Mass of Moisture	g	12.17
Moisture Content	%	20.62
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1690
Volume of Speciman	cm^3	875.88
Wet Density	t/m^3	1.93
Dry Density	t/m^3	1.60
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	17.43

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	20	26	0.01	0.01
2	120	4.00	20	26	0.01	0.01
3	120	4.00	19	26	0.01	0.01
4	110	4.00	19	26	0.01	0.01
5	110	4.00	19	26	0.01	0.01
6	110	4.00	19	26	0.01	0.01
7	101	4.00	17	26	0.01	0.01
8	101	4.00	18	26	0.02	0.01
9	101	4.00	17	26	0.01	0.01
10	90	4.00	16	26	0.02	0.01
11	90	4.00	15	26	0.01	0.01
12	90	4.00	16	26	0.02	0.01

Average K_{20} m/s	2.19E-06

Tested By: IG / SL
Date: 22 January 2016

Q.A. Check By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Form: GE-L-03

Page 1 of 1

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BULK DENSITY
NZS 4402:1986 (Test 5,1,3)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE / TESTED**	:	26 January 2016
SITE ADDRESS	:	BH03A, Nadi Temple.	**TECHNOLOGIST**	:	KB/SL
SAMPLE LOCATION	:	BH03A 8.8m - 9.0m	**MATERIAL TYPE**	:	Highly to completly weathered, orange brown, SANDSTONE, firm to stiff, moist, medium palsticity (Core)
TEST NUMBER	:	N 24			

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

Moisture Content	Container No.	-	1106	86	
	Mass of Container	g	131.89	117.70	
	Mass of Container + Wet Soil	g	270.22	271.03	
	Mass of Container + Dry Soil	g	239.00	233.61	
	Mass of Dry Soil	g	107.11	115.91	
	Mass of Moisture	g	31.22	37.42	
	Moisture Content	%	29.15	32.28	30.72

Bulk Density	Sample No.	-	N 24
	Diameter of Specimen	mm	62.66
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	3082.13
	Initial length of specimen Lo	mm	54.64
	Initial mass of specimen Mi	g	292.31
	Bulk Density ρ	t/m^3	1.74
	Dry Density ρd	t/m^3	1.33

Tested by : KB/SL	Q.A. Check by : KB	Approved by : IG
Date : 26 January 2016	Date : 27 January 2016	Date : 27 January 2016

Page 1 of 1

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815A
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	26 January 2016
SITE ADDRESS :	BH03A, Nadi Temple.	**TECHNOLOGIST** :	KB/SL
SAMPLE LOCATION :	BH03A 10.8m - 10.9m	**MATERIAL TYPE** :	Highly to completely weathered SANDSTONE with some coarse to medium gravel and trace of sand, very weak, moist (Core)
TEST NUMBER :	N 27		

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

Moisture Content	Container No.	-	77	82	
	Mass of Container	g	99.32	90.14	
	Mass of Container + Wet Soil	g	224.58	223.12	
	Mass of Container + Dry Soil	g	210.10	205.80	
	Mass of Dry Soil	g	110.78	115.66	
	Mass of Moisture	g	14.48	17.32	
	Moisture Content	%	13.07	14.97	14.02

Bulk Density	Sample No.	-	N 27
	Diameter of Specimen	mm	65.80
	Initial area of specimen Ao (π/4 d^2)	mm^2	3398.77
	Initial length of specimen Lo	mm	45.09
	Initial mass of specimen Mi	g	258.50
	Bulk Density ρ	t/m^3	1.69
	Dry Density ρd	t/m^3	1.48

Tested by : KB/SL	Q.A. Check by : KB	Approved by : IG
Date : 26 January 2016	Date : 27 January 2016	Date : 27 January 2016

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815A
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	26 January 2016
SITE ADDRESS :	BH03A, Nadi Temple.	**TECHNOLOGIST** :	KB/SL
SAMPLE LOCATION :	BH03A 13.75m - 13.85m	**MATERIAL TYPE** :	Gravelly SAND with silt, orange brown, tightly packed, moist (Core)
TEST NUMBER :	N 31		

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

Moisture Content	Container No.	-	78	66	
	Mass of Container	g	78.53	90.97	
	Mass of Container + Wet Soil	g	256.62	256.00	
	Mass of Container + Dry Soil	g	228.81	229.37	
	Mass of Dry Soil	g	150.28	138.40	
	Mass of Moisture	g	27.81	26.63	
	Moisture Content	%	18.51	19.24	18.87

Bulk Density	Sample No.	-	N 31
	Diameter of Specimen	mm	61.51
	Initial area of specimen Ao (π/4 d^2)	mm^2	2970.03
	Initial length of specimen Lo	mm	57.19
	Initial mass of specimen Mi	g	344.00
	Bulk Density ρ	t/m^3	2.03
	Dry Density ρd	t/m^3	1.70

Tested by : KB/SL	Q.A. Check by : KB	Approved by : IG
Date : 26 January 2016	Date : 27 January 2016	Date : 27 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fill: Coarse to medium GRAVEL, grey, losely packed, sub angular to rounded (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N20 (BH03A 1.00m - 1.50m)

Moisture Content	%						
Container No.	g	A13	A14				
Mass of Container	g	51.65	51.23				
Mass of Container + Wet Soil	g	92.50	93.03				
Mass of Container + Dry Soil	g	82.71	83.64				
Mass of Dry Soil	g	31.06	32.41				
Mass of Moisture	g	9.79	9.39				
Moisture Content	%	31.52	28.97				30.25

Tested By: RK
Date: 13 January 2013

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fill: Angular to sub angular medium to coarse GRAVEL with coarse to fine sand, grey white brown, loosely packed (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N21 (BH03A 2.00m - 2.50m)

Moisture Content	%						
Container No.	g	A15	A16				
Mass of Container	g	51.47	51.70				
Mass of Container + Wet Soil	g	79.62	79.83				
Mass of Container + Dry Soil	g	74.66	74.53				
Mass of Dry Soil	g	23.19	22.83				
Mass of Moisture	g	4.96	5.30				
Moisture Content	%	21.39	23.22				22.30

Tested By: RK
Date: 13 January 2016

Q.A. Checked By: KB
Date: 26 January 2016

Approved By: IG
Date: 26 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fill: Angular to sub-angular coarse to medium GRAVEL with trace of silt, grey, losely packed (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N22 (BH03A 5.00m - 5.50m)

Moisture Content	%						
Container No.	g	A17	A18				
Mass of Container	g	51.63	51.79				
Mass of Container + Wet Soil	g	65.56	65.49				
Mass of Container + Dry Soil	g	60.76	60.77				
Mass of Dry Soil	g	9.13	8.98				
Mass of Moisture	g	4.80	4.72				
Moisture Content	%	52.57	52.56				52.57

Tested By:RK
Date : 13 January 2016

Q.A. Checked By: KB
Date: 26 January 2016

Approved By: IG
Date: 27 January 2016

Form GE-L-07

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Gravelly SILT with trace of sand, yellow brown, firm to stiff, moist, low plasticity. (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N23 (BH03A 8.0m - 8.5m)

Moisture Content	%						
Container No.	g	7	8				
Mass of Container	g	52.76	53.06				
Mass of Container + Wet Soil	g	83.54	84.50				
Mass of Container + Dry Soil	g	78.48	79.34				
Mass of Dry Soil	g	25.72	26.28				
Mass of Moisture	g	5.06	5.16				
Moisture Content	%	19.67	19.63				19.65

Tested By:RK
Date : 13 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Form GE-L-07

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Slightly weathered, grey blue, ANDESITE, strong	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N25 (BH03A 9.40m - 9.50m)

Moisture Content	%						
Container No.	g	11	13				
Mass of Container	g	52.87	52.88				
Mass of Container + Wet Soil	g	105.15	103.46				
Mass of Container + Dry Soil	g	104.30	102.77				
Mass of Dry Soil	g	51.43	49.89				
Mass of Moisture	g	0.85	0.69				
Moisture Content	%	1.65	1.38				1.52

Tested By:RK
Date : 13 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Highly to completely weathered SANDSTONE with some coarse to medium gravel and trace of sand, very weak, moist. (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N26 (BH03A 9.50m - 10.00m)

Moisture Content	%						
Container No.	g	1	2				
Mass of Container	g	52.73	53.95				
Mass of Container + Wet Soil	g	73.73	72.16				
Mass of Container + Dry Soil	g	69.16	68.42				
Mass of Dry Soil	g	16.43	14.47				
Mass of Moisture	g	4.57	3.74				
Moisture Content	%	27.81	25.85				26.83

Tested By:RK
Date :13 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: FM
MATERIAL TYPE & DESCRIPTION	: Highly to completely weathered SANDSTONE with some coarse to medium gravel and trace of sand, very weak, moist (Core)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N27 (BH03A 10.80m - 10.90m)

Moisture Content	%						
Container No.	g	A14	A13				
Mass of Container	g	51.22	51.66				
Mass of Container + Wet Soil	g	72.89	72.25				
Mass of Container + Dry Soil	g	70.07	69.40				
Mass of Dry Soil	g	18.85	17.74				
Mass of Moisture	g	2.82	2.85				
Moisture Content	%	14.96	16.07				15.51

Tested By:RK
Date : 13 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Completely to highly weathered fine to coarse grained SANDSTONE, brown, extremely to very weak. (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N29 (BH03A 12.50m - 13.0m)

Moisture Content	%						
Container No.	g	4	5				
Mass of Container	g	52.64	53.36				
Mass of Container + Wet Soil	g	93.35	93.10				
Mass of Container + Dry Soil	g	86.80	86.98				
Mass of Dry Soil	g	34.16	33.62				
Mass of Moisture	g	6.55	6.12				
Moisture Content	%	19.17	18.20				18.69

Tested By:RK
Date : 13 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Gravelly SAND with silt, orange brown, tightly packed, moist (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N32 (BH03A 14.0m - 14.50m)

Moisture Content	%						
Container No.	g	14	15				
Mass of Container	g	53.55	52.70				
Mass of Container + Wet Soil	g	108.61	122.76				
Mass of Container + Dry Soil	g	99.43	111.23				
Mass of Dry Soil	g	45.88	58.53				
Mass of Moisture	g	9.18	11.53				
Moisture Content	%	20.01	19.70				19.85

Tested By:RK
Date : 13 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH 03A, Nadi Temple.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Gravelly SAND with silt, orange brown, tightly packed, moist. (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N33 (BH03A 15.50m - 16.0m)

Moisture Content	%						
Container No.	g	9	10				
Mass of Container	g	53.51	52.27				
Mass of Container + Wet Soil	g	101.54	101.41				
Mass of Container + Dry Soil	g	93.97	93.03				
Mass of Dry Soil	g	40.46	40.76				
Mass of Moisture	g	7.57	8.38				
Moisture Content	%	18.71	20.56				19.63

Tested By:RK
Date : 13 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	:
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE /**	: 13 January 2016
SITE ADDRESS	: BH03A, Nadi Temple	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH03A 1.00 - 1.50m	**MATERIAL TYPE & LOCATION**	: FILL: Coarse to medium GRAVEL, grey, losely packed, sub angular to rounded (SPT).
TEST NUMBER	: N20		

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

Moisture Content (Material passing 19mm)	Container No.	-	12	16
	Mass of Container	g	53.14	52.74
	Mass of Container + Wet Soil	g	71.67	69.06
	Mass of Container + Dry Soil	g	66.97	65.02
	Mass of Dry Soil	g	13.83	12.28
	Mass of Moisture	g	4.70	4.04
	Moisture Content	%	33.98	32.90
	Average Moisture Content	%	33.44	

SPLIT SAMPLE

Mass Passing Last Sieve: - gM_3

Mass after Spliting: - gM_4

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

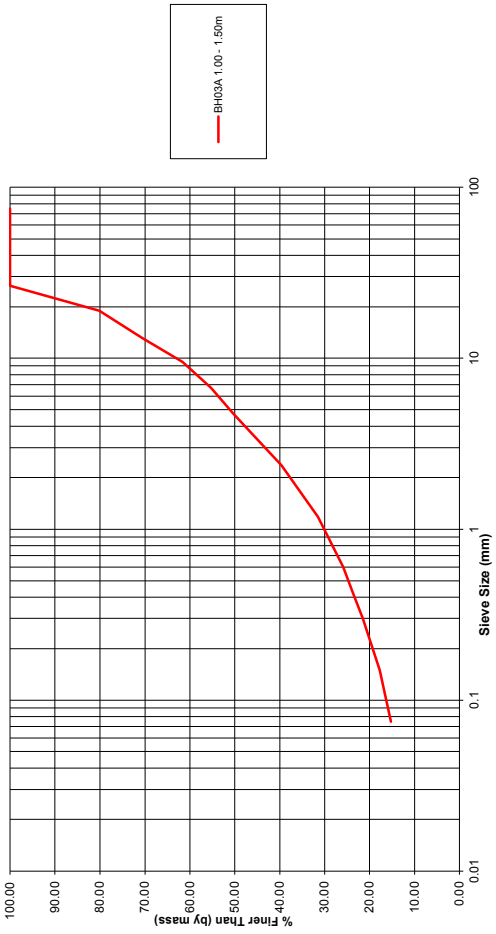
Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	262.11
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	196.42

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	39.06	N/A	19.89	80.11		200
13.2 mm	18.40	N/A	9.37	70.75	600	300
9.50 mm	18.00	N/A	9.16	61.58	450	300
6.70 mm	12.51	N/A	6.37	55.21	300	300
4.75 mm	9.47	N/A	4.82	50.39	250	200
2.36 mm	21.20	N/A	10.79	39.60	150	200
1.18 mm	16.01	N/A	8.15	31.45	100	200
600 µm	11.04	N/A	5.62	25.83	80	200
425 µm	4.14	N/A	2.11	23.72	70	200
300 µm	4.27	N/A	2.17	21.55	60	200
150 µm	7.42	N/A	3.78	17.77	40	200
75 µm	4.93	N/A	2.51	15.26	25	200
Passing 75 µm	29.97	N/A	15.26	0.00	-	-
Pan Total	196.42	-	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 : KB	Approved by : IG
Date : 13 January 2016	Date : 27 January 2016	Date : 27 January 2016

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS



LOCATION: BH03A 1.00 - 1.50m
DESCRIPTION: FILL: Coarse to medium GRAVEL, grey, losely packed, sub angular to rounded (SPT).
DATE OF TEST : 13 January 2016
SAMPLE No: N20

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

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815A
PROJECT NAME :	Geotechnical Investigation for Nadi River Project Drilling Works	**DATE /** :	13 January 2016
SITE ADDRESS :	BH03A, Nadi Temple	**TECHNOLOGIST** :	RK
SAMPLE LOCATION :	BH03A 2.0m - 2.50m	**MATERIAL TYPE & LOCATION** :	FILL: Angular to sub angular medium to coarse GRAVEL with coarse to fine sand, grey white brown, loosely packed (SPT)
TEST NUMBER :	N 21		

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

Moisture Content (Material passing 19mm)	Container No.	-	3	6
	Mass of Container	g	52.42	53.08
	Mass of Container + Wet Soil	g	75.09	75.13
	Mass of Container + Dry Soil	g	71.30	71.60
	Mass of Dry Soil	g	18.88	18.52
	Mass of Moisture	g	3.79	3.53
	Moisture Content	%	20.07	19.06
	Average Moisture Content	%	19.57	

SPLIT SAMPLE

Mass Passing Last Sieve: - gM_3

Mass after Spliting: - gM_4

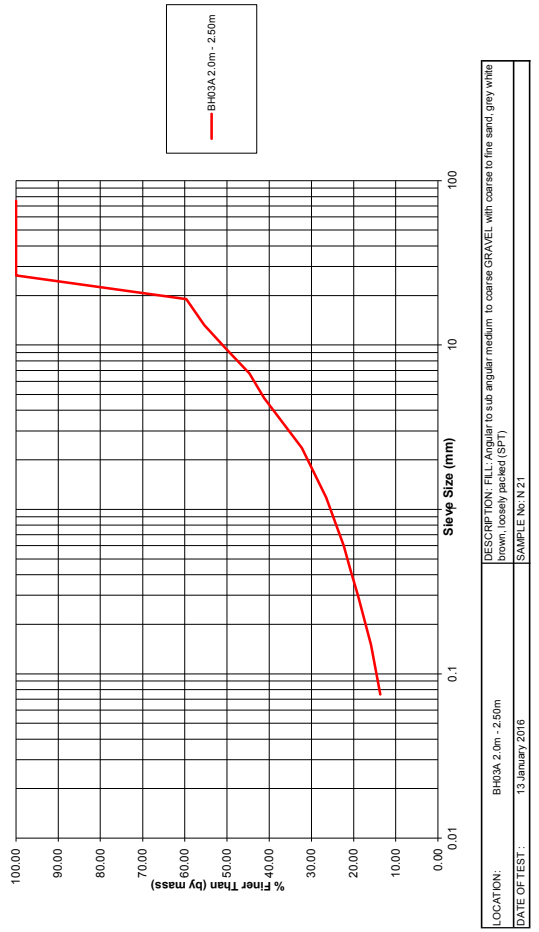
Spliting Factor = $\frac{M_3}{M_4}$

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	241.86
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	202.28

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	81.69	N/A	40.38	59.62		200
13.2 mm	8.46	N/A	4.18	55.43	600	300
9.50 mm	10.48	N/A	5.18	50.25	450	300
6.70 mm	11.20	N/A	5.54	44.72	300	300
4.75 mm	7.09	N/A	3.51	41.21	250	200
2.36 mm	18.04	N/A	8.92	32.29	150	200
1.18 mm	11.77	N/A	5.82	26.47	100	200
600 µm	8.43	N/A	4.17	22.31	80	200
425 µm	3.22	N/A	1.59	20.71	70	200
300 µm	3.58	N/A	1.77	18.94	60	200
150 µm	6.28	N/A	3.10	15.84	40	200
75 µm	4.38	N/A	2.17	13.67	25	200
Passing 75 µm	27.66	N/A	13.67	0.00	-	-
Pan Total	202.28	-	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 : 13 January 2016	Date : 27 January 2016	Date : 27 January 2016



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LOCATION:	BH03A 2.0m - 2.50m
DATE OF TEST :	13 January 2016
DESCRIPTION: FILL: Angular to sub angular medium to coarse GRAVEL with coarse to fine sand, grey white brown, loosely packed (SPT)	
SAMPLE No: N 21	

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Project - Drilling Works	**DATE /**	:	13 January 2016
SITE ADDRESS	:	BH03A, Nadi Temple	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03A 8.00m - 8.50m	**MATERIAL TYPE & LOCATION**	:	Gravelly SILT with trace of sand, yellow brown, firm to stiff, moist, low plasticity (SPT)
TEST NUMBER	:	N 23			

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

Moisture Content (Material passing 19mm)	Container No.	-	94	95
	Mass of Container	g	88.05	89.88
	Mass of Container + Wet Soil	g	117.74	116.54
	Mass of Container + Dry Soil	g	112.98	112.44
	Mass of Dry Soil	g	24.93	22.56
	Mass of Moisture	g	4.76	4.10
	Moisture Content	%	19.09	18.17
	Average Moisture Content	%	18.63	

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	308.00
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	259.62

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	22.02	N/A	8.48	91.52		200
13.2 mm	36.38	N/A	14.01	77.51	600	300
9.50 mm	62.84	N/A	24.20	53.30	450	300
6.70 mm	29.77	N/A	11.47	41.83	300	300
4.75 mm	14.87	N/A	5.73	36.11	250	200
2.36 mm	13.83	N/A	5.33	30.78	150	200
1.18 mm	9.57	N/A	3.69	27.09	100	200
600 µm	8.42	N/A	3.24	23.85	80	200
425 µm	3.74	N/A	1.44	22.41	70	200
300 µm	4.11	N/A	1.58	20.83	60	200
150 µm	5.54	N/A	2.13	18.69	40	200
75 µm	3.55	N/A	1.37	17.33	25	200
Passing 75 µm	44.98	N/A	17.33	0.00	-	-
Pan Total	259.62	-	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 : 13 January 2016	Date : 27 January 2016	Date : 27 January 2016

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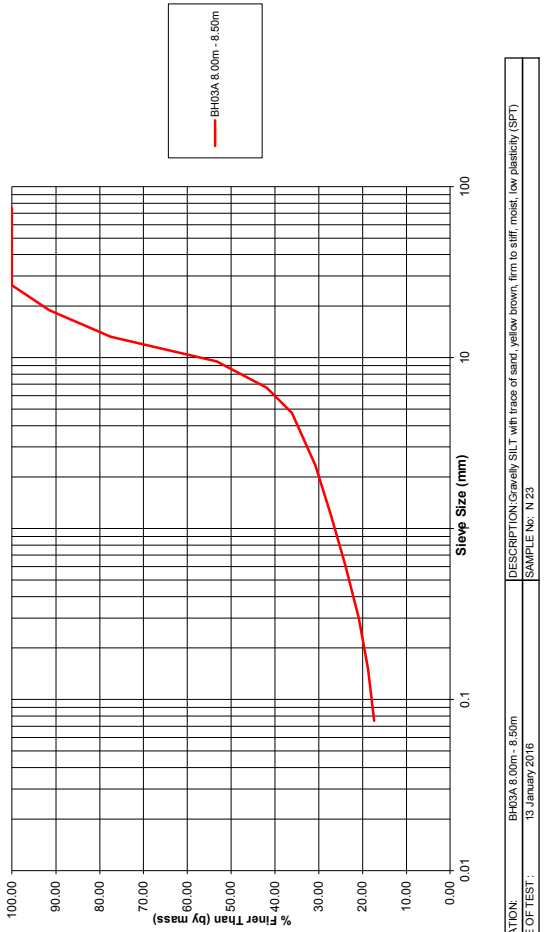

LOCATION: BH03A 8.00m - 8.50m
DATE OF TEST : 13 January 2016
DESCRIPTION:Gravelly SILT with trace of sand, yellow brown, firm to stiff, moist, low plasticity (SPT)
SAMPLE No: N 23

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH03A, Nadi Temple	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Gravelly SILT with trace of sand, yellow brown, firm to stiff, moist, low plasticity (SPT)	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N23 (BH03A 8.0m - 8.5m) SPT

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.		66	69				
Mass of Container	g	90.94	90.27				
Mass of Container + Wet Soil	g	127.18	128.90				
Mass of Container + Dry Soil	g	121.10	122.68				
Mass of Dry Soil	g	30.16	32.41				
Mass of Moisture	g	6.08	6.22				
Moisture Content	%	20.16	19.19				19.68

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		23	24				
Mass of Container	g	14.69	14.59				
Mass of Container + Wet Soil	g	20.27	20.29				
Mass of Container + Dry Soil	g	19.01	19.01				
Mass of Dry Soil	g	4.32	4.42				
Mass of Moisture	g	1.26	1.28				
Moisture Content	%	29.17	28.96				29.06

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	36	30	25	21	15
Container No.		127	142	148	168	101	140
Mass of Container	g	11.56	11.83	11.72	11.55	11.62	11.86
Mass of Container + Wet Soil	g	18.84	19.01	18.45	19.23	19.49	21.73
Mass of Container + Dry Soil	g	16.37	16.55	16.11	16.44	16.58	18.04
Mass of Dry Soil	g	4.81	4.72	4.39	4.89	4.96	6.18
Mass of Moisture	g	2.47	2.46	2.34	2.79	2.91	3.69
Moisture Content	%	51.35	52.12	53.30	57.06	58.67	59.71

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

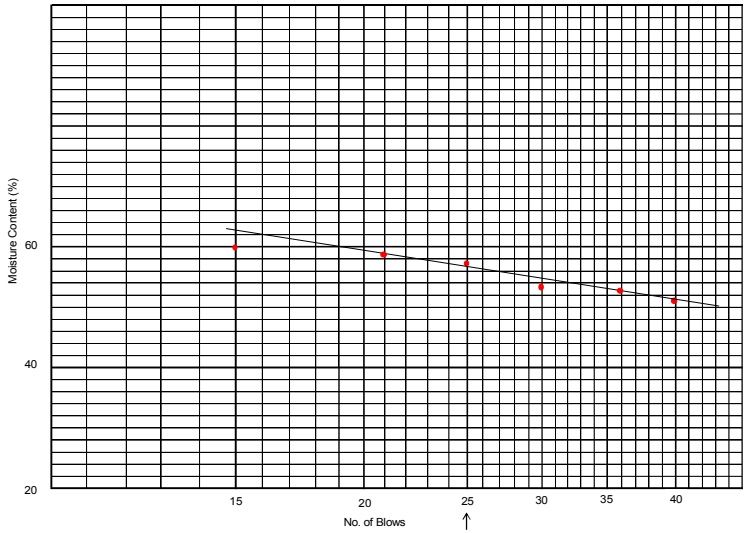
Liquid Limit	56.30 %
Plastic Limit	29.06 %
Plasticity Index	27.24 %
Shrinkage Limit	16.00 %

Tested By:RK
Date:13 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Graph of Moisture Content vs No. of Blows



Project No: 1920815A
Sample No: N23

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 13 January 2016
SITE ADDRESS	: BH03A, Nadi Temple	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Highly to completely weathered SANDSTONE with some coarse to medium gravel and trace of sand, very weak, moist (SPT)	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N26 (BH03A 9.50 - 10.0m)SPT

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	57	59				
Mass of Container	g	63.48	63.71				
Mass of Container + Wet Soil	g	111.95	95.55				
Mass of Container + Dry Soil	g	101.50	88.64				
Mass of Dry Soil	g	38.02	24.93				
Mass of Moisture	g	10.45	6.91				
Moisture Content	%	27.49	27.72				27.60

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		35	36				
Mass of Container	g	14.28	14.12				
Mass of Container + Wet Soil	g	19.41	19.39				
Mass of Container + Dry Soil	g	18.15	18.07				
Mass of Dry Soil	g	3.87	3.95				
Mass of Moisture	g	1.26	1.32				
Moisture Content	%	32.56	33.42				32.99

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	16
Container No.		49	50	51	52	53	54
Mass of Container	g	3.58	3.62	3.54	3.58	3.47	3.57
Mass of Container + Wet Soil	g	6.71	7.23	7.50	8.52	7.85	8.92
Mass of Container + Dry Soil	g	5.58	5.90	6.06	6.66	6.19	6.89
Mass of Dry Soil	g	2.00	2.28	2.52	3.08	2.72	3.32
Mass of Moisture	g	1.13	1.33	1.44	1.86	1.66	2.03
Moisture Content	%	56.50	58.33	57.14	60.39	61.03	61.14

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

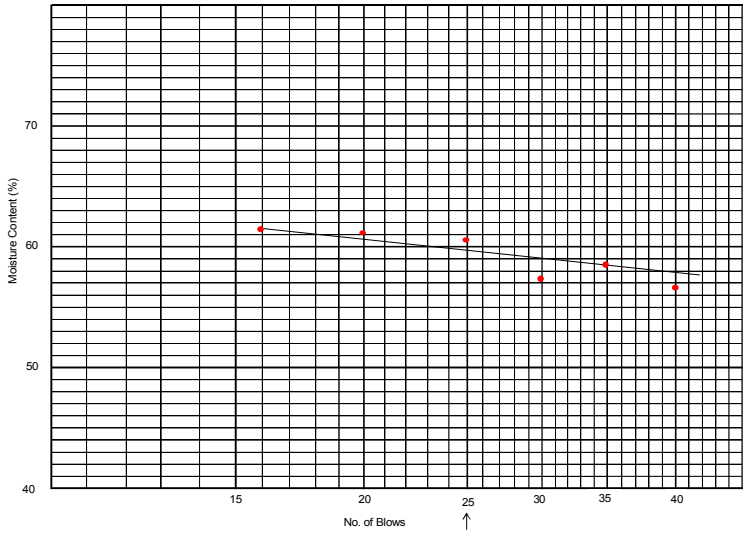
Liquid Limit	59.80 %
Plastic Limit	32.99 %
Plasticity Index	26.81 %
Shrinkage Limit	16.80 %

Tested By: RK
Date:13 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Graph of Moisture Content vs No. of Blows



Project No: 1920815A
Sample N26

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	:1920815.02
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	:13 January 2016
SITE ADDRESS	: BH03A, Nadi Temple	**TECHNOLOGIST**	:RK
MATERIAL TYPE & DESCRIPTION	: Highly to completely weathered SANDSTONE with some coarse to medium gravel and trace of sand, very weak, moist(SPT)	**TEST METHOD**	:NZS 4402:1986 (amended version)
		SAMPLE No.	N28 (BH03 11.0m - 11.5m) SPT

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	96	92				
Mass of Container	g	64.36	74.35				
Mass of Container + Wet Soil	g	164.32	161.63				
Mass of Container + Dry Soil	g	155.18	152.03				
Mass of Dry Soil	g	90.82	77.68				
Mass of Moisture	g	9.14	9.60				
Moisture Content	%	10.06	12.36				11.21

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		162	166				
Mass of Container	g	11.96	11.71				
Mass of Container + Wet Soil	g	18.48	18.27				
Mass of Container + Dry Soil	g	17.06	16.82				
Mass of Dry Soil	g	5.10	5.11				
Mass of Moisture	g	1.42	1.45				
Moisture Content	%	27.84	28.38				28.11

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	16
Container No.		104	110	113	118	134	147
Mass of Container	g	11.90	11.93	11.89	11.76	11.30	11.61
Mass of Container + Wet Soil	g	17.96	17.90	17.12	17.33	16.76	18.71
Mass of Container + Dry Soil	g	16.09	16.03	15.47	15.54	14.95	16.35
Mass of Dry Soil	g	4.19	4.10	3.58	3.78	3.65	4.74
Mass of Moisture	g	1.87	1.87	1.65	1.79	1.81	2.36
Moisture Content	%	44.63	45.61	46.09	47.35	49.59	49.79

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

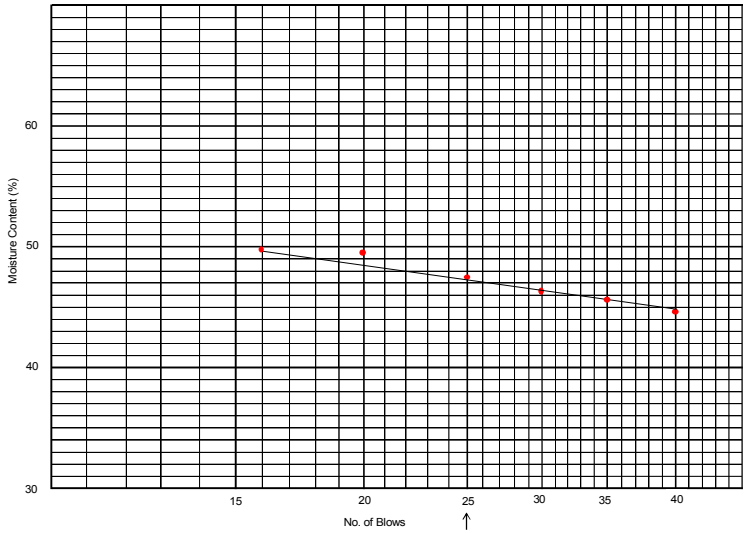
Liquid Limit	47.25 %
Plastic Limit	28.11 %
Plasticity Index	19.14 %
Shrinkage Limit	19.20 %

Tested By:RK
Date:13 January 2015

Q.A. Checked By: KB
Date:27 January 2016

Approved By: IG
Date:27 January 2016

Graph of Moisture Content vs No. of Blows



Project No: 1920815A
Sample No: N28

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	PROJECT No.	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works.	DATE TESTED	:	22 January 2016
SITE ADDRESS	:	BH 03A, Nadi Temple	TECHNOLOGIST	:	KB
SAMPLE LOCATION	:	BH 03A 13.10m - 13.20m	MATERIAL TYPE	:	Gravelly SAND with silt, orange brown, tightly packed, moist (Core)
TEST NUMBER	:	N30			

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

Moisture Content			
	Container No.	-	91
	Mass of Container	g	114.96
	Mass of Container + Wet Soil	g	810.75
	Mass of Container + Dry Soil	g	682.65
	Mass of Dry Soil	g	567.69
	Mass of Moisture	g	128.10
	Moisture Content	%	22.57

Bulk Density			
	Sample No.	-	N30
	Diameter of Specimen	mm	62.21
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	3038.02
	Initial length of specimen Lo	mm	119.62
	Initial mass of specimen Mi	g	713.59
	Bulk Density ρ	t/m³	1.96
	Dry Density ρd	t/m³	1.60

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)	%	m²	kPa
0.00	0	0	0.000	0.003038	0.00
0.50	70	0.1405	0.418	0.003051	46.05
1.00	130.0	0.2610	0.836	0.003064	85.19
1.50	185.0	0.3714	1.254	0.003077	120.72
2.00	210.0	0.4216	1.672	0.003090	136.45
2.50	149.0	0.2991	2.090	0.003103	96.39
3.00	80.0	0.1606	2.508	0.003116	51.54
3.50	30.0	0.0602	2.926	0.003130	19.24
4.00	10.0	0.0200	3.344	0.003143	6.36

Tested by : KB	Q.A. Check by : UM	Approved by : IG
Date : 22 January 2016	Date : 27 January 2015	Date : 27 January 2015

ENTEC LIMITED
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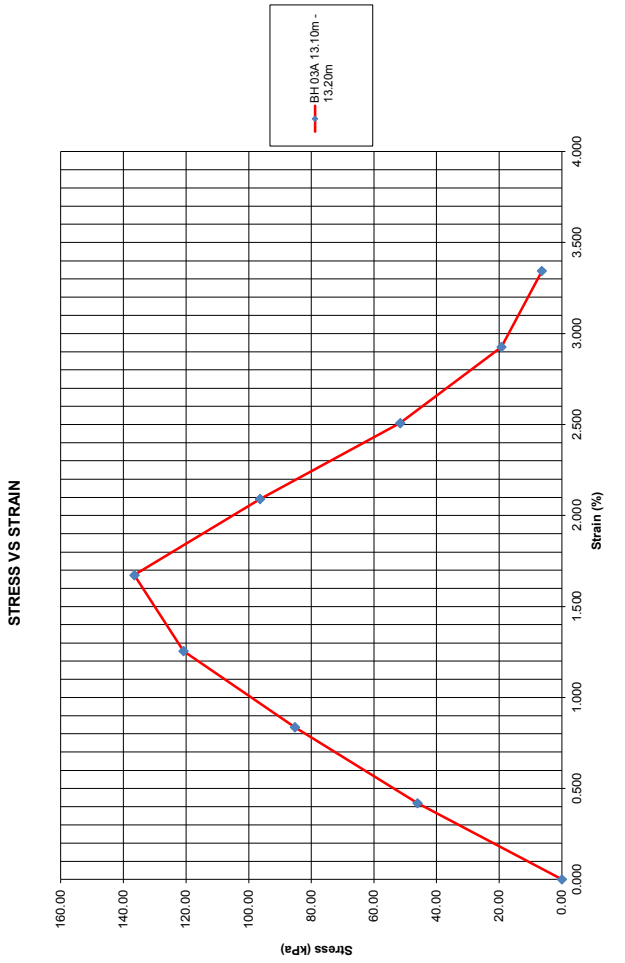

DESCRIPTION: Gravelly SAND with silt, orange brown, tightly packed, moist (Core)

LOCATION: BH 03A 13.10m - 13.20m

DATE OF TEST : 22 January 2016

ENTEC LIMITED ENGINEERING & SCIENCE CONSULTANTS
Level 2 Mid City. Corner Cumming Street & Renwick Road, Suva FIJI
PO Box 12309 Suva FIJI
Phone (+679) 330 0300 Fax: (+679) 331 8618 Email: info@entecfiji.com

Project Ref: 1920815A

2 February 2016

Mr. Takashi TOYODA
The Deputy Team Leader
Nadi River Flood Control Project
JICA Study Team Office
Level 1 Nadi Town Council Complex
Main Street
NADI

Dear Mr. Toyoda,

RE: Additional Geotechnical Engineering Investigation Factual Report, Nadi River Basin Project.

***Additional Borehole (BH3B) at SITE 3* – Qeleloa, Nadi, Fiji.**

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 additional geotechnical engineering investigation and laboratory testing for the Nadi River Basin Project as per Entec proposal (Ref:P1920815.L02) dated 3 December 2015. Entec were granted authority to carry out the geotechnical engineering investigation as per the signed contract agreement between the JICA Study Team and ENTEC Limited, 'ADDITIONAL GEOTECHNICAL INVESTIGATION IN NADI RIVER BASIN', dated 21 January 2016.

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

2.0 SITE SETTING

2.1 Site Location

The site is located off Nadi Back Road at approximately 650m South East of Nadi town, Viti Levu, Fiji. Borehole 03 is located at approximately 150 meters east of the site.

The approximate location of the site is shown below in Figure 1.

Figure 1: Site Locality Plan

2.2 Site Description

The site is located on farm land on the northern side of a tributary river of Nadi River. The area was generally flat. At the time of the investigation the site was generally occupied by farming crops, shrubs and trees. Residential houses were located to the northern side from the site.

3.0 FIELDWORK SUMMARY

The fieldwork for the investigation was completed on 05 January 2016 and comprised the following scope of work:

- One (1No.) borehole designated BH03B 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.
- Standard Penetrometer Testing (SPT) was completed initially at 1.0m, 2.0m and at 1.5m intervals thereafter.

The machine borehole location is shown on the 'Test Locality Plan', Appendix 1, with the Engineering Borehole Log (including in-situ test results) and photos of the core return provided in Appendix 2.

The core sample, disturbed and undisturbed samples were returned to the Entec Laboratory (Nadi).

4.0 LABORATORY TESTING

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

- 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 are provided in Appendix 3.

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 Study Team. 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

per: Daniel McCartney

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

APPENDIX 1

Test Locality Plan

APPENDIX 2

Engineering Borehole Log and Core Photos

DRILL HOLE LOG

Project: Nadi River Drilling Works	Feature	Location: Qeleloa West	No.: **BH 3B**
Job No.: 1920815	Start Date: 14/01/2016 Finish Date: 14/01/2016	Ground Level (m):	Co-Ordinates ():
Client: JICA Study Team	Hole Depth: 26.00 m		Sheet: 1 of 6

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.

Columns: Type | Run | Fluid & Water | Piezometer | Geological Description | 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	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Sandy SILT with trace of clay, brown, soft, wet, low to medium plasticity	0.00	100		P= 20 kPa
Sandy SILT with trace of clay, brown, firm, moist, low to medium plasticity	1	50	1.00	SPT 1.00 m N=6
Clayey SILT, brown, soft to firm, moist to wet, low to medium plasticity	2	33	2.00 -2.50 PT	
	3			
Medium to coarse GRAVEL with some coarse sand and trace of silt, light brown	4	33	3.50	SPT 3.50 m N=7

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

N

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Rotary Tripple Tube	Logged by: RK/FM	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3B.GPJ <<DrawingFile>> 28/01/2016 15:36 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project: Nadi River Drilling Works	Feature	Location: Qeleloa West	No.: **BH 3B**
Job No.: 1920815	Start Date: 14/01/2016 Finish Date: 14/01/2016	Ground Level (m):	Co-Ordinates ():
Client: JICA Study Team	Hole Depth: 26.00 m		Sheet: 2 of 6

Geological Description	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to medium GRAVEL with some coarse sand and minor silt, dark grey	5.00	29	5.00	SPT 5.00 m N=8 P= 7.5 kPa
	6			
NO RECOVERY (Fine to coarse SAND with some fine to medium subangular gravel, dark grey - inferred from SPT)	7	0	6.50	SPT 6.50 m N=28
NO RECOVERY (Medium GRAVEL with some coarse sand, dark grey - inferred from SPT)	8 / 9	0	8.00	SPT 8.00 m N=18
SILT with some fine to coarse sand and trace of medium gravel		27	9.50	SPT 9.50 m N=15

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

N

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Rotary Tripple Tube	Logged by: RK/FM	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3B.GPJ <<DrawingFile>> 28/01/2016 15:36 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Drilling Works		Qeleloa West	BH 3B

Job No.:	Start Date: / Finish Date:	Ground Level (m):	Co-Ordinates ():
1920815	14/01/2016 / 14/01/2016		

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

Depth (m)	Geological Description	TCR (SCR) RQD (%)	Samples	Tests
10.00–11.00	Silty CLAY wih minor organics and trace of fine sand, grey green mottled dark brown, soft, moist, medium to high plasticity	27		P= 25 kPa; P= 20 kPa
11.00–12.50	NO RECOVERY	0	11.00 -11.50 PT	P= 8.3 kPa
12.50–14.00	Silty CLAY with trace of sand and organics, green grey, soft, medium to high plasticity	100	12.50	SPT 12.50 m N=0; P= 0 kPa; P= 0 kPa
14.00–15.00	NO RECOVERY	0	14.00 -14.00 PT	P= 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
PT= Push Tube
Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Rotary Tripple Tube	Logged by: RK/FM	Checked by: DMC

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Drilling Works		Qeleloa West	BH 3B

Job No.:	Start Date: / Finish Date:	Ground Level (m):	Co-Ordinates ():
1920815	14/01/2016 / 14/01/2016		

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

Depth (m)	Geological Description	TCR (SCR) RQD (%)	Samples	Tests
15.00–15.50	NO RECOVERY *(continued)*	0		
15.50–18.50	Fine Sandy SILT with trace of organics, green grey, soft, moist, low to medium plasticity	53; 73	17.00	P= 10 kPa; SPT 17.00 m N=0; P= 0 kPa; P= 0 kPa
18.50–20.00	Fine to medium subangular to subrounded GRAVEL with some fine to coarse sand, blackish green	16		

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
PT= Push Tube
Logged to NZGS 'Field description of soil & rock' December 2005

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Rotary Tripple Tube	Logged by: RK/FM	Checked by: DMC

DRILL HOLE LOG

Project: Nadi River Drilling Works	Feature	Location: Qeleloa West	No.:
Job No.: 1920815	Start Date: 14/01/2016 Finish Date: 14/01/2016	Ground Level (m):	Co-Ordinates ():	**BH 3B**
Client: JICA Study Team	Hole Depth: 26.00 m		Sheet: 5 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 (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	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to coarse sub angular GRAVEL, basalt sand, greenish black		27	20.00	SPT 20.00 m N=50
	21			
Bluish grey, BASALT, greyish SANDSTONE		40	21.50	SPT 21.50 m N=50+
	22			
Highly weathered, CONGLOMORATE	23	100	23.00	SPT 23.00 m N=50+
	24			
Highly weathered, CONGLOMORATE		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

N

Remarks
N = Standard Penetration Test
PT= Push Tube

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Rotary Tripple Tube	Logged by: RK/FM	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3B.GPJ <<DrawingFile>> 28/01/2016 15:36 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project: Nadi River Drilling Works	Feature	Location: Qeleloa West	No.:
Job No.: 1920815	Start Date: 14/01/2016 Finish Date: 14/01/2016	Ground Level (m):	Co-Ordinates ():	**BH 3B**
Client: JICA Study Team	Hole Depth: 26.00 m		Sheet: 6 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 (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	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Highly weathered, CONGLOMORATE *(continued)*		100		
Hole Terminated at 26.00 m N = Standard Penetration Test PT= Push Tube Logged to NZGS 'Field description of soil & rock' December 2005	26		26.00	SPT 26.00 m N=50+
	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

N

Remarks
N = Standard Penetration Test
PT= Push Tube

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Rotary Tripple Tube	Logged by: RK/FM	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3B.GPJ <<DrawingFile>> 28/01/2016 15:36 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

Borehole 3B Core Photos (0.00m to 26.0m)

0.00m to 5.00m

5.00m to 13.30m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, Borehole 3B, Nadi, Fiji.

13.30m to 18.50m

18.50m to 23.00m

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1920815A.BH3B

23.00m to 25.00m

25.00m to 26.00m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, Borehole 3B, Nadi, Fiji.
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1920815A.BH3B

APPENDIX 3

Laboratory Test Schedule and Laboratory Test Results

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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : BH 03B
PROJECT NUMBER :1920815A
TEST RESTULTS REQUIRED BY:

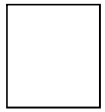
Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required						
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation
1920815A	(BH03B)	Sandy SILT with trace of clay	SPT	1.0 - 1.5			1	1			
		Clayey SILT	PT	2.0 - 2.5		1	1		1	1	1
		Fine to Coarse SAND with trace of gravel	SPT	3.5 - 4.0				1			
		SILT with some fine to medium gravel	SPT	5.0 - 5.5					1		
		Fine to Coarse SAND with trace of gravel	SPT	6.5 - 7.0	1		1				
		Medium GRAVEL with some sand	SPT	8.0 - 8.5				1			
		SILT with some fine to coarse sand and trace of medium gravel	SPT	9.5 - 10.0				1			
		No Description	PT	11.0 - 11.5		1	1			1	1
		Clayey SILT with trace of sand	SPT	12.5 - 13.0			1		1		
		No Description	PT	14.0 - 14.5		1	1	1		1	1
		Fine sandy SILT with trace of organics	SPT	17.0 - 17.5	No recovery						
		Fine to Coarse SAND with trace of gravel	SPT	20.0 - 20.5			1	1			
		BASALT, broken boulders	SPT	21.5 - 22.0	No recovery						
		Highly weathered Conglomorate	SPT	23.0 - 23.5			1				
		Highly weathered Conglomorate	Core Sample	24.0 - 24.3							
		Highly weathered Conglomorate	SPT	24.5 - 25.0			1				
		Highly weathered Conglomorate	SPT	26.0 - 26.5			1				
TOTALS					1	3	10	6	3	3	3
Bill of Quanatity					1	3	10	6	3	4	3

Lab Test Schedule checked by: DMC

Oedometer Settlement Test

Sample Details



sketch showing specimen location in original sample

Depth	2.0 - 2.5m		
Description			
Type	Clayey SILT, brown, soft to firm,low to medium plasticity.		
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	67.3
Bulk Density	ρ_0	(Mg/m3)	1.71
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	27
Initial Dry Density	ρ_{di}	(Mg/m3)	1.35
Initial Voids Ratio	e_i	.	0.967
Initial Degree of Saturation	S_i	(%)	74.6
Initial Swelling	S_S	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	25
Dry Density	ρ_{df}	(Mg/m3)	1.35
Voids Ratio	e_f	.	0.964
Saturation	S_f	(%)	69
Height Settlement	ΔL_s	(mm)	0.030
Compression Index	C_C	.	0.247
Cs	C_S	.	0.469
Po	σ'_{vo}	(kPa)	6
Eo	e_o	.	0.659
Pp	σ'_p	(kPa)	16
Ep	e_p	.	0.533

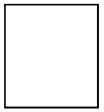
Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
50	0.966	0.010	306.1	0.010	29.0	29.0		0.145	0.0087
100	0.965	0.020	84.0	0.010	29.0	29.0		0.528	0.0087
200	0.423	5.535	54.0	2.760	29.0	29.0		0.610	0.0087
400	0.964	0.030	6581.0	1.903	29.0	29.0		0.005	0.0087
800	0.965	0.023	76.1	0.001	29.0	29.0		0.582	0.0087
1600	0.423	5.535	2743.2	0.345	29.0	0.0		0.012	0.0087
400	0.963	0.042			29.0	0.0			
100	0.964	0.030			29.0	0.0			

Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_028
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference		Test Date	1/28/2016
Jobfile	Geotechnical Engineering for Nadi	Sample	N 46
Client	JICA	Borehole	BH03B
Operator	IG/MK	Checked	DMC
Approved	DMC		

Oedometer Settlement Test

Sample Details



sketch showing specimen location in original sample

Depth	11.0 - 11.5m		
Description			
Type	Silty Clay, dark brown, moist, soft to firm, medium to high plasticity.		
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	67.3
Bulk Density	ρ_0	(Mg/m3)	1.71
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	66
Initial Dry Density	ρ_{di}	(Mg/m3)	1.03
Initial Voids Ratio	e_i	.	1.564
Initial Degree of Saturation	S_i	(%)	100.0
Initial Swelling	S_S	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	53
Dry Density	ρ_{df}	(Mg/m3)	1.03
Voids Ratio	e_f	.	1.566
Saturation	S_f	(%)	89
Height Settlement	ΔL_s	(mm)	-0.013
Compression Index	C_C	.	0.247
Cs	C_S	.	0.469
Po	σ'_{vo}	(kPa)	6
Eo	e_o	.	0.659
Pp	σ'_p	(kPa)	16
Ep	e_p	.	0.533

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)
10.0	1.564	-0.003	306.3	0.015	29.0	29.0		0.145	0.0087
20.0	1.566	-0.019	281.3	0.080	29.0	29.0		0.158	0.0087
40	1.566	-0.013	88.1	0.015	29.0	29.0		0.505	0.0087
60	1.566	-0.013	23.9		29.0	29.0		1.858	0.0087
80	1.566	-0.013	63.1		29.0	29.0		0.705	0.0087
160	1.547	0.130	14.8	0.089	29.0	0.0		2.982	0.0087
320	1.566	-0.013	42.5	0.045	29.0	0.0		1.039	0.0087
640	1.566	-0.013	945.9		29.0	0.0		0.047	0.0087
160	0.808	5.896			29.0	0.0			
60	1.566	-0.013			29.0	0.0			

Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_026
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference		Test Date	1/30/2016
Jobfile	Geotechnical Engineering for Nadi	Sample	N 52
Client	JICA	Borehole	BH03B
Operator	IG/MK	Checked	DMC
Approved	DMC		

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 22 January 2016
SITE ADDRESS	: BH03B, Qeleloa West	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey SILT, brown, soft to firm, moist to wet, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N46 BH 03B 2.0 - 2.50m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	A13	A14				
Mass of Container	g	51.67	51.23				
Mass of Container + Wet Soil	g	75.67	75.22				
Mass of Container + Dry Soil	g	71.51	70.92				
Mass of Dry Soil	g	19.84	19.69				
Mass of Moisture	g	4.16	4.30				
Moisture Content	%	20.97	21.84				21.40

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		37	38				
Mass of Container	g	14.67	14.77				
Mass of Container + Wet Soil	g	21.75	21.32				
Mass of Container + Dry Soil	g	20.06	19.75				
Mass of Dry Soil	g	5.39	4.98				
Mass of Moisture	g	1.69	1.57				
Moisture Content	%	31.35	31.53				31.44

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	21	15
Container No.		31	32	33	34	35	36
Mass of Container	g	14.54	14.56	14.44	14.88	14.28	14.10
Mass of Container + Wet Soil	g	23.48	24.17	24.34	28.42	25.97	25.72
Mass of Container + Dry Soil	g	20.66	21.08	21.15	23.96	22.08	21.80
Mass of Dry Soil	g	6.12	6.52	6.71	9.08	7.80	7.70
Mass of Moisture	g	2.82	3.09	3.19	4.46	3.89	3.92
Moisture Content	%	46.08	47.39	47.54	49.12	49.87	50.91

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample	145.00					
Final length of Sample after Shrinkage	118.00					
% Shrinkage	18.62					18.62

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

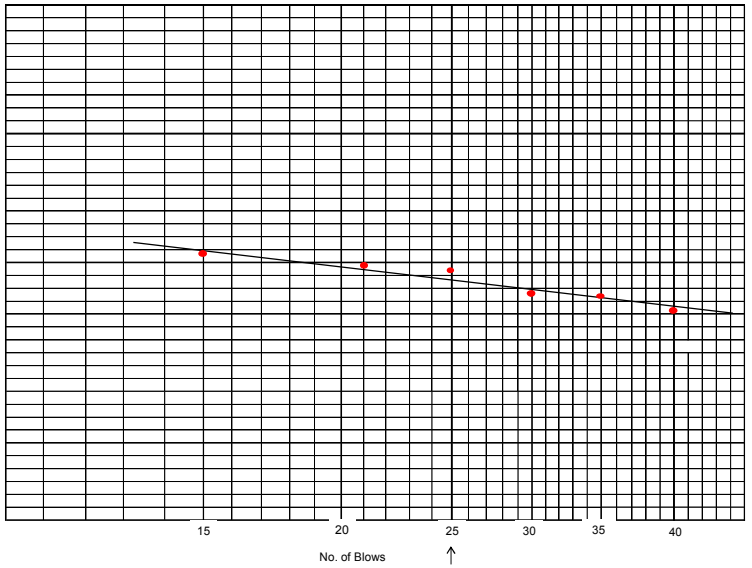
Liquid Limit	48.60 %
Plastic Limit	31.44 %
Plasticity Index	17.16 %
Shrinkage Limit	18.62 %

Tested By: RK
Date: 22 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Graph of Moisture Content vs No. of Blows



Project No: 1920815A
Sample No: N 46

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	:1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling	**DATE**	:25 January 2016
SITE ADDRESS	: BH03B, Qeleloa West	**TECHNOLOGIST**	:RK
MATERIAL TYPE & DESCRIPTION	: Fine to medium GRAVEL with some coarse sand and minor silt, dark grey	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N48 BH03B 5.0m - 5.5m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.		11	13				
Mass of Container	g	52.83	52.88				
Mass of Container + Wet Soil	g	72.40	69.85				
Mass of Container + Dry Soil	g	66.85	65.12				
Mass of Dry Soil	g	14.02	12.24				
Mass of Moisture	g	5.55	4.73				
Moisture Content	%	39.59	38.64				39.12

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		25	37				
Mass of Container	g	14.44	14.68				
Mass of Container + Wet Soil	g	20.42	21.03				
Mass of Container + Dry Soil	g	19.33	19.85				
Mass of Dry Soil	g	4.07	5.17				
Mass of Moisture	g	1.09	1.18				
Moisture Content	%	26.78	22.82				24.80

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	21	15
Container No.		19	21	39	40	45	46
Mass of Container	g	14.84	14.50	14.22	14.52	14.45	14.71
Mass of Container + Wet Soil	g	25.56	24.23	23.72	24.18	25.45	27.44
Mass of Container + Dry Soil	g	23.11	21.89	21.45	21.84	22.72	24.09
Mass of Dry Soil	g	8.27	7.39	7.23	7.32	8.27	9.38
Mass of Moisture	g	2.45	2.34	2.27	2.34	2.73	3.35
Moisture Content	%	29.63	31.66	31.40	31.97	33.01	35.71

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				108.00		
% Shrinkage				13.60		13.60

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

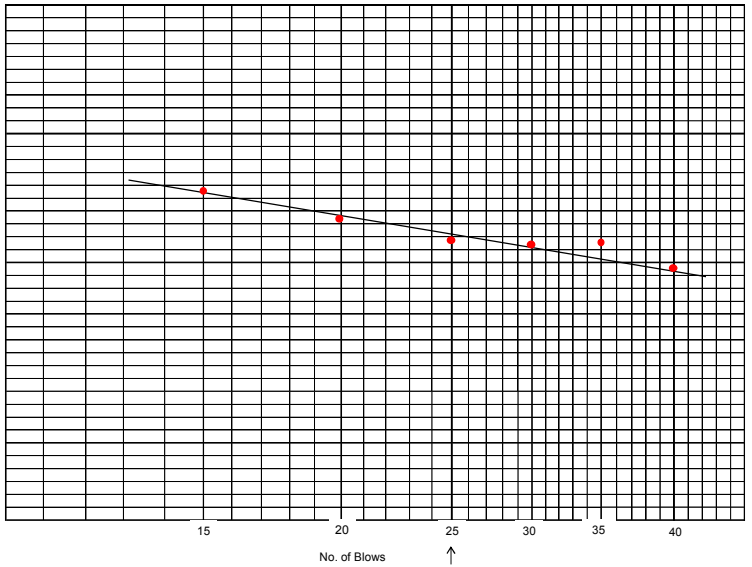
Liquid Limit	32.20 %
Plastic Limit	24.80 %
Plasticity Index	7.40 %
Shrinkage Limit	13.60 %

Tested By: RK
Date:25 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Graph of Moisture Content vs No. of Blows



Project No: 1920815A
Sample No: N48

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 26 January 2016
SITE ADDRESS	: BH03B, Qeleloa West	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty CLAY with trace of sand and organics, green grey, soft, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N53 BH03B 12.5m - 13.0m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	A9	A10				
Mass of Container	g	51.64	51.01				
Mass of Container + Wet Soil	g	98.35	98.08				
Mass of Container + Dry Soil	g	80.43	79.86				
Mass of Dry Soil	g	28.79	28.85				
Mass of Moisture	g	17.92	18.22				
Moisture Content	%	62.24	63.15				62.70

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		26	27				
Mass of Container	g	15.01	14.30				
Mass of Container + Wet Soil	g	20.90	20.74				
Mass of Container + Dry Soil	g	18.88	18.51				
Mass of Dry Soil	g	4.07	4.21				
Mass of Moisture	g	2.02	2.23				
Moisture Content	%	49.63	52.97				51.30

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	16
Container No.		18	28	29	30	41	42
Mass of Container	g	14.60	13.99	14.26	13.43	14.31	14.54
Mass of Container + Wet Soil	g	24.03	25.48	27.37	27.36	26.79	25.51
Mass of Container + Dry Soil	g	20.02	20.60	21.77	21.38	21.39	20.72
Mass of Dry Soil	g	5.42	6.61	7.51	7.95	7.08	6.18
Mass of Moisture	g	4.01	4.88	5.60	5.98	5.40	4.79
Moisture Content	%	73.99	73.83	74.57	75.22	76.27	77.51

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample	145.00					
Final length of Sample after Shrinkage	123.00					
% Shrinkage	15.17					15.17

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

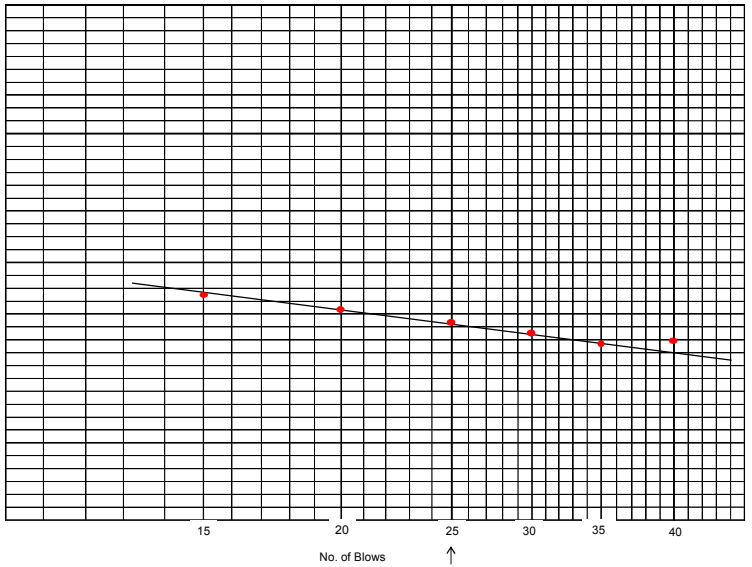
Liquid Limit	75.10 %
Plastic Limit	51.30 %
Plasticity Index	23.80 %
Shrinkage Limit	15.17 %

Tested By: RK
Date: 26 January 2016

Q.A. Checked By: KB
Date: 27January 2016

Approved By: IG
Date: 27 January 2016

Graph of Moisture Content vs No. of Blows



Project No: 1920815A
Sample No: N75

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815A
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	22 January 2016
SITE ADDRESS :	BH03B, Qeleloa West	**TECHNOLOGIST** :	IG /RK
SAMPLE LOCATION :	BH03B 2.0m - 2.5m	**MATERIAL TYPE** :	Clayey SILT, brown, soft to firm, moist to wet, low to medium plasticity (PT)
TEST NUMBER :	N46		

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

Moisture Content	Container No.	-	3	6	
	Mass of Container	g	52.42	53.07	
	Mass of Container + Wet Soil	g	80.24	80.60	
	Mass of Container + Dry Soil	g	75.15	75.62	
	Mass of Dry Soil	g	22.73	22.55	
	Mass of Moisture	g	5.09	4.98	
	Moisture Content	%	22.39	22.08	22.24

Bulk Density	Sample No.	-	N46
	Diameter of Specimen	mm	53.62
	Initial area of specimen Ao (π/4 d²)	mm²	2256.96
	Initial length of specimen Lo	mm	26.22
	Initial mass of specimen Mi	g	101.03
	Bulk Density ρ	t/m³	1.71
	Dry Density ρd	t/m³	1.40

Tested by : IG/RK	Q.A. Check by : UM	Approved by : IG
Date : 22 January 2016	Date : 27 January 2016	Date : 27 Janaury 2016

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

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815A
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	22 January 2016
SITE ADDRESS :	BH03B, Qeleloa West	**TECHNOLOGIST** :	IG /RK
SAMPLE LOCATION :	BH03B 11.0m - 11.5m	**MATERIAL TYPE** :	Clayey SILT, grey brown, moist, medium plasticity, minor shell fragments and organic. (PT)
TEST NUMBER :	N46		

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

Moisture Content	Container No.	-	62	65	
	Mass of Container	g	72.21	87.18	
	Mass of Container + Wet Soil	g	139.40	140.99	
	Mass of Container + Dry Soil	g	114.56	121.35	
	Mass of Dry Soil	g	42.35	34.17	
	Mass of Moisture	g	24.84	19.64	
	Moisture Content	%	58.65	57.48	58.07

Bulk Density	Sample No.	-	N52
	Diameter of Specimen	mm	53.72
	Initial area of specimen Ao (π/4 d²)	mm²	2265.38
	Initial length of specimen Lo	mm	34.50
	Initial mass of specimen Mi	g	121.96
	Bulk Density ρ	t/m³	1.56
	Dry Density ρd	t/m³	0.99

Tested by : IG/RK	Q.A. Check by : UM	Approved by : IG
Date : 22 January 2016	Date : 27 January 2016	Date : 27 Janaury 2016

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815A
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	22 January 2016
SITE ADDRESS :	BH03B, Qeleloa West	**TECHNOLOGIST** :	IG /RK
SAMPLE LOCATION :	BH03B 14.0m - 14.5m	**MATERIAL TYPE** :	Clayey sandy SILT with some organic, dark grey, Stiff, moist, medium to high plasticity (PT)
TEST NUMBER :	N54		

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

Moisture Content	Container No.	-	68	85	
	Mass of Container	g	74.11	88.76	
	Mass of Container + Wet Soil	g	174.35	173.21	
	Mass of Container + Dry Soil	g	141.12	146.43	
	Mass of Dry Soil	g	67.01	57.67	
	Mass of Moisture	g	33.23	26.78	
	Moisture Content	%	49.59	46.44	48.01

Bulk Density	Sample No.	-	N54
	Diameter of Specimen	mm	53.94
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2283.98
	Initial length of specimen Lo	mm	49.75
	Initial mass of specimen Mi	g	187.08
	Bulk Density ρ	t/m³	1.65
	Dry Density ρd	t/m³	1.11

Tested by : IG/RK	Q.A. Check by : UM	Approved by : IG
Date : 22 January 2016	Date : 27 January 2016	Date : 27 Janaury 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 20 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: FM
MATERIAL TYPE & DESCRIPTION	: Sandy SILT with trace of clay, brown, firm, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N45 (BH03B 1.00m - 1.50m)

Moisture Content	%						
Container No.	g	A1	A2				
Mass of Container	g	51.61	51.68				
Mass of Container + Wet Soil	g	82.30	82.65				
Mass of Container + Dry Soil	g	76.07	76.57				
Mass of Dry Soil	g	24.46	24.89				
Mass of Moisture	g	6.23	6.08				
Moisture Content	%	25.47	24.43				24.95

Tested By:FM
Date: 20 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 22 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey SILT, brown, soft to firm, moist to wet, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N46 (BH03B 2.00m - 2.50m)

Moisture Content	%						
Container No.	g	1	2				
Mass of Container	g	52.72	53.97				
Mass of Container + Wet Soil	g	72.25	74.12				
Mass of Container + Dry Soil	g	68.45	70.22				
Mass of Dry Soil	g	15.73	16.25				
Mass of Moisture	g	3.80	3.90				
Moisture Content	%	24.16	24.00				24.08

Tested By:RK
Date: 22 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 20 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: FM
MATERIAL TYPE & DESCRIPTION	: Fine to coarse SAND with some fine to medium subangular gravel, dark grey (inferred from SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N49 (BH03B 6.50m-7.0m)

Moisture Content	%						
Container No.	g	A3	A6				
Mass of Container	g	51.73	51.49				
Mass of Container + Wet Soil	g	89.12	82.88				
Mass of Container + Dry Soil	g	86.22	80.52				
Mass of Dry Soil	g	34.49	29.03				
Mass of Moisture	g	2.90	2.36				
Moisture Content	%	8.41	8.13				8.27

Tested By:FM
Date: 20 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 22 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey Sandy SILT with some organic, dark grey, stiff, moist, medium to high plasticity (PT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N52 (BH03B 11.0m - 11.50m)

Moisture Content	%						
Container No.	g	73	74				
Mass of Container	g	70.12	86.62				
Mass of Container + Wet Soil	g	120.84	124.47				
Mass of Container + Dry Soil	g	101.08	109.48				
Mass of Dry Soil	g	30.96	22.86				
Mass of Moisture	g	19.76	14.99				
Moisture Content	%	63.82	65.57				64.70

Tested By:RK
Date: 22 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 20 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: FM
MATERIAL TYPE & DESCRIPTION	: Silty CLAY with trace of sand and organics, green grey, soft, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N53 (BH03B 12.50m - 13.0m)

Moisture Content	%						
Container No.	g	A5	A6				
Mass of Container	g	51.52	51.49				
Mass of Container + Wet Soil	g	212.08	211.70				
Mass of Container + Dry Soil	g	150.15	150.49				
Mass of Dry Soil	g	98.63	99.00				
Mass of Moisture	g	61.93	61.21				
Moisture Content	%	62.79	61.83				62.31

Tested By:FM
Date: 20 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 22 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: FM
MATERIAL TYPE & DESCRIPTION	: Clayey Sandy SILT with some organic, dark grey, Stiff, moist, medium to high plasticity (PT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N54 (BH03B 14.0m - 14.50m)

Moisture Content	%						
Container No.	g	69	79				
Mass of Container	g	90.25	87.11				
Mass of Container + Wet Soil	g	141.10	143.50				
Mass of Container + Dry Soil	g	123.93	124.61				
Mass of Dry Soil	g	33.68	37.50				
Mass of Moisture	g	17.17	18.89				
Moisture Content	%	50.98	50.37				50.68

Tested By:FM
Date: 22 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 20 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: FM
MATERIAL TYPE & DESCRIPTION	: Fine to coarse sub angular GRAVEL, basalt sand, greenish black	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N55 (BH03B 20.0m - 20.5m)

Moisture Content	%						
Container No.	g	A11	A12				
Mass of Container	g	51.54	51.52				
Mass of Container + Wet Soil	g	64.54	65.40				
Mass of Container + Dry Soil	g	62.06	62.60				
Mass of Dry Soil	g	10.52	11.08				
Mass of Moisture	g	2.48	2.80				
Moisture Content	%	23.58	25.27				24.43

Tested By:FM
Date: 20 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 20 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: FM
MATERIAL TYPE & DESCRIPTION	: Highly weathered, CONGLOMORATE	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N56 (BH03B 23.0m - 23.5m)

Moisture Content	%						
Container No.	g	A7	A8				
Mass of Container	g	51.72	51.54				
Mass of Container + Wet Soil	g	82.33	82.00				
Mass of Container + Dry Soil	g	78.13	78.10				
Mass of Dry Soil	g	26.41	26.56				
Mass of Moisture	g	4.20	3.90				
Moisture Content	%	15.90	14.68				15.29

Tested By:FM
Date: 20 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 20 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: FM
MATERIAL TYPE & DESCRIPTION	: Highly weathered, CONGLOMORATE	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N58(BH03B 24.5m - 25.0m)

Moisture Content	%						
Container No.	g	7	8				
Mass of Container	g	52.74	53.07				
Mass of Container + Wet Soil	g	125.34	120.95				
Mass of Container + Dry Soil	g	113.08	108.81				
Mass of Dry Soil	g	60.34	55.74				
Mass of Moisture	g	12.26	12.14				
Moisture Content	%	20.32	21.78				21.05

Tested By:FM
Date: 20 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Form GE-L-07

Page 1 of 1

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 20 January 2016
SITE ADDRESS	: BH 03B Qeleloa West	**TECHNOLOGIST**	: FM
MATERIAL TYPE & DESCRIPTION	: SPT	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N59 (BH03B 26.0m - 26.50m)

Moisture Content	%						
Container No.	g	4	5				
Mass of Container	g	52.62	53.34				
Mass of Container + Wet Soil	g	146.44	145.55				
Mass of Container + Dry Soil	g	128.96	128.91				
Mass of Dry Soil	g	76.34	75.57				
Mass of Moisture	g	17.48	16.64				
Moisture Content	%	22.90	22.02				22.46

Tested By:FM
Date: 20 January 2016

Q.A. Checked By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Form GE-L-07

Page 1 of 1

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

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE**	: 25 January 2016
SITE ADDRESS	: BH03B Qeleloa West	**TECHNOLOGIST**	: IG/SL
MATERIAL TYPE & DESCRIPTION	: Fine to coarse SAND with some fine to medium subangular gravel, dark grey - (inferred from SPT)	**TEST METHOD**	: AS 1289.6.7.3-2001
		SAMPLE No.	: N49 BH03B (6.50m - 7.0m)

Total Weight : 1980g
Weight Retained on : -
Percentage retained: : -

MOISTURE CONTENT

Container No.		6
Mass of Container	g	53.09
Mass of Container + Wet	g	151.25
Mass of Container + Dry	g	131.11
Mass of Dry Soil	g	78.02
Mass of Moisture	g	20.14
Moisture Content	%	25.81
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1920
Volume of Speciman	cm^3	827.87
Wet Density	t/m^3	2.32
Dry Density	t/m^3	1.84
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	16.47

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	120.0	4.00	410	26	0.280	0.244
2	120.0	4.00	400	26	0.273	0.238
3	120.0	4.00	390	26	0.266	0.232
4	114.0	4.00	340	26	0.244	0.213
5	114.0	4.00	330	26	0.237	0.207
6	114.0	4.00	330	26	0.237	0.207
7	106.5	4.00	290	26	0.223	0.194
8	106.5	4.00	280	26	0.215	0.188
9	106.5	4.00	280	26	0.215	0.188
10	98.5	4.00	210	26	0.175	0.152
11	98.5	4.00	460	26	0.383	0.333
12	98.5	4.00	410	26	0.341	0.297

Average K_{20} m/s	3.74E-05

Tested By: IG
Date: 25 January 2016

Q.A. Check By: UM
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Form: GE-L-03

Page 1 of 1

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Unconfined Compressive Strength

NZS 4402:1986 (Test 6.3.1)

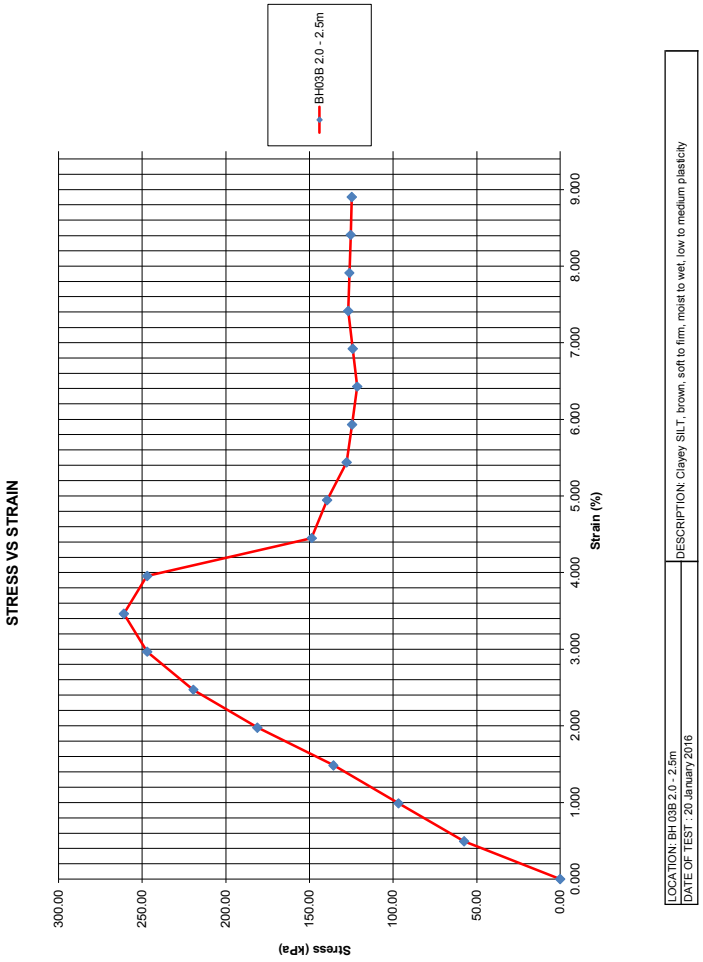
PRINCIPAL	:	Japan International Cooperation Agency (JICA	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	20 January 2016
SITE ADDRESS	:	BH 03B Qeleloa West	**TECHNOLOGIST**	:	KB / SL
SAMPLE LOCATION	:	BH03B 2.0 - 2.5m	**MATERIAL TYPE**	:	Clayey SILT, brown, soft to firm, moist to wet, low to medium plasticity
TEST NUMBER	:	N46			

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	256.55
	Mass of Container + Dry Soil	g	228.81
	Mass of Dry Soil	g	110.74
	Mass of Moisture	g	27.74
	Moisture Content	%	25.05

Bulk Density	Sample No.	-	N46
	Diameter of Specimen	mm	53.64
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2258.64
	Initial length of specimen Lo	mm	101.13
	Initial mass of specimen Mi	g	438.86
	Bulk Density ρ	t/m^3	1.92
	Dry Density ρd	t/m^3	1.54

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	0.00	0	0.000	0.002259	0.00
0.50	65.00	0.1305	0.494	0.002270	57.49
1.00	110.00	0.2208	0.989	0.002281	96.79
1.50	155.00	0.3112	1.483	0.002293	135.74
2.00	208.00	0.4176	1.978	0.002304	181.23
2.50	253.00	0.5079	2.472	0.002316	219.31
3.00	287.00	0.5750	2.966	0.002328	247.03
3.50	305.00	0.6106	3.461	0.002340	260.98
4.00	290.00	0.5810	3.955	0.002352	247.06
4.50	175.00	0.3514	4.450	0.002364	148.66
5.00	165.00	0.3313	4.944	0.002376	139.43
5.50	152.00	0.3052	5.439	0.002389	127.78



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LOCATION: BH 03B 2.0 - 2.5m
DATE OF TEST : 20 January 2016

DESCRIPTION: Clayey SILT, brown, soft to firm, moist to wet, low to medium plasticity

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

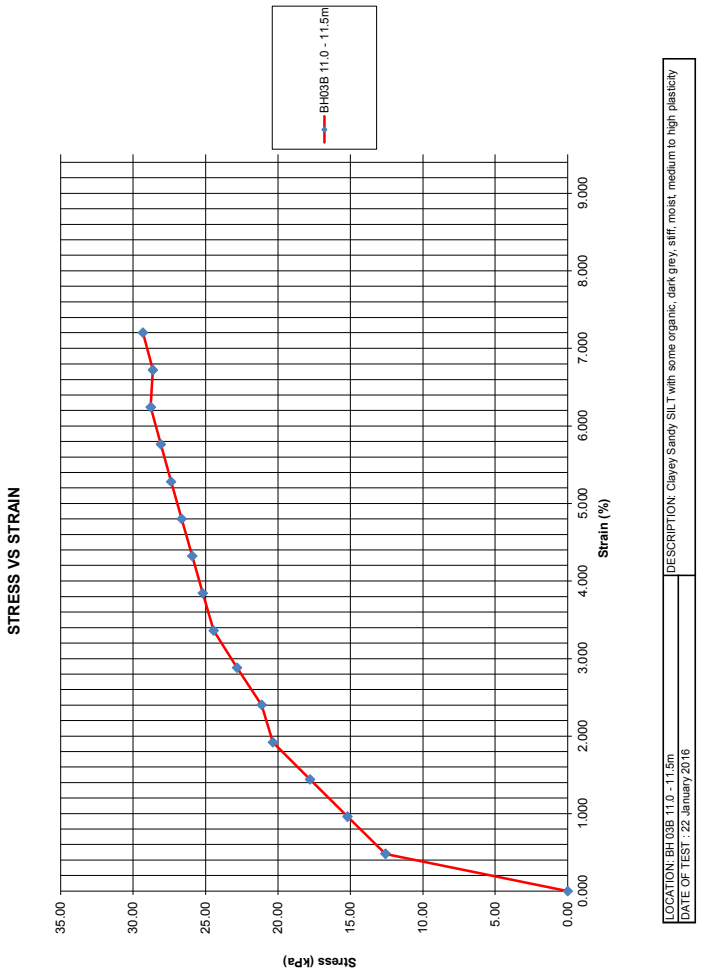
PRINCIPAL	:	Japan International Cooperation Agency (JICA	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	22 January 2016
SITE ADDRESS	:	BH 03B Qeleloa West	**TECHNOLOGIST**	:	KB / SL
SAMPLE LOCATION	:	BH03B 11.0 - 11.5m	**MATERIAL TYPE**	:	Clayey Sandy SILT with some organic, dark grey, stiff, moist, medium to high plasticity (PT)
TEST NUMBER	:	N52			

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

Moisture Content	Container No.	-	67
	Mass of Container	g	72.08
	Mass of Container + Wet Soil	g	237.85
	Mass of Container + Dry Soil	g	175.03
	Mass of Dry Soil	g	102.95
	Mass of Moisture	g	62.82
	Moisture Content	%	61.02

Bulk Density	Sample No.	-	N52
	Diameter of Specimen	mm	53.20
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2221.74
	Initial length of specimen Lo	mm	104.13
	Initial mass of specimen Mi	g	376.21
	Bulk Density ρ	t/m^3	1.63
	Dry Density ρd	t/m^3	1.01

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	0.002222	0.00
0.50	14	0.0281	0.480	0.002232	12.59
1.00	17.0	0.0341	0.960	0.002243	15.20
1.50	20.0	0.0401	1.441	0.002254	17.79
2.00	23.0	0.0461	1.921	0.002265	20.35
2.50	24.0	0.0481	2.401	0.002276	21.13
3.00	26.0	0.0522	2.881	0.002288	22.82
3.50	28.0	0.0562	3.361	0.002299	24.45
4.00	29.0	0.0582	3.841	0.002310	25.19
4.50	30.0	0.0602	4.322	0.002322	25.92
5.00	31.0	0.0622	4.802	0.002334	26.65
5.50	32.0	0.0642	5.282	0.002346	27.37



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DESCRIPTION: Clayey Sandy SILT with some organic, dark grey, stiff, moist, medium to high plasticity

LOCATION: BH 03B 11.0 - 11.5m
DATE OF TEST : 22 January 2016

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	22 January 2016
SITE ADDRESS	:	BH 03B Qeleloa West	**TECHNOLOGIST**	:	KB / FM / SL
SAMPLE LOCATION	:	BH03B 14.0 - 14.5m	**MATERIAL TYPE**	:	Clayey sandy SILT with some organic, dark grey, stiff, moist, medium to high plasticity (PT)
TEST NUMBER	:	N54			

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

Moisture Content	Container No.	-	79
	Mass of Container	g	87.11
	Mass of Container + Wet Soil	g	143.50
	Mass of Container + Dry Soil	g	124.61
	Mass of Dry Soil	g	37.50
	Mass of Moisture	g	18.89
	Moisture Content	%	50.37

Bulk Density	Sample No.	-	N54
	Diameter of Specimen	mm	53.77
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2269.60
	Initial length of specimen Lo	mm	104.53
	Initial mass of specimen Mi	g	385.81
	Bulk Density ρ	t/m³	1.63
	Dry Density ρd	t/m³	1.08

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	0.002270	0.00
0.50	35	0.0702	0.478	0.002281	30.78
1.00	51.0	0.1024	0.957	0.002292	44.69
1.50	64.0	0.1285	1.435	0.002303	55.81
2.00	74.0	0.1485	1.913	0.002314	64.18
2.50	83.0	0.1666	2.392	0.002325	71.65
3.00	88.0	0.1767	2.870	0.002337	75.62
3.50	91.0	0.1827	3.348	0.002348	77.80
4.00	94.0	0.1887	3.827	0.002360	79.96
4.50	92.0	0.1847	4.305	0.002372	77.88
5.00	60.0	0.1204	4.783	0.002384	50.51
5.50	9.0	0.0180	5.262	0.002396	7.51

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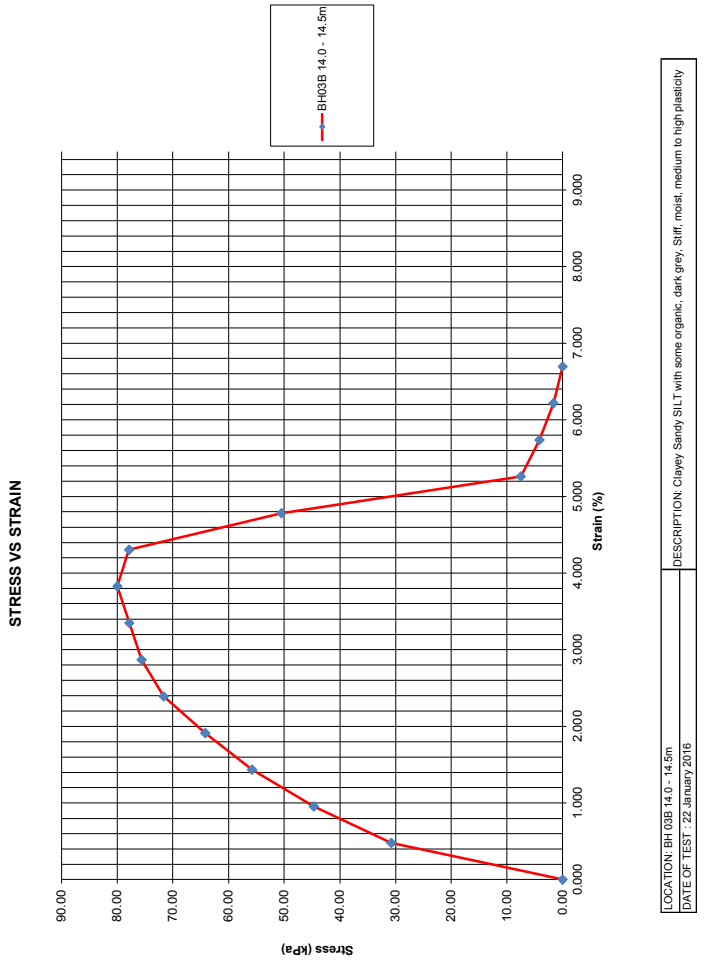

LOCATION: BH 03B 14.0 - 14.5m
DATE OF TEST : 22 January 2016
DESCRIPTION: Clayey Sandy SILT with some organic, dark grey, Stiff, moist, medium to high plasticity

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Project Drilling Works	**DATE /**	:	23 January 2016
SITE ADDRESS	:	BH03B Qeleloa West	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03B 1.00m - 1.50m	**MATERIAL TYPE & LOCATION**	:	Sandy SILT with trace of clay, brown, firm, moist, low to medium plasticity
TEST NUMBER	:	N45			

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

Moisture Content (Material passing 19mm)	Container No.	-	A7	A8	SPLIT SAMPLE		
	Mass of Container	g	51.73	51.57	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	94.93	94.80	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	85.85	85.39	Spliting Factor = M_3/M_4		
	Mass of Dry Soil	g	34.12	33.82			
	Mass of Moisture	g	9.08	9.41			
	Moisture Content	%	26.61	27.82			
	Average Moisture Content	%	27.22				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	246.69
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	193.91

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	0.80	N/A	0.41	99.59	250	200
2.36 mm	3.14	N/A	1.62	97.97	150	200
1.18 mm	1.95	N/A	1.01	96.96	100	200
600 µm	1.25	N/A	0.64	96.32	80	200
425 µm	0.79	N/A	0.41	95.91	70	200
300 µm	1.06	N/A	0.55	95.36	60	200
150 µm	13.35	N/A	6.88	88.48	40	200
75 µm	35.22	N/A	18.16	70.32	25	200
Passing 75 µm	136.35	N/A	70.32	0.00	-	-
Pan Total	193.91	-	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 : UM	Approved by : IG
Date : 23 January 2016	Date : 27 January 2016	Date : 27 January 2016

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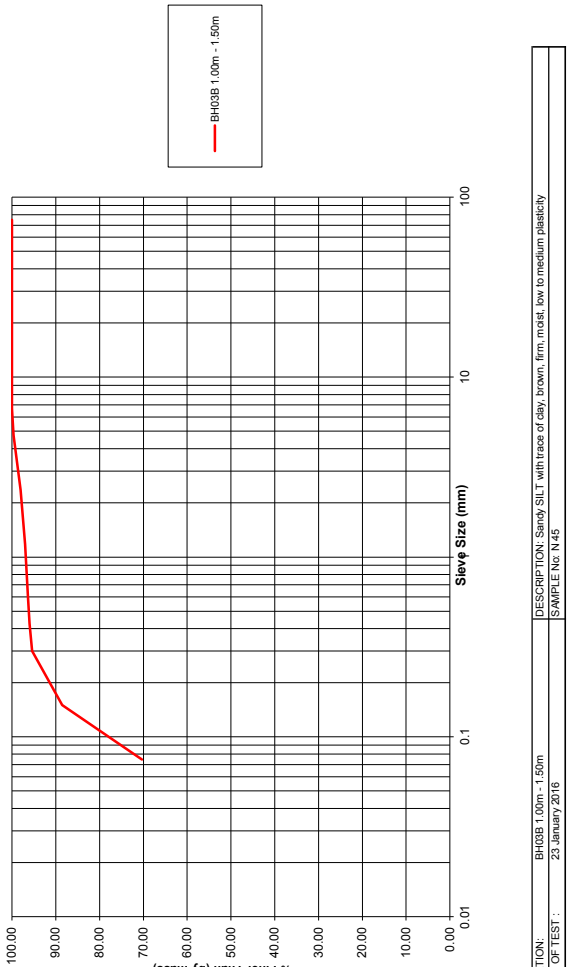

LOCATION: BH03B 1.00m - 1.50m
DESCRIPTION: Sandy SILT with trace of clay, brown, firm, moist, low to medium plasticity
DATE OF TEST : 23 January 2016
SAMPLE No: N 45

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Project Drilling Works	**DATE /**	:	23 January 2016
SITE ADDRESS	:	BH03B Qeleloa West	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03B 3.50m - 4.00m	**MATERIAL TYPE & LOCATION**	:	Medium to coarse GRAVEL with some coarse sand and trace of silt, light brown
TEST NUMBER	:	N47			

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

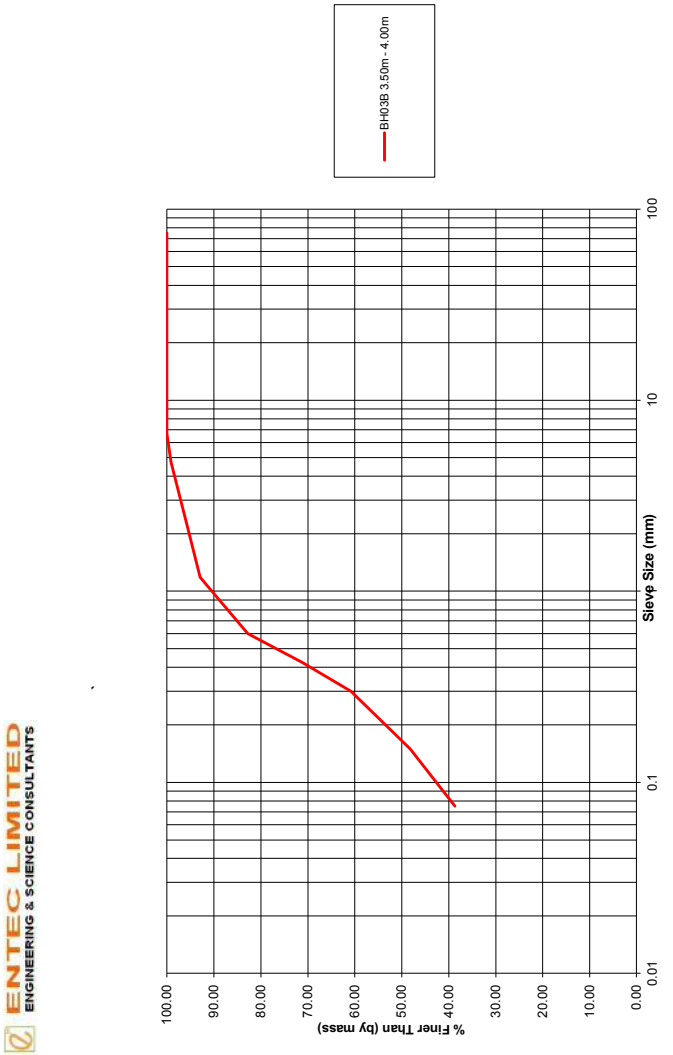
Moisture Content (Material passing 19mm)	Container No.	-	63	70	SPLIT SAMPLE
	Mass of Container	g	102.01	90.09	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	151.60	150.94	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	138.17	133.73	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	36.16	43.64	
	Mass of Moisture	g	13.43	17.21	
	Moisture Content	%	37.14	39.44	
	Average Moisture Content	%	38.29		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	237.12
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	171.47

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	1.49	N/A	0.87	99.13	250	200
2.36 mm	5.25	N/A	3.06	96.07	150	200
1.18 mm	5.35	N/A	3.12	92.95	100	200
600 µm	17.42	N/A	10.16	82.79	80	200
425 µm	19.93	N/A	11.62	71.17	70	200
300 µm	17.75	N/A	10.35	60.81	60	200
150 µm	21.64	N/A	12.62	48.19	40	200
75 µm	16.31	N/A	9.51	38.68	25	200
Passing 75 µm	66.33	N/A	38.68	0.00	-	-
Pan Total	171.47	-	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 : UM	Approved by : IG
Date :20 October 2015	Date : 27 January 2016	Date : 27 January 2016



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LOCATION:	BH03B 3.50m - 4.00m
DATE OF TEST :	23 January 2016
DESCRIPTION:	Medium to coarse GRAVEL with some coarse sand and trace of silt, light brown
SAMPLE No:	N 47

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE /**	: 26 January 2016
SITE ADDRESS	: BH03B Qeleloa West	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH03B 8.00 - 8.50m	**MATERIAL TYPE & LOCATION**	: Medium GRAVEL with some coarse sand, dark grey (inferred from SPT)
TEST NUMBER	: N50		

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

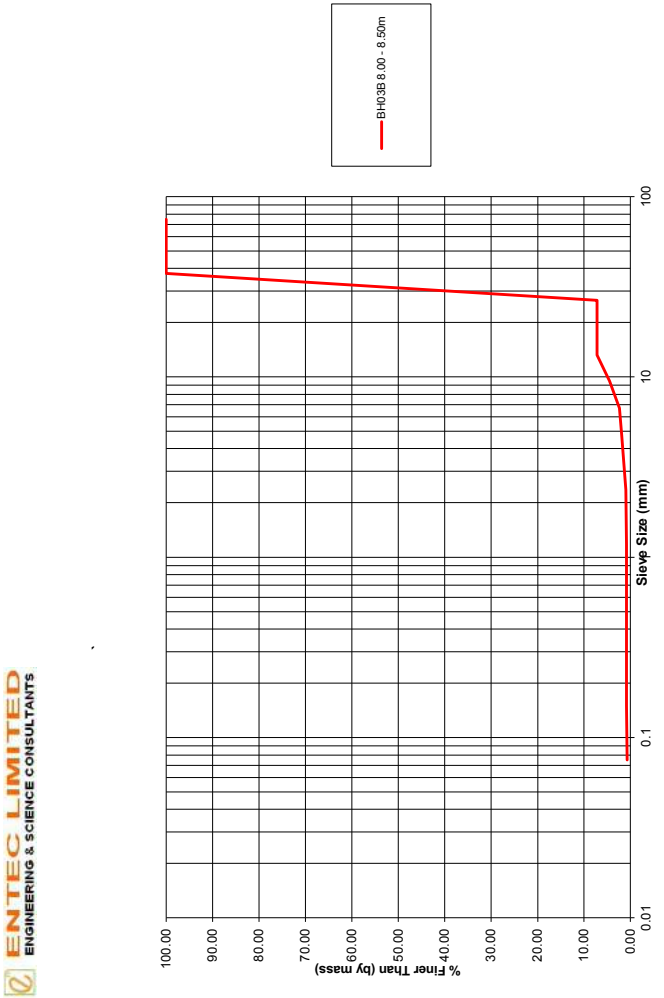
Moisture Content (Material passing 19mm)	Container No.	-	1	2	SPLIT SAMPLE		
	Mass of Container	g	52.72	53.95	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	117.49	99.65	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	116.74	97.93	Spliting Factor = M_3/M_4		
	Mass of Dry Soil	g	64.02	43.98			
	Mass of Moisture	g	0.75	1.72			
	Moisture Content	%	1.17	3.91			
	Average Moisture Content	%	2.54				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	111.60
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	108.83

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	100.99	N/A	92.79	7.21		300
19.0mm	0.00	N/A	0.00	7.21		200
13.2 mm	0.00	N/A	0.00	7.21	600	300
9.50 mm	2.94	N/A	2.70	4.51	450	300
6.70 mm	2.34	N/A	2.15	2.36	300	300
4.75 mm	0.54	N/A	0.50	1.86	250	200
2.36 mm	0.95	N/A	0.87	0.99	150	200
1.18 mm	0.16	N/A	0.15	0.84	100	200
600 µm	0.00	N/A	0.00	0.84	80	200
425 µm	0.00	N/A	0.00	0.84	70	200
300 µm	0.00	N/A	0.00	0.84	60	200
150 µm	0.00	N/A	0.00	0.84	40	200
75 µm	0.17	N/A	0.16	0.68	25	200
Passing 75 µm	0.74	N/A	0.68	0.00	-	-
Pan Total	108.83	-	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 : UM	Approved by : IG
Date : 26 January 2016	Date : 27 January 2016	Date : 27 January 2016



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LOCATION:	BH03B 8.00 - 8.50m	DESCRIPTION:	Medium GRAVEL with some coarse sand, dark grey (inferred from SPT)
DATE OF TEST :	26 January 2016	SAMPLE No:	N50

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE /**	: 26 January 2016
SITE ADDRESS	: BH03B Qeleloa West	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH03B 9.50m - 10.00m	**MATERIAL TYPE & LOCATION**	: SILT with some fine to coarse sand and trace of medium gravel
TEST NUMBER	: N51		

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

Moisture Content (Material passing 19mm)	Container No.	-	A1	A2	SPLIT SAMPLE
	Mass of Container	g	51.56	51.70	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	70.37	71.67	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	62.90	63.94	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	11.34	12.24	
	Mass of Moisture	g	7.47	7.73	
	Moisture Content	%	65.87	63.15	
	Average Moisture Content	%	64.51		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	276.10
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	167.83	

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	37.48	N/A	22.33	77.67		300
19.0mm	19.59	N/A	11.67	66.00		200
13.2 mm	24.25	N/A	14.45	51.55	600	300
9.50 mm	12.16	N/A	7.25	44.30	450	300
6.70 mm	7.12	N/A	4.24	40.06	300	300
4.75 mm	8.74	N/A	5.21	34.85	250	200
2.36 mm	12.22	N/A	7.28	27.57	150	200
1.18 mm	6.53	N/A	3.89	23.68	100	200
600 µm	3.88	N/A	2.31	21.37	80	200
425 µm	1.52	N/A	0.91	20.46	70	200
300 µm	1.26	N/A	0.75	19.71	60	200
150 µm	2.43	N/A	1.45	18.26	40	200
75 µm	1.85	N/A	1.10	17.16	25	200
Passing 75 µm	28.80	N/A	17.16	0.00	-	-
Pan Total	167.83	-	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 : UM	Approved by : IG
Date : 26 January 2016	Date : 27 January 2016	Date : 27 January 2016

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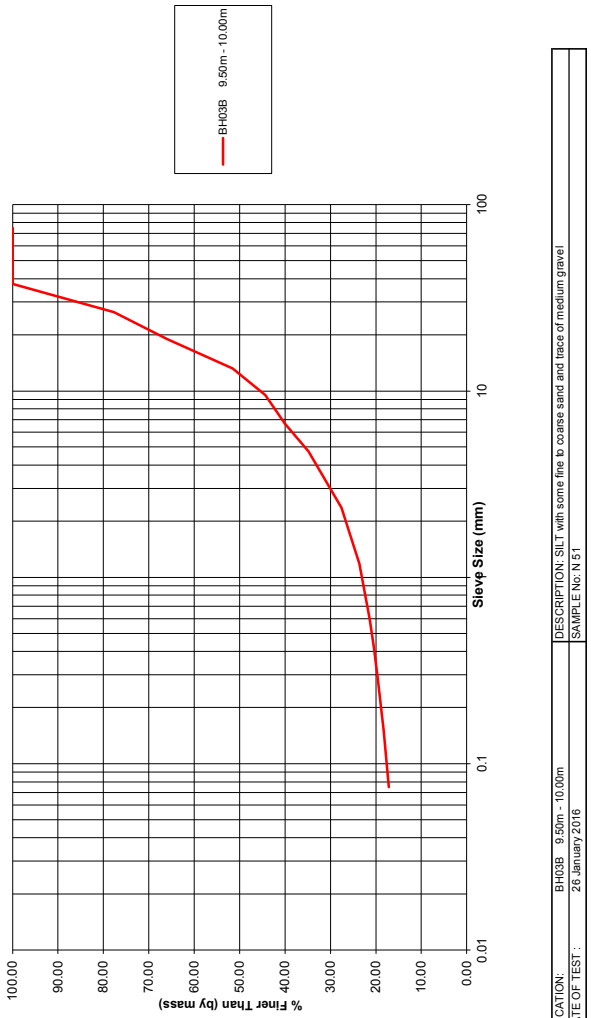

LOCATION: BH03B 9.50m - 10.00m
DATE OF TEST: 26 January 2016
DESCRIPTION: SILT with some fine to coarse sand and trace of medium gravel
SAMPLE No: N 51

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Project Drilling Works	**DATE /**	: 23 January 2016
SITE ADDRESS	: BH03B Qeleloa West	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH03B 14.00m - 14.50m	**MATERIAL TYPE & LOCATION**	: Clayey Sandy SILT with some organic, dark grey, Stiff, moist, medium to high plasticity
TEST NUMBER	: N54		

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

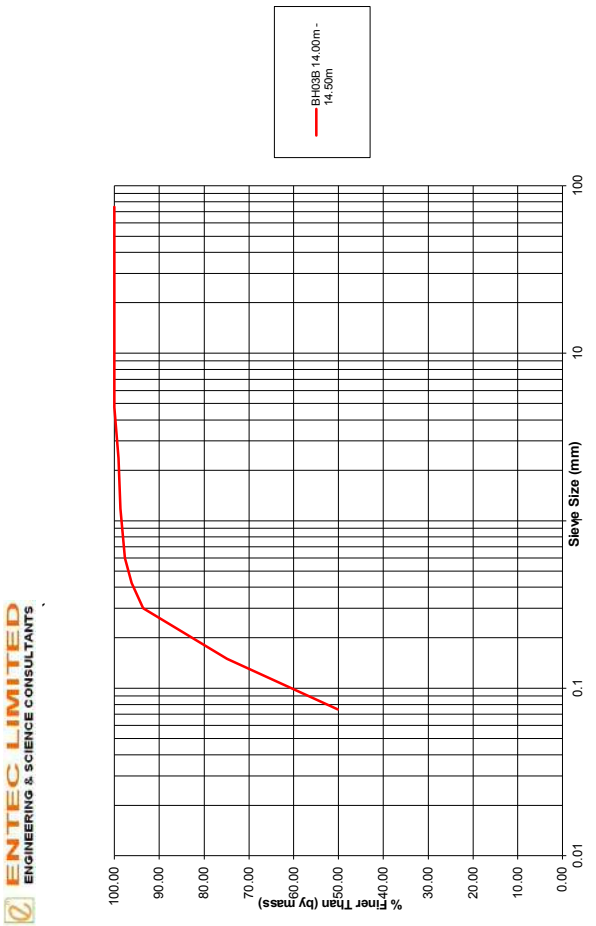
Moisture Content (Material passing 19mm)	Container No.	-	72	83	SPLIT SAMPLE		
	Mass of Container	g	86.40	71.19	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	121.51	121.25	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	110.20	104.89	Spliting Factor = M_3/M_4		
	Mass of Dry Soil	g	23.80	33.70			
	Mass of Moisture	g	11.31	16.36			
	Moisture Content	%	47.52	48.55			
	Average Moisture Content	%	48.03				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	259.65
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	175.40

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	1.58	N/A	0.90	99.10	150	200
1.18 mm	0.75	N/A	0.43	98.67	100	200
600 µm	1.86	N/A	1.06	97.61	80	200
425 µm	2.50	N/A	1.43	96.19	70	200
300 µm	4.58	N/A	2.61	93.57	60	200
150 µm	32.79	N/A	18.69	74.88	40	200
75 µm	43.39	N/A	24.74	50.14	25	200
Passing 75 µm	87.95	N/A	50.14	0.00	-	-
Pan Total	175.40	-	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 : UM	Approved by : IG
Date : 23 January 2016	Date : 27 January 2016	Date : 27 January 2016



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LOCATION:	BH03B 14.00m - 14.50m
DATE OF TEST :	23 January 2016
DESCRIPTION:	Clayey Sandy SILT with some organic, dark grey, Stiff, moist, medium to high plasticity
SAMPLE No:	N54

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Project Drilling Works	**DATE /**	:	26 January 2016
SITE ADDRESS	:	BH03B Qeleloa West	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03B 20.00m - 20.50m	**MATERIAL TYPE & LOCATION**	:	Fine to coarse sub angular GRAVEL, basalt sand, greenish black
TEST NUMBER	:	N55			

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

Moisture Content (Material passing 19mm)	Container No.	-	A11	A12	SPLIT SAMPLE
	Mass of Container	g	51.54	51.52	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	64.56	65.40	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	62.06	62.60	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	10.52	11.08	
	Mass of Moisture	g	2.50	2.80	
	Moisture Content	%	23.76	25.27	
	Average Moisture Content	%	24.52		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	206.35
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	165.72

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	46.11	N/A	27.82	72.18		300
19.0mm	16.12	N/A	9.73	62.45		200
13.2 mm	0.00	N/A	0.00	62.45	600	300
9.50 mm	0.00	N/A	0.00	62.45	450	300
6.70 mm	1.16	N/A	0.70	61.75	300	300
4.75 mm	3.88	N/A	2.34	59.41	250	200
2.36 mm	5.56	N/A	3.36	56.05	150	200
1.18 mm	11.84	N/A	7.14	48.91	100	200
600 µm	20.49	N/A	12.36	36.54	80	200
425 µm	13.84	N/A	8.35	28.19	70	200
300 µm	10.80	N/A	6.52	21.67	60	200
150 µm	6.10	N/A	3.68	17.99	40	200
75 µm	2.38	N/A	1.44	16.56	25	200
Passing 75 µm	27.44	N/A	16.56	0.00	-	-
Pan Total	165.72	-	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 : UM	Approved by : IG
Date : 26 January 2016	Date : 27 January 2016	Date : 27 January 2016

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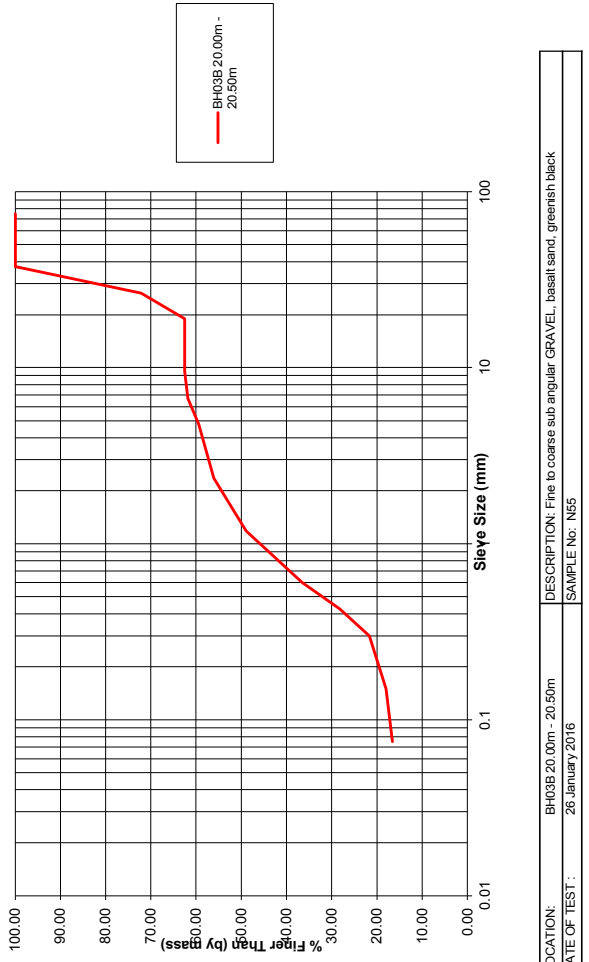

LOCATION: BH03B 20.00m - 20.50m
DESCRIPTION: Fine to coarse sub angular GRAVEL, basalt sand, greenish black
DATE OF TEST : 26 January 2016
SAMPLE No: N55

ENTEC LIMITED ENGINEERING & SCIENCE CONSULTANTS
Level 2 Mid City. Corner Cumming Street & Renwick Road, Suva FIJI
PO Box 12309 Suva FIJI
Phone (+679) 330 0300 Fax: (+679) 331 8618 Email: info@entecfiji.com

Project Ref: 1920815A

02 February 2016

Mr. Takashi TOYODA
The Deputy Team Leader
Nadi River Flood Control Project
JICA Study Team Office
Level 1 Nadi Town Council Complex
Main Street
NADI

Dear Mr. Toyoda,

RE: Additional Geotechnical Engineering Investigation Factual Report, Nadi River Basin Project.

***Additional Borehole (BH3C) at SITE 3* – Qeleloa, Nadi, Fiji.**

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 additional geotechnical engineering investigation and laboratory testing for the Nadi River Basin Project as per Entec proposal (Ref:P1920815.L02) dated 3 December 2015. Entec were granted authority to carry out the geotechnical engineering investigation as per the signed contract agreement between the JICA Study Team and ENTEC Limited, 'ADDITIONAL GEOTECHNICAL INVESTIGATION IN NADI RIVER BASIN', dated 21 January 2016.

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

2.0 SITE SETTING

2.1 Site Location

The site is located off Nadi Back Road at approximately 200m. The site is located in Nawaka village, Viti Levu, Fiji. Nadi town is located at approximated 2km North West.

The approximate location of the site is shown below in Figure 1.

Figure 1: Site Locality Plan

2.2 Site Description

The site is located in Nawaka village on the northern side of a tributary river of Nadi River. The area was generally flat. The borehole was located at approximately 7 meters from the river bank.

At the time of the investigation the site was generally vegetated with grass, shrubs and trees. Residential houses were located to the northern and eastern side from the site.

3.0 FIELDWORK SUMMARY

The fieldwork for the investigation was completed on 05 January 2016 and comprised the following scope of work:

- One (1No.) borehole designated BH03C was drilled using a track mounted drilling rig (Geotech Drilling International Services Ltd.) to a depth of 21.5m with the final SPT test extended to a depth of 21.95m below existing surface level.
- Standard Penetrometer Testing (SPT) was completed initially at 1.0m, 2.0m and at 1.5m intervals thereafter.
- Undisturbed samples were obtained using U60 push tubes at selected depths within the soil profile.

The machine borehole location is shown on the 'Test Locality Plan', Appendix 1, with the Engineering Borehole Log (including in-situ test results) and photos of the core return provided in Appendix 2.

The core sample, disturbed and undisturbed samples were returned to the Entec Laboratory (Nadi).

4.0 LABORATORY TESTING

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

- 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 are provided in Appendix 3.

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 Study Team. 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

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

APPENDIX 1

Test Locality Plan

APPENDIX 2

Engineering Borehole Log and Core Photos

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nawaka Village	No.: BH 03C
Job No.: 1920815	Start Date: 06/01/2016 Finish Date: 06/01/2016	Ground Level (m):	Co-Ordinates ():
Client: Jica Study Team	Hole Depth: 21.50 m		Sheet: 1 of 5

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 XW HW MW SW UW) | Field Strength (VS VL S L F MD St D VSt VD H 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

Depth (m)	Geological Description	TCR (SCR) RQD (%)	Samples	Tests
0.00–2.00	Clayey sandy SILT with trace of gravel, dark brown, soft, moist to wet, medium plasticity	43		
		33	1.00	SPT 1.00 m N=10
2.00–3.40	Clayey sandy SILT ,pale brown orange, soft, moist, medium plasticity	67	2.00 -2.50 PT	
3.40–	Silty fine SAND, pale brown orange, loosely to tightly packed, moist	93	3.50	SPT 3.50 m N=3

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

N

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig- Tripple Tube	Logged by: MK/IG/RK	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3C.GPJ <<DrawingFile>> 28/01/2016 13:43 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nawaka Village	No.: BH 03C
Job No.: 1920815	Start Date: 06/01/2016 Finish Date: 06/01/2016	Ground Level (m):	Co-Ordinates ():
Client: Jica Study Team	Hole Depth: 21.50 m		Sheet: 2 of 5

Depth (m)	Geological Description	TCR (SCR) RQD (%)	Samples	Tests
5.00–5.30	Clayey SILT with minor sand, dark brown, soft to firm, moist, high plasticity		5.00 -5.50 PT	
5.30–6.20	Clayey SILT with minor fine sand, brown grey, soft to firm, moist, medium plasticity	80		
6.20–6.30	Clayey SILT with minor fine sand, grey brown, soft to firm, moist, medium plasticity			
6.30–8.00	Sandy SILT with trace of clay, grey, soft to firm, moist, medium plasticity	53	6.50	SPT 6.50 m sunk
8.00–9.40	SILT with minor fine sand, soft to firm, moist, medium plasticity	33	8.00 -8.50 PT	
9.40–9.50	Silty fine GRAVEL, grey, loosely packed, moist			
9.50–	Medium to fine sub-angular to sub-rounded GRAVEL, loosely packed, grey orange white	20	9.50	SPT 9.50 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

N

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig- Tripple Tube	Logged by: MK/IG/RK	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3C.GPJ <<DrawingFile>> 28/01/2016 13:43 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nawaka Village	No.: BH 03C
Job No.: 1920815	Start Date: 06/01/2016 Finish Date: 06/01/2016	Ground Level (m):	Co-Ordinates ():
Client: Jica Study Team	Hole Depth: 21.50 m		Sheet: 3 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/W 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

Depth (m)	Geological Description	TCR (SCR) RQD (%)	Samples	Tests
10.0–11.0	Medium to fine sub-angular to sub-rounded GRAVEL, loosely packed, grey orange white *(continued)*	20		
11.0–14.0	Sub-rounded to sub-angular GRAVEL, grey, loosely packed	17		SPT 11.50 m N=34
			12.50	SPT 12.50 m N=25 No Recovery
		7		
14.0–	SANDSTONE gravels, grey, loosely packed	33	14.00	SPT 14.00 m N=41

Depth markers: 11, 12, 13, 14

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

N

Remarks
N = Standard Penetration Test
PT= Push Tube

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig- Tripple Tube	Logged by: MK/IG/RK	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3C.GPJ <<DrawingFile>> 28/01/2016 13:43 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nawaka Village	No.: BH 03C
Job No.: 1920815	Start Date: 06/01/2016 Finish Date: 06/01/2016	Ground Level (m):	Co-Ordinates ():
Client: Jica Study Team	Hole Depth: 21.50 m		Sheet: 4 of 5

Depth (m)	Geological Description	TCR (SCR) RQD (%)	Samples	Tests
15.0–15.3	Highly weathered BASALT, grey black, weak	33		
15.3–15.5	Slightly to highly weathered BASALT, grey, strong		15.40 -15.50	SPT 15.50 m N=50+
15.5–	Fine grain SANDSTONE, dark grey, closely spaced defects, narrow aperture of discontinuity		15.50	
		87	16.10 -16.35	
			16.35 -16.65	
			17.00 -17.35	
			17.35 -17.65	
		100	17.65 -17.90	
		100	18.80 -19.30	

Depth markers: 16, 17, 18, 19

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

N

Remarks
N = Standard Penetration Test
PT= Push Tube

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig- Tripple Tube	Logged by: MK/IG/RK	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3C.GPJ <<DrawingFile>> 28/01/2016 13:43 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nawaka Village	No.: **BH 03C**
Job No.: 1920815	Start Date: 06/01/2016 Finish Date: 06/01/2016	Ground Level (m):	Co-Ordinates ():
Client: Jica Study Team	Hole Depth: 21.50 m		Sheet: 5 of 5

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
				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 HW MW SW UW	VS/VL S/L F/MD St/D VSt/VD H/EW VW W MS S VS ES				500 100	(type, orientation, spacing, roughness, persistence aperture, infilling etc)			
				Fine grain SANDSTONE, dark grey, closely spaced defects, narrow aperture of discontinuity *(continued)*					21				100	20.20-20.40 20.50-20.70 21.10-21.40	
				Hole Terminated at 21.50 m N = Standard Penetration Test PT= Push Tube Logged to NZGS 'Field description of soil & rock' December 2005					22 23 24						

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

N

Remarks

N = Standard Penetration Test
PT= Push Tube

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

All dimensions in metres Scale 1:31	Contractor: GDISL	Rig/Plant Used: Drill Rig- Tripple Tube	Logged by: MK/IG/RK	Checked by: DMC

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3C.GPJ <<DrawingFile>> 28/01/2016 13:43 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

Borehole 3C Core Photos (0.00m to 21.5m)

0.00m to 4.20m

4.20m to 8.00m

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8.0 to 15.50m

15.50m to 18.20m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, Borehole 3C, Nadi, Fiji.

18.20m to 21.10m

21.10m to 21.50m

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1920815A.BH3C

APPENDIX 3

Laboratory Test Schedule and Laboratory Test Results

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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : Site 03C, Nawaka Village
PROJECT NUMBER :1920815A

TEST RESTULTS REQUIRED BY:

Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required						
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation
1920815A	(BH03C)	Clayey sandy SILT	SPT	1.0 - 1.5			1	1	1		
		Clayey sandy SILT	U	2.0 - 2.5		1	1	1			1
		Silty fine SAND	SPT	3.5 - 4.0	1		1	1			
		Clayey SILT with trace of sand	U	5.0 - 5.5		1	1	1	1		1
		Sandy SILT	SPT	6.5 - 7.0			1	1			
		SILT	U	8.0 - 8.5		1	1	1	1		1
		GRAVEL	SPT	9.5 - 10.0			1				
		GRAVEL	SPT	11.0 - 11.5							
		GRAVEL	SPT	12.5 - 13.0							
		SANDSTONE	SPT	14.0 - 14.5			1				
		SANDSTONE	Core	15.4 - 15.5			1				
		SANDSTONE	SPT	15.5 - 16.0							
		SANDSTONE	CORE 1	16.1 - 16.35							
		SANDSTONE	CORE 2	16.35 - 17.0			1			1	
		SANDSTONE	CORE 3	17.0 - 17.35							
		SANDSTONE	CORE 4	17.35 - 17.65							
		SANDSTONE	CORE 5	17.65 - 17.90							
		SANDSTONE	CORE 6	18.8 - 19.3							
		SANDSTONE	CORE 7	20.2 - 20.4							
		SANDSTONE	CORE 8	20.5 - 20.7							
		SANDSTONE	CORE 9	21.1 - 21.4						1	
TOTALS					1	3	10	6	3	2	3
Bill of Quanatity					1	3	10	6	3	3	3

Lab Test Schedule checked by: DMC

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815A
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	19 January 2016
SITE ADDRESS :	BH03C Nawaka Village, Nadi.	**TECHNOLOGIST** :	IG/RK
SAMPLE LOCATION :	BH03C 2.00m - 2.50m	**MATERIAL TYPE** :	Clayey sandy SILT ,pale brown orange, soft, moist, medium plasticity (PT)
TEST NUMBER :	N 35		

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

Moisture Content	Container No.	-	56	60	
	Mass of Container	g	62.61	62.87	
	Mass of Container + Wet Soil	g	111.18	120.58	
	Mass of Container + Dry Soil	g	99.67	107.46	
	Mass of Dry Soil	g	37.06	44.59	
	Mass of Moisture	g	11.51	13.12	
	Moisture Content	%	31.06	29.42	30.24

Bulk Density	Sample No.	-	N35
	Diameter of Specimen	mm	53.30
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2230.10
	Initial length of specimen Lo	mm	49.64
	Initial mass of specimen Mi	g	190.74
	Bulk Density ρ	t/m³	1.72
	Dry Density ρd	t/m³	1.32

Tested by : IG/RK	Q.A. Check by : KB	Approved by : IG
Date : 19 January 2016	Date : 27 January 2016	Date : 27 January 2016

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815A
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	19 January 2016
SITE ADDRESS :	BH03C Nawaka Village, Nadi.	**TECHNOLOGIST** :	IG/RK
SAMPLE LOCATION :	BH03C 5.00m - 5.50m	**MATERIAL TYPE** :	Clayey SILT with minor sand, dark brown, soft to firm, moist, high plasticity (PT)
TEST NUMBER :	N37		

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

Moisture Content	Container No.	-	14	15	
	Mass of Container	g	53.55	52.68	
	Mass of Container + Wet Soil	g	118.17	117.15	
	Mass of Container + Dry Soil	g	99.99	98.93	
	Mass of Dry Soil	g	46.44	46.25	
	Mass of Moisture	g	18.18	18.22	
	Moisture Content	%	39.15	39.39	39.27

Bulk Density	Sample No.	-	N37
	Diameter of Specimen	mm	53.53
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2249.39
	Initial length of specimen Lo	mm	58.69
	Initial mass of specimen Mi	g	226.85
	Bulk Density ρ	t/m³	1.72
	Dry Density ρd	t/m³	1.23

Tested by : IG/RK	Q.A. Check by : KB	Approved by : IG
Date : 19 January 2016	Date : 27 January 2016	Date : 27 January 2016

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815A
PROJECT NAME :	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	19 January 2016
SITE ADDRESS :	BH03C Nawaka Village, Nadi.	**TECHNOLOGIST** :	IG/RK
SAMPLE LOCATION :	BH03C 8.00m - 8.50m	**MATERIAL TYPE** :	SILT with minor fine sand, soft to firm, moist, medium plasticity (PT)
TEST NUMBER :	N39		

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

Moisture Content	Container No.	-	1	2	
	Mass of Container	g	52.71	53.95	
	Mass of Container + Wet Soil	g	120.18	119.98	
	Mass of Container + Dry Soil	g	105.05	105.07	
	Mass of Dry Soil	g	52.34	51.12	
	Mass of Moisture	g	15.13	14.91	
	Moisture Content	%	28.91	29.17	29.04

Bulk Density	Sample No.	-	N39
	Diameter of Specimen	mm	52.50
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2163.66
	Initial length of specimen Lo	mm	46.39
	Initial mass of specimen Mi	g	197.19
	Bulk Density ρ	t/m³	1.96
	Dry Density ρd	t/m³	1.52

Tested by : IG/RK	Q.A. Check by : KB	Approved by : IG
Date : 19 January 2016	Date : 27 January 2016	Date : 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village,Nadi.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey sandy SILT with trace of gravel, dark brown, soft, moist to wet, medium plasticity (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N35 (BH03C 1.00m - 1.50m)

Moisture Content	%						
Container No.	g	67	68				
Mass of Container	g	72.10	74.13				
Mass of Container + Wet Soil	g	125.13	125.42				
Mass of Container + Dry Soil	g	115.52	115.96				
Mass of Dry Soil	g	43.42	41.83				
Mass of Moisture	g	9.61	9.46				
Moisture Content	%	22.13	22.62				22.37

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village,Nadi.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey sandy SILT ,pale brown orange, soft, moist, medium plasticity (PT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N36 (BH03C 2.00m - 2.50m)

Moisture Content	%						
Container No.	g	4	5				
Mass of Container	g	52.63	53.37				
Mass of Container + Wet Soil	g	98.29	98.10				
Mass of Container + Dry Soil	g	87.68	87.63				
Mass of Dry Soil	g	35.05	34.26				
Mass of Moisture	g	10.61	10.47				
Moisture Content	%	30.27	30.56				30.42

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village, Nadi.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty fine SAND, pale brown orange, loosely to tightly packed, moist (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N37 (BH03C 3.50m - 4.00m)

Moisture Content	%						
Container No.	g	77	81				
Mass of Container	g	99.34	87.45				
Mass of Container + Wet Soil	g	147.20	147.54				
Mass of Container + Dry Soil	g	135.18	132.72				
Mass of Dry Soil	g	35.84	45.27				
Mass of Moisture	g	12.02	14.82				
Moisture Content	%	33.54	32.74				33.14

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Form GE-L-07

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village, Nadi	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey SILT with minor fine sand, brown grey, soft to firm, moist, medium plasticity (PT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N38 (BH03C 5.00m - 5.50m)

Moisture Content	%						
Container No.	g	9	10				
Mass of Container	g	53.51	52.29				
Mass of Container + Wet Soil	g	107.42	107.14				
Mass of Container + Dry Soil	g	92.61	92.08				
Mass of Dry Soil	g	39.10	39.79				
Mass of Moisture	g	14.81	15.06				
Moisture Content	%	37.88	37.85				37.86

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village, Nadi	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Sandy SILT with trace of clay, grey, soft to firm, moist, medium plasticity (SPT).	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N39 (BH03C 6.50m - 7.00m)

Moisture Content	%						
Container No.	g	82	75				
Mass of Container	g	90.14	89.72				
Mass of Container + Wet Soil	g	121.41	122.03				
Mass of Container + Dry Soil	g	112.51	112.56				
Mass of Dry Soil	g	22.37	22.84				
Mass of Moisture	g	8.90	9.47				
Moisture Content	%	39.79	41.46				40.62

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village, Nadi	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with minor fine sand, soft to firm, moist, medium plasticity (PT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N40 (BH03C 8.00m - 8.50m)

Moisture Content	%						
Container No.	g	3	6				
Mass of Container	g	52.42	53.09				
Mass of Container + Wet Soil	g	150.38	150.16				
Mass of Container + Dry Soil	g	132.66	132.95				
Mass of Dry Soil	g	80.24	79.86				
Mass of Moisture	g	17.72	17.21				
Moisture Content	%	22.08	21.55				21.82

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village, Nadi.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Medium to fine sub-angular to sub-rounded GRAVEL, loosely packed, grey orange white(SPT).	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N41 (BH03C 9.50m - 10.00m)

Moisture Content	%						
Container No.	g	71	73				
Mass of Container	g	86.28	70.12				
Mass of Container + Wet Soil	g	126.93	126.31				
Mass of Container + Dry Soil	g	122.38	120.00				
Mass of Dry Soil	g	36.10	49.88				
Mass of Moisture	g	4.55	6.31				
Moisture Content	%	12.60	12.65				12.63

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village, Nadi	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SANDSTONE gravels, grey, loosely packed (SPT)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N42 (BH03C 14.00m - 14.50m)

Moisture Content	%						
Container No.	g	76	85				
Mass of Container	g	89.73	88.72				
Mass of Container + Wet Soil	g	111.59	122.36				
Mass of Container + Dry Soil	g	107.48	115.84				
Mass of Dry Soil	g	17.75	27.12				
Mass of Moisture	g	4.11	6.52				
Moisture Content	%	23.15	24.04				23.60

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 14 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village, Nadi	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Slightly to highly weathered BASALT, grey, strong. (Core)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N43 (BH03 15.40m - 15.50m)

Moisture Content	%						
Container No.	g	A17	A18				
Mass of Container	g	51.61	51.79				
Mass of Container + Wet Soil	g	115.91	115.76				
Mass of Container + Dry Soil	g	114.95	114.32				
Mass of Dry Soil	g	63.34	62.53				
Mass of Moisture	g	0.96	1.44				
Moisture Content	%	1.52	2.30				1.91

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Form GE-L-07

Page 1 of 1

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 15 January 2016
SITE ADDRESS	: BH 03C, Nawaka Village, Nadi	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fine grain SANDSTONE, dark grey, closely spaced defects, narrow aperture of discontinuity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N44 (BH03C 16.35m - 16.65m)

Moisture Content	%						
Container No.	g	A13	A14				
Mass of Container	g	51.67	51.23				
Mass of Container + Wet Soil	g	87.90	86.40				
Mass of Container + Dry Soil	g	81.79	80.59				
Mass of Dry Soil	g	30.12	29.36				
Mass of Moisture	g	6.11	5.81				
Moisture Content	%	20.29	19.79				20.04

Tested By: RK
Date: 14 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Form GE-L-07

Page 1 of 1

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	: 21 January 2016
SITE ADDRESS	: BH03C Nawaka Village, Nadi.	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH03C 1.00m - 1.50m	**MATERIAL TYPE & LOCATION**	: Clayey sandy SILT with trace of gravel, dark brown, soft, moist to wet, medium plasticity (SPT)
TEST NUMBER	: N 34		

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

Moisture Content (Material passing 19mm)	Container No.	-	1	2	SPLIT SAMPLE		
	Mass of Container	g	52.72	53.96	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	74.37	74.32	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	69.85	70.30	Spliting Factor M_3 / M_4 =		
	Mass of Dry Soil	g	17.13	16.34			
	Mass of Moisture	g	4.52	4.02			
	Moisture Content	%	26.39	24.60			
	Average Moisture Content	%	25.49				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_T)	g	Nil
	Total Wet Weight (M_w)	g	226.01
	Total Mass of dry sample (M_T)	M_T =	$\frac{100M_w}{100 + w}$
		M_T =	180.10

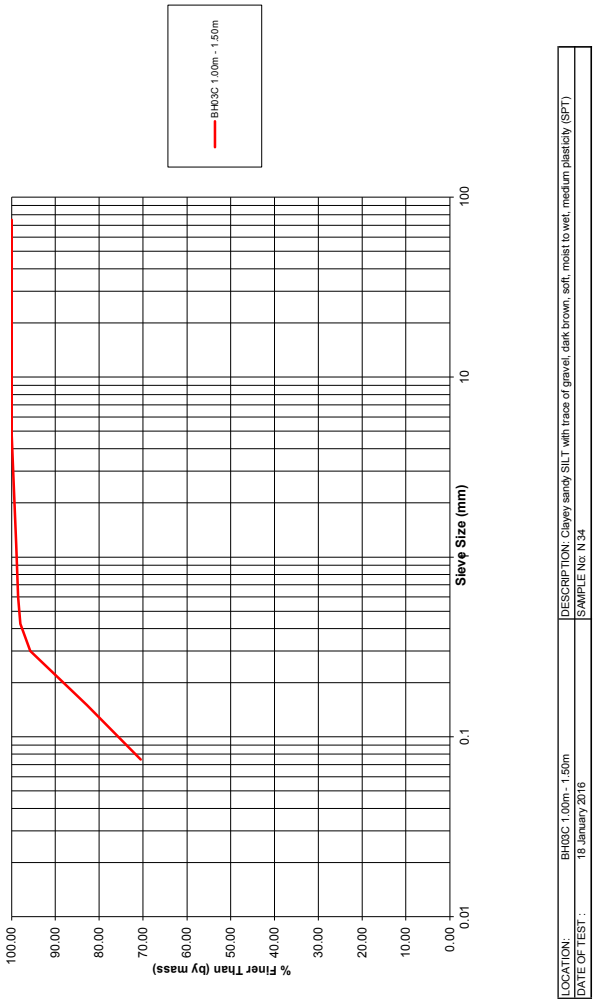
Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	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	0.93	N/A	0.52	99.48	150	200
1.18 mm	1.02	N/A	0.57	98.92	100	200
600 µm	0.72	N/A	0.40	98.52	80	200
425 µm	0.82	N/A	0.46	98.06	70	200
300 µm	4.13	N/A	2.29	95.77	60	200
150 µm	23.25	N/A	12.91	82.86	40	200
75 µm	22.18	N/A	12.32	70.54	25	200
Passing 75 µm	127.05	N/A	70.54	0.00	-	-
Pan Total	180.10	-	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 : 18 January 2016	Date : 27 January 2016	Date : 27 January 2016

Form GE-L-06

Page 1 of 2



DESCRIPTION:	Clayey sandy SILT with trace of gravel, dark brown, soft, moist to wet, medium plasticity (SPT)
SAMPLE No:	N 34
LOCATION:	BH03C 1.00m - 1.50m
DATE OF TEST :	18 January 2016

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	21 January 2016
SITE ADDRESS	:	BH03C Nawaka Village, Nadi.	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03C 2.00m - 2.50m	**MATERIAL TYPE & LOCATION**	:	Clayey sandy SILT ,pale brown orange, soft, moist, medium plasticity (PT)
TEST NUMBER	:	N 35			

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

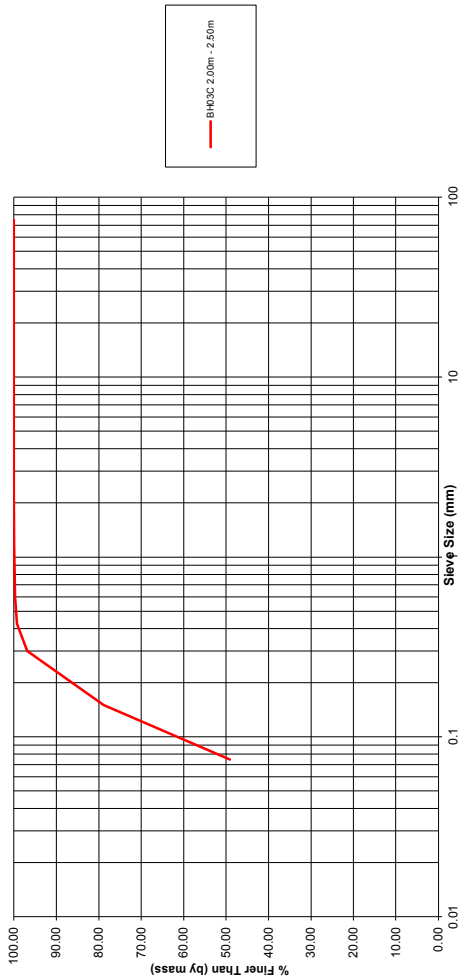
Moisture Content (Material passing 19mm)	Container No.	-	4	5	SPLIT SAMPLE
	Mass of Container	g	52.63	53.37	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	98.29	98.10	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	87.68	87.63	Spliting Factor M_3 / M_4
	Mass of Dry Soil	g	35.05	34.26	
	Mass of Moisture	g	10.61	10.47	
	Moisture Content	%	30.27	30.56	
	Average Moisture Content	%	30.42		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	196.67
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	150.80

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	0.09	N/A	0.06	99.94	100	200
600 µm	0.38	N/A	0.25	99.69	80	200
425 µm	0.71	N/A	0.47	99.22	70	200
300 µm	3.60	N/A	2.39	96.83	60	200
150 µm	27.10	N/A	17.97	78.86	40	200
75 µm	44.87	N/A	29.75	49.11	25	200
Passing 75 µm	74.05	N/A	49.11	0.00	-	-
Pan Total	150.80	-	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 :21 January 2016	Date : 27 January 2016	Date : 27 January 2016



DESCRIPTION: Clayey sandy SILT ,pale brown orange, soft, moist, medium plasticity (PT)
SAMPLE No: N 35
LOCATION: BH03C 2.00m - 2.50m
DATE OF TEST : 21 January 2016

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	21 January 2016
SITE ADDRESS	:	BH03C Nawaka Village, Nadi.	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03C 3.50 - 4.00m	**MATERIAL TYPE & LOCATION**	:	Silty fine SAND, pale brown orange, loosely to tightly packed, moist (SPT)
TEST NUMBER	:	N 36			

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

Moisture Content (Material passing 19mm)	Container No.	-	19	21
	Mass of Container	g	14.87	14.51
	Mass of Container + Wet Soil	g	35.40	35.26
	Mass of Container + Dry Soil	g	30.46	30.33
	Mass of Dry Soil	g	15.59	15.82
	Mass of Moisture	g	4.94	4.93
	Moisture Content	%	31.69	31.16
	Average Moisture Content	%	31.43	

SPLIT SAMPLE

Mass Passing Last Sieve: - gM_3

Mass after Spliting: - gM_4

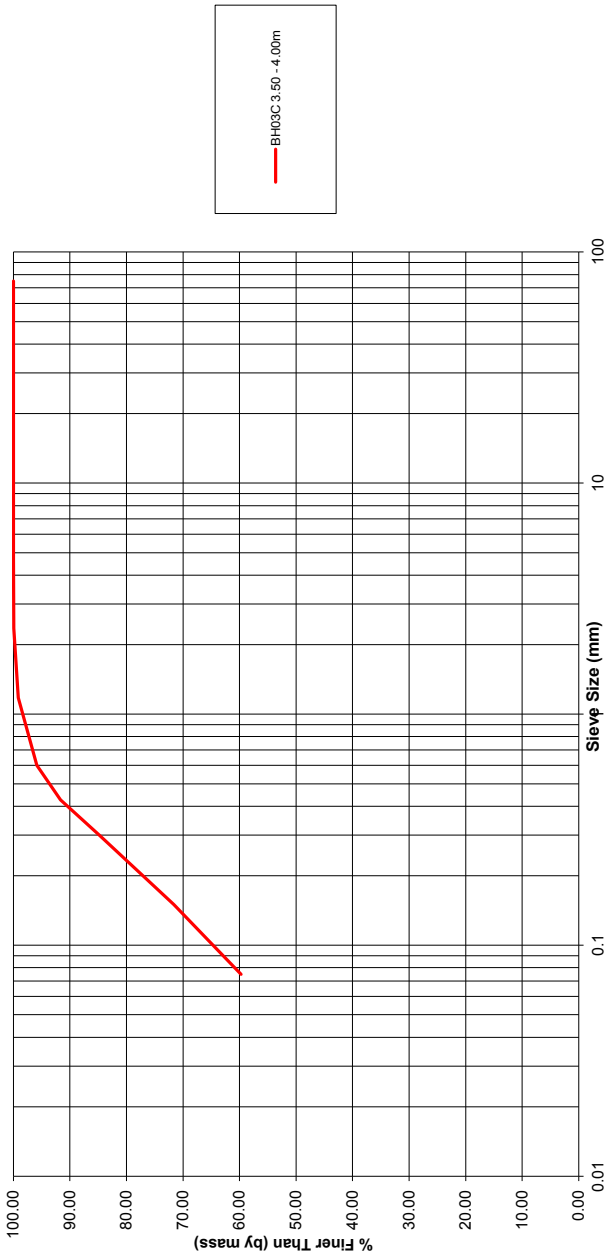
Spliting Factor $\frac{M_3}{M_4}$ =

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	225.03
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	171.22

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	0.15	N/A	0.09	99.91	150	200
1.18 mm	1.35	N/A	0.79	99.12	100	200
600 µm	5.66	N/A	3.31	95.82	80	200
425 µm	7.13	N/A	4.16	91.65	70	200
300 µm	11.70	N/A	6.83	84.82	60	200
150 µm	22.56	N/A	13.18	71.64	40	200
75 µm	20.34	N/A	11.88	59.76	25	200
Passing 75 µm	102.33	N/A	59.76	0.00	-	-
Pan Total	171.22	-	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 : 21 January 2016	Date : 27 January 2016	Date : 27 January 2016



DESCRIPTION: Silty fine SAND, pale brown orange, loosely to tightly packed, moist (SPT)

LOCATION: BH03C 3.50 - 4.00m

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.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	: 21 January 2016
SITE ADDRESS	: BH03C Nawaka Village, Nadi.	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH03C 5.00m - 5.50m	**MATERIAL TYPE & LOCATION**	: Clayey SILT with minor fine sand, brown grey, soft to firm, moist, medium plasticity (PT)
TEST NUMBER	: N 37		

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

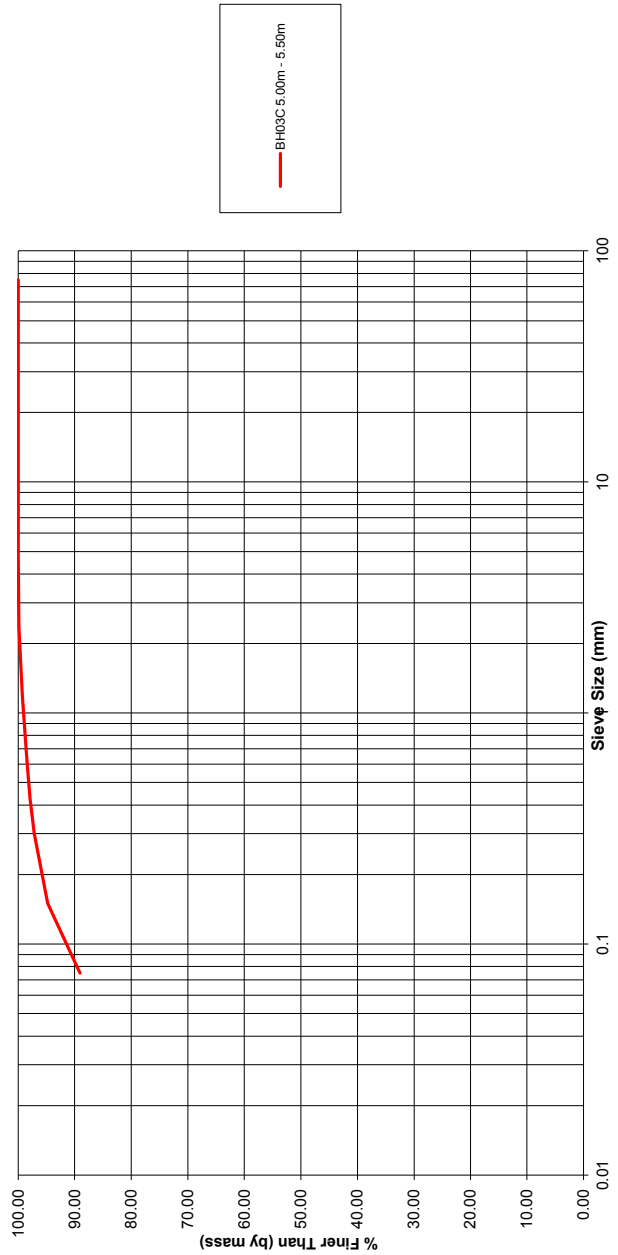
Moisture Content (Material passing 19mm)	Container No.	-	9	10	SPLIT SAMPLE
	Mass of Container	g	53.51	52.29	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	107.42	107.14	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	92.61	92.08	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	39.10	39.79	
	Mass of Moisture	g	14.81	15.06	
	Moisture Content	%	37.88	37.85	
	Average Moisture Content	%	37.86		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	220.42
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	159.88

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	0.22	N/A	0.14	99.86	150	200
1.18 mm	0.94	N/A	0.59	99.27	100	200
600 µm	1.34	N/A	0.84	98.44	80	200
425 µm	0.88	N/A	0.55	97.89	70	200
300 µm	1.14	N/A	0.71	97.17	60	200
150 µm	3.78	N/A	2.36	94.81	40	200
75 µm	9.13	N/A	5.71	89.10	25	200
Passing 75 µm	142.45	N/A	89.10	0.00	-	-
Pan Total	159.88	-	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 : 23 January 2016	Date : 27 January 2016	Date : 27 January 2016



DESCRIPTION: Clayey SILT with minor fine sand, brown grey, soft to firm, moist, medium plasticity (PT)

LOCATION: BH03C 5.00m - 5.50m

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.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	21 January 2016
SITE ADDRESS	:	BH03C Nawaka Village, Nadi.	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03C 6.50m - 7.00m	**MATERIAL TYPE & LOCATION**	:	Sandy SILT with trace of clay, grey, soft to firm, moist, medium plasticity (SPT)
TEST NUMBER	:	N 38			

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

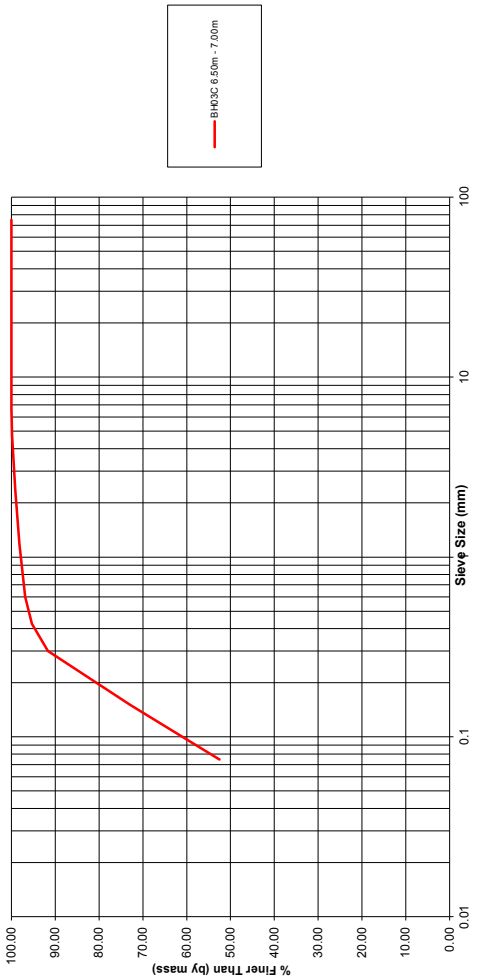
Moisture Content (Material passing 19mm)	Container No.	-	88	89	SPLIT SAMPLE
	Mass of Container	g	124.11	121.04	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	192.64	192.08	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	173.92	172.37	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	49.81	51.33	
	Mass of Moisture	g	18.72	19.71	
	Moisture Content	%	37.58	38.40	
	Average Moisture Content	%	37.99		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	285.81
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	207.12

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	0.24	N/A	0.12	99.88	250	200
2.36 mm	1.57	N/A	0.76	99.13	150	200
1.18 mm	1.97	N/A	0.95	98.17	100	200
600 µm	2.62	N/A	1.26	96.91	80	200
425 µm	3.28	N/A	1.58	95.33	70	200
300 µm	7.61	N/A	3.67	91.65	60	200
150 µm	38.95	N/A	18.81	72.85	40	200
75 µm	42.02	N/A	20.29	52.56	25	200
Passing 75 µm	108.86	N/A	52.56	0.00	-	-
Pan Total	207.12	-	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 : KB	Approved by : IG
Date : 18 January 2016	Date : 27 January 2016	Date : 27 January 2016



LOCATION:	BH03C 6.50m - 7.00m
DATE OF TEST :	18 January 2016
DESCRIPTION:	Sandy SILT with trace of clay, grey, soft to firm, moist, medium plasticity (SPT)
SAMPLE No:	N 38

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	21 January 2016
SITE ADDRESS	:	BH03C Nawaka Village, Nadi.	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH03C 8.00m - 8.50m	**MATERIAL TYPE & LOCATION**	:	SILT with minor fine sand, soft to firm, moist, medium plasticity (PT)
TEST NUMBER	:	N 39			

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

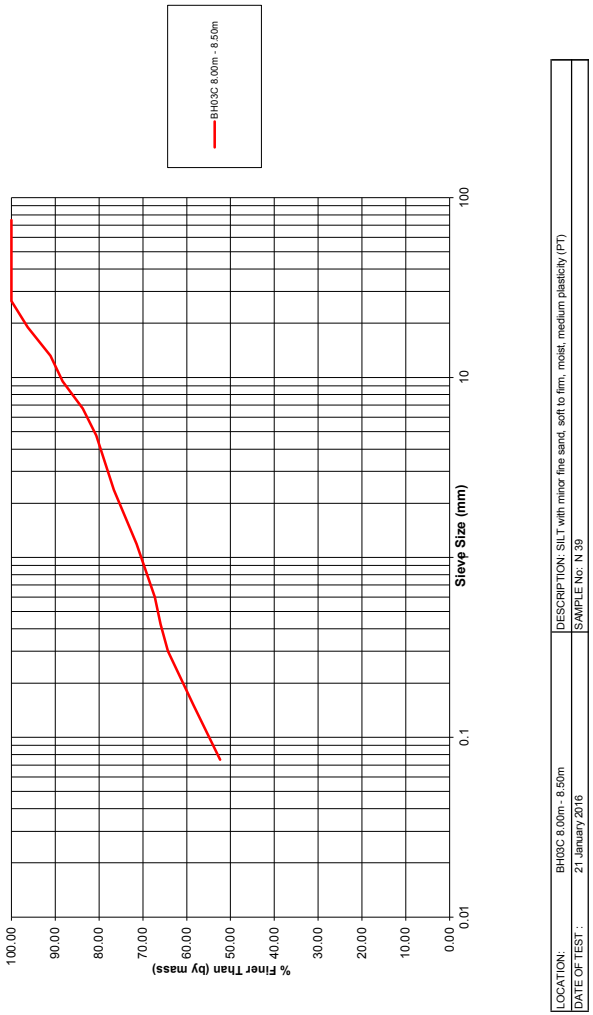
Moisture Content (Material passing 19mm)	Container No.	-	3	6	SPLIT SAMPLE
	Mass of Container	g	52.42	53.09	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	150.38	150.16	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	132.66	132.95	Spliting Factor = M_5 / M_4
	Mass of Dry Soil	g	80.24	79.86	
	Mass of Moisture	g	17.72	17.21	
	Moisture Content	%	22.08	21.55	
	Average Moisture Content	%	21.82		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	540.70
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	443.86

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	16.53	N/A	3.72	96.28		200
13.2 mm	22.92	N/A	5.16	91.11	600	300
9.50 mm	12.18	N/A	2.74	88.37	450	300
6.70 mm	20.77	N/A	4.68	83.69	300	300
4.75 mm	13.49	N/A	3.04	80.65	250	200
2.36 mm	17.80	N/A	4.01	76.64	150	200
1.18 mm	23.11	N/A	5.21	71.43	100	200
600 µm	18.43	N/A	4.15	67.28	80	200
425 µm	6.00	N/A	1.35	65.93	70	200
300 µm	7.31	N/A	1.65	64.28	60	200
150 µm	25.91	N/A	5.84	58.44	40	200
75 µm	26.93	N/A	6.07	52.38	25	200
Passing 75 µm	232.48	N/A	52.38	0.00	-	-
Pan Total	443.86	-	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 : 21 January 2016	Date : 27 January 2016	Date : 27 January 2016



LOCATION:	BH03C 8.00m - 8.50m
DATE OF TEST :	21 January 2016
DESCRIPTION:	SILT with minor fine sand, soft to firm, moist, medium plasticity (PT)
SAMPLE No:	N 39

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Form GE-L-06

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 20 January 2016
SITE ADDRESS	: BH03C, Nawaka Village, Nadi.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey sandy SILT with trace of gravel, dark brown, soft, moist to wet, medium plasticity (SPT)	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N34 (BH03C 1.00m - 1.50m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	56	60				
Mass of Container	g	62.65	62.99				
Mass of Container + Wet Soil	g	87.64	88.19				
Mass of Container + Dry Soil	g	83.17	83.70				
Mass of Dry Soil	g	20.52	20.71				
Mass of Moisture	g	4.47	4.49				
Moisture Content	%	21.78	21.68				21.73

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		116	122				
Mass of Container	g	11.71	11.70				
Mass of Container + Wet Soil	g	17.52	17.21				
Mass of Container + Dry Soil	g	16.40	16.16				
Mass of Dry Soil	g	4.69	4.46				
Mass of Moisture	g	1.12	1.05				
Moisture Content	%	23.88	23.54				23.71

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	15
Container No.		125	171	176	174	146	172
Mass of Container	g	11.88	11.81	11.78	12.21	11.74	12.33
Mass of Container + Wet Soil	g	18.47	17.34	16.74	17.99	18.16	20.99
Mass of Container + Dry Soil	g	16.76	15.87	15.45	16.46	16.39	18.61
Mass of Dry Soil	g	4.88	4.06	3.67	4.25	4.65	6.28
Mass of Moisture	g	1.71	1.47	1.29	1.53	1.77	2.38
Moisture Content	%	35.04	36.21	35.15	36.00	38.06	37.90

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				116.00		
% Shrinkage				7.20		7.20

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

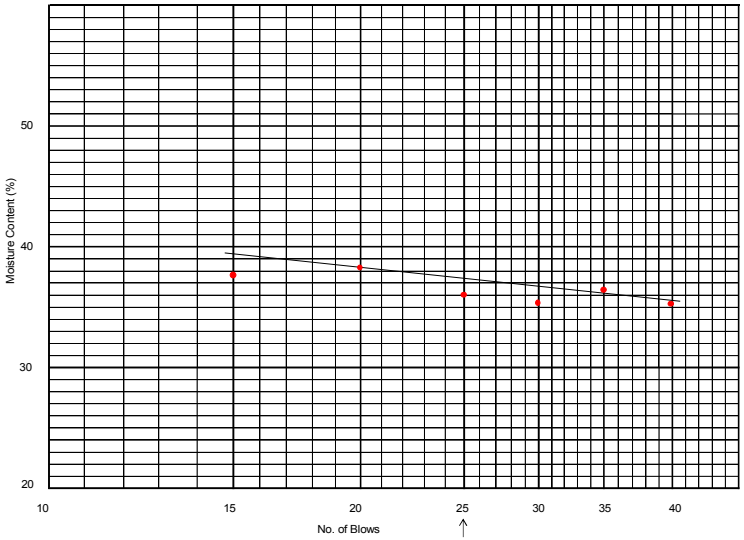
Liquid Limit	37.20 %
Plastic Limit	23.71 %
Plasticity Index	13.49 %
Shrinkage Limit	7.20 %

Tested By:RK
Date:20 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Graph of Moisture Content vs No. of Blows



Project No: 1920815A
Sample No: N 34

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 20 January 2016
SITE ADDRESS	: BH03C, Nawaka Village, Nadi.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey SILT with minor sand, dark brown, soft to firm, moist, high plasticity (PT)	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N37 (BH03C 5.00m - 5.50m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	35	36				
Mass of Container	g	14.29	14.10				
Mass of Container + Wet Soil	g	42.44	42.43				
Mass of Container + Dry Soil	g	34.64	34.60				
Mass of Dry Soil	g	20.35	20.50				
Mass of Moisture	g	7.80	7.83				
Moisture Content	%	38.33	38.20				38.26

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		170	159				
Mass of Container	g	12.06	12.20				
Mass of Container + Wet Soil	g	17.51	17.61				
Mass of Container + Dry Soil	g	16.03	16.17				
Mass of Dry Soil	g	3.97	3.97				
Mass of Moisture	g	1.48	1.44				
Moisture Content	%	37.28	36.27				36.78

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	16
Container No.		157	139	115	135	100	144
Mass of Container	g	11.86	11.34	11.75	11.59	11.73	11.96
Mass of Container + Wet Soil	g	19.90	19.44	19.93	23.72	23.99	20.20
Mass of Container + Dry Soil	g	17.02	16.55	17.00	19.35	19.51	17.17
Mass of Dry Soil	g	5.16	5.21	5.25	7.76	7.78	5.21
Mass of Moisture	g	2.88	2.89	2.93	4.37	4.48	3.03
Moisture Content	%	55.81	55.47	55.81	56.31	57.58	58.16

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

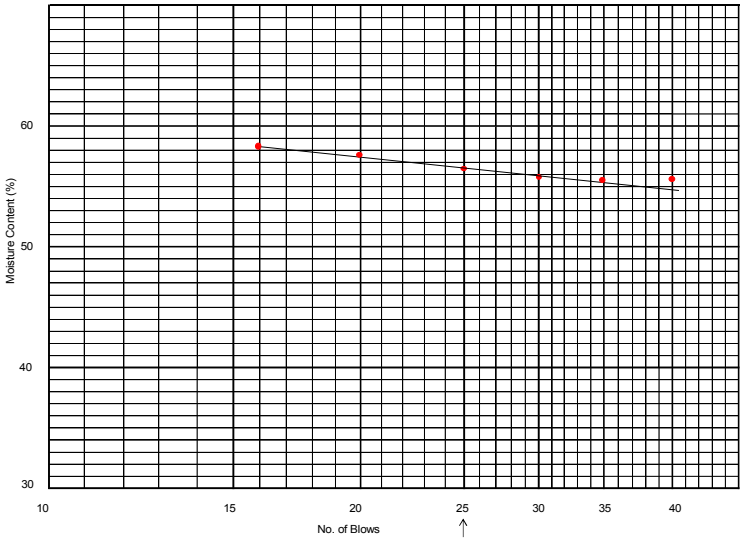
Liquid Limit	56.50 %
Plastic Limit	36.78 %
Plasticity Index	19.72 %
Shrinkage Limit	18.40 %

Tested By:RK
Date:20 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Graph of Moisture Content vs No. of Blows



Project No: 1920815A
Sample No: N 37

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815A
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 25 January 2016
SITE ADDRESS	: BH03C, Nawaka Village, Nadi.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with minor fine sand, soft to firm, moist, medium plasticity (PT)	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N39 (BH03C 8.00m - 8.50m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	9	10				
Mass of Container	g	53.53	52.24				
Mass of Container + Wet Soil	g	84.10	82.18				
Mass of Container + Dry Soil	g	76.17	74.56				
Mass of Dry Soil	g	22.64	22.32				
Mass of Moisture	g	7.93	7.62				
Moisture Content	%	35.03	34.14				34.58

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		43	44				
Mass of Container	g	14.87	14.58				
Mass of Container + Wet Soil	g	22.25	22.23				
Mass of Container + Dry Soil	g	20.79	20.82				
Mass of Dry Soil	g	5.92	6.24				
Mass of Moisture	g	1.46	1.41				
Moisture Content	%	24.66	22.60				23.63

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	15
Container No.		166	157	100	139	115	144
Mass of Container	g	11.71	11.87	11.74	11.36	11.75	11.96
Mass of Container + Wet Soil	g	23.02	24.75	23.03	23.25	24.92	25.02
Mass of Container + Dry Soil	g	19.76	21.03	19.79	19.75	21.01	21.09
Mass of Dry Soil	g	8.05	9.16	8.05	8.39	9.26	9.13
Mass of Moisture	g	3.26	3.72	3.24	3.50	3.91	3.93
Moisture Content	%	40.50	40.61	40.25	41.72	42.22	43.04

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample		125.00				
Final length of Sample after Shrinkage		112.00				
% Shrinkage		10.40				10.40

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

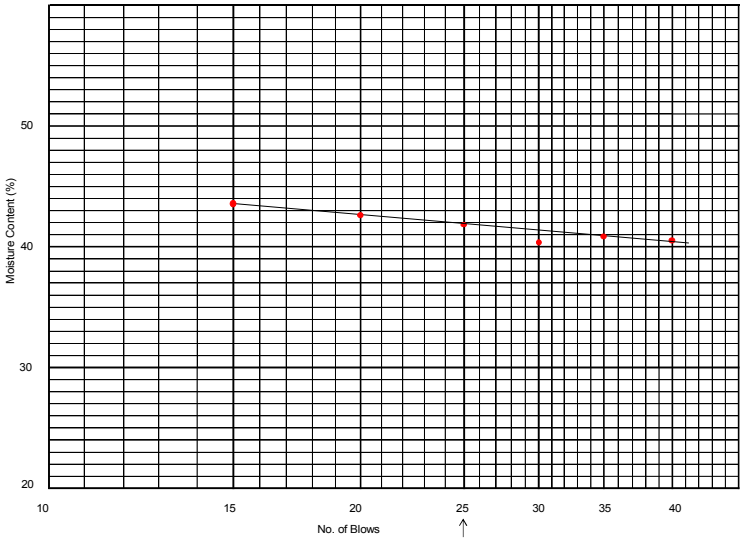
Liquid Limit	42.00 %
Plastic Limit	23.63 %
Plasticity Index	18.37 %
Shrinkage Limit	10.40 %

Tested By:RK
Date:25 January 2016

Q.A. Checked By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

Graph of Moisture Content vs No. of Blows



Project No: 1920815A
Sample No: N 39

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works.	**DATE TESTED**	:	23 January 2016
SITE ADDRESS	:	BH 03C, Nawaka village,Nadi.	**TECHNOLOGIST**	:	FM
SAMPLE LOCATION	:	BH 03C 16.35m - 16.65m	**MATERIAL TYPE**	:	Fine grain SANDSTONE, dark grey, closely spaced defects, narrow aperture of discontinuity (Core 2)
TEST NUMBER	:	N43			

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	550.65
	Mass of Container + Dry Soil	g	483.85
	Mass of Dry Soil	g	367.38
	Mass of Moisture	g	66.80
	Moisture Content	%	18.18

Bulk Density	Sample No.	-	N43
	Diameter of Specimen	mm	61.03
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2923.86
	Initial length of specimen Lo	mm	120.16
	Initial mass of specimen Mi	g	722.50
	Bulk Density ρ	t/m^3	2.06
	Dry Density ρd	t/m^3	1.74

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	0.002924	0.00
0.50	3.0	0.375	0.416	0.002936	127.72
1.00	19.0	2.375	0.832	0.002948	805.52
1.50	38.0	4.6428	1.248	0.002961	1568.08
2.00	67.0	8.125	1.664	0.002973	2732.61
2.50	102.0	12.3809	2.081	0.002986	4146.34
3.00	138.0	16.7857	2.497	0.002999	5597.61
3.50	171.0	20.7142	2.913	0.003012	6878.18
4.00	204.0	24.6428	3.329	0.003025	8147.61
4.50	235.0	28.3333	3.745	0.003038	9327.47

Tested by : FM	Q.A. Check by :KB	Approved by : IG
Date : 23 January 2016	Date : 27 January 2016	Date : 27 January 2016

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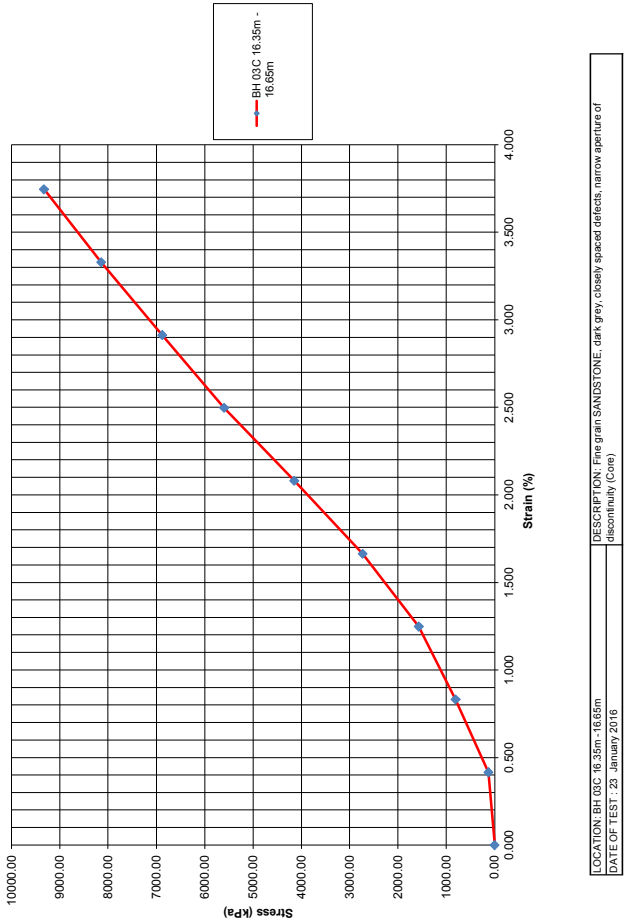
STRESS VS STRAIN



LOCATION: BH 03C 16.35m -16.65m
DATE OF TEST : 23 January 2016
DESCRIPTION: Fine grain SANDSTONE, dark grey, closely spaced defects, narrow aperture of discontinuity (Core)

Form GE-L-10

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works.	**DATE TESTED**	:	25 January 2016
SITE ADDRESS	:	BH 03C, Nawaka village,Nadi.	**TECHNOLOGIST**	:	FM/SL
SAMPLE LOCATION	:	BH 03C 21.1m - 21.4m	**MATERIAL TYPE**	:	Fine grain SANDSTONE, dark grey, closely spaced defects, narrow aperture of discontinuity (Core 9)
TEST NUMBER	:	N 44			

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	838.37
	Mass of Container + Dry Soil	g	768.98
	Mass of Dry Soil	g	652.51
	Mass of Moisture	g	69.39
	Moisture Content	%	10.63

Bulk Density	Sample No.	-	N44
	Diameter of Specimen	mm	60.85
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2906.64
	Initial length of specimen Lo	mm	120.21
	Initial mass of specimen Mi	g	724.18
	Bulk Density ρ	t/m³	2.07
	Dry Density ρd	t/m³	1.87

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	0.002907	0.00
0.50	15.0	1.875	0.416	0.002919	642.39
1.00	29.0	3.5714	0.832	0.002931	1218.48
1.50	44.0	5.3571	1.248	0.002943	1820.06
2.00	65.0	7.875	1.664	0.002956	2664.24
2.50	96.0	11.6666	2.080	0.002968	3930.30
3.00	128.0	15.5952	2.496	0.002981	5231.48
3.50	161.0	19.5238	2.912	0.002994	6521.40
4.00	195.0	23.5714	3.328	0.003007	7839.66
4.50	229.0	27.619	3.743	0.003020	9146.34

Tested by : FM/SL	Q.A. Check by :KB	Approved by : IG
Date : 25 January 2016	Date : 27 January 2016	Date : 27 January 2016

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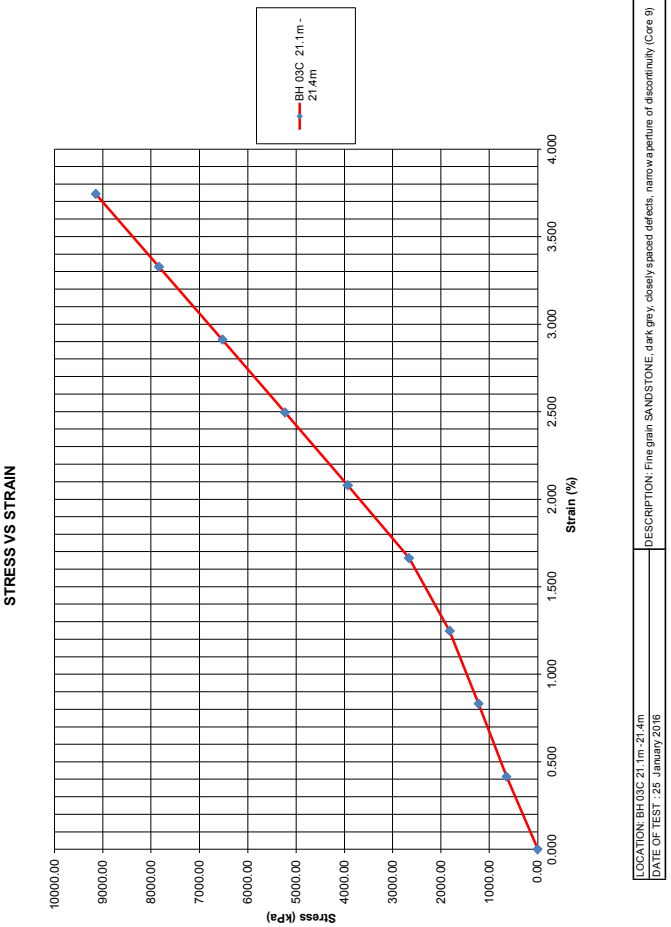
STRESS VS STRAIN



DESCRIPTION: Fine grain SANDSTONE, d ark grey, closely spaced defects, narrow aperture of discontinuity (Core 9)

LOCATION: BH 03C 21.1m -21.4m
DATE OF TEST : 25 January 2016

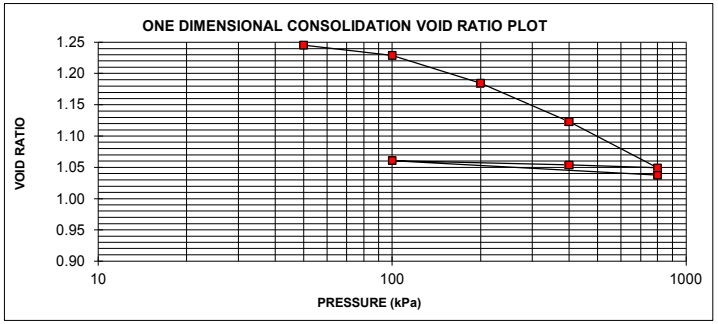
Form GE-L-10

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 35
Client Name:	Japan International Cooperation Agency (JICA)	**Depth:**	2.0-2.5m
Job No:	1920815A	**Tested By:**	IG
Site Address :	Nawaka Village, Nadi.	**Date Tested:**	15 January 2016
Sample Location:	BH 03C		

Sample Description: Clayey sandy SILT ,pale brown orange, soft, moist, medium plasticity
Sample History: Undisturbed / ~~Remoulded~~ / ~~Compacted~~ / ~~Slurried~~ / ~~Unknown~~
Date Sample Collected: 06/01/16 **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 21.22
Mass of ring + ~~watch glass~~ + wet specimen		g	M_3	269.00	M_4 264.87
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	$M_3 - M_5$	19.12	$M_4 - M_5$ 14.99
Water content, *w*		%	w_i	43.64	w_f 34.22
Dry density, Q_d		t/m^3	Q_{di}	1.16	Q_{df} 1.30
Height of soil particles, H_s		mm		10.41	
Voids ratio, *e*			e_i	1.29	e_f 1.04
Degree of saturation, *S*			S_i	89.96	S_f 87.39

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)*
50	0.418	23.382	0.018	12.97	1.25	42.14	
100	0.588	23.212	0.025	12.80	1.23	41.53	0.49
200	1.052	22.748	0.046	12.33	1.18	89.75	0.44
400	1.694	22.106	0.077	11.69	1.12	150.67	0.36
800	2.462	21.338	0.115	10.92	1.05	35.10	0.26
400	2.416	21.384	0.113	10.97	1.05	0.00	-0.25
100	2.342	21.458	0.109	11.04	1.06	0.00	-0.33
800	2.582	21.218	0.122	10.80	1.04	78.08	0.15
0	0.00	23.800	0.000	13.39	1.29	0.00	

Tested by: IG
Date: 15 January 2016

Q.A. Check By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

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

Loading Date & Time					15/01/2016 @ 07:46hrs			18/01/2016 @ 08:04hrs			19/01/2016 @ 08:11hrs			20/01/2016 @ 08:18hrs			21/01/2016 @ 08:27hrs			22/01/2016 @ 08:31hrs		
Hanger Load					800g			1600g			3200g			6400g			12800g			6400g		
Effective Pressure					50 kPa			100 kPa			200kPa			400kPa			800kPa			400kPa		
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	07:46:00	2296	0.000	08:04	2086	0.000	08:11	1992	0.000	08:18	1749	0.000	08:27	1401	0.000	08:31	960	0.000
		6	0.100	0.316	07:46:06	2195	0.202	08:04:06	2060	0.052	08:11:06	1890	0.204	08:18:06	1580	0.338	08:27:06	1345	0.112	08:31:06	980	0.040
		15	0.250	0.500	07:46:15	2187	0.218	08:04:15	2052	0.068	08:11:15	1875	0.234	08:18:15	1555	0.388	08:27:15	1240	0.322	08:31:15	980	0.040
		30	0.500	0.707	07:46:30	2179	0.234	08:04:30	2048	0.076	08:11:30	1860	0.264	08:18:30	1540	0.418	08:27:30	1222	0.358	08:31:30	980	0.040
	1		1.000	1.000	07:47:00	2169	0.254	08:05:00	2044	0.084	08:12:00	1843	0.298	08:19:00	1521	0.456	08:28:00	1100	0.602	08:32:00	981	0.042
	2	15	2.250	1.500	07:48:15	2159	0.274	08:06:15	2038	0.096	08:13:15	1825	0.334	08:20:15	1497	0.504	08:29:15	1069	0.664	08:33:15	982	0.044
	4		4.000	2.000	07:50:00	2154	0.284	08:08:00	2036	0.100	08:15:00	1815	0.354	08:22:00	1483	0.532	08:31:00	1057	0.688	08:35:00	982	0.044
	6	15	6.250	2.500	07:52:15	2152	0.288	08:10:15	2030	0.112	08:17:15	1808	0.368	08:24:15	1474	0.550	08:33:15	1046	0.710	08:37:15	982	0.044
	9		9.000	3.000	07:55:00	2150	0.292	08:13:00	2028	0.116	08:20:00	1803	0.378	08:27:00	1468	0.562	08:36:00	1039	0.724	08:40:00	982	0.044
	16		16.00	4.000	08:02:00	2148	0.296	08:20:00	2024	0.124	08:27:00	1793	0.398	08:34:00	1458	0.582	08:43:00	1028	0.746	08:47:00	982	0.044
	30		30.00	5.480	08:16:00	2146	0.300	08:34:00	2020	0.132	08:41:00	1785	0.414	08:48:00	1449	0.600	08:57:00	1016	0.770	09:01:00	983	0.046
1			60.00	7.750	08:46:00	2144	0.304	09:04:00	2016	0.140	09:11:00	1780	0.424	09:18:00	1440	0.618	09:27:00	1005	0.792	09:31:00	983	0.046
2			120.0	10.950	09:46:00	2119	0.354	10:04:00	2011	0.150	10:11:00	1772	0.440	10:18:00	1431	0.636	10:27:00	995	0.812	10:31:00	983	0.046
4			240.0	15.49	11:46:00	2113	0.366	12:04:00	2005	0.162	12:11:00	1766	0.452	12:18:00	1422	0.654	12:27:00	984	0.834	12:31:00	983	0.046
8			480.0	21.91	15:46:00	2107	0.378	16:04:00	2000	0.172	16:11:00	1759	0.466	16:18:00	1412	0.674	16:27:00	973	0.856	16:31:00	984	0.048
24			1440	37.95	07:46:00	2086	0.420	08:04:00	1992	0.188	08:11:00	1749	0.486	08:18:00	1401	0.696	08:27:00	960	0.882	08:31:00	985	0.050
																				UNLOADING		
Machine Correction					0.002			0.018			0.022			0.054			0.114			0.004		
Δ H (Corrected)					0.418			0.170			0.464			0.642			0.768			0.046		
Net Total Settlement					0.418			0.588			1.052			1.694			2.462			2.416		

D15-489

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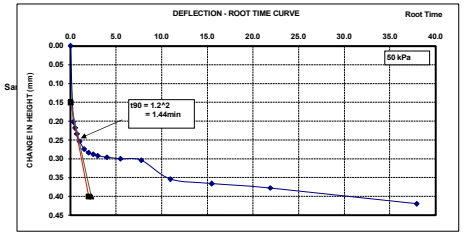
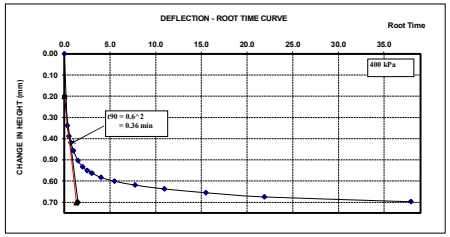
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

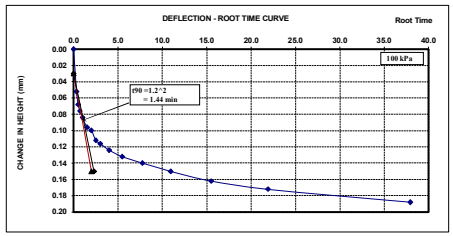
Loading Date and Time					23/012016 @ 08:33hrs			25/01/2016 @ 08:08hrs														
Hanger Load					1600g			12800g														
Effective Pressure					100kPa			800kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	sec	t min	√t min	△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	08:33	985	0.000	08:08	1057	0.000												
		6	0.100	0.316	08:33:06	1036	0.102	08:08:06	960	0.194												
		15	0.250	0.500	08:33:15	1037	0.104	08:08:15	952	0.210												
		30	0.500	0.707	08:33:30	1038	0.106	08:08:30	951	0.212												
	1		1.000	1.000	08:34:00	1040	0.110	08:09:00	949	0.216												
	2	15	2.250	1.500	08:35:15	1043	0.116	08:10:15	946	0.222												
	4		4.000	2.000	08:37:00	1044	0.118	08:12:00	944	0.226												
	6	15	6.250	2.500	08:39:15	1045	0.120	08:14:15	943	0.228												
	9		9.000	3.000	08:42:00	1046	0.122	08:17:00	942	0.230												
	16		16.00	4.000	08:49:00	1047	0.124	08:24:00	940	0.234												
	30		30.00	5.480	09:03:00	1048	0.126	08:38:00	937	0.240												
1			60.00	7.750	09:33:00	1050	0.130	09:08:00	935	0.244												
2			120.0	10.950	10:33:00	1051	0.132	10:08:00	933	0.248												
4			240.0	15.49	12:33:00	1052	0.134	12:08:00	928	0.258												
8			480.0	21.91	16:33:00	1054	0.138	16:08:00	924	0.266												
24			1440	37.95	08:33:00	1057	0.144	08:08:00	918	0.278												
					UNLOADING			RELOADING														
Machine Correction					0.028			0.038														
Δ H (Corrected)					0.116			0.240														
Net Total Settlement					2.342			2.582														

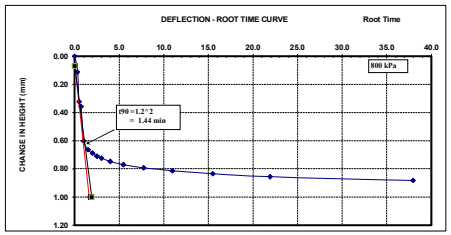
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

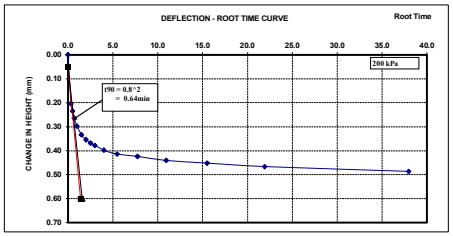
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

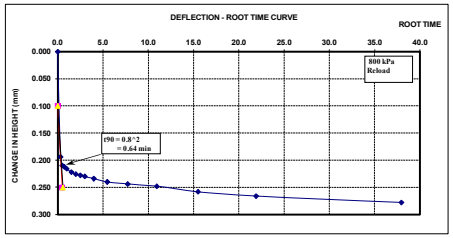












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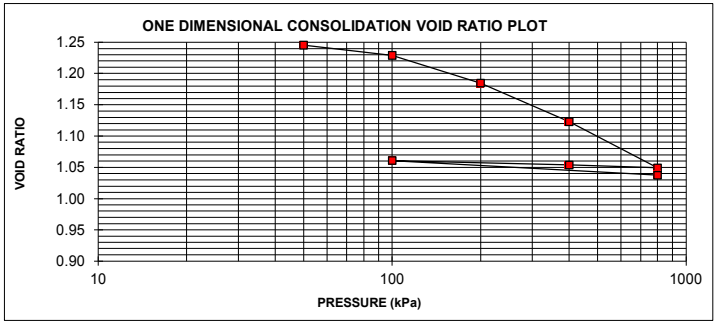
Determination of The One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Project Name:	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**Sample No:**	N 35
Client Name:	Japan International Cooperation Agency (JICA)	**Depth:**	2.0-2.5m
Job No:	1920815A	**Tested By:**	IG
Site Address :	Nawaka Village, Nadi.	**Date Tested:**	15 January 2016
Sample Location:	BH 03C		

Sample Description: Clayey sandy SILT ,pale brown orange, soft, moist, medium plasticity
Sample History: Undisturbed ~~/ Remoulded / Compacted / Slurried / Unknown~~
Date Sample Collected: 06/01/16 **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	21.22
Mass of ring + ~~watch glass~~ + wet specimen		g	M_3 269.00	M_4	264.87
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	$M_3 - M_5$ 19.12	$M_4 - M_5$	14.99
Water content, *w*		%	w_i 43.64	w_f	34.22
Dry density, Q_d		t/m^3	Q_{di} 1.16	Q_{df}	1.30
Height of soil particles, H_s		mm	10.41		
Voids ratio, *e*			e_i 1.29	e_f	1.04
Degree of saturation, *S*			S_i 89.96	S_f	87.39

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)*
50	0.418	23.382	0.018	12.97	1.25	42.14	
100	0.588	23.212	0.025	12.80	1.23	41.53	0.49
200	1.052	22.748	0.046	12.33	1.18	89.75	0.44
400	1.694	22.106	0.077	11.69	1.12	150.67	0.36
800	2.462	21.338	0.115	10.92	1.05	35.10	0.26
400	2.416	21.384	0.113	10.97	1.05	0.00	-0.25
100	2.342	21.458	0.109	11.04	1.06	0.00	-0.33
800	2.582	21.218	0.122	10.80	1.04	78.08	0.15
0	0.00	23.800	0.000	13.39	1.29	0.00	

Tested by: IG
Date: 15 January 2016

Q.A. Check By: KB
Date: 27 January 2016

Approved By: IG
Date: 27 January 2016

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

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

Loading Date & Time					15/01/2016 @ 07:46hrs			18/01/2016 @ 08:04hrs			19/01/2016 @ 08:11hrs			20/01/2016 @ 08:18hrs			21/01/2016 @ 08:27hrs			22/01/2016 @ 08:31hrs		
Hanger Load					800g			1600g			3200g			6400g			12800g			6400g		
Effective Pressure					50 kPa			100 kPa			200kPa			400kPa			800kPa			400kPa		
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	07:46:00	2296	0.000	08:04	2086	0.000	08:11	1992	0.000	08:18	1749	0.000	08:27	1401	0.000	08:31	960	0.000
		6	0.100	0.316	07:46:06	2195	0.202	08:04:06	2060	0.052	08:11:06	1890	0.204	08:18:06	1580	0.338	08:27:06	1345	0.112	08:31:06	980	0.040
		15	0.250	0.500	07:46:15	2187	0.218	08:04:15	2052	0.068	08:11:15	1875	0.234	08:18:15	1555	0.388	08:27:15	1240	0.322	08:31:15	980	0.040
		30	0.500	0.707	07:46:30	2179	0.234	08:04:30	2048	0.076	08:11:30	1860	0.264	08:18:30	1540	0.418	08:27:30	1222	0.358	08:31:30	980	0.040
	1		1.000	1.000	07:47:00	2169	0.254	08:05:00	2044	0.084	08:12:00	1843	0.298	08:19:00	1521	0.456	08:28:00	1100	0.602	08:32:00	981	0.042
	2	15	2.250	1.500	07:48:15	2159	0.274	08:06:15	2038	0.096	08:13:15	1825	0.334	08:20:15	1497	0.504	08:29:15	1069	0.664	08:33:15	982	0.044
	4		4.000	2.000	07:50:00	2154	0.284	08:08:00	2036	0.100	08:15:00	1815	0.354	08:22:00	1483	0.532	08:31:00	1057	0.688	08:35:00	982	0.044
	6	15	6.250	2.500	07:52:15	2152	0.288	08:10:15	2030	0.112	08:17:15	1808	0.368	08:24:15	1474	0.550	08:33:15	1046	0.710	08:37:15	982	0.044
	9		9.000	3.000	07:55:00	2150	0.292	08:13:00	2028	0.116	08:20:00	1803	0.378	08:27:00	1468	0.562	08:36:00	1039	0.724	08:40:00	982	0.044
	16		16.00	4.000	08:02:00	2148	0.296	08:20:00	2024	0.124	08:27:00	1793	0.398	08:34:00	1458	0.582	08:43:00	1028	0.746	08:47:00	982	0.044
	30		30.00	5.480	08:16:00	2146	0.300	08:34:00	2020	0.132	08:41:00	1785	0.414	08:48:00	1449	0.600	08:57:00	1016	0.770	09:01:00	983	0.046
1			60.00	7.750	08:46:00	2144	0.304	09:04:00	2016	0.140	09:11:00	1780	0.424	09:18:00	1440	0.618	09:27:00	1005	0.792	09:31:00	983	0.046
2			120.0	10.950	09:46:00	2119	0.354	10:04:00	2011	0.150	10:11:00	1772	0.440	10:18:00	1431	0.636	10:27:00	995	0.812	10:31:00	983	0.046
4			240.0	15.49	11:46:00	2113	0.366	12:04:00	2005	0.162	12:11:00	1766	0.452	12:18:00	1422	0.654	12:27:00	984	0.834	12:31:00	983	0.046
8			480.0	21.91	15:46:00	2107	0.378	16:04:00	2000	0.172	16:11:00	1759	0.466	16:18:00	1412	0.674	16:27:00	973	0.856	16:31:00	984	0.048
24			1440	37.95	07:46:00	2086	0.420	08:04:00	1992	0.188	08:11:00	1749	0.486	08:18:00	1401	0.696	08:27:00	960	0.882	08:31:00	985	0.050
																				UNLOADING		
Machine Correction					0.002			0.018			0.022			0.054			0.114			0.004		
Δ H (Corrected)					0.418			0.170			0.464			0.642			0.768			0.046		
Net Total Settlement					0.418			0.588			1.052			1.694			2.462			2.416		

D15-491

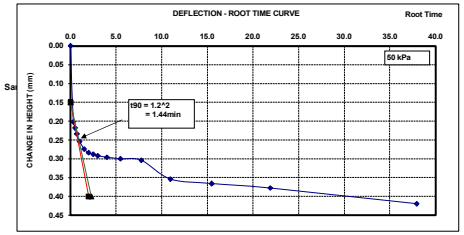
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

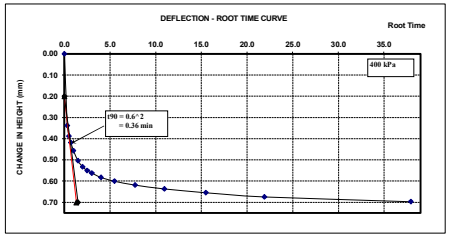
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

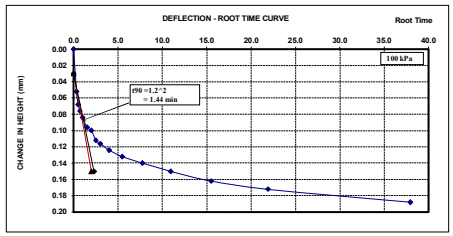
Loading Date and Time					23/012016 @ 08:33hrs			25/01/2016 @ 08:08hrs														
Hanger Load					1600g			12800g														
Effective Pressure					100kPa			800kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	sec	t min	√t min	△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	08:33	985	0.000	08:08	1057	0.000												
		6	0.100	0.316	08:33:06	1036	0.102	08:08:06	960	0.194												
		15	0.250	0.500	08:33:15	1037	0.104	08:08:15	952	0.210												
		30	0.500	0.707	08:33:30	1038	0.106	08:08:30	951	0.212												
	1		1.000	1.000	08:34:00	1040	0.110	08:09:00	949	0.216												
	2	15	2.250	1.500	08:35:15	1043	0.116	08:10:15	946	0.222												
	4		4.000	2.000	08:37:00	1044	0.118	08:12:00	944	0.226												
	6	15	6.250	2.500	08:39:15	1045	0.120	08:14:15	943	0.228												
	9		9.000	3.000	08:42:00	1046	0.122	08:17:00	942	0.230												
	16		16.00	4.000	08:49:00	1047	0.124	08:24:00	940	0.234												
	30		30.00	5.480	09:03:00	1048	0.126	08:38:00	937	0.240												
1			60.00	7.750	09:33:00	1050	0.130	09:08:00	935	0.244												
2			120.0	10.950	10:33:00	1051	0.132	10:08:00	933	0.248												
4			240.0	15.49	12:33:00	1052	0.134	12:08:00	928	0.258												
8			480.0	21.91	16:33:00	1054	0.138	16:08:00	924	0.266												
24			1440	37.95	08:33:00	1057	0.144	08:08:00	918	0.278												
					UNLOADING			RELOADING														
Machine Correction					0.028			0.038														
Δ H (Corrected)					0.116			0.240														
Net Total Settlement					2.342			2.582														

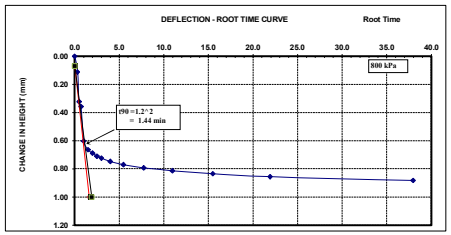
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

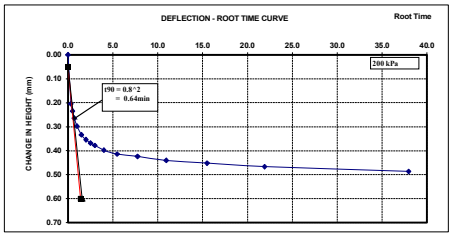
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

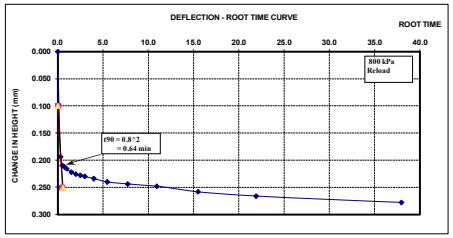












Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth			8.0 - 8.5m
Description			
Type			SILT
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	67.3
Bulk Density	ρ_0	(Mg/m3)	1.71
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	30
Initial Dry Density	ρ_{di}	(Mg/m3)	1.32
Initial Voids Ratio	e_i	.	1.003
Initial Degree of Saturation	S_i	(%)	78.0
Initial Swelling	S_s	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	28
Dry Density	ρ_{df}	(Mg/m3)	1.33
Voids Ratio	e_f	.	0.990
Saturation	S_f	(%)	74
Height Settlement	ΔL_s	(mm)	0.127
Compression Index	C_C	.	0.247
Cs	C_S	.	0.469
Po	σ'_{vo}	(kPa)	6
Eo	e_o	.	0.659
Pp	σ'_p	(kPa)	16
Ep	e_p	.	0.533

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)
50	1.001	0.016	123.6	0.016	29.0	29.0		0.359	0.0087
100	1.007	-0.045	271.1	0.061	29.0	29.0		0.164	0.0087
200	1.007	-0.045	142.0		29.0	29.0		0.314	0.0087
400	1.007	-0.045	309.7		29.0	29.0		0.144	0.0087
800	0.993	0.101	1106.9	0.018	29.0	29.0		0.040	0.0087
1600	0.991	0.123	233.5	0.001	29.0	0.0		0.188	0.0087
400	1.008	-0.048			29.0	0.0			
100	0.990	0.127			29.0	0.0			

Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_026
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference		Test Date	1/26/2016
Jobfile	Geotechnical Engineering for Nadi	Sample	N 39
Client	JICA	Borehole	BH 03C
Operator	IG/MK	Checked	DMC
		Approved	DMC

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