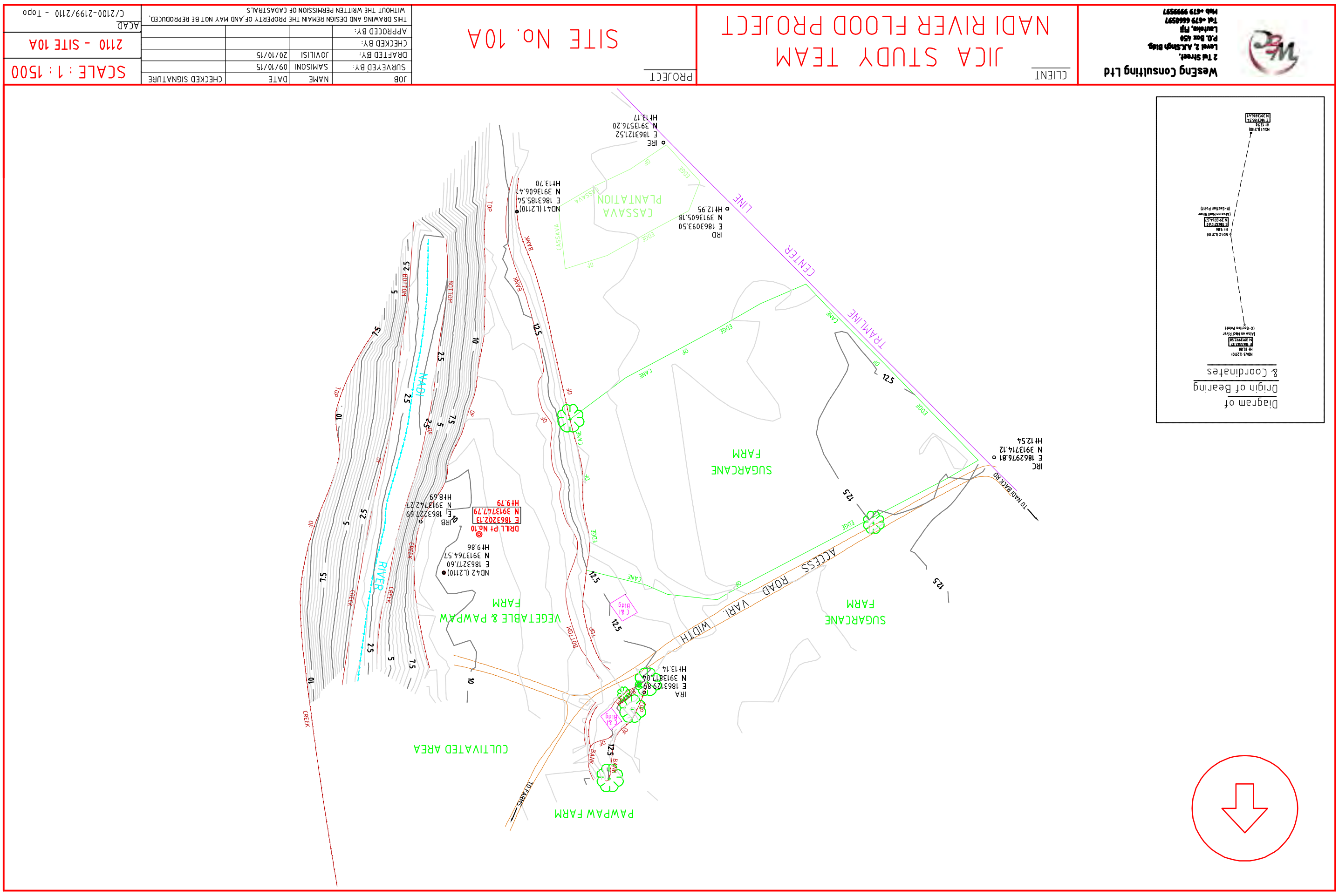
APPENDIX 10

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

APPENDIX 10a

Test Locality Plan



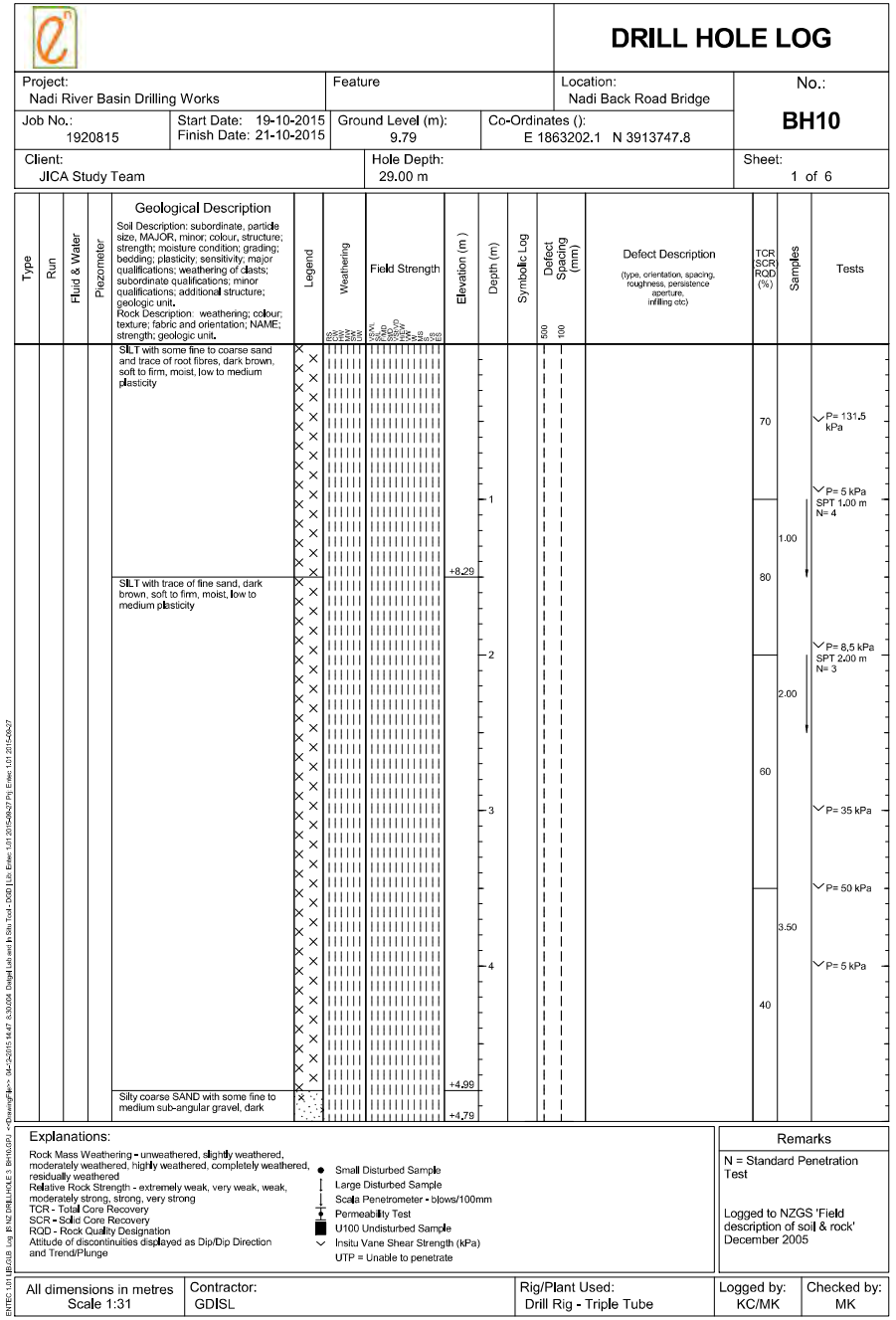
D15-305

ENTEC LIMITED ENGINEERING AND SCIENCE CONSULTANTS		CLIENT: Japan International Cooperation Agency (JICA)	NOTE: THIS DRAWING HAS BEEN REPRODUCED BY ENTEC TO SHOW THE APPROXIMATE BOREHOLE LOCATION.	DRAWN BY	SS
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	PROJECT: Nadi River Basin Project		CHECKED BY	KC
Phone	(679) 330 0300			APPROVED BY	JD
Fax	(679) 331 8618			SHEET TITLE	TEST LOCALITY PLAN
Email	info@entecfiji.com			SCALE	NTS
				ISSUE DATE	November 2015

A3
PROJECT NO: 1920815
DRAWING NO: 1 of 1

APPENDIX 10b

Engineering Borehole Log and Core Photos



DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Back Road Bridge	No.: BH10
Job No.: 1920815	Start Date: 19-10-2015 Finish Date: 21-10-2015	Ground Level (m): 9.79	Co-Ordinates (): E 1863202.1 N 3913747.8
Client: JICA Study Team	Hole Depth: 29.00 m		Sheet: 1 of 6

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				SILT with some fine to coarse sand and trace of root fibres, dark brown, soft to firm, moist, low to medium plasticity					1				70		P= 131.5 kPa
															P= 5 kPa
														1.00	SPT 1.00 m N= 4
								+8.29					80		
				SILT with trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity					2						P= 8.5 kPa
														2.00	SPT 2.00 m N= 3
													60		
									3						P= 35 kPa
															P= 50 kPa
														3.50	
									4						P= 5 kPa
													40		
				Silty coarse SAND with some fine to medium sub-angular gravel, dark				+4.99							
								+4.79							

Explanations:

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

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

UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Back Road Bridge	No.: BH10
Job No.: 1920815	Start Date: 19-10-2015 Finish Date: 21-10-2015	Ground Level (m): 9.79	Co-Ordinates (): E 1863202.1 N 3913747.8
Client: JICA Study Team	Hole Depth: 29.00 m		Sheet: 2 of 6

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 | 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)

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
brown					
Fine to coarse SAND with fine sub-angular gravel,dark brown				5.00	SPT 5.00 m N= 17
Medium sub-angular GRAVEL with trace of coarse sand	+4.29	6	20		
Fine to coarse SAND with trace of medium sub-angular gravel	+3.29			6.50	SPT 6.50 m N= 24
Fine to medium sub-angular GRAVEL with some fine to coarse sand	+2.79	7	13		
Fine to coarse SAND with trace of medium sub-rounded gravel, dark brown	+1.79	8		8.00	SPT 8.00 m N= 43
Fine to medium sub-angular to sub-rounded GRAVEL, pale brown grey	+1.29	9	20		
Fine to coarse SAND with trace of medium sub-rounded gravel, dark grey	+0.29		30	9.50	SPT 9.50 m N= 38

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Back Road Bridge	No.: BH10
Job No.: 1920815	Start Date: 19-10-2015 Finish Date: 21-10-2015	Ground Level (m): 9.79	Co-Ordinates (): E 1863202.1 N 3913747.8
Client: JICA Study Team	Hole Depth: 29.00 m		Sheet: 3 of 6

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 | 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)

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to coarse SAND with trace of medium sub-rounded gravel, dark grey *(continued)*			30		
Coarse SAND with some silt and trace of medium sub-angular gravel, pale brown	-1.21	11	13	11.00	SPT 11.00 m N= 8
		12			
Coarse SAND with some silt, brown	-2.71			12.50	SPT 12.50 m N= 14
Fine to coarse SAND with some medium sub-angular gravel, pale brown grey	-3.21	13	27		
Fine to coarse SAND with trace of medium sub-angular gravel, pale brown grey	-4.21	14		14.00	SPT 14.00 m N= 16
Fine to medium sub-angular to sub-rounded GRAVEL, grey	-4.71		20		

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH10.GPJ <<DrawingFile>> 04-12-2015 14:47 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 Basin Drilling Works		Nadi Back Road Bridge	
Job No.: 1920815	Start Date: 19-10-2015 Finish Date: 21-10-2015	Ground Level (m): 9.79	Co-Ordinates (): E 1863202.1 N 3913747.8	BH10
Client: JICA Study Team	Hole Depth: 29.00 m		Sheet: 4 of 6

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to medium sub-angular to sub-rounded GRAVEL, grey *(continued)*	-5.71		20		
Fine to coarse SAND, dark brown	-6.21	16		15.50	SPT 15.50 m N= 40
Fine to medium sub-angular to sub-rounded GRAVEL	-7.01		37		
Fine sub-angular gravel with minor coarse sand, dark grey brown	-7.21	17			
Clayey SILT with some minor shell fragments and trace of fine sub-angular gravel, grey brown, low to medium plasticity	-8.71	18	7	17.00	SPT 17.00 m N= 35
Medium sub-angular to sub-rounded GRAVEL with minor silt, dark grey brown	-9.21	19		18.50	SPT 18.50 m N= 50
SILT with some fine to medium sand and minor fine to medium sub-angular gravel with trace of shell fragments, light grey, very soft to soft, low to medium plasticity	-9.51		67		P= 103 kPa
Silty fine to medium SAND with trace of shell fragments and sand stone nodules, light grey green (highly to completely weathered SANDSTONE, light green, weak to very weak)	-10.21				

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH10.GPJ <<DrawingFile>> 04-12-2015 14:47 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 Basin Drilling Works		Nadi Back Road Bridge	
Job No.: 1920815	Start Date: 19-10-2015 Finish Date: 21-10-2015	Ground Level (m): 9.79	Co-Ordinates (): E 1863202.1 N 3913747.8	BH10
Client: JICA Study Team	Hole Depth: 29.00 m		Sheet: 5 of 6

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with fine sand and trace of shell fragments with organics and silt stone nodules, light grey, moist, low to medium plasticity (highly to completely weathered, SILTSTONE, light grey, weak to very weak)				20.00	SPT 20.00 m N= 41; P= 300 kPa; P= 300 kPa
		21	83		P= 300 kPa; P= 300 kPa
		22	100	21.50	SPT 21.50 m N= 50; P= 300 kPa; P= 300 kPa; P= 300 kPa
Fine to medium SAND with some silt and traces of organics, light grey, moist, low plasticity	-13.21	23		23.00	SPT 23.00 m N=50
		24	0		
SILT with some fine sand and trace of shell fragments, dark grey brown, moist, low to medium plasticity (highly to completely weathered SILTSTONE, dark grey brown, weak to very weak)	-14.71		93	24.50	SPT 24.50 m N=50

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH10.GPJ <<DrawingFile>> 04-12-2015 14:47 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: Nadi Back Road Bridge	No.: BH10
Job No.: 1920815	Start Date: 19-10-2015 Finish Date: 21-10-2015	Ground Level (m): 9.79	Co-Ordinates (): E 1863202.1 N 3913747.8
Client: JICA Study Team	Hole Depth: 29.00 m		Sheet: 6 of 6

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.

Weathering: RS CW HW MW SW UW

Field Strength: VSVL, SF, FMD, STVS, HVD, VW, WS, VS, ES

Defect Spacing (mm): 500, 100

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with some fine sand and trace of shell fragments, dark grey brown, moist, low to medium plasticity (highly to completely weathered SILTSTONE, dark grey brown, weak to very weak) *(continued)*	-16.01		93		P= 300 kPa P= 300 kPa
SILT with trace of shell fragments, light green grey, stiff,moist, medium to high plasticity (highly to completely weathered SILTSTONE, light green grey, weak to very weak)	-17.71	26 27	100	26.00	P= 300 kPa SPT 26.00 m N= 41 P= 300 kPa P= 300 kPa
SILT with some fine sand and trace of shell fragments, light green grey, stiff to hard,low to medium plasticity (highly to completely weathered SILTSTONE, light green grey, weak to very weak)	-19.21	28 29	100	27.50	P= 300 kPa SPT 27.50 m N= 54 P= 300 kPa
Hole Terminated at 29.00 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005				29.00	P= 300 kPa SPT 29.00 m N= 50

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH10.GPJ <<DrawingFile>> 04-12-2015 14:47 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 10 Core Photos (0.00m to 29.00m)

0.00m to 4.60m

4.60m to 11.00m

11.00m to 19.30m

19.00m to 22.20m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 10, Nadi Back Road Export Farm, Nadi, Fiji.

22.20m to 25.80m

25.80m to 27.70m

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1920815.10

27.70m to 29.00m

APPENDIX 10c

Laboratory Test Schedule and Test Results

ENTEC LIMITED
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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : Site 9 (BH 09), Salovi
Date: 18 December 2015

Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required					Remark
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	
1920815	Site 10, (BH 10)	Sandy SILT	SPT	1.0-1.5			1					
		Sandy SILT	SPT	2.0-2.5					1			
		Sandy SILT	U	3.5-4.0		1	1			1	1	
		GRAVEL	SPT	5.0-5.5			1	1				
		Sandy GRAVEL	SPT	6.50-7.0				1				
		GRAVEL	SPT	8.0-8.5			1					
		GRAVEL	SPT	9.5-10.0				1				
		SAND	SPT	12.5-13.0	1		1	1				
		GRAVEL	SPT	14.0-14.5				1				
		GRAVEL	SPT	15.5-16.0			1					
		GRAVEL	SPT	17.0-17.5			1					
		Sandy SILT	SPT	20.0-20.5				1				
		SILT	SPT	21.5-22.0					1			
		SILT	SPT	23.0-23.5			1					
		SILT	SPT	26.0-26.5					1			
		SILT/Sandy SILT	SPT	27.5-28.0			1					
		Sandy SILT	SPT	29.0-29.5			1					Total
	TOTALS				1	1	10	6	3	1	1	23
	Bill of Qunatity				1	3	10	6	3	3	3	29

Lab Test Schedule checked by: DMC

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**	: 02 November 2015
SITE ADDRESS	: BH 10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: SILT trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N623 BH10 2.00m - 2.5m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	20	30				
Mass of Container	g	14.09	13.43				
Mass of Container + Wet Soil	g	34.28	31.97				
Mass of Container + Dry Soil	g	27.77	26.11				
Mass of Dry Soil	g	13.68	12.68				
Mass of Moisture	g	6.51	5.86				
Moisture Content	%	47.59	46.21				46.90

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		26	27				
Mass of Container	g	15.04	14.29				
Mass of Container + Wet Soil	g	20.96	19.57				
Mass of Container + Dry Soil	g	19.48	18.24				
Mass of Dry Soil	g	4.44	3.95				
Mass of Moisture	g	1.48	1.33				
Moisture Content	%	33.33	33.67				33.50

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	34	31	24	20	15
Container No.		31	32	34	36	41	43
Mass of Container	g	14.52	14.54	14.88	14.09	14.34	14.85
Mass of Container + Wet Soil	g	24.02	25.17	25.28	24.68	26.59	28.17
Mass of Container + Dry Soil	g	20.85	21.56	21.74	21.01	22.30	23.42
Mass of Dry Soil	g	6.33	7.02	6.86	6.92	7.96	8.57
Mass of Moisture	g	3.17	3.61	3.54	3.67	4.29	4.75
Moisture Content	%	50.08	51.42	51.60	53.03	53.89	55.43

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample	140.00					
Final length of Sample after Shrinkage	123.00					
% Shrinkage	12.14					12.14

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

Liquid Limit	52.70 %
Plastic Limit	33.50 %
Plasticity Index	19.20 %
Shrinkage Limit	12.14 %

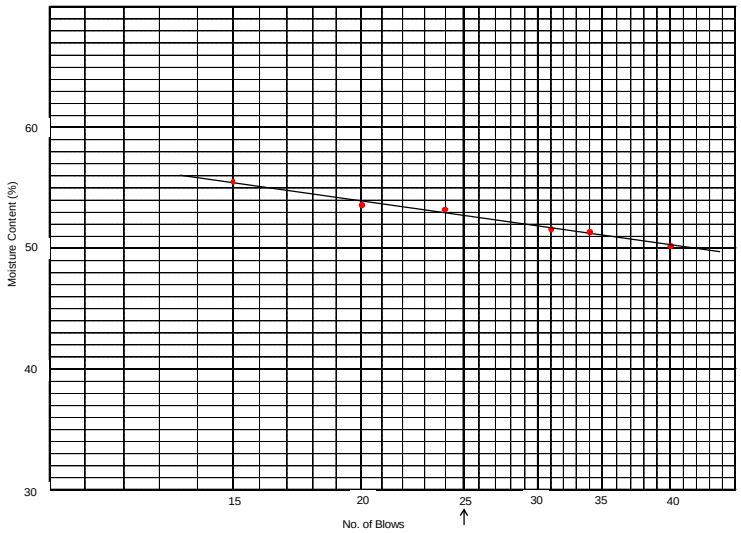
Tested By:LN
Date:02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By:IG
Date: 03 December 2015

Form: GE-L-03

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N623

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**	:02 November 2015
SITE ADDRESS	: BH 10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	:LN
MATERIAL TYPE & DESCRIPTION	: SILT with fine sand trace of shell fragments and organics and silt stone nodules, light grey , moist, low to medium plasticity(highly to completely	**TEST METHOD**	:NZS 4402:1986 (amended version)
		SAMPLE No.	N634 BH10 21.50m - 22.0m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	22	39				
Mass of Container	g	14.42	14.19				
Mass of Container + Wet Soil	g	25.39	24.82				
Mass of Container + Dry Soil	g	22.69	22.25				
Mass of Dry Soil	g	8.27	8.06				
Mass of Moisture	g	2.70	2.57				
Moisture Content	%	32.65	31.89				32.27

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		118	119				
Mass of Container	g	11.77	11.41				
Mass of Container + Wet Soil	g	18.43	18.00				
Mass of Container + Dry Soil	g	16.99	16.52				
Mass of Dry Soil	g	5.22	5.11				
Mass of Moisture	g	1.44	1.48				
Moisture Content	%	27.59	28.96				28.27

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	26	20	14
Container No.		112	132	135	149	159	166
Mass of Container	g	11.73	11.82	11.60	11.74	12.20	11.71
Mass of Container + Wet Soil	g	20.65	22.53	24.44	22.61	25.77	28.52
Mass of Container + Dry Soil	g	17.77	18.97	20.11	18.88	20.95	22.23
Mass of Dry Soil	g	6.04	7.15	8.51	7.14	8.75	10.52
Mass of Moisture	g	2.88	3.56	4.33	3.73	4.82	6.29
Moisture Content	%	47.68	49.79	50.88	52.24	55.09	59.79

LINEAR SHRINKAGE TEST

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

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

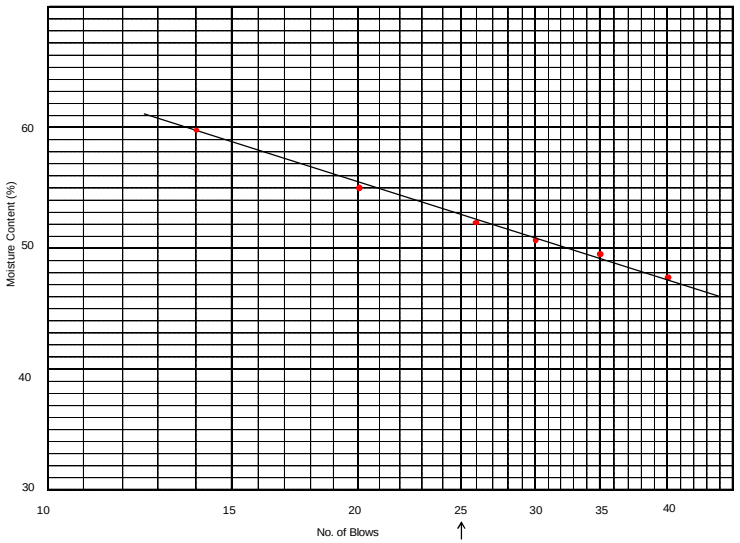
Liquid Limit	52.90 %
Plastic Limit	28.27 %
Plasticity Index	24.63 %
Shrinkage Limit	16.80 %

Tested By:LN
Date:03 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By:IG
Date: 03 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N 634

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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**	: 03 November 2015
SITE ADDRESS	: BH 10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: SILT trace of shell fragments , light green grey, stiff, moist medium to high plasticity (highly to completely	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N636 BH10 26.00m - 26.5m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.		45	46				
Mass of Container	g	14.46	14.7				
Mass of Container + Wet Soil	g	28.06	29.95				
Mass of Container + Dry Soil	g	24.73	26.19				
Mass of Dry Soil	g	10.27	11.49				
Mass of Moisture	g	3.33	3.76				
Moisture Content	%	32.42	32.72				32.57

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		130	140				
Mass of Container	g	11.63	11.87				
Mass of Container + Wet Soil	g	19.25	20.81				
Mass of Container + Dry Soil	g	17.35	18.56				
Mass of Dry Soil	g	5.72	6.69				
Mass of Moisture	g	1.90	2.25				
Moisture Content	%	33.22	33.63				33.42

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	34	29	24	19	14
Container No.		102	121	154	150	156	117
Mass of Container	g	12.13	11.65	11.27	10.75	11.84	11.19
Mass of Container + Wet Soil	g	21.40	20.31	21.66	22.16	21.89	28.15
Mass of Container + Dry Soil	g	18.14	17.19	17.90	18.01	18.13	21.82
Mass of Dry Soil	g	6.01	5.54	6.63	7.26	6.29	10.63
Mass of Moisture	g	3.26	3.12	3.76	4.15	3.76	6.33
Moisture Content	%	54.24	56.32	56.71	57.16	59.78	59.55

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample	140.00					
Final length of Sample after Shrinkage	113.00					
% Shrinkage	19.29					19.29

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

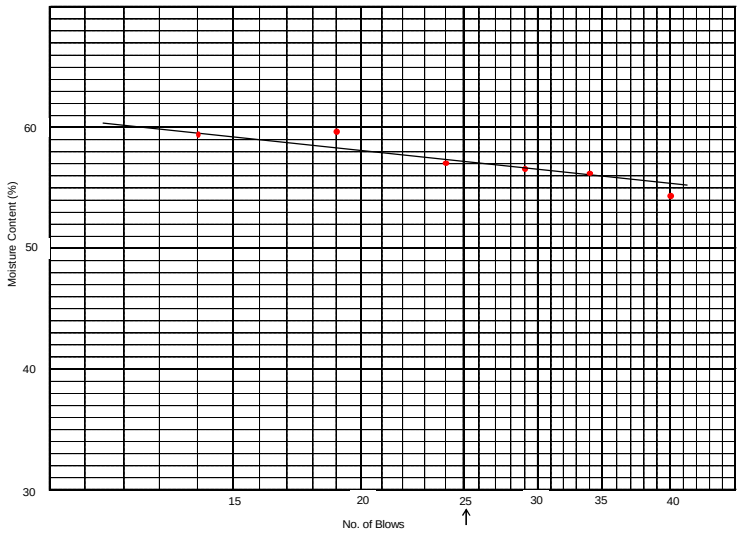
Liquid Limit	57.20 %
Plastic Limit	33.42 %
Plasticity Index	23.78 %
Shrinkage Limit	19.29 %

Tested By:LN
Date:03 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By:IG
Date: 03 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N636

Form: GE-L-03

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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** :	24 October 2015
SITE ADDRESS :	BH10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST** :	KB/LN
SAMPLE LOCATION :	BH10 3.5m - 4.0m	**MATERIAL TYPE** :	SILT trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity
TEST NUMBER :	N616		

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

Moisture Content	Container No.	-	1161	81	
	Mass of Container	g	79.21	87.47	
	Mass of Container + Wet Soil	g	167.60	185.90	
	Mass of Container + Dry Soil	g	143.14	159.68	
	Mass of Dry Soil	g	63.93	72.21	
	Mass of Moisture	g	24.46	26.22	
	Moisture Content	%	38.26	36.31	37.29

Bulk Density	Sample No.	-	N616
	Diameter of Specimen	mm	53.52
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2248.55
	Initial length of specimen Lo	mm	49.11
	Initial mass of specimen Mi	g	187.50
	Bulk Density ρ	t/m³	1.70
	Dry Density ρd	t/m³	1.24

Tested by : LN/KB	Q.A. Check by : UM	Approved by : IG
Date : 24 October 2015	Date : 03 December 2015	Date : 03 December 2015

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

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	:	6 November 2015
SITE ADDRESS	: BH10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	:	IG
MATERIAL TYPE & DESCRIPTION	: coarse SAND with some silt, brown	**TEST METHOD**	:	AS 1289.6.7.3-2001
		SAMPLE No.	:	N629 (BH10 12.5m - 13.00m)

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

MOISTURE CONTENT

Container No.		8
Mass of Container	g	53.05
Mass of Container + Wet	g	84.11
Mass of Container + Dry	g	80.32
Mass of Dry Soil	g	27.27
Mass of Moisture	g	3.79
Moisture Content	%	13.90
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1780
Volume of Speciman	cm^3	904.78
Wet Density	t/m^3	1.97
Dry Density	t/m^3	1.73
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	18.00

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	85	5.00	14	26	0.012	0.010
2	85	5.00	14	26	0.012	0.010
3	85	5.00	14	26	0.012	0.010
4	92	5.00	15	26	0.012	0.010
5	92	5.00	15	26	0.012	0.010
6	92	5.00	15	26	0.012	0.010
7	110	5.00	16	26	0.010	0.009
8	110	5.00	17	26	0.011	0.010
9	110	5.00	16	26	0.010	0.009
10	123	5.00	17	26	0.010	0.009
11	123	5.00	17	26	0.010	0.009
12	123	5.00	18	26	0.010	0.009

Average K_{20} m/s	1.64E-06

Tested By: IG
Date: 06 November 2015

Q.A. Check By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

Form: GE-L-03

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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**	:	24 October 2015
SITE ADDRESS	:	BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	:	KB/LN
SAMPLE LOCATION	:	BH 10 3.5m - 4.0m	**MATERIAL TYPE**	:	SILT trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity
TEST NUMBER	:	N616			

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

Moisture Content	Container No.	-	88
	Mass of Container	g	124.16
	Mass of Container + Wet Soil	g	521.84
	Mass of Container + Dry Soil	g	410.88
	Mass of Dry Soil	g	286.72
	Mass of Moisture	g	110.96
	Moisture Content	%	38.70

Bulk Density	Sample No.	-	N616
	Diameter of Specimen	mm	52.43
	Initial area of specimen Ao (π/4 d^2)	mm^2	2157.89
	Initial length of specimen Lo	mm	100.00
	Initial mass of specimen Mi	g	398.86
	Bulk Density ρ	t/m^3	1.85
	Dry Density ρd	t/m^3	1.33

Compression Gauge Reading	**Load Gauge Reading**	**Load**	**Strain ε= Cn - Co / Lo**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference σ1 - σ3 = 1000P/A**
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002158	0.00
0.50	19	0.0381	0.500	0.002169	17.57
1.00	25.5	0.0491	1.000	0.002180	22.53
1.50	30.5	0.0621	1.500	0.002191	28.35
2.00	33.0	0.0662	2.000	0.002202	30.06
2.50	29.5	0.0592	2.500	0.002213	26.75
3.00	10.0	0.0200	3.000	0.002225	8.99
3.50	6.5	0.0130	3.500	0.002236	5.81
4.00	6.5	0.0130	4.000	0.002248	5.78
4.50	8.5	0.0170	4.500	0.002260	7.52
5.00	7.5	0.0150	5.000	0.002271	6.60
5.50	7.5	0.0150	5.500	0.002283	6.57
6.00	7.0	0.0140	6.000	0.002296	6.10
6.50	7.0	0.0140	6.500	0.002308	6.07

Form GE-L-10

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STRESS VS STRAIN

LOCATION: BH 10 3.5m - 4.0m
DATE OF TEST 24 October 2015
SILT trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity

Form GE-L-10

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: Sandy SILT, dark brown, soft to firm, moist, medium to high plasticity	**SAMPLE No.**	: N622 BH10 1.0m - 1.5m

Moisture Content	%						
Container No.	g	2	3				
Mass of Container	g	53.98	52.42				
Mass of Container + Wet Soil	g	78.39	78.31				
Mass of Container + Dry Soil	g	71.12	70.88				
Mass of Dry Soil	g	17.14	18.46				
Mass of Moisture	g	7.27	7.43				
Moisture Content	%	42.42	40.25				41.33

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: SILT trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity	**SAMPLE No.**	: N616 BH10 3.5m - 4.0m

Moisture Content	%						
Container No.	g	71	81				
Mass of Container	g	86.29	87.47				
Mass of Container + Wet Soil	g	104.89	104.84				
Mass of Container + Dry Soil	g	99.46	99.82				
Mass of Dry Soil	g	13.17	12.35				
Mass of Moisture	g	5.43	5.02				
Moisture Content	%	41.23	40.65				40.94

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: fine to coarse SAND with trace of medium sub-rounded gravel, dark brown	**SAMPLE No.**	: N625 BH10 5.00m - 5.5m

Moisture Content	%						
Container No.	g	5	6				
Mass of Container	g	53.77	53.27				
Mass of Container + Wet Soil	g	76.22	76.16				
Mass of Container + Dry Soil	g	73.78	73.25				
Mass of Dry Soil	g	20.01	19.98				
Mass of Moisture	g	2.44	2.91				
Moisture Content	%	12.19	14.56				13.38

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: fine to coarse SAND with trace of medium sub-rounded gravel, dark brown	**SAMPLE No.**	: N627 BH10 8.0m - 8.5m

Moisture Content	%						
Container No.	g	8	7				
Mass of Container	g	53.05	52.79				
Mass of Container + Wet Soil	g	79.43	77.34				
Mass of Container + Dry Soil	g	76.60	74.17				
Mass of Dry Soil	g	23.55	21.38				
Mass of Moisture	g	2.83	3.17				
Moisture Content	%	12.02	14.83				13.42

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: coarse SAND with some silt, brown	**SAMPLE No.**	: N629 BH10 12.5m - 13.0m

Moisture Content	%						
Container No.	g	9	10				
Mass of Container	g	53.52	52.28				
Mass of Container + Wet Soil	g	65.97	62.35				
Mass of Container + Dry Soil	g	64.10	60.99				
Mass of Dry Soil	g	10.58	8.71				
Mass of Moisture	g	1.87	1.36				
Moisture Content	%	17.67	15.61				16.64

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: fine to coarse SAND, dark brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N631 BH10 15.5m - 16.0m

Moisture Content	%						
Container No.	g	11	12				
Mass of Container	g	53.06	53.17				
Mass of Container + Wet Soil	g	71.67	74.90				
Mass of Container + Dry Soil	g	69.53	72.08				
Mass of Dry Soil	g	16.47	18.91				
Mass of Moisture	g	2.14	2.82				
Moisture Content	%	12.99	14.91				13.95

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: GRAClayey SILT with some minor shell fragments and trace of fine sub-angular gravel, grey brown, low to medium plasticity	**SAMPLE No.**	: N632 BH10 17.0m - 17.5m

Moisture Content	%						
Container No.	g	13	14				
Mass of Container	g	52.90	53.55				
Mass of Container + Wet Soil	g	90.37	90.43				
Mass of Container + Dry Soil	g	79.18	79.35				
Mass of Dry Soil	g	26.28	25.80				
Mass of Moisture	g	11.19	11.08				
Moisture Content	%	42.58	42.95				42.76

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: fine to medium SAND with some silt and traces of organics, light grey, moist, low plasticity	**SAMPLE No.**	: N635 BH10 23.0m - 23.5m

Moisture Content	%						
Container No.	g	15	16				
Mass of Container	g	52.70	52.75				
Mass of Container + Wet Soil	g	77.14	72.75				
Mass of Container + Dry Soil	g	71.16	67.96				
Mass of Dry Soil	g	18.46	15.21				
Mass of Moisture	g	5.98	4.79				
Moisture Content	%	32.39	31.49				31.94

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand and trace of shell fragments, light green grey, stiff to hard, low to medium plasticity, (highly to completely weathered	**SAMPLE No.**	: N624 BH10 27.5m - 28.0m

Moisture Content	%						
Container No.	g	58	60				
Mass of Container	g	62.70	62.91				
Mass of Container + Wet Soil	g	96.77	99.01				
Mass of Container + Dry Soil	g	88.60	90.34				
Mass of Dry Soil	g	25.90	27.43				
Mass of Moisture	g	8.17	8.67				
Moisture Content	%	31.54	31.61				31.58

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: BH 10 - Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand and trace of shell fragments, light green grey, stiff to hard, low to medium plasticity, (highly to completely weathered	**SAMPLE No.**	: N637 BH10 29.0m - 29.5m

Moisture Content	%						
Container No.	g	61	56				
Mass of Container	g	62.17	62.62				
Mass of Container + Wet Soil	g	84.78	88.55				
Mass of Container + Dry Soil	g	79.46	82.25				
Mass of Dry Soil	g	17.29	19.63				
Mass of Moisture	g	5.32	6.30				
Moisture Content	%	30.77	32.09				31.43

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: UM
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

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

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	02 November 2015
SITE ADDRESS	:	BH10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH10 5.0m - 5.5m	**MATERIAL TYPE & LOCATION**	:	fine to coarse SAND with fine sub-angular gravel, dark brown
TEST NUMBER	:	N625			

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

Moisture Content (Material passing 19mm)	Container No.	-	72	76	SPLIT SAMPLE
	Mass of Container	g	86.32	86.31	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	111.40	106.43	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	109.24	104.86	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	22.92	18.55	
	Mass of Moisture	g	2.16	1.57	
	Moisture Content	%	9.42	8.46	
	Average Moisture Content	%	8.94		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	300.63
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	275.95

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	56.04	N/A	20.31	79.69		200
13.2 mm	32.10	N/A	11.63	68.06	600	300
9.50 mm	11.41	N/A	4.13	63.92	450	300
6.70 mm	19.06	N/A	6.91	57.02	300	300
4.75 mm	18.30	N/A	6.63	50.39	250	200
2.36 mm	32.77	N/A	11.88	38.51	150	200
1.18 mm	30.46	N/A	11.04	27.47	100	200
600 µm	26.77	N/A	9.70	17.77	80	200
425 µm	11.33	N/A	4.11	13.67	70	200
300 µm	10.63	N/A	3.85	9.81	60	200
150 µm	11.19	N/A	4.06	5.76	40	200
75 µm	4.43	N/A	1.61	4.15	25	200
Passing 75 µm	11.46	N/A	4.15	0.00	-	-
Pan Total	275.95	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015

DESCRIPTION: fine to coarse SAND with fine sub-angular gravel, dark brown

SAMPLE No: N625

LOCATION: BH10 5.0m - 5.5m

DATE OF TEST : 02 November 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	02 November 2015
SITE ADDRESS	:	BH10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH10 6.5m - 7.0m	**MATERIAL TYPE & LOCATION**	:	fine to coarse SAND with trace of medium sub angular gravel
TEST NUMBER	:	N626			

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

Moisture Content (Material passing 19mm)	Container No.	-	75	83	SPLIT SAMPLE		
	Mass of Container	g	89.71	71.22	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	134.45	111.50	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	130.11	106.89	Spliting Factor =	M_3 / M_4	
	Mass of Dry Soil	g	40.40	35.67			
	Mass of Moisture	g	4.34	4.61			
	Moisture Content	%	10.74	12.92			
	Average Moisture Content	%	11.83				

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	298.55
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	266.96

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	60.28	N/A	22.58	77.42	600	300
9.50 mm	28.75	N/A	10.77	66.65	450	300
6.70 mm	23.27	N/A	8.72	57.93	300	300
4.75 mm	19.97	N/A	7.48	50.45	250	200
2.36 mm	36.44	N/A	13.65	36.80	150	200
1.18 mm	26.90	N/A	10.08	26.73	100	200
600 µm	18.29	N/A	6.85	19.88	80	200
425 µm	7.86	N/A	2.94	16.93	70	200
300 µm	8.22	N/A	3.08	13.85	60	200
150 µm	10.63	N/A	3.98	9.87	40	200
75 µm	6.62	N/A	2.48	7.39	25	200
Passing 75 µm	19.73	N/A	7.39	0.00	-	-
Pan Total	266.96	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015

DESCRIPTION	fine to coarse SAND with trace of medium sub angular gravel
SAMPLE No:	N626
LOCATION:	BH10 6.5m - 7.0m
DATE OF TEST :	02 November 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	02 November 2015
SITE ADDRESS	:	BH10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH10 9.5m - 10.0m	**MATERIAL TYPE & LOCATION**	:	fine to coarse SAND with trace of medium sub-rounded gravel, dark grey
TEST NUMBER	:	N628			

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

Moisture Content (Material passing 19mm)	Container No.	-	64	68	SPLIT SAMPLE
	Mass of Container	g	82.03	74.11	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	113.26	106.99	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	110.10	103.09	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	28.07	28.98	
	Mass of Moisture	g	3.16	3.90	
	Moisture Content	%	11.26	13.46	
	Average Moisture Content	%	12.36		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	310.56
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	276.40

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm	12.51	N/A	4.53	95.47		200
13.2 mm	46.34	N/A	16.77	78.71	600	300
9.50 mm	52.47	N/A	18.98	59.73	450	300
6.70 mm	44.87	N/A	16.23	43.49	300	300
4.75 mm	27.16	N/A	9.83	33.67	250	200
2.36 mm	33.86	N/A	12.25	21.42	150	200
1.18 mm	24.35	N/A	8.81	12.61	100	200
600 µm	13.85	N/A	5.01	7.60	80	200
425 µm	4.78	N/A	1.73	5.87	70	200
300 µm	4.84	N/A	1.75	4.11	60	200
150 µm	6.79	N/A	2.46	1.66	40	200
75 µm	3.86	N/A	1.40	0.26	25	200
Passing 75 µm	0.72	N/A	0.26	0.00	-	-
Pan Total	276.40	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015

DESCRIPTION	fine to coarse SAND with trace of medium sub-rounded gravel, dark grey
SAMPLE No:	N628
LOCATION:	BH10 9.5m - 10.0m
DATE OF TEST :	02 November 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	02 November 2015
SITE ADDRESS	:	BH10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH10 12.5m - 13.0m	**MATERIAL TYPE & LOCATION**	:	coarse SAND with some silt, brown
TEST NUMBER	:	N629			

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

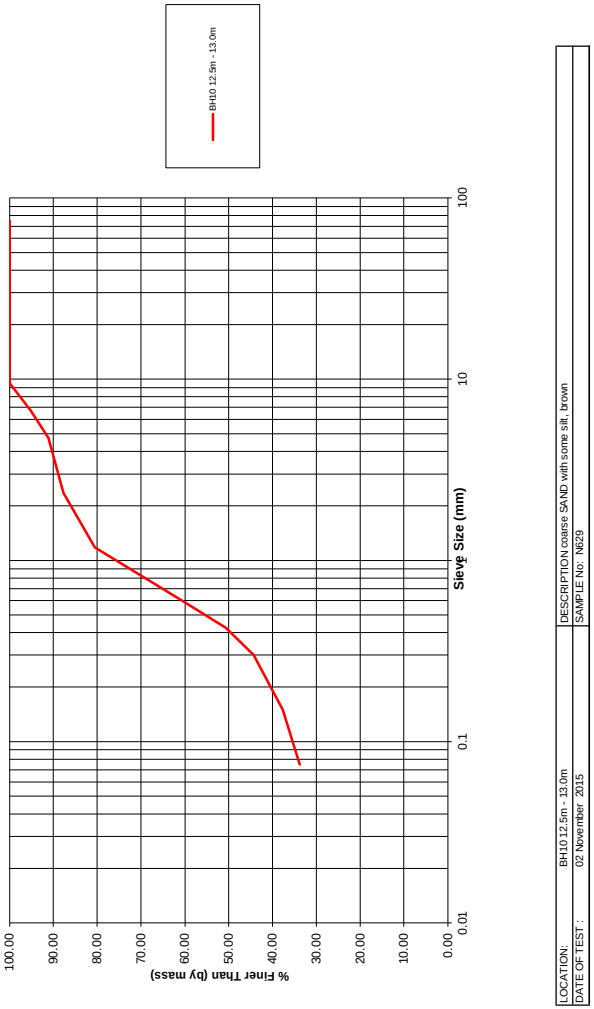
Moisture Content (Material passing 19mm)	Container No.	-	70	79	SPLIT SAMPLE
	Mass of Container	g	90.09	87.12	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	104.12	100.07	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	102.24	98.32	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	12.15	11.20	
	Mass of Moisture	g	1.88	1.75	
	Moisture Content	%	15.47	15.63	
	Average Moisture Content	%	15.55		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	200.97
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	173.93

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm	8.49	N/A	4.88	95.12	300	300
4.75 mm	6.90	N/A	3.97	91.15	250	200
2.36 mm	5.95	N/A	3.42	87.73	150	200
1.18 mm	12.49	N/A	7.18	80.55	100	200
600 µm	34.56	N/A	19.87	60.68	80	200
425 µm	17.28	N/A	9.94	50.74	70	200
300 µm	11.10	N/A	6.38	44.36	60	200
150 µm	11.56	N/A	6.65	37.71	40	200
75 µm	6.77	N/A	3.89	33.82	25	200
Passing 75 µm	58.83	N/A	33.82	0.00	-	-
Pan Total	173.93	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	02 November 2015
SITE ADDRESS	:	BH10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH10 14.0m - 14.5m	**MATERIAL TYPE & LOCATION**	:	fine to coarse SAND with trace of medium sub- angular gravel, pale brown
TEST NUMBER	:	N630			

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

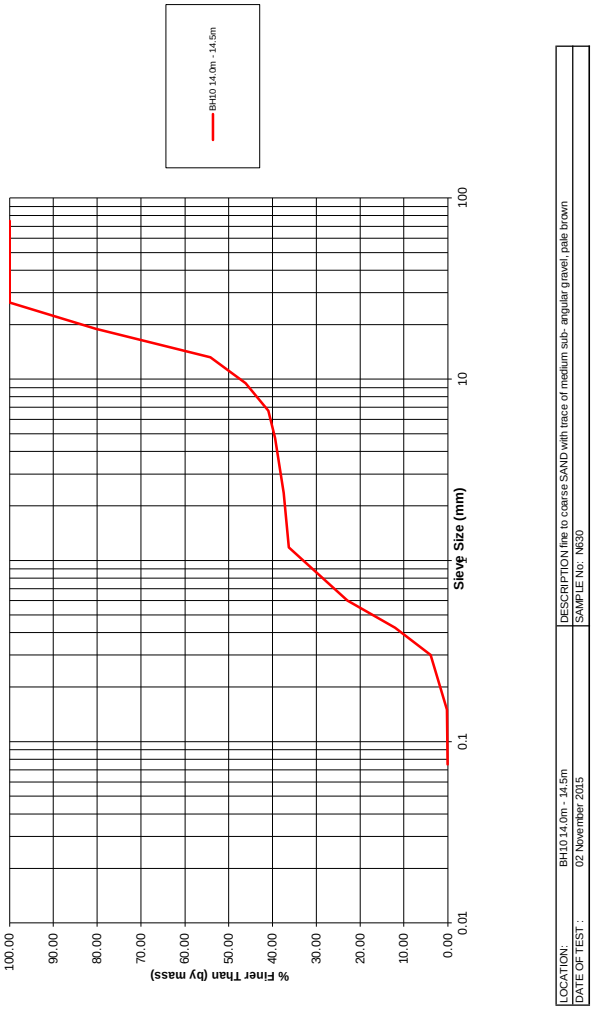
Moisture Content (Material passing 19mm)	Container No.	-	78	66	SPLIT SAMPLE
	Mass of Container	g	78.57	90.96	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	91.44	103.45	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	88.94	100.93	Spliting Factor M_3 / M_4
	Mass of Dry Soil	g	10.37	9.97	
	Mass of Moisture	g	2.50	2.52	
	Moisture Content	%	24.11	25.28	
	Average Moisture Content	%	24.69		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	216.02
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	173.24

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	34.08	N/A	19.67	80.33		200
13.2 mm	45.33	N/A	26.17	54.16	600	300
9.50 mm	14.00	N/A	8.08	46.08	450	300
6.70 mm	8.81	N/A	5.09	41.00	300	300
4.75 mm	2.74	N/A	1.58	39.41	250	200
2.36 mm	3.43	N/A	1.98	37.43	150	200
1.18 mm	1.92	N/A	1.11	36.33	100	200
600 µm	23.25	N/A	13.42	22.91	80	200
425 µm	18.87	N/A	10.89	12.01	70	200
300 µm	14.00	N/A	8.08	3.93	60	200
150 µm	6.50	N/A	3.75	0.18	40	200
75 µm	0.25	N/A	0.14	0.04	25	200
Passing 75 µm	0.06	N/A	0.04	0.00	-	-
Pan Total	173.24	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015



DESCRIPTION fine to coarse SAND with trace of medium sub- angular gravel, pale brown

SAMPLE No: N630

LOCATION: BH10 14.0m - 14.5m

DATE OF TEST : 02 November 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	02 November 2015
SITE ADDRESS	:	BH10 Road Opposite Flame Tree in export farming plot	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH10 20.0m - 20.5m	**MATERIAL TYPE & LOCATION**	:	SILT with fine sand trace of shell fragments and organics and silt stone nodules, light grey , moist, low to medium plasticity(highly to completely weathered, SILTSTONE, light grey weak to very weak
TEST NUMBER	:	N633			

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

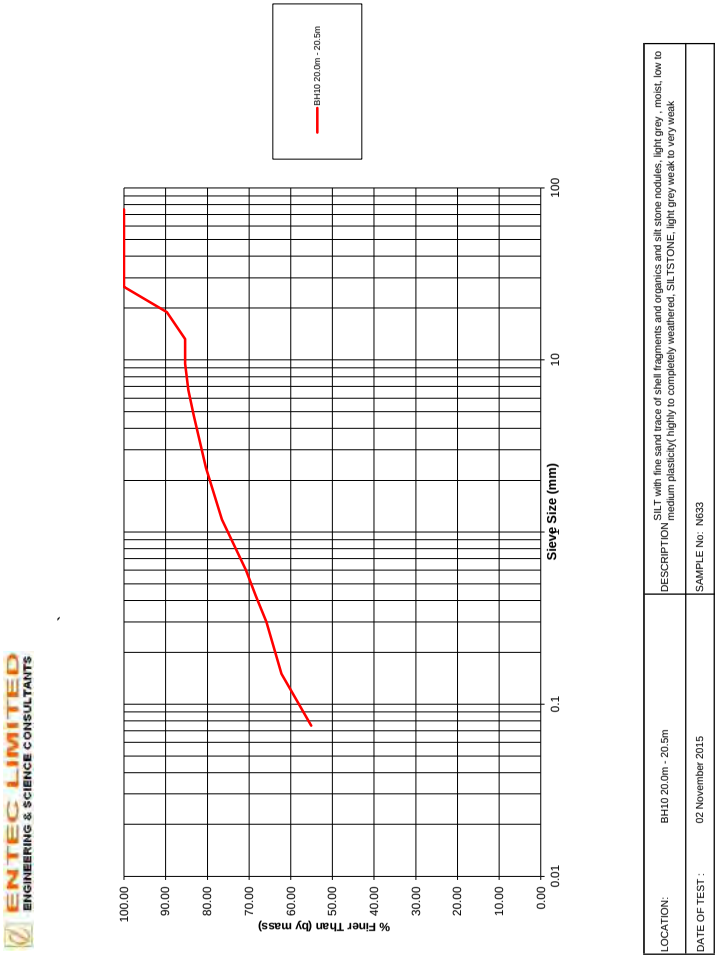
Moisture Content (Material passing 19mm)	Container No.	-	74	85	SPLIT SAMPLE		
	Mass of Container	g	86.65	88.72	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	122.63	126.59	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	114.09	117.75	Spliting Factor = M_3/M_4		
	Mass of Dry Soil	g	27.44	29.03			
	Mass of Moisture	g	8.54	8.84			
	Moisture Content	%	31.12	30.45			
	Average Moisture Content	%	30.79				

Total Mass of Dry Sample				
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil	
	Total Wet Weight (M_w)	g	300.09	
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
		M_T =	229.45	

Test Sieve Size mm	Mass of Dry Soil Retained (M_{Di})	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	23.50	N/A	10.24	89.76		200
13.2 mm	10.07	N/A	4.39	85.37	600	300
9.50 mm	0.00	N/A	0.00	85.37	450	300
6.70 mm	1.82	N/A	0.79	84.58	300	300
4.75 mm	3.01	N/A	1.31	83.26	250	200
2.36 mm	6.57	N/A	2.86	80.40	150	200
1.18 mm	8.96	N/A	3.90	76.50	100	200
600 µm	13.09	N/A	5.70	70.79	80	200
425 µm	5.64	N/A	2.46	68.33	70	200
300 µm	5.67	N/A	2.47	65.86	60	200
150 µm	8.22	N/A	3.58	62.28	40	200
75 µm	16.43	N/A	7.16	55.12	25	200
Passing 75 µm	126.47	N/A	55.12	0.00	-	-
Pan Total	229.45	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015



DESCRIPTION:	SILT with fine sand trace of shell fragments and organics and silt stone nodules, light grey , moist, low to medium plasticity(highly to completely weathered, SILTSTONE, light grey weak to very weak
SAMPLE No:	N633
LOCATION:	BH10 20.0m - 20.5m
DATE OF TEST :	02 November 2015

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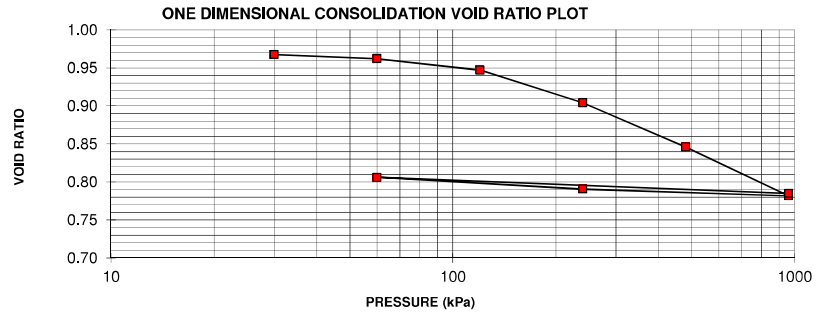
Determination of The One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

Project Name:	Geotechnical Investigation for Nadi River Basin Drilling Works	**Sample No:**	N 616
Client Name:	Japan International Cooperation Agency (JICA)	**Depth:**	3.5m - 4.0m
Job No:	1920815	**Tested By:**	IG/FM
Site Address :	Road Opposite Flame Tree in exporting farming plot.	**Date Tested:**	12 January 2016
Sample Location:	BH 10 3.5 - 4.0m Re - Test		

Sample Description: Silt trace of sand, dark brown, soft to firm, moist, low to medium plasticity.
Sample History: Undisturbed / ~~Remoulded / Compacted / Slurried / Unknown~~
Date Sample Collected: 07/10/15 **Temperature:** Max: 27°C Min: 25°C
Loading Cycle: 1 hr 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 21.83
Mass of ring + ~~watch glass +~~ wet specimen		g	M_3	273.51	M_4 269.41
Mass of ring + ~~watch glass +~~ dry specimen	M_5	g		256.87	
Mass of ring	M_1	g		206.02	
Mass of watch glass	M_2	g		0	
Mass of dry specimen	$M_s = M_5 - M_1 - M_2$	g		50.85	
Mass of water		g	$M_3 - M_5$	16.64	$M_4 - M_5$ 12.54
Water content, w		%	w_i	32.72	w_f 24.66
Dry density, Q_d		t/m^3	Q_{di}	1.35	Q_{df} 1.47
Height of soil particles, H_s		mm		12.09	
Voids ratio, e			e_i	0.97	e_f 0.81
Degree of saturation, S			S_i	89.48	S_f 81.07

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)
30	0.018	23.782	0.001	11.70	0.97	697.55	
60	0.084	23.716	0.004	11.63	0.96	173.42	0.12
120	0.266	23.534	0.011	11.45	0.95	384.23	0.19
240	0.784	23.016	0.034	10.93	0.90	367.50	0.27
480	1.488	22.312	0.067	10.23	0.85	345.37	0.26
960	2.264	21.536	0.105	9.45	0.78	143.00	0.20
240	2.156	21.644	0.100	9.56	0.79	0.00	-0.13
60	1.970	21.830	0.090	9.74	0.81	0.00	-0.46
960	2.23	21.574	0.103	9.49	0.78	322.90	0.10

Tested by: FM/IG
Date: 12/13 January 2016

Q.A. Check By: KB
Date: 15 January 2015

Approved By: IG
Date: 15 January 2015

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

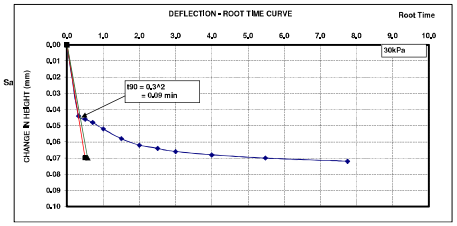
Loading Date & Time					12/01/2016 @ 9.01hrs			12/01/2015 @ 10:08hrs			12/01/2016 @ 11:15hrs			12/01/2016 @ 12:18hrs			12/01/2016 @ 13:34hrs			12/01/2016 @ 14:42		
Hanger Load					490g			980g			1960			3920			7840			15680g		
Effective Pressure					30kPa			60kPa			120kPa			240kPa			480kPa			960kPa		
Time 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/5	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm
		0		0.00	09:01:00	2233	0.000	10:08:00	2197	0.000	11:15:00	2155	0.000	12:18:00	2053	0.000	13:34:00	1767	0.000	02:42:00	1388	0.000
		6	0.100	0.316	09:01:06	2211	0.044	10:08:06	2175	0.044	11:15:06	2116	0.078	12:18:06	1940	0.226	13:34:06	1590	0.354	02:42:06	1211	0.354
		15	0.250	0.500	09:01:15	2210	0.046	10:08:15	2172	0.050	11:15:15	2111	0.088	12:18:15	1920	0.266	13:34:15	1570	0.394	02:42:15	1150	0.476
		30	0.500	0.707	09:01:30	2209	0.048	10:08:30	2170	0.054	11:15:30	2108	0.094	12:18:30	1906	0.294	13:34:30	1550	0.434	02:42:30	1122	0.532
	1		1.000	1.000	09:02:00	2207	0.052	10:09:00	2168	0.058	11:16:00	2102	0.106	12:19:00	1889	0.328	13:35:00	1527	0.480	02:43:00	1096	0.584
	2	15	2.250	1.500	09:03:15	2204	0.058	10:10:15	2165	0.064	11:17:15	2092	0.126	12:20:15	1863	0.380	13:36:15	1496	0.542	02:44:15	1060	0.656
	4		4.000	2.000	09:05:00	2202	0.062	10:12:00	2163	0.068	11:19:00	2085	0.140	12:22:00	1840	0.426	13:38:00	1471	0.592	02:46:00	1033	0.710
	6	15	6.250	2.500	09:07:15	2201	0.064	10:14:15	2161	0.072	11:21:15	2079	0.152	12:24:15	1821	0.464	13:40:15	1451	0.632	02:48:15	1011	0.754
	9		9.000	3.000	09:10:00	2200	0.066	10:17:00	2160	0.074	11:24:00	2074	0.162	12:27:00	1809	0.488	13:43:00	1436	0.662	02:51:00	995	0.786
	16		16.00	4.000	09:17:00	2199	0.068	10:24:00	2159	0.076	11:31:00	2068	0.174	12:34:00	1793	0.520	13:50:00	1417	0.700	02:58:00	974	0.828
	30		30.00	5.480	09:31:00	2198	0.070	10:38:00	2158	0.078	11:45:00	2061	0.188	12:48:00	1779	0.548	14:04:00	1402	0.730	03:12:00	957	0.862
1			60.00	7.750	10:01:00	2197	0.072	11:08:00	2155	0.084	12:15:00	2053	0.204	13:18:00	1767	0.572	14:34:00	1388	0.758	03:42:00	943	0.890
2																						
4																						
8																						
24																						
Machine Correction					0.054			0.018			0.022			0.054			0.054			0.114		
Δ H (Corrected)					0.018			0.066			0.182			0.518			0.704			0.776		
Net Total Settlement					0.018			0.084			0.266			0.784			1.488			2.264		

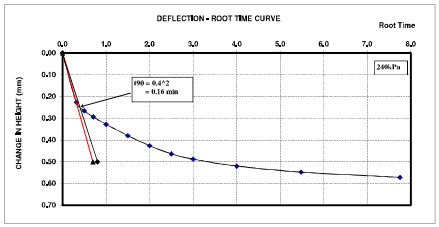
D15-329

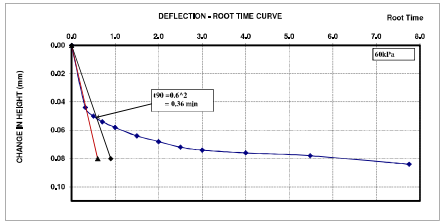
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

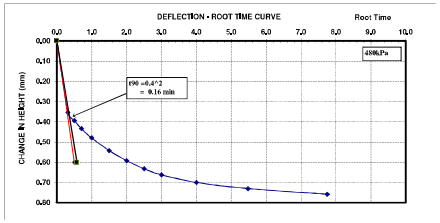
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

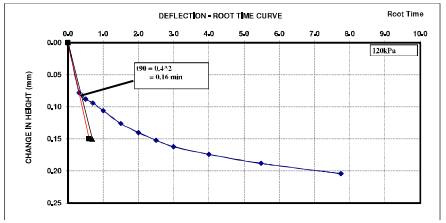
Loading Date and Time					12/01/2016 @ 3:54.p.m			13/01/2016 @ 07:33hrs			13/01/2016 @ 08:39 hrs											
Hanger Load					3920 g			980 g			15680 g											
Effective Pressure					240kPa			60kPa			960kPa											
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	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	02:54:00	943	0.000	07:33:00	1011	0.000	08:39:00	1085	0.000									
		6	0.100	0.316	02:54:06	991	0.096	07:33:06	1055	-0.088	08:39:06	945	0.280									
		15	0.250	0.500	02:54:15	995	0.104	07:33:15	1050	-0.078	08:39:15	939	0.292									
		30	0.500	0.707	02:54:30	998	0.110	07:33:30	1052	-0.082	08:39:30	936	0.298									
	1		1.000	1.000	02:55:00	1001	0.116	07:34:00	1057	-0.092	08:40:00	932	0.306									
	2	15	2.250	1.500	02:56:15	1004	0.122	07:35:15	1064	-0.106	08:41:15	927	0.316									
	4		4.000	2.000	02:58:00	1006	0.126	07:37:00	1068	-0.114	08:43:00	923	0.324									
	6	15	6.250	2.500	03:00:15	1007	0.128	07:39:15	1072	-0.122	08:45:15	919	0.332									
	9		9.000	3.000	03:03:00	1008	0.130	07:42:00	1075	-0.128	08:48:00	915	0.340									
	16		16.00	4.000	03:10:00	1009	0.132	07:49:00	1078	-0.134	08:55:00	911	0.348									
	30		30.00	5.480	03:24:00	1010	0.134	08:03:00	1082	-0.142	09:09:00	906	0.358									
1			60.00	7.750	03:54:00	1011	0.136	08:33:00	1085	-0.148	09:39:00	900	0.370									
					UNLOADING			UNLOADING														
Machine Correction					0.028			0.038			0.114											
Δ H (Corrected)					0.108			-0.186			0.256											
Net Total Settlement					2.156			1.970			2.226											

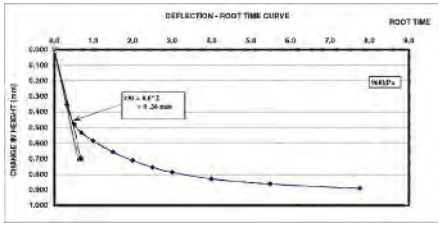


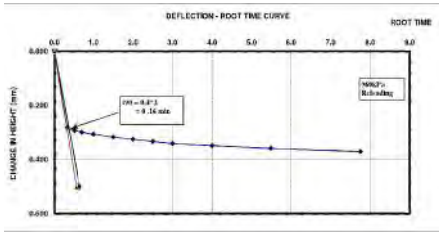












APPENDIX 11

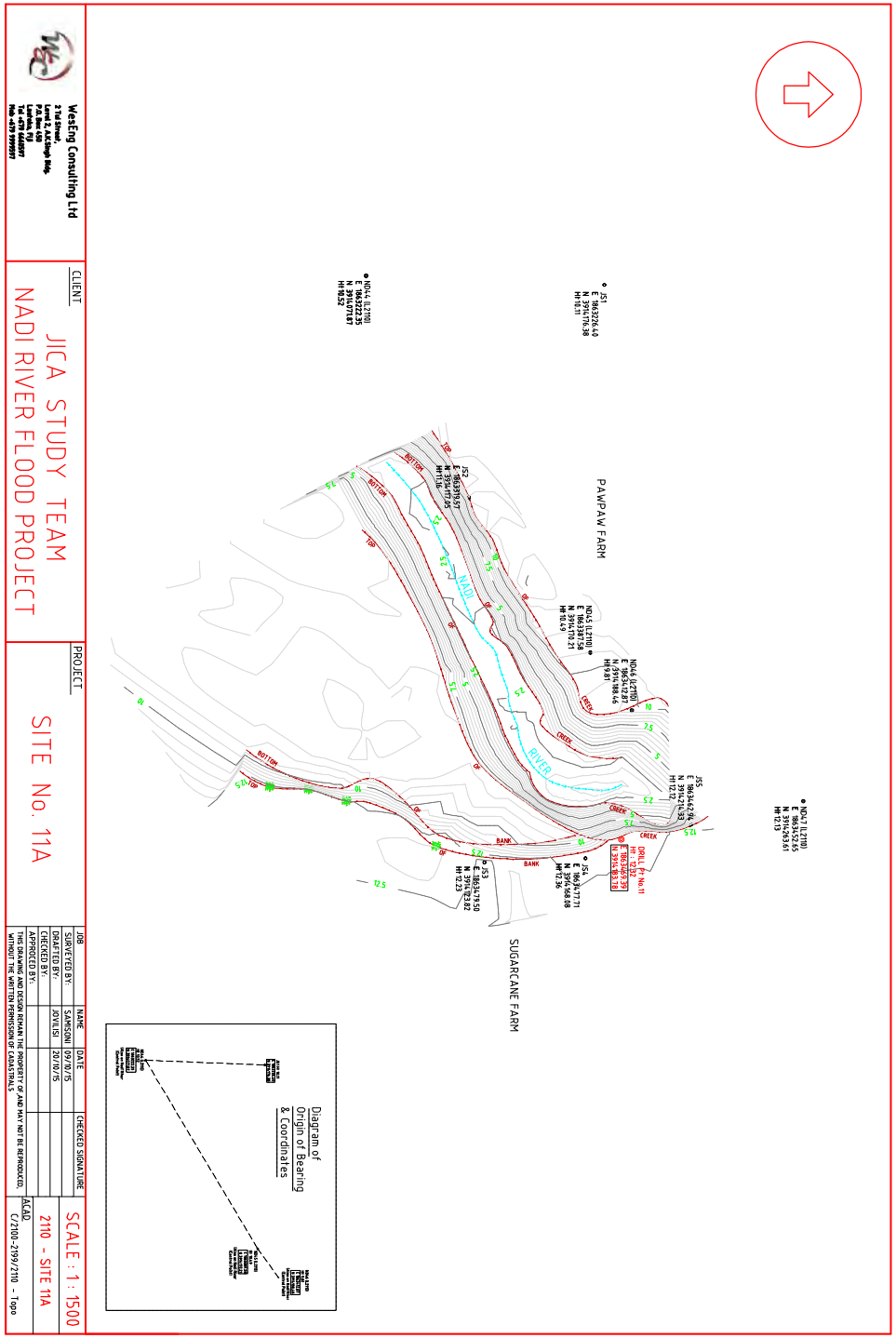
SITE 11 –Votualevu Sugar Cane Farm Opposite Nasau, Nadi, Fiji.

APPENDIX 11a

Test Locality Plan

APPENDIX 11b

Engineering Borehole Log and Core Photos



DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Votualevu Sugar Cane Farm	**BH11**
Job No.: 1920815	Start Date: 21-10-2015 Finish Date: 22-10-2015	Ground Level (m): 12.32	Co-Ordinates (): E 1863469.4 N 3914183.8
Client: JICA Study Team	Hole Depth: 27.50 m		Sheet: 1 of 6

Column headings: 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: 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.

Geological Description	Elevation (m) (base)	Depth (m) (base)
SILT with trace of fine sand and root fibres, dark brown, stiff to hard, low to medium plasticity	+11.32	1
SILT with some fine sand and trace of iron staining and siltstone nodules, orange brown, moist, firm, medium to high plasticity	+10.32	2
SILT with some fine sand, orange brown, soft to firm, low to medium plasticity	+8.82	
SILT with trace of clay , brown to light brown, soft to firm, moist, medium to high plasticity	+8.32	4
SILT with trace of fine sand, very soft to soft		

TCR (SCR) RQD (%)	Samples	Tests
86		SPT 0.00 m
		P= 48 kPa
		P= 215 kPa
87	1.00	SPT 1.00 m N= 13
		P= 88 kPa
91	2.00	P= 33 kPa
		P= 111.3 kPa
		P= 76.5 kPa
		P= 148 kPa
40	3.50	SPT 3.50 m N= 8
		P= 231.5 kPa

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Votualevu Sugar Cane Farm	**BH11**
Job No.: 1920815	Start Date: 21-10-2015 Finish Date: 22-10-2015	Ground Level (m): 12.32	Co-Ordinates (): E 1863469.4 N 3914183.8
Client: JICA Study Team	Hole Depth: 27.50 m		Sheet: 2 of 6

Column headings: 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	Elevation (m)	Depth (m)
SILT with trace of fine sand, very soft to soft *(continued)*	+2.82	
SILT with some silt stone nodules trace of iron staining and meduim subrounded gravel	+2.32	

Depth marks: 6, 7, 8, 9

TCR (SCR) RQD (%)	Samples	Tests
13	5.00	SPT 5.00 m N= 25
69	6.50	SPT 6.50 m N= 15
		P= 45 kPa
		P= 231.5 kPa
33	8.00	SPT 8.00 m N= 19
		P= 113 kPa
53	9.50	

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Votualevu Sugar Cane Farm	No.: **BH11**
Job No.: 1920815	Start Date: 21-10-2015 Finish Date: 22-10-2015	Ground Level (m): 12.32	Co-Ordinates (): E 1863469.4 N 3914183.8
Client: JICA Study Team	Hole Depth: 27.50 m		Sheet: 3 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.

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with some siltstone nodules and trace of iron staining with medium subrounded gravel (highly to completely weathered, SILTSTONE, pale brown, weak to very weak)	+1.32	11	53		
SILT with minor fine sand and minor clay with traces of fine subangular gravel, pale brown, firm to stiff, low to medium plasticity	+0.12	12	53	11.00	SPT 11.00 m N= 21; P= 63 kPa
SILT with some fine sand and trace of fine sub-angular gravel, light orangish brown, firm to stiff, low to medium plasticty	-0.18				
SILT with some fine sand and trace of fine sub-angular gravel, light orangish brown, firm to stiff, low to medium plasticity	-0.68	13		12.50	SPT 12.50 m N= 22
Fine Sandy SILT, light brown, soft to firm, moist, low to medium plasticity	-1.68	14	61		P= 113 kPa; P= 300 kPa
Fine Sandy SILT with trace of siltstone nodules, light brown, firm to stiff, moist, low to medium plasticity	-2.28		85	14.00	SPT 14.00 m N= 40; P= 130 kPa
SILT with some fine sand , grey, firm, moist, low to medium plasticity	-2.48				

Explanations:

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

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

Remarks: N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH011.GPJ <<DrawingFile>> 04-12-2015 15:41 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 Sugar Cane Farm	No.: **BH11**
Job No.: 1920815	Start Date: 21-10-2015 Finish Date: 22-10-2015	Ground Level (m): 12.32	Co-Ordinates (): E 1863469.4 N 3914183.8
Client: JICA Study Team	Hole Depth: 27.50 m		Sheet: 4 of 6

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with some fine to coarse sand, brown, firm to stiff, low to medium plasticity *(continued)*	-3.18		85		P= 237.5 kPa
SILT with some fine to coarse sand. pale brown, soft to firm, low to medium plasticity	-3.68	16		15.50	SPT 15.50 m N= 30
Fine to medium SAND with some silt, pale brown	-4.38		100		
Fine to medium SAND with some silt , grey	-4.68	17			
Fine to medium SAND with some silt and trace of sub-angluar to sub-rounded gravel, brown grey	-5.18			17.00	SPT 17.00 m N= 50
Fine to medium sub-angular to sub-rounded GRAVEL	-6.18	18	57		
Fine angular GRAVEL with some fine to medium sand, grey, moist	-6.68	19		18.50	SPT 18.50 m N= 50
Fine to coarse sub-angular to sub-rounded GRAVEL	-7.68		43		

Explanations:

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

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

Remarks: N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH011.GPJ <<DrawingFile>> 04-12-2015 15:41 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 Sugar Cane Farm	No.: BH11
Job No.: 1920815	Start Date: 21-10-2015 Finish Date: 22-10-2015	Ground Level (m): 12.32	Co-Ordinates (): E 1863469.4 N 3914183.8
Client: JICA Study Team	Hole Depth: 27.50 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	Elevation (m) (base)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with trace of fine sand, oragnics and silt stone nodules, green grey, firm to stiff, low to medium plasticity	-8.18			20.00	SPT 20.00 m N= 47; P= 247.5 kPa
SILT with trace of fine sand and organics , green grey, stiff to hard, low to medium plasticity (moderately to highly weathered, SILTSTONE, green grey, weak to very weak)	-9.18	21	100		P= 300 kPa
SILT with trace of fine sand and organics, green grey, firm, low to medium plasticity	-9.68			21.50	SPT 21.50 m N= 50
Fine to coarse SAND with some fine sub-rounded gravel, grey black	-10.68	22	93		P= 185 kPa; P= 138 kPa
SILT with some fine to medium sand trace of fine sub-angular gravel	-11.18	23		23.00	SPT 23.00 m N= 50; P= 111.5 kPa
Fine to coarse SAND with some fine sub-angular gravel and trace of silt, dark grey	-12.18	24	73		
SILT with some fine sub-angular gravel and trace of fine sand, pale grey (moderatly to highly weathered , SILTSTONE CONGLOMERATE, pale grey, weak to very weak)	-12.68			24.50	SPT 24.50 m N= 50

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

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

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

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

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DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Votualevu Sugar Cane Farm	No.: BH11
Job No.: 1920815	Start Date: 21-10-2015 Finish Date: 22-10-2015	Ground Level (m): 12.32	Co-Ordinates (): E 1863469.4 N 3914183.8
Client: JICA Study Team	Hole Depth: 27.50 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 | Field Strength | 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 (%)
		25.00
	26	26.00
	27	
Hole Terminated at 27.50 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005	28	
	29	

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

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

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH011.GPJ <<DrawingFile>> 04-12-2015 15:41 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

Borehole 11 Core Photos (0.00m to 24.50m)

0.00m to 2.70m

2.70m to 7.80m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 11,Votulevu Sugar Cane Farm Opposite Nasau, Nadi, Fiji.

7.80m to 14.80m

14.80m to 21.40m

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21.40m to 24.50m

APPENDIX 11c

Laboratory Test Schedule and Test Results

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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : Site 11 (BH11), Votualevu Sugar Cane Farm
Date: 18 December 2015

Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required					Remarks
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	
1920815	Site 11, (BH11)	Clayey SIL T/Silty CLAY	SPT	1.0-1.5		1	1					
		Clayey SIL T/Silty CLAY	U	2.0-2.50			1				1	
		Clayey SILT	SPT	3.5-4.0		1			1			
		SILT	SPT	5.0-5.5			1					
		Clayey SIL T/Silty CLAY	SPT	6.5-7.0			1					
		Clayey SILT	SPT	8.0-8.5			1					
		Clayey SILT	U	9.5-10.0		1	1			1	1	
		Clayey SILT	SPT	11.0-11.5				1	1			
		GRAVEL	SPT	12.5-13.0				1				
		Sandy SILT	SPT	14.0-14.45								
		Silty SAND	SPT	15.5-16.0	1		1	1				
		Sandy SILT	SPT	17.0-17.5			1	1				
		GRAVEL	SPT	18.5-19.0				1				
		Clayey SIL T/Silty CLAY	SPT	20.0-20.5			1					
		Clayey SIL T/Silty CLAY	SPT	21.5-22.0			1					
		Gravelly SAND	SPT	23.0-23.5				1	1			
		Gravelly SAND	SPT	24.5-29.0				1				
	TOTALS				1	2	10	6	3	1	2	25
	Bill of Quantity				1	3	10	6	3	3	3	29

Lab Test Schedule checked by: DMC

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	: Japan International Cooperation Agency	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	: 02 November 2015
SITE ADDRESS	: Siite 11	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH11 12.5m-13.0m	**MATERIAL TYPE & LOCATION**	: SILT with some fine sand and trace of fine sub-angular gravel, light orangish brown, firm to stiff, low to medium plasticity
TEST NUMBER	: N 645		

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

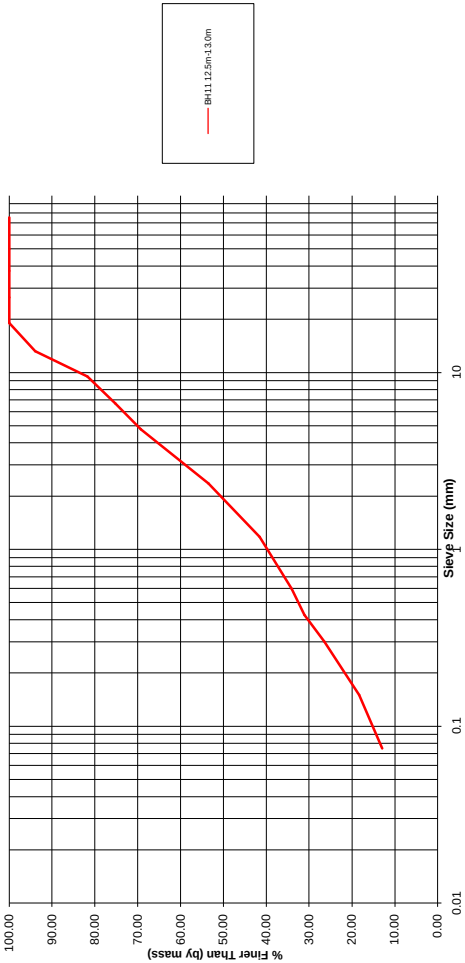
Moisture Content (Material passing 19mm)	Container No.	-	152	170	SPLIT SAMPLE
	Mass of Container	g	11.52	12.01	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	18.80	19.73	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	16.49	17.26	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	4.97	5.25	
	Mass of Moisture	g	2.31	2.47	
	Moisture Content	%	46.48	47.05	
	Average Moisture Content	%	46.76		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	205.50
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	140.02

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	8.49	N/A	6.06	93.94	600	300
9.50 mm	17.06	N/A	12.18	81.75	450	300
6.70 mm	9.12	N/A	6.51	75.24	300	300
4.75 mm	8.30	N/A	5.93	69.31	250	200
2.36 mm	22.14	N/A	15.81	53.50	150	200
1.18 mm	16.72	N/A	11.94	41.56	100	200
600 µm	10.45	N/A	7.46	34.10	80	200
425 µm	4.17	N/A	2.98	31.12	70	200
300 µm	6.60	N/A	4.71	26.40	60	200
150 µm	11.32	N/A	8.08	18.32	40	200
75 µm	7.52	N/A	5.37	12.95	25	200
Passing 75 µm	18.13	N/A	12.95	0.00	-	-
Pan Total	140.02	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015



DESCRIPTION:	SILT with some fine sand and trace of fine sub-angular gravel, light orangish brown, firm to stiff, low to medium plasticity
SAMPLE No:	N645
LOCATION:	BH11 12.5m-13.0m
DATE OF TEST :	02 November 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	02 November2015
SITE ADDRESS	:	Siite 11	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH11 15.5-16.0m	**MATERIAL TYPE & LOCATION**	:	SILT with some fine to coarse sand, pale brown, soft to firm, low to medium plasticity
TEST NUMBER	:	N646			

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

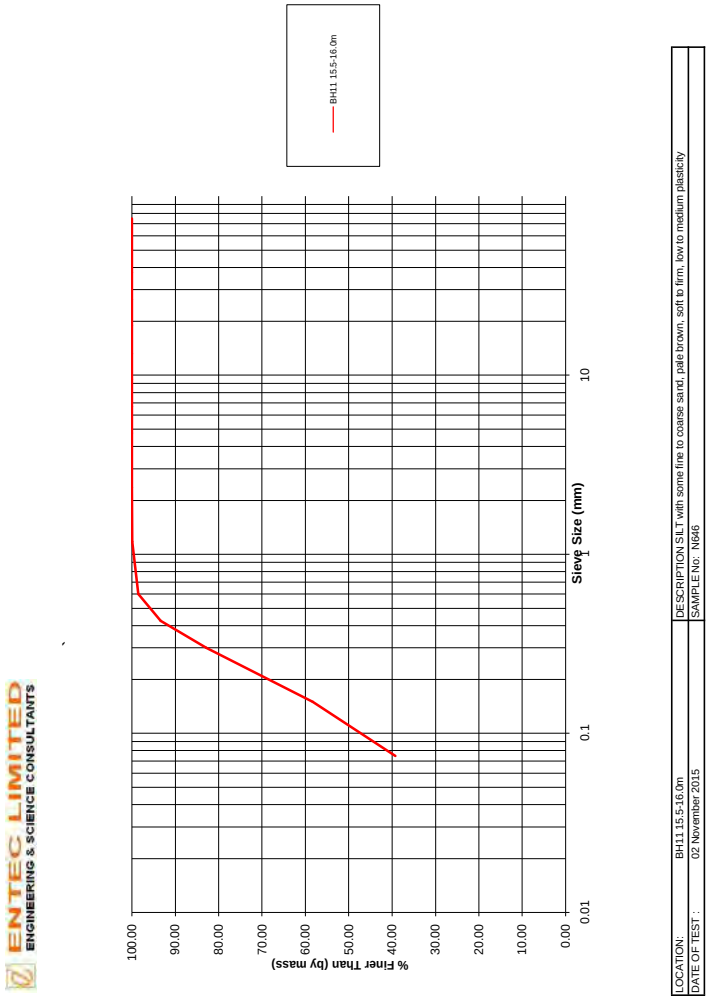
Moisture Content (Material passing 19mm)	Container No.	-	128	168	SPLIT SAMPLE		
	Mass of Container	g	11.83	11.55	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	25.95	25.96	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	22.41	22.33	Spliting Factor =	M_3 / M_4	
	Mass of Dry Soil	g	10.58	10.78			
	Mass of Moisture	g	3.54	3.63			
	Moisture Content	%	33.46	33.67			
	Average Moisture Content	%	33.57				

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)		g	Nil
Total Wet Weight (M_w)		g	264.66
Total Mass of dry sample (M_T)		M_T =	$\frac{100M_w}{100 + w}$
		M_T =	198.15

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		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	0.04	N/A	0.02	99.98	100	200
600 µm	2.91	N/A	1.47	98.51	80	200
425 µm	10.10	N/A	5.10	93.41	70	200
300 µm	20.89	N/A	10.54	82.87	60	200
150 µm	48.58	N/A	24.52	58.35	40	200
75 µm	37.70	N/A	19.03	39.33	25	200
Passing 75 µm	77.93	N/A	39.33	0.00	-	-
Pan Total	198.15	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	02 November 2015
SITE ADDRESS	:	Siite 11	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH11 17.0-17.5m	**MATERIAL TYPE & LOCATION**	:	Fine to medium SAND with some silt and trace of sub-angular to sub-rounded gravel, brown grey
TEST NUMBER	:	N647			

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

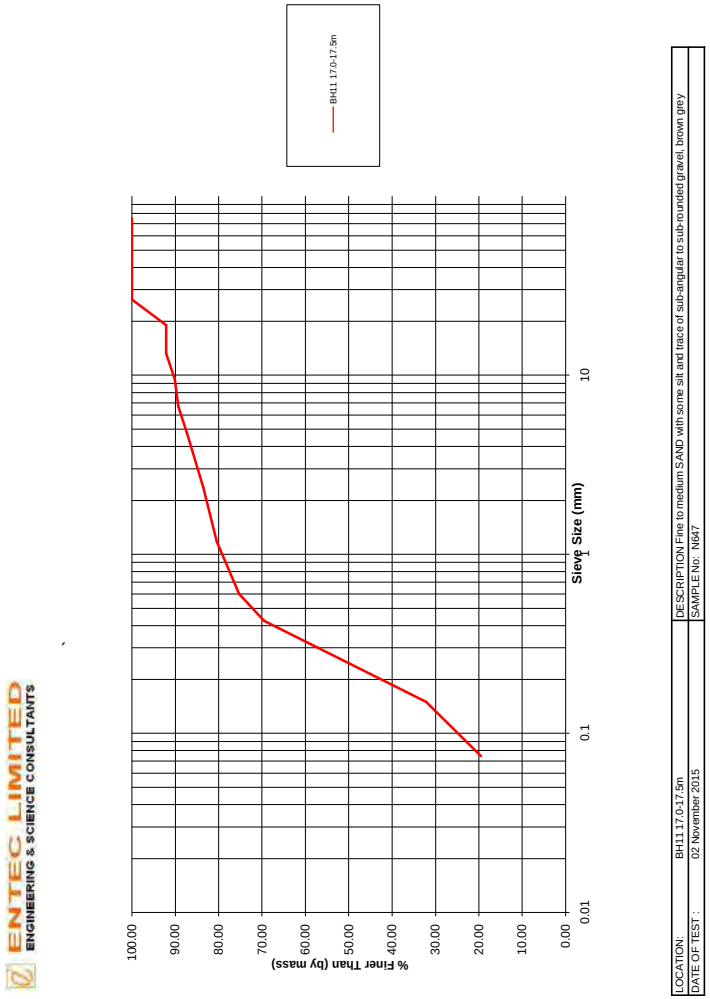
Moisture Content (Material passing 19mm)	Container No.	-	138	165	SPLIT SAMPLE		
	Mass of Container	g	11.13	11.76	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	22.38	22.25	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	19.50	19.52	Spliting Factor $\frac{M_3}{M_4}$ =		
	Mass of Dry Soil	g	8.37	7.76			
	Mass of Moisture	g	2.88	2.73			
	Moisture Content	%	34.41	35.18			
	Average Moisture Content	%	34.79				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	261.03
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	193.65

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	15.35	N/A	7.93	92.07		200
13.2 mm	0.00	N/A	0.00	92.07	600	300
9.50 mm	3.77	N/A	1.95	90.13	450	300
6.70 mm	1.58	N/A	0.82	89.31	300	300
4.75 mm	3.88	N/A	2.00	87.31	250	200
2.36 mm	7.35	N/A	3.80	83.51	150	200
1.18 mm	5.89	N/A	3.04	80.47	100	200
600 µm	10.00	N/A	5.16	75.31	80	200
425 µm	11.18	N/A	5.77	69.53	70	200
300 µm	24.03	N/A	12.41	57.12	60	200
150 µm	48.31	N/A	24.95	32.18	40	200
75 µm	24.26	N/A	12.53	19.65	25	200
Passing 75 µm	38.05	N/A	19.65	0.00	-	-
Pan Total	193.65	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015



LOCATION: BH11 17.0-17.5m
DATE OF TEST : 02 November 2015
DESCRIPTION Fine to medium SAND with some silt and trace of sub-angular to sub-rounded gravel, brown grey
SAMPLE No: N647

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	02 November 2015
SITE ADDRESS	:	Siite 11	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH11 18.5-19.0m	**MATERIAL TYPE & LOCATION**	:	Fine angular GRAVEL with some fine to medium sand, grey, moist
TEST NUMBER	:	N648			

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

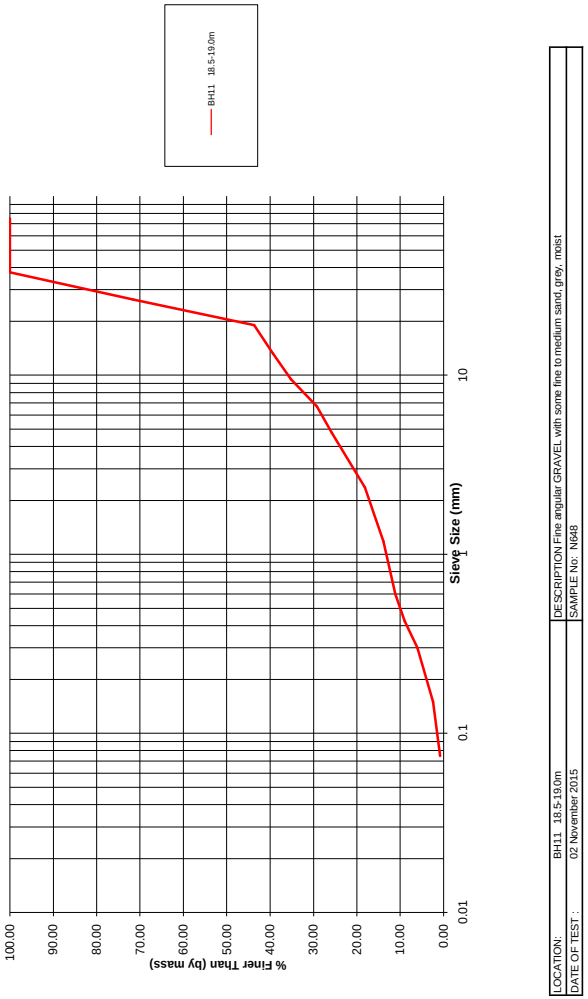
Moisture Content (Material passing 19mm)	Container No.	-	120	164	SPLIT SAMPLE		
	Mass of Container	g	11.68	11.81	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	19.91	20.34	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	18.96	19.24	Spliting Factor = $\frac{M_3}{M_4}$		
	Mass of Dry Soil	g	7.28	7.43			
	Mass of Moisture	g	0.95	1.10			
	Moisture Content	%	13.05	14.80			
	Average Moisture Content	%	13.93				

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)		g	Nil
Total Wet Weight (M_w)		g	271.48
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
	M_T =		238.29

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	67.69	N/A	28.41	71.59		300
19.0mm	66.41	N/A	27.87	43.72		200
13.2 mm	10.40	N/A	4.36	39.36	600	300
9.50 mm	9.89	N/A	4.15	35.21	450	300
6.70 mm	14.13	N/A	5.93	29.28	300	300
4.75 mm	8.29	N/A	3.48	25.80	250	200
2.36 mm	18.12	N/A	7.60	18.20	150	200
1.18 mm	10.37	N/A	4.35	13.85	100	200
600 µm	6.46	N/A	2.71	11.13	80	200
425 µm	4.99	N/A	2.09	9.04	70	200
300 µm	7.18	N/A	3.01	6.03	60	200
150 µm	8.42	N/A	3.53	2.49	40	200
75 µm	3.91	N/A	1.64	0.85	25	200
Passing 75 µm	2.03	N/A	0.85	0.00	-	-
Pan Total	238.29	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	2/11/2015
SITE ADDRESS	:	Site 11	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH11 23.0m-23.5m	**MATERIAL TYPE & LOCATION**	:	SILT with some fine to medium sand trace of fine sub-angular gravel
TEST NUMBER	:	N651			

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

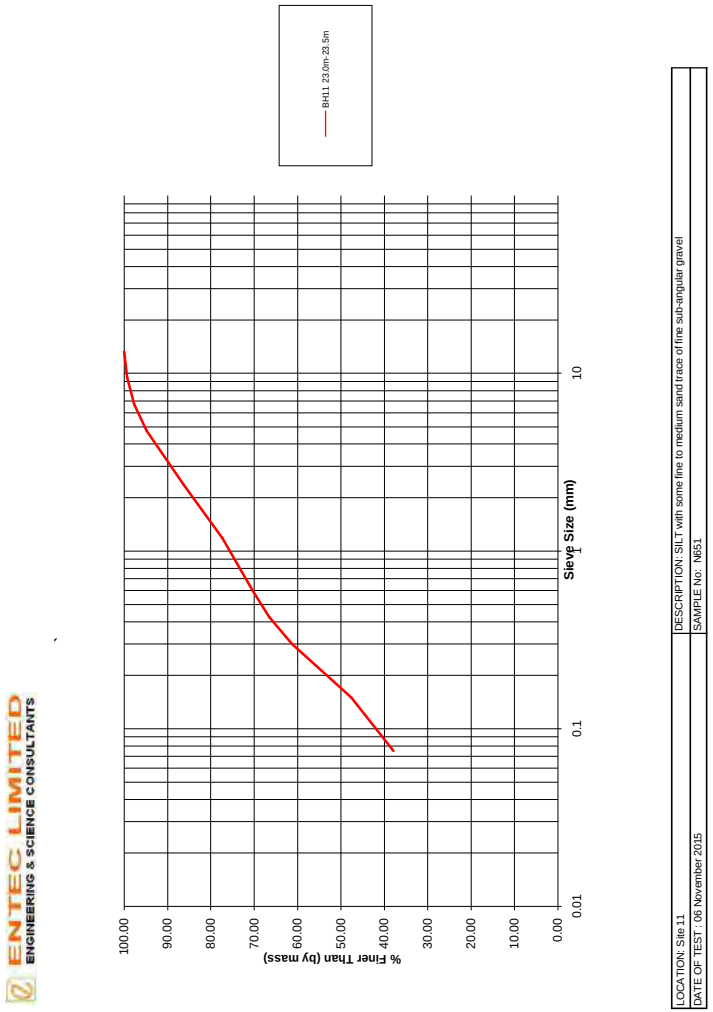
Moisture Content (Material passing 19mm)	Container No.	-	28	29	SPLIT SAMPLE		
	Mass of Container	g	13.98	14.26	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	28.64	27.98	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	24.79	24.35	Spliting Factor $\frac{M_3}{M_4}$ =		
	Mass of Dry Soil	g	10.81	10.09			
	Mass of Moisture	g	3.85	3.63			
	Moisture Content	%	35.62	35.98			
	Average Moisture Content	%	35.80				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	313.59
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	230.93

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	1.51	N/A	0.65	99.35	450	300
6.70 mm	3.82	N/A	1.65	97.69	300	300
4.75 mm	6.63	N/A	2.87	94.82	250	200
2.36 mm	19.66	N/A	8.51	86.31	150	200
1.18 mm	20.73	N/A	8.98	77.33	100	200
600 µm	16.11	N/A	6.98	70.35	80	200
425 µm	8.83	N/A	3.82	66.53	70	200
300 µm	11.95	N/A	5.17	61.36	60	200
150 µm	31.54	N/A	13.66	47.70	40	200
75 µm	22.50	N/A	9.74	37.95	25	200
Passing 75 µm	87.65	N/A	37.95	0.00	-	-
Pan Total	230.93	-	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 : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	6/11/2015
SITE ADDRESS	:	Siite 11	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH11 24.5-24.9m	**MATERIAL TYPE & LOCATION**	:	SILT with some fine sub angular gravel with trace of fine sand, pale grey green (moderately to highly weathered, SILTSTONE CONGLOMERATE, pale grey weak to very weak
TEST NUMBER	:	N652			

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

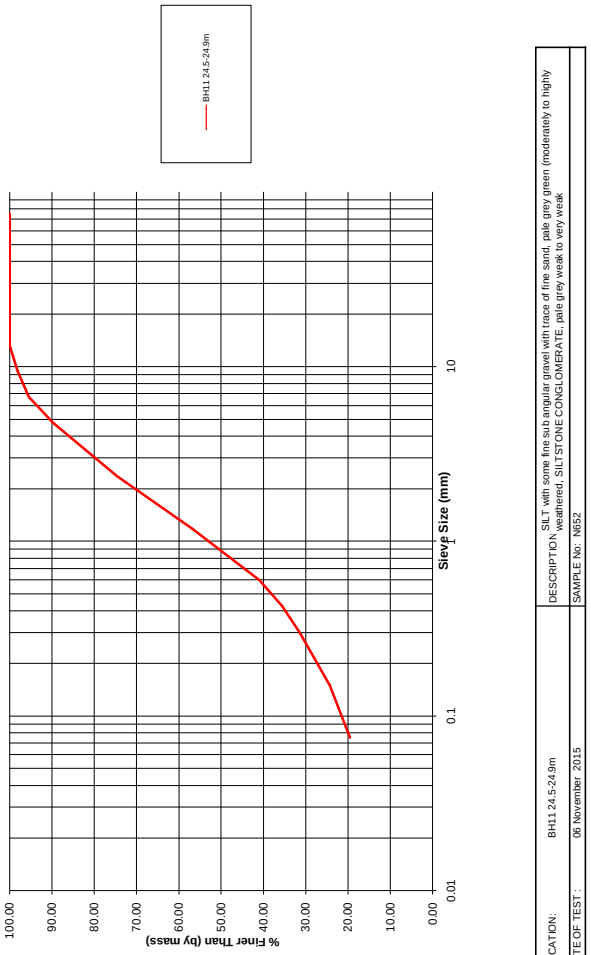
Moisture Content (Material passing 19mm)	Container No.	-	23	25	SPLIT SAMPLE		
	Mass of Container	g	14.68	14.43	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	26.66	26.47	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	24.46	24.30	Spliting Factor =	M_3 / M_4	
	Mass of Dry Soil	g	9.78	9.87			
	Mass of Moisture	g	2.20	2.17			
	Moisture Content	%	22.49	21.99			
	Average Moisture Content	%	22.24				

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)		g	Nil
Total Wet Weight (M_w)		g	308.16
Total Mass of dry sample (M_T)	M_T =	$\frac{100M_w}{100 + w}$	
	M_T =	252.09	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm	4.51	N/A	1.79	98.21	450	300
6.70 mm	7.06	N/A	2.80	95.41	300	300
4.75 mm	14.41	N/A	5.72	89.69	250	200
2.36 mm	37.79	N/A	14.99	74.70	150	200
1.18 mm	45.25	N/A	17.95	56.75	100	200
600 µm	39.79	N/A	15.78	40.97	80	200
425 µm	13.56	N/A	5.38	35.59	70	200
300 µm	10.46	N/A	4.15	31.44	60	200
150 µm	17.92	N/A	7.11	24.33	40	200
75 µm	12.03	N/A	4.77	19.56	25	200
Passing 75 µm	49.31	N/A	19.56	0.00	-	-
Pan Total	252.09	-	100.00	-	-	-

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

Tested by : TL	Q.A. Checked by : KB	Approved by : IG
Date : 24 October 2015	Date : 03 December 2015	Date : 03 December 2015



LOCATION:	BH11 24.5-24.9m
DATE OF TEST :	08 November 2015
DESCRIPTION	SILT with some fine sub angular gravel with trace of fine sand, pale grey green (moderately to highly weathered), SILTSTONE CONGLOMERATE, pale grey weak to very weak
SAMPLE No:	N652

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Form GE-L-06

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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**	:	24 October 2015
SITE ADDRESS	:	Site 11	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH 11 2.0m-2.5m	**MATERIAL TYPE**	:	SILT with some fine sand , orange brown , soft to firm, low to medium plasticity
TEST NUMBER	:	N 617			

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

Moisture Content	Container No.	-	95
	Mass of Container	g	89.90
	Mass of Container + Wet Soil	g	522.50
	Mass of Container + Dry Soil	g	423.79
	Mass of Dry Soil	g	333.89
	Mass of Moisture	g	98.71
	Moisture Content	%	29.56

Bulk Density	Sample No.	-	N617
	Diameter of Specimen	mm	53.69
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2262.85
	Initial length of specimen Lo	mm	104.24
	Initial mass of specimen Mi	g	433.10
	Bulk Density ρ	t/m^3	1.84
	Dry Density ρd	t/m^3	1.42

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	0.000	0.002263	0.00
0.50	33.0	0.0662	0.480	0.002274	29.11
1.00	48.0	0.0963	0.959	0.002285	42.15
1.50	62.0	0.1244	1.439	0.002296	54.18
2.00	74.0	0.1485	1.919	0.002307	64.37
2.50	88.0	0.1767	2.398	0.002318	76.21
3.00	98.5	0.1977	2.878	0.002330	84.85
3.50	107.0	0.2148	3.358	0.002341	91.74
4.00	113.0	0.2269	3.837	0.002353	96.42
4.50	117.0	0.2349	4.317	0.002365	99.33
5.00	119.0	0.2389	4.797	0.002377	100.51
5.50	120.0	0.2409	5.276	0.002389	100.84
6.00	121.0	0.2429	5.756	0.002401	101.16
6.50	120.0	0.2409	6.236	0.002413	99.82
7.00	117.0	0.2349	6.715	0.002426	96.84
7.50	107.0	0.2148	7.195	0.002438	88.09
8.00	100.0	0.2008	7.675	0.002451	81.93

Tested by : KB	Q.A. Check by :KB	Approved by : IG
Date : 24 October 2015	Date : 03 December 2015	Date : 03 December 2015

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	03 November 2015
SITE ADDRESS	:	Site 11	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH 11 9.50 - 10.00m	**MATERIAL TYPE**	:	SILT with some silt stone nodules trace of iron staining and medium subrounded gravel
TEST NUMBER	:	N643			

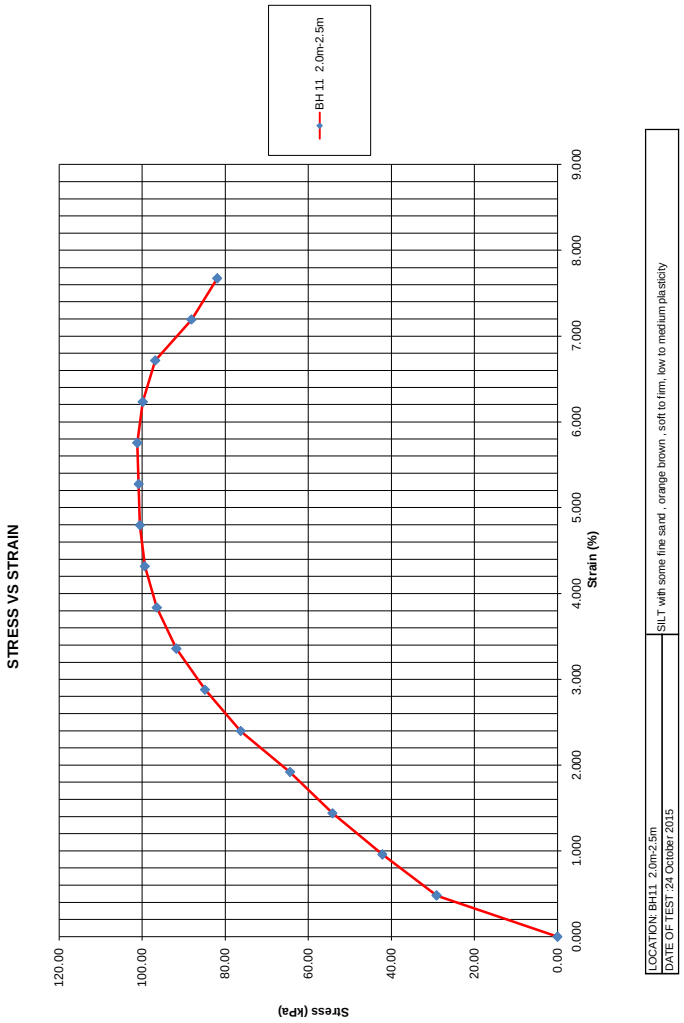
SAMPLE HISTORY : NATURAL / AIR ~~DRIED~~ / OVEN ~~DRIED~~ / ~~UNKNOWN~~

Moisture Content	Container No.	-	93
	Mass of Container	g	88.64
	Mass of Container + Wet Soil	g	541.26
	Mass of Container + Dry Soil	g	429.03
	Mass of Dry Soil	g	340.39
	Mass of Moisture	g	112.23
	Moisture Content	%	32.97

Bulk Density	Sample No.	-	N643
	Diameter of Specimen	mm	53.70
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2263.70
	Initial length of specimen Lo	mm	107.76
	Initial mass of specimen Mi	g	453.66
	Bulk Density ρ	t/m^3	1.86
	Dry Density ρd	t/m^3	1.40

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	0.002264	0.00
0.50	51	0.1024	0.464	0.002274	45.03
1.00	67.0	0.1345	0.928	0.002285	58.86
1.50	84.0	0.1686	1.392	0.002296	73.44
2.00	81.0	0.1626	1.856	0.002307	70.50
2.50	73.0	0.1465	2.320	0.002317	63.22
3.00	53.0	0.1064	2.784	0.002329	45.69
3.50	39.0	0.0783	3.248	0.002340	33.47

Tested by : KB	Q.A. Check by :KB	Approved by : IG
Date : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015



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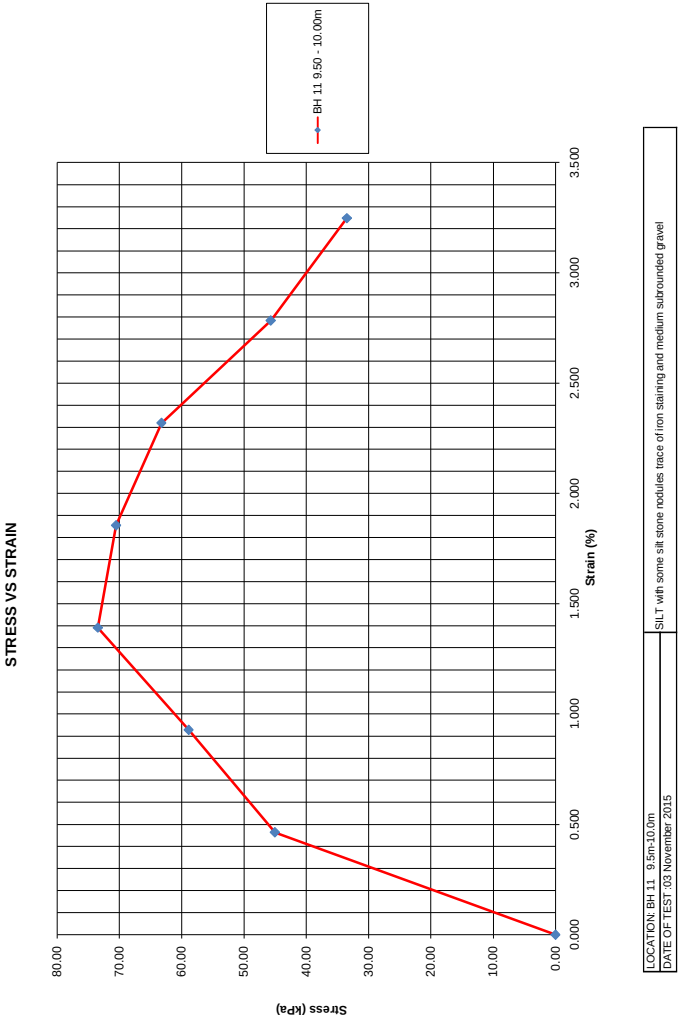

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Form GE-L-10

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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**	: 04 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: TL
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand and minor clay and trace of fine sub-angular gravel, pale brown, firm to stiff, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N644 (BH11 11.0 - 11.5m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	37	38				
Mass of Container	g	14.69	14.78				
Mass of Container + Wet Soil	g	22.21	21.62				
Mass of Container + Dry Soil	g	20.10	19.70				
Mass of Dry Soil	g	5.41	4.92				
Mass of Moisture	g	2.11	1.92				
Moisture Content	%	39.00	39.02				39.01

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		123	125				
Mass of Container	g	11.59	11.87				
Mass of Container + Wet Soil	g	15.40	16.01				
Mass of Container + Dry Soil	g	14.30	14.78				
Mass of Dry Soil	g	2.71	2.91				
Mass of Moisture	g	1.10	1.23				
Moisture Content	%	40.59	42.27				41.43

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		41	36	30	25	22	15
Container No.		157	171	172	173	175	176
Mass of Container	g	11.88	11.80	12.35	11.98	11.29	11.79
Mass of Container + Wet Soil	g	22.78	20.82	21.94	18.14	19.87	21.84
Mass of Container + Dry Soil	g	18.85	17.54	18.45	15.86	16.67	18.01
Mass of Dry Soil	g	6.97	5.74	6.10	3.88	5.38	6.22
Mass of Moisture	g	3.93	3.28	3.49	2.28	3.20	3.83
Moisture Content	%	56.38	57.14	57.21	58.76	59.48	61.58

LINEAR SHRINKAGE TEST

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

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

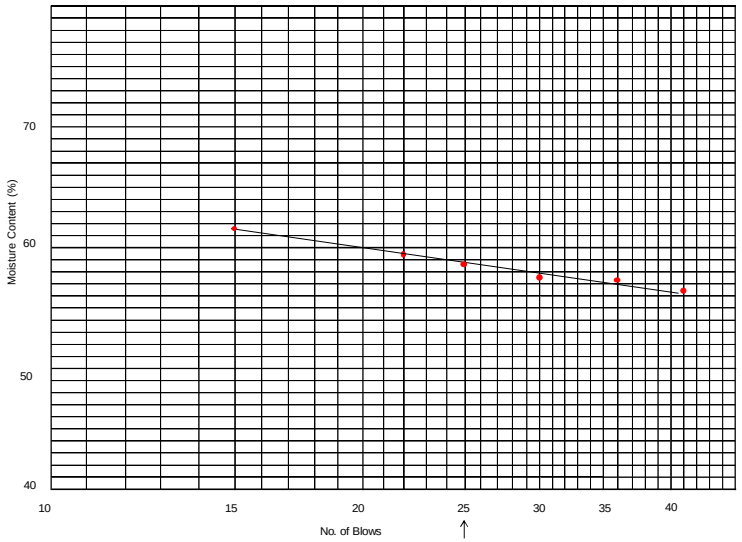
Liquid Limit	58.70 %
Plastic Limit	41.43 %
Plasticity Index	17.27 %
Shrinkage Limit	12.00 %

Tested By:TL
Date:04 November 2015

Q.A. Checked By: KB
Date: 03 December 2015

Approved By:
Date: 03 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N 644

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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**	: 05 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand and organics, green grey, firm, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N650 (BH11 21.5 - 22.0m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	31	32				
Mass of Container	g	14.52	14.55				
Mass of Container + Wet Soil	g	20.53	20.83				
Mass of Container + Dry Soil	g	18.42	18.60				
Mass of Dry Soil	g	3.90	4.05				
Mass of Moisture	g	2.11	2.23				
Moisture Content	%	54.10	55.06				54.58

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		110	155				
Mass of Container	g	11.91	11.70				
Mass of Container + Wet Soil	g	17.09	17.24				
Mass of Container + Dry Soil	g	15.60	15.62				
Mass of Dry Soil	g	3.69	3.92				
Mass of Moisture	g	1.49	1.62				
Moisture Content	%	40.38	41.33				40.85

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	15
Container No.		24	18	41	43	163	147
Mass of Container	g	14.61	14.59	14.32	14.86	11.76	11.63
Mass of Container + Wet Soil	g	21.82	21.83	21.07	22.29	21.44	19.05
Mass of Container + Dry Soil	g	19.28	19.21	18.58	19.50	17.76	16.13
Mass of Dry Soil	g	4.67	4.62	4.26	4.64	6.00	4.50
Mass of Moisture	g	2.54	2.62	2.49	2.79	3.68	2.92
Moisture Content	%	54.39	56.71	58.45	60.13	61.33	64.89

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

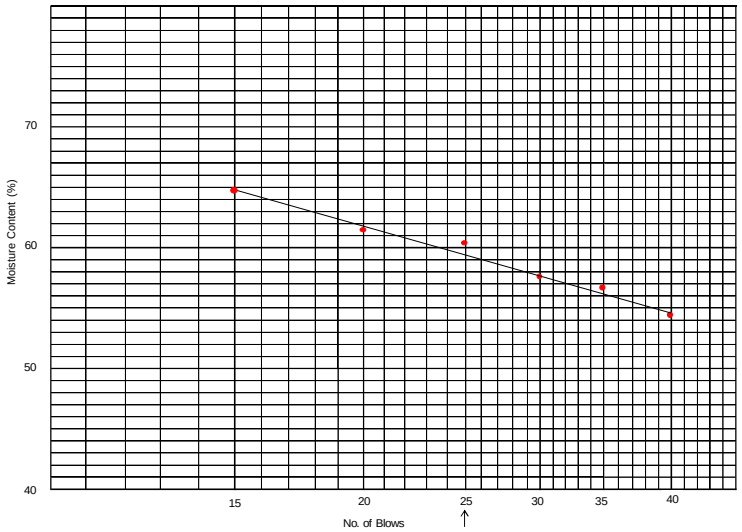
Liquid Limit	59.40 %
Plastic Limit	40.85 %
Plasticity Index	18.55 %
Shrinkage Limit	19.20 %

Tested By:KB
Date:05 November 2015

Q.A. Checked By: KB
Date: 03 December 2015

Approved By:
Date: 03 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N650

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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**	: 02 November 2015
SITE ADDRESS	: BH11	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: SILT with trace of clay, brown to light brown, soft to firm, moist, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N639 (BH11 3.5 - 4.0m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.		18	19				
Mass of Container	g	14.61	14.85				
Mass of Container + Wet Soil	g	25.74	27.61				
Mass of Container + Dry Soil	g	22.91	24.29				
Mass of Dry Soil	g	8.30	9.44				
Mass of Moisture	g	2.83	3.32				
Moisture Content	%	34.10	35.17				34.63

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		174	122				
Mass of Container	g	12.22	11.68				
Mass of Container + Wet Soil	g	18.31	18.09				
Mass of Container + Dry Soil	g	16.82	16.55				
Mass of Dry Soil	g	4.60	4.87				
Mass of Moisture	g	1.49	1.54				
Moisture Content	%	32.39	31.62				32.01

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	29	24	19	15
Container No.		107	151	145	139	105	131
Mass of Container	g	11.58	12.00	11.88	11.35	11.58	11.65
Mass of Container + Wet Soil	g	22.09	23.03	20.66	23.68	22.63	20.84
Mass of Container + Dry Soil	g	17.93	18.63	17.14	18.64	18.08	17.01
Mass of Dry Soil	g	6.35	6.63	5.26	7.29	6.50	5.36
Mass of Moisture	g	4.16	4.40	3.52	5.04	4.55	3.83
Moisture Content	%	65.51	66.37	66.92	69.14	70.00	71.46

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

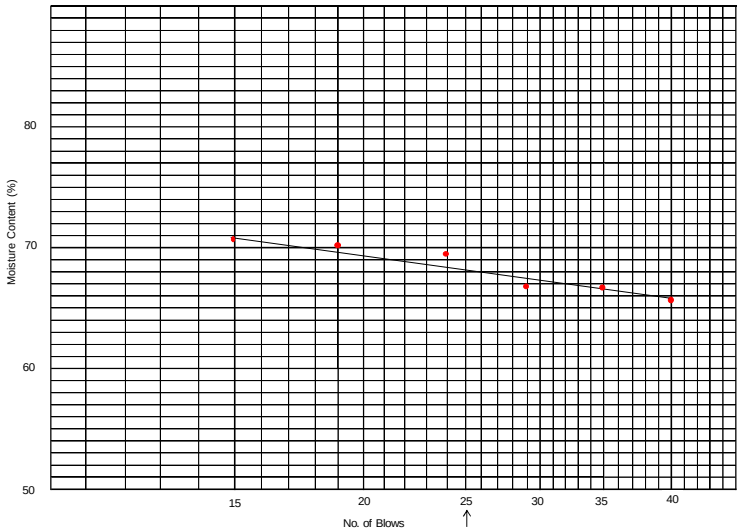
Liquid Limit	68.00 %
Plastic Limit	32.01 %
Plasticity Index	35.99 %
Shrinkage Limit	16.80 %

Tested By:LN
Date:03 November 2015

Q.A. Checked By: KB
Date: 03 December 2015

Approved By:IG
Date: 03 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N636

Form: GE-L-03

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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** :	24 October 2015
SITE ADDRESS :	Site 11	**TECHNOLOGIST** :	KB
SAMPLE LOCATION :	BH11 2.0-2.5m	**MATERIAL TYPE** :	SILT with some fine sand , orange brown , soft to firm, low to medium plasticity
TEST NUMBER :	N617		

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

Moisture Content	Container No.	-	76	71	
	Mass of Container	g	86.35	86.42	
	Mass of Container + Wet Soil	g	167.02	169.15	
	Mass of Container + Dry Soil	g	151.58	153.68	
	Mass of Dry Soil	g	65.23	67.26	
	Mass of Moisture	g	15.44	15.47	
	Moisture Content	%	23.67	23.00	23.34

Bulk Density	Sample No.	-	N617
	Diameter of Specimen	mm	53.65
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2259.48
	Initial length of specimen Lo	mm	41.77
	Initial mass of specimen Mi	g	163.54
	Bulk Density ρ	t/m³	1.73
	Dry Density ρd	t/m³	1.40

Tested by : KB	Q.A. Check by : KB	Approved by : IG
Date : 24 October 2015	Date :03 December 2015	Date :03 December 2015

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

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	03 November 2015
SITE ADDRESS :	Site 11	**TECHNOLOGIST** :	TL
SAMPLE LOCATION :	BH11 9.5-10.0m	**MATERIAL TYPE** :	SILT with some silt stone nodules trace of iron staining and medium subrounded gravel
TEST NUMBER :	N643		

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

Moisture Content	Container No.	-	94	95	
	Mass of Container	g	88.03	89.88	
	Mass of Container + Wet Soil	g	201.64	190.44	
	Mass of Container + Dry Soil	g	166.63	159.24	
	Mass of Dry Soil	g	78.60	69.36	
	Mass of Moisture	g	35.01	31.20	
	Moisture Content	%	44.54	44.98	44.76

Bulk Density	Sample No.	-	N643
	Diameter of Specimen	mm	53.92
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2282.28
	Initial length of specimen Lo	mm	54.65
	Initial mass of specimen Mi	g	214.29
	Bulk Density ρ	t/m^3	1.72
	Dry Density ρd	t/m^3	1.19

Tested by : TL	Q.A. Check by : KB	Approved by : IG
Date : 03 November 2015	Date :03 December 2015	Date : 03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand and trace of iron staining and silt stone nodules,orange brown, moist, firm, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N638 (BH11 1.00m - 1.5m)

Moisture Content	%						
Container No.	g	116	169				
Mass of Container	g	11.70	11.37				
Mass of Container + Wet Soil	g	24.14	26.24				
Mass of Container + Dry Soil	g	21.05	22.58				
Mass of Dry Soil	g	9.35	11.21				
Mass of Moisture	g	3.09	3.66				
Moisture Content	%	33.05	32.65				32.85

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand , orange brown , soft to firm, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N617 (BH11 2.00m - 2.50m)

Moisture Content	%						
Container No.	g	97	104				
Mass of Container	g	11.54	11.90				
Mass of Container + Wet Soil	g	26.91	27.90				
Mass of Container + Dry Soil	g	23.37	24.14				
Mass of Dry Soil	g	11.83	12.24				
Mass of Moisture	g	3.54	3.76				
Moisture Content	%	29.92	30.72				30.32

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand andd trace of iron staining , light brown, firm to hard, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N640 (BH09 5.0m - 5.5m)

Moisture Content	%						
Container No.	g	133	136				
Mass of Container	g	11.29	11.76				
Mass of Container + Wet Soil	g	31.56	31.04				
Mass of Container + Dry Soil	g	26.31	26.01				
Mass of Dry Soil	g	15.02	14.25				
Mass of Moisture	g	5.25	5.03				
Moisture Content	%	34.95	35.30				35.13

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

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ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand andd trace of iron staining , light brown, firm to hard, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N641 (BH11 6.5m - 7.0m)

Moisture Content	%						
Container No.	g	147	158				
Mass of Container	g	11.64	12.12				
Mass of Container + Wet Soil	g	30.38	30.23				
Mass of Container + Dry Soil	g	25.09	25.13				
Mass of Dry Soil	g	13.45	13.01				
Mass of Moisture	g	5.29	5.10				
Moisture Content	%	39.33	39.20				39.27

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand andd trace of iron staining , light brown, firm to hard, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N642 (BH11 8.0m - 8.5m)

Moisture Content	%						
Container No.	g	126	127				
Mass of Container	g	12.83	11.55				
Mass of Container + Wet Soil	g	33.69	33.67				
Mass of Container + Dry Soil	g	27.97	27.63				
Mass of Dry Soil	g	15.14	16.08				
Mass of Moisture	g	5.72	6.04				
Moisture Content	%	37.78	37.56				37.67

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some silt stone nodules trace of iron staining and medium subrounded gravel	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N643 (BH11 9.5m - 10.0m)

Moisture Content	%						
Container No.	g	160	124				
Mass of Container	g	11.93	11.74				
Mass of Container + Wet Soil	g	22.49	22.05				
Mass of Container + Dry Soil	g	19.35	18.92				
Mass of Dry Soil	g	7.42	7.18				
Mass of Moisture	g	3.14	3.13				
Moisture Content	%	42.32	43.59				42.96

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine to coarse sand, pale brown, soft to firm, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N646 (BH11 15.5m - 16.0m)

Moisture Content	%						
Container No.	g	98	99				
Mass of Container	g	11.91	11.84				
Mass of Container + Wet Soil	g	27.54	27.57				
Mass of Container + Dry Soil	g	23.62	23.65				
Mass of Dry Soil	g	11.71	11.81				
Mass of Moisture	g	3.92	3.92				
Moisture Content	%	33.48	33.19				33.33

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fine to medium SAND with some silt and trace of sub-angular to sub-rounded gravel, brown grey	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N647 (BH11 17.0m - 17.5m)

Moisture Content	%						
Container No.	g	113	114				
Mass of Container	g	11.89	11.92				
Mass of Container + Wet Soil	g	23.26	23.57				
Mass of Container + Dry Soil	g	20.09	20.32				
Mass of Dry Soil	g	8.20	8.40				
Mass of Moisture	g	3.17	3.25				
Moisture Content	%	38.66	38.69				38.67

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand , oragnics and silt stone nodules, green grey , firm to stiff, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N649 (BH11 20.0m - 20.5m)

Moisture Content	%						
Container No.	g	101	106				
Mass of Container	g	11.62	12.04				
Mass of Container + Wet Soil	g	22.17	22.12				
Mass of Container + Dry Soil	g	19.73	19.78				
Mass of Dry Soil	g	8.11	7.74				
Mass of Moisture	g	2.44	2.34				
Moisture Content	%	30.09	30.23				30.16

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 02 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand and organics, green grey, firm, low to medium plasticity y	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N650 (BH11 21.5m - 22.0m)

Moisture Content	%						
Container No.	g	137	141				
Mass of Container	g	11.30	11.68				
Mass of Container + Wet Soil	g	24.74	24.82				
Mass of Container + Dry Soil	g	21.20	21.29				
Mass of Dry Soil	g	9.90	9.61				
Mass of Moisture	g	3.54	3.53				
Moisture Content	%	35.76	36.73				36.25

Tested By: RK
Date: 02 November 2015

Q.A. Checked By: KB
Date:03 December 2015

Approved By: IG
Date:03 December 2015

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**	: 07 November 2015
SITE ADDRESS	: Site 11	**TECHNOLOGIST**	: IG
MATERIAL TYPE & DESCRIPTION	: SILT with some fine to coarse sand, pale brown, soft to firm, low to medium plasticity (Core Sample)	**TEST METHOD**	: AS 1289.6.7.3-2001
		SAMPLE No.	: N646 (BH11 16.0m - 16.4m)

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

MOISTURE CONTENT

Container No.		10
Mass of Container	g	52.38
Mass of Container + Wet	g	79.55
Mass of Container + Dry	g	74.61
Mass of Dry Soil	g	22.23
Mass of Moisture	g	4.94
Moisture Content	%	22.22
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1400
Volume of Speciman	cm^3	819.33
Wet Density	t/m^3	1.71
Dry Density	t/m^3	1.40
Maximum Dry Density	t/m^3	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm^2	113.10
Cross sectional area of soil speciman(8cm)	cm^2	50.27
Length of soil speciman	cm	16.30

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	124	5.00	15	26	0.01	0.01
2	124	5.00	15	26	0.01	0.01
3	124	5.00	15	26	0.01	0.01
4	117	5.00	13	26	0.01	0.01
5	117	5.00	13	26	0.01	0.01
6	117	5.00	13	26	0.01	0.01
7	109	5.00	12	26	0.01	0.01
8	109	5.00	12	26	0.01	0.01
9	109	5.00	12	26	0.01	0.01
10	102	5.00	10.5	26	0.01	0.01
11	102	5.00	11	26	0.01	0.01
12	102	5.00	11	26	0.01	0.01

Average K_{20} m/s	1.08E-06

Tested By: IG
Date: 7 November 2015

Q.A. Check By:KB
Date: 03 December 2015

Approved By: IG
Date: 03 December 2015

Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth			2.0 - 2.5m
Description			
Type			SILT with some fine sand, orange 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)	68.1
Bulk Density	ρ_0	(Mg/m3)	1.73
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	33
Initial Dry Density	ρ_{di}	(Mg/m3)	1.30
Initial Voids Ratio	e_i	.	1.034
Initial Degree of Saturation	S_i	(%)	84.8
Initial Swelling	S_S	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	24
Dry Density	ρ_{df}	(Mg/m3)	1.14
Voids Ratio	e_f	.	1.316
Saturation	S_f	(%)	48
Height Settlement	ΔL_s	(mm)	-2.782

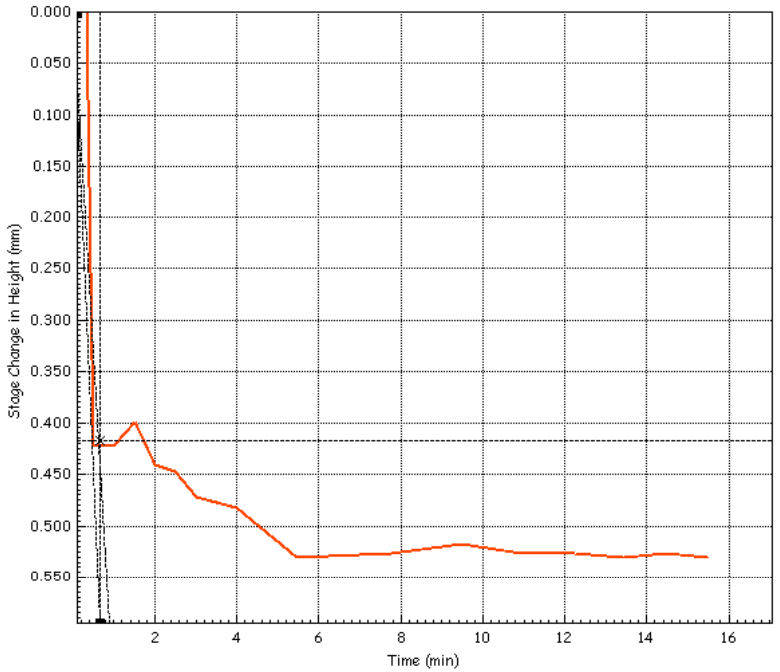
Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
50	0.980	0.530	103.2	0.530	29.0	0.0		0.419	0.0087
100	1.317	-2.785	28.4	3.405	29.0	0.0		1.744	0.0087
200	1.317	-2.785	42.7		29.0	0.0		1.350	0.0087
400	1.317	-2.785	31.4		29.0	0.0		1.835	0.0087
600	1.317	-2.785	12.3		29.0	0.0		4.694	0.0087
1200	1.317	-2.785	15.8		29.0	0.0		3.641	0.0087
400	1.317	-2.785			29.0	0.0			
50	1.317	-2.785			29.0	0.0			

Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/3/2015
Jobfile	Geotechnical Engineering	Sample	N617
Client	Japan International Cooperation	Borehole	BH11
Operator IG/MK	Checked DMC	Approved DMC	

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)	0.530
Voids Ratio	e_f	.	0.980
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.419
Consolidation	C_V	(m2/year)	103.2
Compressibility	m_V	(m2/MN)	0.530
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

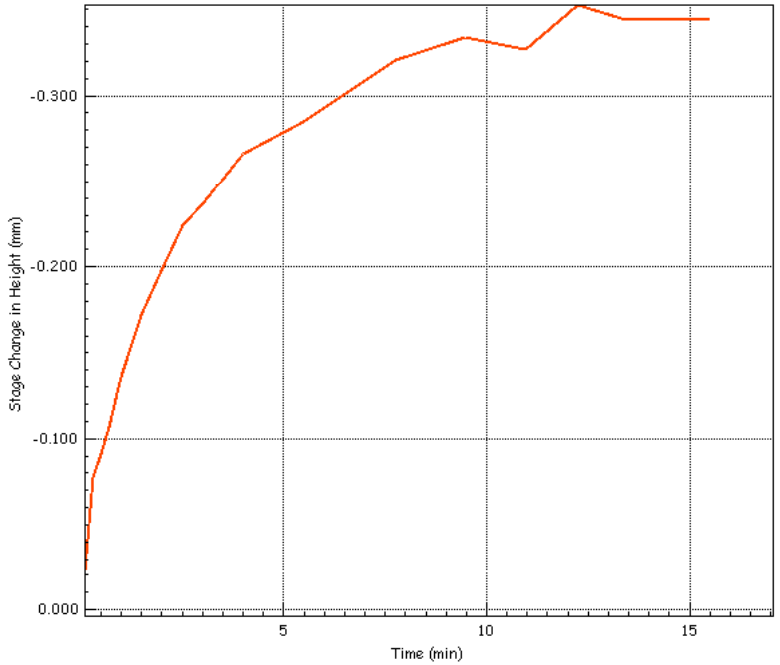


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/3/2015
Jobfile	Geotechnical Engineering	Sample	N617
Client	Japan International Cooperation	Borehole	BH11
Operator IG/MK	Checked DMC	Approved DMC	

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	50
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-2.782
Voids Ratio	e_f	.	1.316
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)	

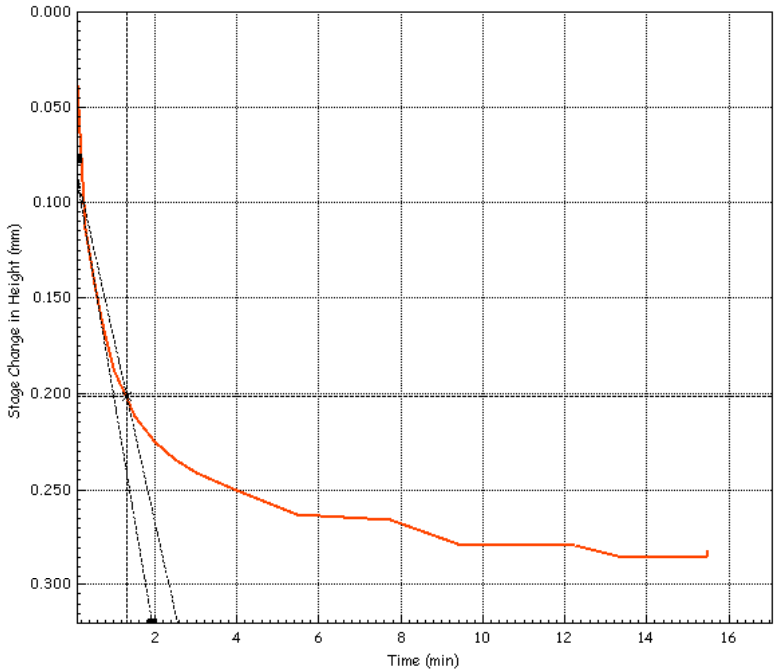


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/3/2015
Jobfile	Geotechnical Engineering	Sample	N617
Client	Japan International Cooperation	Borehole	BH11
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	1.815
Voids Ratio	e_f	.	0.849
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	1.744
Consolidation	C_V	(m2/year)	22.6
Compressibility	m_V	(m2/MN)	1.320
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

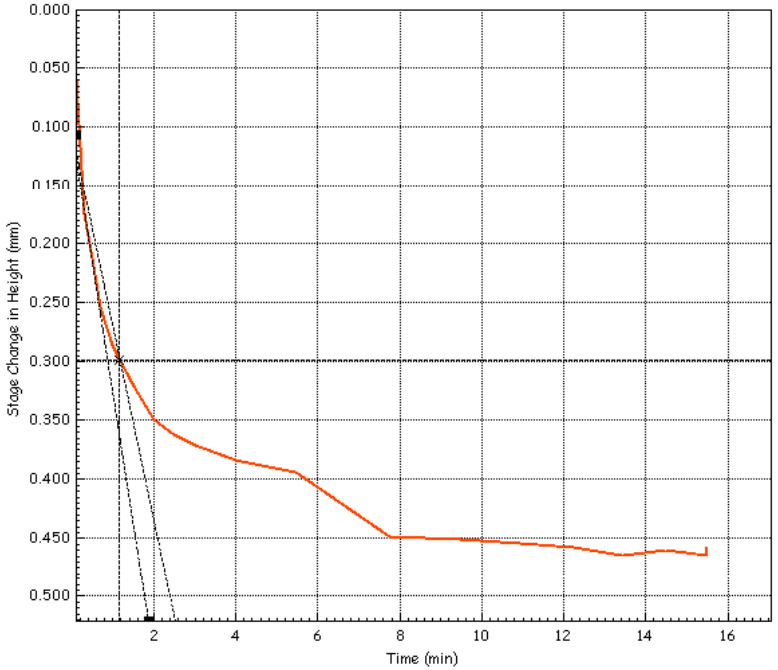


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/3/2015
Jobfile	Geotechnical Engineering	Sample	N617
Client	Japan International Cooperation	Borehole	BH11
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	-2.775
Voids Ratio	e_f	.	1.316
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	1.350
Consolidation	C_V	(m2/year)	42.6
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

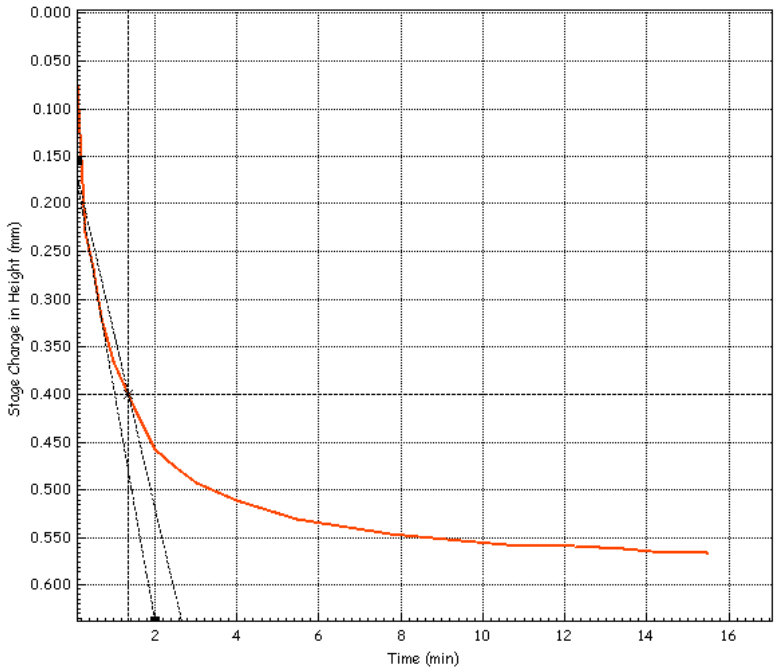


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/3/2015
Jobfile	Geotechnical Engineering	Sample	N617
Client	Japan International Cooperation	Borehole	BH11
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	-2.778
Voids Ratio	e_f	.	1.316
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	1.835
Consolidation	C_V	(m2/year)	31.4
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

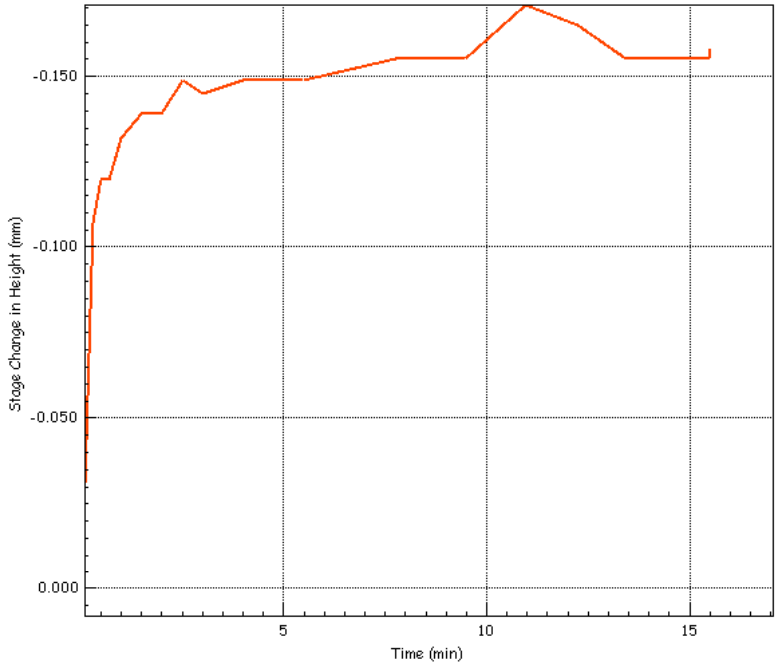


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/3/2015
Jobfile	Geotechnical Engineering	Sample	N617
Client	Japan International Cooperation	Borehole	BH11
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	-2.775
Voids Ratio	e_f	.	1.316
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)	

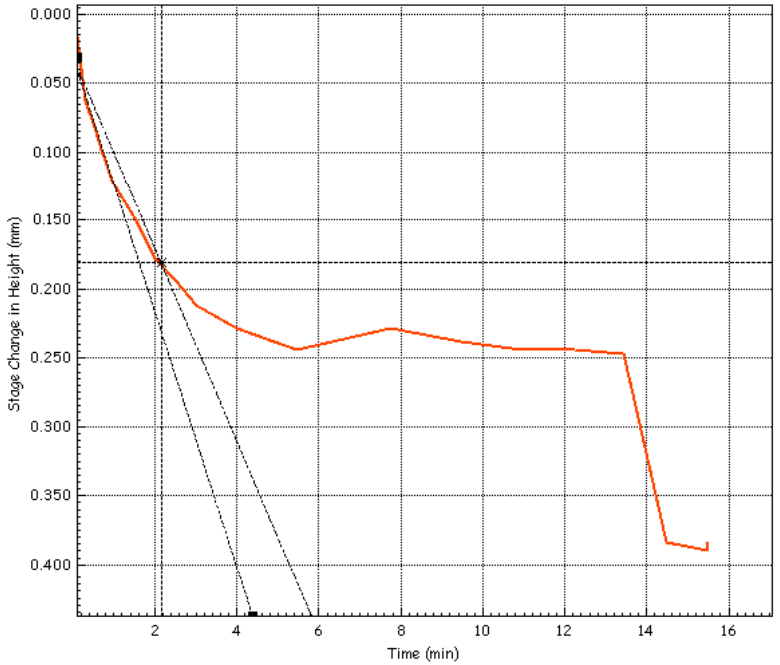


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/3/2015
Jobfile	Geotechnical Engineering	Sample	N617
Client	Japan International Cooperation	Borehole	BH11
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	600
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-2.778
Voids Ratio	e_f	.	1.316
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	4.694
Consolidation	C_V	(m2/year)	12.3
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

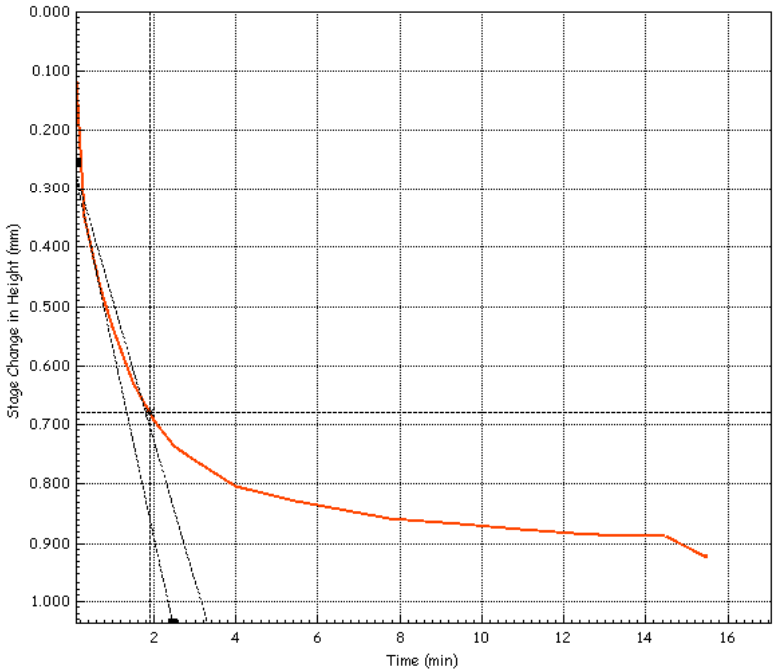


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/3/2015
Jobfile	Geotechnical Engineering	Sample	N617
Client	Japan International Cooperation	Borehole	BH11
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'i	(kPa)	1200
Initial Temperature	Ti	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	ΔLs	(mm)	-2.775
Voids Ratio	ef	.	1.316
Final Temperature	Tf	(oC)	0.0
t50 Time	t50	(min)	
t90 Time	t90	(min)	3.641
Consolidation	Cv	(m2/year)	15.8
Compressibility	mv	(m2/MN)	
Secondary Compression	C SEC	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/3/2015
Jobfile	Geotechnical Engineering	Sample	N617
Client	Japan International Cooperation	Borehole	BH11
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth			9.5 - 10.0m
Description			
Type			SILT with some siltstone nodules trace of iron staining and medium
Initial Height	L0	(mm)	20.0
Initial Diameter	D0	(mm)	50.0
Initial Weight	W0	(gr)	59.8
Bulk Density	ρ0	(Mg/m3)	1.52
Particle Density	ρs	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L IP	(mm)	CH 3
Initial Moisture	ωi%	(%)	44
Initial Dry Density	ρdi	(Mg/m3)	1.05
Initial Voids Ratio	ei	.	1.512
Initial Degree of Saturation	Si	(%)	77.7
Initial Swelling	Ss	(kPa)	0

Final Conditions

Final Moisture	ωf%	(%)	42
Dry Density	ρdf	(Mg/m3)	1.27
Voids Ratio	ef	.	1.087
Saturation	Sf	(%)	100
Height Settlement	ΔLs	(mm)	3.388

Vertical Stress σ'i (kPa)	Voids Ratio ef .	Height ΔLs (mm)	Consolidation Cv (m2/year)	Compressibility mv (m2/MN)	Initial Ti (oC)	Final Tf (oC)	t50 Time t50 (min)	t90 Time t90 (min)	Secondary C SEC (m2/MN)
50	1.487	0.201	21.5	0.201	29.0	0.0		2.046	0.0087
100	1.087	3.385	133.8	3.216	29.0	0.0		0.275	0.0087
200	1.087	3.385	57.2		29.0	0.0		0.536	0.0087
400	1.087	3.385	20.3		29.0	0.0		1.508	0.0087
800	1.087	3.385	41.8		29.0	0.0		0.733	0.0087
1600	1.087	3.385	15.9		29.0	0.0		1.933	0.0087
400	1.087	3.385			29.0	0.0			
100	1.087	3.385			29.0	0.0			

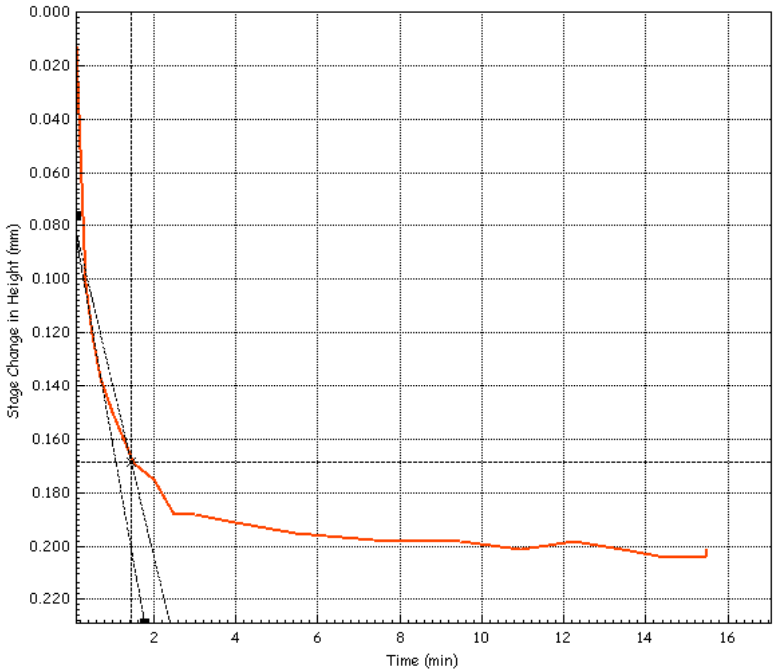
Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/5/2015
Jobfile	Geotechnical Engineering	Sample	N643
Client	Japan International Cooperation	Borehole	BH11a
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)	50
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.201
Voids Ratio	e_f	.	1.487
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	2.046
Consolidation	C_V	(m2/year)	21.5
Compressibility	m_V	(m2/MN)	0.201
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

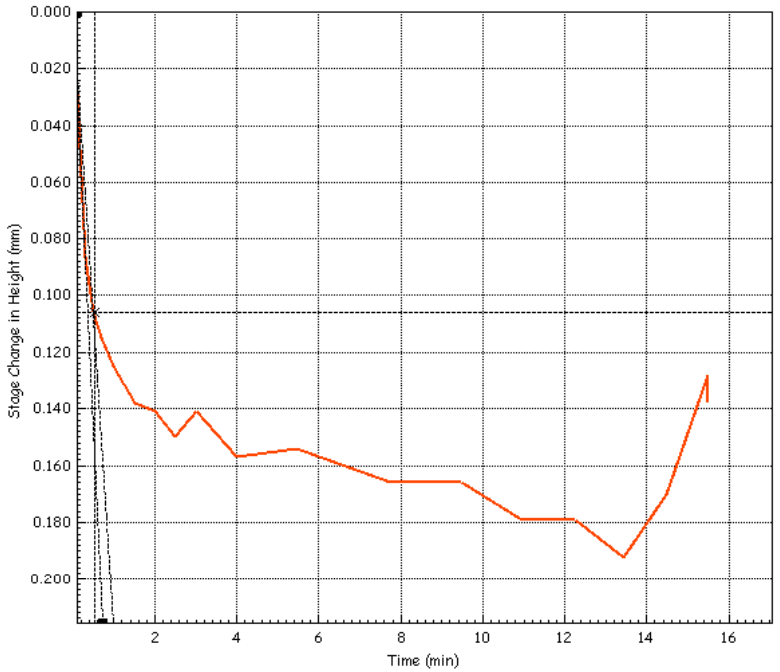


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/5/2015
Jobfile	Geotechnical Engineering	Sample	N643
Client	Japan International Cooperation	Borehole	BH11a
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	3.385
Voids Ratio	e_f	.	1.087
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.275
Consolidation	C_V	(m2/year)	133.8
Compressibility	m_V	(m2/MN)	3.216
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

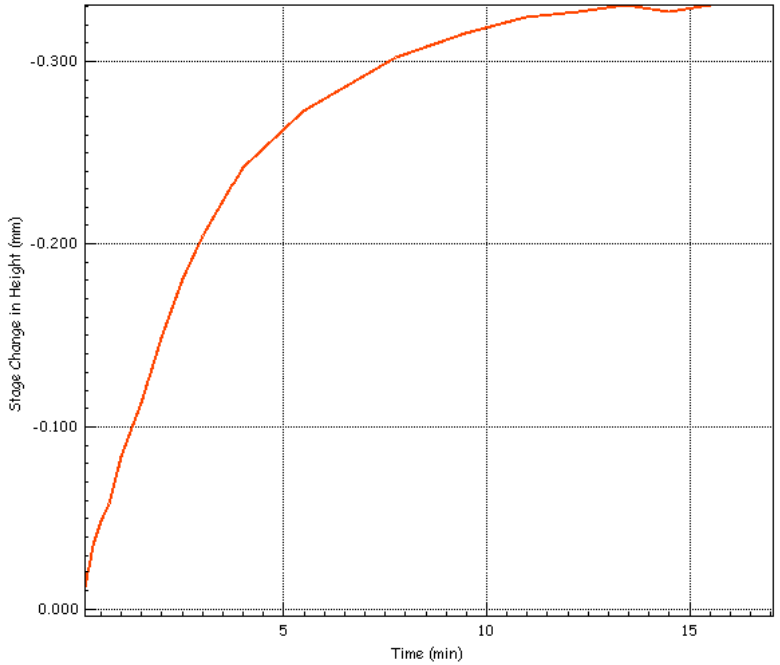


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/5/2015
Jobfile	Geotechnical Engineering	Sample	N643
Client	Japan International Cooperation	Borehole	BH11a
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	3.385
Voids Ratio	e_f	.	1.087
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)	

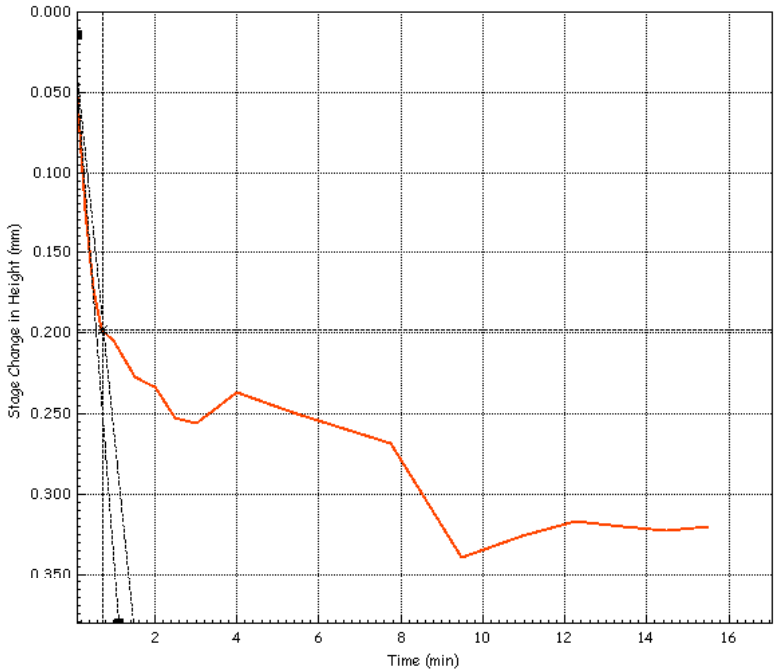


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/5/2015
Jobfile	Geotechnical Engineering	Sample	N643
Client	Japan International Cooperation	Borehole	BH11a
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	3.378
Voids Ratio	e_f	.	1.088
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.536
Consolidation	C_V	(m2/year)	57.2
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

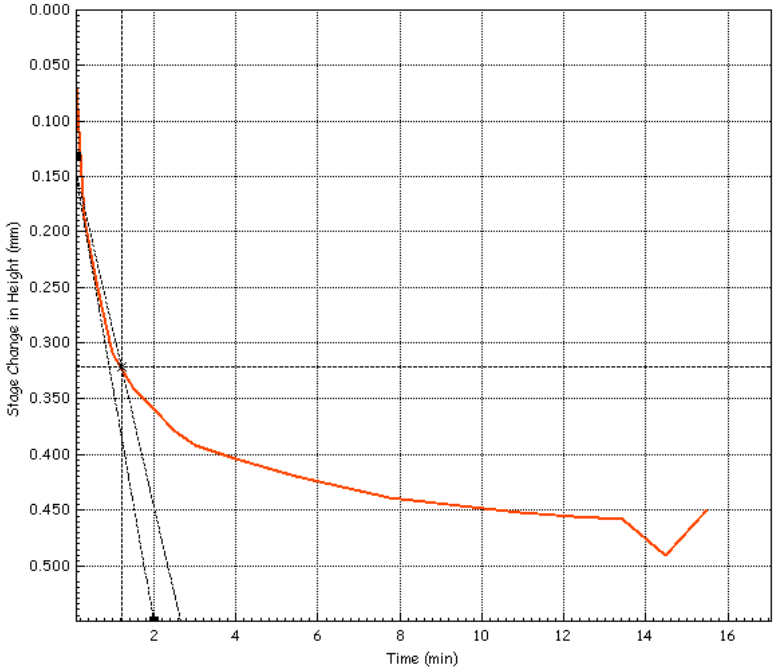


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/5/2015
Jobfile	Geotechnical Engineering	Sample	N643
Client	Japan International Cooperation	Borehole	BH11a
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	3.382
Voids Ratio	e_f	.	1.087
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	1.508
Consolidation	C_V	(m2/year)	20.3
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

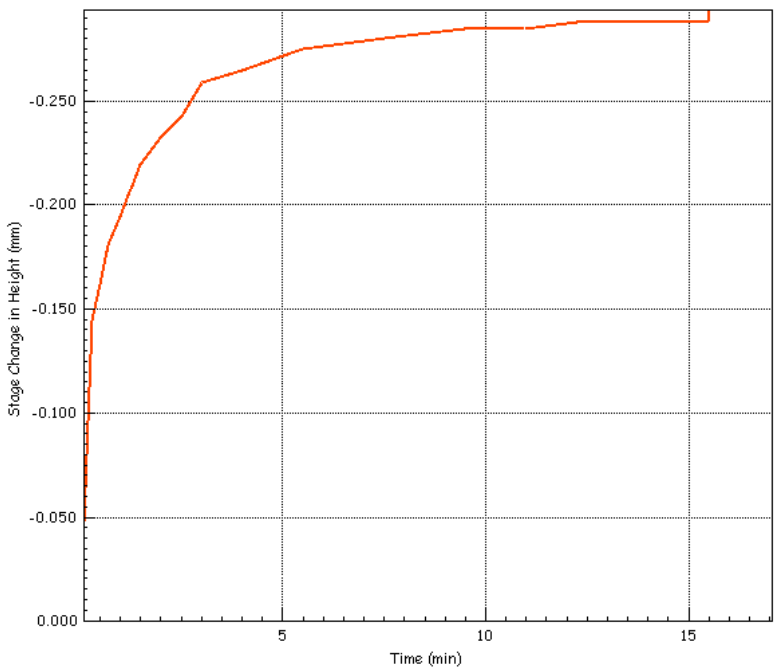


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/5/2015
Jobfile	Geotechnical Engineering	Sample	N643
Client	Japan International Cooperation	Borehole	BH11a
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	3.388
Voids Ratio	e_f	.	1.087
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)	

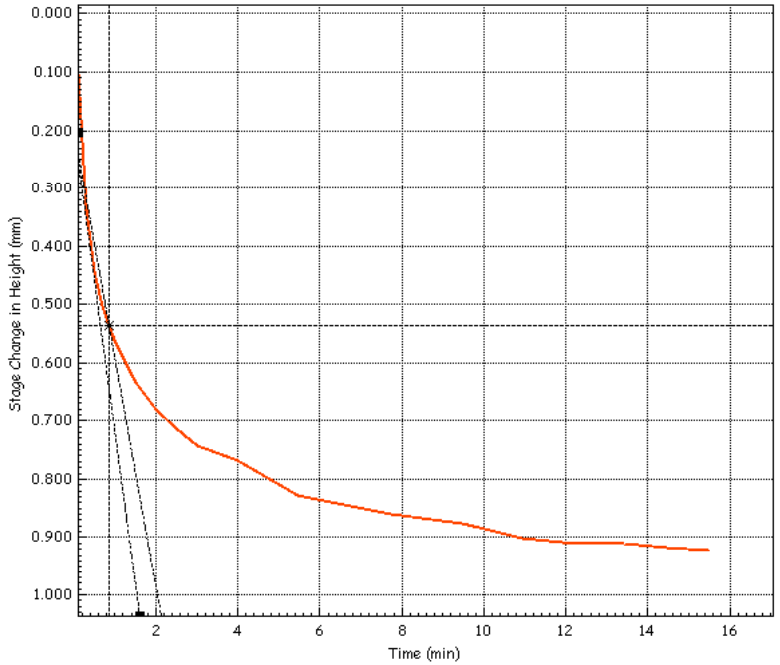


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/5/2015
Jobfile	Geotechnical Engineering	Sample	N643
Client	Japan International Cooperation	Borehole	BH11a
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	3.378
Voids Ratio	e_f	.	1.088
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.733
Consolidation	C_V	(m2/year)	41.8
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
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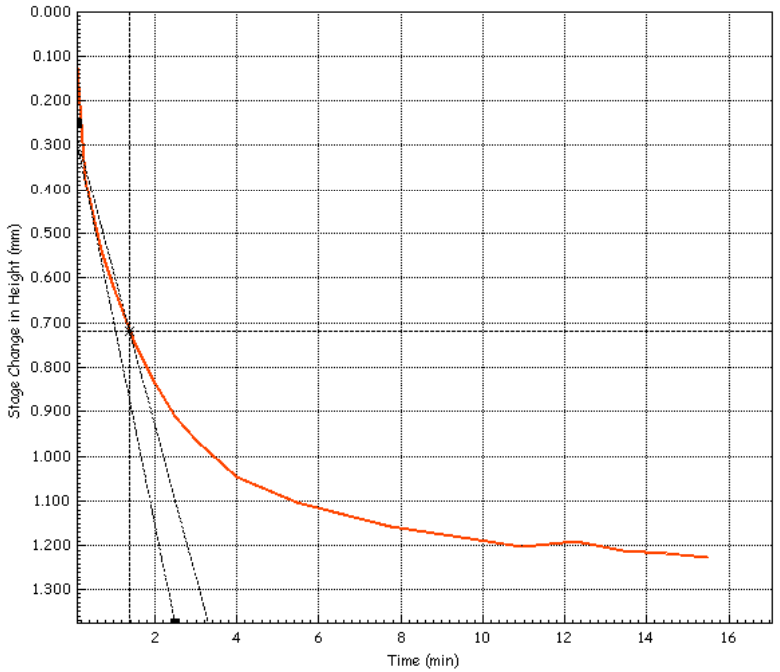
Site Reference	1920815	Test Date	12/5/2015
Jobfile	Geotechnical Engineering	Sample	N643
Client	Japan International Cooperation	Borehole	BH11a
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	1600
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	3.388
Voids Ratio	e_f	.	1.087
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	1.933
Consolidation	C_V	(m2/year)	15.8
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/5/2015
Jobfile	Geotechnical Engineering	Sample	N643
Client	Japan International Cooperation	Borehole	BH11a
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

APPENDIX 12

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

APPENDIX 12a

Test Locality Plan

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

D15-366

APPENDIX 12b

Engineering Borehole Log and Core Photos

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Votualevu Sugar Cane Farm	No.: BH12
Job No.: 1920815	Start Date: 22-10-2015 Finish Date: 23-10-2015	Ground Level (m): 12.63	Co-Ordinates (): E 1863331.7 N 3913180.8
Client: JICA Study Team	Hole Depth: 28.00 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, Field Strength, Elevation (m), Depth (m), Symbolic Log, Defect Spacing (mm) (500, 100), Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc), TCR (SCR) RQD (%), Samples, Tests

Geological Description	Elevation (m) (base)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with minor fine sand with trace of root fibres, dark brown, soft to very soft, moist, low to medium plasticity	+12.23		80		
Fine to medium SAND and minor silt with trace of organics and root fibres, brown, moist	+11.63	1			
SILT with minor fine to medium sand with trace of fine sub-rounded gravel, dark brown, soft to very soft, low to medium plasticity	+10.13	2	20	1.00	SPT 1.00 m N= 20
			60	2.00	SPT 2.00 m N= 20; P= 156.5 kPa
Fine to medium SAND with trace of silt and root fibres, brown, moist	+9.13	3			P= 300 kPa
SILT with some fine to medium sand with trace of root fibres, dark brown, soft, moist, low to medium plasticity	+8.63	4			SPT 3.50 m N= 13
Fine to medium SAND with trace of silt, brown, moist	+7.63		47		

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

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

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Votualevu Sugar Cane Farm	No.: BH12
Job No.: 1920815	Start Date: 22-10-2015 Finish Date: 23-10-2015	Ground Level (m): 12.63	Co-Ordinates (): E 1863331.7 N 3913180.8
Client: JICA Study Team	Hole Depth: 28.00 m		Sheet: 2 of 6

Geological Description	Elevation (m) (base)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to medium SAND with minor silt, dark brown, moist	+6.13	6	53	5.00	SPT 5.00 m N= 13
Fine to coarse SAND with trace of fine to medium sub-rounded gravel, brown	+5.63	7		6.50	SPT 6.50 m N= 26
Fine to medium sub-angular to sub-rounded GRAVEL	+4.63	8	27		
Fine to coarse SAND with some fine sub-angular gravel, brown black, moist	+4.13			8.00	SPT 8.00 m N= 19
Fine sub-angular to sub-rounded GRAVEL with trace of coarse sand	+3.13	9	20		
Fine to medium sub-angular GRAVEL with trace of coarse sand, blackish brown			13	9.50	SPT 9.50 m N= 0

Explanations:
Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge
Small Disturbed Sample; Large Disturbed Sample; Scala Penetrometer - blows/100mm; Permeability Test; U100 Undisturbed Sample; Insitu Vane Shear Strength (kPa); UTP = Unable to penetrate
Remarks: N = Standard Penetration Test. Logged to NZGS 'Field description of soil & rock' December 2005
All dimensions in metres Scale 1:31 | Contractor: GDISL | Rig/Plant Used: Drill Rig - Triple Tube | Logged by: KC/MK | Checked by: DMC

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Votualevu Sugar Cane Farm	No.: BH12
Job No.: 1920815	Start Date: 22-10-2015 Finish Date: 23-10-2015	Ground Level (m): 12.63	Co-Ordinates (): E 1863331.7 N 3913180.8
Client: JICA Study Team	Hole Depth: 28.00 m		Sheet: 3 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.

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to medium sub-angular GRAVEL with trace of coarse sand, blackish brown *(continued)*	+1.63	11	13		
Fine to medium SAND with trace of silt and fine sub-angular gravel	+1.13			11.00	SPT 11.00 m N= 50
Fine to coarse sub-angular to sub-rounded GRAVEL with trace of fine to medium sand and silt, brownish black	+0.13	12	20		
Fine SAND with some silt and trace of sub-angular gravel	-0.37	13		12.50	SPT 12.50 m N= 15
Fine to coarse sub-angular to sub-rounded GRAVEL	-1.37	14	40		
Fine to coarse SAND with minor fine sub-angular gravel	-1.87			14.00	SPT 14.00 m N= 47
Fine to medium sub-angular to sub-rounded GRAVEL			45		

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

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

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Votualevu Sugar Cane Farm	No.: BH12
Job No.: 1920815	Start Date: 22-10-2015 Finish Date: 23-10-2015	Ground Level (m): 12.63	Co-Ordinates (): E 1863331.7 N 3913180.8
Client: JICA Study Team	Hole Depth: 28.00 m		Sheet: 4 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.

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to medium sub-angular to sub-rounded GRAVEL *(continued)*	-4.07	16	45, 49	15.50	
Fine to coarse SAND with some fine to medium sub-angular gravel	-4.17				
SILT with minor organics and trace of fine sand, dark grey, firm to stiff, medium to high plasticity	-4.87	17		17.00	P= 136 kPa; SPT 17.00 m N= 40; P= 300 kPa
SILT with trace of organics and fine sand, greenish rey, stiff to hard, moist, medium to high plasticity (moderately to higly weathered, SILTSTONE, greenish, weak to very weak)	-5.77	18	100		P= 283 kPa
SILT with some fine sand and shell fragments with trace of organics, green grey, stiff to hard, moist, low to medium plasticity	-7.37	19	100	18.50	SPT 18.50 m N= 50; P= 300 kPa; P= 290 kPa

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

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

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH12.GPJ <<DrawingFile>> 04-12-2015 16:13 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: Votualevu Sugar Cane Farm	No.: **BH12**
Job No.: 1920815	Start Date: 22-10-2015 Finish Date: 23-10-2015	Ground Level (m): 12.63	Co-Ordinates (): E 1863331.7 N 3913180.8
Client: JICA Study Team	Hole Depth: 28.00 m		Sheet: 5 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.

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with minor sand and trace of organics with shell fragments, green grey, stiff, moist, low to medium plasticity	-7.87		100	20.00	SPT 20.00 m N= 44; P= 200 kPa
SILT with some fine sand and shell fragments with trace of organics, green grey, stiff to hard, moist, low to medium plasticity	-8.27				
SILT with some fine sand and organic with trace of shell fragments, green grey, stiff, moist, low to medium plasticity	-8.87	21			P= 300 kPa; P= 300 kPa
SILT with trace of fine sand and shell fragments with organics, green grey, stiff, moist, low to medium plasticity	-9.87	22	100	21.50	SPT 21.50 m N= 50; P= 300 kPa; P= 300 kPa
SILT with some fine sand and shell fragments with trace of organics, green grey, stiff, low to medium plasticity	-10.37				P= 300 kPa
SILT with minor shell fragments and trace of organics,green grey, stiff, moist, medium to high plasticity	-10.87	23	100	23.00	SPT 23.00 m N= 51; P= 300 kPa
SILT with some fine sand and shell fragments with trace of organics, green grey, stiff to hard, moist, low to medium plasticity	-11.87	24			P= 300 kPa; P= 300 kPa
SILT with some fine sand and trace of shell fragments, green grey, soft to firm, moist, low to medium plasticity	-12.37		53	24.50	SPT 24.50 m N= 50

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

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

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH12.GPJ <<DrawingFile>> 04-12-2015 16:13 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: Votualevu Sugar Cane Farm	No.: **BH12**
Job No.: 1920815	Start Date: 22-10-2015 Finish Date: 23-10-2015	Ground Level (m): 12.63	Co-Ordinates (): E 1863331.7 N 3913180.8
Client: JICA Study Team	Hole Depth: 28.00 m		Sheet: 6 of 6

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILTwith some fine to medium sand and fine to medium sub-angular to sub-rounded gravel with traces of shell fragments, green grey, firm to stiff, moist, low to medium plasticity (moderately to highly weathered SILTSTONE, grey green, weak to very weak)	-13.37	26	53		P= 300 kPa
SILT with some shell fragments and trace of fine sand, green grey, stiff, moist, low to medium plasticity	-13.87			26.00	SPT 26.00 m N= 52
SILT with trace of fine sand and shell fragment with organics, green grey, stiff to hard, moist, low to medium plasticity (moderately to highly weathered SILTSTONE, grey green, weak to very weak)	-14.37	27	100		
SILT with some shell fragments and trace of fine sand, grey green, stiff to hard, moist, low to medium plasticity (moderately to highly weathered SILTSTONE, grey green, weak to very weak)	-14.87				P= 300 kPa
SILT with trace of fine sand and shell fragments with organics, grey green, firm to stiff, medium plasticity	-15.37	28		27.50	SPT 27.50 m N= 44
Hole Terminated at 28.00 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005		29			

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

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

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH12.GPJ <<DrawingFile>> 04-12-2015 16:13 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 12 Core Photos (0.00m to 24.50m)

0.00m to 11.00m

11.00m to 19.00m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 12,Votulevu Tobacco Farm Opposite Nasau, Nadi, Fiji.

19.00m to 23.30m

23.30m to 27.50m

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1920815.12

APPENDIX 12c

Laboratory Test Schedule and Test Results

D15-371

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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : Site 12 (BH12), Votualevu Sugar Cane 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	BH12	Sandy SILT	SPT	1.0-1.5			1					
		Sandy SILT/silty SAND	SPT	2.0-2.5					1			
		SAND	SPT	3.5-4.0			1					
		SAND	SPT	5.0-5.5	1			1				
		Gravelly SAND	SPT	6.5-7.0			1					
		Gravelly SAND	SPT	8.0-8.5				1				
		Sandy GRAVEL	SPT	9.5-10.0			1					
		Sandy GRAVEL	SPT	11.0-11.5				1				
		Sandy SILT	SPT	12.5-13.0			1		1			
		GRAVEL	SPT	14.0-14.5				1				
		SILT/ Sandy SILT	SPT	17.0-17.5			1					
		Sandy SILT	SPT	18.5-19.0				1				
		Sandy SILT	SPT	20.0-20.5			1					
		SILT	SPT	21.5-22.0					1			
		Sandy SILT	SPT	23.0-23.5			1					
		Sandy SILT	SPT	24.5-25.0			1					
		Gravelly SAND	SPT	26.0-26.5				1				
		Clayey SILT/Silty CLAY	SPT	27.5-28.0			1					Total
Total					1		10	6	3	0	0	20
Bill of Quantitiy					1	3	10	6	3	3	3	29

Lab Test Schedule checked by: DMC

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with minor fine to medium sand trace of fine fine subrounded gravel, dark brown,soft to very soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N654 BH 12 2.0 - 2.5m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	146	161				
Mass of Container	g	11.78	11.73				
Mass of Container + Wet Soil	g	18.16	17.84				
Mass of Container + Dry Soil	g	16.68	16.46				
Mass of Dry Soil	g	4.90	4.73				
Mass of Moisture	g	1.48	1.38				
Moisture Content	%	30.20	29.18				29.69

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		54	52				
Mass of Container	g	3.54	3.57				
Mass of Container + Wet Soil	g	8.14	8.64				
Mass of Container + Dry Soil	g	7.17	7.57				
Mass of Dry Soil	g	3.63	4.00				
Mass of Moisture	g	0.97	1.07				
Moisture Content	%	26.72	26.75				26.74

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	15
Container No.		21	40	33	100 103		143
Mass of Container	g	14.51	14.52	14.44	11.72 11.32		11.85
Mass of Container + Wet Soil	g	21.56	23.40	22.82	21.19	20.72	22.08
Mass of Container + Dry Soil	g	19.46	20.70	20.25	18.25	17.75	18.80
Mass of Dry Soil	g	4.95	6.18	5.81	6.53	6.43	6.95
Mass of Moisture	g	2.10	2.70	2.57	2.94	2.97	3.28
Moisture Content	%	42.42	43.69	44.23	45.02	46.19	47.19

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				115.00		
% Shrinkage				8.00		8.00

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

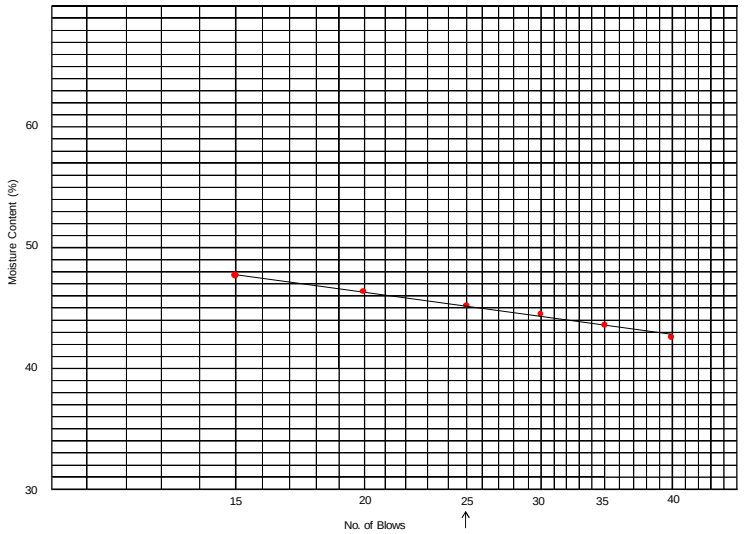
Liquid Limit	45.00 %
Plastic Limit	26.74 %
Plasticity Index	18.26 %
Shrinkage Limit	8.00 %

Tested By:KB
Date:04 November 2015

Q.A. Checked By: KB
Date: 04 Dcember 2015

Approved By:IG
Date: 04 Dcember 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N654

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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**	:04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	:KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand and shell fragments and organics, green grey, stiff, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	N666 BH12 21.5 - 22.0m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	158	126				
Mass of Container	g	12.13	12.82				
Mass of Container + Wet Soil	g	24.10	22.45				
Mass of Container + Dry Soil	g	21.03	19.99				
Mass of Dry Soil	g	8.90	7.17				
Mass of Moisture	g	3.07	2.46				
Moisture Content	%	34.49	34.31				34.40

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		39	22				
Mass of Container	g	14.19	14.41				
Mass of Container + Wet Soil	g	18.28	18.42				
Mass of Container + Dry Soil	g	17.20	17.38				
Mass of Dry Soil	g	3.01	2.97				
Mass of Moisture	g	1.08	1.04				
Moisture Content	%	35.88	35.02				35.45

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	15
Container No.		115	53	50	51	49	133
Mass of Container	g	11.74	3.49	3.60	3.54	3.59	11.29
Mass of Container + Wet Soil	g	23.60	8.95	11.45	10.32	12.34	18.79
Mass of Container + Dry Soil	g	18.94	6.78	8.31	7.58	8.78	15.72
Mass of Dry Soil	g	7.20	3.29	4.71	4.04	5.19	4.43
Mass of Moisture	g	4.66	2.17	3.14	2.74	3.56	3.07
Moisture Content	%	64.72	65.96	66.67	67.82	68.59	69.30

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

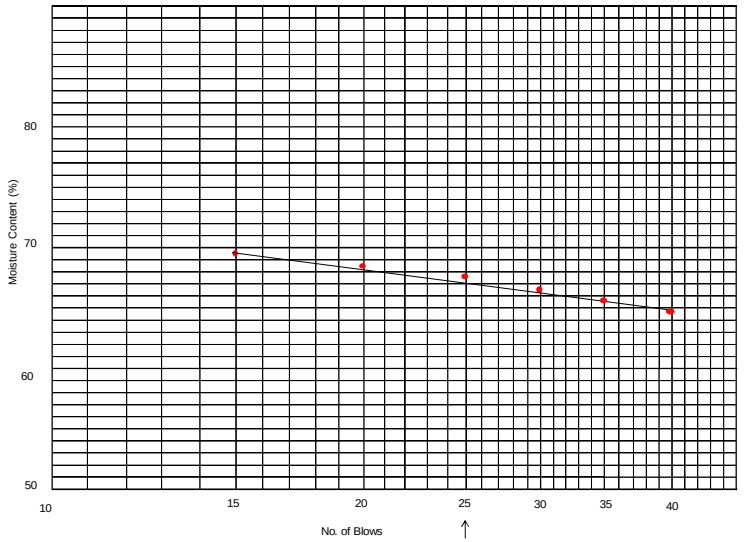
Liquid Limit	67.00 %
Plastic Limit	35.45 %
Plasticity Index	31.55 %
Shrinkage Limit	16.00 %

Tested By:KB
Date:04 November 2015

Q.A. Checked By: KB
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 666

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Determination of The Cone Penetration Limit & Plastic Limit, Plasticity Index and Water Content
NZS 4407:1991 Test 3.1, 3.2, 3.3 & 3.4

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	:	05/11/2015
SITE ADDRESS	:	Site 12	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH12 12.5 - 13.0m	**MATERIAL TYPE & LOCATION**	:	Fine SAND with some silt and trace of subangular gravel
TEST NUMBER	:	N 661			

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

DETERMINATION OF THE CONE PENETRATION LIMIT AND WATER CONTENT

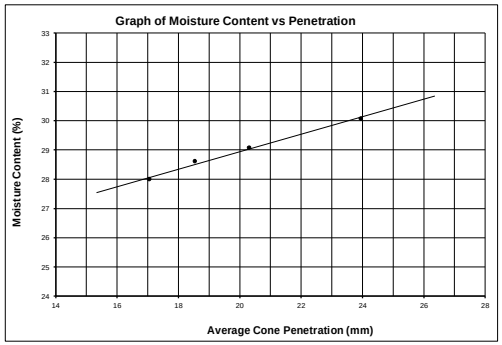
TEST No.		1			2			3			4			5		
Initial Dial Gauge Reading	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00			
Final Dial Gauge Reading	mm	23.50	24.02	24.34	20.45	19.66	20.82	18.52	18.55		16.74	17.62	16.79			
Cone Penetration	mm	23.50	24.02	24.34	20.45	19.66	20.82	18.52	18.55		16.74	17.62	16.79			
Average Cone Penetration	mm	23.95			20.31			18.54			17.05					
Container No.		19			20			21			22					
Mass of Container	g	14.84			14.12			14.49			14.41					
Mass of Container + Wet Soil	g	32.53			30.81			26.76			29.22					
Mass of Container + Dry Soil	g	28.44			27.05			24.03			25.98					
Mass of Dry Soil	g	13.60			12.93			9.54			11.57					
Mass of Moisture	g	4.09			3.76			2.73			3.24					
Moisture Content	%	30.07			29.08			28.62			28.00					

DETERMINATION OF THE WATER CONTENT

Container No.		120	152
Mass of Container	g	11.68	11.49
Mass of Container + Wet Soil	g	28.80	24.15
Mass of Container + Dry Soil	g	25.80	21.91
Mass of Dry Soil	g	14.12	10.42
Mass of Moisture	g	3.00	2.24
Moisture Content	%	21.25	21.50
Average Moisture Content	%	21.37	

DETERMINATION OF THE PLASTIC LIMIT

Container No.		129	144
Mass of Container	g	11.55	11.96
Mass of Container + Wet Soil	g	18.26	18.65
Mass of Container + Dry Soil	g	17.16	17.54
Mass of Dry Soil	g	5.61	5.58
Mass of Moisture	g	1.10	1.11
Moisture Content	%	19.61	19.89
Average Moisture Content	%	19.75	



Water Content	=	21.37
Cone Penetration Limit	=	29± 1
Plastic Limit	=	20 ± 1
Plasticity Index	=	9 ± 2

Tested By: KB
Date: 05 November 2015

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

Approved By: IG
Date: 04 December 2015

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

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE**	:	11 November 2015
SITE ADDRESS	:	Site 12	**TECHNOLOGIST**	:	IG
			TEST METHOD	:	AS 1289.6.7.3-2001
MATERIAL TYPE & DESCRIPTION	:	Fine to medium SAND with minor silt, dark brown, moist	**SAMPLE No.**	:	N656 (BH12 5.0m - 5.5m)

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

MOISTURE CONTENT

Container No.		24
Mass of Container	g	14.61
Mass of Container + Wet	g	34.66
Mass of Container + Dry	g	31.07
Mass of Dry Soil	g	16.46
Mass of Moisture	g	3.59
Moisture Content	%	21.81
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1680
Volume of Speciman	cm^3	844.46
Wet Density	t/m^3	1.99
Dry Density	t/m^3	1.63
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	16.80

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(^{o}c)	KT cm/min	K_{20} cm/min
1	120	10.00	22	26	0.01	0.01
2	120	10.00	21	26	0.01	0.01
3	120	10.00	21	26	0.01	0.01
4	109	10.00	18	26	0.01	0.00
5	109	10.00	18	26	0.01	0.00
6	109	10.00	19	26	0.01	0.01
7	97	10.00	19	26	0.01	0.01
8	97	10.00	17	26	0.01	0.01
9	97	10.00	17	26	0.01	0.01
10	87	10.00	15	26	0.01	0.01
11	87	10.00	15	26	0.01	0.01
12	87	10.00	15	26	0.01	0.01

Average K_{20} m/s	8.68E-07

Tested By: IG
Date:11 November 2015

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

Approved By: IG
Date: 04 December 2015

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Wet Sieve Analysis
(NZS 4407:1991 (Test 3.8.1

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	04 November 2015
SITE ADDRESS	:	Siite 12	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH12 5.0 - 5.5m	**MATERIAL TYPE & LOCATION**	:	Fine to medium SAND with minor silt, dark brown, moist
TEST NUMBER	:	N 656			

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

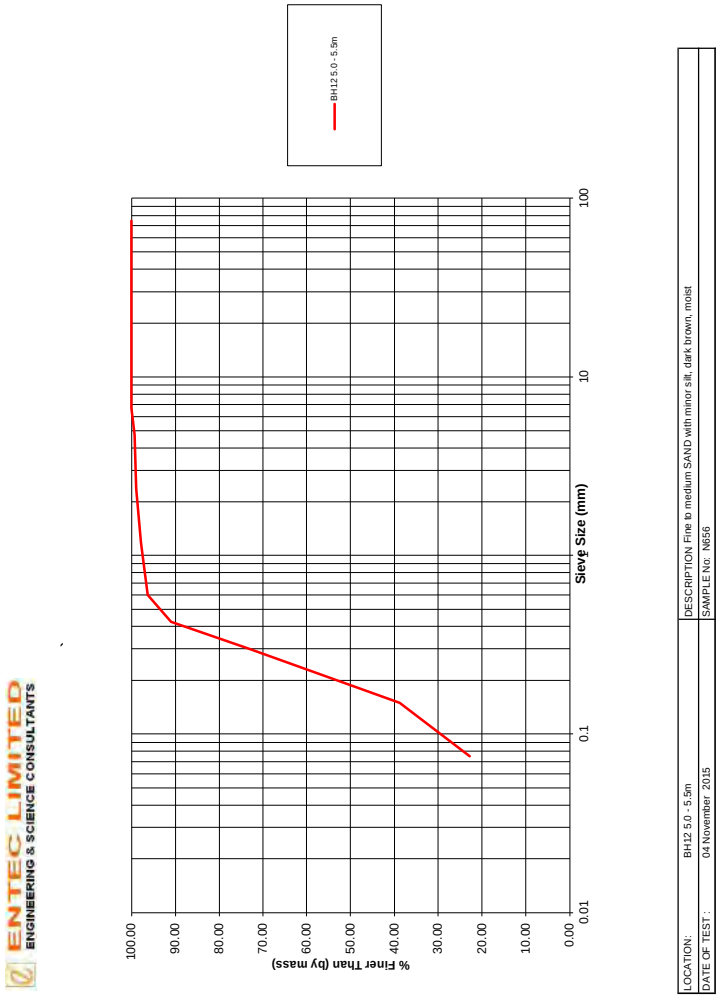
Moisture Content (Material passing 19mm)	Container No.	-	116	114	SPLIT SAMPLE		
	Mass of Container	g	11.72	11.92	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	20.57	20.16	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	18.79	18.56	Spliting Factor $\frac{M_3}{M_4}$ =		
	Mass of Dry Soil	g	7.07	6.64			
	Mass of Moisture	g	1.78	1.60			
	Moisture Content	%	25.18	24.10			
	Average Moisture Content	%	24.64				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	261.70
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	209.97

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	1.47	N/A	0.70	99.30	250	200
2.36 mm	0.85	N/A	0.40	98.90	150	200
1.18 mm	2.14	N/A	1.02	97.88	100	200
600 µm	3.19	N/A	1.52	96.36	80	200
425 µm	11.42	N/A	5.44	90.92	70	200
300 µm	37.50	N/A	17.86	73.06	60	200
150 µm	72.06	N/A	34.32	38.74	40	200
75 µm	33.57	N/A	15.99	22.75	25	200
Passing 75 µm	47.77	N/A	22.75	0.00	-	-
Pan Total	209.97	-	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 : 04 November 2015	Date : 04 December 2015	Date : 04 December 2015



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LOCATION: BH12 5.0 - 5.5m
DATE OF TEST : 04 November 2015
DESCRIPTION Fine to medium SAND with minor silt, dark brown, moist
SAMPLE No: N656

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Wet Sieve Analysis
(NZS 4407:1991 (Test 3.8.1

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	04 November2015
SITE ADDRESS	:	Siite 12	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH12 8.0 - 8.5m	**MATERIAL TYPE & LOCATION**	:	Fine to coarse SAND with some fine subangular gravel, brown black, moist
TEST NUMBER	:	N658			

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

Moisture Content (Material passing 19mm)	Container No.	-	107	151	SPLIT SAMPLE
	Mass of Container	g	11.58	12.00	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	31.73	31.55	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	29.36	29.31	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	17.78	17.31	
	Mass of Moisture	g	2.37	2.24	
	Moisture Content	%	13.33	12.94	
	Average Moisture Content	%	13.14		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	267.40
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	236.35

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	38.71	N/A	16.38	83.62		300
19.0mm		N/A	0.00	83.62		200
13.2 mm	18.51	N/A	7.83	75.79	600	300
9.50 mm	23.73	N/A	10.04	65.75	450	300
6.70 mm	21.41	N/A	9.06	56.69	300	300
4.75 mm	13.50	N/A	5.71	50.98	250	200
2.36 mm	23.59	N/A	9.98	41.00	150	200
1.18 mm	20.91	N/A	8.85	32.15	100	200
600 µm	22.49	N/A	9.52	22.64	80	200
425 µm	13.26	N/A	5.61	17.03	70	200
300 µm	13.32	N/A	5.64	11.39	60	200
150 µm	16.32	N/A	6.90	4.49	40	200
75 µm	5.90	N/A	2.50	1.99	25	200
Passing 75 µm	4.70	N/A	1.99	0.00	-	-
Pan Total	236.35	-	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 : 04 November 2015	Date : 04 December 2015	Date : 04 December 2015

ENTEC LIMITED
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LOCATION: BH12 8.0 - 8.5m
DATE OF TEST : 04 November 2015
DESCRIPTION Fine to coarse SAND with some fine subangular gravel, brown black, moist
SAMPLE No: N658

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

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	04 November 2015
SITE ADDRESS	:	Siite 12	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH12 11.0 - 11.5m	**MATERIAL TYPE & LOCATION**	:	Fine to medium SAND with trace silt and fine subangular gravel
TEST NUMBER	:	N660			

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

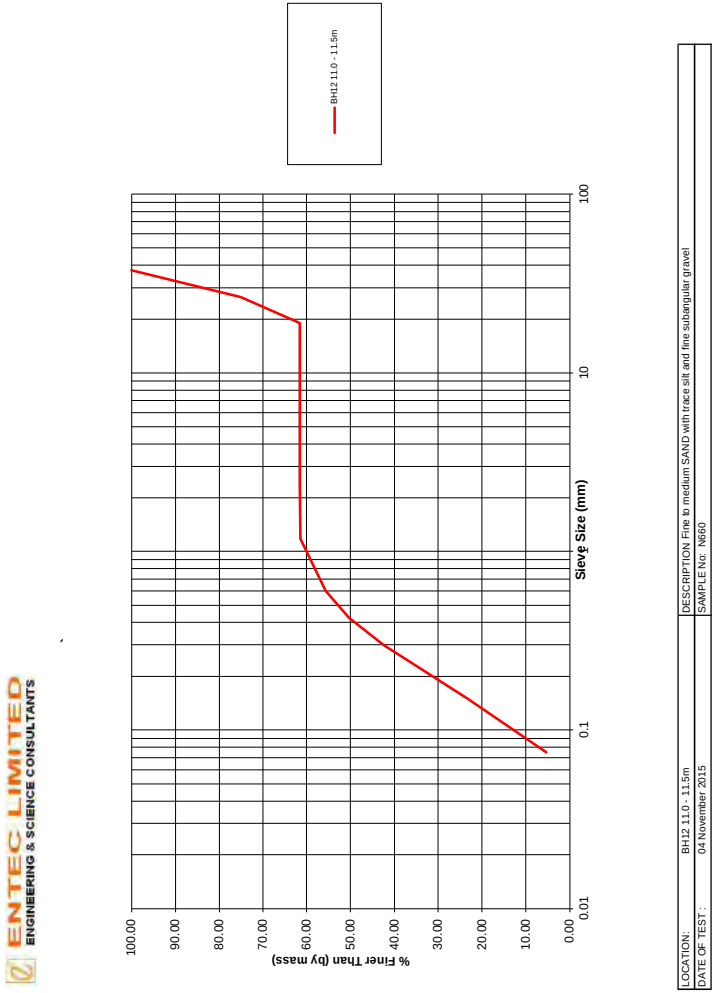
Moisture Content (Material passing 19mm)	Container No.	-	122	105	SPLIT SAMPLE		
	Mass of Container	g	11.72	11.57	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	21.03	20.47	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	19.15	18.70	Spliting Factor =	M_3 / M_4	
	Mass of Dry Soil	g	7.43	7.13			
	Mass of Moisture	g	1.88	1.77			
	Moisture Content	%	25.30	24.82			
	Average Moisture Content	%	25.06				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	218.03
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	174.34	

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	43.42	N/A	24.91	75.09		300
19.0mm	23.43	N/A	13.44	61.65		200
13.2 mm		N/A	0.00	61.65	600	300
9.50 mm		N/A	0.00	61.65	450	300
6.70 mm		N/A	0.00	61.65	300	300
4.75 mm		N/A	0.00	61.65	250	200
2.36 mm		N/A	0.00	61.65	150	200
1.18 mm	0.28	N/A	0.16	61.49	100	200
600 µm	10.12	N/A	5.80	55.69	80	200
425 µm	9.38	N/A	5.38	50.31	70	200
300 µm	13.79	N/A	7.91	42.40	60	200
150 µm	33.37	N/A	19.14	23.26	40	200
75 µm	31.32	N/A	17.97	5.29	25	200
Passing 75 µm	9.23	N/A	5.29	0.00	-	-
Pan Total	174.34	-	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 : 04 November 2015	Date : 04 December 2015	Date : 04 December 2015



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LOCATION: BH12 11.0 - 11.5m
DATE OF TEST : 04 November 2015
DESCRIPTION Fine to medium SAND with trace silt and fine subangular gravel
SAMPLE No: N660

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Wet Sieve Analysis
(NZS 4407:1991 (Test 3.8.1

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	04 November 2015
SITE ADDRESS	:	Siite 12	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH12 14.0 - 14.5m	**MATERIAL TYPE & LOCATION**	:	Fine to coarse SAND with minor fine subangular gravel
TEST NUMBER	:	N662			

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

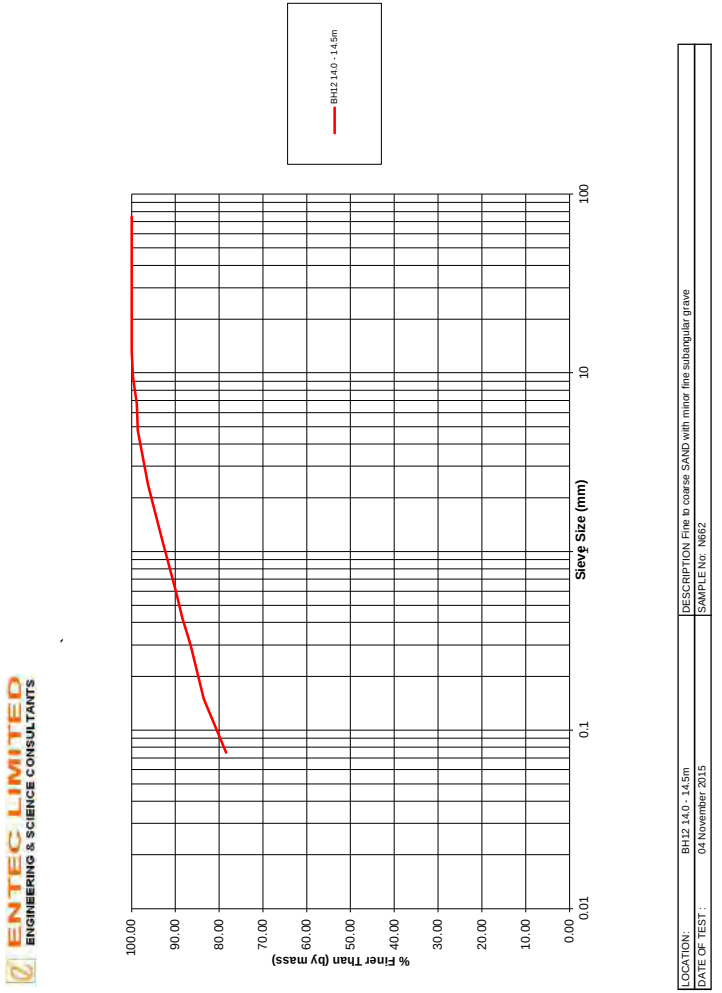
Moisture Content (Material passing 19mm)	Container No.	-	86	89	SPLIT SAMPLE
	Mass of Container	g	117.75	121.19	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	188.92	189.83	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	173.24	174.22	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	55.49	53.03	
	Mass of Moisture	g	15.68	15.61	
	Moisture Content	%	28.26	29.44	
	Average Moisture Content	%	28.85		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	368.43
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	285.94

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	0.85	N/A	0.30	99.70	450	300
6.70 mm	2.57	N/A	0.90	98.80	300	300
4.75 mm	0.60	N/A	0.21	98.59	250	200
2.36 mm	6.74	N/A	2.36	96.24	150	200
1.18 mm	9.09	N/A	3.18	93.06	100	200
600µm	9.13	N/A	3.19	89.87	80	200
425 µm	4.20	N/A	1.47	88.40	70	200
300 µm	5.23	N/A	1.83	86.57	60	200
150 µm	8.51	N/A	2.98	83.59	40	200
75 µm	14.80	N/A	5.18	78.42	25	200
Passing 75 µm	224.22	N/A	78.42	0.00	-	-
Pan Total	285.94	-	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 : 04 November 2015	Date : 04 December 2015	Date : 04 December 2015



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LOCATION: BH12 14.0 - 14.5m
DATE OF TEST : 04 November 2015
DESCRIPTION Fine to coarse SAND with minor fine subangular grave
SAMPLE No: N662

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Wet Sieve Analysis
(NZS 4407:1991 (Test 3.8.1

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	04 November 2015
SITE ADDRESS	:	Siite 12	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH12 18.5 - 19.0m	**MATERIAL TYPE & LOCATION**	:	SILT with some fine sand and shell fragments and trace of organics, green grey, stiff to hard, moist, low to medium plasticity
TEST NUMBER	:	N664			

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

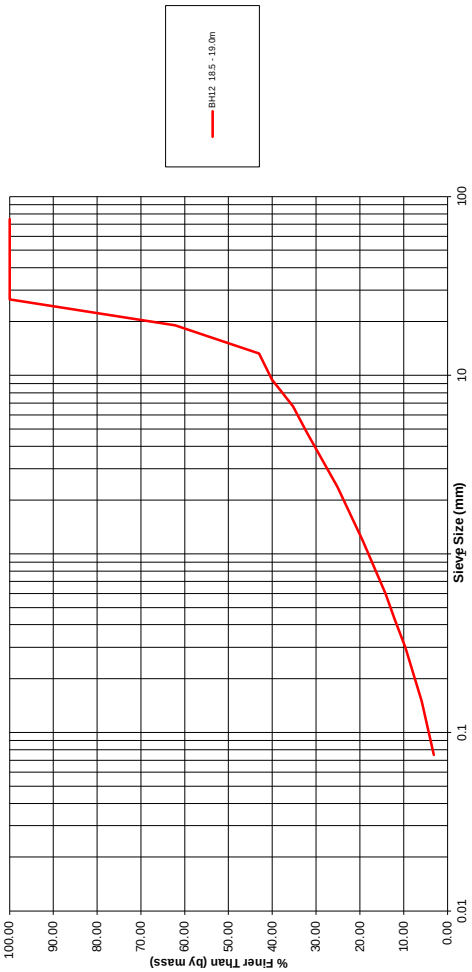
Moisture Content (Material passing 19mm)	Container No.	-	131	139	SPLIT SAMPLE		
	Mass of Container	g	11.66	11.33	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	41.37	41.80	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	37.39	37.76	Spliting Factor = M_3 / M_4		
	Mass of Dry Soil	g	25.73	26.43			
	Mass of Moisture	g	3.98	4.04			
	Moisture Content	%	15.47	15.29			
	Average Moisture Content	%	15.38				

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	340.90
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	295.47

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	111.90	N/A	37.87	62.13		200
13.2 mm	56.48	N/A	19.12	43.01	600	300
9.50 mm	8.45	N/A	2.86	40.15	450	300
6.70 mm	14.28	N/A	4.83	35.32	300	300
4.75 mm	9.64	N/A	3.26	32.06	250	200
2.36 mm	20.40	N/A	6.90	25.15	150	200
1.18 mm	17.22	N/A	5.83	19.32	100	200
600 µm	15.25	N/A	5.16	14.16	80	200
425 µm	6.59	N/A	2.23	11.93	70	200
300 µm	6.84	N/A	2.31	9.62	60	200
150 µm	10.87	N/A	3.68	5.94	40	200
75 µm	8.36	N/A	2.83	3.11	25	200
Passing 75 µm	9.19	N/A	3.11	0.00	-	-
Pan Total	295.47	-	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	Q.A. Checked by : KB	Approved by : IG
Date : 04 November 2015	Date : 04 December 2015	Date : 04 December 2015



LOCATION: BH12 18.5 - 19.0m
DESCRIPTION: SILT with some fine sand and shell fragments and trace of organics, green grey, stiff to hard, moist, low to medium plasticity
DATE OF TEST : 04 November 2015
SAMPLE No: N664

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	04 November 2015
SITE ADDRESS	:	Site 12	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH12 26.0 - 26.5m	**MATERIAL TYPE & LOCATION**	:	SILT with some shell fragmentsand trace of fine sand, green grey, stiff, moist, low to medium plasticity
TEST NUMBER	:	N669			

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

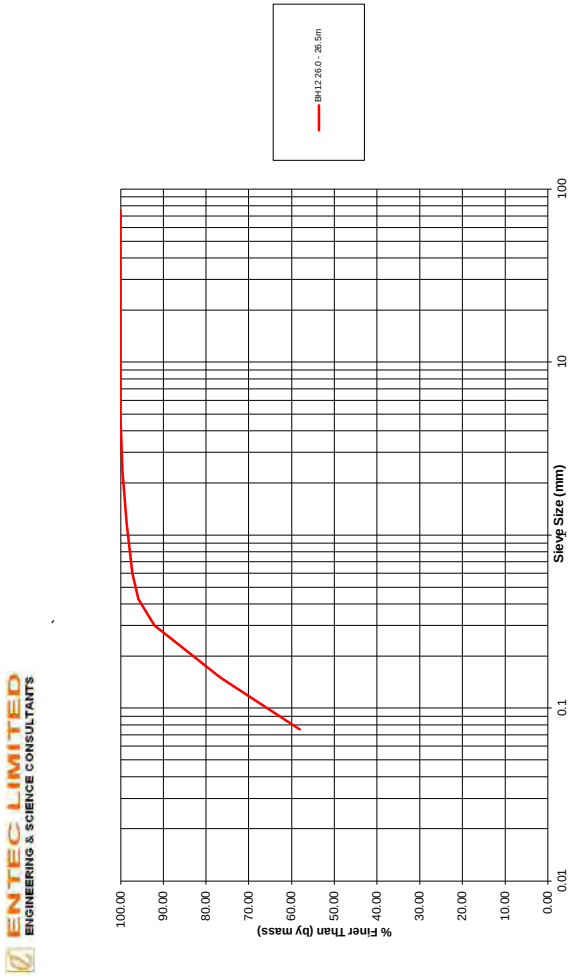
Moisture Content (Material passing 19mm)	Container No.	-	108	109	SPLIT SAMPLE
	Mass of Container	g	11.27	11.38	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	36.87	36.45	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	30.65	30.33	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	19.38	18.95	
	Mass of Moisture	g	6.22	6.12	
	Moisture Content	%	32.09	32.30	
	Average Moisture Content	%	32.20		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	285.01
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	215.60

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	0.43	99.57	150	200
1.18 mm	2.11	N/A	0.98	98.59	100	200
600 µm	2.79	N/A	1.29	97.30	80	200
425 µm	3.11	N/A	1.44	95.85	70	200
300 µm	8.06	N/A	3.74	92.11	60	200
150 µm	33.24	N/A	15.42	76.70	40	200
75 µm	39.94	N/A	18.53	58.17	25	200
Passing 75 µm	125.42	N/A	58.17	0.00	-	-
Pan Total	215.60	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 04 November 2015	Date : 04 December 2015	Date : 04 December 2015



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DESCRIPTION: SILT with some shell fragmentsand trace of fine sand, green grey, stiff, moist, low to medium plasticity
SAMPLE No: N669
LOCATION: BH12 26.0 - 26.5m
DATE OF TEST : 04 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with minor fine to medium sand trace of fine fine subrounded gravel, dark brown,soft to very soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N653 BH12 1.0m - 1.5m

Moisture Content	%						
Container No.	g	113	98				
Mass of Container	g	11.88	11.92				
Mass of Container + Wet Soil	g	44.30	40.12				
Mass of Container + Dry Soil	g	37.32	33.93				
Mass of Dry Soil	g	25.44	22.01				
Mass of Moisture	g	6.98	6.19				
Moisture Content	%	27.44	28.12				27.78

Tested By: RK
Date: 04 November 2015

Q.A. Checked By: KB
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 Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine to medium sand trace of root fibres, dark brown, soft, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N655 BH12 3.5m - 4.0m

Moisture Content	%						
Container No.	g	99	104				
Mass of Container	g	11.84	11.90				
Mass of Container + Wet Soil	g	41.31	41.76				
Mass of Container + Dry Soil	g	34.36	34.84				
Mass of Dry Soil	g	22.52	22.94				
Mass of Moisture	g	6.95	6.92				
Moisture Content	%	30.86	30.17				30.51

Tested By: RK
Date: 04 November 2015

Q.A. Checked By: KB
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 Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fine to coarse SAND with trace of fine to medium sub-rounded gravelbrown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N657 BH12 6.5m - 7.0m

Moisture Content	%						
Container No.	g	67	81				
Mass of Container	g	72.11	87.47				
Mass of Container + Wet Soil	g	120.39	120.42				
Mass of Container + Dry Soil	g	111.88	114.87				
Mass of Dry Soil	g	39.77	27.40				
Mass of Moisture	g	8.51	5.55				
Moisture Content	%	21.40	20.26				20.83

Tested By: RK
Date: 04 November 2015

Q.A. Checked By: KB
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 Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fine to medium subangular GRAVEL with trace of coarse sand, blackish brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N659 BH12 9.5m - 10.0m

Moisture Content	%						
Container No.	g	142	148				
Mass of Container	g	11.82	11.93				
Mass of Container + Wet Soil	g	23.97	24.16				
Mass of Container + Dry Soil	g	23.64	23.80				
Mass of Dry Soil	g	11.82	11.87				
Mass of Moisture	g	0.33	0.36				
Moisture Content	%	2.79	3.03				2.91

Tested By: RK
Date: 04 November 2015

Q.A. Checked By: KB
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 Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fine SAND with some silt and trace of subangular gravel	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N661 BH12 12.5m - 13.0m

Moisture Content	%						
Container No.	g	136	97				
Mass of Container	g	11.78	11.56				
Mass of Container + Wet Soil	g	22.75	22.63				
Mass of Container + Dry Soil	g	20.38	20.19				
Mass of Dry Soil	g	8.60	8.63				
Mass of Moisture	g	2.37	2.44				
Moisture Content	%	27.56	28.27				27.92

Tested By: RK
Date: 04 November 2015

Q.A. Checked By: KB
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 Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with minor organics trace of fine sand dark grey, firm to stiff, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N663 BH12 17.0m - 17.5m

Moisture Content	%						
Container No.	g	164	138				
Mass of Container	g	11.82	11.15				
Mass of Container + Wet Soil	g	39.46	38.96				
Mass of Container + Dry Soil	g	31.22	30.91				
Mass of Dry Soil	g	19.40	19.76				
Mass of Moisture	g	8.24	8.05				
Moisture Content	%	42.47	40.74				41.61

Tested By: RK
Date: 04 November 2015

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

Approved By: IG
Date:04 December 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with minor sand and trace of organics and shell fragments, green grey, stiff, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N665 BH12 20.0m - 20.5m

Moisture Content	%						
Container No.	g	165	106				
Mass of Container	g	11.74	12.04				
Mass of Container + Wet Soil	g	35.47	36.86				
Mass of Container + Dry Soil	g	29.17	30.35				
Mass of Dry Soil	g	17.43	18.31				
Mass of Moisture	g	6.30	6.51				
Moisture Content	%	36.14	35.55				35.85

Tested By: RK
Date: 04 November 2015

Q.A. Checked By: KB
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 Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with minor shell fragments and trace of fine sand, green grey, stiff, moist, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N667 BH12 23.0m - 23.5m

Moisture Content	%						
Container No.	g	124	137				
Mass of Container	g	11.72	11.30				
Mass of Container + Wet Soil	g	30.94	29.32				
Mass of Container + Dry Soil	g	26.05	24.67				
Mass of Dry Soil	g	14.33	13.37				
Mass of Moisture	g	4.89	4.65				
Moisture Content	%	34.12	34.78				34.45

Tested By: RK
Date: 04 November 2015

Q.A. Checked By: KB
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 Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand and trace of shell fragments, green grey, soft to firm, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N668 BH12 24.5m - 25.0m

Moisture Content	%						
Container No.	g	101	141				
Mass of Container	g	11.61	11.67				
Mass of Container + Wet Soil	g	39.72	38.99				
Mass of Container + Dry Soil	g	32.96	32.71				
Mass of Dry Soil	g	21.35	21.04				
Mass of Moisture	g	6.76	6.28				
Moisture Content	%	31.66	29.85				30.76

Tested By: RK
Date: 04 November 2015

Q.A. Checked By: KB
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 Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 04 November 2015
SITE ADDRESS	: Site 12	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand and shell fragmentss and organics, grey green, firm to stiff, medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N670 BH12 27.5m - 28.0m

Moisture Content	%						
Container No.	g	160	127				
Mass of Container	g	11.92	11.57				
Mass of Container + Wet Soil	g	35.92	35.02				
Mass of Container + Dry Soil	g	28.69	27.86				
Mass of Dry Soil	g	16.77	16.29				
Mass of Moisture	g	7.23	7.16				
Moisture Content	%	43.11	43.95				43.53

Tested By: RK
Date: 04 November 2015

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

Approved By: IG
Date:04 December 2015

Form GE-L-07

Page 1 of 1

APPENDIX 13

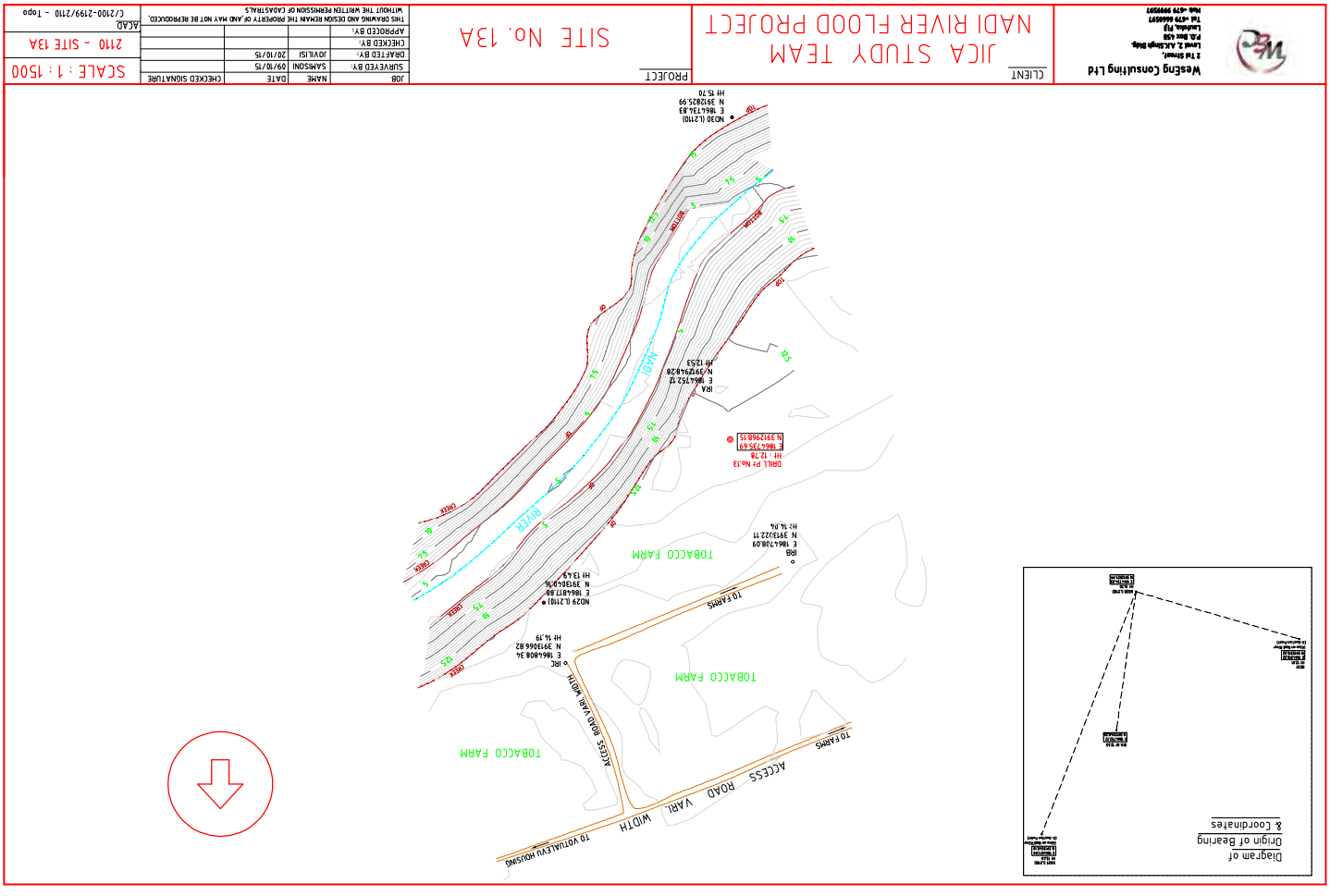
SITE 13 – Votualevu Vegetable Farm Opposite Nasau, Nadi, Fiji.

APPENDIX 13a

Test Locality Plan

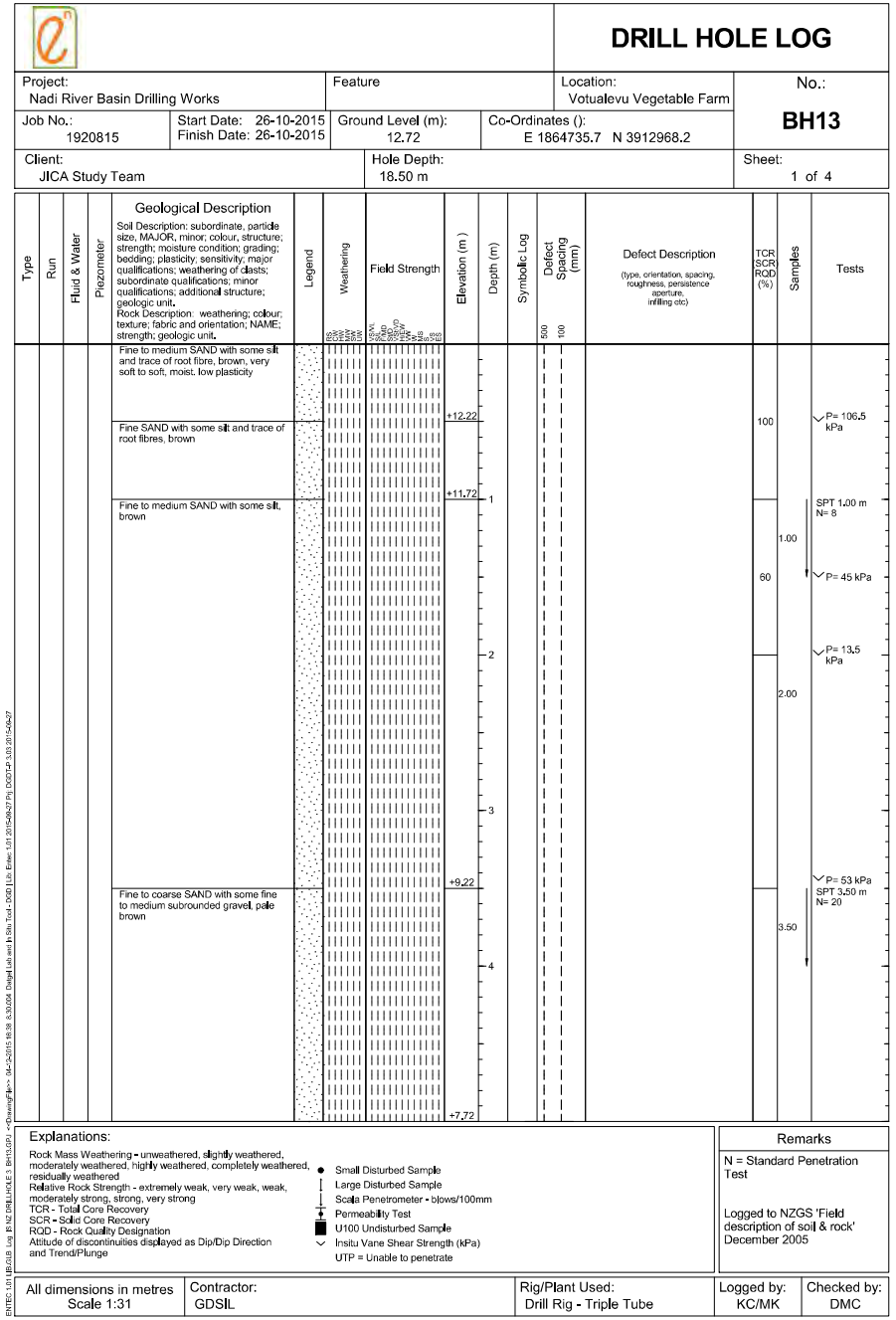
ENTEC LIMITED ENGINEERING AND SCIENCE CONSULTANTS				CLIENT:	Japan International Cooperation Agency (JICA)	NOTE: THIS DRAWING HAS BEEN REPRODUCED BY ENTEC TO SHOW THE APPROXIMATE BOREHOLE LOCATION.	DRAWN BY: SS; CHECKED BY: KC; APPROVED BY: JD; SHEET TITLE: TEST LOCALITY PLAN; SCALE: NTS; ISSUE DATE: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

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

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
				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						
				Fine to medium SAND with some silt, brown									60	1.00	SPT 1.00 m N= 8 P= 45 kPa
									2						P= 13.5 kPa
														2.00	
									3						P= 53 kPa
				Fine to coarse SAND with some fine to medium subrounded gravel, pale brown				+9.22						3.50	SPT 3.50 m N= 20
									4						
								+7.72							

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to coarse SAND with some fine to medium subrounded gravel, pale brown			20	5.00	SPT 5.00 m N= 7
		6			
		7	30		
No recovery	+4.72	8		8.00	SPT 8.00 m N= 26
		9			
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

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine sub-angular GRAVEL with some coarse sand, grey pale brown *(continued)*			33		P= 80 kPa
SILT with trace of fine sand, orange brown, soft to firm, moist, low to medium plasticity	+1.72	11	100	11.00	SPT 11.00 m N= 19; P= 236.5 kPa; P= 163 kPa
SILT with some fine sand and trace of fine sub-angular to sub-rounded gravel, pale brown	+0.62	12			
SILT with some fine to medium sub-angular to sub-rounded gravel and trace of coarse sand, brown, very soft to soft, low plasticity	+0.22	13	33	12.50	SPT 12.50 m N= 50
Fine to medium GRAVEL with some coarse sand, dark grey	-1.28	14	27	14.00	SPT 14.00 m N= 50
Fine to medium sub-angular to sub-rounded GRAVEL	-1.78				

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: 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 | 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)

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
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

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
ENGINEERING & SCIENCE CONSULTANTS

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~~

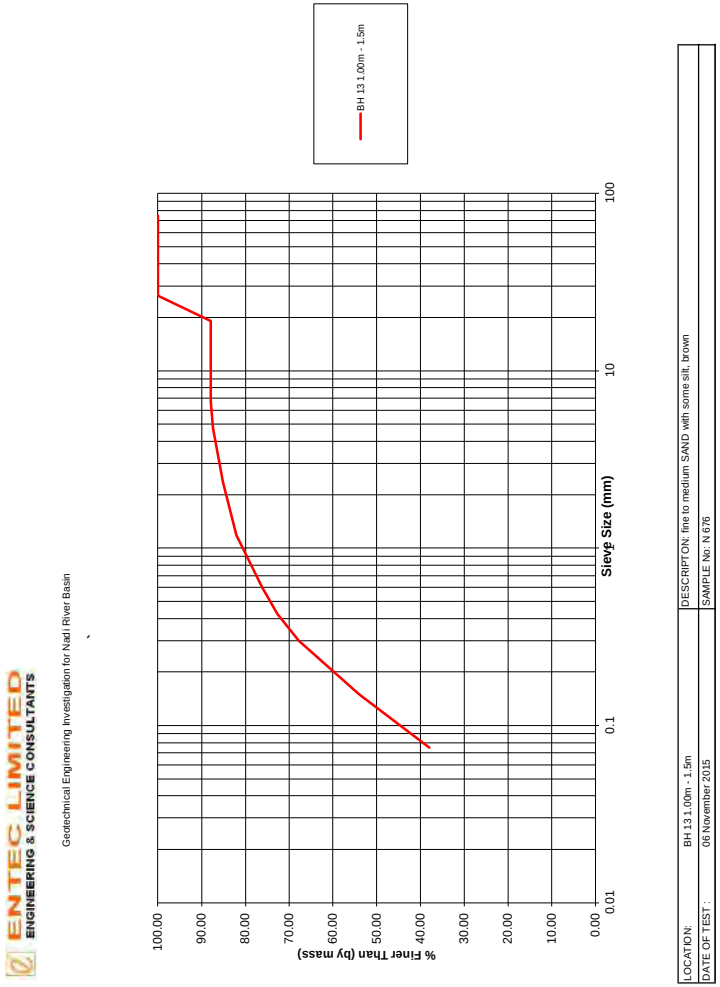
Moisture Content (Material passing 19mm)	Container No.	-	153	128	SPLIT SAMPLE
	Mass of Container	g	11.24	11.84	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	25.02	24.38	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	21.83	21.46	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass 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
ENGINEERING & SCIENCE CONSULTANTS
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~~

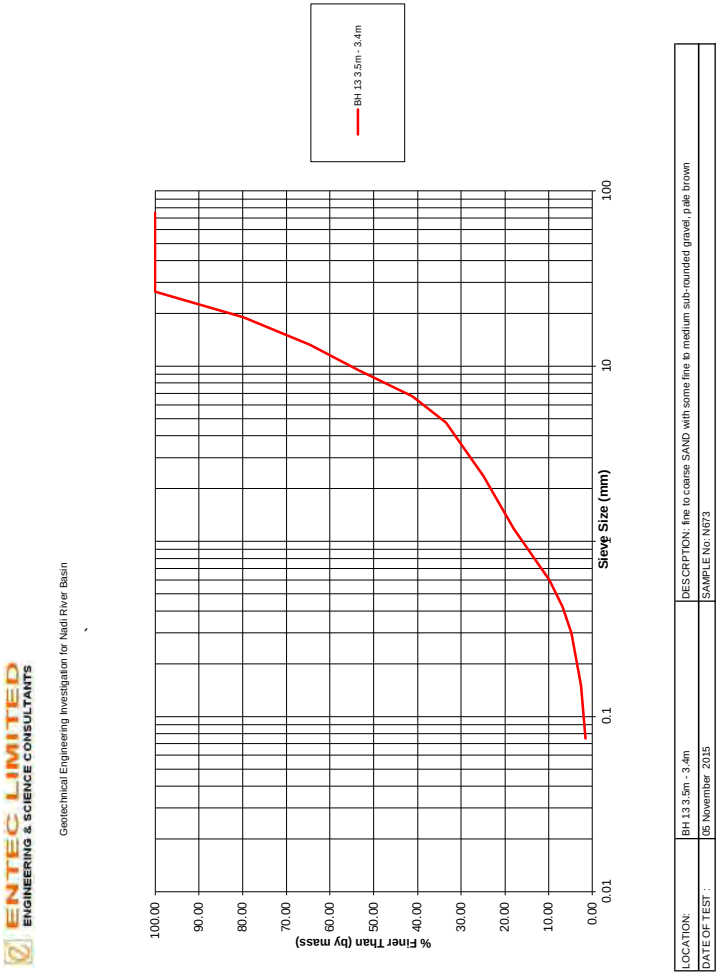
Moisture Content (Material passing 19mm)	Container No.	-	15	16	SPLIT SAMPLE
	Mass of Container	g	52.67	52.73	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	72.94	74.68	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	71.71	73.44	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	19.04	20.71	
	Mass of Moisture	g	1.23	1.24	
	Moisture Content	%	6.46	5.99	
	Average Moisture Content	%	6.22		

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
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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 /**	:	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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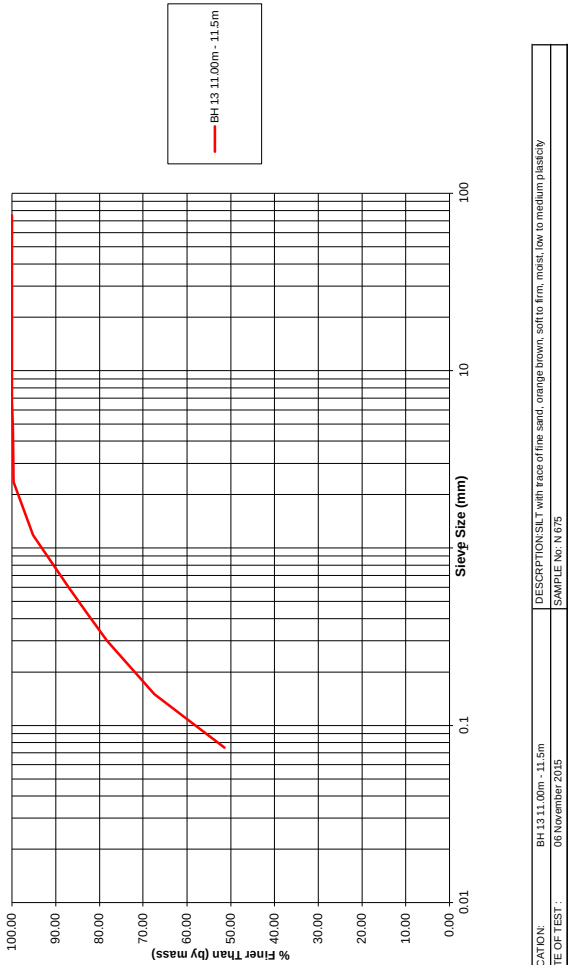
Geotechnical Engineering Investigation for Nadi River Basin



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

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 /**	:	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 $\frac{M_3}{M_4}$ =
	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		

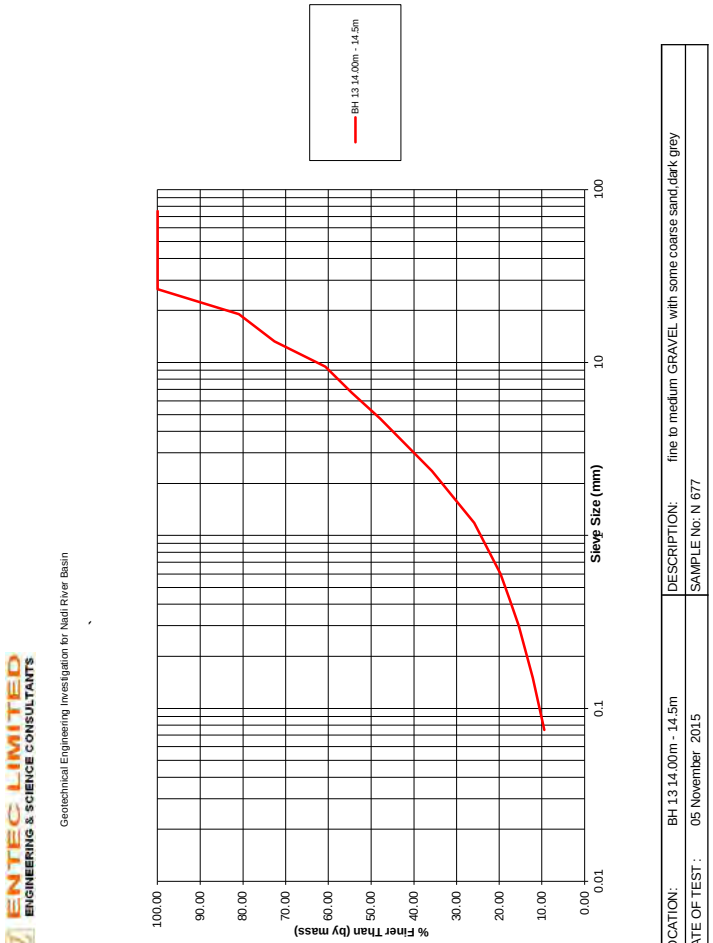
Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	253.31
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	222.47

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

Form GE-L-06



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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

Form GE-L-06

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

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Investigation for Nadi River Basin Drilling Works	**DATE /**	:	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~~

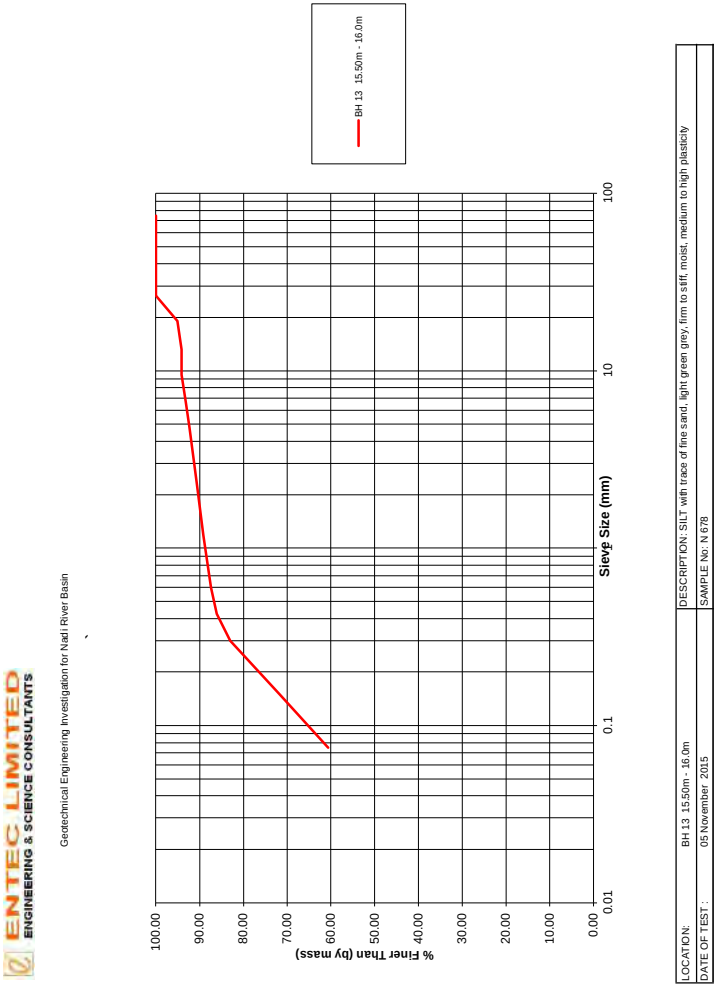
Moisture Content (Material passing 19mm)	Container No.	-	78	76	SPLIT SAMPLE
	Mass of Container	g	78.54	86.30	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	116.02	118.76	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	105.08	109.39	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass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

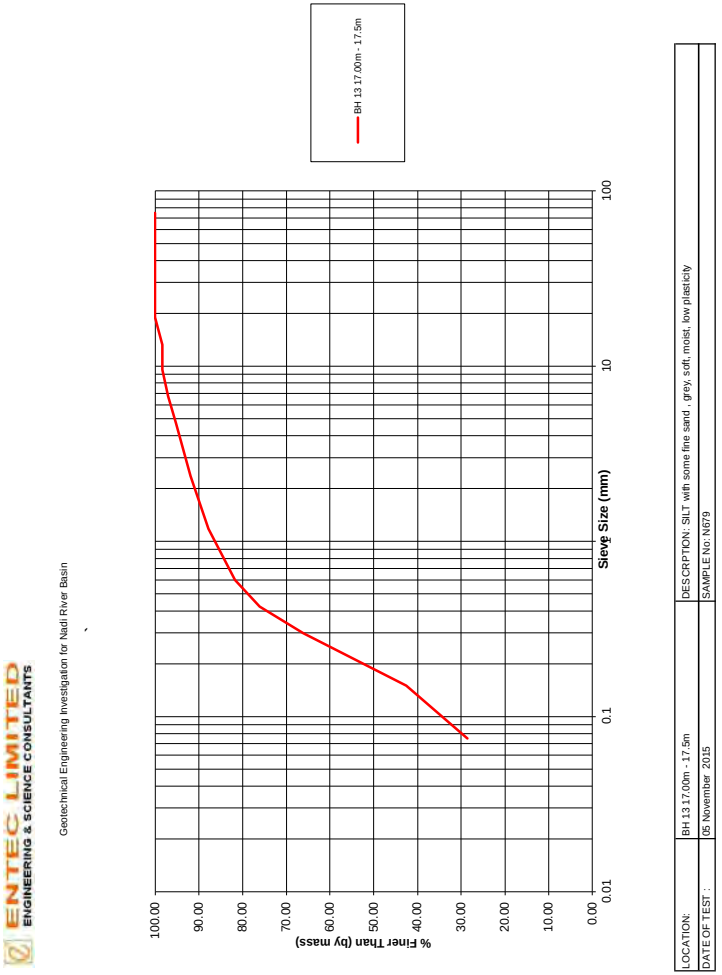
Moisture Content (Material passing 19mm)	Container No.	-	72	66	SPLIT SAMPLE
	Mass of Container	g	86.35	90.96	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	112.67	118.68	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	105.94	111.66	Spliting Factor = M_3 / M_4
	Mass of Dry 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 ($\pi/4\ d^2$)	mm^2	2269.60
	Initial length of specimen Lo	mm	100.00
	Initial mass of specimen Mi	g	405.17
	Bulk Density ρ	t/m^3	1.79
	Dry Density ρd	t/m^3	1.44

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	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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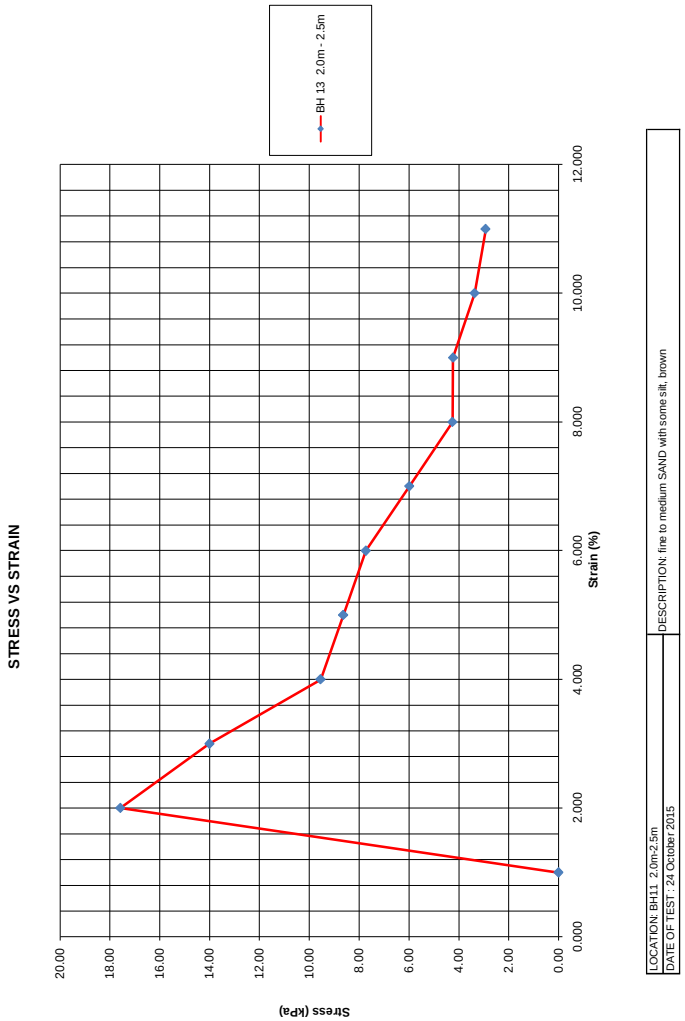

Form GE-L-10

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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 ($\pi/4\ d^2$)	mm^2	2296.70
	Initial length of specimen Lo	mm	45.17
	Initial mass of specimen Mi	g	152.73
	Bulk Density ρ	t/m^3	1.47
	Dry Density ρd	t/m^3	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

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 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

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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

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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

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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 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

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	: 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

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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

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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

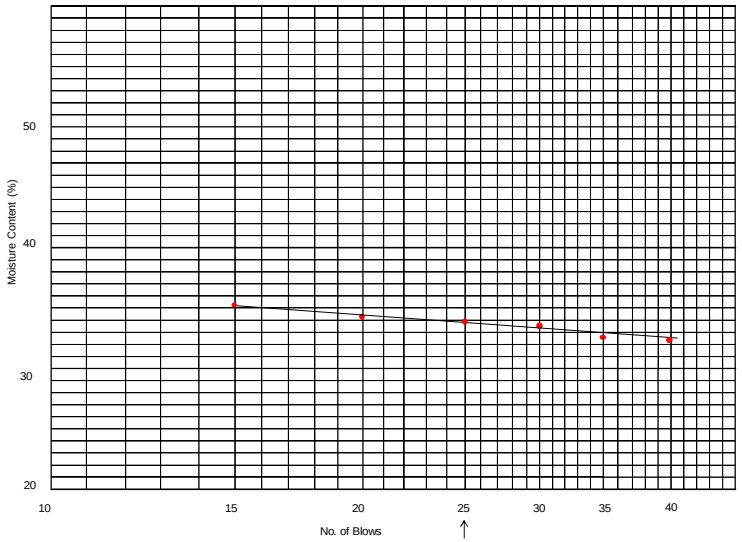
Liquid Limit	33.80 %
Plastic Limit	25.78 %
Plasticity Index	8.02 %
Shrinkage Limit	8.80 %

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

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**	: 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

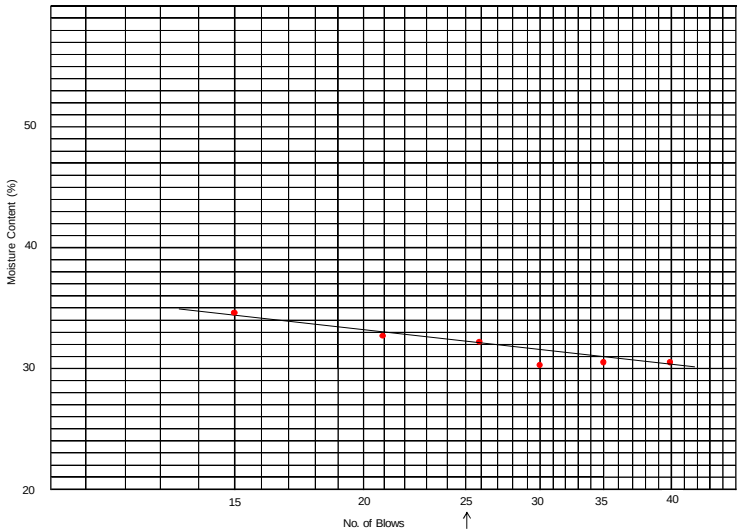
Liquid Limit	32.20 %
Plastic Limit	22.90 %
Plasticity Index	9.30 %
Shrinkage Limit	16.00 %

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

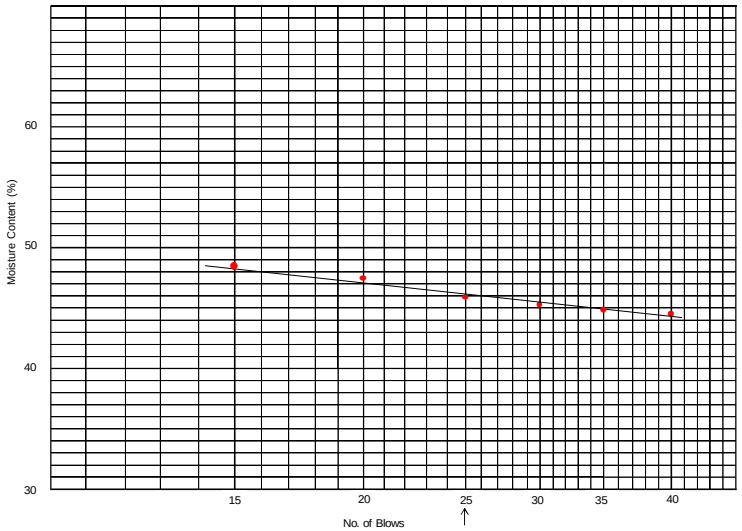
Liquid Limit	45.90 %
Plastic Limit	30.08 %
Plasticity Index	15.82 %
Shrinkage Limit	11.20 %

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			

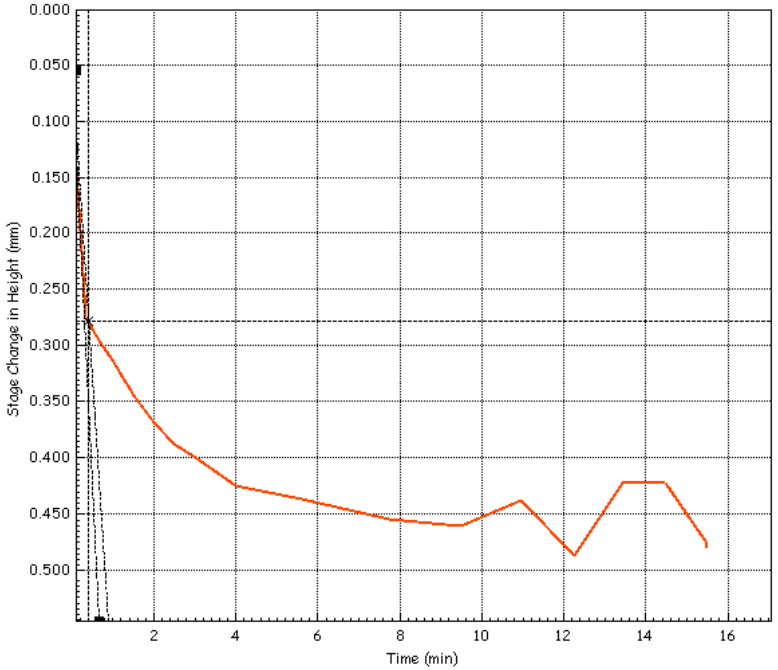
Notes

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 CIty, 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

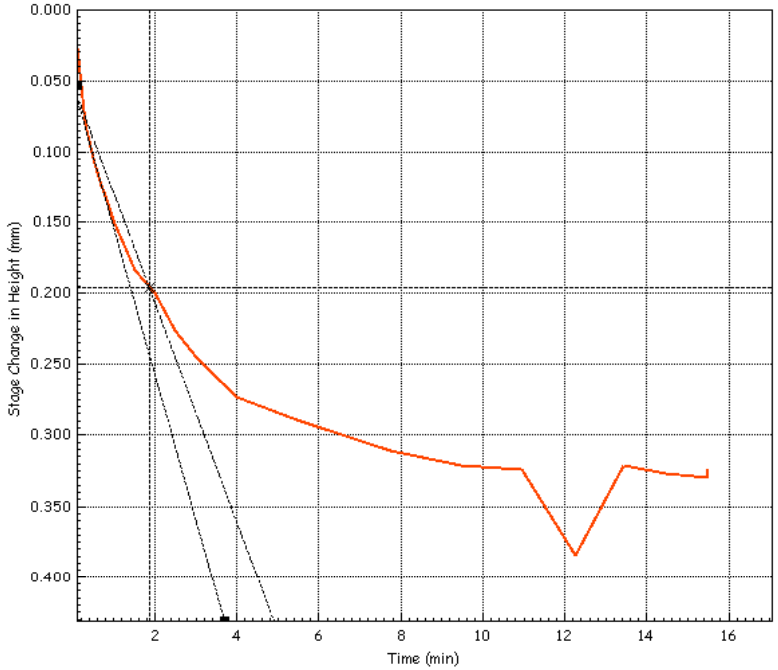


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

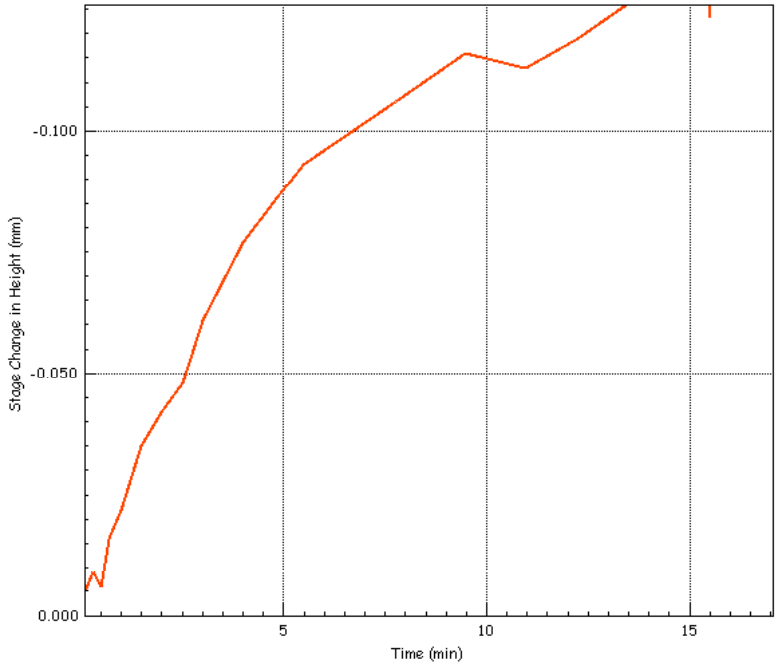


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	

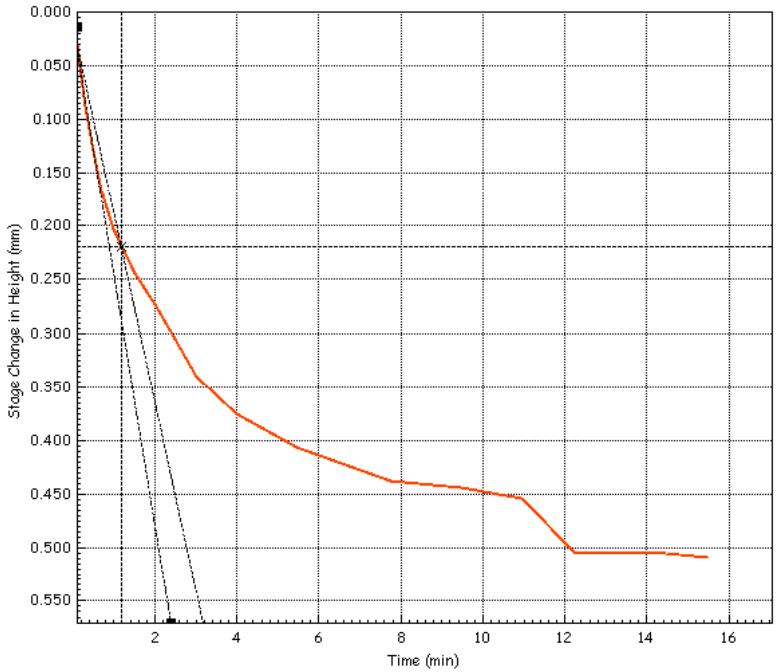


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

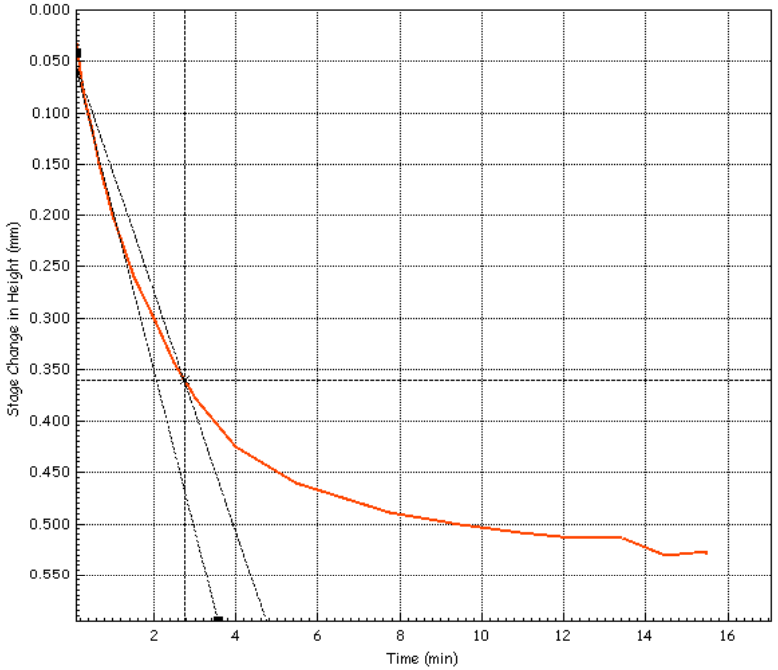


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

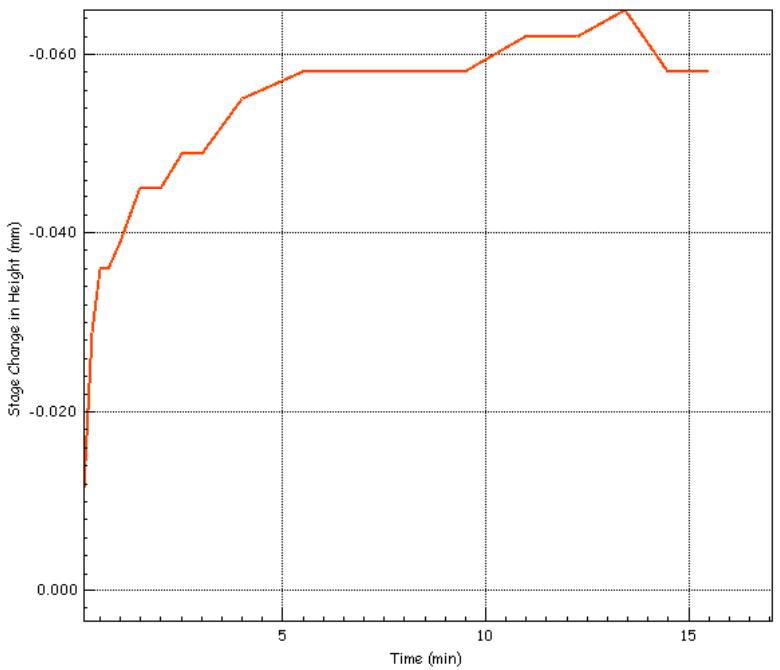


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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)	

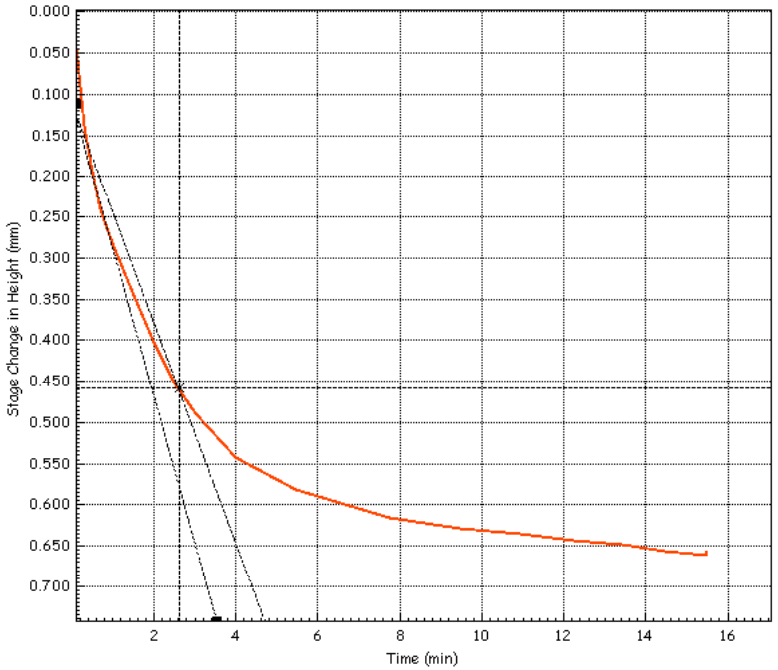


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

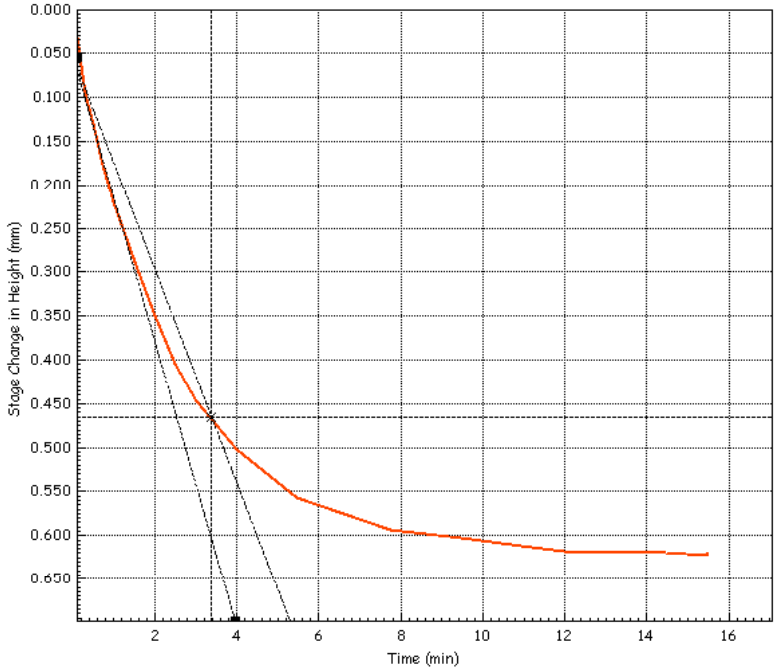


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-14_012
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/7/2015
Jobfile	Geotechnical Engineering	Sample	N672
Client	Japan International Cooperation	Borehole	BH13
Operator	IG/MK	Checked	DMC
Approved	DMC		

Entec Limited, Level 2 Mid CIty, 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 CIty, 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

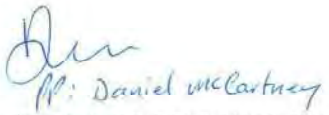
The Laboratory testing schedule and associated laboratory test certificates are provided in Appendix 3.

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: Nadi River Drilling Works	Feature	Location: Nadi Temple	No.: 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

Columns: Type | Run | Fluid & Water | Piezometer | Geological Description (Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.) | Legend | Weathering | Field Strength | Elevation (m) | Depth (m) | Symbolic Log | Defect Spacing (mm) 500 100 | Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc) | TCR (SCR) RQD (%) | Samples | Tests

Geological Description	Depth (m)	TCR (%)	Samples	Tests
FILL: Highly to completely weathered, pale brown, SUVA MARL with some coarse to medium gravel, moist		40		
FILL: Sandy SILT with some soarse to fine gravel with trace of organic, dark brown, moist, low plasticity	1			
FILL: Coarse to medium GRAVEL, grey, losely packed, sub angular to rounded		35	1.00	SPT 1.00 m N=5
FILL: Gravelly SILT with trace of medium to fine sand, dark brown, moist, medium plasticity	2			
FILL: Angular to sub angular medium to coarse GRAVEL with coarse to fine sand, grey white brown, loosely packed	3	13	2.00	SPT 2.00 m N=16
FILL: CONCRETE				
No recovery	4	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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 03A.GPJ <<DrawingFile>> 11-01-2016 15:19 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: Nadi Temple	No.: 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

Geological Description	Depth (m)	TCR (%)	Samples	Tests
FILL: Angular to sub-angular coarse to medium GRAVEL with trace of silt, grey, losely packed	6	13	5.00	SPT 5.00 m N=4
No Recovery	7	0	6.50	SPT 6.50 m N=22
Gravelly SILT with trace of sand, yellow brown, firm to stiff, moist, low plasticity	8		8.00	SPT 8.00 m N=11
Highly to complety weathered, orange brown, SANDSTONE, firm to stiff, moist, medium palsticity		63		
Highly weathered, pale yellow grey, SANDSTONE, weak, moist	9			
Clayey silty GRAVEL with some sand, pale yellow orange, moist, tightly packed				
Slightly weathered, grey blue, ANDESITE, strong				
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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 03A.GPJ <<DrawingFile>> 11-01-2016 15:19 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: Nadi Temple	No.: **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: 3 of 4

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

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, Field Strength, 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

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.: **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: 4 of 4

Geological Description	Depth (m)	TCR/SCR/RQD (%)	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	16, 17, 18, 19		15.50	SPT 15.50 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

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

D15-419

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
ENGINEERING & SCIENCE CONSULTANTS

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(^oc)	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

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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 (π/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

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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 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
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	: 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

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

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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	: 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

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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	: 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

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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

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**	: 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

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.	: 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

Form GE-L-07

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ENTEC LIMITED
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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

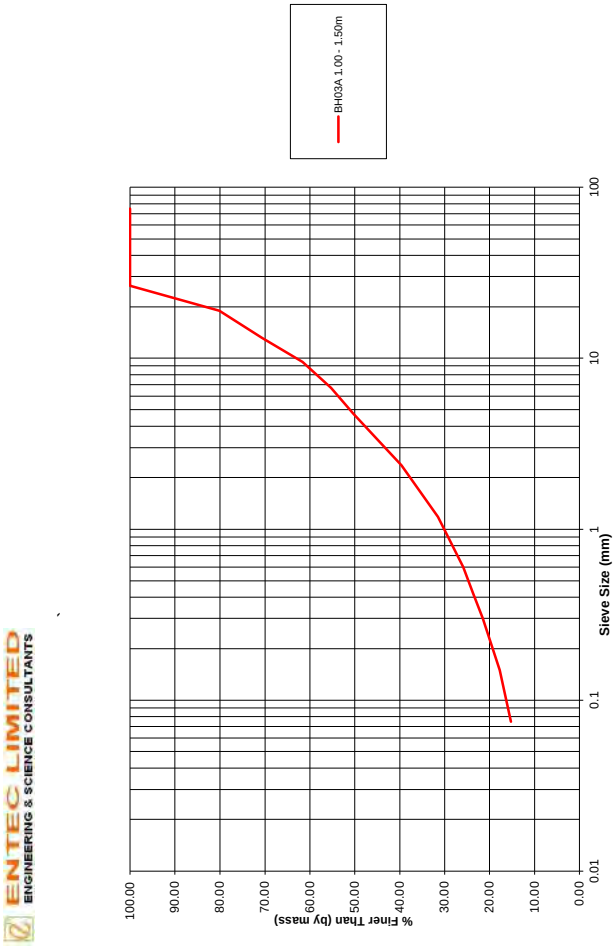
Spliting Factor = $\frac{M_3}{M_4}$

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



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LOCATION: BH03A 1.00 - 1.50m
DATE OF TEST: 13 January 2016
DESCRIPTION: FILL: Coarse to medium GRAVEL, grey, losely packed, sub angular to rounded (SPT).
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~~

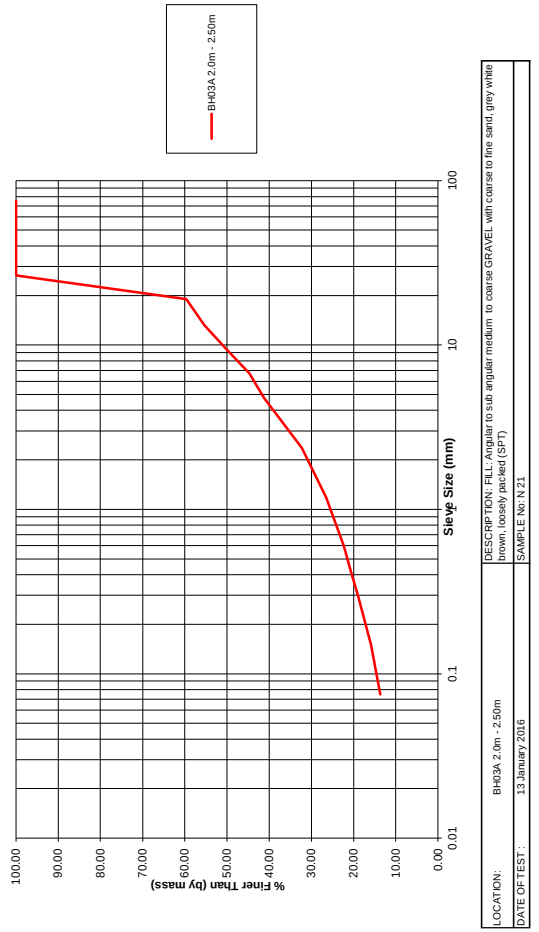
Moisture Content (Material passing 19mm)	Container No.	-	3	6	SPLIT SAMPLE
	Mass of Container	g	52.42	53.08	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	75.09	75.13	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	71.30	71.60	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	18.88	18.52	
	Mass of Moisture	g	3.79	3.53	
	Moisture Content	%	20.07	19.06	
	Average Moisture Content	%	19.57		

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

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 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	SPLIT SAMPLE
	Mass of Container	g	88.05	89.88	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	117.74	116.54	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	112.98	112.44	Spliting Factor = M_3 / M_4
	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		

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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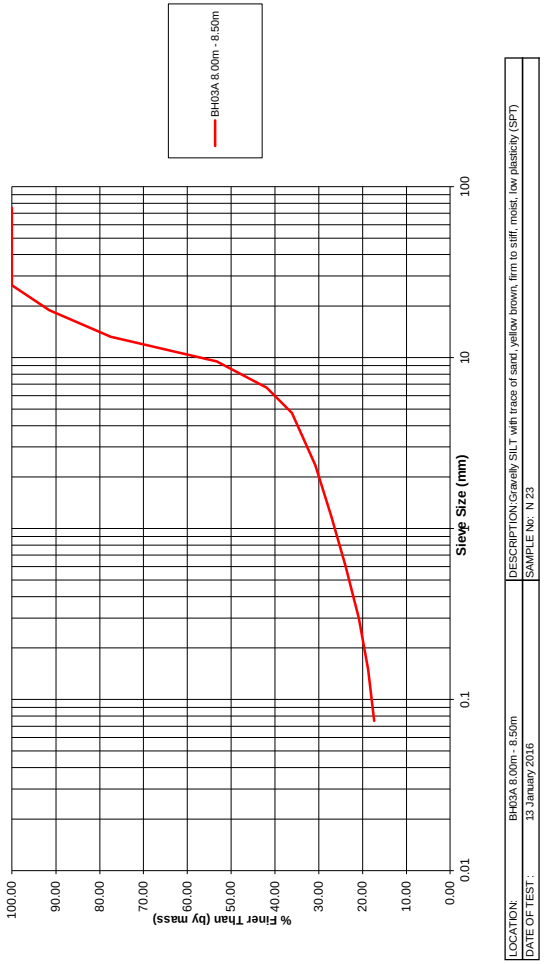

LOCATION: BH03A 8.00m - 8.50m
DATE OF TEST : 13 January 2016
DESCRIPTION:Gravelly SILT with trace of sand , yellow brown, firm to stiff, moist, low plasticity (SPT)
SAMPLE No: N 23

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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

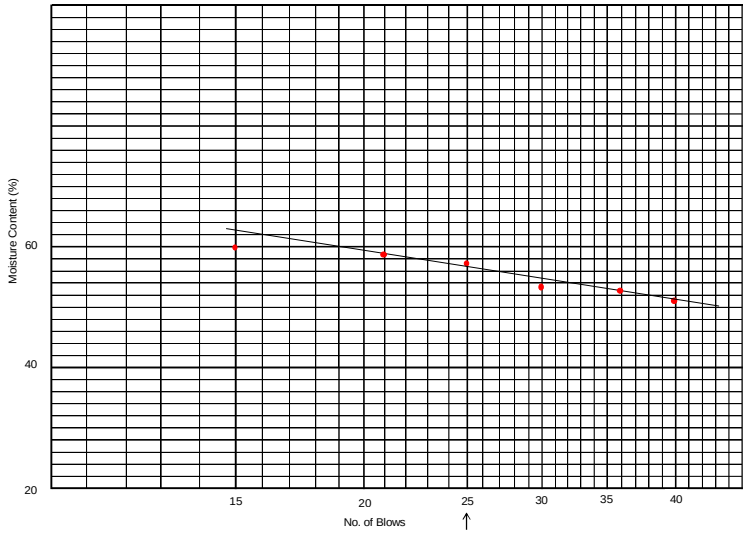
Liquid Limit	56.30 %
Plastic Limit	29.06 %
Plasticity Index	27.24 %
Shrinkage Limit	16.00 %

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

Form: GE-L-03

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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	: 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

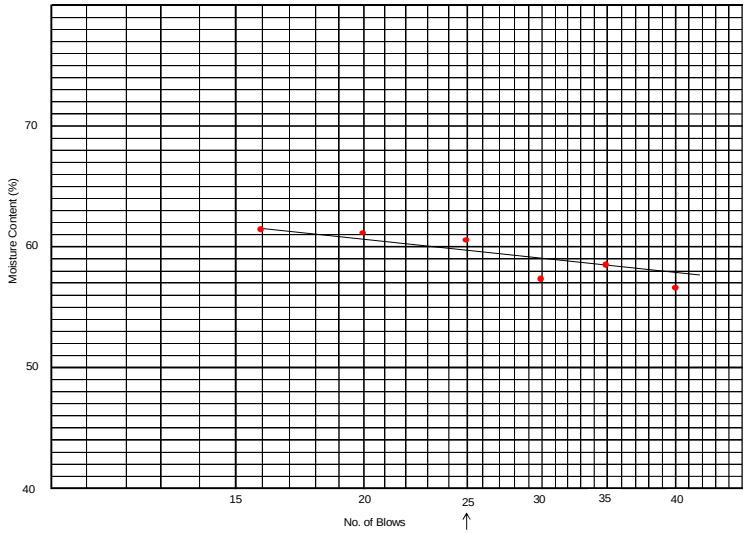
Liquid Limit	59.80 %
Plastic Limit	32.99 %
Plasticity Index	26.81 %
Shrinkage Limit	16.80 %

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 4		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

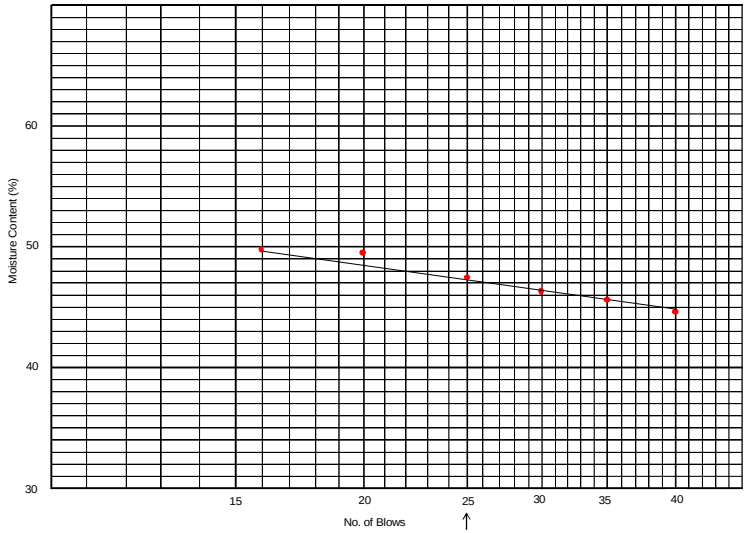
Liquid Limit	47.25 %
Plastic Limit	28.11 %
Plasticity Index	19.14 %
Shrinkage Limit	19.20 %

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 (π/4 d^2)	mm^2	3038.02
	Initial length of specimen Lo	mm	119.62
	Initial mass of specimen Mi	g	713.59
	Bulk Density ρ	t/m^3	1.96
	Dry Density ρd	t/m^3	1.60

Compression Gauge Reading	Load Gauge Reading	Load	Strain ε= Cn - Co / Lo	Corrected Area A = Ao/ 1-ε	Principal Stress Difference σ1 - σ3 = 1000P/A
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.003038	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

Form GE-L-10

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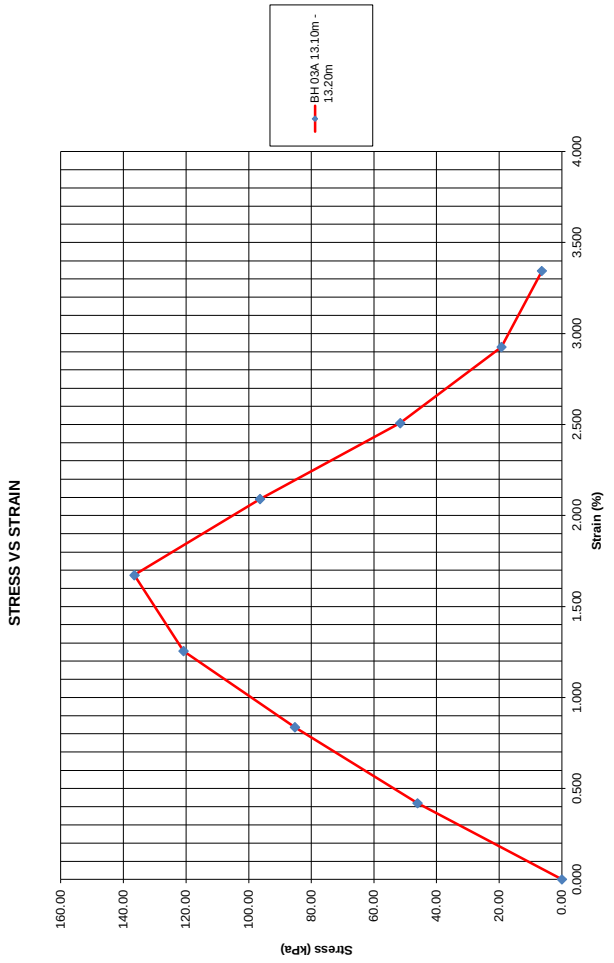


DESCRIPTION: Gravelly SAND with silt, orange brown, tightly packed, moist (Core)

LOCATION: BH 03A 13.10m - 13.20m

DATE OF TEST : 22 January 2016

Page 2 of 2

Form GE-L-10

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

M. 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.

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

Depth (m)	Geological Description	TCR (SCR) RQD (%)	Samples	Tests
0.00 – 0.80	Sandy SILT with trace of clay, brown, soft, wet, low to medium plasticity	100		P= 20 kPa
0.80 – 2.00	Sandy SILT with trace of clay, brown, firm, moist, low to medium plasticity	50	1.00	SPT 1.00 m N=6
2.00 – 3.50	Clayey SILT, brown, soft to firm, moist to wet, low to medium plasticity	33	2.00 -2.50 PT	
3.50 – 5.00	Medium to coarse GRAVEL with some coarse sand and trace of silt, light brown	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

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.: 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

Depth (m)	Geological Description	TCR (SCR) RQD (%)	Samples	Tests
5.00 – 6.50	Fine to medium GRAVEL with some coarse sand and minor silt, dark grey	29	5.00	SPT 5.00 m N=8; P= 7.5 kPa
6.50 – 8.00	NO RECOVERY (Fine to coarse SAND with some fine to medium subangular gravel, dark grey - inferred from SPT)	0	6.50	SPT 6.50 m N=28
8.00 – 9.50	NO RECOVERY (Medium GRAVEL with some coarse sand, dark grey - inferred from SPT)	0	8.00	SPT 8.00 m N=18
9.50 – 10.00	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

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.: 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: 3 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.

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 — Defect Spacing (mm): 500 100 — Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR (SCR) RQD (%)	Samples	Tests
				Silty CLAY 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
				NO RECOVERY					11				0	11.00 -11.50 PT	P= 8.3 kPa
									12						
				Silty CLAY with trace of sand and organics, green grey, soft, medium to high plasticity					13				100	12.50	SPT 12.50 m N=0; P= 0 kPa; P= 0 kPa
				NO RECOVERY					14				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

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: 4 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.

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 — Defect Spacing (mm): 500 100 — Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)

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
				NO RECOVERY *(continued)*									0		
				Fine Sandy SILT with trace of organics, green grey, soft, moist, low to medium plasticity					16				53		P= 10 kPa
									17				73	17.00	SPT 17.00 m N=0; P= 0 kPa
									18						P= 0 kPa
				Fine to medium subangular to subrounded GRAVEL with some fine to coarse sand, blackish green					19				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

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: 5 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 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	21	27	20.00	SPT 20.00 m N=50
Bluish grey, BASALT, greyish SANDSTONE	22	40	21.50	SPT 21.50 m N=50+
Highly weathered, CONGLOMORATE	23, 24	100	23.00	SPT 23.00 m N=50+
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.: 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: 6 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.

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, 27, 28, 29		26.00	SPT 26.00 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

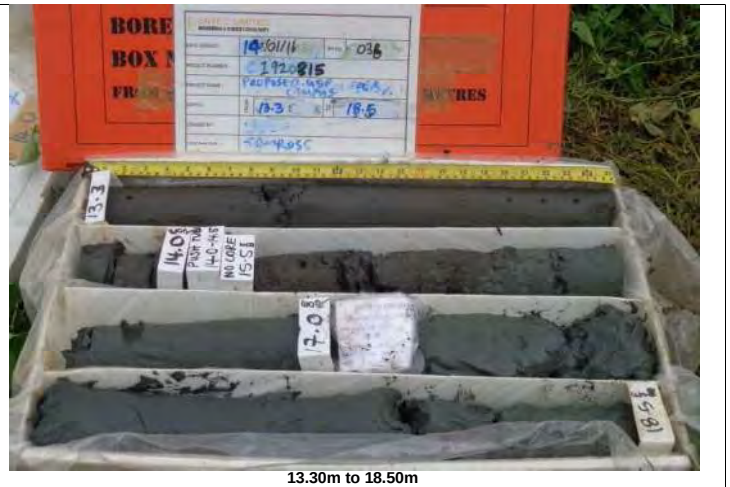
ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH 3B.GPJ <<DrawingFile>> 28/01/2016 15:36 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

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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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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APPENDIX 3

Laboratory Test Schedule and Laboratory Test Results

D15-442

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

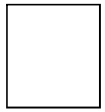
Lab test Schedule

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

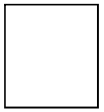
Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
50	0.966	0.010	306.1	0.010	29.0	29.0		0.145	0.0087
100	0.965	0.020	84.0	0.010	29.0	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

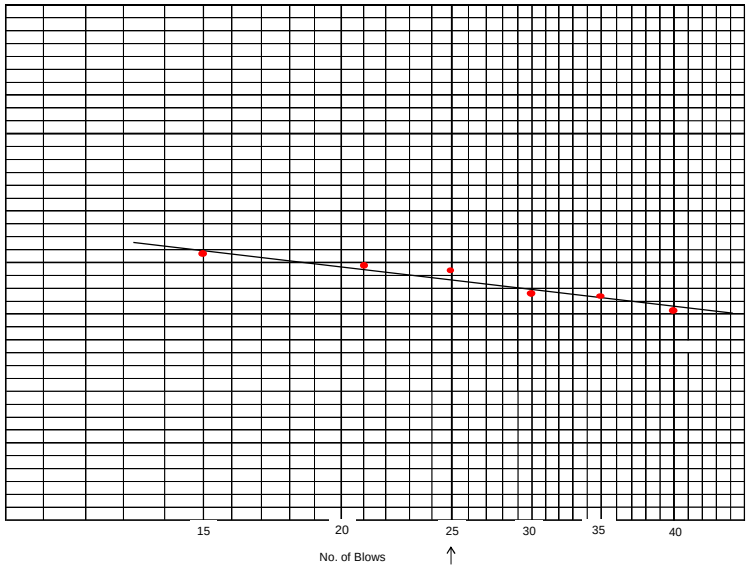
Liquid Limit	48.60 %
Plastic Limit	31.44 %
Plasticity Index	17.16 %
Shrinkage Limit	18.62 %

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

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 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.	g	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

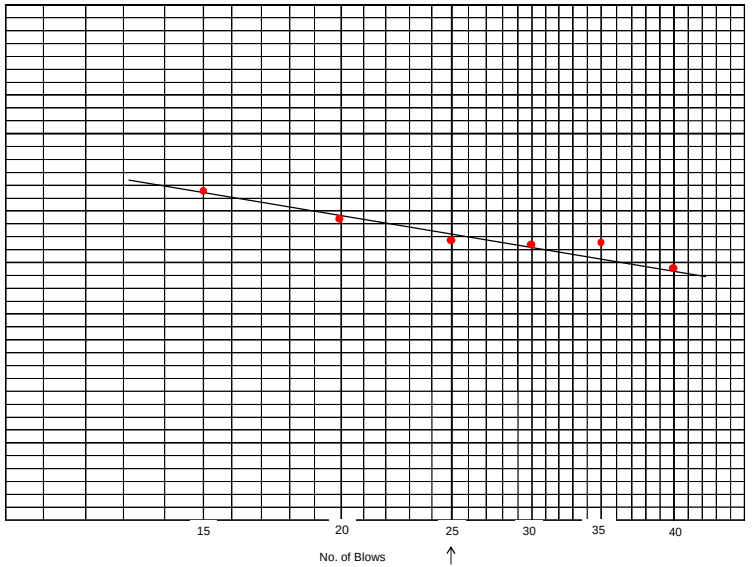
Liquid Limit	32.20 %
Plastic Limit	24.80 %
Plasticity Index	7.40 %
Shrinkage Limit	13.60 %

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.		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

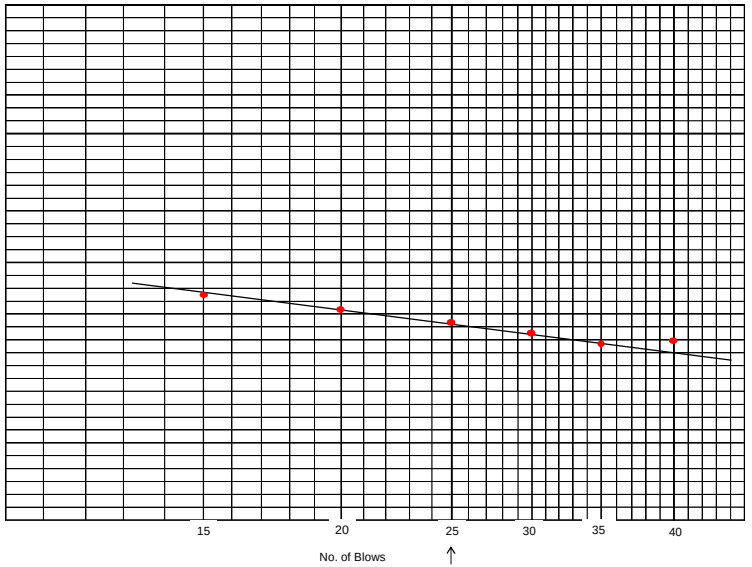
Liquid Limit	75.10 %
Plastic Limit	51.30 %
Plasticity Index	23.80 %
Shrinkage Limit	15.17 %

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~~ / O~~VEN - 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

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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~~ / O~~VEN - 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

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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

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 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

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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

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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(^oc)	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

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

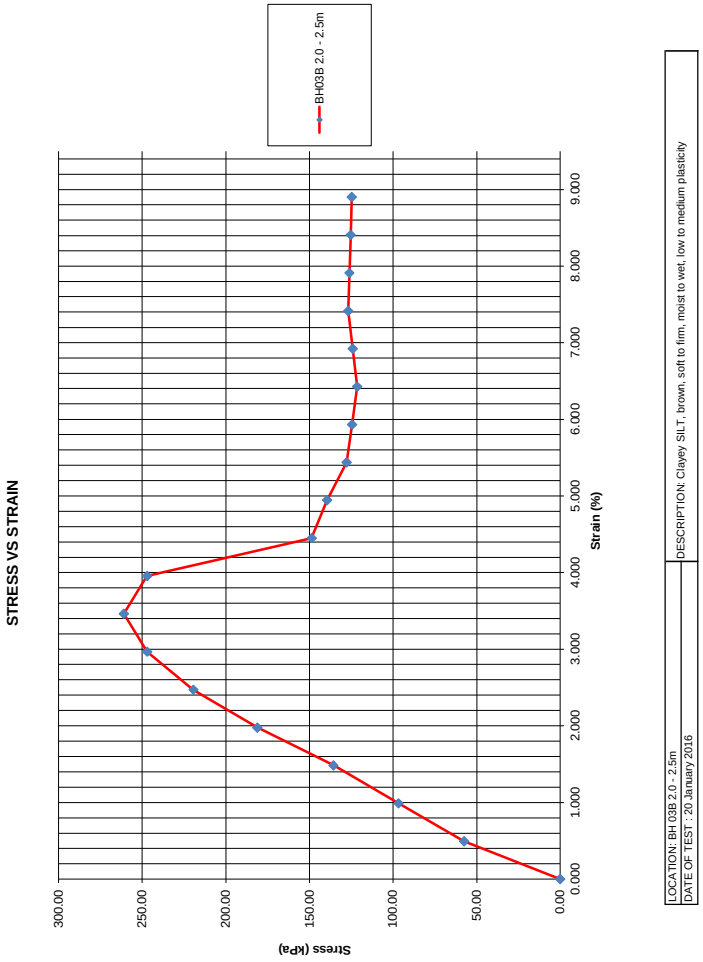
PRINCIPAL	:	Japan International Cooperation Agency (JICA	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	20 January 2016
SITE ADDRESS	:	BH 03B Qeleloa West	**TECHNOLOGIST**	:	KB / SL
SAMPLE LOCATION	:	BH03B 2.0 - 2.5m	**MATERIAL 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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Unconfined Compressive Strength

NZS 4402:1986 (Test 6.3.1)

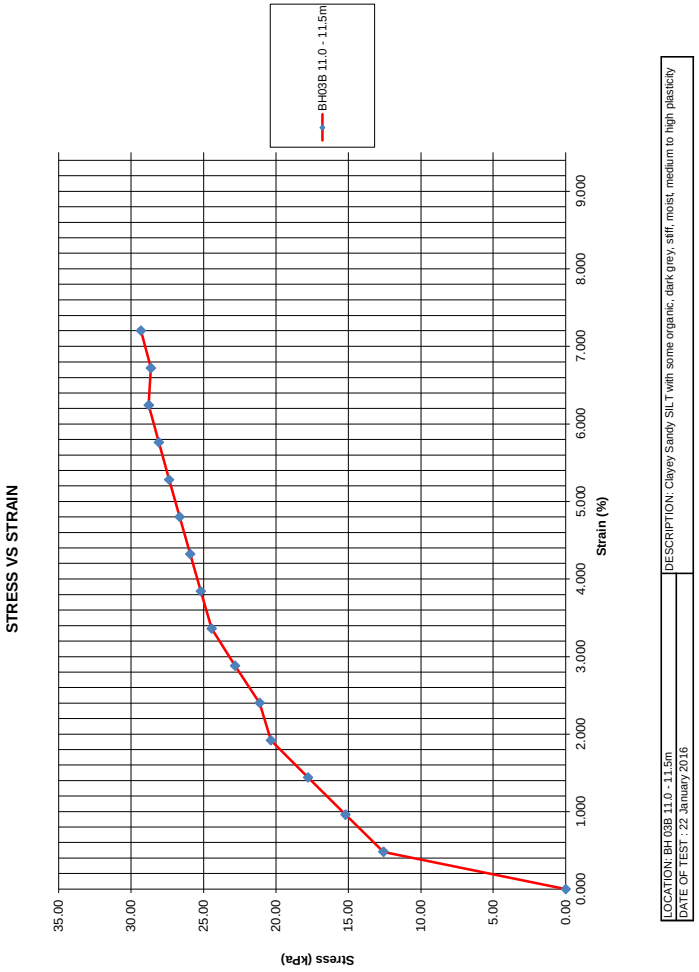
PRINCIPAL	:	Japan International Cooperation Agency (JICA	**PROJECT No.**	:	1920815A
PROJECT NAME	:	Geotechnical Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	22 January 2016
SITE ADDRESS	:	BH 03B Qeleloa West	**TECHNOLOGIST**	:	KB / SL
SAMPLE LOCATION	:	BH03B 11.0 - 11.5m	**MATERIAL 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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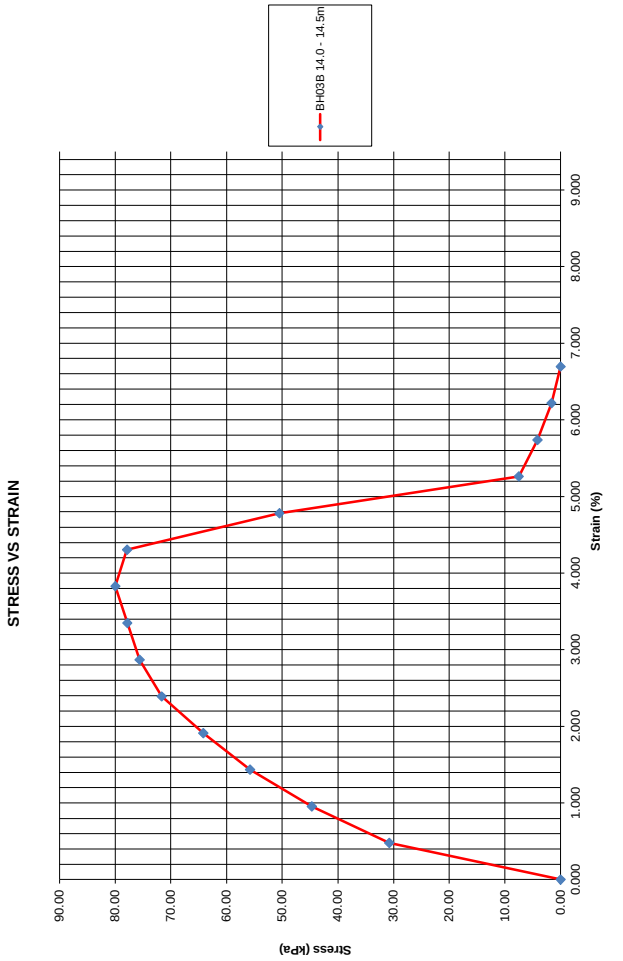

DESCRIPTION: Clayey Sandy SILT with some organic, dark grey, Stiff, moist, medium to high plasticity

LOCATION: BH 03B 14.0 - 14.5m
DATE OF TEST : 22 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 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~~

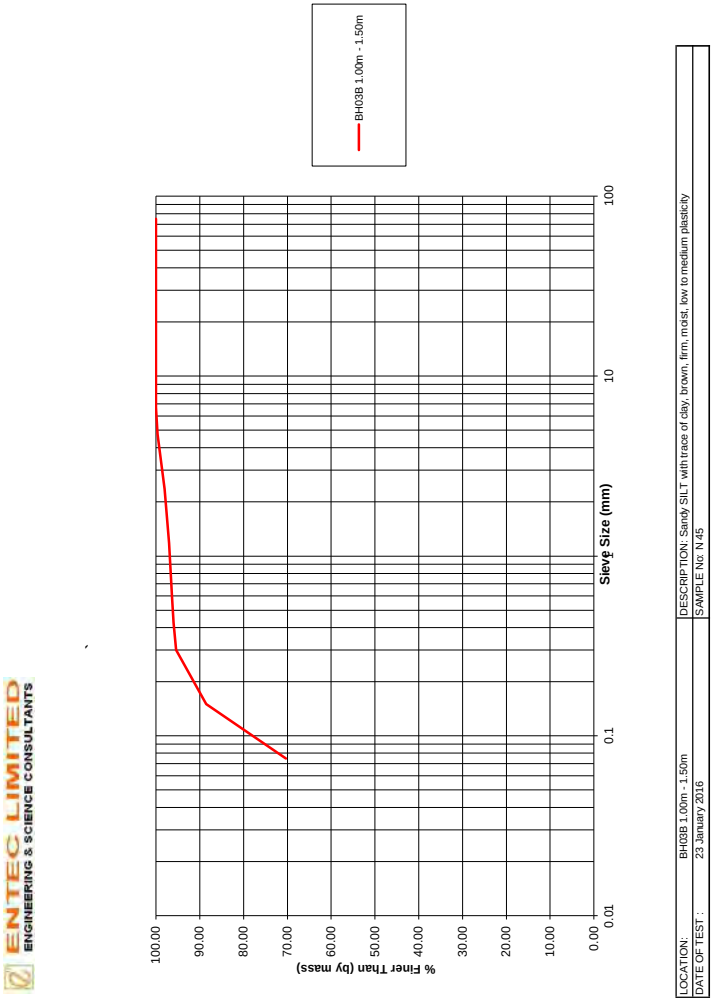
Moisture Content (Material passing 19mm)	Container No.	-	A7	A8	SPLIT SAMPLE		
	Mass of Container	g	51.73	51.57	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	94.93	94.80	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	85.85	85.39	Spliting Factor = M_3/M_4		
	Mass of Dry Soil	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
DATE OF TEST : 23 January 2016
DESCRIPTION: Sandy SILT with trace of clay, brown, firm, moist, low to medium plasticity
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~~

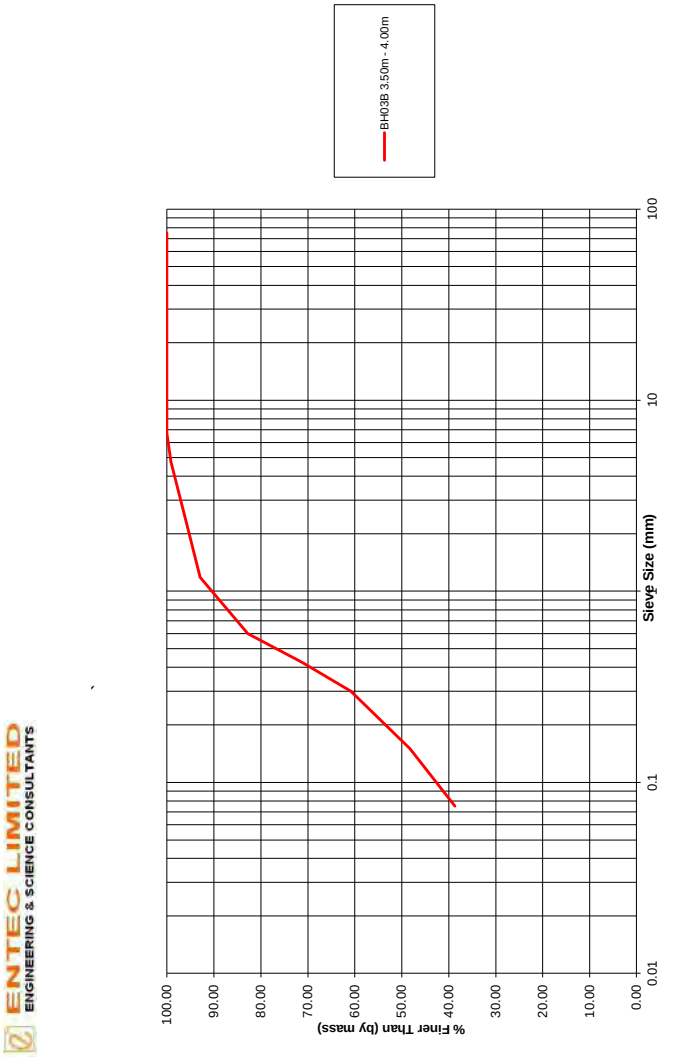
Moisture Content (Material passing 19mm)	Container No.	-	63	70	SPLIT SAMPLE
	Mass of Container	g	102.01	90.09	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	151.60	150.94	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	138.17	133.73	Spliting Factor = M_3 / M_4
	Mass of Dry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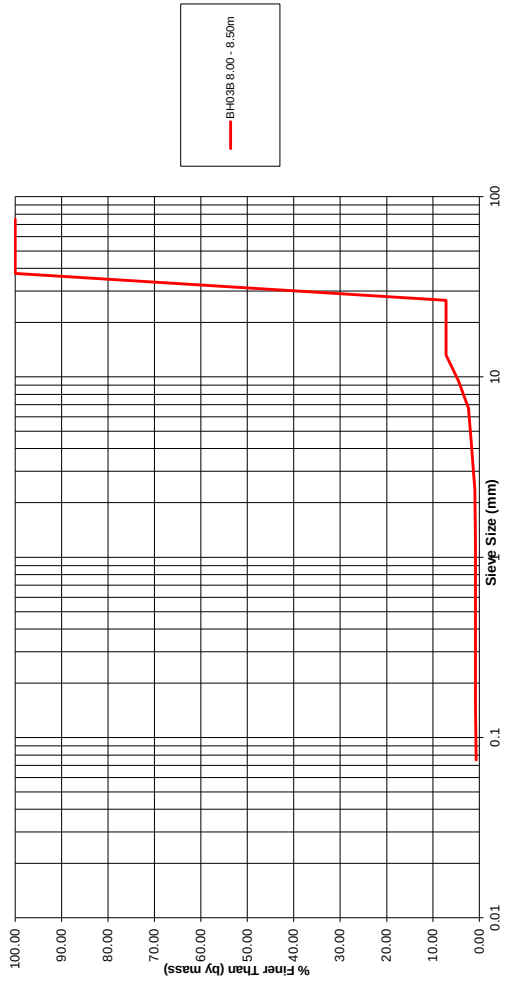

LOCATION: BH03B 8.00 - 8.50m
DATE OF TEST : 26 January 2016
DESCRIPTION: Medium GRAVELwith some coarse sand, dark grey (inferred from SPT)
SAMPLE No: N50

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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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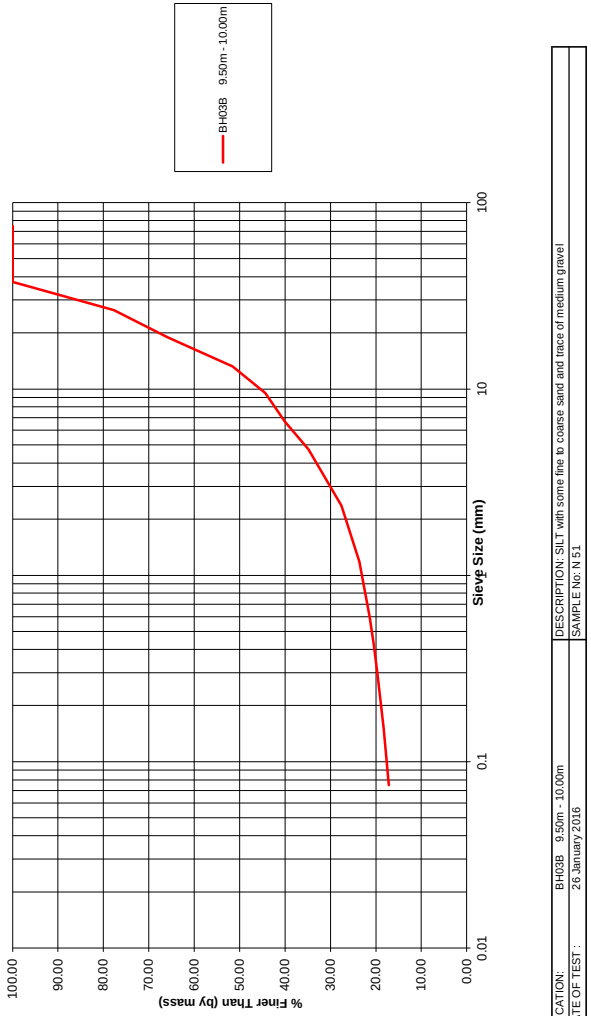

LOCATION: BH03B 9.50m - 10.00m
DATE OF TEST: 26 January 2016
DESCRIPTION: SILT with some fine to coarse sand and trace of medium gravel
SAMPLE No: N 51

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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~~

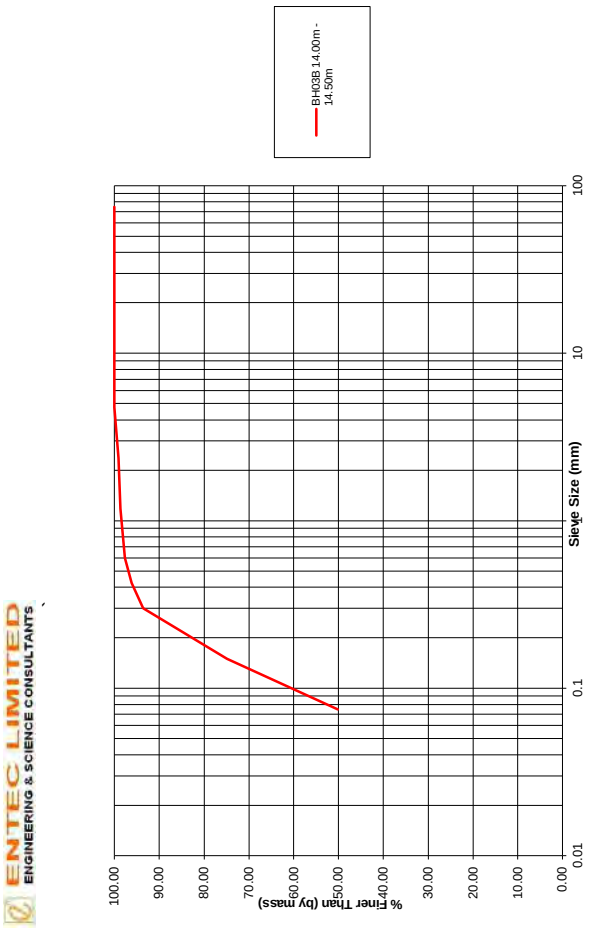
Moisture Content (Material passing 19mm)	Container No.	-	72	83	SPLIT SAMPLE		
	Mass of Container	g	86.40	71.19	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	121.51	121.25	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	110.20	104.89	Spliting Factor = M_3/M_4		
	Mass of Dry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

Form GE-L-06

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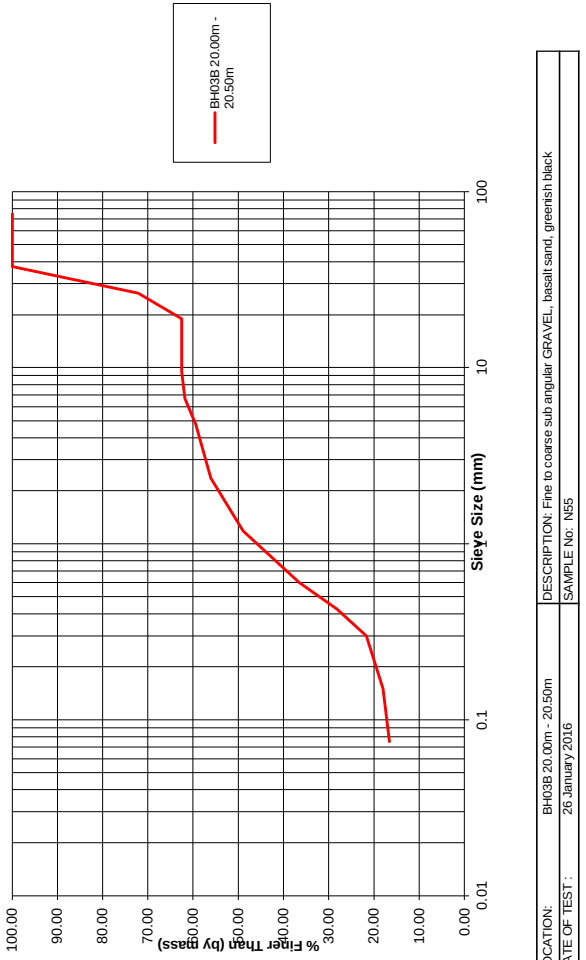

LOCATION: BH03B 20.00m - 20.50m
DESCRIPTION: Fine to coarse sub angular GRAVEL, basalt sand, greenish black
DATE OF TEST : 26 January 2016
SAMPLE No: N55

Page 2 of 2

Form GE-L-06

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.:
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

BH 03C

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.

Weathering: RS XW HW MW SW FR

Field Strength: VS VL S L F MD St D VSt VD H

Defect Spacing (mm): 500 100

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

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		
1		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	
3.40–5.00	Silty fine SAND, pale brown orange, loosely to tightly packed, moist	93	3.50	SPT 3.50 m N=3

Explanations:	Remarks
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	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

DRILL HOLE LOG

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

BH 03C

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			
9.50–10.00	Medium to fine sub-angular to sub-rounded GRAVEL, loosely packed, grey orange white	20	9.50	SPT 9.50 m N=50+

Explanations:	Remarks
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	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.:
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		**BH 03C**
			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/VD W VW 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
10.00–11.00	Medium to fine sub-angular to sub-rounded GRAVEL, loosely packed, grey orange white *(continued)*	20		
11.00–14.00	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		
14.00–	SANDSTONE gravels, grey, loosely packed	33	14.00	SPT 14.00 m N=41

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.:
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		**BH 03C**
			Sheet: 4 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/VD W VW 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
15.00–	Highly weathered BASALT, grey black, weak	33		
	Slightly to highly weathered BASALT, grey, strong		15.40-15.50	SPT 15.50 m N=50+
15.50–	Fine grain SANDSTONE, dark grey, closely spaced defects, narrow aperture of discontinuity		15.50	
		87	16.10-16.35	
			16.35-16.65	
		100	17.00-17.35	
			17.35-17.65	
			17.65-17.90	
		100	18.80-19.30	

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 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
				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 2015-09-07 Prj: Entec 1.01 2015-09-07

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

0.00m to 4.20m

4.20m to 8.00m

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

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

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

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 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

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 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
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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 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

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	: 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
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	: 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
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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	: 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

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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

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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

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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

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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 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_1)	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

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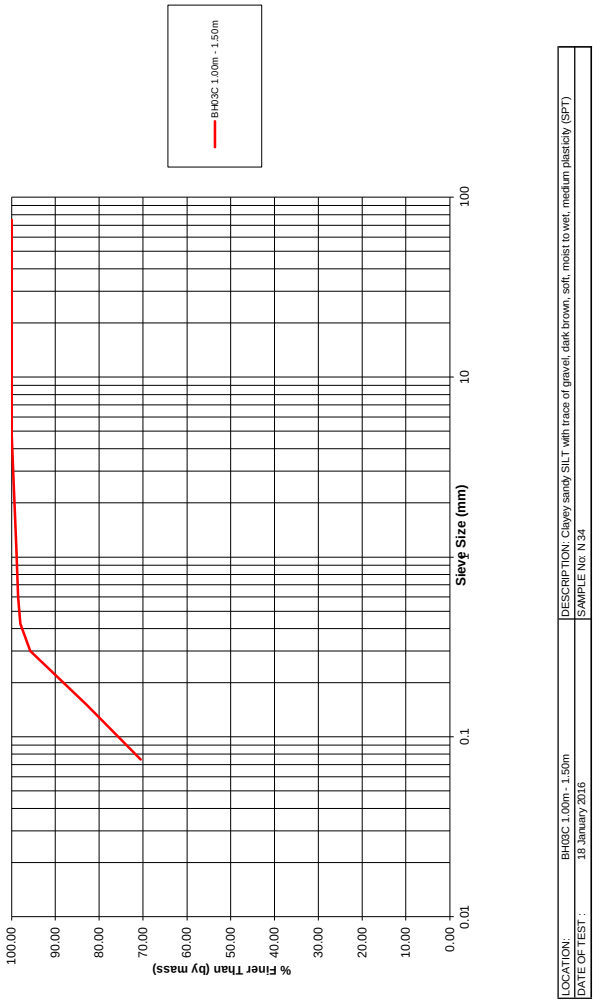

DESCRIPTION: Clayey sandy SILT with trace of gravel, dark brown, soft, moist to wet, medium plasticity (SPT)
SAMPLE No: N 34
LOCATION: BH03C 1.00m - 1.50m
DATE OF TEST : 18 January 2016

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Form GE-L-06

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

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	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 $\frac{M_3}{M_4}$ =
	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

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

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	

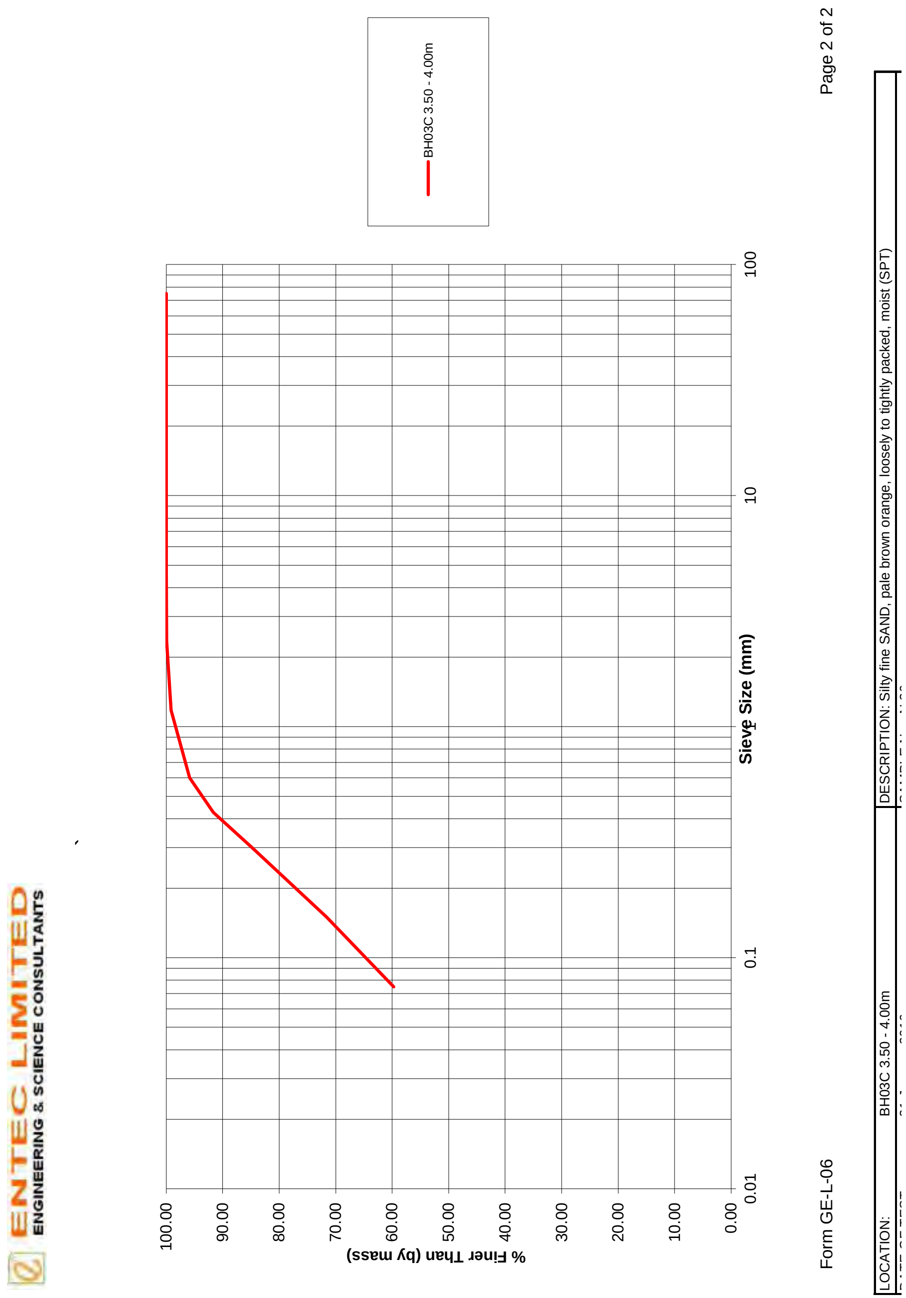
SPLIT SAMPLE			
Mass Passing Last Sieve:	-	gM_3	
Mass after Spliting:	-	gM_4	
Spliting Factor =	$\frac{M_3}{M_4}$		

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



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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~~

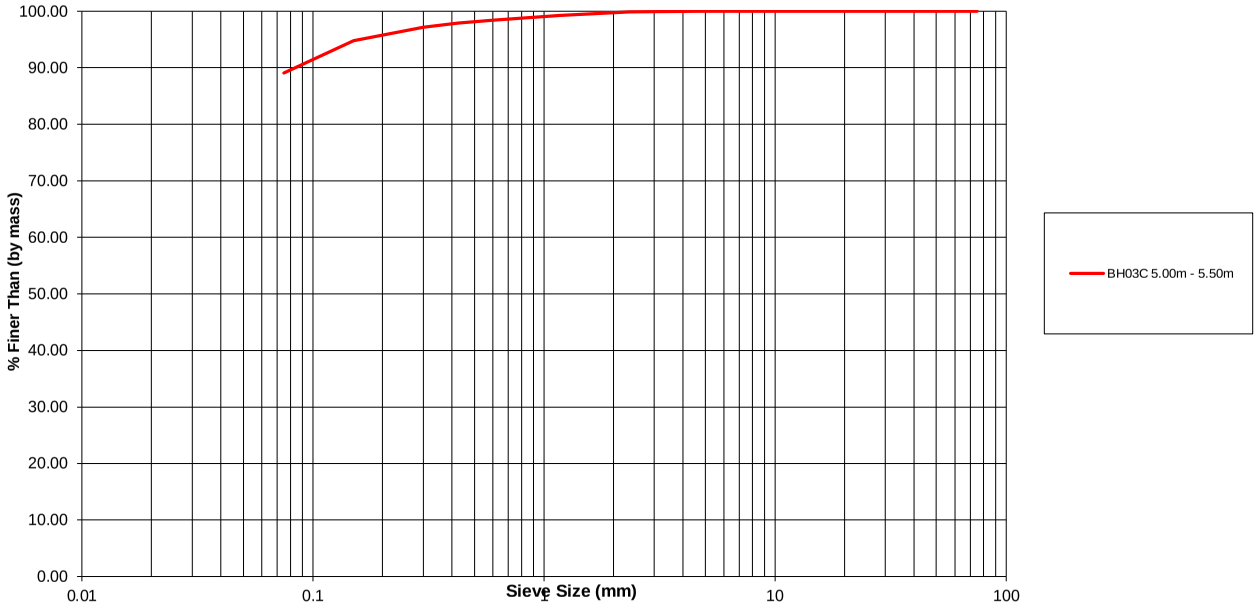
Moisture Content (Material passing 19mm)	Container No.	-	9	10	SPLIT SAMPLE
	Mass of Container	g	53.51	52.29	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	107.42	107.14	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	92.61	92.08	Spliting Factor = $\frac{M_3}{M_4}$
	Mass of 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



LOCATION:	BH03C 5.00m - 5.50m	DESCRIPTION: Clayey SILT with minor fine sand, brown grey, soft to firm, moist, medium plasticity (PT)

D15-481

Wet Sieve Analysis
NZS 4407:1991 (Test 3.4.1)

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 38mm)					SPLIT SAMPLE
	Container No.	-	88	89	
	Mass of Container	g	124.11	121.04	Mass Passing Last Sieve: - gM_5
	Mass of Container + Wet Soil	g	192.64	192.08	Mass after Spilling: - gM_4
	Mass of Container + Dry Soil	g	173.92	172.37	Spilling Factor = 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_2)	Corrected Mass	Percentage Retained = (MassM_2) x 100 / M_T	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	
Date : 18 January 2016	Date : 27 January 2016	Approved by: IG
		Date : 27 January 2016

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

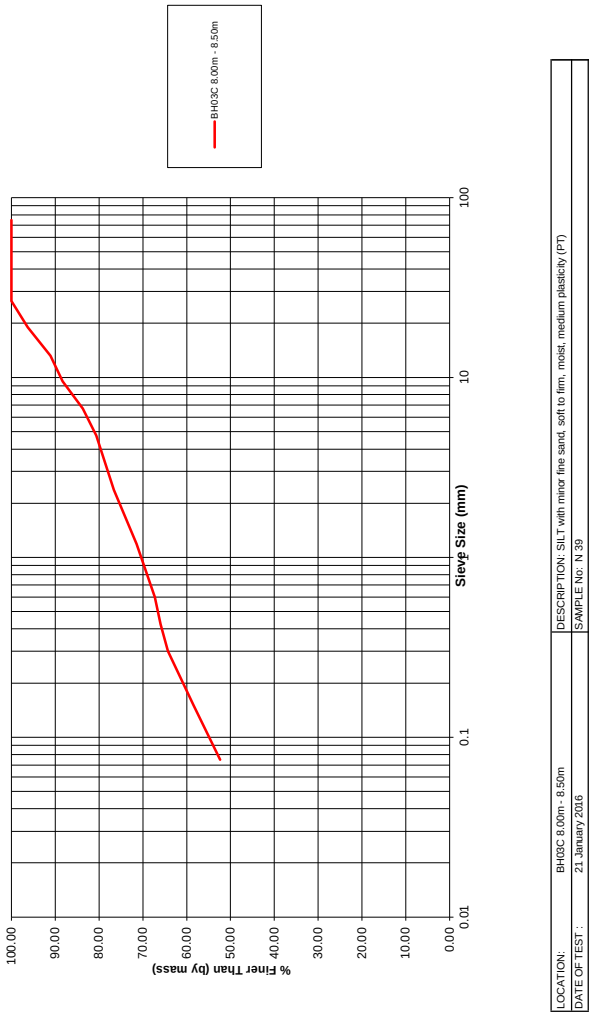
Moisture Content (Material passing 19mm)	Container No.	-	3	6	SPLIT SAMPLE
	Mass of Container	g	52.42	53.09	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	150.38	150.16	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	132.66	132.95	Spliting Factor = M_5 / M_4
	Mass of Dry Soil	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_5)	g	Nil
	Total Wet Weight (M_w)	g	540.70
	Total Mass of dry sample (M_T)	M_T =	$100M_w / (100 + w)$
		M_T =	443.86

Test Sieve Size mm	Mass of Dry Soil Retained (M_{ds})	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



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

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

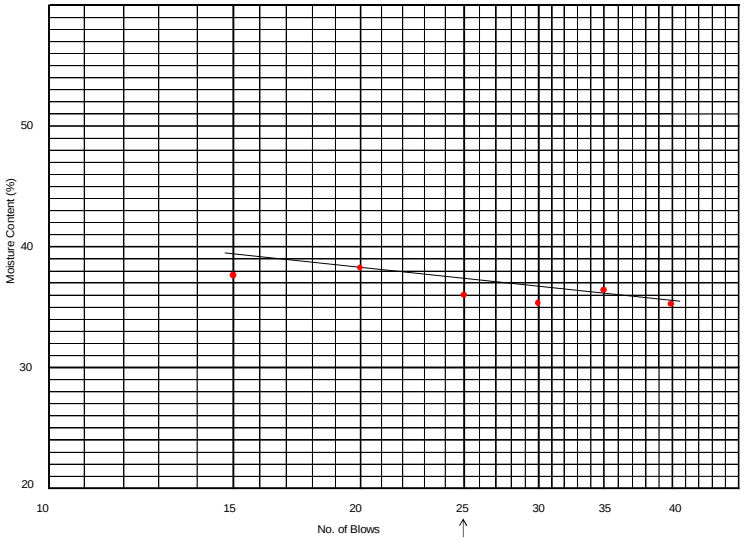
Liquid Limit	37.20 %
Plastic Limit	23.71 %
Plasticity Index	13.49 %
Shrinkage Limit	7.20 %

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

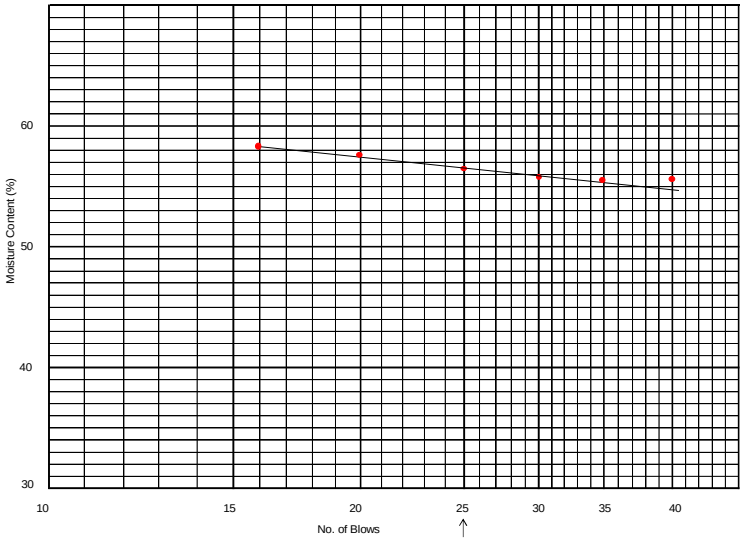
Liquid Limit	56.50 %
Plastic Limit	36.78 %
Plasticity Index	19.72 %
Shrinkage Limit	18.40 %

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

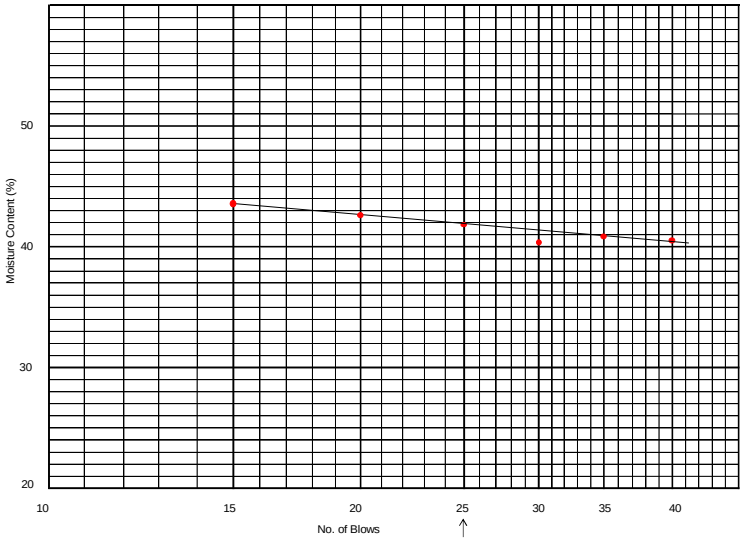
Liquid Limit	42.00 %
Plastic Limit	23.63 %
Plasticity Index	18.37 %
Shrinkage Limit	10.40 %

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 ε= Cn - Co / Lo**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference σ1 - σ3 = 1000P/A**
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002924	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

ENTEC LIMITED
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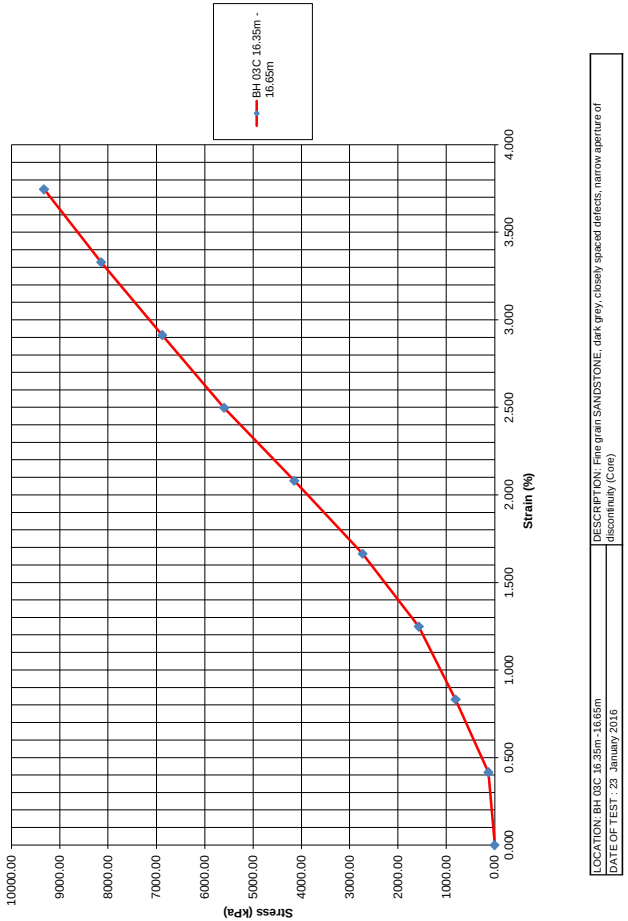
STRESS VS STRAIN



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

LOCATION: BH 03C 16.35m -16.65m

DATE OF TEST : 23 January 2016

Form GE-L-10

ENTEC LIMITED
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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)	%	m^2	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

ENTEC LIMITED
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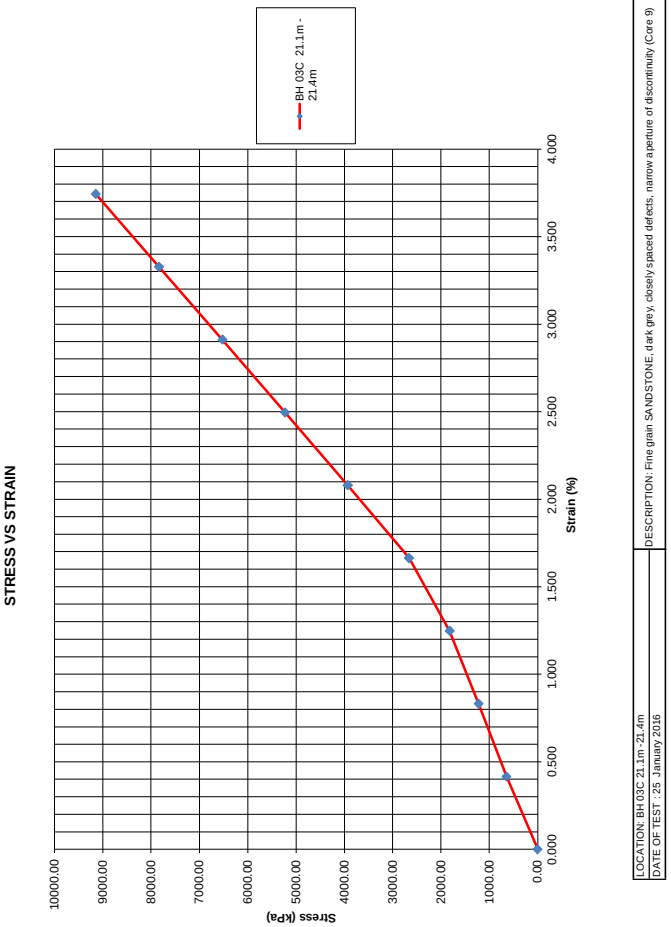
STRESS VS STRAIN



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

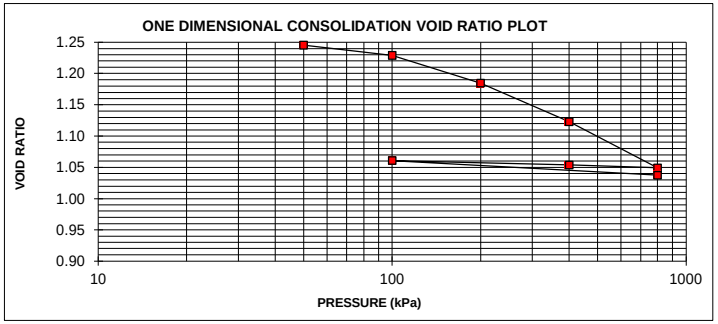
Form GE-L-10

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 mm²
Solid density of soil particles (Q_s): 2.65 t/m³ (~~Measured~~ / Assumed)
Method used: Square root of time fitting method



			Initial		Final
Measured thickness of specimen, H		mm	H_i	23.8	H_f 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/m³	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 *(m²/yr)*	Coefficient of compressibility M_v *(m²/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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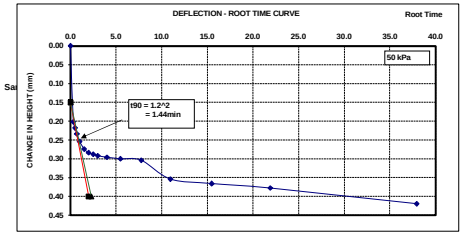
ENGINEERING & SCIENCE CONSULTANTS

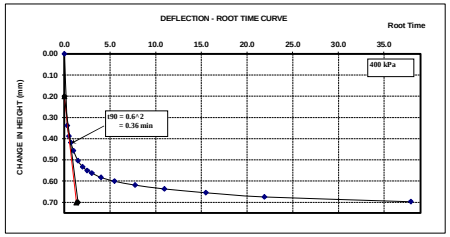
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

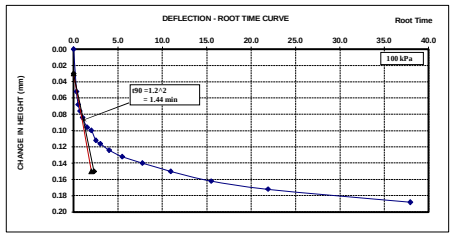
Loading Date and Time					23/012016 @ 08:33hrs			25/01/2016 @ 08:08hrs														
Hanger Load					1600g			12800g														
Effective Pressure					100kPa			800kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	sec	t min	√t min	△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														

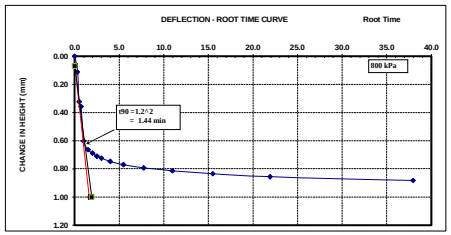
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

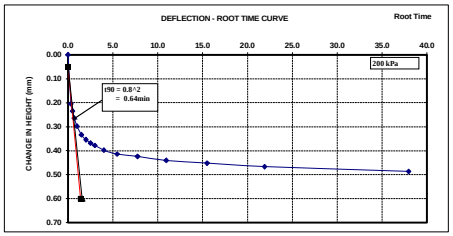
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

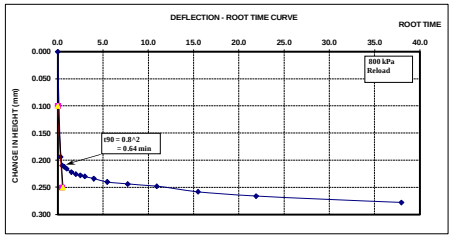












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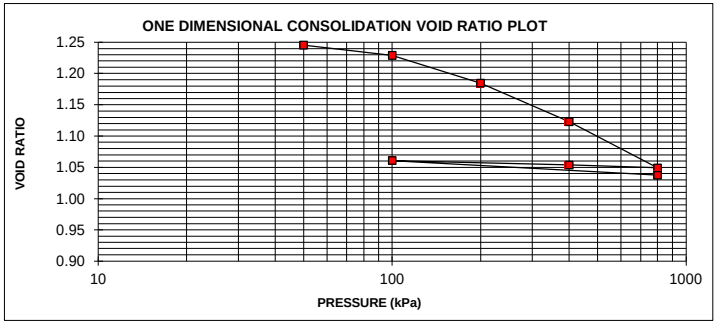
Determination of The One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

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

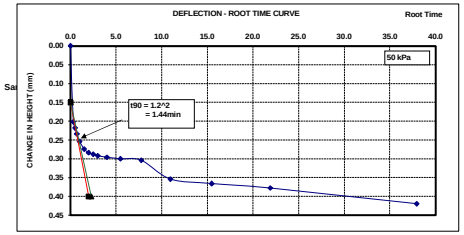
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

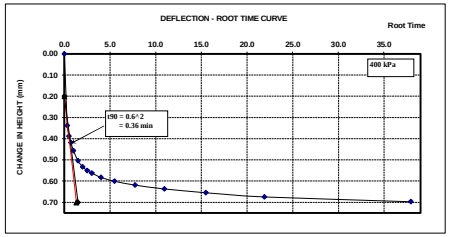
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

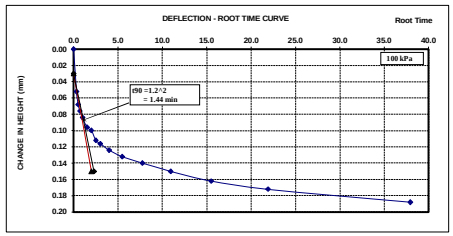
Loading Date and Time					23/012016 @ 08:33hrs			25/01/2016 @ 08:08hrs														
Hanger Load					1600g			12800g														
Effective Pressure					100kPa			800kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	sec	t min	√t min	△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														

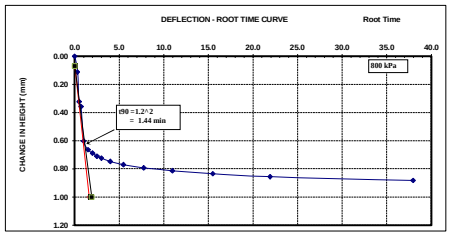
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

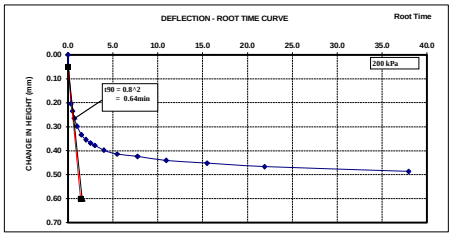
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

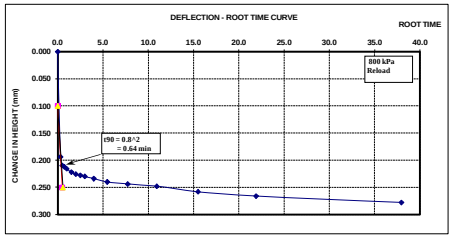












Oedometer Settlement Test

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 CIty, Cnr Cumming Street & Renwick Road, Suva