

**APPENDIX 9**

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

**APPENDIX 9a**

**Test Locality Plan**

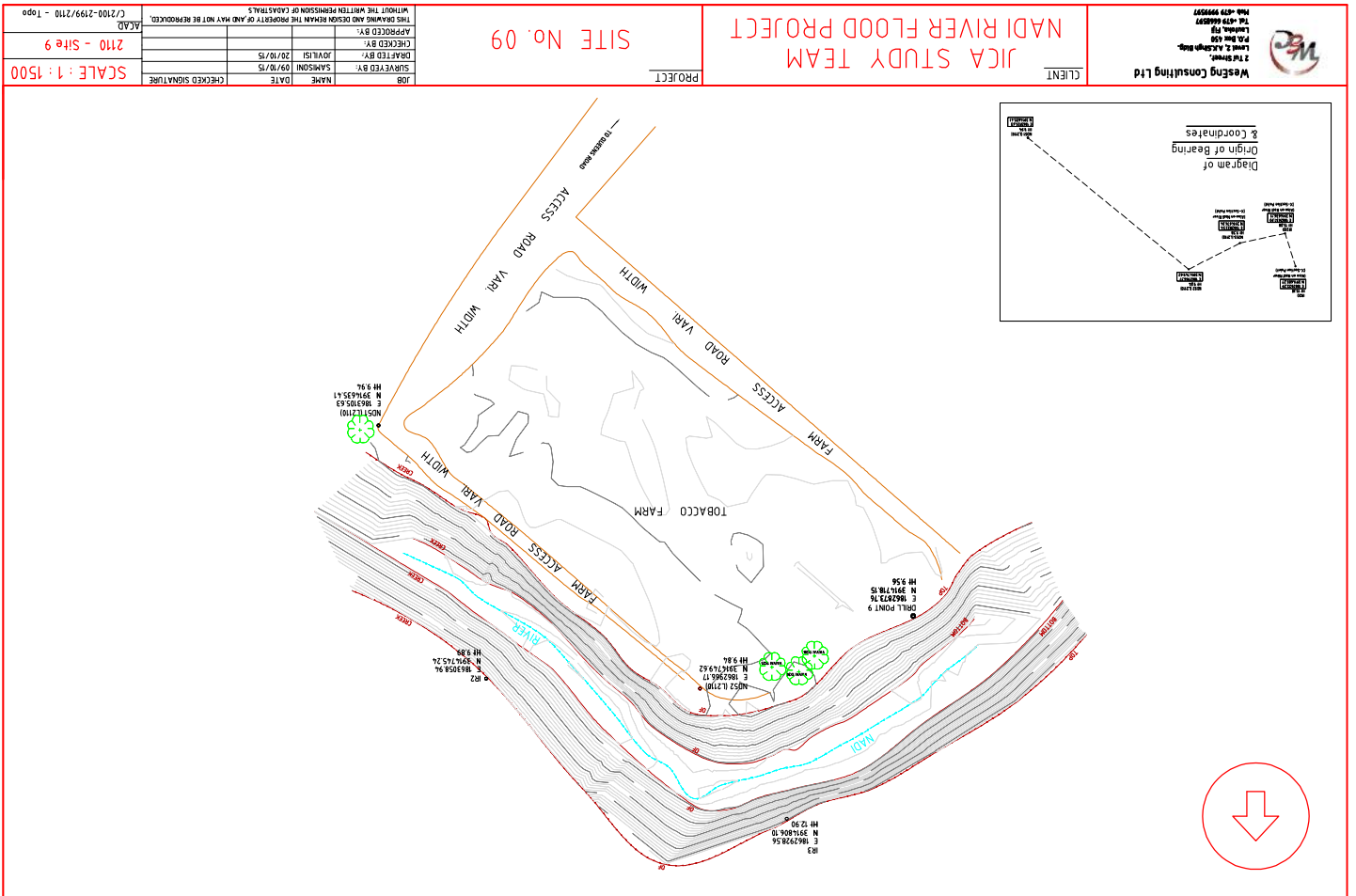


**LEGEND**  
- BOREHOLE



	<b>ENTEC LIMITED</b> Level 2, Mid City Plaza Cnr. Cumming St & Renwick Road P.O. Box 12309 Suva, Fiji.	<b>ENGINEERING AND SCIENCE CONSULTANTS</b> Unit 2, VT Solutions 24 Cawa Road Marintar P.O. Box 12309 Nadi, Fiji.	Phone (679) 330 0300 Fax (679) 331 8618 Email info@entecfiji.com	<b>CLIENT:</b> Japan International Cooperation Agency (JICA) <b>PROJECT:</b> Nadi River Basin Project	NOTE: THIS DRAWING HAS BEEN REPRODUCED BY ENTEC TO SHOW THE APPROXIMATE BOREHOLE LOCATION.	<b>DRAWN BY:</b> SS <b>CHECKED BY:</b> KC <b>APPROVED BY:</b> JD <b>SHEET TITLE:</b> TEST LOCALITY PLAN <b>SCALE:</b> NTS <b>ISSUE DATE:</b> November 2015	<b>A3</b> <b>PROJECT NO.:</b> 1920815 <b>DRAWING NO.:</b> 1 of 1
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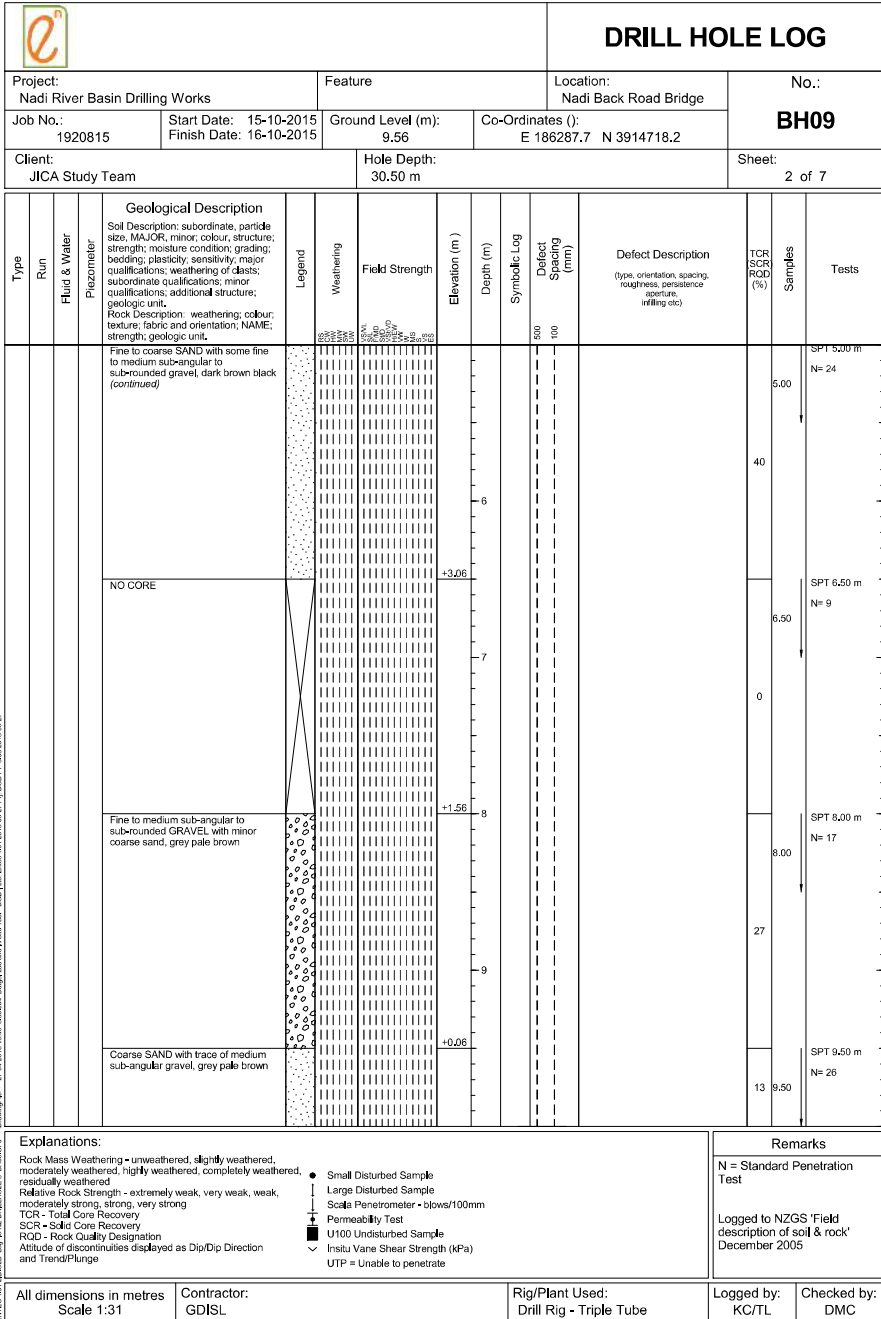
D15-275



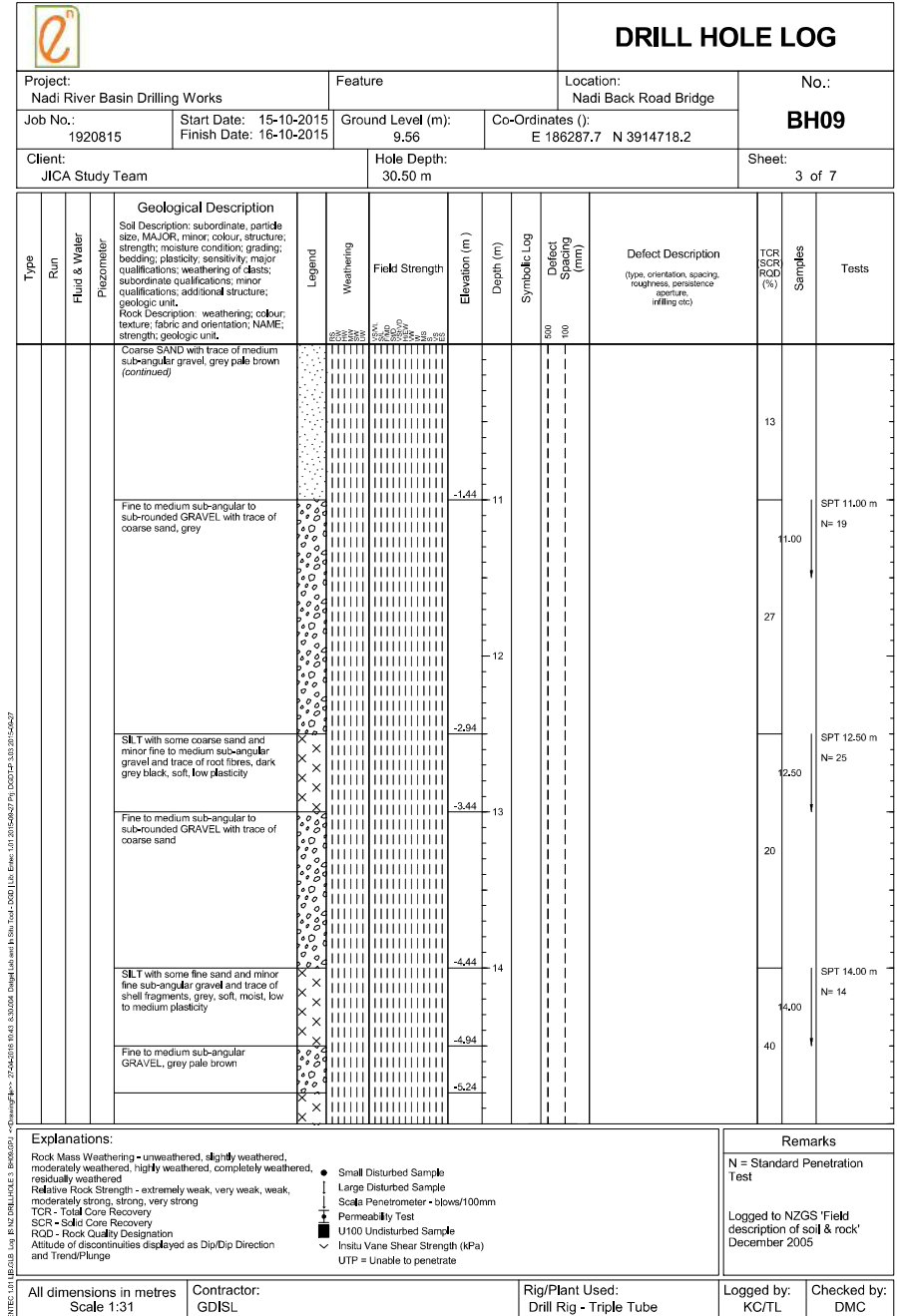
## APPENDIX 2

### Engineering Borehole Log and Core Photos

<b>DRILL HOLE LOG</b>															
Project: Nadi River Basin Drilling Works					Feature			Location: Nadi Back Road Bridge		No.:					
Job No.: 1920815		Start Date: 15-10-2015 Finish Date: 16-10-2015		Ground Level (m): 9.56		Co-Ordinates (): E 186287.7 N 3914718.2			<b>BH09</b>						
Client: JICA Study Team					Hole Depth: 30.50 m			Sheet: 1 of 7							
Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR SCR ROD (%)	Samples	Tests
				SILT with trace of fine sand, dark brown, stiff, low to medium plasticity	X			1	1				100	✓	P= 70 kPa
				SILT with trace of fine sand and root fibres, dark brown, moist, low to medium plasticity	X			+7.56	2				1.00	✓	P= 85 kPa
				Fine SAND with some silt, dark brown, moist	X			+6.56	3				67	✓	SPT 2.00 m N= 3
				Fine to coarse SAND with some fine to medium sub-angular to sub-rounded gravel, dark brown black	X			+4.26	4				40	✓	SPT 3.50 m N= 13
<b>Explanations:</b> 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 ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge													<b>Remarks</b> N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005		
All dimensions in metres Scale 1:31					Contractor: GDISL					Rig/Plant Used: Drill Rig - Triple Tube		Logged by: KC/TL	Checked by: DMC		



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DRILL HOLE LOG																	
Project: Nadi River Basin Drilling Works			Feature			Location: Nadi Back Road Bridge		No.: <b>BH09</b>									
Job No.: 1920815		Start Date: 15-10-2015 Finish Date: 16-10-2015		Ground Level (m): 9.56		Co-Ordinates (): E 186287.7 N 3914718.2											
Client: JICA Study Team				Hole Depth: 30.50 m			Sheet: 4 of 7										
Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR	SCR	ROD (%)	Samples	Tests
				SILT with some fine sand and minor shell fragments and trace of fine sub-angular gravel, grey green, stiff, moist, low to medium plasticity (continued)				-5.94								40	
				SILT with some fine sand and minor shell fragments, grey, soft to firm, moist, low to medium plasticity				-6.44	16							15.50	SPT 15.50 m N= 50
				SILT with minor shell fragments and trace of fine sand, dark grey brown, stiff, moist, low to medium plasticity (highly to completely weathered SILTSTONE, dark grey brown, weak to very weak)				-17.00	17							17.00	✓ P= 280 kPa SPT 17.00 m N= 30 ✓ P= 300 kPa
				SILT with minor shell fragments with trace of fine sand and organics and siltstone nodules, pale grey, stiff, moist, low to medium plasticity (highly weathered SILTSTONE, dark grey brown, weak to very weak)				-18.50	18							30	✓ P= 128 kPa
				SILT with minor shell fragments with trace of fine sand and organics and siltstone nodules, pale grey, stiff, moist, low to medium plasticity (highly weathered SILTSTONE, dark grey brown, weak to very weak)				-19.44	19							18.50	✓ P= 230 kPa SPT 18.50 m N= 50 ✓ P= 300 kPa
				SILT with minor shell fragments with trace of fine sand and organics and siltstone nodules, pale grey, stiff, moist, low to medium plasticity (highly weathered SILTSTONE, dark grey brown, weak to very weak)				-24.50	24							93	✓ P= 300 kPa SPT 24.50 m N= 39
<b>Explanations:</b> 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 ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge ● Small Disturbed Sample ○ Large Disturbed Sample Scale Penetrometer - blows/100mm ↓ Permeability Test U100 Undisturbed Sample Insitu Vane Shear Strength (kPa) UTP = Unable to penetrate										<b>Remarks</b> N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005							
All dimensions in metres Scale 1:31			Contractor: GDISL		Rig/Plant Used: Drill Rig - Triple Tube			Logged by: KC/TL		Checked by: DMC							

ENTEC: L011816218.L011816218.E043.8330205.DrillHoleLog.NadiBackRoadBridge.D00742.4.03.2015-0627

DRILL HOLE LOG																	
Project: Nadi River Basin Drilling Works			Feature			Location: Nadi Back Road Bridge		No.: <b>BH09</b>									
Job No.: 1920815		Start Date: 15-10-2015 Finish Date: 16-10-2015		Ground Level (m): 9.56		Co-Ordinates (): E 186287.7 N 3914718.2											
Client: JICA Study Team				Hole Depth: 30.50 m			Sheet: 5 of 7										
Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR	SCR	ROD (%)	Samples	Tests
				SILT with minor shell fragments with trace of fine sand and organics and siltstone nodules, pale grey, stiff, moist, low to medium plasticity (highly weathered SILTSTONE, dark grey brown, weak to very weak)				-11.14	87							20.00	SPT 20.00 m N= 50 ✓ P= 300 kPa
				Clayey SILT with trace of shell fragments and fine sand, dark grey green, stiff, moist, low to medium plasticity (highly to completely weathered SILTSTONE grey green, weak to very weak)				-21.50	21							87	✓ P= 300 kPa SPT 21.50 m N= 45 ✓ P= 300 kPa
				SILT with minor shell fragments with trace of fine sand and organics and siltstone nodules, pale grey, stiff, moist, low to medium plasticity (highly weathered SILTSTONE, dark grey brown, weak to very weak)				-22.50	22							100	✓ P= 300 kPa
				SILT with minor shell fragments with trace of fine sand and organics and siltstone nodules, pale grey, stiff, moist, low to medium plasticity (highly weathered SILTSTONE, dark grey brown, weak to very weak)				-23.50	23							100	✓ P= 145 kPa
				SILT with minor shell fragments with trace of fine sand and organics and siltstone nodules, pale grey, stiff, moist, low to medium plasticity (highly weathered SILTSTONE, dark grey brown, weak to very weak)				-24.50	24							100	✓ P= 125 kPa SPT 23.50 m N= 30 ✓ P= 300 kPa
				SILT with minor shell fragments with trace of fine sand and organics and siltstone nodules, pale grey, stiff, moist, low to medium plasticity (highly weathered SILTSTONE, dark grey brown, weak to very weak)				-24.50	24							93	✓ P= 100 kPa SPT 24.50 m N= 39
<b>Explanations:</b> 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 ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge ● Small Disturbed Sample ○ Large Disturbed Sample Scale Penetrometer - blows/100mm ↓ Permeability Test U100 Undisturbed Sample Insitu Vane Shear Strength (kPa) UTP = Unable to penetrate										<b>Remarks</b> N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005							
All dimensions in metres Scale 1:31			Contractor: GDISL		Rig/Plant Used: Drill Rig - Triple Tube			Logged by: KC/TL		Checked by: DMC							

ENTEC: L011816218.L011816218.E043.8330205.DrillHoleLog.NadiBackRoadBridge.D00742.5.03.2015-0627

DRILL HOLE LOG																	
Project: Nadi River Basin Drilling Works			Feature			Location: Nadi Back Road Bridge		No.:									
Job No.:		Start Date:		Ground Level (m):		Co-Ordinates ( ):		BH09									
1920815		15-10-2015 Finish Date: 16-10-2015		9.56		E 186287.7 N 3914718.2											
Client: JICA Study Team				Hole Depth: 30.50 m			Sheet: 6 of 7										
Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m )	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR	SCR	ROD (%)	Samples	Tests
				Clayey SILT with trace of shell fragments and fine sand, dark grey green, stiff, moist, low to medium plasticity (highly to completely weathered SILTSTONE grey green, weak to very weak) (continued)	X						500 100						P= 280 kPa
				Coarse SAND with some silt and shell fragments, dark grey				-16.14									
				Clayey SILT with some coarse sand and trace of shell fragments, grey pale brown, stiff, low to medium plasticity	X			-18.44	26								SPT 26.00 m N= 50 ✓ P= 300 kPa
				Clayey SILT with some shell fragments and trace of fine sand, green grey, stiff, low to medium plasticity	X			-17.34	27								✓ P= 300 kPa
																	✓ P= 170 kPa SPT 27.50 m N= 50 ✓ P= 300 kPa
									28								✓ P= 300 kPa
									29								✓ P= 175 kPa SPT 29.00 m N= 39 ✓ P= 263 kPa
								-20.04									
<b>Explanations:</b> 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 ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge • Small Disturbed Sample ○ Large Disturbed Sample ▾ Scale Penetrometer - blows/100mm ⊕ Permeability Test ⊕ U100 Undisturbed Sample ⊕ Insitu Vane Shear Strength (kPa) ⊕ UTP = Unable to penetrate										<b>Remarks</b> N = Standard Penetration Test  Logged to NZGS 'Field description of soil & rock' December 2005							
All dimensions in metres Scale 1:31			Contractor: GDISL		Rig/Plant Used: Drill Rig - Triple Tube		Logged by: KC/TL		Checked by: DMC								

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DRILL HOLE LOG																	
Project: Nadi River Basin Drilling Works			Feature			Location: Nadi Back Road Bridge		No.:									
Job No.:		Start Date:		Ground Level (m):		Co-Ordinates ( ):		BH09									
1920815		15-10-2015 Finish Date: 16-10-2015		9.56		E 186287.7 N 3914718.2											
Client: JICA Study Team				Hole Depth: 30.50 m			Sheet: 7 of 7										
Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m )	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR	SCR	ROD (%)	Samples	Tests
				Clayey SILT with some shell fragments and trace of fine sand, green grey, stiff, low to medium plasticity (highly to completely weathered, SILTSTONE, green grey, weak to very weak) (continued)	X												P= 185 kPa
				Hole Terminated at 30.50 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005				-20.94									SPT 30.50 m N= 38
									31								
									32								
									33								
									34								
<b>Explanations:</b> 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 ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge • Small Disturbed Sample ○ Large Disturbed Sample ▾ Scale Penetrometer - blows/100mm ⊕ Permeability Test ⊕ U100 Undisturbed Sample ⊕ Insitu Vane Shear Strength (kPa) ⊕ UTP = Unable to penetrate										<b>Remarks</b> N = Standard Penetration Test  Logged to NZGS 'Field description of soil & rock' December 2005							
All dimensions in metres Scale 1:31			Contractor: GDISL		Rig/Plant Used: Drill Rig - Triple Tube		Logged by: KC/TL		Checked by: DMC								

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**Borehole 9 Core Photos (0.00m to 31.50m)**



0.00m to 3.50m



3.50m to 12.50m



12.50m to 17.00m



17.00m to 20.00m



20.00m to 22.30m



22.30m to 24.50m



24.50m to 26.90m



26.90m to 29.00m





29.0m to 30.50m

## APPENDIX 9c Laboratory Test Schedule and Test Results

Project No.	Site	Soil Type	Sample type	Depth (m)	Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	Remarks		
1920815	Site 9, (BH 09)	Silt with trace of fine sand	U	1.0 - 1.5	1					1				
		Sandy Silt	SPT	2.0 - 2.5			1							
		Silty sand	SPT	3.5 - 4.0	1			1						
		Sandy Gravel	SPT	5.0 - 5.5					1					
		Coarsely Sand	SPT	6.5 - 7.0					1					
		Sandy Gravel	SPT	8.5 - 10.0					1					
		Sandy Silt	SPT	11.5 - 13.0					1					
		Silt shell fragments	SPT	14.5 - 16.0					1					
		Weathered sandy silt	SPT	17.5 - 19.0					1					
		Silt with fine sand	SPT	20.0 - 23.0					1					
		Clayey Silt	SPT	23.5 - 24.0					1					
		Silty Sand	SPT	26.0 - 26.5					1					
		Clayey Silt	SPT	27.5 - 28.0					1					
		Clayey Silt	SPT	30.5 - 31.0					1					
		<b>TOTALS</b>												
		Bill of Quantity					1	3	10	6	3	3	1	Total
		Lab Test Schedule checked by: DMC												

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 25 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b>	: TL
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT with trace of fine sand and root fibres, dark brown, moist low to medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: N601 BH09 2.0-2.5m

NATURAL MOISTURE CONTENT					
TEST No.		1	2		Average
Container No.	g	112	113		
Mass of Container	g	11.74	11.92		
Mass of Container + Wet Soil	g	19.94	19.04		
Mass of Container + Dry Soil	g	18.11	17.43		
Mass of Dry Soil	g	6.37	5.51		
Mass of Moisture	g	1.83	1.61		
Moisture Content	%	28.73	29.22		28.97

PLASTIC LIMIT					
TEST No.		1	2		Average
Container No.		104	106		
Mass of Container	g	11.89	12.06		
Mass of Container + Wet Soil	g	16.30	16.90		
Mass of Container + Dry Soil	g	15.22	15.72		
Mass of Dry Soil	g	3.33	3.66		
Mass of Moisture	g	1.08	1.18		
Moisture Content	%	32.43	32.24		32.34

LIQUID LIMIT						
TEST No.		1	2	3	4	5
Number of Blows		40	36	30	25	20
Container No.		141	147	149	150	158
Mass of Container	g	11.67	11.62	11.76	10.76	12.14
Mass of Container + Wet Soil	g	17.55	18.43	20.07	18.63	22.15
Mass of Container + Dry Soil	g	15.79	16.36	17.48	16.15	18.98
Mass of Dry Soil	g	4.12	4.74	5.72	5.39	6.84
Mass of Moisture	g	1.76	2.07	2.59	2.48	3.17
Moisture Content	%	42.72	43.67	45.28	46.01	46.35

LINEAR SHRINKAGE TEST						
Mould No.		1	2	3	4	5
Initial length of Sample				125.00		
Final length of Sample after Shrinkage				110.00		
% Shrinkage				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

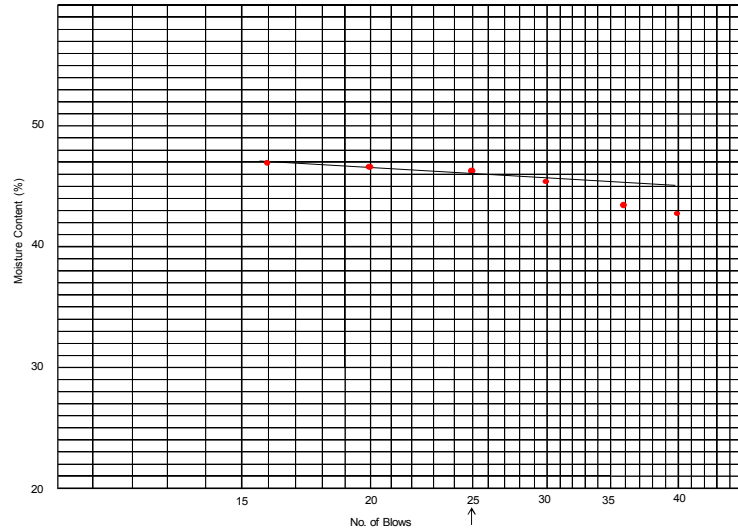
Liquid Limit = 46.00 %  
 Plastic Limit = 32.34 %  
 Plasticity Index = 13.66 %  
 Shrinkage Limit = 12.00 %

Tested By: TL  
 Date: 25 October 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:N601

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 25 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b>	: TL
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	SILT with minor shell fragments and trace of fine sand , dark grey brown, stiff, : moist, low to medium plasticity ( highly to completely weathered, SILTSTONE, dark grey brown, weak to very weak	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: N608 BH09 17.0-17.5m

NATURAL MOISTURE CONTENT		1	2				Average
TEST No.							
Container No.	g	114	119				
Mass of Container	g	11.92	11.43				
Mass of Container + Wet Soil	g	19.70	19.26				
Mass of Container + Dry Soil	g	17.54	17.10				
Mass of Dry Soil	g	5.62	5.67				
Mass of Moisture	g	2.16	2.16				
Moisture Content	%	38.43	38.10				38.26

PLASTIC LIMIT		1	2				Average
TEST No.							
Container No.		125	127				
Mass of Container	g	11.87	11.57				
Mass of Container + Wet Soil	g	17.34	17.47				
Mass of Container + Dry Soil	g	15.65	15.63				
Mass of Dry Soil	g	3.78	4.06				
Mass of Moisture	g	1.69	1.84				
Moisture Content	%	44.71	45.32				45.01

LIQUID LIMIT		1	2	3	4	5	6
TEST No.							
Number of Blows		40	36	30	25	20	16
Container No.		101	103	124	160	143	163
Mass of Container	g	11.62	11.31	11.74	11.94	11.86	11.75
Mass of Container + Wet Soil	g	19.97	18.27	21.23	20.31	19.75	20.46
Mass of Container + Dry Soil	g	16.55	15.43	17.28	16.75	16.35	16.64
Mass of Dry Soil	g	4.93	4.12	5.54	4.81	4.49	4.89
Mass of Moisture	g	3.42	2.84	3.95	3.56	3.40	3.82
Moisture Content	%	69.37	68.93	71.30	74.01	75.72	78.12

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

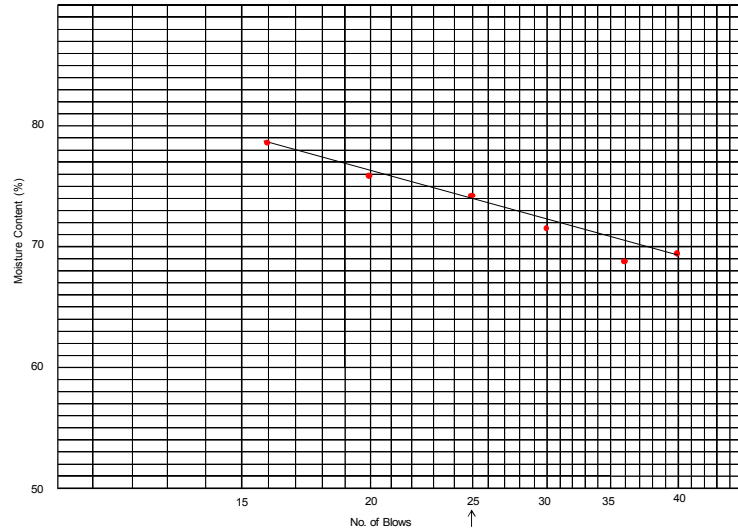
<b>Sample Preparation</b>		
as received	Liquid Limit	74.00 %
washed/sieved on 425 µm sieve	Plastic Limit	45.01 %
air dried/oven dried 105°C	Plasticity Index	28.99 %
after making a paste cured for 12-16 hrs	Shrinkage Limit	16.80 %

Tested By: LN  
Date: 22 October 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: N570

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 25 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b>	: TL
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: Clayey SILT with trace of shell fragments and fine sand, dark grey green, stiff, moist low to medium plasticity (highly to completely weathered SILTSTONE grey green, weak to very weak	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: N611 BH09 23.5-24.0m

NATURAL MOISTURE CONTENT		1	2	Average	
TEST No.					
Container No.	g	152	157		
Mass of Container	g	11.46	11.87		
Mass of Container + Wet Soil	g	19.50	20.00		
Mass of Container + Dry Soil	g	17.22	17.68		
Mass of Dry Soil	g	5.76	5.81		
Mass of Moisture	g	2.28	2.32		
Moisture Content	%	39.58	39.93		39.76

PLASTIC LIMIT		1	2	Average	
TEST No.					
Container No.		40	44		
Mass of Container	g	14.52	14.59		
Mass of Container + Wet Soil	g	20.30	19.49		
Mass of Container + Dry Soil	g	18.64	18.08		
Mass of Dry Soil	g	4.12	3.49		
Mass of Moisture	g	1.66	1.41		
Moisture Content	%	40.29	40.40		40.35

LIQUID LIMIT		1	2	3	4	5	6
TEST No.							
Number of Blows		40	35	30	24	21	15
Container No.		126	132	121	156	166	161
Mass of Container	g	12.85	11.77	11.65	11.87	11.70	11.73
Mass of Container + Wet Soil	g	20.86	18.30	18.81	19.32	19.46	18.94
Mass of Container + Dry Soil	g	17.34	15.44	15.63	15.99	15.97	15.60
Mass of Dry Soil	g	4.49	3.67	3.98	4.12	4.27	3.87
Mass of Moisture	g	3.52	2.86	3.18	3.33	3.49	3.34
Moisture Content	%	78.40	77.93	79.90	80.83	81.73	86.30

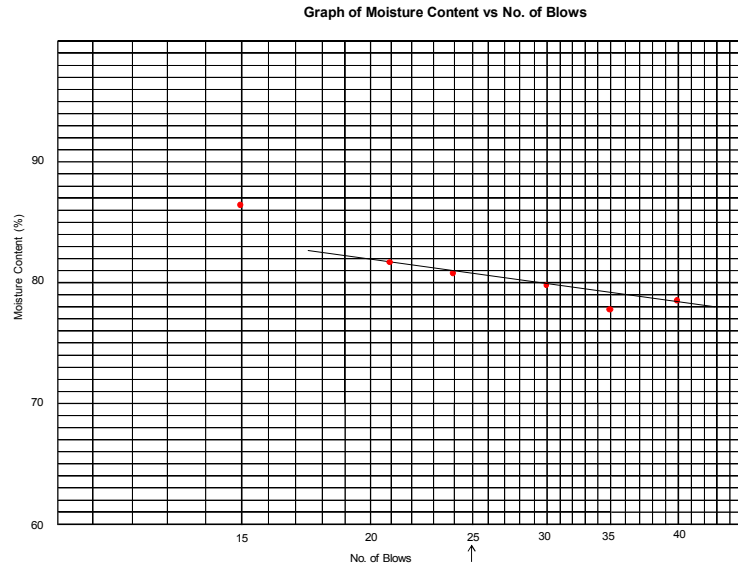
LINEAR SHRINKAGE TEST		1	2	3	4	5	Average
Mould No.							
Initial length of Sample						125.00	
Final length of Sample after Shrinkage						99.00	
% Shrinkage						20.80	20.80

<b>Sample Preparation</b>		
as received	Liquid Limit	80.70 %
washed/sieved on 425 µm sieve	Plastic Limit	40.35 %
air dried/oven dried 105°C	Plasticity Index	40.35 %
after making a paste cured for 12-16 hrs	Shrinkage Limit	20.80 %

Tested By: LN  
Date :23 October 2015

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

Approved By:IG  
Date: 03 December 2015



Project No: 1920815  
Sample No: N611

<b>PRINCIPAL</b> :	Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	<b>DATE / TESTED</b> :	24 October 2015
<b>SITE ADDRESS</b> :	Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b> :	KB/LN
<b>SAMPLE LOCATION</b> :	BH09 1.00m -1.50m	<b>MATERIAL TYPE</b> :	SILT with trace of fine sand, dark brown, stiff, low to medium plasticity
<b>TEST NUMBER</b> :	N600		
<b>SAMPLE HISTORY</b> : NATURAL / AIR-DRIED / OVEN-DRIED / UNKNOWN			

Moisture Content	Container No.	-	93	94
	Mass of Container	g	88.97	88.07
Mass of Container + Wet Soil	g	173.07	229.54	
Mass of Container + Dry Soil	g	155.98	200.79	
Mass of Dry Soil	g	67.01	112.72	
Mass of Moisture	g	17.09	28.75	
Moisture Content	%	25.50	25.51	25.50

Bulk Density	Sample No.	-	N600
	Diameter of Specimen	mm	54.01
Initial area of specimen $A_0$ ( $\pi r^2$ )	mm <sup>2</sup>	2289.91	
Initial length of specimen $L_0$	mm	52.97	
Initial mass of specimen $M_i$	g	226.07	
<b>Bulk Density <math>\rho</math></b>	t/m <sup>3</sup>	1.86	
<b>Dry Density <math>\rho_d</math></b>	t/m <sup>3</sup>	1.49	

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

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	SILT with trace of fine sand and root fibres, dark brown, moist low to medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N601 BH09 2.0m - 2.5m

Moisture Content		%					
Container No.	g	29	25				
Mass of Container	g	14.29	14.44				
Mass of Container + Wet Soil	g	23.21	21.89				
Mass of Container + Dry Soil	g	21.30	20.21				
Mass of Dry Soil	g	7.01	5.77				
Mass of Moisture	g	1.91	1.68				
Moisture Content	%	27.25	29.12				28.18

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date: 03 December 2015

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	Fine SAND with some silt, dark brown, moist	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N602 BH09 3.5m - 4.0m

Moisture Content		%					
Container No.	g	28	19				
Mass of Container	g	13.98	14.84				
Mass of Container + Wet Soil	g	22.12	22.99				
Mass of Container + Dry Soil	g	20.82	21.77				
Mass of Dry Soil	g	6.84	6.93				
Mass of Moisture	g	1.30	1.22				
Moisture Content	%	19.01	17.60				18.31

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date: 03 December 2015

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: Fine to coarse SAND with some fine to medium sub-angular to sub-rounded gravel, dark brown black	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N603 BH09 5.0m - 5.5m

Moisture Content	%					
Container No.	g	44	40			
Mass of Container	g	14.60	14.58			
Mass of Container + Wet Soil	g	26.75	27.27			
Mass of Container + Dry Soil	g	25.37	25.95			
Mass of Dry Soil	g	10.77	11.37			
Mass of Moisture	g	1.38	1.32			
Moisture Content	%	12.81	11.61			12.21

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date: 03 December 2015

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT with some fine sand and minor shell fragments, grey, soft to firm, moist, low to medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N607 BH09 15.5m - 16.0m

Moisture Content	%					
Container No.	g	18	34			
Mass of Container	g	14.60	14.90			
Mass of Container + Wet Soil	g	21.35	24.33			
Mass of Container + Dry Soil	g	20.35	23.04			
Mass of Dry Soil	g	5.75	8.14			
Mass of Moisture	g	1.00	1.29			
Moisture Content	%	17.39	15.85			16.62

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date: 03 December 2015

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back : Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	SILT with minor shell fragments and trace of fine sand , dark grey brown, stiff, moist, low to medium plasticity ( highly to completely weathered, SILTSTONE, dark grey brown, weak to very weak	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N608 BH09 17.0m - : 17.5m

Moisture Content	%					
Container No.	g	33	36			
Mass of Container	g	14.47	14.09			
Mass of Container + Wet Soil	g	21.45	20.69			
Mass of Container + Dry Soil	g	19.48	18.89			
Mass of Dry Soil	g	5.01	4.80			
Mass of Moisture	g	1.97	1.80			
Moisture Content	%	39.32	37.50			38.41

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date:03 December 2015

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back : Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	SILT with minor shell fragments and trace of fine sand and organics and silt stone nodules, pale grey, stiff, moist, low to medium plasticity ( highly to completely weathered, SILTSTONE, dark grey brown, weak to very weak	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N609 BH09 20.0m - : 20.5m

Moisture Content	%					
Container No.	g	26	38			
Mass of Container	g	15.02	14.78			
Mass of Container + Wet Soil	g	22.47	22.15			
Mass of Container + Dry Soil	g	20.80	20.52			
Mass of Dry Soil	g	5.78	5.74			
Mass of Moisture	g	1.67	1.63			
Moisture Content	%	28.89	28.40			28.64

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date:03 December 2015



**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back : Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: Clayey SILT with trace of shell fragments and fine sand, dark grey green, stiff, moist low to : medium plasticity (highly to completely weathered SILTSTONE grey green, weak to very weak	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N610 BH09 21.5m - : 22.0m

Moisture Content	%					
Container No.	g	22	31			
Mass of Container	g	14.40	14.56			
Mass of Container + Wet Soil	g	21.51	22.49			
Mass of Container + Dry Soil	g	19.57	20.29			
Mass of Dry Soil	g	5.17	5.73			
Mass of Moisture	g	1.94	2.20			
Moisture Content	%	37.52	38.39			37.96

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date: 03 December 2015

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back : Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: Clayey SILT with trace of shell fragments and fine sand, dark grey green, stiff, moist low to : medium plasticity (highly to completely weathered SILTSTONE grey green, weak to very weak	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N611 BH09 23.5m - : 24.0m

Moisture Content	%					
Container No.	g	39	43			
Mass of Container	g	14.18	14.88			
Mass of Container + Wet Soil	g	24.14	23.81			
Mass of Container + Dry Soil	g	21.25	21.27			
Mass of Dry Soil	g	7.07	6.39			
Mass of Moisture	g	2.89	2.54			
Moisture Content	%	40.88	39.75			40.31

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date: 03 December 2015

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back : Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	Clay SILT with some shell fragments and trace of fine sand , green grey , stiff, low to medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N613 BH09 27.5m - :28.0m

Moisture Content	%					
Container No.	g	27	41			
Mass of Container	g	14.29	14.34			
Mass of Container + Wet Soil	g	21.09	22.82			
Mass of Container + Dry Soil	g	19.72	21.06			
Mass of Dry Soil	g	5.43	6.72			
Mass of Moisture	g	1.37	1.76			
Moisture Content	%	25.23	26.19			25.71

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date:03 December 2015

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River Project Drilling Works	<b>DATE</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 09- Upstream Nadi Back : Road Bridge	<b>TECHNOLOGIST</b>	: AP
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	Clay SILT with some shell fragments and trace of fine sand , green grey , stiff, low to medium plasticity (highly to completely weathered, SILTSTONE, green grey,weak to very weak	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: N614 (BH09 30.5m - :31.0m)

Moisture Content	%					
Container No.	g	46	21			
Mass of Container	g	14.70	14.48			
Mass of Container + Wet Soil	g	20.65	21.52			
Mass of Container + Dry Soil	g	19.16	19.85			
Mass of Dry Soil	g	4.46	5.37			
Mass of Moisture	g	1.49	1.67			
Moisture Content	%	33.41	31.10			32.25

 Tested By: AP  
 Date: 24 October 2015

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

 Approved By: IG  
 Date:03 December 2015

<b>PRINCIPAL</b> :	Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	<b>DATE</b> :	29 November 2015
<b>SITE ADDRESS</b> :	Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b> :	IG
<b>MATERIAL TYPE &amp; DESCRIPTION</b> :	Fine to coarse SAND with some fine to medium sub-angular to sub-rounded gravel, dark brown black	<b>TEST METHOD</b> :	AS 1289.6.7.3-2001
		<b>SAMPLE No.</b> :	N603 (BH09 5.0m - 5.5m)

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

**MOISTURE CONTENT**

Container No.		4
Mass of Container	g	52.60
Mass of Container + Wet	g	93.15
Mass of Container + Dry	g	88.46
Mass of Dry Soil	g	35.86
Mass of Moisture	g	4.69
Moisture Content	%	13.08
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

**DENSITY**

Mass of Specimen	g	1790
Volume of Specimen	cm <sup>3</sup>	819.33
Wet Density	t/m <sup>3</sup>	2.18
Dry Density	t/m <sup>3</sup>	1.93
Maximum Dry Density	t/m <sup>3</sup>	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm <sup>2</sup>	113.10
Cross sectional area of soil	cm <sup>2</sup>	50.27
Length of soil specimen	cm	16.30

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm <sup>3</sup> )	Water temp T(°C)	KT cm/min	K <sub>20</sub> cm/min
1	105	4.00	210	26	0.162	0.144
2	105	4.00	210	26	0.162	0.144
3	105	4.00	210	26	0.162	0.144
4	98	4.00	205	26	0.170	0.151
5	98	4.00	201	26	0.166	0.148
6	98	4.00	202	26	0.167	0.149
7	92	4.00	200	26	0.176	0.157
8	92	4.00	197	26	0.174	0.154
9	92	4.00	197	26	0.174	0.154
10	87	4.00	192	26	0.179	0.159
11	87	4.00	192	26	0.179	0.159
12	87	4.00	192	26	0.179	0.159

Average K<sub>20</sub> m/s : 2.53E-05

Tested By: IG  
Date: 29 October 2015

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

Approved By: IG  
Date: 03 December 2015

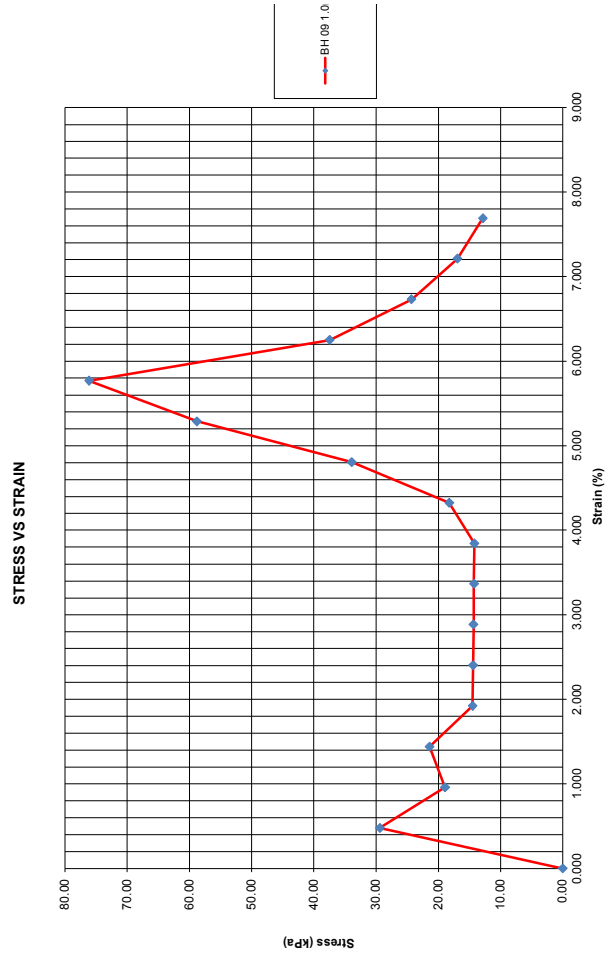
<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	<b>DATE TESTED</b> :	24 October 2015
<b>SITE ADDRESS</b> :	Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b> :	KB/LN
<b>SAMPLE LOCATION</b> :	BH 09 1.0m-1.50m	<b>MATERIAL TYPE</b> :	SILT with trace of fine sand, dark brown, stiff, low to medium plasticity
<b>TEST NUMBER</b> :	N600		

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

Moisture Content	Container No.	-	1106
	Mass of Container	g	131.88
	Mass of Container + Wet Soil	g	542.94
	Mass of Container + Dry Soil	g	457.68
	Mass of Dry Soil	g	325.80
	Mass of Moisture	g	85.26
	Moisture Content	%	26.17

Bulk Density	Sample No.	-	N600
	Diameter of Specimen	mm	54.26
	Initial area of specimen A <sub>0</sub> (π/4 d <sup>2</sup> )	mm <sup>2</sup>	2311.16
	Initial length of specimen L <sub>0</sub>	mm	104.00
	Initial mass of specimen M <sub>i</sub>	g	416.08
	<b>Bulk Density ρ</b>	t/m <sup>3</sup>	1.73
	<b>Dry Density ρ<sub>d</sub></b>	t/m <sup>3</sup>	1.37

Compression Gauge Reading	Load Gauge Reading	Load	Strain ε = (C <sub>n</sub> - C <sub>0</sub> ) / L <sub>0</sub>	Corrected Area A = A <sub>0</sub> / (1 - ε)	Principal Stress Difference σ <sub>1</sub> - σ <sub>3</sub> = 1000P/A
mm		(kN)	%	m <sup>2</sup>	kPa
0.00	0	0	0.000	0.002311	0.00
0.50	34	0.0682	0.481	0.002322	29.37
1.00	22.0	0.0441	0.962	0.002334	18.90
1.50	25.0	0.0502	1.442	0.002345	21.41
2.00	17.0	0.0341	1.923	0.002356	14.47
2.50	17.0	0.0341	2.404	0.002368	14.40
3.00	17.0	0.0341	2.885	0.002380	14.33
3.50	17.0	0.0341	3.365	0.002392	14.26
4.00	17.0	0.0341	3.846	0.002404	14.19
4.50	22.0	0.0441	4.327	0.002416	18.26
5.00	41.0	0.0823	4.808	0.002428	33.90
5.50	71.5	0.1435	5.288	0.002440	58.81
6.00	93.0	0.1867	5.769	0.002453	76.12



LOCATION: BH 09 1.00-1.50m  
DATE OF TEST: 24 October 2015  
DESCRIPTION: SLT with trace of fine sand, dark brown, stiff, low to medium plasticity

Form GE-L-10

Page 2 of 2

**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.8.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	25 October 2015
<b>SITE ADDRESS</b> :	Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b> :	TL
<b>SAMPLE LOCATION</b> :	BH09 3.5m-3.9m	<b>MATERIAL TYPE &amp; LOCATION</b> :	Fine SAND with some silt, dark brown, moist
<b>TEST NUMBER</b> :	N602		

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

Moisture Content (Material passing 19mm)	Container No.	-	7	12	SPLIT SAMPLE
Mass of Container	g		52.78	53.13	Mass Passing Last Sieve: - gM <sub>3</sub>
Mass of Container + Wet Soil	g		74.91	74.11	Mass after Splitting: - gM <sub>4</sub>
Mass of Container + Dry Soil	g		71.00	70.51	Splitting Factor = $\frac{M_3}{M_4}$
Mass of Dry Soil	g		18.22	17.38	
Mass of Moisture	g		3.91	3.60	
Moisture Content	%		21.46	20.71	
Average Moisture Content	%		21.09		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M <sub>1</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g		200.47
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>T</sub> =	165.56	

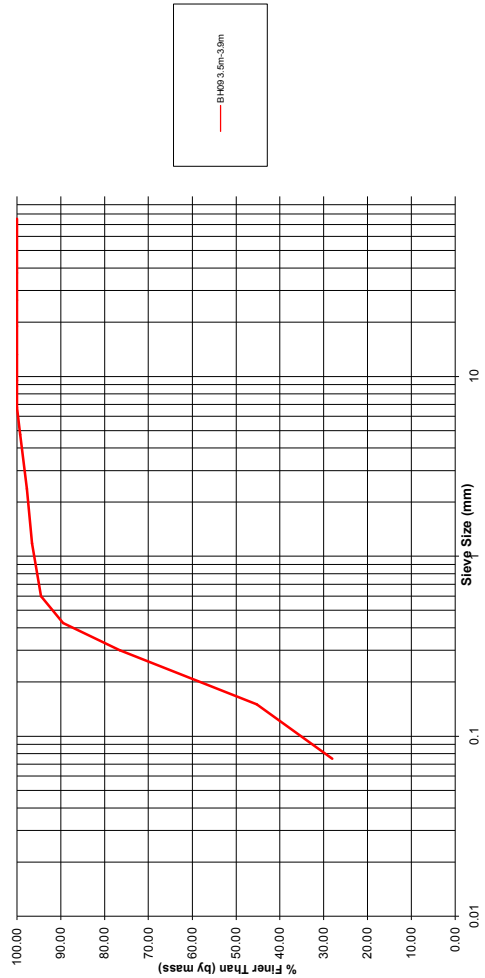
Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>s</sub> )	Corrected Mass	Percentage Retained = $\frac{M_{s_i}}{M_T} \times 100$	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm	N/A	N/A	0.00	100.00		300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	N/A	0.00	100.00		300
19.0mm	N/A	N/A	0.00	100.00		200
13.2 mm	N/A	N/A	0.00	100.00	600	300
9.50 mm	N/A	N/A	0.00	100.00	450	300
6.70 mm	N/A	N/A	0.00	100.00	300	300
4.75 mm	1.18	N/A	0.71	99.29	250	200
2.36 mm	2.63	N/A	1.59	97.70	150	200
1.18 mm	1.82	N/A	1.10	96.60	100	200
600 µm	3.39	N/A	2.05	94.55	80	200
425 µm	8.32	N/A	5.03	89.53	70	200
300 µm	21.42	N/A	12.94	76.59	60	200
150 µm	51.86	N/A	31.32	45.26	40	200
75 µm	28.47	N/A	17.20	28.07	25	200
Passing 75 µm	46.47	N/A	28.07	0.00	-	-
Pan Total	165.56	-	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 : 25 October 2015	Date : 03 December 2015	Date : 03 December 2015

Form GE-L-06

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BH09 3.5-3.9m

LOCATION: BH09 3.5-3.9m  
DESCRIPTION: FINE SAND with some silt, dark brown, moist  
DATE OF TEST: 25 October 2015  
SAMPLE No: N602

Form GE-L-06

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**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.8.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	24 October 2015
<b>SITE ADDRESS</b> :	Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b> :	TL
<b>SAMPLE LOCATION</b> :	BH09 6.5-7.0m	<b>MATERIAL TYPE &amp; LOCATION</b> :	Fine to coarse SAND with some fine to medium sub-angular to sub-rounded gravel, dark brown black
<b>TEST NUMBER</b> :	N604		

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

Moisture Content (Material passing 19mm)	Container No.	-	24	23	SPLIT SAMPLE
Mass of Container	g	14.58	14.71		Mass Passing Last Sieve: - gM <sub>5</sub>
Mass of Container + Wet Soil	g	27.92	27.55		Mass after Splitting: - gM <sub>4</sub>
Mass of Container + Dry Soil	g	26.14	25.97		Splitting Factor $\frac{M_5}{M_4}$
Mass of Dry Soil	g	11.56	11.26		= $\frac{M_5}{M_4}$
Mass of Moisture	g	1.78	1.58		
Moisture Content	%	15.40	14.03		
Average Moisture Content	%		14.71		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M <sub>1</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	245.95	
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>T</sub> =	214.40	

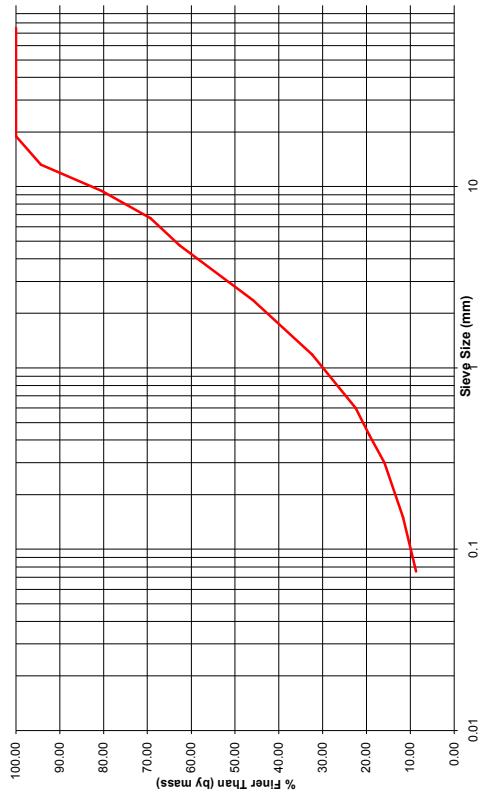
Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>2</sub> ) g	Corrected Mass g	Percentage Retained = (Mass/M <sub>T</sub> ) x 100 %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 200mm) g	Sieve Diameter mm
75.0mm	N/A	N/A	0.00	100.00		300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	N/A	0.00	100.00		300
19.0mm	N/A	N/A	0.00	100.00		200
13.2 mm	12.35	N/A	5.76	94.24	600	300
9.50 mm	29.72	N/A	13.86	80.38	450	300
6.70 mm	23.82	N/A	11.11	69.27	300	300
4.75 mm	14.27	N/A	6.66	62.61	250	200
2.36 mm	35.70	N/A	16.65	45.96	150	200
1.18 mm	29.01	N/A	13.53	32.43	100	200
600 µm	21.31	N/A	9.94	22.49	80	200
425 µm	6.79	N/A	3.17	19.32	70	200
300 µm	7.28	N/A	3.40	15.93	60	200
150 µm	9.16	N/A	4.27	11.66	40	200
75 µm	6.42	N/A	2.99	8.66	25	200
Passing 75 µm	18.57	N/A	8.66	0.00	-	-
Pan Total	214.40	-	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 : TL	Q.A. Checked by : KB	Approved by : IG
Date : 24 October 2015	Date : 03 December 2015	Date : 03 December 2015

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BH09.6.5.7.0m

LOCATION: BH09.6.5.7.0m  
DATE OF TEST: 24 October 2015  
DESCRIPTION: Fine to coarse SAND with some fine to medium sub-angular to sub-rounded gravel, dark brown black  
SAMPLE No: N604

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**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.6.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	24 October 2015
<b>SITE ADDRESS</b> :	Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b> :	TL
<b>SAMPLE LOCATION</b> :	BH09 9.5m-10.0m	<b>MATERIAL TYPE &amp; LOCATION</b> :	Coarse SAND with trace of medium sub-angular gravel, grey pale brown
<b>TEST NUMBER</b> :	N 605		

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

Moisture Content (Material passing 19mm)	Container No.	-	10	11	SPLIT SAMPLE
Mass of Container	g	52.30	52.87		Mass Passing Last Sieve: - gM <sub>s</sub>
Mass of Container + Wet Soil	g	68.29	68.73		Mass after Splitting: - gM <sub>t</sub>
Mass of Container + Dry Soil	g	65.25	65.63		Splitting Factor $\frac{M_s}{M_t}$
Mass of Dry Soil	g	12.95	12.76		= $\frac{M_s}{M_t}$
Mass of Moisture	g	3.04	3.10		
Moisture Content	%	23.47	24.29		
Average Moisture Content	%			23.88	

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M <sub>s</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	314.43	
Total Mass of dry sample (M <sub>t</sub> )	M <sub>t</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>t</sub> =	253.81	

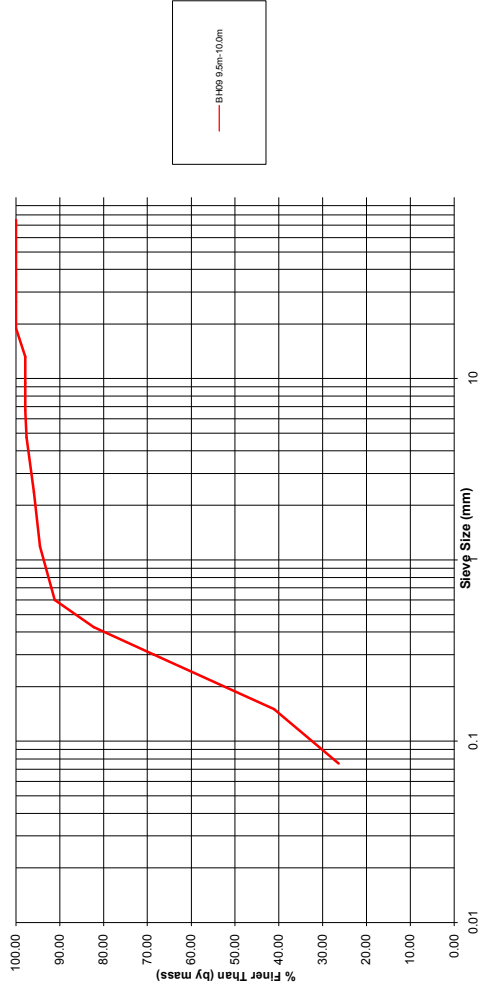
Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>b</sub> )	Corrected Mass	Percentage Retained = $\frac{M_{bs}}{M_t} \times 100$	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g		%	%	g	mm
75.0mm	N/A	N/A	0.00	100.00		300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	N/A	0.00	100.00		300
19.0mm	N/A	N/A	0.00	100.00		200
13.2 mm	5.39	N/A	2.12	97.88	600	300
9.50 mm	0.0	N/A	0.00	97.88	450	300
6.70 mm	0.0	N/A	0.00	97.88	300	300
4.75 mm	0.71	N/A	0.28	97.60	250	200
2.36 mm	4.41	N/A	1.74	95.86	150	200
1.18 mm	3.41	N/A	1.34	94.51	100	200
600 µm	8.58	N/A	3.38	91.13	80	200
425 µm	22.62	N/A	8.91	82.22	70	200
300 µm	34.97	N/A	13.78	68.44	60	200
150 µm	69.43	N/A	27.36	41.09	40	200
75 µm	37.47	N/A	14.76	26.32	25	200
Passing 75 µm	66.81	N/A	26.32	0.00	-	-
Pan Total	253.81	-	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

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BH09 9.5m-10.0m

DESCRIPTION: Coarse SAND with trace of medium sub-angular gravel, grey, pale brown  
 SAMPLE No: N605  
 LOCATION: BH09 9.5m-10.0m  
 DATE OF TEST: 24 October 2015



**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.6.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	24 October 2015
<b>SITE ADDRESS</b> :	Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b> :	TL
<b>SAMPLE LOCATION</b> :	BH09 14.0-14.50m	<b>MATERIAL TYPE &amp; LOCATION</b> :	SILT with some fine sand and minor fine subangular gravel and trace of shell fragments, grey , soft , moist, low to medium plasticity
<b>TEST NUMBER</b> :	N606	<b>SAMPLE HISTORY</b> : NATURAL/AIR-DRIED/ OVEN-DRIED/UNKNOWN	

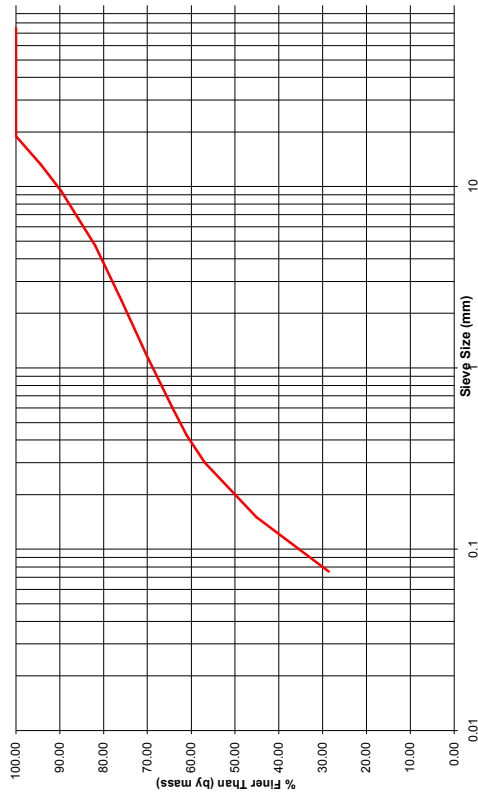
Moisture Content (Material passing 19mm)	Container No.	-	15	16	SPLIT SAMPLE
Mass of Container	g	52.70	52.76		Mass Passing Last Sieve: - gM <sub>3</sub>
Mass of Container + Wet Soil	g	82.99	82.85		Mass after Splitting: - gM <sub>4</sub>
Mass of Container + Dry Soil	g	76.19	75.79		Splitting Factor $\frac{M_3}{M_4}$
Mass of Dry Soil	g	23.49	23.03		= $\frac{M_3}{M_4}$
Mass of Moisture	g	6.80	7.06		
Moisture Content	%	28.95	30.66		
Average Moisture Content	%			29.80	

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M <sub>1</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g		350.06
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>T</sub> =	269.69	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>c</sub> ) g	Corrected Mass g	Percentage Retained = $\frac{M_{c}}{M_T} \times 100$ %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 200mm) g	Sieve Diameter mm
75.0mm	N/A	N/A	0.00	100.00		300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	N/A	0.00	100.00		300
19.0mm	N/A	N/A	0.00	100.00		200
13.2 mm	15.56	N/A	5.77	94.23	600	300
9.50 mm	12.20	N/A	4.52	89.71	450	300
6.70 mm	10.55	N/A	3.91	85.79	300	300
4.75 mm	10.42	N/A	3.86	81.93	250	200
2.36 mm	16.10	N/A	5.97	75.96	150	200
1.18 mm	15.42	N/A	5.72	70.24	100	200
600 μm	16.05	N/A	5.95	64.29	80	200
425 μm	8.68	N/A	3.22	61.07	70	200
300 μm	11.43	N/A	4.24	56.84	60	200
150 μm	31.69	N/A	11.75	45.08	40	200
75 μm	44.53	N/A	16.51	28.57	25	200
Passing 75 μm	77.06	N/A	28.57	0.00	-	-
Pan Total	269.69	-	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



BH09 14.0-14.50m

LOCATION: BH09 14.0-14.50m  
DATE OF TEST: 24 October 2015  
DESCRIPTION: SILT with some fine sand and minor fine subangular gravel and trace of shell fragments, grey, soft, moist.  
SAMPLE No: N610

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**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.6.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	24 October 2015
<b>SITE ADDRESS</b> :	Site 09- Upstream Nadi Back Road Bridge	<b>TECHNOLOGIST</b> :	TL
<b>SAMPLE LOCATION</b> :	BH09 21.5-22.0m	<b>MATERIAL TYPE &amp; LOCATION</b> :	Clayey SILT with trace of shell fragments and fine sand, dark grey green, stiff, moist low to medium plasticity (highly to completely weathered SILTSTONE grey green, weak to very weak
<b>TEST NUMBER</b> :	N610		
<b>SAMPLE HISTORY</b> : NATURAL / AIR-DRIED / OVEN-DRIED / UNKNOWN			

Moisture Content (Material passing 19mm)	Container No.	-	8	9	SPLIT SAMPLE
Mass of Container	g	53.06	53.52	Mass Passing Last Sieve:	- gM <sub>3</sub>
Mass of Container + Wet Soil	g	78.87	78.60	Mass after Splitting:	- gM <sub>4</sub>
Mass of Container + Dry Soil	g	71.77	71.70	Splitting Factor	$\frac{M_3}{M_4}$
Mass of Dry Soil	g	18.71	18.18	=	$\frac{M_3}{M_4}$
Mass of Moisture	g	7.10	6.90		
Moisture Content	%	37.95	37.95		
Average Moisture Content	%	37.95			

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M <sub>1</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	312.57	
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> =	$\frac{100M_w}{100 + w}$	
	M <sub>T</sub> =	226.58	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>c</sub> ) g	Corrected Mass g	Percentage Retained = (M <sub>c</sub> /M <sub>T</sub> ) × 100 %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 200mm) g	Sieve Diameter 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	0.09	N/A	0.04	99.96	150	200
1.18 mm	0.45	N/A	0.20	99.76	100	200
600 µm	0.33	N/A	0.15	99.62	80	200
425 µm	0.17	N/A	0.08	99.54	70	200
300 µm	0.25	N/A	0.11	99.43	60	200
150 µm	0.72	N/A	0.32	99.11	40	200
75 µm	2.15	N/A	0.95	98.16	25	200
Passing 75 µm	222.42	N/A	98.16	0.00	-	-
Pan Total	226.58	-	100.00	-	-	-

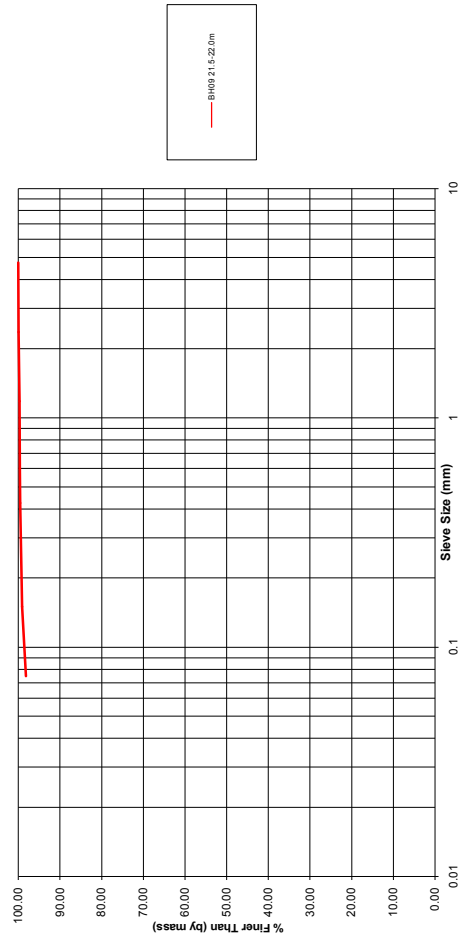
NOTES: 1) Testing performed on fraction passing/retained on 19mm sieve  
2) The percentage passing the finest sieve was obtained by difference

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

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LOCATION: BH09 21.5-22.0m  
 DATE OF TEST: 22 October 2015  
 DESCRIPTION: Clayey SILT with trace of shell fragments and fine sand, dark grey green, stiff, moist to medium plasticity (highly to completely weathered SILTS) (MC: grey green, weak to very weak)  
 SAMPLE No: N610

Form GE-L-06

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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 / : 24 October 2015
SITE ADDRESS : Site 09- Upstream Nadi Back Road Bridge	TECHNOLOGIST : TL
SAMPLE LOCATION : BH09 26.0-26.5m	MATERIAL TYPE & LOCATION : Clay SILT with some coarse sand and trace of shell fragments, grey pale brown, stiff, low to medium plasticity
TEST NUMBER : N612	
SAMPLE HISTORY : NATURAL / AIR-DRIED / OVEN-DRIED / UNKNOWN	

Moisture Content (Material passing 19mm)	Container No.	-	1	3	SPLIT SAMPLE
Mass of Container	g	52.71	52.43	Mass Passing Last Sieve: -	gM <sub>3</sub>
Mass of Container + Wet Soil	g	77.54	77.60	Mass after Splitting: -	gM <sub>4</sub>
Mass of Container + Dry Soil	g	70.85	70.75	Splitting Factor = $\frac{M_3}{M_4}$	
Mass of Dry Soil	g	18.14	18.32	=	$\frac{M_3}{M_4}$
Mass of Moisture	g	6.69	6.85		
Moisture Content	%	36.88	37.39		
Average Moisture Content	%	37.14			

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M <sub>r</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	368.28	
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>T</sub> =	268.55	

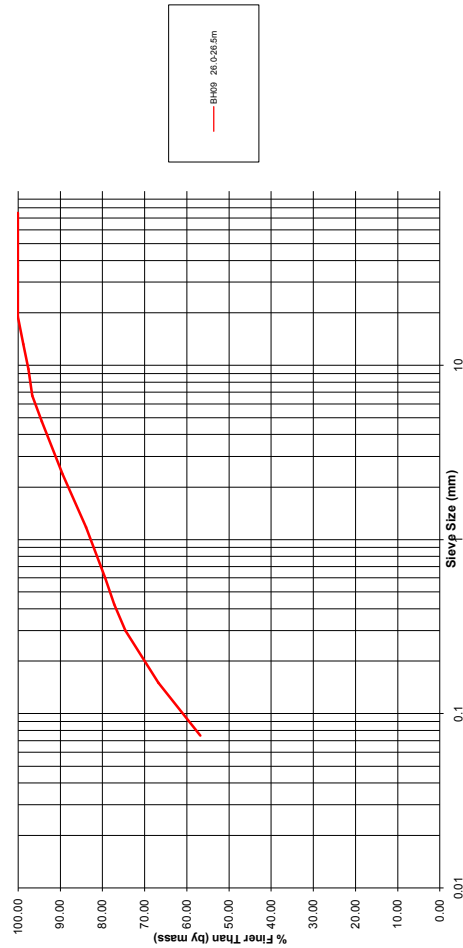
Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>r</sub> ) g	Corrected Mass g	Percentage Retained = (Mass/M <sub>T</sub> ) × 100 %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 200mm) g	Sieve Diameter mm
75.0mm	N/A	0.00	100.00			300
50.0mm	N/A	0.00	100.00			300
37.5mm	N/A	0.00	100.00			300
26.5mm	N/A	0.00	100.00			300
19.0mm	N/A	0.00	100.00			200
13.2 mm	3.26	N/A	1.21	98.79	600	300
9.50 mm	3.23	N/A	1.20	97.58	450	300
6.70 mm	2.61	N/A	0.97	96.61	300	300
4.75 mm	6.16	N/A	2.29	94.32	250	200
2.36 mm	13.18	N/A	4.91	89.41	150	200
1.18 mm	14.83	N/A	5.52	83.89	100	200
600 µm	12.32	N/A	4.59	79.30	80	200
425 µm	5.54	N/A	2.06	77.24	70	200
300 µm	7.24	N/A	2.70	74.54	60	200
150 µm	20.80	N/A	7.75	66.80	40	200
75 µm	26.84	N/A	9.99	56.80	25	200
Passing 75 µm	152.54	N/A	56.80	0.00	-	-
Pan Total	268.55	-	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

Form GE-L-06

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LOCATION:	BH09 26.0-26.5m	DESCRIPTION:	Clay SILT, with some coarse sand and trace of shell fragments, grey pale brown, stiff, low to medium plasticity
DATE OF TEST:	25 October 2015	SAMPLE No:	N612

Form GEL-06

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### Oedometer Settlement Test


<b>Sample Details</b>   sketch showing specimen location in original sample	Depth	1.00 - 1.50m		
	Description Type	SILT with trace of fine sand, dark brown, stiff, low to medium plasticity.		
Initial Height	L <sub>0</sub>	(mm)	20.0	
Initial Diameter	D <sub>0</sub>	(mm)	50.0	
Initial Weight	W <sub>0</sub>	(gr)	63.1	
Bulk Density	ρ <sub>0</sub>	(Mg/m <sup>3</sup> )	1.61	
Particle Density	ρ <sub>s</sub>	(Mg/m <sup>3</sup> )	2.65	

<b>Initial Conditions</b>			
Settlement Input	L <sub>IP</sub>	(mm)	CH 3
Initial Moisture	ω <sub>i</sub> %	(%)	22
Initial Dry Density	ρ <sub>di</sub>	(Mg/m <sup>3</sup> )	1.32
Initial Voids Ratio	e <sub>i</sub>	.	1.005
Initial Degree of Saturation	S <sub>i</sub>	(%)	56.9
Initial Swelling	S <sub>s</sub>	(kPa)	0

<b>Final Conditions</b>			
Final Moisture	ω <sub>f</sub> %	(%)	23
Dry Density	ρ <sub>df</sub>	(Mg/m <sup>3</sup> )	1.15
Voids Ratio	e <sub>f</sub>	.	1.297
Saturation	S <sub>f</sub>	(%)	46
Height Settlement	ΔL <sub>s</sub>	(mm)	-2.909

Vertical Stress σ' <sub>v</sub> (kPa)	Voids Ratio e <sub>f</sub>	Height ΔL <sub>s</sub> (mm)	Consolidation C <sub>v</sub> (m <sup>2</sup> /year)	Compressibility m <sub>v</sub> (m <sup>2</sup> /MN)	Initial T <sub>i</sub> (oC)	Final T <sub>f</sub> (oC)	t <sub>50</sub> Time t <sub>50</sub> (min)	t <sub>90</sub> Time t <sub>90</sub> (min)	Secondary C <sub>SEC</sub> (m <sup>2</sup> /MN)
50	1.006	-0.010	22211.1	0.010	29.0	0.0		0.002	0.0087
100	1.297	-2.913	12781.5	2.902	29.0	0.0		0.004	0.0087
200	0.970	0.351	2957.0	1.425	29.0	0.0		0.017	0.0087
400	1.297	-2.913	564.8	0.831	29.0	0.0		0.089	0.0087
800	0.843	1.614	216.1	0.494	29.0	0.0		0.219	0.0087
1600	0.759	2.456	459.3	0.057	29.0	0.0		0.078	0.0087
400	0.782	2.224			29.0	0.0			
100	1.297	-2.909			29.0	0.0			

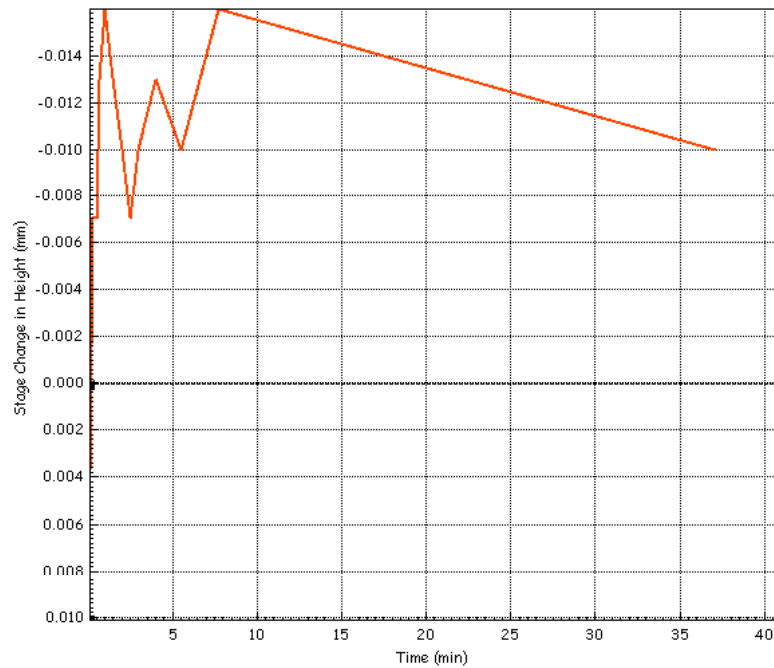
**Notes**

	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
	Site Reference	1920815	Database:	.\SQLEXPRESS \ ENTEC
	Jobfile	Geotechnical Engineering	Test Date	11/29/2015
	Client	Japan International Cooperation	Sample	N600
	Operator	IG/MK	Borehole	BH09
	Checked	DMC	Approved	DMC

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

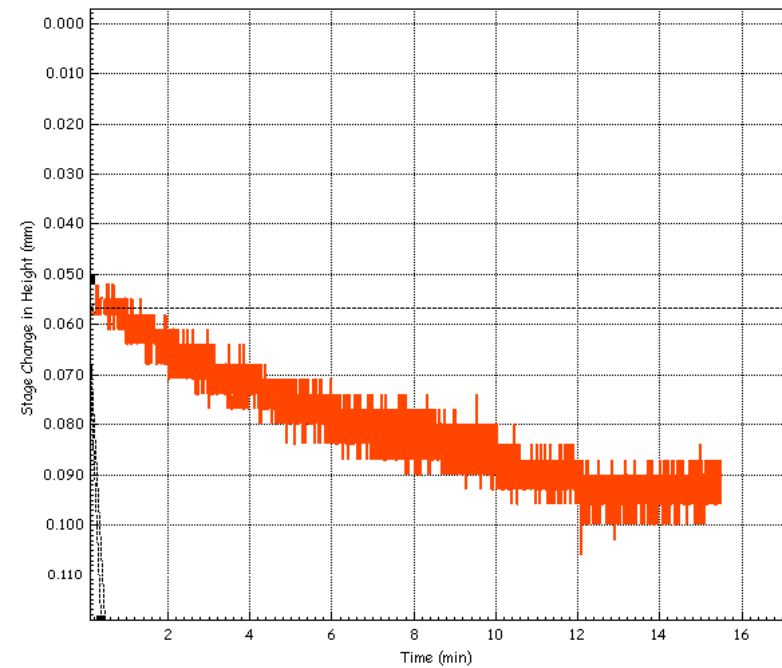
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	50
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-0.010
Voids Ratio	$e_f$	.	1.004
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	0.002
Consolidation	$C_v$	(m <sup>2</sup> /year)	22211.1
Compressibility	$m_v$	(m <sup>2</sup> /MN)	0.010
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	100
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-2.909
Voids Ratio	$e_f$	.	1.297
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	0.004
Consolidation	$C_v$	(m <sup>2</sup> /year)	12779.2
Compressibility	$m_v$	(m <sup>2</sup> /MN)	2.898
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	11/29/2015
	Client	Japan International Cooperation	Sample	N600
	Operator	IG/MK	Borehole	BH09
	Checked	DMC	Approved	DMC

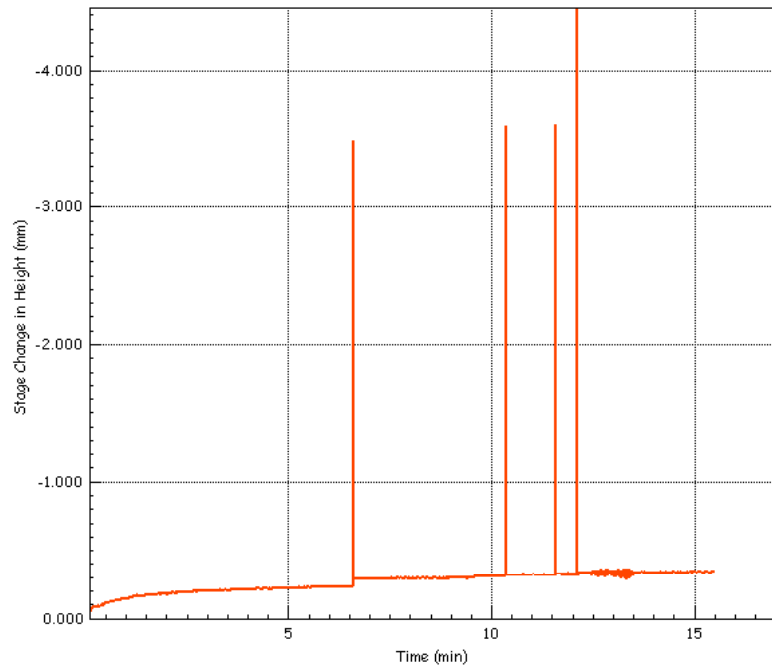
Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	11/29/2015
	Client	Japan International Cooperation	Sample	N600
	Operator	IG/MK	Borehole	BH09
	Checked	DMC	Approved	DMC

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

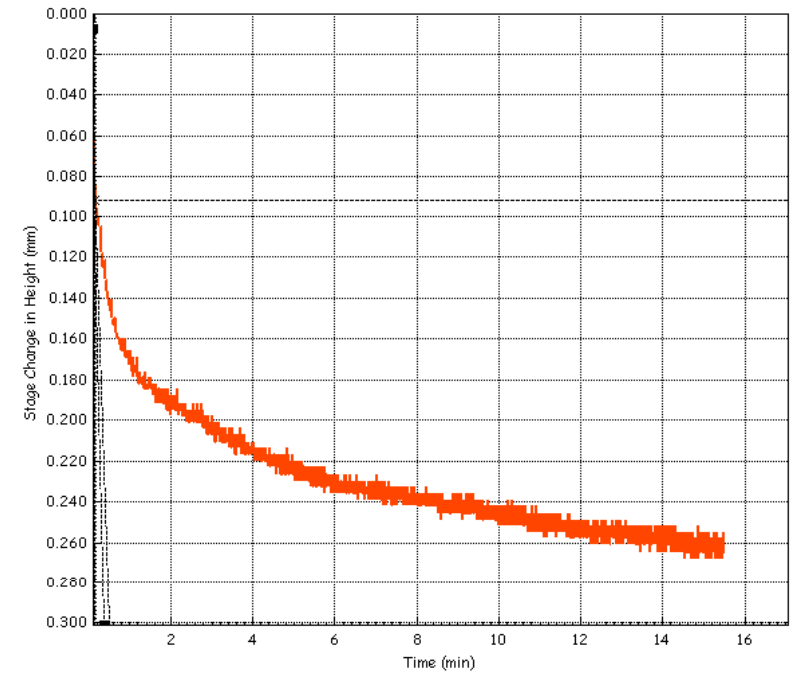
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	100
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-2.916
Voids Ratio	$e_f$	.	1.295
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	
Consolidation	$C_v$	(m <sup>2</sup> /year)	
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	200
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	0.351
Voids Ratio	$e_f$	.	0.968
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	0.017
Consolidation	$C_v$	(m <sup>2</sup> /year)	2957.0
Compressibility	$m_v$	(m <sup>2</sup> /MN)	1.425
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	11/29/2015
	Client	Japan International Cooperation	Sample	N600
	Operator	IG/MK	Borehole	BH09
	Checked	DMC	Approved	DMC

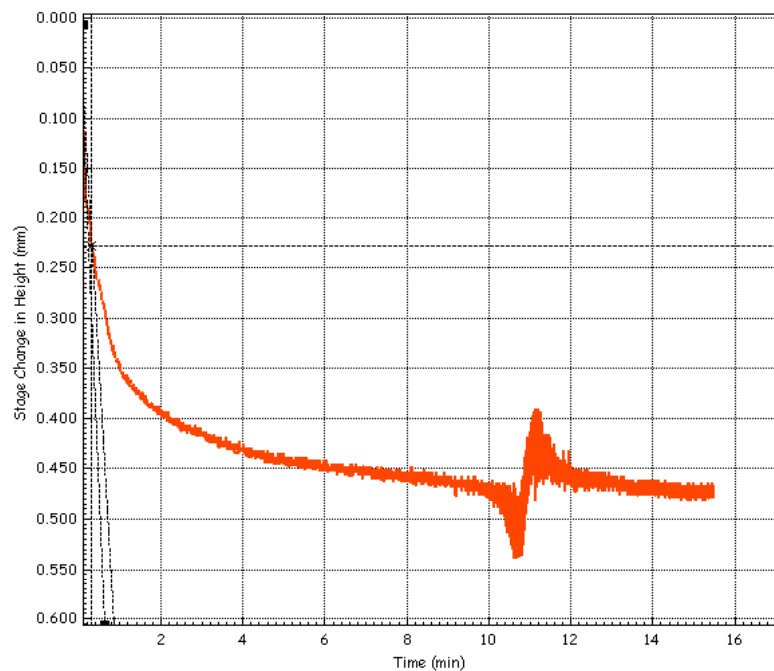
Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	11/29/2015
	Client	Japan International Cooperation	Sample	N600
	Operator	IG/MK	Borehole	BH09
	Checked	DMC	Approved	DMC

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

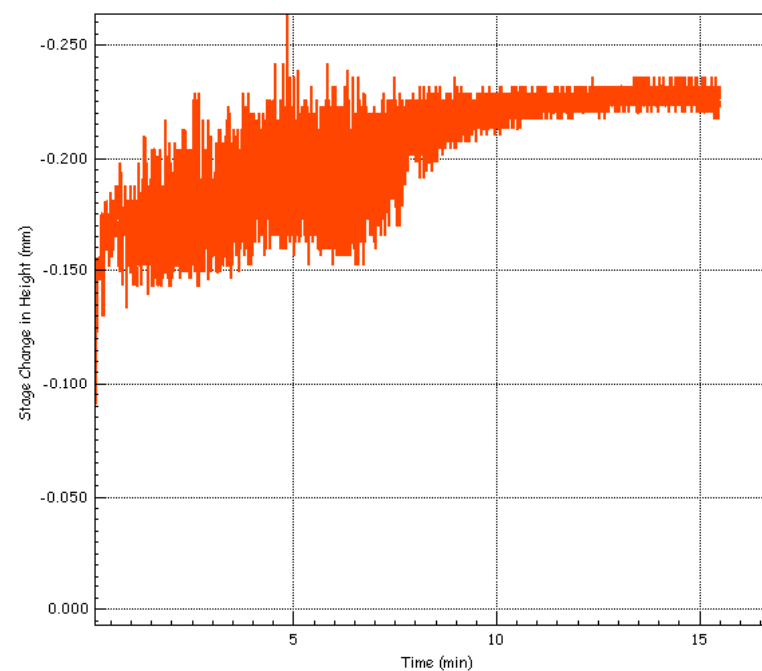
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	400
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-2.913
Voids Ratio	$e_f$	.	1.295
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	0.089
Consolidation	$C_v$	(m <sup>2</sup> /year)	564.8
Compressibility	$m_v$	(m <sup>2</sup> /MN)	0.831
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	400
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	2.224
Voids Ratio	$e_f$	.	0.781
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	
Consolidation	$C_v$	(m <sup>2</sup> /year)	
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	



	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
	Site Reference	1920815	Database:	.\SQLEXPRESS \ ENTEC
	Jobfile	Geotechnical Engineering	Test Date	11/29/2015
	Client	Japan International Cooperation	Sample	N600
	Operator	IG/MK	Borehole	BH09
	Checked	DMC	Approved	DMC

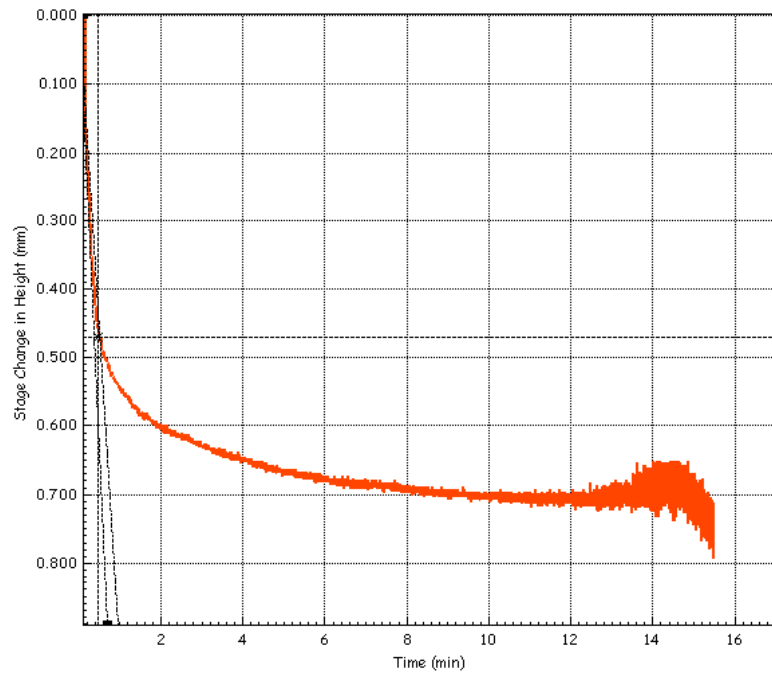
Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
	Site Reference	1920815	Database:	.\SQLEXPRESS \ ENTEC
	Jobfile	Geotechnical Engineering	Test Date	11/29/2015
	Client	Japan International Cooperation	Sample	N600
	Operator	IG/MK	Borehole	BH09
	Checked	DMC	Approved	DMC

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

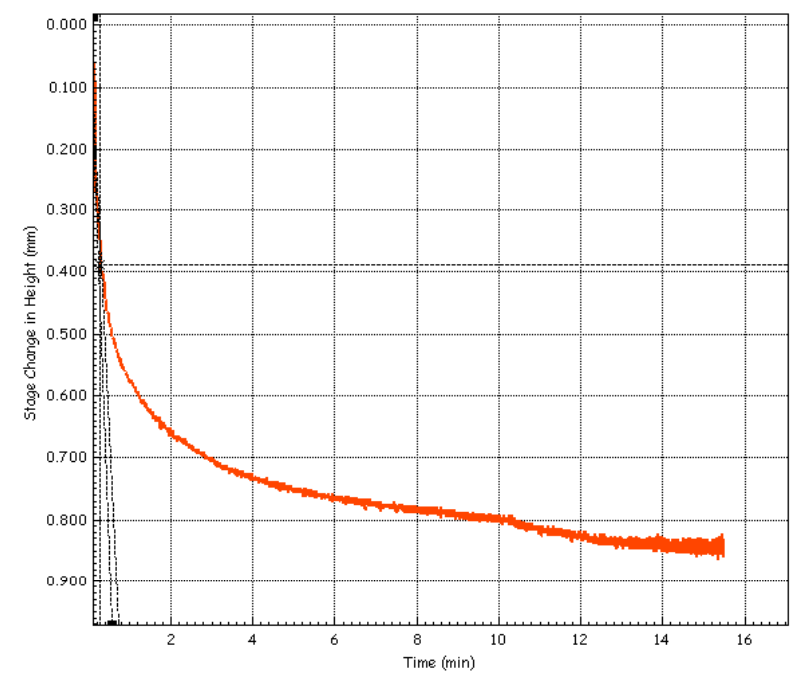
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	800
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	1.614
Voids Ratio	$e_f$	.	0.842
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	0.219
Consolidation	$C_v$	(m <sup>2</sup> /year)	216.2
Compressibility	$m_v$	(m <sup>2</sup> /MN)	0.494
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	1600
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	2.456
Voids Ratio	$e_f$	.	0.757
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	0.078
Consolidation	$C_v$	(m <sup>2</sup> /year)	459.3
Compressibility	$m_v$	(m <sup>2</sup> /MN)	0.057
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	11/29/2015
	Client	Japan International Cooperation	Sample	N600
	Operator	IG/MK	Borehole	BH09
	Checked	DMC	Approved	DMC

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

	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	11/29/2015
	Client	Japan International Cooperation	Sample	N600
	Operator	IG/MK	Borehole	BH09
	Checked	DMC	Approved	DMC

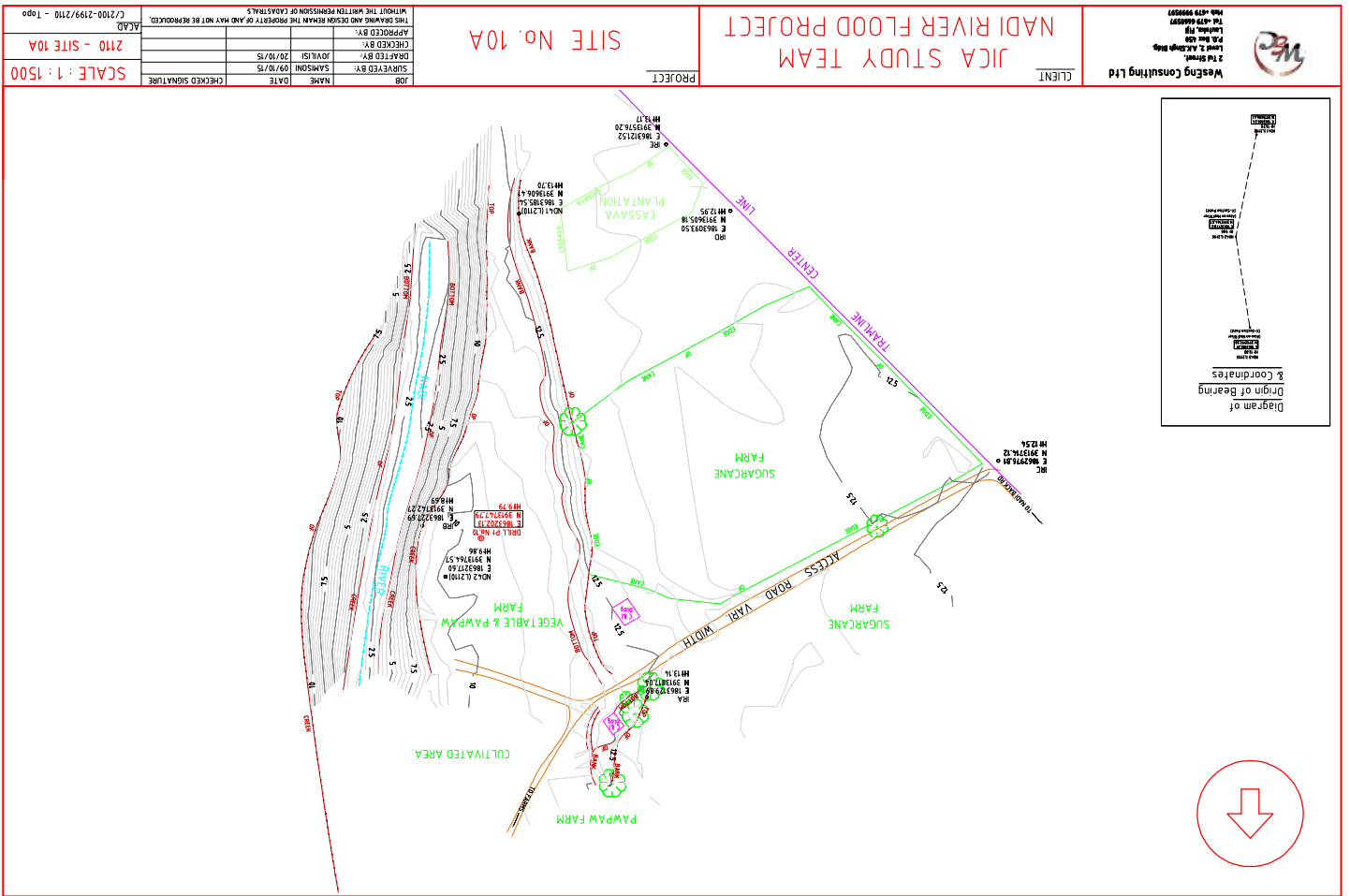
Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

**APPENDIX 10**

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

**APPENDIX 10a**

**Test Locality Plan**



D15-305



	<b>ENTEC LIMITED</b> Level 2, Mid City Plaza Cnr. Cumming St & Renwick Road P.O. Box 12309 Suva, Fiji	<b>ENGINEERING AND SCIENCE CONSULTANTS</b> Unit 2, VT Solutions 24 Cawa Road Maritara P.O. Box 12309 Nadi, Fiji	Phone (679) 330 0300 Fax (679) 331 8618 Email info@entecfiji.com	<b>CLIENT:</b> Japan International Cooperation Agency (JICA) <b>PROJECT:</b> Nadi River Basin Project	NOTE: THIS DRAWING HAS BEEN REPRODUCED BY ENTEC TO SHOW THE APPROXIMATE BOREHOLE LOCATION.	<b>DRAWN BY:</b> SS <b>CHECKED BY:</b> KC <b>APPROVED BY:</b> JD <b>SHEET TITLE:</b> TEST LOCALITY PLAN <b>SCALE:</b> NTS <b>ISSUE DATE:</b> November 2015	<b>A3</b> <b>PROJECT NO.:</b> 1920815 <b>DRAWING NO.:</b> 1 of 1
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## APPENDIX 10b Engineering Borehole Log and Core Photos

<b>DRILL HOLE LOG</b>																
Project: Nadi River Basin Drilling Works					Feature			Location: Nadi Back Road Bridge		No.: <b>BH10</b>						
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)	Symbiotic Log	Defect Spacing (mm)	Defect Description	TCR/SCR/RQD (%)	Samples	Tests
				Soil Description: subordinate, particle size, MAJOR, minor, colour, structure, strength, moisture condition, grading, bedding, plasticity, sensitivity, major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.												
				SILT with some fine to coarse sand and trace of root fibres, dark brown, soft to firm, moist, low to medium plasticity												
				SILT with trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity												
				Silty coarse SAND with some fine to medium sub-angular gravel, dark												
									+8.26							
									+4.99							
									+4.79							
<b>Explanations:</b> 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 Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge														<b>Remarks</b> 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.:			
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: 2 of 6				
Type	Run	Fluid & Water Piezometer	Geological Description Soil Description: subordinate, particle size, MAJOR, minor, colour, structure, strength; moisture condition, grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.	Legend Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	Tests
			brown Fine to coarse SAND with fine sub-angular gravel, dark brown			+4.29	6	500 100		SPT 5.00 m N= 17
			Medium sub-angular GRAVEL with trace of coarse sand				6			20
			Fine to coarse SAND with trace of medium sub-angular gravel			+3.29	7			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			SPT 6.00 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	9			SPT 9.50 m N= 38
<b>Explanations:</b> 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 TOR - Total Core Recovery SCR - Solid Core Recovery ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge			<b>Remarks</b> N = Standard Penetration Test  Logged to NZGS 'Field description of soil & rock' December 2005			<ul style="list-style-type: none"> <li>● Small Disturbed Sample</li> <li>○ Large Disturbed Sample</li> <li>□ Scale Penetrometer - blows/100mm</li> <li>⬇ Permeability Test</li> <li>U100 Undisturbed Sample</li> <li>◀ Insitu Vane Shear Strength (kPa)</li> <li>UTP = Unable to penetrate</li> </ul>				
All dimensions in metres Scale 1:31		Contractor: GDISL		Rig/Plant Used: Drill Rig - Triple Tube		Logged by: KC/MK	Checked by: MK			

ENTEC Ltd (BEO) Ltd, P1 NZ REG 100015, BEO 0201, 04/2/2015 14:47, 8/3/2008, D:\proj\lab\en\B.391\_Tot\_0021 (U.S. Elec. 1:1) 20150627 (U.S. Elec. 1:1) 20150627

DRILL HOLE LOG										
Project: Nadi River Basin Drilling Works			Feature		Location: Nadi Back Road Bridge		No.:			
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: 3 of 6				
Type	Run	Fluid & Water Piezometer	Geological Description Soil Description: subordinate, particle size, MAJOR, minor, colour, structure, strength; moisture condition, grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.	Legend Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	Tests
			Fine to coarse SAND with trace of medium sub-rounded gravel, dark grey (continued)			-1.21	11			
			Coarse SAND with some silt and trace of medium sub-angular gravel, pale brown				11			SPT 11.00 m N= 5
			Fine to coarse SAND with trace of medium sub-angular gravel, pale brown				12			11.00
			Coarse SAND with some silt, brown			-2.71	13			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			
			Fine to medium sub-angular to sub-rounded GRAVEL, grey			-4.71	14			SPT 14.00 m N= 16
<b>Explanations:</b> 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 TOR - Total Core Recovery SCR - Solid Core Recovery ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge			<b>Remarks</b> N = Standard Penetration Test  Logged to NZGS 'Field description of soil & rock' December 2005			<ul style="list-style-type: none"> <li>● Small Disturbed Sample</li> <li>○ Large Disturbed Sample</li> <li>□ Scale Penetrometer - blows/100mm</li> <li>⬇ Permeability Test</li> <li>U100 Undisturbed Sample</li> <li>◀ Insitu Vane Shear Strength (kPa)</li> <li>UTP = Unable to penetrate</li> </ul>				
All dimensions in metres Scale 1:31		Contractor: GDISL		Rig/Plant Used: Drill Rig - Triple Tube		Logged by: KC/MK	Checked by: MK			


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DRILL HOLE LOG																																																																																																																																																																											
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1920815	19-10-2015	21-10-2015	9.79	E 1863202.1 N 3913747.8	BH10	4 of 6	29.00 m	Sheet:	4 of 6																																																																																																																																																																		
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										<h2 style="text-align: center;">DRILL HOLE LOG</h2>									
Project: Nadi River Basin Drilling Works					Feature					Location: Nadi Back Road Bridge					No.: <b>BH10</b>				
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			Sheet: 6 of 6							
Client: JICA Study Team					Hole Depth: 29.00 m														
Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR	SCR	ROD (%)	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)	X			-16.01	26.00								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)	X			-17.71	27.50								P= 300 kPa SPT 26.00 m N= 41		
				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)	X			-19.21	29.00								P= 300 kPa SPT 27.50 m N= 54		
				Hole Terminated at 29.00 m N = Standard Penetration Test  Logged to NZGS 'Field description of soil & rock' December 2005	X			-19.21	29.00								P= 300 kPa SPT 29.00 m N= 50		

ENTEC LTD (B02) 0.01 ENTEC LTD (B02) 0.01 ENTEC LTD (B02) 0.01 ENTEC LTD (B02) 0.01 ENTEC LTD (B02) 0.01 ENTEC LTD (B02) 0.01 ENTEC LTD (B02) 0.01 ENTEC LTD (B02) 0.01 ENTEC LTD (B02) 0.01 ENTEC LTD (B02) 0.01

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

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

**Borehole 10 Core Photos (0.00m to 29.00m)**



0.00m to 4.60m

4.60m to 11.00m

1920815.10





11.00m to 19.30m



19.00m to 22.20m



22.20m to 25.80m



25.80m to 27.70m



27.70m to 29.00m

## APPENDIX 10c Laboratory Test Schedule and Test Results

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		1				
		Sandy SILT	SPT	2.0-2.5									
		Sandy SILT	U	3.5-4.0	1						1		
		GRAVEL	SPT	5.0-5.5			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								
		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						
		<b>TOTALS</b>					1	1	10	6	3	3	1
Bill of Quantity					1	3		6	3	3	3	3	29

Lab Test Schedule checked by: DMC

**Atterberg Limit Test Results**

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 02 November 2015
<b>SITE ADDRESS</b>	: BH 10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b>	: LN
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: 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

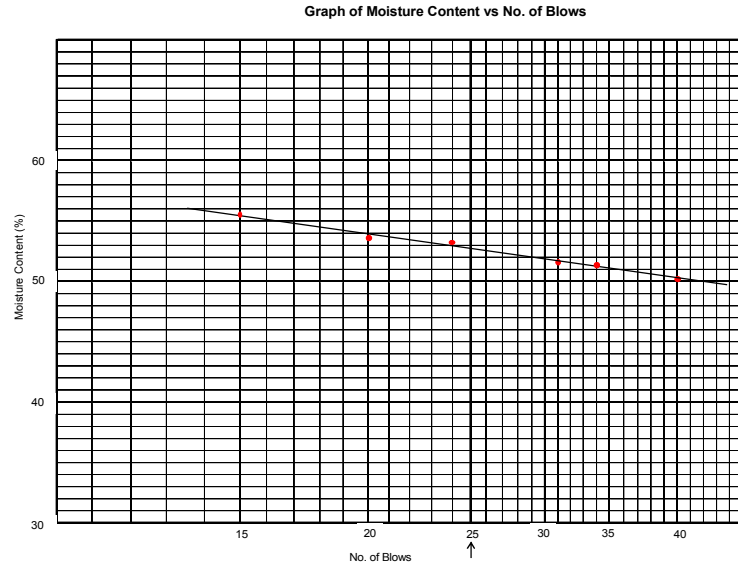
**Sample Preparation**  
 as received  
 washed/sieved on 425 µm sieve  
 air dried/oven dried 105°C  
 after making a paste cured for 12-16 hrs

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



Project No: 1920815  
Sample No: N623

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 02 November 2015
<b>SITE ADDRESS</b>	: BH 10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b>	: LN
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT with fine sand trace of shell fragments and organics and silt stone nodules, light grey, moist, low to medium plasticity( highly to completely	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: N634 BH10 21.50m - 22.0m

NATURAL MOISTURE CONTENT		1	2				Average
TEST No.							
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		1	2				Average
TEST No.							
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		1	2	3	4	5	6
TEST No.							
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		1	2	3	4	5	Average
Mould No.							
Initial length of Sample			125.00				
Final length of Sample after Shrinkage			104.00				
% Shrinkage			16.80				16.80

<b>Sample Preparation</b>		
as received	Liquid Limit	52.90 %
washed/sieved on 425 µm sieve	Plastic Limit	28.27 %
air dried/oven dried 105°C	Plasticity Index	24.63 %
after making a paste cured for 12-16 hrs	Shrinkage Limit	16.80 %

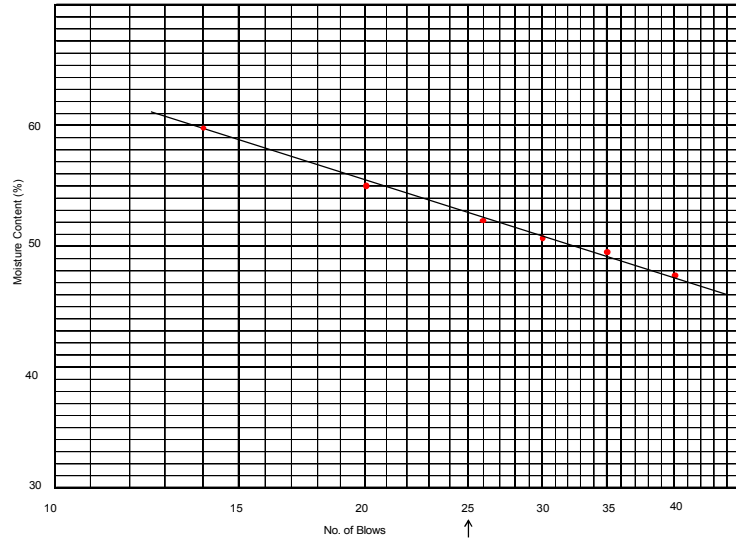
Tested By: LN  
Date: 03 November 2015

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

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 03 November 2015
<b>SITE ADDRESS</b>	: BH 10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b>	: LN
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT trace of shell fragments, light green grey, stiff, moist medium to high plasticity (highly to completely)	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: N636 BH10 26.00m - 26.5m

NATURAL MOISTURE CONTENT						
TEST No.	1	2				Average
Container No.	g 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

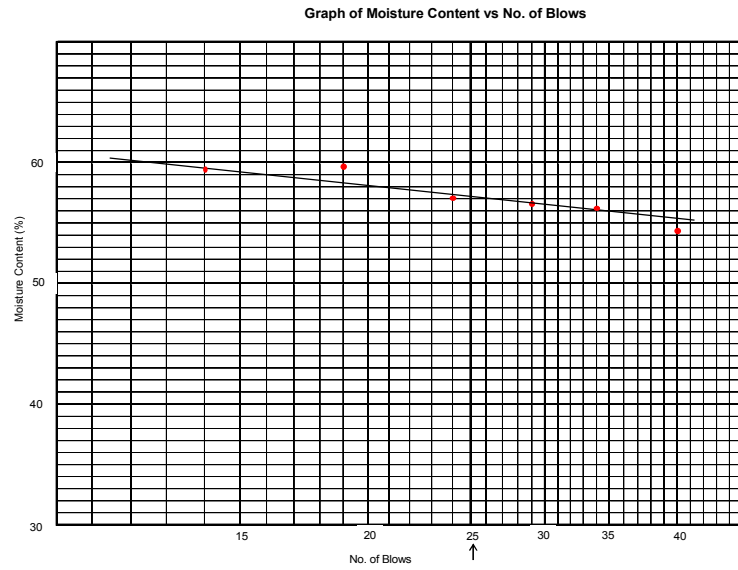
LINEAR SHRINKAGE TEST						
Mould No.	1	2	3	4	5	Average
Initial length of Sample	140.00					
Final length of Sample after Shrinkage	113.00					
% Shrinkage	19.29					19.29

<b>Sample Preparation</b>	
as received	Liquid Limit 57.20 %
washed/sieved on 425 µm sieve	Plastic Limit 33.42 %
air dried/oven dried 105°C	Plasticity Index 23.78 %
after making a paste cured for 12-16 hrs	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



Project No: 1920815  
Sample No: N636

<b>PRINCIPAL</b> :	Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	<b>DATE / TESTED</b> :	24 October 2015
<b>SITE ADDRESS</b> :	BH10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b> :	KB/LN
<b>SAMPLE LOCATION</b> :	BH10 3.5m - 4.0m	<b>MATERIAL TYPE</b> :	SILT trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity
<b>TEST NUMBER</b> :	N616		
<b>SAMPLE HISTORY</b> : NATURAL / AIR-DRIED / OVEN-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 $A_0$ ( $\pi/4 d^2$ )	mm <sup>2</sup>	2248.55			
	Initial length of specimen $L_0$	mm	49.11			
	Initial mass of specimen $M_i$	g	187.50			
	<b>Bulk Density <math>\rho</math></b>	t/m <sup>3</sup>	1.70			
	<b>Dry Density <math>\rho_d</math></b>	t/m <sup>3</sup>	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

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

<b>PRINCIPAL</b> : Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b> : 1920815
<b>PROJECT NAME</b> : Geotechnical Engineering Investigation for Nadi River Project Drilling Works	<b>DATE</b> : 6 November 2015
<b>SITE ADDRESS</b> : BH10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b> : IG
<b>MATERIAL TYPE &amp; DESCRIPTION</b> : coarse SAND with some silt, brown	<b>TEST METHOD</b> : AS 1289.6.7.3-2001
	<b>SAMPLE No.</b> : 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 Specimen	cm <sup>3</sup>	904.78
Wet Density	t/m <sup>3</sup>	1.97
Dry Density	t/m <sup>3</sup>	1.73
Maximum Dry Density	t/m <sup>3</sup>	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm <sup>2</sup>	113.10
Cross sectional area of soil	cm <sup>2</sup>	50.27
Length of soil specimen	cm	18.00

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm <sup>3</sup> )	Water temp T(°C)	KT cm/min	K <sub>20</sub> 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<sub>20</sub> 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

**Unconfined Compressive Strength  
NZS 4402:1986 (Test 6.3.1)**

<b>PRINCIPAL</b> : Japan International Cooperation Agency	<b>PROJECT No.</b> : 1920815
<b>PROJECT NAME</b> : Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	<b>DATE TESTED</b> : 24 October 2015
<b>SITE ADDRESS</b> : BH 10 - Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b> : KB/LN
<b>SAMPLE LOCATION</b> : BH 10 3.5m - 4.0m	<b>MATERIAL TYPE</b> : SILT trace of fine sand, dark brown, soft to firm, moist, low to medium plasticity
<b>TEST NUMBER</b> : N616	

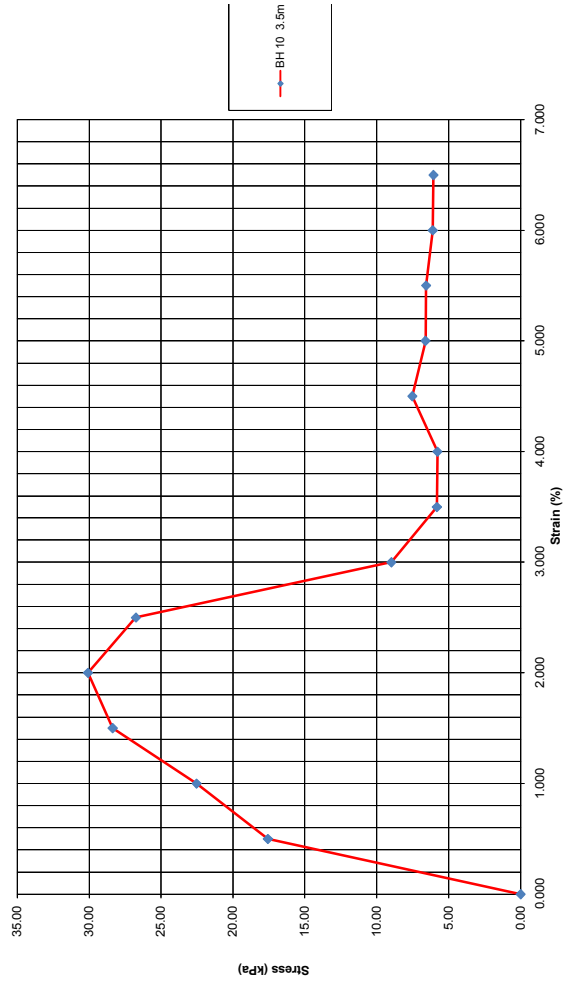
**SAMPLE HISTORY** : NATURAL / AIR-DRIED / OVEN-DRIED / UNKNOWN

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 A <sub>0</sub> (π/4 d <sup>2</sup> )	mm <sup>2</sup>	2157.89
	Initial length of specimen L <sub>0</sub>	mm	100.00
	Initial mass of specimen M <sub>i</sub>	g	398.86
	<b>Bulk Density ρ</b>	t/m <sup>3</sup>	1.85
	<b>Dry Density ρ<sub>d</sub></b>	t/m <sup>3</sup>	1.33

Compression Gauge Reading	Load Gauge Reading	Load	Strain ε = C <sub>1n</sub> - C <sub>0</sub> / L <sub>0</sub>	Corrected Area A = A <sub>0</sub> / 1-ε	Principal Stress Difference σ <sub>1</sub> - σ <sub>3</sub> = 1000P/A
mm		(kN)	%	m <sup>2</sup>	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

STRESS VS STRAIN



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

Form GE-L-10

Page 2 of 2

Moisture Content Test Results

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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

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

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

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

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



**Moisture Content Test Results**

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

**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.8.1)

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

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

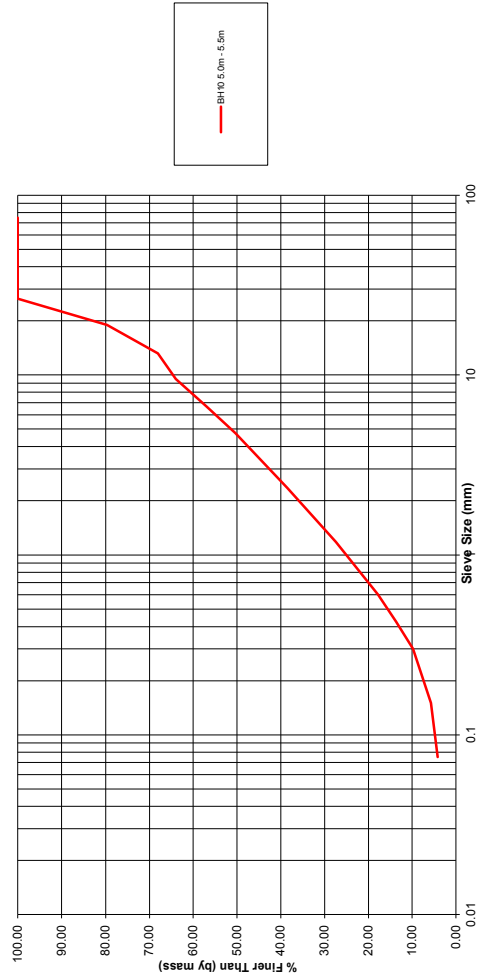
Moisture Content (Material passing 19mm)	Container No.	-	72	76	SPLIT SAMPLE
Mass of Container	g		86.32	86.31	Mass Passing Last Sieve: - gM <sub>3</sub>
Mass of Container + Wet Soil	g		111.40	106.43	Mass after Splitting: - gM <sub>4</sub>
Mass of Container + Dry Soil	g		109.24	104.86	Splitting Factor = $\frac{M_3}{M_4}$
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 <sub>1</sub> )	g	Nil
	Total Wet Weight (M <sub>w</sub> )	g	300.63
	Total Mass of dry sample (M <sub>1</sub> )	M <sub>1</sub> =	$\frac{100M_w}{100 + w}$
		M <sub>1</sub> =	275.95

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>s</sub> ) g	Corrected Mass g	Percentage Retained = (Mass/M <sub>1</sub> ) x 100 %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 200mm) g	Sieve Diameter 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



LOCATION: BH10 5.0m - 5.5m  
DATE OF TEST: 02 November 2015  
DESCRIPTION: fine to coarse SAND with fine sub-angular gravel, dark brown  
SAMPLE No: N625

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**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.8.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	02 November 2015
<b>SITE ADDRESS</b> :	BH10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b> :	RK
<b>SAMPLE LOCATION</b> :	BH10 6.5m - 7.0m	<b>MATERIAL TYPE &amp; LOCATION</b> :	fine to coarse SAND with trace of medium sub angular gravel
<b>TEST NUMBER</b> :	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 <sub>5</sub>
Mass of Container + Wet Soil	g	134.45	111.50		Mass after Splitting: - gM <sub>4</sub>
Mass of Container + Dry Soil	g	130.11	106.89		Splitting Factor = $\frac{M_3}{M_4}$
Mass of Dry Soil	g	40.40	35.67		= $\frac{M_3}{M_4}$
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 <sub>1</sub> )	g	Nil
	Total Wet Weight (M <sub>w</sub> )	g	298.55
	Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$	
		M <sub>T</sub> =	266.96

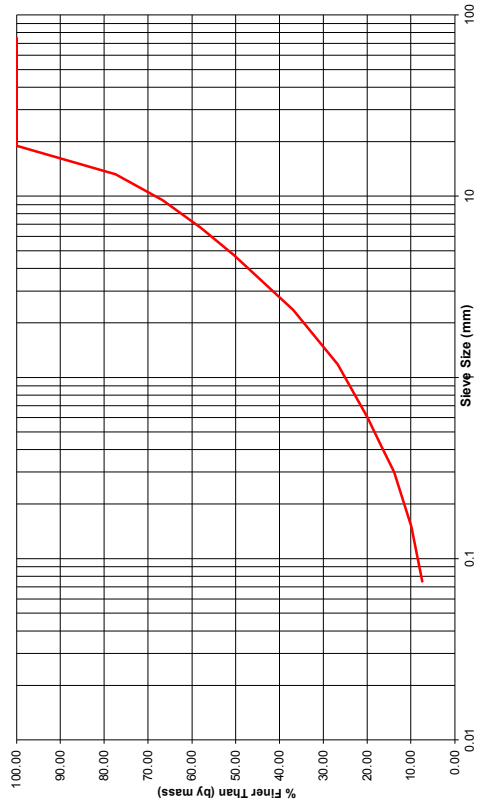
Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>s</sub> )	Corrected Mass	Percentage Retained = (Mass/M <sub>T</sub> ) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm	N/A		0.00	100.00		300
50.0mm	N/A		0.00	100.00		300
37.5mm	N/A		0.00	100.00		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	G.A. Checked by : UM	Approved by : IG
Date : 02 November 2015	Date : 03 December 2015	Date : 03 December 2015

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BH10 6.5m - 7.0m

LOCATION: BH10 6.5m - 7.0m  
 DATE OF TEST: 02 November 2015  
 DESCRIPTION fine to coarse SAND with trace of medium sub angular gravel  
 SAMPLE No: N628

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**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.8.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	02 November 2015
<b>SITE ADDRESS</b> :	BH10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b> :	RK
<b>SAMPLE LOCATION</b> :	BH10 9.5m - 10.0m	<b>MATERIAL TYPE &amp; LOCATION</b> :	fine to coarse SAND with trace of medium sub-rounded gravel, dark grey
<b>TEST NUMBER</b> :	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 <sub>s</sub>
Mass of Container + Wet Soil	g	113.26	106.99		Mass after Splitting: - gM <sub>s</sub>
Mass of Container + Dry Soil	g	110.10	103.09		Splitting Factor = $\frac{M_3}{M_4}$
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 <sub>1</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	310.56	
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>T</sub> =	276.40	

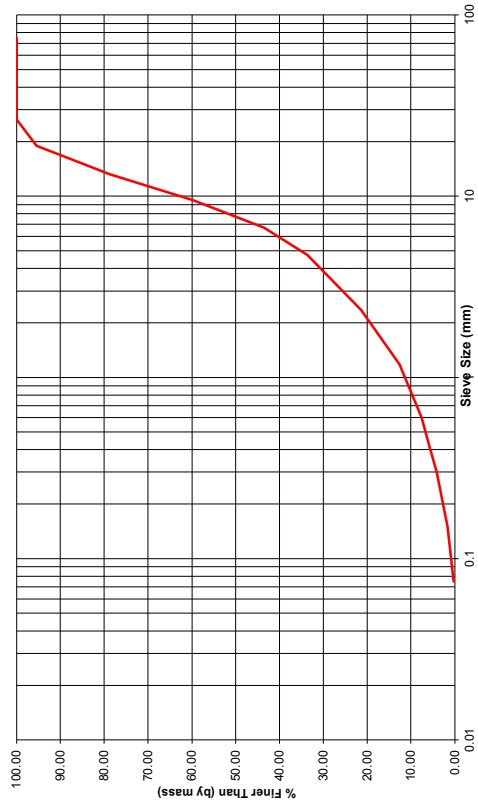
Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>b</sub> )	Corrected Mass	Percentage Retained = (M <sub>sa</sub> /M <sub>T</sub> ) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g		%	%	g	mm
75.0mm	N/A	N/A	0.00	100.00		300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	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

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BH10 9.5m - 10.0m

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

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**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.8.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	02 November 2015
<b>SITE ADDRESS</b> :	BH10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b> :	RK
<b>SAMPLE LOCATION</b> :	BH10 12.5m - 13.0m	<b>MATERIAL TYPE &amp; LOCATION</b> :	coarse SAND with some silt, brown
<b>TEST NUMBER</b> :	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 <sub>s</sub>
Mass of Container + Wet Soil	g	104.12	100.07	Mass after Splitting:	- gM <sub>s</sub>
Mass of Container + Dry Soil	g	102.24	98.32	Splitting Factor = $\frac{M_1}{M_2}$	
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 <sub>r</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	200.97	
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>T</sub> =	173.93	

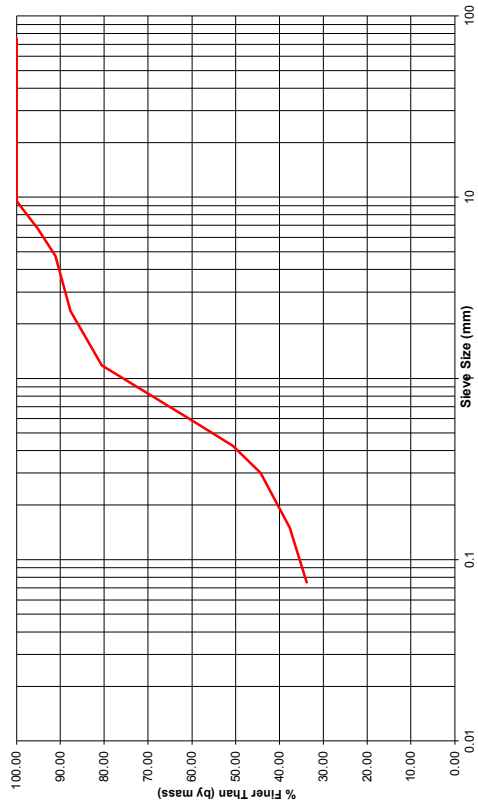
Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>b</sub> ) g	Corrected Mass	Percentage Retained = $\frac{M_{b,c}}{M_T} \times 100$	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter mm
75.0mm	N/A	N/A	0.00	100.00	g	300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	N/A	0.00	100.00		300
19.0mm	N/A	N/A	0.00	100.00		200
13.2 mm	N/A	N/A	0.00	100.00	600	300
9.50 mm	N/A	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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LOCATION: BH10 12.5m - 13.0m  
 DATE OF TEST: 02 November 2015  
 DESCRIPTION coarse SAND with some silt, brown  
 SAMPLE No: NB29

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**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.8.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	02 November 2015
<b>SITE ADDRESS</b> :	BH10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b> :	RK
<b>SAMPLE LOCATION</b> :	BH10 14.0m - 14.5m	<b>MATERIAL TYPE &amp; LOCATION</b> :	fine to coarse SAND with trace of medium sub- angular gravel, pale brown
<b>TEST NUMBER</b> :	N630	<b>SAMPLE HISTORY</b> : 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 <sub>3</sub>
Mass of Container + Wet Soil	g	91.44	103.45	Mass after Splitting:	- gM <sub>4</sub>
Mass of Container + Dry Soil	g	88.94	100.93	Splitting Factor = $\frac{M_3}{M_4}$	
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 <sub>1</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	216.02	
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>T</sub> =	173.24	

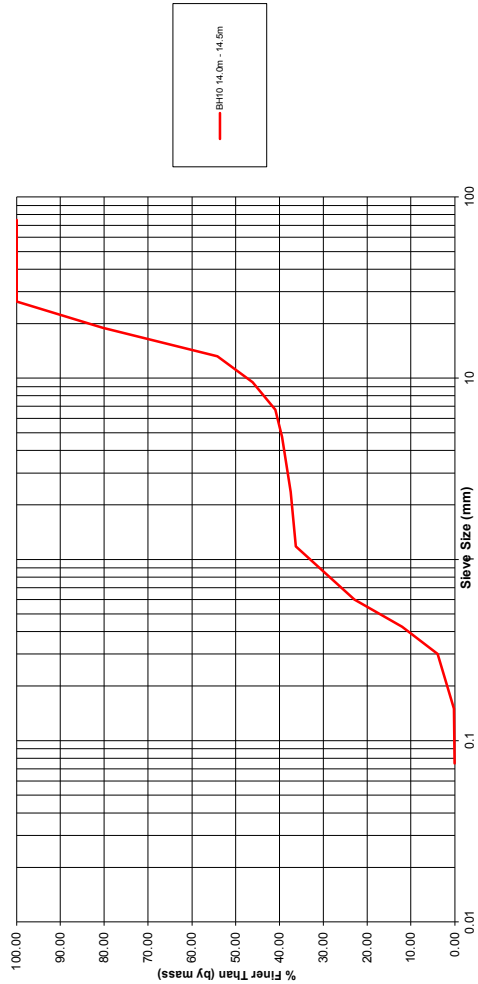
Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>s</sub> ) g	Corrected Mass g	Percentage Retained = (Mass/M <sub>T</sub> ) × 100 %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 200mm) g	Sieve Diameter mm
75.0mm	N/A	0.00	100.00			300
50.0mm	N/A	0.00	100.00			300
37.5mm	N/A	0.00	100.00			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

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LOCATION: BH10 14.0m - 14.5m  
 DATE OF TEST: 02 November 2015  
 DESCRIPTION fine to coarse SAND with trace of medium sub-angular gravel, pale brown  
 SAMPLE No: N633

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**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.8.1)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> :	02 November 2015
<b>SITE ADDRESS</b> :	BH10 Road Opposite Flame Tree in export farming plot	<b>TECHNOLOGIST</b> :	RK
<b>SAMPLE LOCATION</b> :	BH10 20.0m - 20.5m	<b>MATERIAL TYPE &amp; LOCATION</b> :	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
<b>TEST NUMBER</b> :	N633		
<b>SAMPLE HISTORY</b> : 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 <sub>3</sub>
Mass of Container + Wet Soil	g	122.63	126.59	Mass after Splitting:	- gM <sub>4</sub>
Mass of Container + Dry Soil	g	114.09	117.75	Splitting Factor = $\frac{M_3}{M_4}$	
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 <sub>1</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	300.09	
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>T</sub> =	229.45	

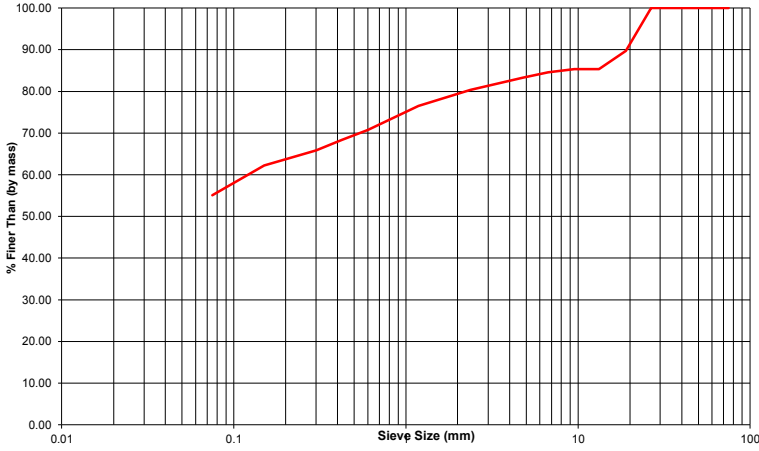
Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>s</sub> )	Corrected Mass	Percentage Retained = (Mass/M <sub>T</sub> ) × 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm	N/A	0.00	100.00			300
50.0mm	N/A	0.00	100.00			300
37.5mm	N/A	0.00	100.00			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

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LOCATION:	BH10 20.0m - 20.5m	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
DATE OF TEST :	02 November 2015	SAMPLE No:	N633

Form GE-L-06

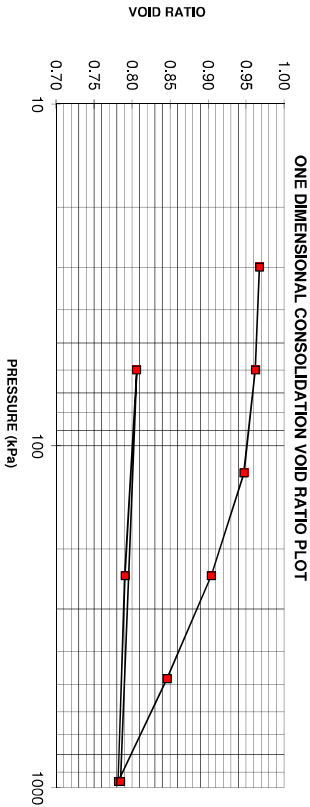
Page 2 of 2

D15-328

**Project Name:** Geotechnical Investigation for Naei River Basin Drilling Works  
**Client Name:** Japan International Cooperation Agency (JICA)  
**Job No:** 1920815  
**Site Address :** Road Opposite Flame Tree in exporting farming plot.  
**Sample Location:** BH 10 3.5 - 4.0m Re - Test

**Sample No:** N 616  
**Depth:** 3.5m - 4.0m  
**Tested By:** IG/FM  
**Date Tested:** 12 January 2016

**Sample Description:** Silt trace of sand, dark brown, soft to firm, moist, low to medium plasticity.  
**Sample History:** Undisturbed ~~Remoulded~~ ~~Compressed~~ ~~Starved~~ ~~Unknown~~  
**Date Sample Collected:** 07/10/15  
**Loading Cycle:** 1 hr 0 mins  
**Temperature:** Max: 27°C Min: 25°C  
**Diameter of ring (D):** 44.96 mm  
**Height of ring:** 23.8 mm  
**Area of ring (A):** 1587.61 mm<sup>2</sup>  
**Solid density of soil particles (Q<sub>s</sub>):** 2.65 t/m<sup>3</sup> (Measured/Assumed)  
**Method used:** Square root of time fitting method



Measured thickness of specimen, $H$	mm	$H_i$	23.8	$H_f$	21.83
Mass of ring + watch glass + wet specimen	g	$M_s$	273.51	$M_d$	269.41
Mass of ring + watch glass + dry specimen	g	$M_1$	256.87		
Mass of ring	g	$M_2$	206.02		
Mass of watch glass	g		0		
Mass of dry specimen	g	$M_s = M_1 - M_2$	50.85		
Mass of water	g	$M_w = M_s - M_d$	16.64		12.54
Water content, $w$	%	$w_i$	32.72		24.86
Dry density, $Q_d$	t/m <sup>3</sup>	$Q_{d,i}$	1.35		1.47
Height of soil particles, $H_s$	mm		12.09		
Void ratio, $e$		$e_i$	0.97		0.81
Degree of saturation, $S$		$S_i$	89.48		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 <sup>2</sup> /yr)	Coefficient of compressibility $M_v$ (m <sup>2</sup> /kN)
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	0.286	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

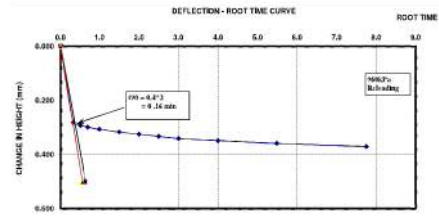
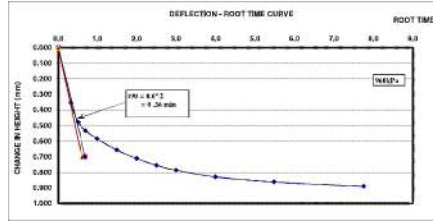
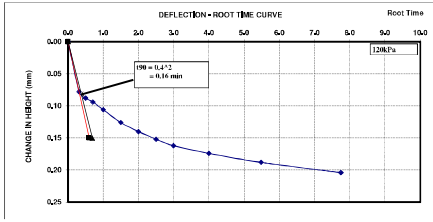
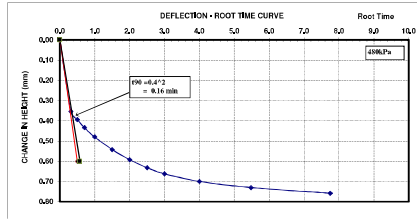
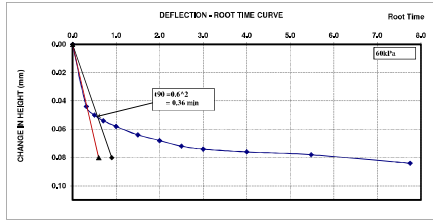
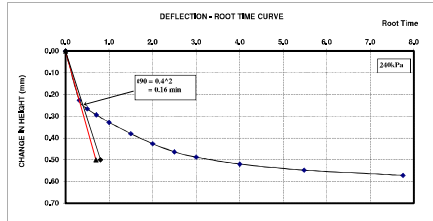
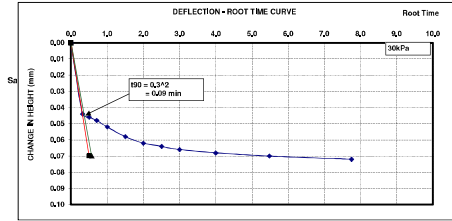
Tested by: FM/IG  
Date: 12/13 January 2016

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

Approved By: IG  
Date: 15 January 2015



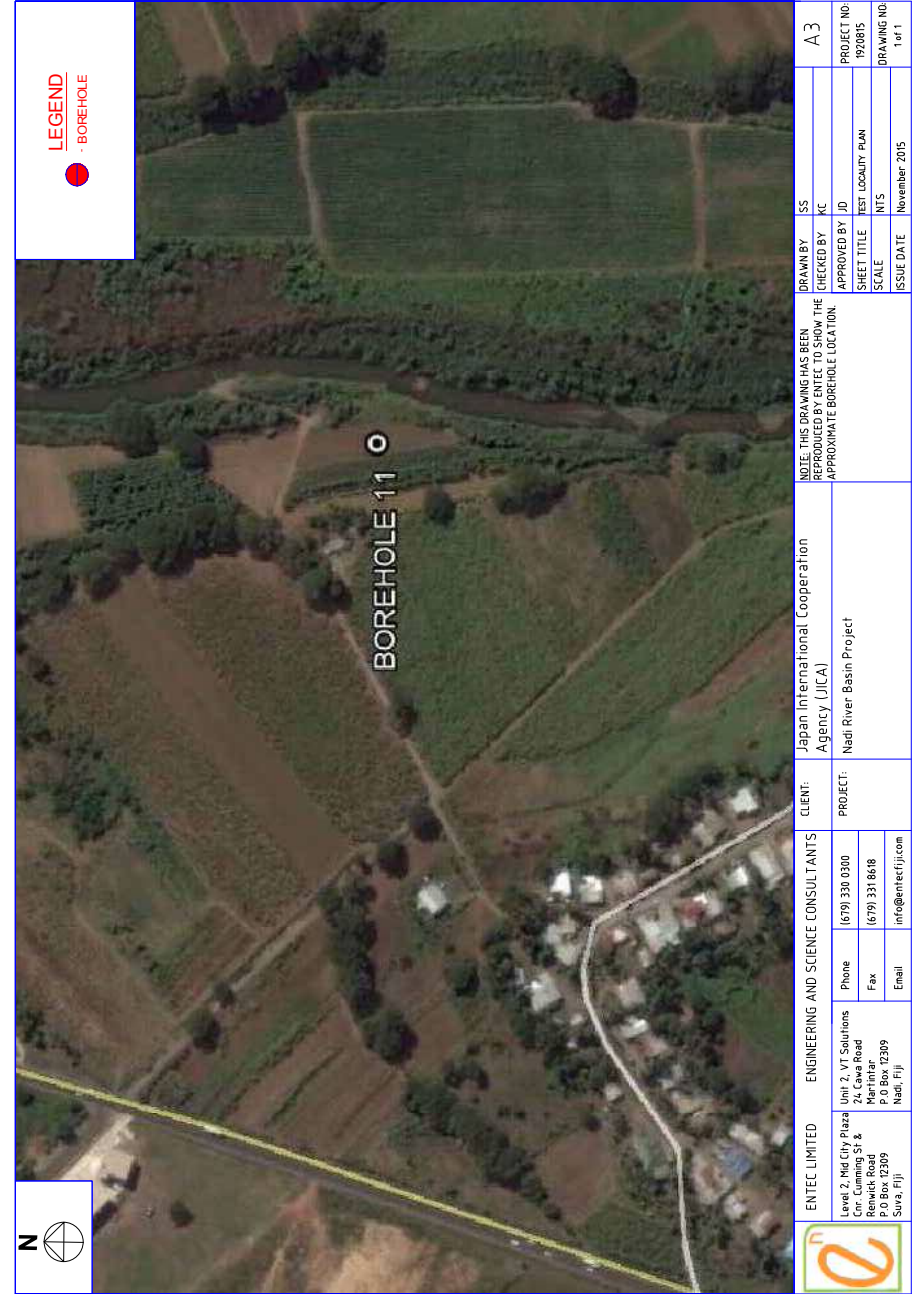




## APPENDIX 11

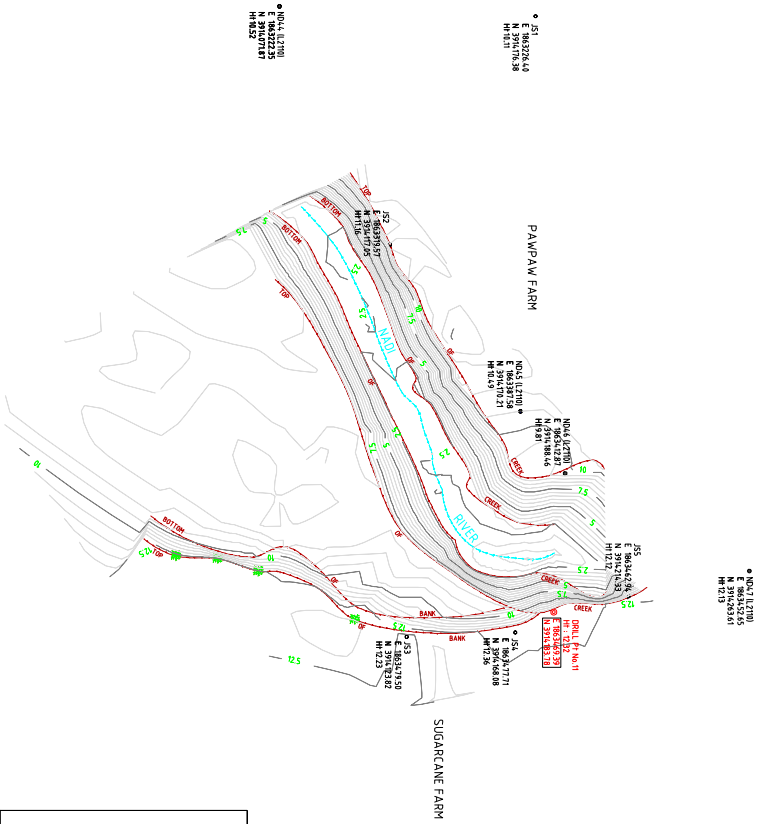
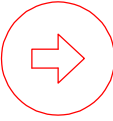
### SITE 11 –Votualevu Sugar Cane Farm Opposite Nasau, Nadi, Fiji.

# APPENDIX 11a Test Locality Plan



# APPENDIX 11b

## Engineering Borehole Log and Core Photos



**Westing Consulting Ltd**  
 21st Street, **Geelong**, Vic  
 3220  
 Phone: 03 524 1234  
 Fax: 03 524 1235  
 Email: info@westing.com.au  
 Website: www.westing.com.au

CLIENT  
**JICA STUDY TEAM**  
**NADI RIVER FLOOD PROJECT**

PROJECT  
**SITE No. 11A**

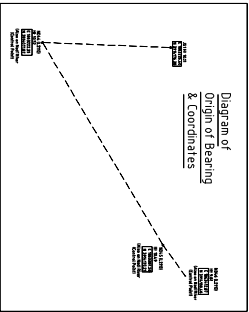
ROLE	NAME	DATE	CHECKED SIGNATURE
SURVEYED BY	SAMPSON	09/10/15	
DRAWN BY	JOYCE	20/10/15	
CHECKED BY			
APPROVED BY			

SCALE : 1 : 1500

210 - SITE 11A

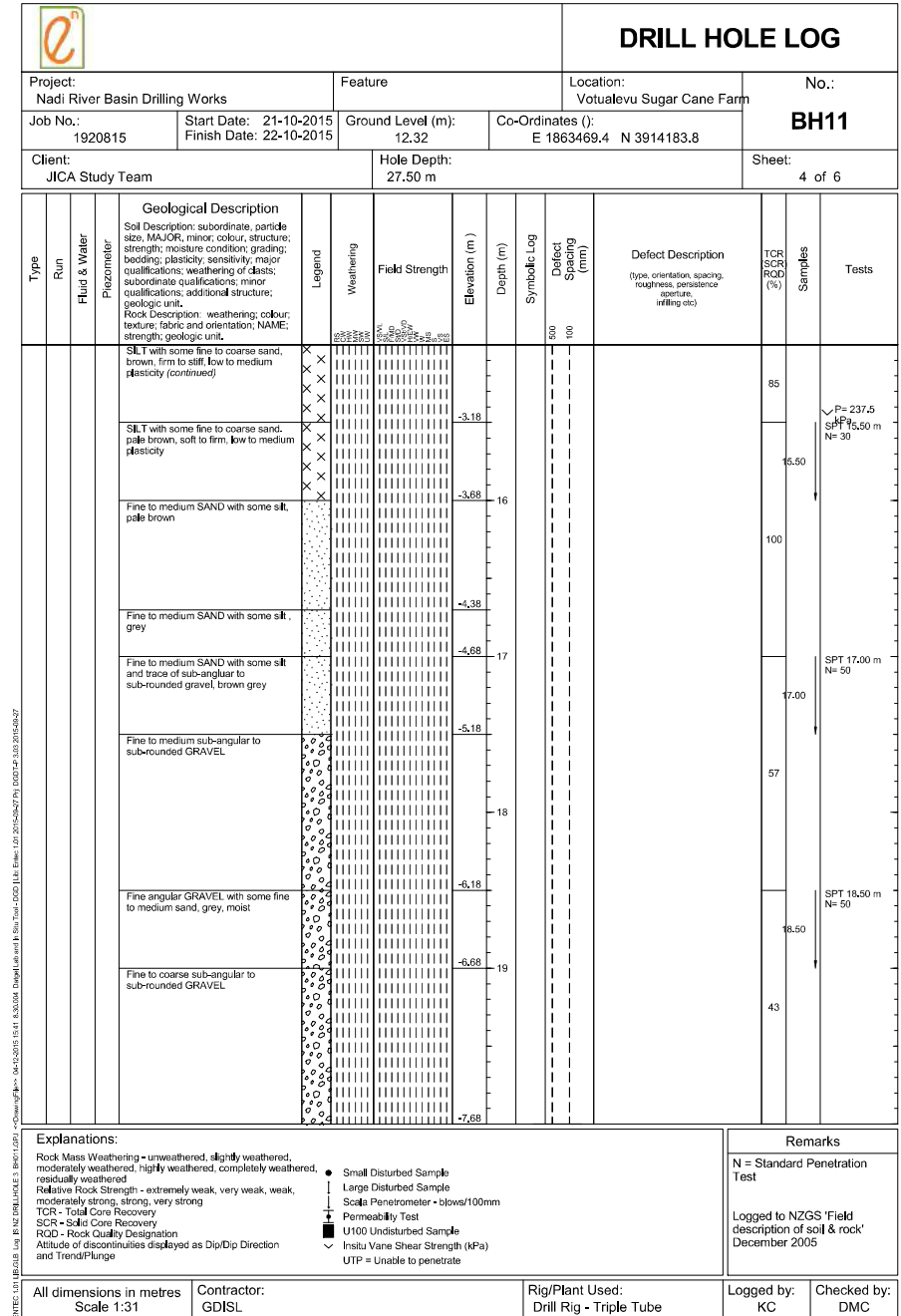
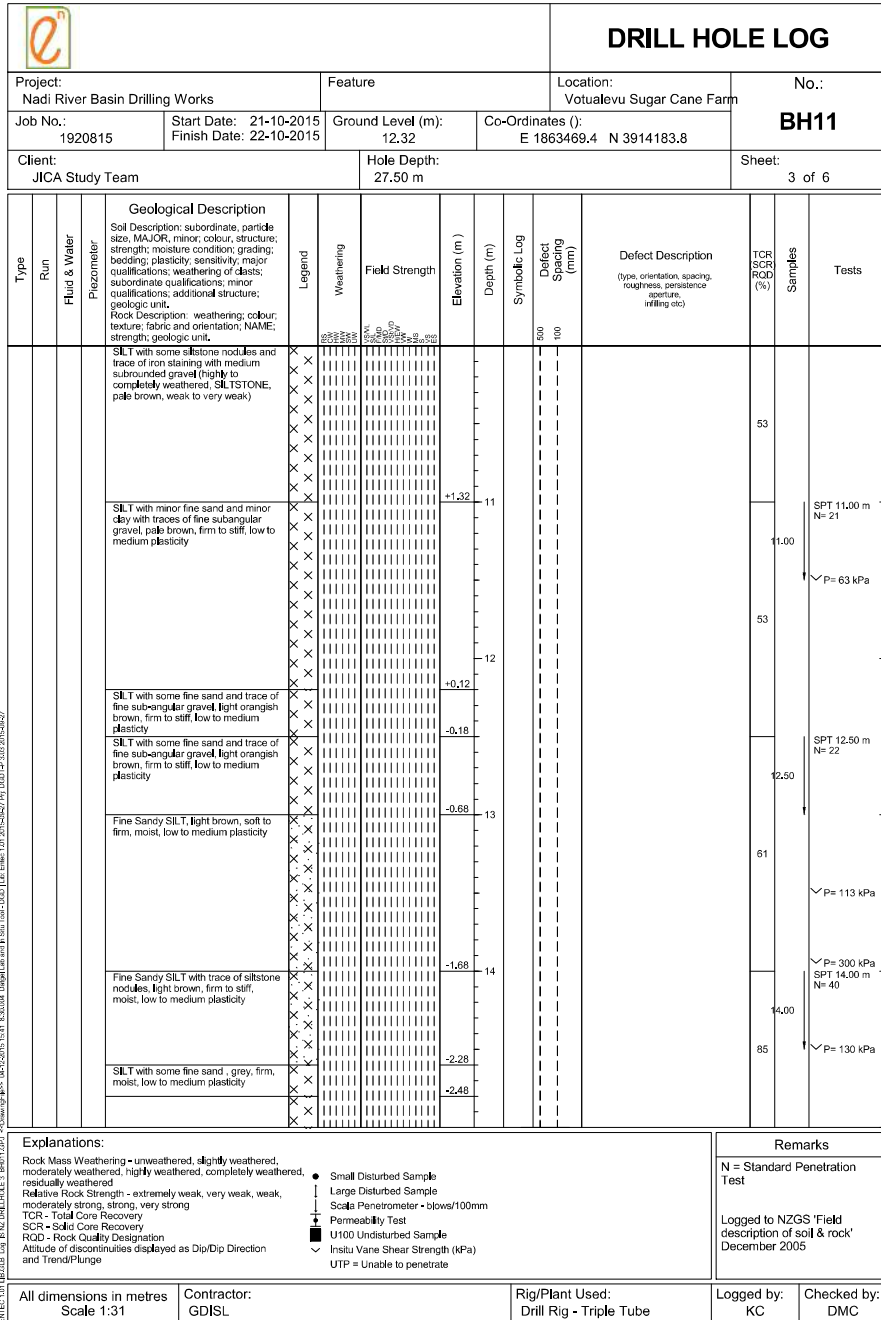
CAD: C/2100-2109/210 - Top

WITHOUT THE APPLICABLE PROFESSIONAL CERTIFICATE



DRILL HOLE LOG																	
Project: Nadi River Basin Drilling Works			Feature		Location: Votualevu Sugar Cane Farm		No.: <b>BH11</b>										
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										
Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR	SCR	ROD (%)	Samples	Tests
				SILT with trace of fine sand and root fibres, dark brown, stiff to hard, low to medium plasticity	X	W1		+11.32	1		500					86	SPT 0.00 m P=48 kPa
				SILT with some fine sand and trace of iron staining and silstone nodules, orange brown, moist, firm, medium to high plasticity	X	W2		+10.32	2		100					87	SPT 1.00 m N=13 P=88 kPa
				SILT with some fine sand, orange brown, soft to firm, low to medium plasticity	X	W3		+10.32	2							91	P=33 kPa P=111.3 kPa P=76.5 kPa
				SILT with trace of clay, brown to light brown, soft to firm, moist, medium to high plasticity	X	W4		+8.82	3							40	P=148 kPa SPT 3.50 m N=8 P=231.5 kPa
				SILT with trace of fine sand, very soft to soft	X	W5		+8.32	4								
Explanations:				<ul style="list-style-type: none"> <li>Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered</li> <li>Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong</li> <li>TCR - Total Core Recovery</li> <li>SCR - Solid Core Recovery</li> <li>ROD - Rock Quality Designation</li> <li>Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge</li> <li>Small Disturbed Sample</li> <li>Large Disturbed Sample</li> <li>Scale Penetrometer - blows/100mm</li> <li>Permeability Test</li> <li>U100 Undisturbed Sample</li> <li>In situ Vane Shear Strength (kPa)</li> <li>UTP = Unable to penetrate</li> </ul>													
All dimensions in metres Scale 1:31				Contractor: GDISL		Rig/Plant Used: Drill Rig - Triple Tube		Logged by: KC		Checked by: DMC		Remarks N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005					

DRILL HOLE LOG																	
Project: Nadi River Basin Drilling Works			Feature		Location: Votualevu Sugar Cane Farm		No.: <b>BH11</b>										
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										
Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR	SCR	ROD (%)	Samples	Tests
				SILT with trace of fine sand, very soft to soft (continued)	X	W6		+2.82	8							53	SPT 5.00 m N=25 P=113 kPa
				SILT with some silt stone nodules trace of iron staining and medium subrounded gravel	X	W7		+2.32	9								
Explanations:				<ul style="list-style-type: none"> <li>Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered</li> <li>Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong</li> <li>TCR - Total Core Recovery</li> <li>SCR - Solid Core Recovery</li> <li>ROD - Rock Quality Designation</li> <li>Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge</li> <li>Small Disturbed Sample</li> <li>Large Disturbed Sample</li> <li>Scale Penetrometer - blows/100mm</li> <li>Permeability Test</li> <li>U100 Undisturbed Sample</li> <li>In situ Vane Shear Strength (kPa)</li> <li>UTP = Unable to penetrate</li> </ul>													
All dimensions in metres Scale 1:31				Contractor: GDISL		Rig/Plant Used: Drill Rig - Triple Tube		Logged by: KC		Checked by: DMC		Remarks N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005					



DRILL HOLE LOG														
Project: Nadi River Basin Drilling Works			Feature		Location: Votualevu Sugar Cane Farm		No.: <b>BH11</b>							
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								
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 ROD (%)	Samples	Tests
			SILT with trace of fine sand, organics and silt stone nodules, green grey, firm to stiff, low to medium plasticity				-8.18	20.00		100				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	21.00						P= 300 kPa
			SILT with trace of fine sand and organics, green grey, firm, low to medium plasticity				-9.18	21.50						SPT 21.50 m N= 50 P= 185 kPa
			Fine to coarse SAND with some fine sub-rounded gravel, grey black				-9.68	22.00		93				
			SILT with some fine to medium sand trace of fine sub-angular gravel				-10.68	23.00						P= 138 kPa 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				-11.18	24.00		73				
			SILT with some fine sub-angular gravel and trace of fine sand, pale grey (moderately to highly weathered, SILTSTONE CONGLOMERATE, pale grey, weak to very weak)				-12.18	24.50						SPT 24.50 m N= 50
<b>Explanations:</b> 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 TOR - Total Core Recovery SCR - Solid Core Recovery ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge Small Disturbed Sample Large Disturbed Sample Scale Penetrometer - blows/100mm Permeability Test U100 Undisturbed Sample Insitu Vane Shear Strength (kPa) UTP = Unable to penetrate										<b>Remarks</b> 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.: <b>BH11</b>							
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								
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 ROD (%)	Samples	Tests
			SILT with trace of fine sand, organics and silt stone nodules, green grey, firm to stiff, low to medium plasticity				-8.18	20.00		100				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	21.00						P= 300 kPa
			SILT with trace of fine sand and organics, green grey, firm, low to medium plasticity				-9.18	21.50						SPT 21.50 m N= 50 P= 185 kPa
			Fine to coarse SAND with some fine sub-rounded gravel, grey black				-9.68	22.00		93				
			SILT with some fine to medium sand trace of fine sub-angular gravel				-10.68	23.00						P= 138 kPa 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				-11.18	24.00		73				
			SILT with some fine sub-angular gravel and trace of fine sand, pale grey (moderately to highly weathered, SILTSTONE CONGLOMERATE, pale grey, weak to very weak)				-12.18	24.50						SPT 24.50 m N= 50
<b>Explanations:</b> 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 TOR - Total Core Recovery SCR - Solid Core Recovery ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge Small Disturbed Sample Large Disturbed Sample Scale Penetrometer - blows/100mm Permeability Test U100 Undisturbed Sample Insitu Vane Shear Strength (kPa) UTP = Unable to penetrate										<b>Remarks</b> 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							

**Borehole 11 Core Photos (0.00m to 24.50m)**



0.00m to 2.70m



2.70m to 7.80m



7.80m to 14.80m



14.80m to 21.40m



21.40m to 24.50m

## APPENDIX 11c Laboratory Test Schedule and Test Results



Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Permeability	Density	Moisture Content	Lab Tests Required			Remarks			
								PSD	Atterberg	UCS		Consolidation		
1920815	Site 11, (BH11)	Clayey SILT/ Silty CLAY	SPT	1.0-1.5			1							
			U	2.0-2.50			1							
			SPT	3.5-4.0										
			SILT	5.0-5.5										
			SPT	6.5-7.0										
			SPT	8.0-8.5										
			U	9.5-10.0										
			SPT	11.0-11.5										
			SPT	12.5-13.0										
			SPT	14.0-14.45										
			SPT	15.5-16.0										
			SPT	16.9-17.5										
			SPT	18.5-19.0										
			SPT	20.5-22.0										
			SPT	23.0-23.5										
SPT	24.5-25.0													
<b>TOTALS</b>														
Bill of Quantity														
Lab Test Schedule checked by: <b>DMC</b>														
					1	2	3	6	6	3	3	25		
					1							29		

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

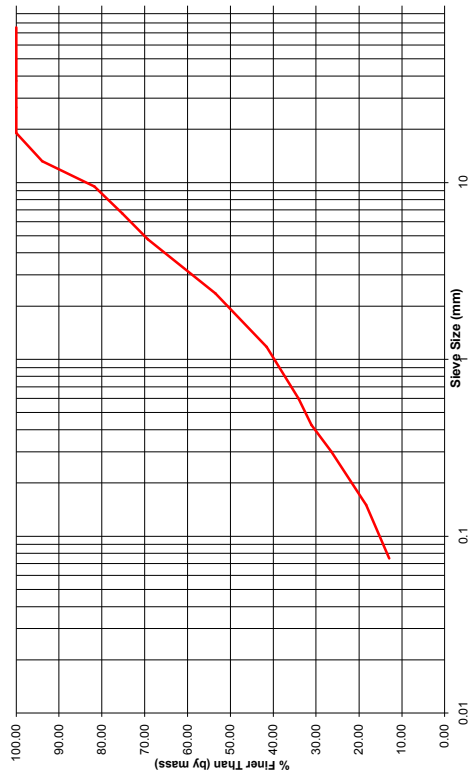
Moisture Content (Material passing 19mm)	Container No.	-	152	170	SPLIT SAMPLE
Mass of Container	g	11.52	12.01		Mass Passing Last Sieve: - gM <sub>s</sub>
Mass of Container + Wet Soil	g	18.80	19.73		Mass after Splitting: - gM <sub>s</sub>
Mass of Container + Dry Soil	g	16.49	17.26		Splitting Factor = $\frac{M_1}{M_2}$
Mass of Dry Soil	g	4.97	5.25		= $\frac{M_1}{M_2}$
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 <sub>s</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g		205.50
Total Mass of dry sample (M <sub>t</sub> )	M <sub>t</sub> =	$\frac{100M_w}{100+w}$	
	M <sub>t</sub> =	140.02	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>s</sub> )	Corrected Mass	Percentage Retained = (Mass/M <sub>t</sub> ) × 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



BH11 12.5m-13.0m

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

Form GE-L-06

Page 2 of 2

**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3-6.4)

PRINCIPAL : Japan International Cooperation Agency	PROJECT No. : 1920815
PROJECT NAME : Geotechnical Engineering Investigation for Nadi River Project Drilling	DATE / : 02 November 2015
SITE ADDRESS : Site 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	

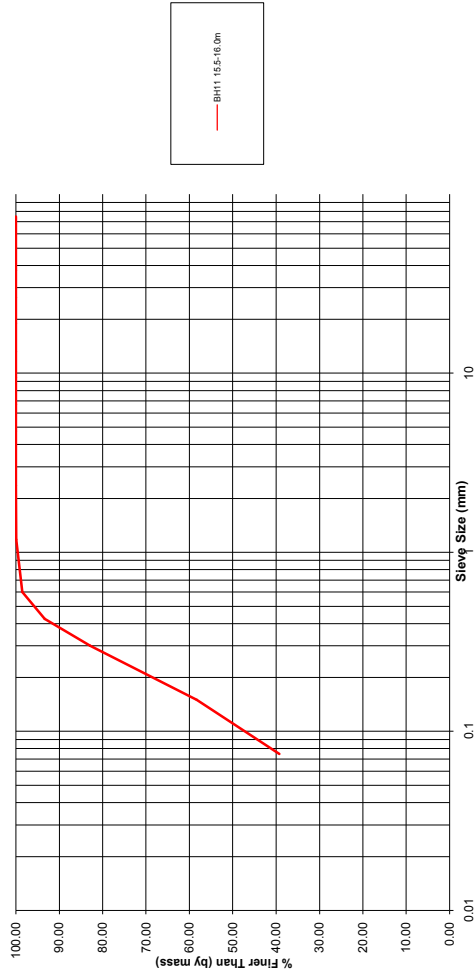
Moisture Content (Material passing 19mm)	Container No.	-	128	168	SPLIT SAMPLE
Mass of Container	g	11.83	11.55	Mass Passing Last Sieve: -	gM <sub>1</sub>
Mass of Container + Wet Soil	g	25.95	25.96	Mass after Splitting: -	gM <sub>2</sub>
Mass of Container + Dry Soil	g	22.41	22.33	Splitting Factor $\frac{M_2}{M_1}$	
Mass of Dry Soil	g	10.58	10.78	=	M <sub>1</sub>
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 <sub>1</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	264.66	
Total Mass of dry sample (M <sub>2</sub> )	M <sub>2</sub> =	$\frac{100M_w}{100 + w}$	
	M <sub>2</sub> =	198.15	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>2</sub> )	Corrected Mass	Percentage Retained = (Mass/M <sub>2</sub> ) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm	N/A	N/A	0.00	100.00		300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	N/A	0.00	100.00		300
19.0mm	N/A	N/A	0.00	100.00		200
13.2 mm	N/A	N/A	0.00	100.00	600	300
9.50 mm	N/A	N/A	0.00	100.00	450	300
6.70 mm	N/A	N/A	0.00	100.00	300	300
4.75 mm	N/A	N/A	0.00	100.00	250	200
2.36 mm	N/A	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



LOCATION: BH11 15.5-16.0m  
DATE OF TEST: 02 November 2015  
DESCRIPTION: SILT with some fine to coarse sand, pale brown, soft to firm, low to medium plasticity  
SAMPLE No: NS48

PRINCIPAL : Japan International Cooperation Agency	PROJECT No. : 1920815
PROJECT NAME : Geotechnical Engineering Investigation for Nadi River Project Drilling	DATE / : 02 November 2015
SITE ADDRESS : Site 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	

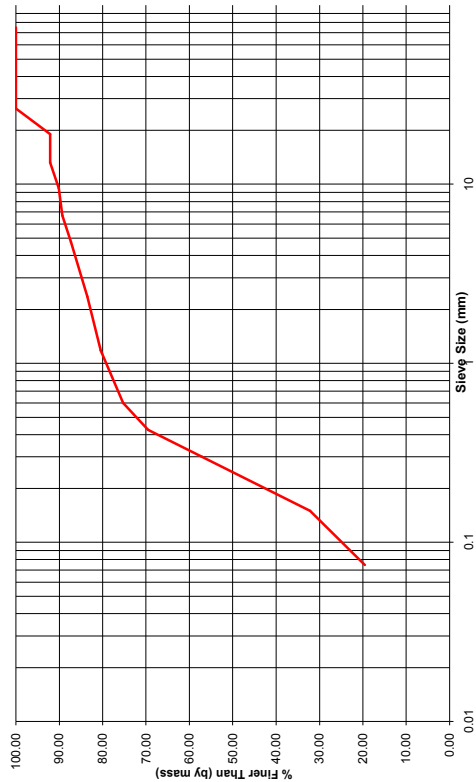
Moisture Content (Material passing 19mm)	Container No.	-	138	165	SPLIT SAMPLE	
Mass of Container	g	11.13	11.76	Mass Passing Last Sieve:	-	gM <sub>1</sub>
Mass of Container + Wet Soil	g	22.38	22.25	Mass after Splitting:	-	gM <sub>2</sub>
Mass of Container + Dry Soil	g	19.50	19.52	Splitting Factor = $\frac{M_1}{M_2}$		
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 <sub>r</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g		261.03
Total Mass of dry sample (M <sub>t</sub> )	M <sub>r</sub> =	$\frac{100M_w}{100+w}$	
	M <sub>t</sub> =	193.65	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>c</sub> )	Corrected Mass	Percentage Retained = (Mass/M <sub>t</sub> ) × 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



BH11 17.0-17.5m

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

**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3-5.1)

PRINCIPAL : Japan International Cooperation Agency	PROJECT No. : 1920815
PROJECT NAME : Geotechnical Engineering Investigation for Nadi River Project Drilling	DATE / : 02 November 2015
SITE ADDRESS : Site 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	

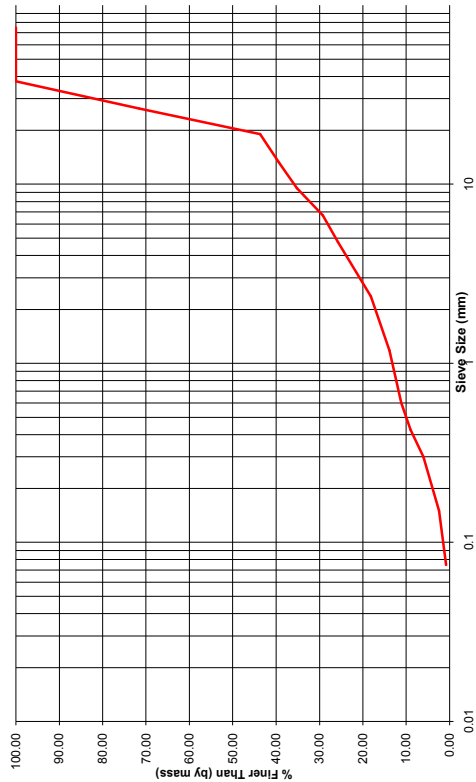
Moisture Content (Material passing 19mm)	Container No.	-	120	164	SPLIT SAMPLE
Mass of Container	g	11.68	11.81	Mass Passing Last Sieve:	- gM <sub>1</sub>
Mass of Container + Wet Soil	g	19.91	20.34	Mass after Splitting:	- gM <sub>2</sub>
Mass of Container + Dry Soil	g	18.96	19.24	Splitting Factor = $\frac{M_1}{M_2}$	= $\frac{M_1}{M_2}$
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 <sub>r</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	271.48	
Total Mass of dry sample (M <sub>t</sub> )	M <sub>r</sub> =	$\frac{100M_w}{100 + w}$	
	M <sub>t</sub> =	238.29	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>c</sub> )	Corrected Mass	Percentage Retained = (Mass/M <sub>t</sub> ) × 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	6.42	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



BH11 18.5-19.6m

LOCATION: BH11 18.5-19.6m  
DATE OF TEST: 02 November 2015  
DESCRIPTION: Fine angular GRAVEL with some fine to medium sand, grey, moist  
SAMPLE No: N98B

Form GE-L-06

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**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3-B-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	

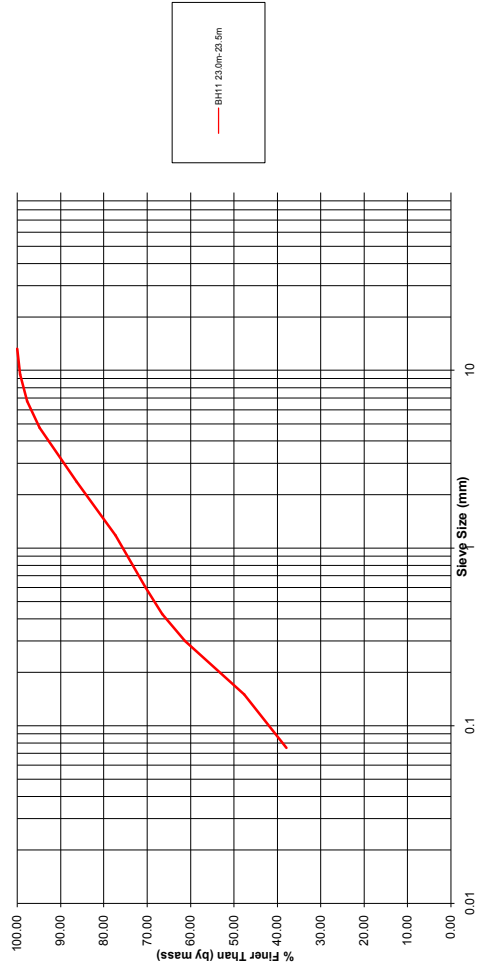
Moisture Content (Material passing 19mm)	Container No.	-	28	29	SPLIT SAMPLE
Mass of Container	g	13.96	14.26	Mass Passing Last Sieve:	- g/M <sub>s</sub>
Mass of Container + Wet Soil	g	28.64	27.98	Mass after Splitting:	- g/M <sub>s</sub>
Mass of Container + Dry Soil	g	24.79	24.35	Splitting Factor = $\frac{M_s}{M_d}$	
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 <sub>r</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	313.59	
Total Mass of dry sample (M <sub>t</sub> )	M <sub>r</sub> =	$\frac{100M_w}{100 + w}$	
	M <sub>r</sub> =	230.93	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>r</sub> )	Corrected Mass	Percentage Retained = $\frac{M_r}{M_t} \times 100$	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



LOCATION: Site 11  
DATE OF TEST: 06 November 2015  
DESCRIPTION: SILT with some fine to medium sand (trace of fine sub-angular gravel)  
SAMPLE No: N652

**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3-5.4)

PRINCIPAL : Japan International Cooperation Agency	PROJECT No. : 1920815
PROJECT NAME : Geotechnical Engineering Investigation for Nadi River Project Drilling	DATE / : 6/11/2015
SITE ADDRESS : Site 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	

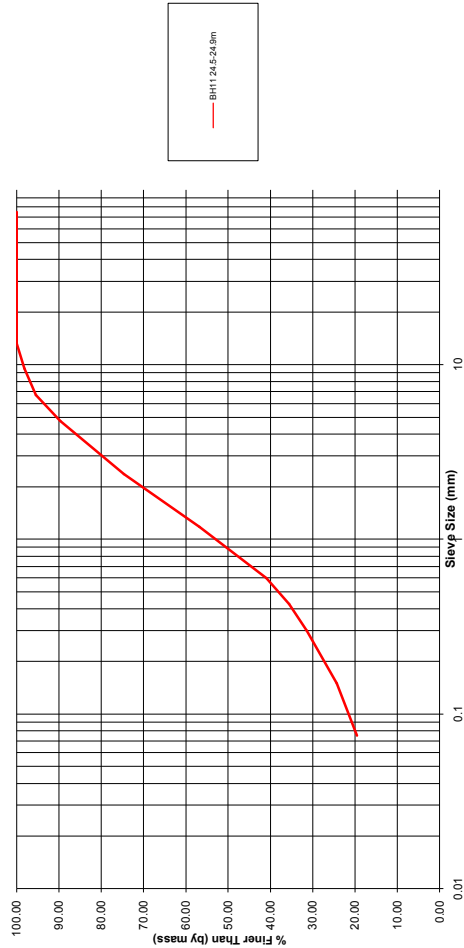
Moisture Content (Material passing 19mm)	Container No.	-	23	25	SPLIT SAMPLE
Mass of Container	g	14.68	14.43	Mass Passing Last Sieve:	- gM <sub>s</sub>
Mass of Container + Wet Soil	g	26.66	26.47	Mass after Splitting:	- gM <sub>s</sub>
Mass of Container + Dry Soil	g	24.46	24.30	Splitting Factor	$\frac{M_s}{M_t}$
Mass of Dry Soil	g	9.78	9.87	=	$\frac{M_s}{M_t}$
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 <sub>r</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	308.16	
Total Mass of dry sample (M <sub>t</sub> )	M <sub>r</sub> =	$\frac{100M_w}{100 + w}$	
	M <sub>r</sub> =	252.09	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>r</sub> )	Corrected Mass	Percentage Retained = (Mass/M <sub>t</sub> ) 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
13.2mm	N/A	0.00	100.00		600	300
9.50mm	4.51	N/A	1.79	98.21	450	300
6.70mm	7.06	N/A	2.80	95.41	300	300
4.75mm	14.41	N/A	5.72	89.69	250	200
2.36mm	37.79	N/A	14.99	74.70	150	200
1.18mm	45.25	N/A	17.95	56.75	100	200
600µm	39.79	N/A	15.78	40.97	80	200
425µm	13.56	N/A	5.38	35.59	70	200
300µm	10.46	N/A	4.15	31.44	60	200
150µm	17.92	N/A	7.11	24.33	40	200
75µm	12.03	N/A	4.77	19.56	25	200
Passing 75µm	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	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
DATE OF TEST:	06 November 2015	SAMPLE No:	N852

Form GE-L-06

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**Unconfined Compressive Strength**  
NZS 4402:1986 (Test 6.3.1)

<b>PRINCIPAL</b>	: Japan International Cooperation Agency	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	<b>DATE TESTED</b>	: 24 October 2015
<b>SITE ADDRESS</b>	: Site 11	<b>TECHNOLOGIST</b>	: KB
<b>SAMPLE LOCATION</b>	: BH 11 2.0m-2.5m	<b>MATERIAL TYPE</b>	: SILT with some fine sand, orange brown, soft to firm, low to medium plasticity
<b>TEST NUMBER</b>	: N 617		
<b>SAMPLE HISTORY :</b> NATURAL / AIR-DRIED / OVEN-DRIED / UNKNOWN			

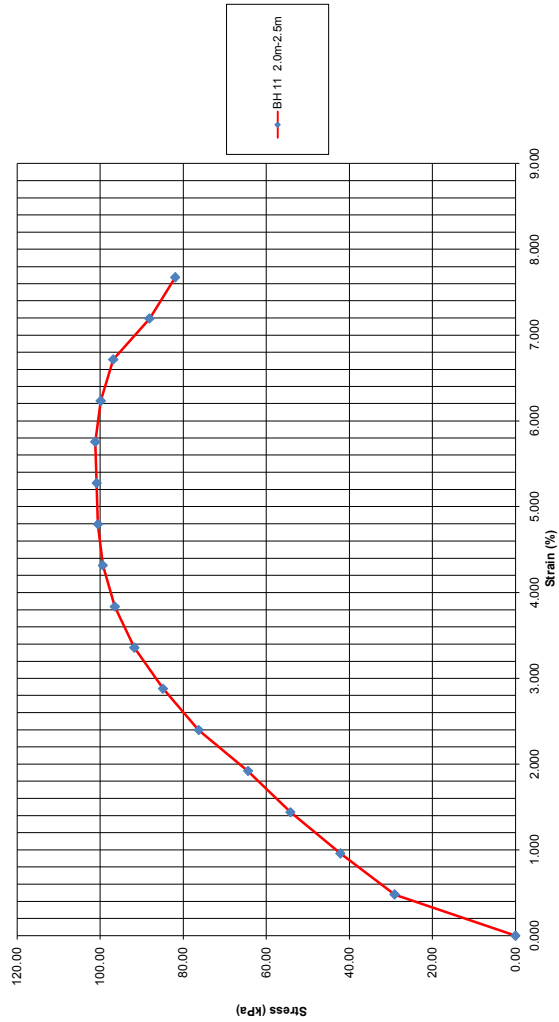
Moisture Content	Container No.	-	95
	Mass of Container	g	89.90
	Mass of Container + Wet Soil	g	522.50
	Mass of Container + Dry Soil	g	423.79
	Mass of Dry Soil	g	333.89
	Mass of Moisture	g	98.71
	Moisture Content	%	29.56

Bulk Density	Sample No.	-	N617
	Diameter of Specimen	mm	53.69
	Initial area of specimen $A_0$ ( $\pi/4 d^2$ )	mm <sup>2</sup>	2262.85
	Initial length of specimen $L_0$	mm	104.24
	Initial mass of specimen $M_i$	g	433.10
	Bulk Density $\rho$	t/m <sup>3</sup>	1.84
	Dry Density $\rho_d$	t/m <sup>3</sup>	1.42

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\epsilon = \frac{C_u - C_o}{L_0}$	Corrected Area $A = A_0(1-\epsilon)$	Principal Stress Difference $\sigma_1 - \sigma_3 = 1000P/A$
mm		(kN)	%	m <sup>2</sup>	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

**STRESS VS STRAIN**



BH 11 2.0m-2.5m

LOCATION: BH11 2.0m-2.5m  
DATE OF TEST: 28 October 2015  
SILT, with some fine sand, orange brown, soft to firm, low to medium plasticity

**Unconfined Compressive Strength**  
NZS 4402:1986 (Test 6.3.1)

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

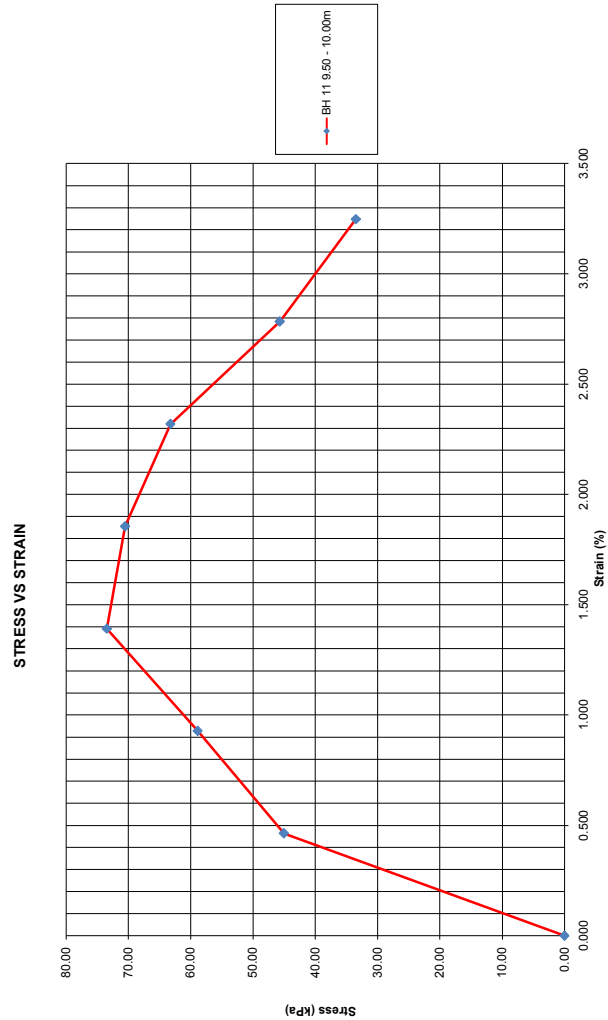
Moisture Content	Container No.	-	93
	Mass of Container	g	88.64
	Mass of Container + Wet Soil	g	541.26
	Mass of Container + Dry Soil	g	429.03
	Mass of Dry Soil	g	340.39
	Mass of Moisture	g	112.23
	Moisture Content	%	32.97

Bulk Density	Sample No.	-	N643
	Diameter of Specimen	mm	53.70
	Initial area of specimen A <sub>0</sub> (π/4 d <sup>2</sup> )	mm <sup>2</sup>	2263.70
	Initial length of specimen L <sub>0</sub>	mm	107.76
	Initial mass of specimen M <sub>i</sub>	g	453.66
	<b>Bulk Density ρ</b>	t/m <sup>3</sup>	1.86
	<b>Dry Density ρ<sub>d</sub></b>	t/m <sup>3</sup>	1.40

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\epsilon = \frac{C_n - C_0}{L_0}$	Corrected Area $A = A_0(1 - \epsilon)$	Principal Stress Difference $\sigma_1 - \sigma_3 = 1000P/A$
mm		(kN)	%	m <sup>2</sup>	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





LOCATION: BH 11: 9.5m-10.0m  
DATE OF TEST: 03 November 2015  
SILT with some silt stone nodules trace of iron staining and medium subrounded gravel

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 11	<b>TECHNOLOGIST</b>	: TL
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT with some fine sand and minor clay and trace of fine sub-angular gravel, pale brown, firm to stiff, low to medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: N644 (BH11 11.0 - 11.5m)

NATURAL MOISTURE CONTENT		1	2			Average
TEST No.						
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		1	2			Average
TEST No.						
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		1	2	3	4	5	6
TEST No.							
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		1	2	3	4	5	Average
Mould No.							
Initial length of Sample				125.00			
Final length of Sample after Shrinkage				110.00			
% Shrinkage				12.00			12.00

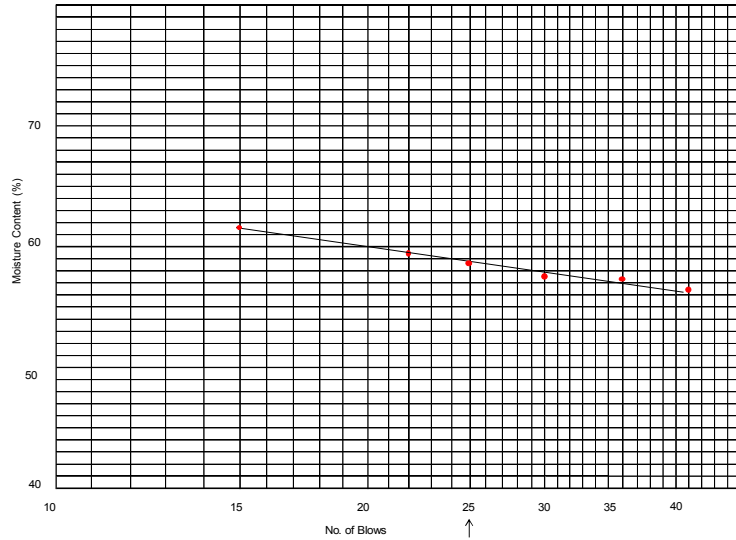
<b>Sample Preparation</b>		
as received	Liquid Limit	58.70 %
washed/sieved on 425 µm sieve	Plastic Limit	41.43 %
air dried/oven dried 105°C	Plasticity Index	17.27 %
after making a paste cured for 12-16 hrs	Shrinkage Limit	12.00 %

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

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 05 November 2015
<b>SITE ADDRESS</b>	: Site 11	<b>TECHNOLOGIST</b>	: KB
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT with trace of fine sand and organics, green grey, firm, low to medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: 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

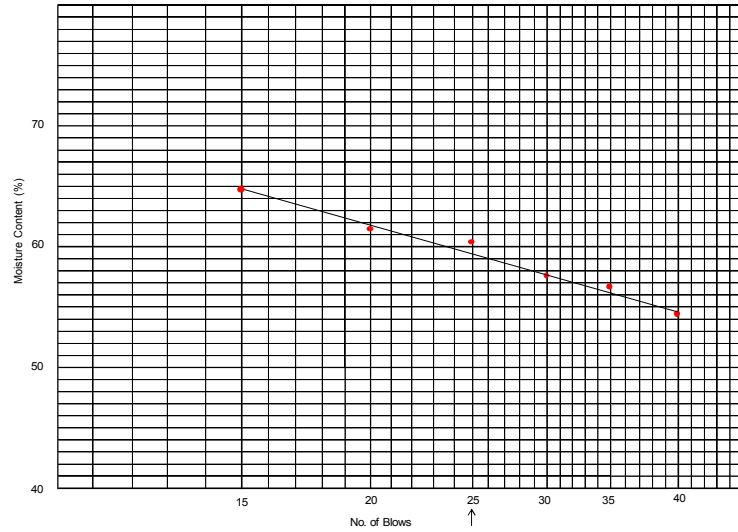
<b>Sample Preparation</b>		
as received	Liquid Limit	59.40 %
washed/sieved on 425 µm sieve	Plastic Limit	40.85 %
air dried/oven dried 105°C	Plasticity Index	18.55 %
after making a paste cured for 12-16 hrs	Shrinkage Limit	19.20 %

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

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 02 November 2015
<b>SITE ADDRESS</b>	: BH11	<b>TECHNOLOGIST</b>	: LN
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT with trace of clay, brown to light brown, soft to firm, moist, medium to high plasticity	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: N639 (BH11 3.5 - 4.0m)

NATURAL MOISTURE CONTENT						
TEST No.	1	2				Average
Container No.	g 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

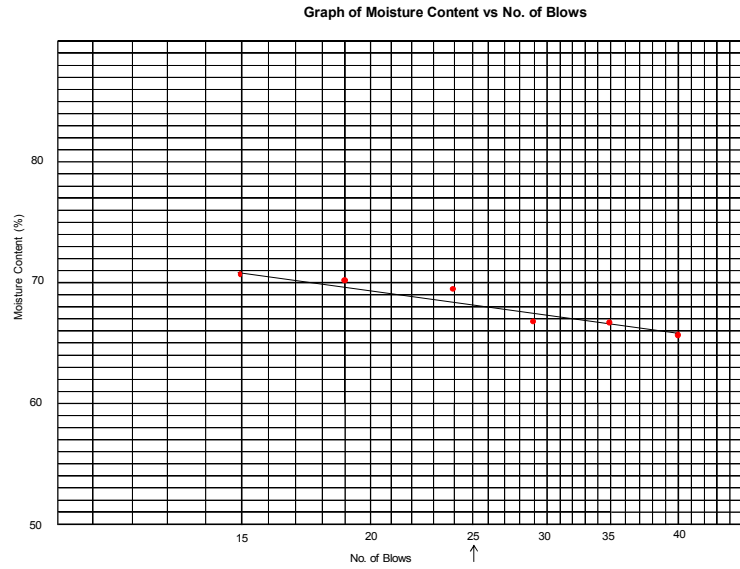
LINEAR SHRINKAGE TEST						
Mould No.	1	2	3	4	5	Average
Initial length of Sample					125.00	
Final length of Sample after Shrinkage					104.00	
% Shrinkage					16.80	16.80

Sample Preparation			
as received	Liquid Limit	68.00 %	
washed/sieved on 425 µm sieve	Plastic Limit	32.01 %	
air dried/oven dried 105°C	Plasticity Index	35.99 %	
after making a paste cured for 12-16 hrs	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



Project No: 1920815  
Sample No: N636

<b>PRINCIPAL</b> :	Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	<b>DATE / TESTED</b> :	24 October 2015
<b>SITE ADDRESS</b> :	Site 11	<b>TECHNOLOGIST</b> :	KB
<b>SAMPLE LOCATION</b> :	BH11 2.0-2.5m	<b>MATERIAL TYPE</b> :	SILT with some fine sand , orange brown , soft to firm, low to medium plasticity
<b>TEST NUMBER</b> :	N617		
<b>SAMPLE HISTORY</b> : 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 $A_0$ ( $\pi/4 d^2$ )	mm <sup>2</sup>	2259.48	
Initial length of specimen $L_0$	mm	41.77	
Initial mass of specimen $M_i$	g	163.54	
<b>Bulk Density <math>\rho</math></b>	t/m <sup>3</sup>	1.73	
<b>Dry Density <math>\rho_d</math></b>	t/m <sup>3</sup>	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

**BULK DENSITY**  
NZS 4402:1986 (Test 5.1.3)

<b>PRINCIPAL</b> :	Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b> :	1920815
<b>PROJECT NAME</b> :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	<b>DATE / TESTED</b> :	03 November 2015
<b>SITE ADDRESS</b> :	Site 11	<b>TECHNOLOGIST</b> :	TL
<b>SAMPLE LOCATION</b> :	BH11 9.5-10.0m	<b>MATERIAL TYPE</b> :	SILT with some silt stone nodules trace of iron staining and medium subrounded gravel
<b>TEST NUMBER</b> :	N643		
<b>SAMPLE HISTORY</b> : 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 A <sub>0</sub> (π/4 d <sup>2</sup> )	mm <sup>2</sup>	2282.28
	Initial length of specimen L <sub>0</sub>	mm	54.65
	Initial mass of specimen M <sub>i</sub>	g	214.29
	<b>Bulk Density p</b>	t/m <sup>3</sup>	1.72
	<b>Dry Density p<sub>d</sub></b>	t/m <sup>3</sup>	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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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



**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

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

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

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 07 November 2015
<b>SITE ADDRESS</b>	: Site 11	<b>TECHNOLOGIST</b>	: IG
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT with some fine to coarse sand, pale brown, soft to firm, low to medium plasticity (Core Sample)	<b>TEST METHOD</b>	: AS 1289.6.7.3-2001
		<b>SAMPLE No.</b>	: 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 Specimen	cm <sup>3</sup>	819.33
Wet Density	t/m <sup>3</sup>	1.71
Dry Density	t/m <sup>3</sup>	1.40
Maximum Dry Density	t/m <sup>3</sup>	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm <sup>2</sup>	113.10
Cross sectional area of soil specimen(8cm)	cm <sup>2</sup>	50.27
Length of soil specimen	cm	16.30

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm <sup>3</sup> )	Water temp T(°c)	KT cm/min	K <sub>20</sub> 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<sub>20</sub> 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


<b>Sample Details</b>	Depth	2.0 - 2.5m		
 sketch showing specimen location in original sample	Description	SILT with some fine sand, orange brown, soft to firm, low to medium plasticity.		
	Initial Height	L <sub>0</sub>	(mm)	20.0
	Initial Diameter	D <sub>0</sub>	(mm)	50.0
	Initial Weight	W <sub>0</sub>	(gr)	68.1
	Bulk Density	ρ <sub>0</sub>	(Mg/m <sup>3</sup> )	1.73
	Particle Density	ρ <sub>s</sub>	(Mg/m <sup>3</sup> )	2.65

<b>Initial Conditions</b>				
Settlement Input	L <sub>1P</sub>	(mm)	CH 3	
Initial Moisture	ω <sub>i</sub> %	(%)	33	
Initial Dry Density	ρ <sub>di</sub>	(Mg/m <sup>3</sup> )	1.30	
Initial Voids Ratio	e <sub>i</sub>	.	1.034	
Initial Degree of Saturation	S <sub>i</sub>	(%)	84.8	
Initial Swelling	S <sub>s</sub>	(kPa)	0	

<b>Final Conditions</b>				
Final Moisture	ω <sub>f</sub> %	(%)	24	
Dry Density	ρ <sub>df</sub>	(Mg/m <sup>3</sup> )	1.14	
Voids Ratio	e <sub>f</sub>	.	1.316	
Saturation	S <sub>f</sub>	(%)	48	
Height Settlement	ΔL <sub>s</sub>	(mm)	-2.782	

Vertical Stress σ' <sub>i</sub> (kPa)	Voids Ratio e <sub>f</sub>	Height ΔL <sub>s</sub> (mm)	Consolidation C <sub>v</sub> (m <sup>2</sup> /year)	Compressibility m <sub>v</sub> (m <sup>2</sup> /MN)	Initial T <sub>i</sub> (°C)	Final T <sub>f</sub> (°C)	t <sub>50</sub> Time t <sub>50</sub> (min)	t <sub>90</sub> Time t <sub>90</sub> (min)	Secondary C <sub>SEC</sub> (m <sup>2</sup> /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			

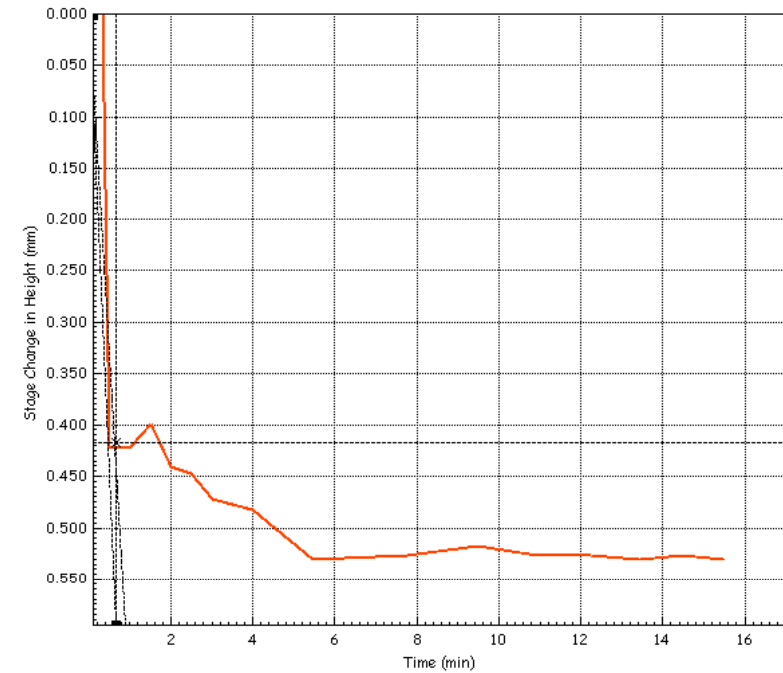
**Notes**


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

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## Oedometer Consolidation Settlement Report

Vertical Stress	σ' <sub>i</sub>	(kPa)	50
Initial Temperature	T <sub>i</sub>	(°C)	29.0
Frame Correction	L <sub>CORR</sub>	(mm)	0.000
Height Settlement	ΔL <sub>s</sub>	(mm)	0.530
Voids Ratio	e <sub>f</sub>	.	0.980
Final Temperature	T <sub>f</sub>	(°C)	0.0
t <sub>50</sub> Time	t <sub>50</sub>	(min)	
t <sub>90</sub> Time	t <sub>90</sub>	(min)	0.419
Consolidation	C <sub>v</sub>	(m <sup>2</sup> /year)	103.2
Compressibility	m <sub>v</sub>	(m <sup>2</sup> /MN)	0.530
Secondary Compression	C <sub>SEC</sub>	(m <sup>2</sup> /MN)	0.0087

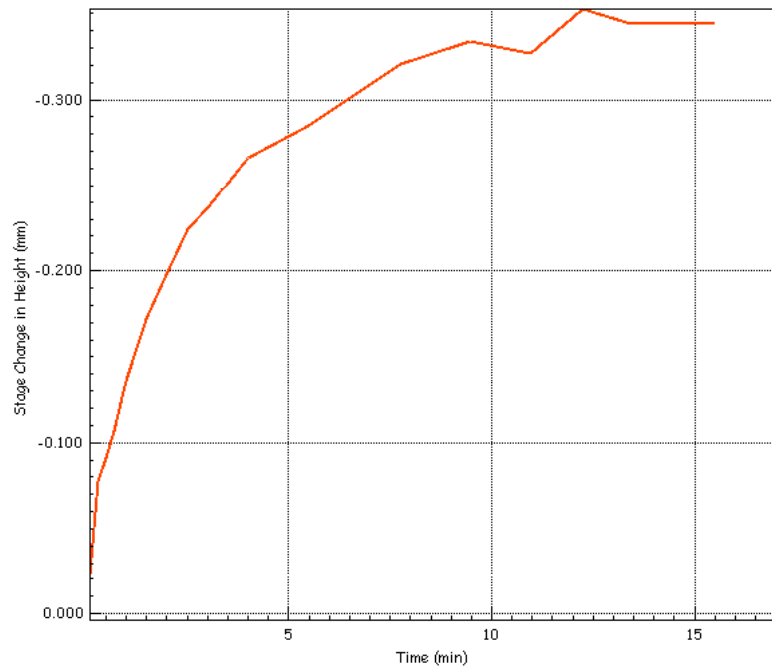


	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
	Site Reference	1920815	Database:	.\SQLEXPRESS \ ENTEC
	Jobfile	Geotechnical Engineering	Test Date	12/3/2015
	Client	Japan International Cooperation	Sample	N617
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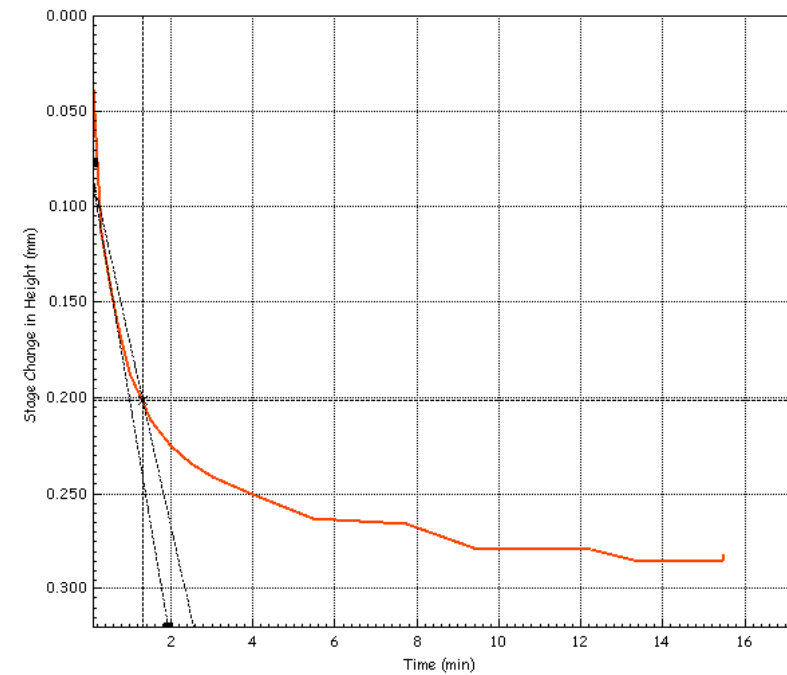
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	50
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-2.782
Voids Ratio	$e_f$	.	1.316
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	
Consolidation	$C_v$	(m <sup>2</sup> /year)	
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	100
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	1.815
Voids Ratio	$e_f$	.	0.849
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	1.744
Consolidation	$C_v$	(m <sup>2</sup> /year)	22.6
Compressibility	$m_v$	(m <sup>2</sup> /MN)	1.320
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



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	Jobfile	Geotechnical Engineering	Test Date	12/3/2015
	Client	Japan International Cooperation	Sample	N617
	Operator	IG/MK	Borehole	BH11
	Checked	DMC	Approved	DMC

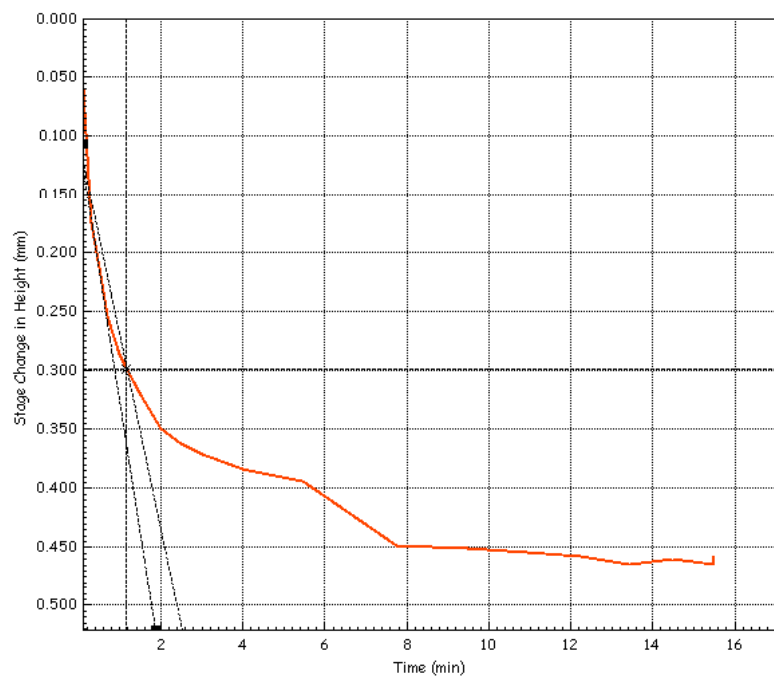
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	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	12/3/2015
	Client	Japan International Cooperation	Sample	N617
	Operator	IG/MK	Borehole	BH11
	Checked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

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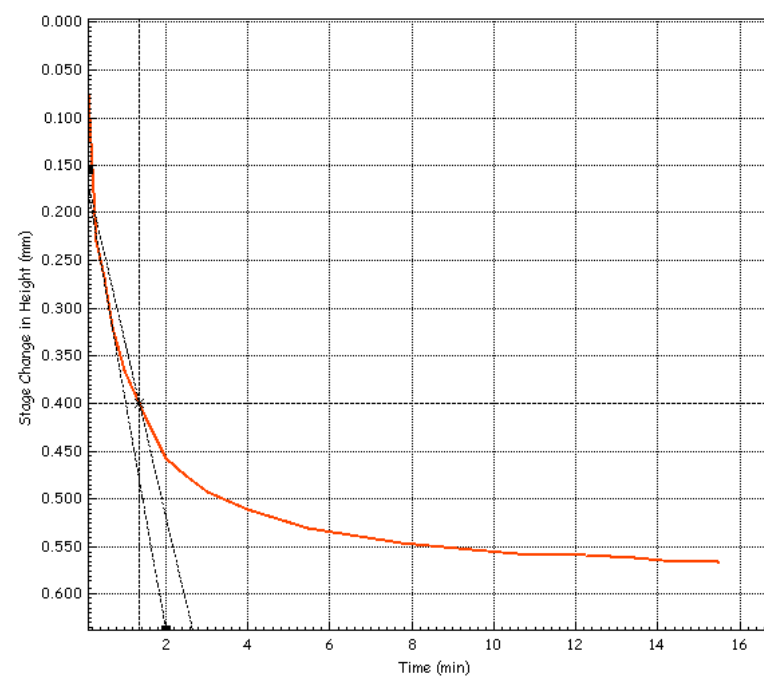
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	200
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-2.775
Voids Ratio	$e_f$	.	1.316
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	1.350
Consolidation	$C_v$	(m <sup>2</sup> /year)	42.6
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	400
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-2.778
Voids Ratio	$e_f$	.	1.316
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	1.835
Consolidation	$C_v$	(m <sup>2</sup> /year)	31.4
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
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	Jobfile	Geotechnical Engineering	Test Date	12/3/2015
	Client	Japan International Cooperation	Sample	N617
	Operator	IG/MK	Borehole	BH11
	Checked	DMC	Approved	DMC

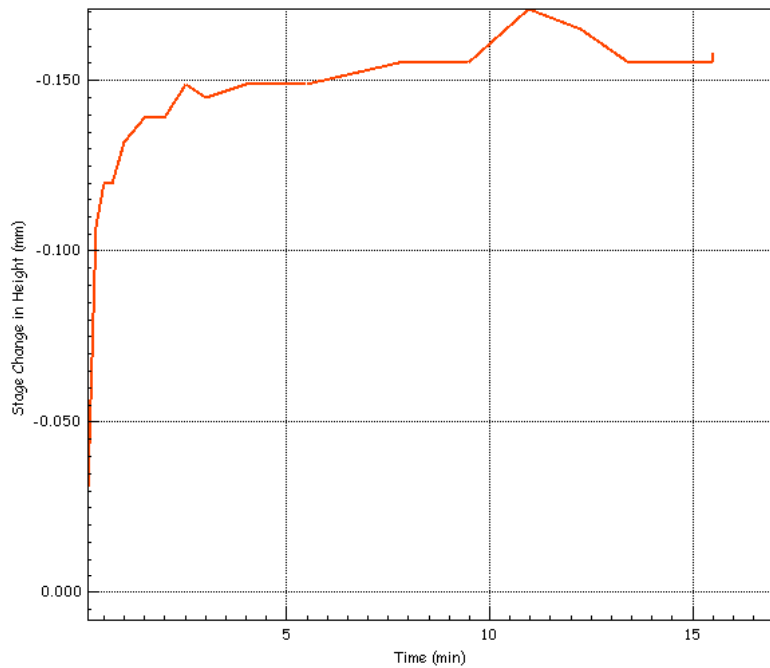
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	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	12/3/2015
	Client	Japan International Cooperation	Sample	N617
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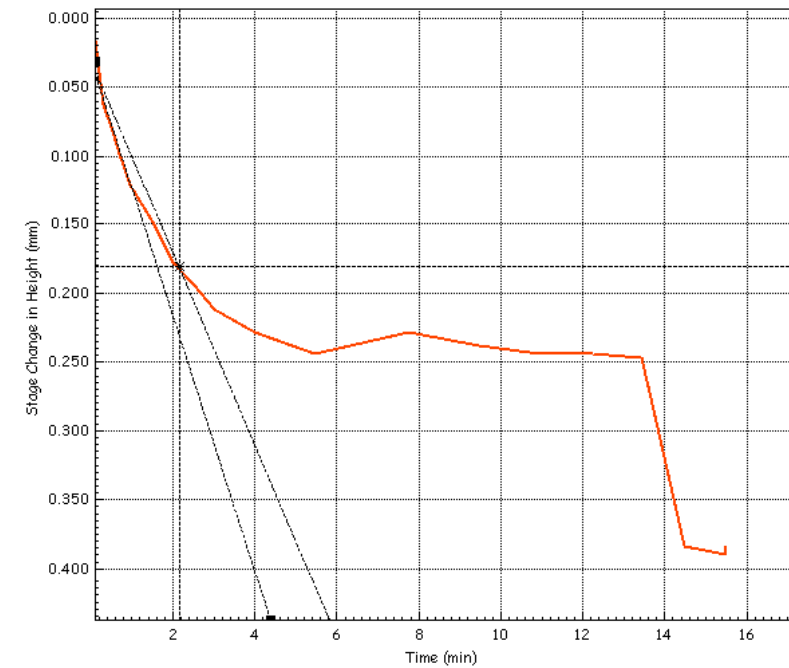
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	400
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-2.775
Voids Ratio	$e_f$	.	1.316
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	
Consolidation	$C_v$	(m <sup>2</sup> /year)	
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	600
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-2.778
Voids Ratio	$e_f$	.	1.316
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	4.694
Consolidation	$C_v$	(m <sup>2</sup> /year)	12.3
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



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

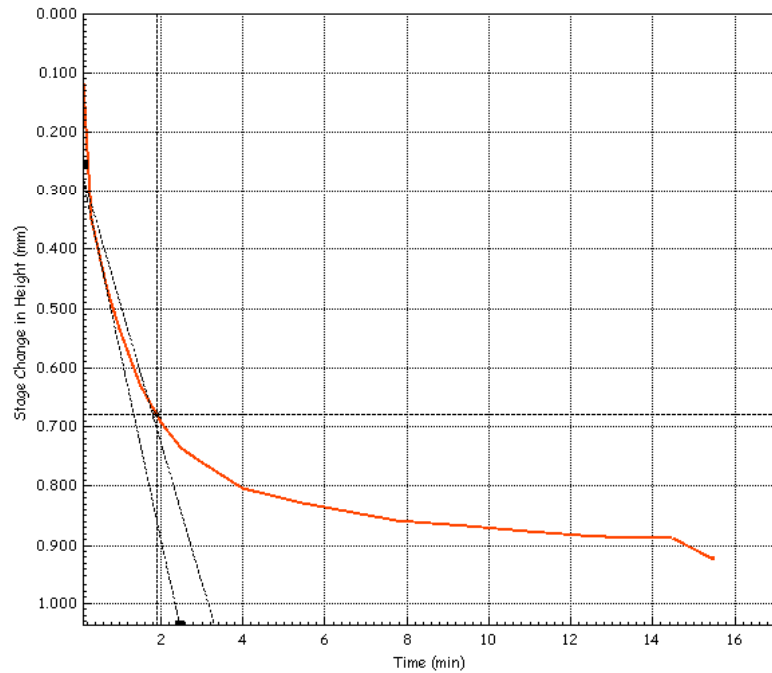
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	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-12_010
	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	12/3/2015
	Client	Japan International Cooperation	Sample	N617
	Operator	IG/MK	Borehole	BH11
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##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

Vertical Stress	$\sigma'_{i}$	(kPa)	1200
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	-2.775
Void Ratio	$e_f$	.	1.316
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t50	(min)	
t90 Time	t90	(min)	3.641
Consolidation	$C_v$	(m <sup>2</sup> /year)	15.8
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



## Oedometer Settlement Test

<p style="font-size: small;">sketch showing specimen location in original sample</p>	Depth	9.5 - 10.0m		
	Description Type	SILT with some siltstone nodules trace of iron staining and medium		
Initial Height	$L_0$	(mm)	20.0	
Initial Diameter	$D_0$	(mm)	50.0	
Initial Weight	$W_0$	(gr)	59.8	
Bulk Density	$\rho_0$	(Mg/m <sup>3</sup> )	1.52	
Particle Density	$\rho_s$	(Mg/m <sup>3</sup> )	2.65	

<b>Initial Conditions</b>			
Settlement Input	LIP	(mm)	CH 3
Initial Moisture	$\omega_i$	(%)	44
Initial Dry Density	$\rho_{di}$	(Mg/m <sup>3</sup> )	1.05
Initial Voids Ratio	$e_i$	.	1.512
Initial Degree of Saturation	$S_i$	(%)	77.7
Initial Swelling	$S_s$	(kPa)	0

<b>Final Conditions</b>			
Final Moisture	$\omega_f$	(%)	42
Dry Density	$\rho_{df}$	(Mg/m <sup>3</sup> )	1.27
Void Ratio	$e_f$	.	1.087
Saturation	$S_f$	(%)	100
Height Settlement	$\Delta L_s$	(mm)	3.388

Vertical Stress $\sigma'_{i}$ (kPa)	Void Ratio $e_f$	Height $\Delta L_s$ (mm)	Consolidation $C_v$ (m <sup>2</sup> /year)	Compressibility $m_v$ (m <sup>2</sup> /MN)	Initial $T_i$ (oC)	Final $T_f$ (oC)	t50 Time t50 (min)	t90 Time t90 (min)	Secondary C SEC (m <sup>2</sup> /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-12_010
	Site Reference	1920815	Database:	.\SQLEXPRESS \ ENTEC
	Jobfile	Geotechnical Engineering	Test Date	12/3/2015
	Client	Japan International Cooperation	Sample	N617
	Operator	IG/MK	Borehole	BH11
Checked	DMC	Approved	DMC	

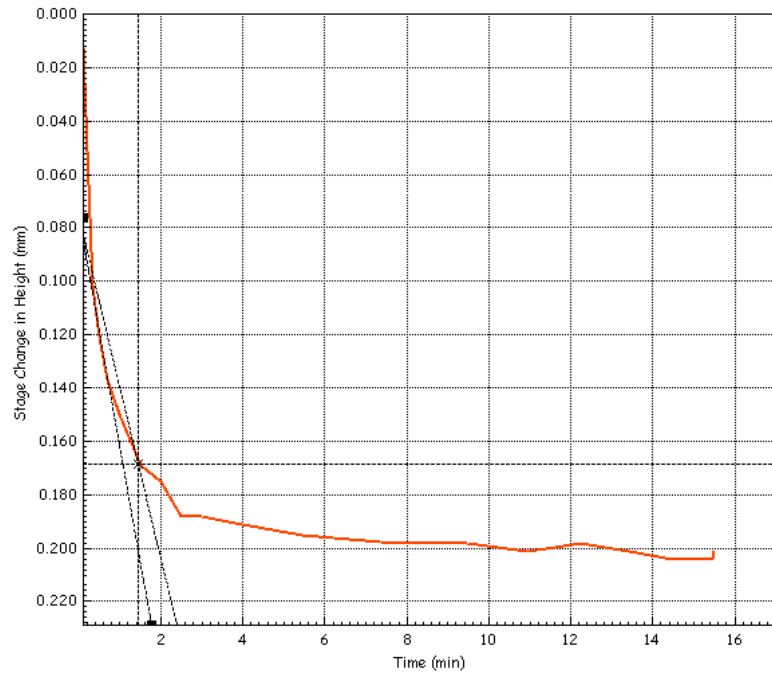
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	Test Method	AS 1289.6.6.1-1998	Test Name	ODO-13_011
	Site Reference	1920815	Database:	.\SQLEXPRESS \ ENTEC
	Jobfile	Geotechnical Engineering	Test Date	12/5/2015
	Client	Japan International Cooperation	Sample	N643
	Operator	IG/MK	Borehole	BH11a
Checked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

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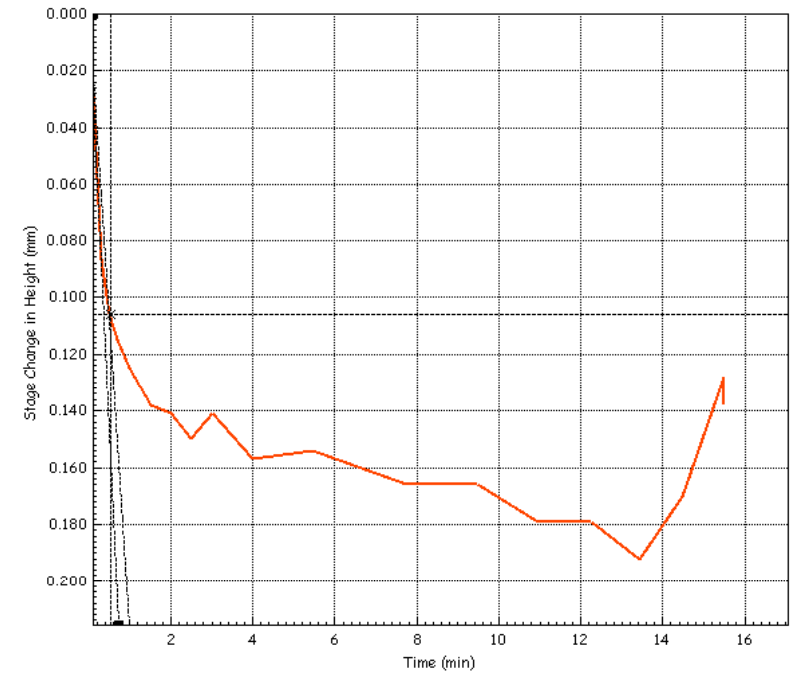
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	50
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	0.201
Voids Ratio	$e_f$	.	1.487
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	2.046
Consolidation	$C_v$	(m <sup>2</sup> /year)	21.5
Compressibility	$m_v$	(m <sup>2</sup> /MN)	0.201
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	100
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	3.385
Voids Ratio	$e_f$	.	1.087
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	0.275
Consolidation	$C_v$	(m <sup>2</sup> /year)	133.8
Compressibility	$m_v$	(m <sup>2</sup> /MN)	3.216
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



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	Jobfile	Geotechnical Engineering	Test Date	12/5/2015
	Client	Japan International Cooperation	Sample	N643
	Operator	IG/MK	Borehole	BH11a
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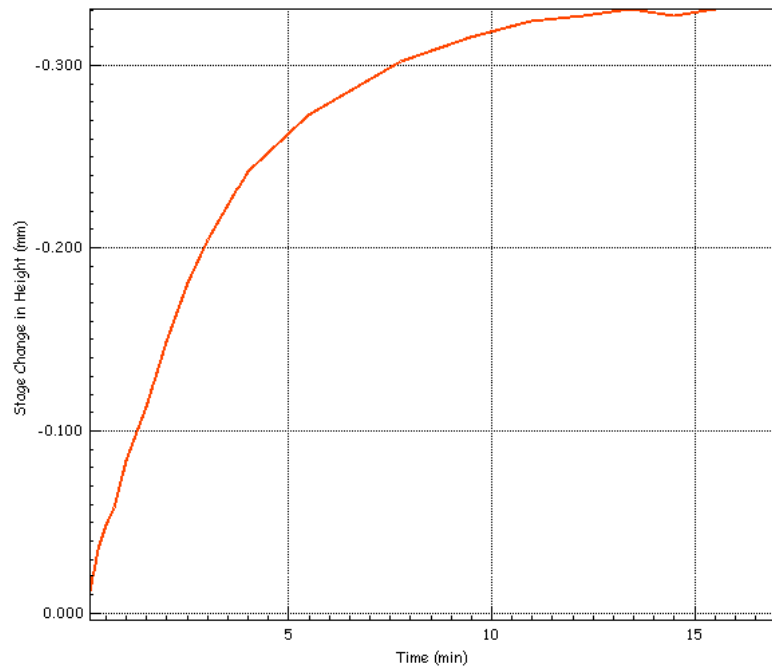
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	Site Reference	1920815	Database:	.\SQLEXPRESS\ENTEC
	Jobfile	Geotechnical Engineering	Test Date	12/5/2015
	Client	Japan International Cooperation	Sample	N643
	Operator	IG/MK	Borehole	BH11a
	Checked	DMC	Approved	DMC

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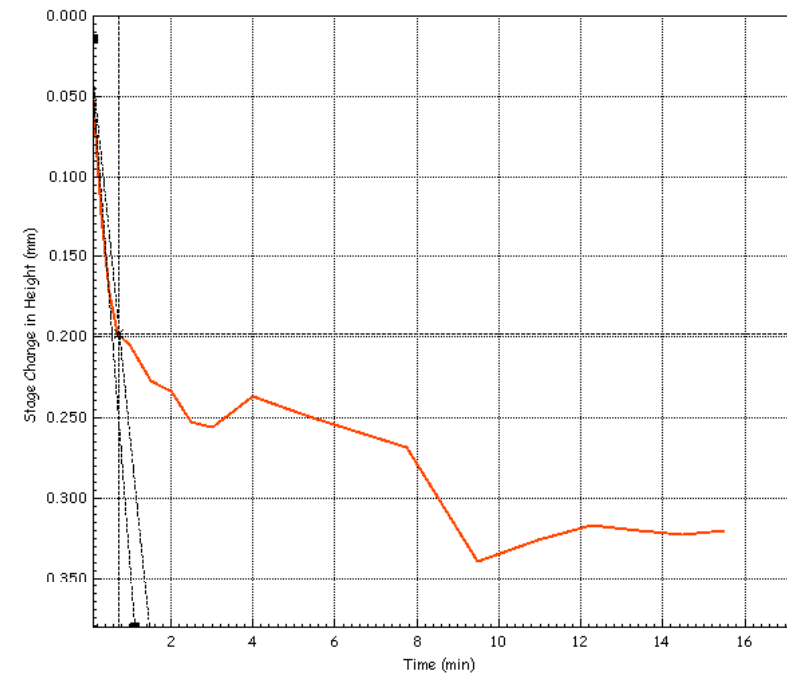
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	100
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	3.385
Voids Ratio	$e_f$	.	1.087
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	
Consolidation	$C_v$	(m <sup>2</sup> /year)	
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	200
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	3.378
Voids Ratio	$e_f$	.	1.088
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	0.536
Consolidation	$C_v$	(m <sup>2</sup> /year)	57.2
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /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

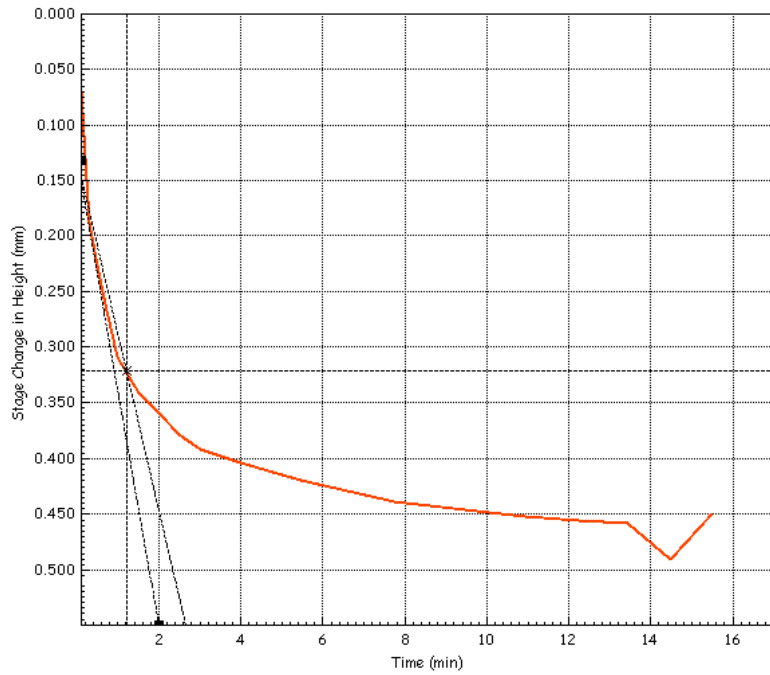
Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

	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

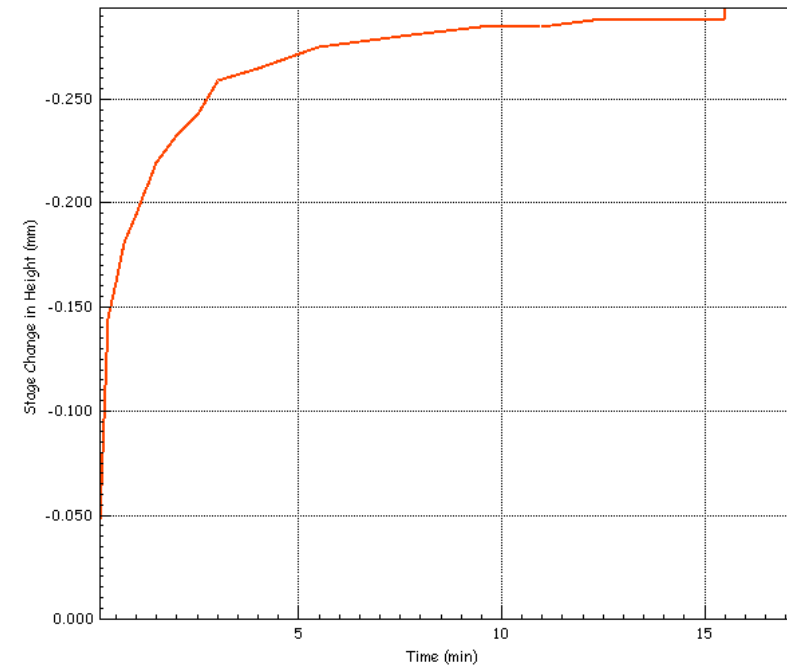
## Oedometer Consolidation Settlement Report


Vertical Stress	$\sigma'_{i}$	(kPa)	400
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	3.382
Voids Ratio	$e_f$	.	1.087
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	1.508
Consolidation	$C_v$	(m <sup>2</sup> /year)	20.3
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087




## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	400
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	3.388
Voids Ratio	$e_f$	.	1.087
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	
Consolidation	$C_v$	(m <sup>2</sup> /year)	
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	



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

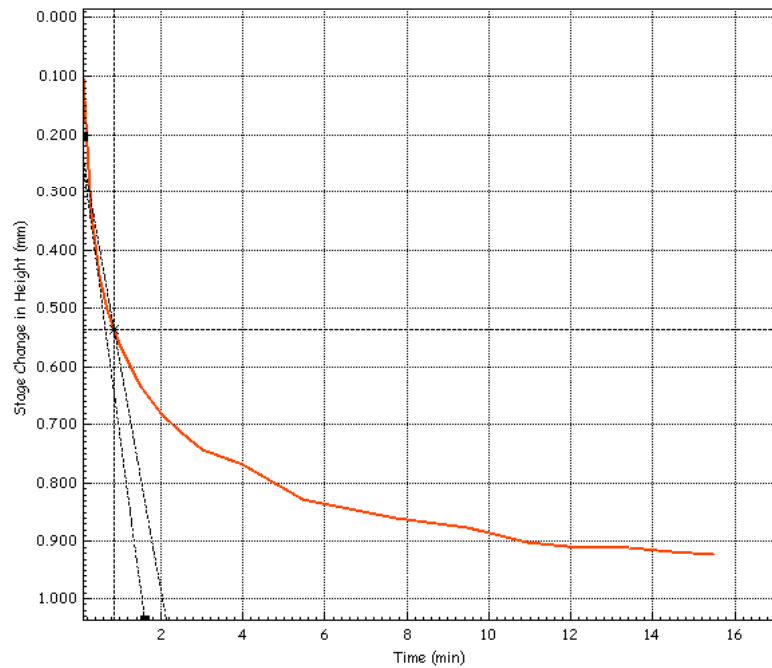
Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva

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

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

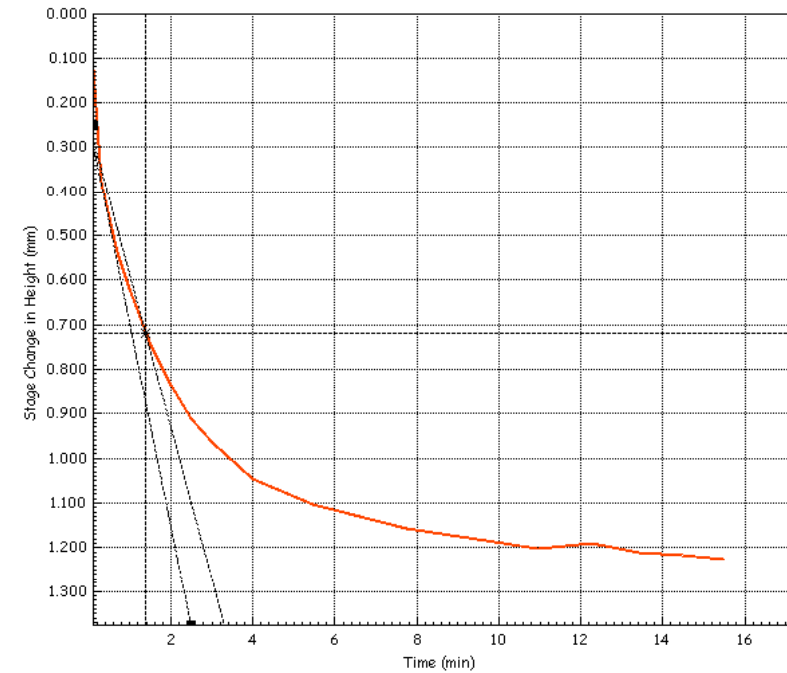
## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	800
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	3.378
Voids Ratio	$e_f$	.	1.088
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	0.733
Consolidation	$C_v$	(m <sup>2</sup> /year)	41.8
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



## Oedometer Consolidation Settlement Report

Vertical Stress	$\sigma'_{i}$	(kPa)	1600
Initial Temperature	$T_i$	(oC)	29.0
Frame Correction	L CORR	(mm)	0.000
Height Settlement	$\Delta L_s$	(mm)	3.388
Voids Ratio	$e_f$	.	1.087
Final Temperature	$T_f$	(oC)	0.0
t50 Time	t <sub>50</sub>	(min)	
t90 Time	t <sub>90</sub>	(min)	1.933
Consolidation	$C_v$	(m <sup>2</sup> /year)	15.8
Compressibility	$m_v$	(m <sup>2</sup> /MN)	
Secondary Compression	$C_{SEC}$	(m <sup>2</sup> /MN)	0.0087



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

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

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

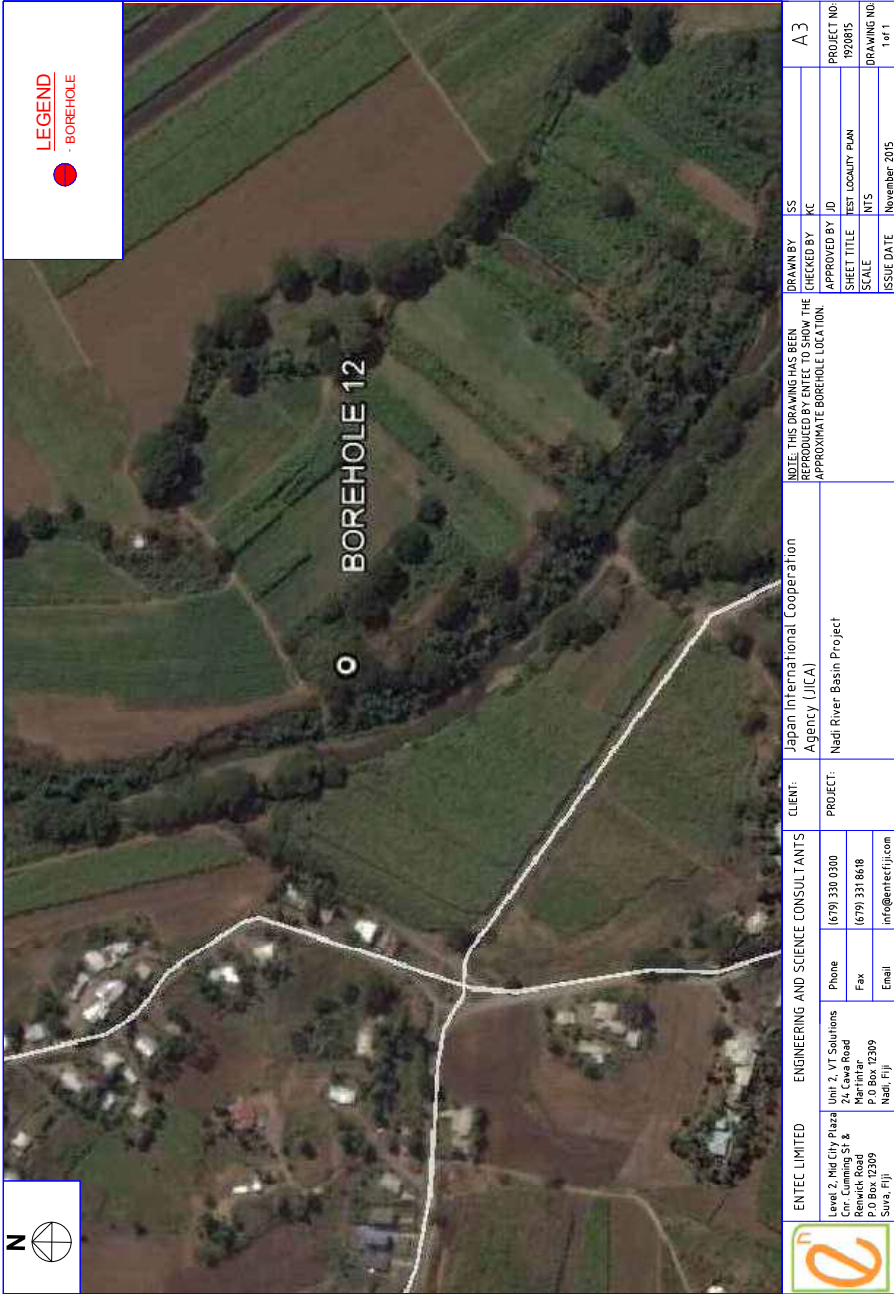
Entec Limited, Level 2 Mid City, Cnr Cumming Street & Renwick Road, Suva


**APPENDIX 12**

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

**APPENDIX 12a**

**Test Locality Plan**



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

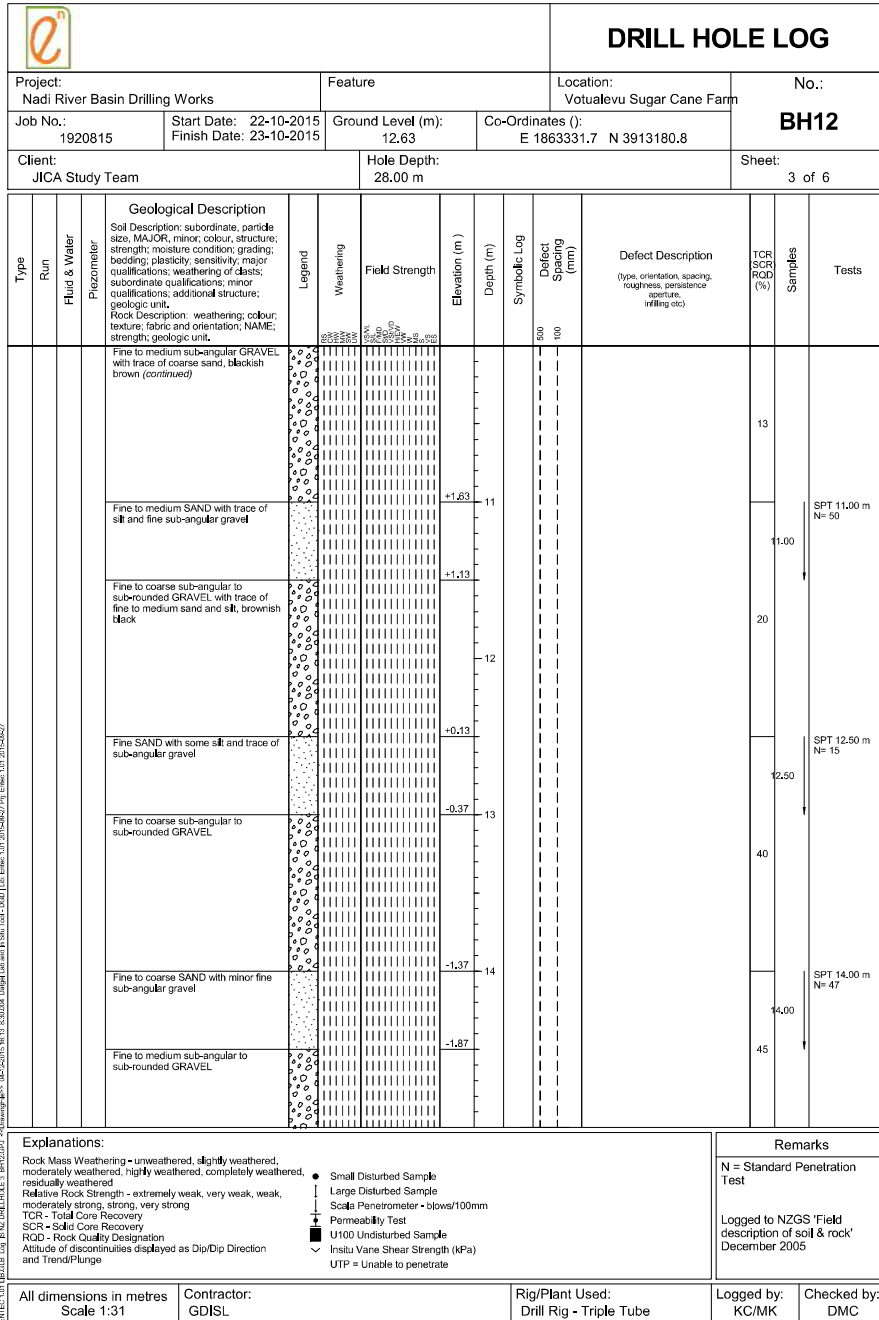
## APPENDIX 12b Engineering Borehole Log and Core Photos

DRILL HOLE LOG														
Project: Nadi River Basin Drilling Works			Feature		Location: Votualevu Sugar Cane Farm		No.: <b>BH12</b>							
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							
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 ROD (%)	Samples	Tests
			SILT with minor fine sand with trace of root fibres, dark brown, soft to very soft, moist, low to medium plasticity	X	W1		+12.23			500 100				
			Fine to medium SAND and minor silt with trace of organics and root fibres, brown, moist		W2		+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	X	W3		+10.13	2						
			Fine to medium SAND with trace of silt and root fibres, brown, moist		W4		+8.13	3						
			SILT with some fine to medium sand with trace of root fibres, dark brown, soft, moist, low to medium plasticity	X	W5		+8.63	4						
			Fine to medium SAND with trace of silt, brown, moist		W6		+7.63							
<b>Explanations:</b> 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 ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge Small Disturbed Sample Large Disturbed Sample Scale Penetrometer - blows/100mm Permeability Test U100 Undisturbed Sample Insitu Vane Shear Strength (kPa) UTP = Unable to penetrate											<b>Remarks</b> 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							

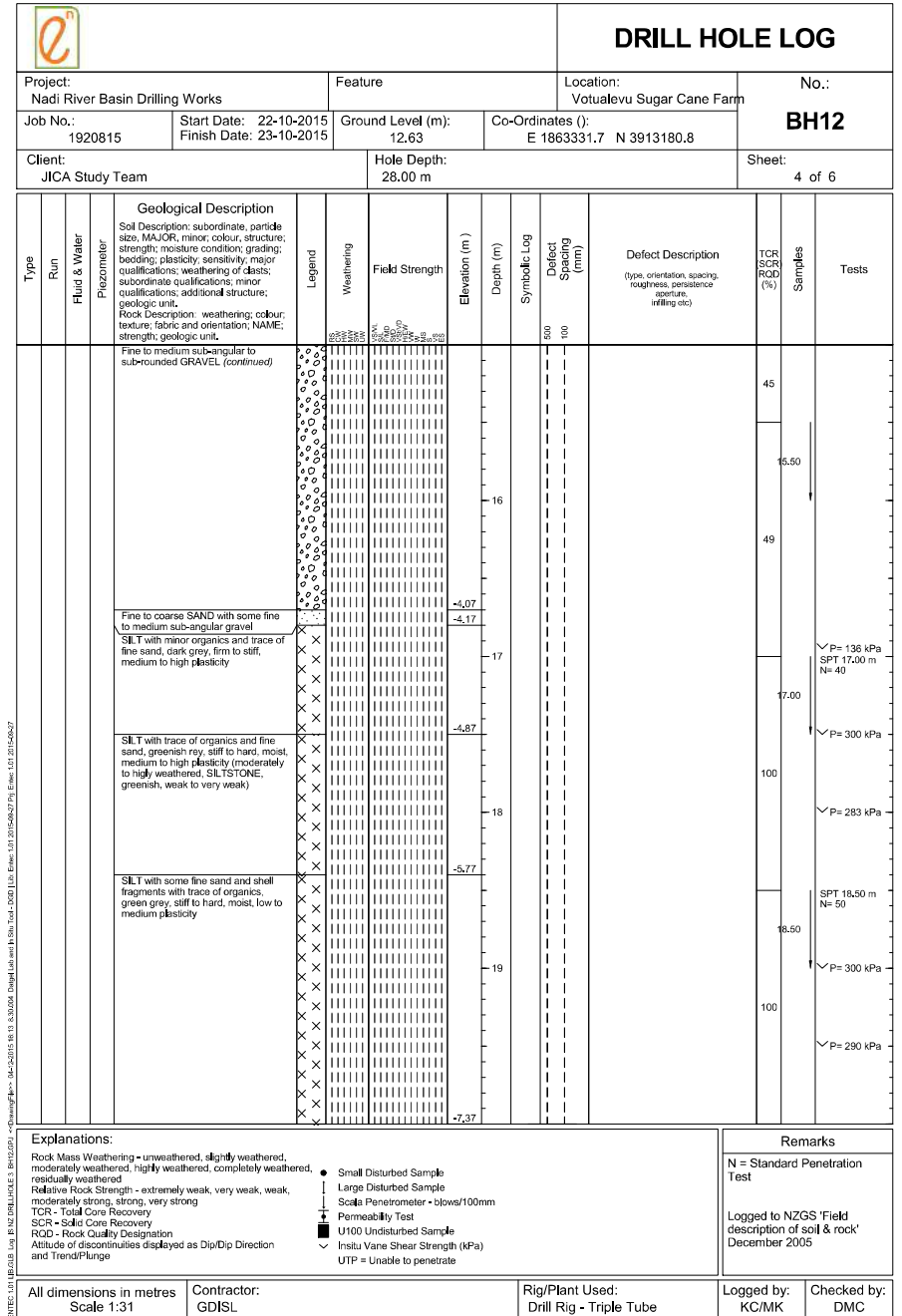
ENRIS: L01/BE/033, L01/BE/132, L01/BE/133, L01/BE/134, L01/BE/135, L01/BE/136, L01/BE/137, L01/BE/138, L01/BE/139, L01/BE/140, L01/BE/141, L01/BE/142, L01/BE/143, L01/BE/144, L01/BE/145, L01/BE/146, L01/BE/147, L01/BE/148, L01/BE/149, L01/BE/150, L01/BE/151, L01/BE/152, L01/BE/153, L01/BE/154, L01/BE/155, L01/BE/156, L01/BE/157, L01/BE/158, L01/BE/159, L01/BE/160, L01/BE/161, L01/BE/162, L01/BE/163, L01/BE/164, L01/BE/165, L01/BE/166, L01/BE/167, L01/BE/168, L01/BE/169, L01/BE/170, L01/BE/171, L01/BE/172, L01/BE/173, L01/BE/174, L01/BE/175, L01/BE/176, L01/BE/177, L01/BE/178, L01/BE/179, L01/BE/180, L01/BE/181, L01/BE/182, L01/BE/183, L01/BE/184, L01/BE/185, L01/BE/186, L01/BE/187, L01/BE/188, L01/BE/189, L01/BE/190, L01/BE/191, L01/BE/192, L01/BE/193, L01/BE/194, L01/BE/195, L01/BE/196, L01/BE/197, L01/BE/198, L01/BE/199, L01/BE/200

DRILL HOLE LOG														
Project: Nadi River Basin Drilling Works			Feature		Location: Votualevu Sugar Cane Farm		No.: <b>BH12</b>							
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							
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 ROD (%)	Samples	Tests
			Fine to medium SAND with minor silt, dark brown, moist		W1		+12.23			500 100				
			Fine to coarse SAND with trace of fine to medium sub-rounded gravel, brown		W2		+6.13	6						SPT 5.00 m N= 13
			Fine to medium sub-angular to sub-rounded GRAVEL		W3		+5.63	7						53
			Fine to coarse SAND with some fine sub-angular gravel, brown black, moist		W4		+4.63	8						6.50
			Fine sub-angular to sub-rounded GRAVEL with trace of coarse sand		W5		+4.13	9						27
			Fine to medium sub-angular GRAVEL with trace of coarse sand, blackish brown		W6		+3.13							8.00
					W7									SPT 8.00 m N= 19
					W8									20
					W9									13 9.50
					W10									SPT 9.50 m N= 0
<b>Explanations:</b> 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 ROD - Rock Quality Designation Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge Small Disturbed Sample Large Disturbed Sample Scale Penetrometer - blows/100mm Permeability Test U100 Undisturbed Sample Insitu Vane Shear Strength (kPa) UTP = Unable to penetrate											<b>Remarks</b> 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							

ENRIS: L01/BE/033, L01/BE/132, L01/BE/133, L01/BE/134, L01/BE/135, L01/BE/136, L01/BE/137, L01/BE/138, L01/BE/139, L01/BE/140, L01/BE/141, L01/BE/142, L01/BE/143, L01/BE/144, L01/BE/145, L01/BE/146, L01/BE/147, L01/BE/148, L01/BE/149, L01/BE/150, L01/BE/151, L01/BE/152, L01/BE/153, L01/BE/154, L01/BE/155, L01/BE/156, L01/BE/157, L01/BE/158, L01/BE/159, L01/BE/160, L01/BE/161, L01/BE/162, L01/BE/163, L01/BE/164, L01/BE/165, L01/BE/166, L01/BE/167, L01/BE/168, L01/BE/169, L01/BE/170, L01/BE/171, L01/BE/172, L01/BE/173, L01/BE/174, L01/BE/175, L01/BE/176, L01/BE/177, L01/BE/178, L01/BE/179, L01/BE/180, L01/BE/181, L01/BE/182, L01/BE/183, L01/BE/184, L01/BE/185, L01/BE/186, L01/BE/187, L01/BE/188, L01/BE/189, L01/BE/190, L01/BE/191, L01/BE/192, L01/BE/193, L01/BE/194, L01/BE/195, L01/BE/196, L01/BE/197, L01/BE/198, L01/BE/199, L01/BE/200



ENRIS: L01/BE/018\_04\_01; F1: NZ 25814/KEL1.5; BR12/2015; 04/20/2015 16:13; 8/3/2006; Digip/Lab/Jan N.Siv; Tool: 000 (L); Evec: L01/2015/42627



ENRIS: L01/BE/018\_04\_01; F1: NZ 25814/KEL1.5; BR12/2015; 04/20/2015 16:13; 8/3/2006; Digip/Lab/Jan N.Siv; Tool: 000 (L); Evec: L01/2015/42627

DRILL HOLE LOG														
Project: Nadi River Basin Drilling Works			Feature			Location: Votualevu Sugar Cane Farm		No.: <b>BH12</b>						
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								
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 ROD (%)	Samples	Tests
			SILT with minor sand and trace of organics with shell fragments, green grey, stiff, moist, low to medium plasticity.	X	U100		-7.87	20.00		100			SPT 20.00 m N= 44	✓ P= 200 kPa
			SILT with some fine sand and shell fragments with trace of organics, green grey, stiff, moist, low to medium plasticity	X	U100		-8.27	100		100			✓ P= 300 kPa	
			SILT with some fine sand and organic with trace of shell fragments, green grey, stiff, moist, low to medium plasticity	X	U100		-8.87	21.50		100			SPT 21.50 m N= 50	✓ P= 300 kPa
			SILT with trace of fine sand and shell fragments with organics, green grey, stiff, moist, low to medium plasticity	X	U100		-9.87	22.00		100			✓ P= 300 kPa	
			SILT with some fine sand and shell fragments with trace of organics, green grey, stiff, low to medium plasticity	X	U100		-10.37	23.00		100			SPT 23.00 m N= 51	✓ P= 300 kPa
			SILT with minor shell fragments and trace of organics, green grey, stiff, moist, medium to high plasticity	X	U100		-10.87	24.00		100			✓ 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	X	U100		-11.87	24.50		100			SPT 24.50 m N= 50	✓ P= 300 kPa
			SILT with some fine sand and trace of shell fragments, green grey, soft to firm, moist, low to medium plasticity	X	U100		-12.37	53		24.50			SPT 24.50 m N= 50	
Explanations:			<ul style="list-style-type: none"> <li>Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered</li> <li>Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong</li> <li>TCR - Total Core Recovery</li> <li>SCR - Solid Core Recovery</li> <li>ROD - Rock Quality Designation</li> <li>Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge</li> <li>Small Disturbed Sample</li> <li>Large Disturbed Sample</li> <li>Scale Penetrometer - blows/100mm</li> <li>Permeability Test</li> <li>U100 Undisturbed Sample</li> <li>In situ Vane Shear Strength (kPa)</li> <li>UTP = Unable to penetrate</li> </ul>											
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.: <b>BH12</b>						
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								
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 ROD (%)	Samples	Tests
			SILT with 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)	X	U100		-13.37	26.00		100			✓ P= 300 kPa SPT 26.00 m N= 52	
			SILT with some shell fragments and trace of fine sand, green grey, stiff, moist, low to medium plasticity	X	U100		-13.87	100		100			✓ P= 300 kPa SPT 27.50 m N= 44	
			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)	X	U100		-14.37	27.00		100			✓ P= 300 kPa	
			SILT with some shell fragments and trace of fine sand, green grey, stiff to hard, moist, low to medium plasticity (moderately to highly weathered)	X	U100		-14.87	27.50		100			✓ P= 300 kPa SPT 27.50 m N= 44	
			SILT with trace of fine sand and shell fragments with organics, green grey, firm to stiff, medium plasticity	X	U100		-15.37	28.00		100			✓ P= 300 kPa	
			Hole Terminated at 28.00 m N = Standard Penetration Test	X	U100									
			Logged to NZGS 'Field description of soil & rock' December 2005	X	U100									
Explanations:			<ul style="list-style-type: none"> <li>Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered</li> <li>Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong</li> <li>TCR - Total Core Recovery</li> <li>SCR - Solid Core Recovery</li> <li>ROD - Rock Quality Designation</li> <li>Altitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge</li> <li>Small Disturbed Sample</li> <li>Large Disturbed Sample</li> <li>Scale Penetrometer - blows/100mm</li> <li>Permeability Test</li> <li>U100 Undisturbed Sample</li> <li>In situ Vane Shear Strength (kPa)</li> <li>UTP = Unable to penetrate</li> </ul>											
All dimensions in metres Scale 1:31			Contractor: GDISL		Rig/Plant Used: Drill Rig - Triple Tube		Logged by: KC/MK		Checked by: DMC					



**Borehole 12 Core Photos (0.00m to 24.50m)**



0.00m to 11.00m



11.00m to 19.00m



19.00m to 23.30m



23.30m to 27.50m

# APPENDIX 12c

## Laboratory Test Schedule and Test Results



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						Remarks	
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS		Consolidation
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 Quantity					1	3	10	6	3	3	3	29

Lab Test Schedule checked by: DMC

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

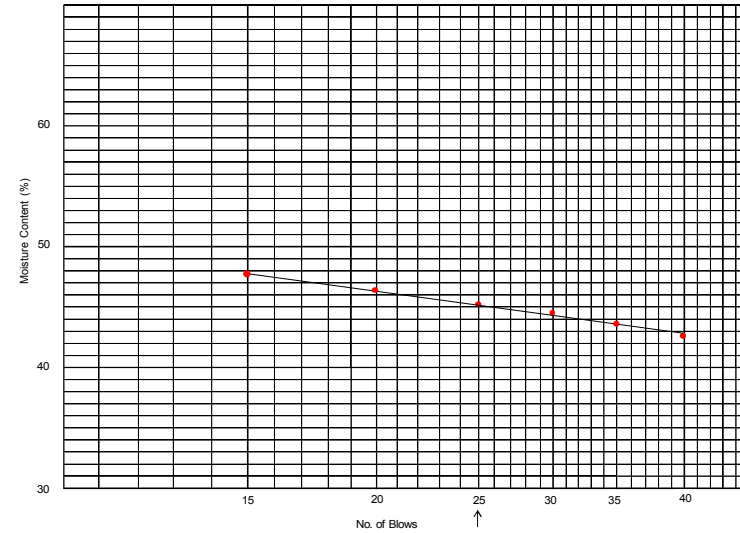
<b>Sample Preparation</b>		
as received	Liquid Limit	45.00 %
washed/sieved on 425 µm sieve	Plastic Limit	26.74 %
air dried/oven dried 105°C	Plasticity Index	18.26 %
after making a paste cured for 12-16 hrs	Shrinkage Limit	8.00 %

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: N654

<b>PRINCIPAL</b>	: Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Investigation for Nadi River Basin Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 12	<b>TECHNOLOGIST</b>	: KB
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	SILT with trace of fine sand and shell fragments and organics, green grey, stiff, moist, low to medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986 (amended version)
		<b>SAMPLE No.</b>	: 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

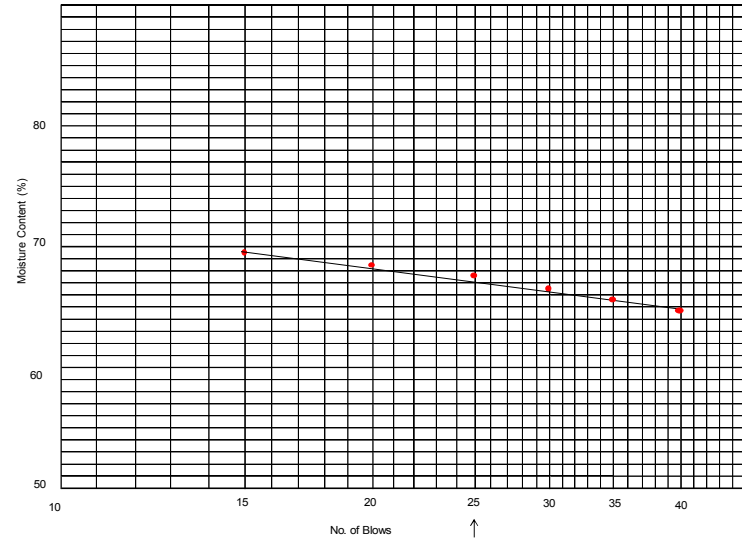
<b>Sample Preparation</b>		
as received	Liquid Limit	67.00 %
washed/sieved on 425 µm sieve	Plastic Limit	35.45 %
air dried/oven dried 105°C	Plasticity Index	31.55 %
after making a paste cured for 12-16 hrs	Shrinkage Limit	16.00 %

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

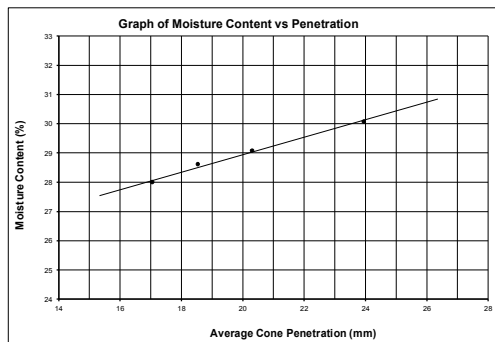
<b>PRINCIPAL</b> : Japan International Cooperation Agency	<b>PROJECT No.</b> : 1920815
<b>PROJECT NAME</b> : Geotechnical Engineering Investigation for Nadi River Project Drilling Works	<b>DATE</b> : 05/11/2015
<b>SITE ADDRESS</b> : Site 12	<b>TECHNOLOGIST</b> : KB
<b>SAMPLE LOCATION</b> : BH12 12.5 - 13.0m	<b>MATERIAL TYPE &amp; LOCATION</b> : Fine SAND with some silt and trace of subangular gravel
<b>TEST NUMBER</b> : 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 21.60
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

<b>PRINCIPAL</b> : Japan International Cooperation Agency (JICA)	<b>PROJECT No.</b> : 1920815
<b>PROJECT NAME</b> : Geotechnical Investigation for Nadi River Basin Drilling Works	<b>DATE</b> : 11 November 2015
<b>SITE ADDRESS</b> : Site 12	<b>TECHNOLOGIST</b> : IG
<b>MATERIAL TYPE &amp; DESCRIPTION</b> : Fine to medium SAND with minor silt, dark brown, moist	<b>TEST METHOD</b> : AS 1289.6.7.3-2001
	<b>SAMPLE No.</b> : 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 <sup>3</sup>	844.46
Wet Density	t/m <sup>3</sup>	1.99
Dry Density	t/m <sup>3</sup>	1.63
Maximum Dry Density	t/m <sup>3</sup>	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm <sup>2</sup>	113.10
Cross sectional area of soil	cm <sup>2</sup>	50.27
Length of soil specimen	cm	16.80

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm <sup>3</sup> )	Water temp T(°C)	KT cm/min	K <sub>20</sub> 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<sub>20</sub> 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

**Wet Sieve Analysis**  
(NZS 4407:1991 (Test 3.8.1

<b>PRINCIPAL</b> : Japan International Cooperation Agency	<b>PROJECT No.</b> : 1920815
<b>PROJECT NAME</b> : Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> : 04 November 2015
<b>SITE ADDRESS</b> : Site 12	<b>TECHNOLOGIST</b> : RK
<b>SAMPLE LOCATION</b> : BH12 5.0 - 5.5m	<b>MATERIAL TYPE &amp; LOCATION</b> : Fine to medium SAND with minor silt, dark brown, moist
<b>TEST NUMBER</b> : 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 <sub>3</sub>
Mass of Container + Wet Soil	g		20.57	20.16	Mass after Splitting: - gM <sub>4</sub>
Mass of Container + Dry Soil	g		18.79	18.56	Splitting 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		

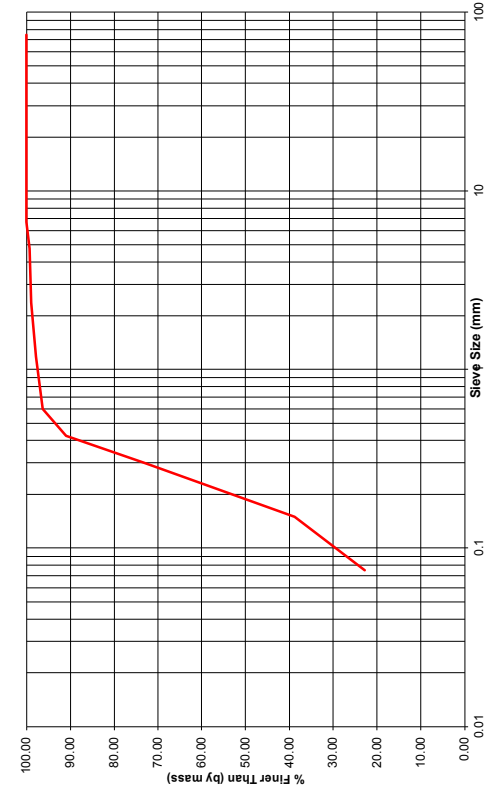
Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M <sub>1</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g		261.70
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> =	$\frac{100M_w}{100 + w}$	
	M <sub>T</sub> =	209.97	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>c</sub> )	Corrected Mass	Percentage Retained = (Mass/M <sub>T</sub> ) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter > 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm	N/A	N/A	0.00	100.00		300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	N/A	0.00	100.00		300
19.0mm	N/A	N/A	0.00	100.00		200
13.2 mm	N/A	N/A	0.00	100.00	600	300
9.50 mm	N/A	N/A	0.00	100.00	450	300
6.70 mm	N/A	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

BH12 5.0 - 5.5m



LOCATION: BH12 5.0 - 5.5m	DESCRIPTION: Fine to medium SAND with minor silt, dark brown, moist
DATE OF TEST: 04 November 2015	SAMPLE No: NR56

**Wet Sieve Analysis**  
(NZS 4407:1991 (Test 3.8.1

<b>PRINCIPAL</b> : Japan International Cooperation Agency	<b>PROJECT No.</b> : 1920815
<b>PROJECT NAME</b> : Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> : 04 November 2015
<b>SITE ADDRESS</b> : Site 12	<b>TECHNOLOGIST</b> : RK
<b>SAMPLE LOCATION</b> : BH12 8.0 - 8.5m	<b>MATERIAL TYPE &amp; LOCATION</b> : Fine to coarse SAND with some fine subangular gravel, brown black, moist
<b>TEST NUMBER</b> : 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 <sub>3</sub>
Mass of Container + Wet Soil	g	31.73	31.55	Mass after Splitting:	- gM <sub>4</sub>
Mass of Container + Dry Soil	g	29.36	29.31	Splitting Factor	$\frac{M_3}{M_4}$
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			

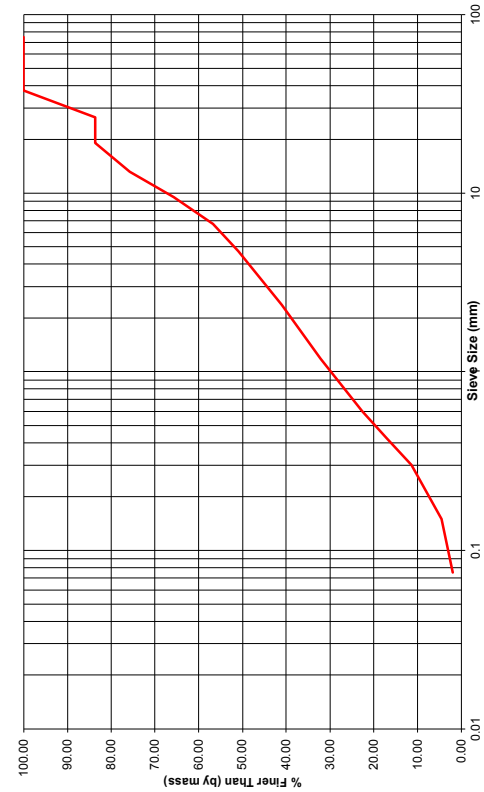
Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M <sub>r</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g	267.40	
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> =	$\frac{100M_w}{100 + w}$	
	M <sub>T</sub> =	236.35	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>s</sub> ) g	Corrected Mass g	Percentage Retained = (Mass/M <sub>T</sub> ) x 100 %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 20mm) g	Sieve Diameter mm
75.0mm	N/A	N/A	0.00	100.00	300	300
50.0mm	N/A	N/A	0.00	100.00	300	300
37.5mm	N/A	N/A	0.00	100.00	300	300
26.5mm	38.71	N/A	16.38	83.62	300	300
19.0mm		N/A	0.00	83.62	200	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

BH12 8.0 - 8.5m



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

<b>PRINCIPAL</b> : Japan International Cooperation Agency	<b>PROJECT No.</b> : 1920815
<b>PROJECT NAME</b> : Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> : 04 November 2015
<b>SITE ADDRESS</b> : Site 12	<b>TECHNOLOGIST</b> : RK
<b>SAMPLE LOCATION</b> : BH12 11.0 - 11.5m	<b>MATERIAL TYPE &amp; LOCATION</b> : Fine to medium SAND with trace silt and fine subangular gravel
<b>TEST NUMBER</b> : N660	
<b>SAMPLE HISTORY</b> : NATURAL / AIR-DRIED / OVEN-DRIED / UNKNOWN	

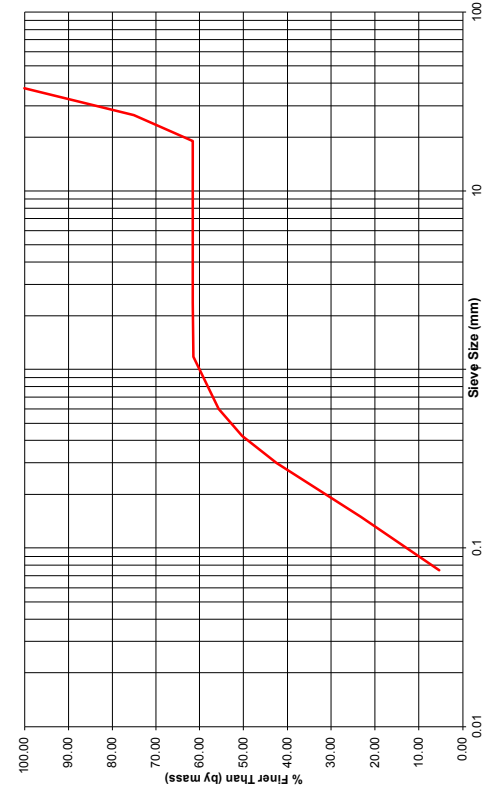
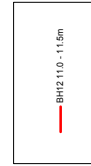
Moisture Content (Material passing 19mm)		Container No.	-	122	105	SPLIT SAMPLE	
Mass of Container		g		11.72	11.57	Mass Passing Last Sieve:	- gM <sub>1</sub>
Mass of Container + Wet Soil		g		21.03	20.47	Mass after Splitting:	- gM <sub>2</sub>
Mass of Container + Dry Soil		g		19.15	18.70	Splitting Factor	$\frac{M_3}{M_4}$
Mass of Dry Soil		g		7.43	7.13	=	$\frac{M_4}{M_3}$
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 <sub>1</sub> )	g	Nil
		Total Wet Weight (M <sub>w</sub> )	g	218.03
		Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> =	$\frac{100M_w}{100 + w}$
		M <sub>T</sub> =	174.34	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>2</sub> ) g	Corrected Mass g	Percentage Retained = (Mass/M <sub>T</sub> ) x 100 %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 200mm) g	Sieve Diameter 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



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



**Wet Sieve Analysis**  
(NZS 4407:1991 (Test 3.8.1

<b>PRINCIPAL</b> : Japan International Cooperation Agency	<b>PROJECT No.</b> : 1920815
<b>PROJECT NAME</b> : Geotechnical Engineering Investigation for Nadi River Project Drilling	<b>DATE /</b> : 04 November 2015
<b>SITE ADDRESS</b> : Site 12	<b>TECHNOLOGIST</b> : RK
<b>SAMPLE LOCATION</b> : BH12 14.0 - 14.5m	<b>MATERIAL TYPE &amp; LOCATION</b> : Fine to coarse SAND with minor fine subangular gravel
<b>TEST NUMBER</b> : N662	
<b>SAMPLE HISTORY</b> : NATURAL / AIR-DRIED / OVEN-DRIED / UNKNOWN	

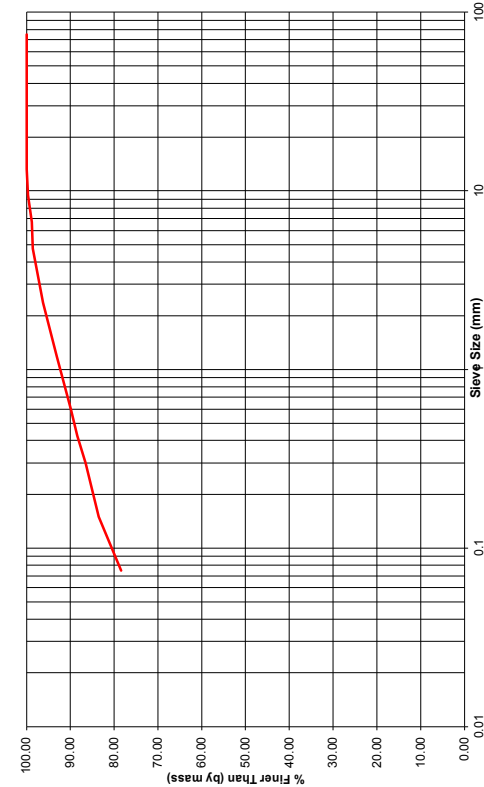
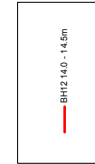
Moisture Content (Material passing 19mm)	Container No.	-	86	89	SPLIT SAMPLE
Mass of Container	g		117.75	121.19	Mass Passing Last Sieve: - gM <sub>1</sub>
Mass of Container + Wet Soil	g		188.92	189.83	Mass after Splitting: - gM <sub>2</sub>
Mass of Container + Dry Soil	g		173.24	174.22	Splitting Factor = $\frac{M_3}{M_4}$
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 <sub>1</sub> )	g	Nil
	Total Wet Weight (M <sub>w</sub> )	g	368.43
	Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$	
	M <sub>T</sub> =	285.94	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>2</sub> )	Corrected Mass	Percentage Retained = $\frac{\text{Mass}(M_2)}{100}$	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm	N/A	N/A	0.00	100.00		300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	N/A	0.00	100.00		300
19.0mm	N/A	N/A	0.00	100.00		200
13.2 mm	N/A	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



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

**Wet Sieve Analysis**  
(NZS 4407:1991 (Test 3.8.1

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

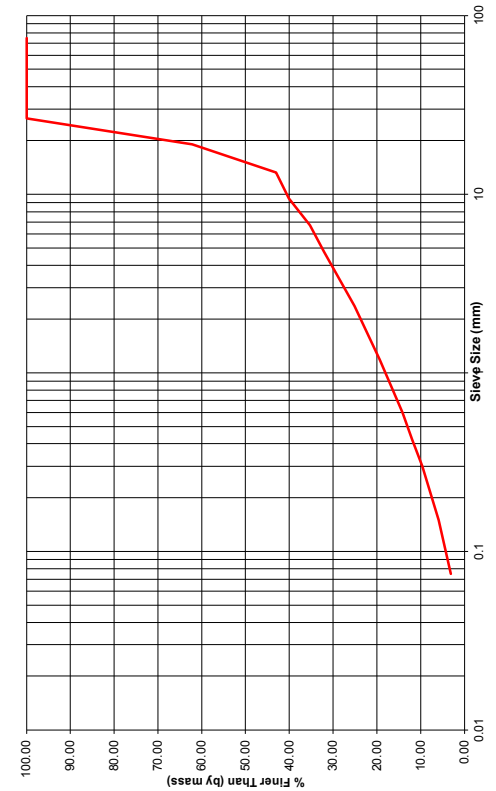
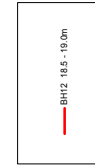
Moisture Content (Material passing 19mm)	Container No.	-	131	139	SPLIT SAMPLE
Mass of Container	g		11.66	11.33	Mass Passing Last Sieve: - gM <sub>1</sub>
Mass of Container + Wet Soil	g		41.37	41.80	Mass after Splitting: - gM <sub>2</sub>
Mass of Container + Dry Soil	g		37.39	37.76	Splitting Factor $\frac{M_3}{M_4}$
Mass of Dry Soil	g		25.73	26.43	= $\frac{M_4}{M_3}$
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 <sub>1</sub> )	g	Nil
	Total Wet Weight (M <sub>w</sub> )	g	340.90
	Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$	
	M <sub>T</sub> =	295.47	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>2</sub> ) g	Corrected Mass g	Percentage Retained = $\frac{\text{Mass}(M_2)}{100} \times 100$ %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 200mm) g	Sieve Diameter 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  
DATE OF TEST: 04 November 2015  
DESCRIPTION: SILT with some fine sand and shell fragments and trace of organics, green grey, stiff to hard, moist, low to medium plasticity  
SAMPLE No: N664

**Wet Sieve Analysis**  
NZS 4407:1991 (Test 3.8.1)

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

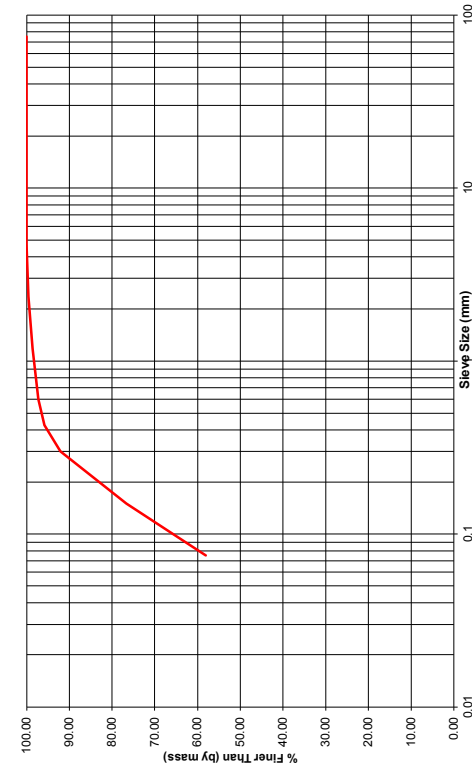
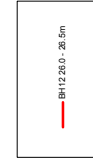
Moisture Content (Material passing 19mm)	Container No.	-	108	109	SPLIT SAMPLE
Mass of Container	g		11.27	11.38	Mass Passing Last Sieve: - gM <sub>s</sub>
Mass of Container + Wet Soil	g		36.87	36.45	Mass after Splitting: - gM <sub>i</sub>
Mass of Container + Dry Soil	g		30.65	30.33	Splitting Factor = $\frac{M_3}{M_4}$
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 <sub>r</sub> )	g	Nil
Total Wet Weight (M <sub>w</sub> )	g		285.01
Total Mass of dry sample (M <sub>T</sub> )	M <sub>T</sub> = $\frac{100M_w}{100 + w}$		
	M <sub>T</sub> =	215.60	

Test Sieve Size mm	Mass of Dry Soil Retained (M <sub>r</sub> ) g	Corrected Mass g	Percentage Retained = $\frac{(Mass M_r)}{100} \times 100$ %	Total Percentage Passing %	Maximum Sieve Load (Sieve Diameter 20mm) g	Sieve Diameter mm
75.0mm	N/A	N/A	0.00	100.00		300
50.0mm	N/A	N/A	0.00	100.00		300
37.5mm	N/A	N/A	0.00	100.00		300
26.5mm	N/A	N/A	0.00	100.00		300
19.0mm	N/A	N/A	0.00	100.00		200
13.2 mm	N/A	N/A	0.00	100.00	600	300
9.50 mm	N/A	N/A	0.00	100.00	450	300
6.70 mm	N/A	N/A	0.00	100.00	300	300
4.75 mm	N/A	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	-	-
Plan 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



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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International : Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River : Project Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 12	<b>TECHNOLOGIST</b>	: RK
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	SILT with some fine to medium sand trace of root fibres, dark brown, soft, moist, low to medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: 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

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International : Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River : Project Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 12	<b>TECHNOLOGIST</b>	: RK
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	Fine to coarse SAND with : trace of fine to medium sub- rounded gravelbrown	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: 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

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International : Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River : Project Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 12	<b>TECHNOLOGIST</b>	: RK
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	Fine to medium subangular : GRAVEL with trace of coarse sand, blackish brown	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: 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

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International : Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River : Project Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 12	<b>TECHNOLOGIST</b>	: RK
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: Fine SAND with some silt and : trace of subangular gravel	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: 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

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International : Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River : Project Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 12	<b>TECHNOLOGIST</b>	: RK
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	: SILT with minor organics trace : of fine sand dark grey, firm to : stiff, medium to high plasticity	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: 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

**Moisture Content Test Results**

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

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International : Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River : Project Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 12	<b>TECHNOLOGIST</b>	: RK
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	SILT with minor shell fragments and trace of fine sand, green grey, stiff, moist, medium to high plasticity	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: 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

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International : Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River : Project Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 12	<b>TECHNOLOGIST</b>	: RK
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	SILT with some fine sand and : trace of shell fragments, green : grey, soft to firm, moist, low to : medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: 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

**Moisture Content Test Results**

<b>PRINCIPAL</b>	: Japan International : Cooperation Agency (JICA)	<b>PROJECT No.</b>	: 1920815
<b>PROJECT NAME</b>	: Geotechnical Engineering : Investigation for Nadi River : Project Drilling Works	<b>DATE</b>	: 04 November 2015
<b>SITE ADDRESS</b>	: Site 12	<b>TECHNOLOGIST</b>	: RK
<b>MATERIAL TYPE &amp; DESCRIPTION</b>	SILT with trace of fine sand : and shell fragments and : organics, grey green, firm to : stiff, medium plasticity	<b>TEST METHOD</b>	: NZS 4402:1986
		<b>SAMPLE No.</b>	: 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