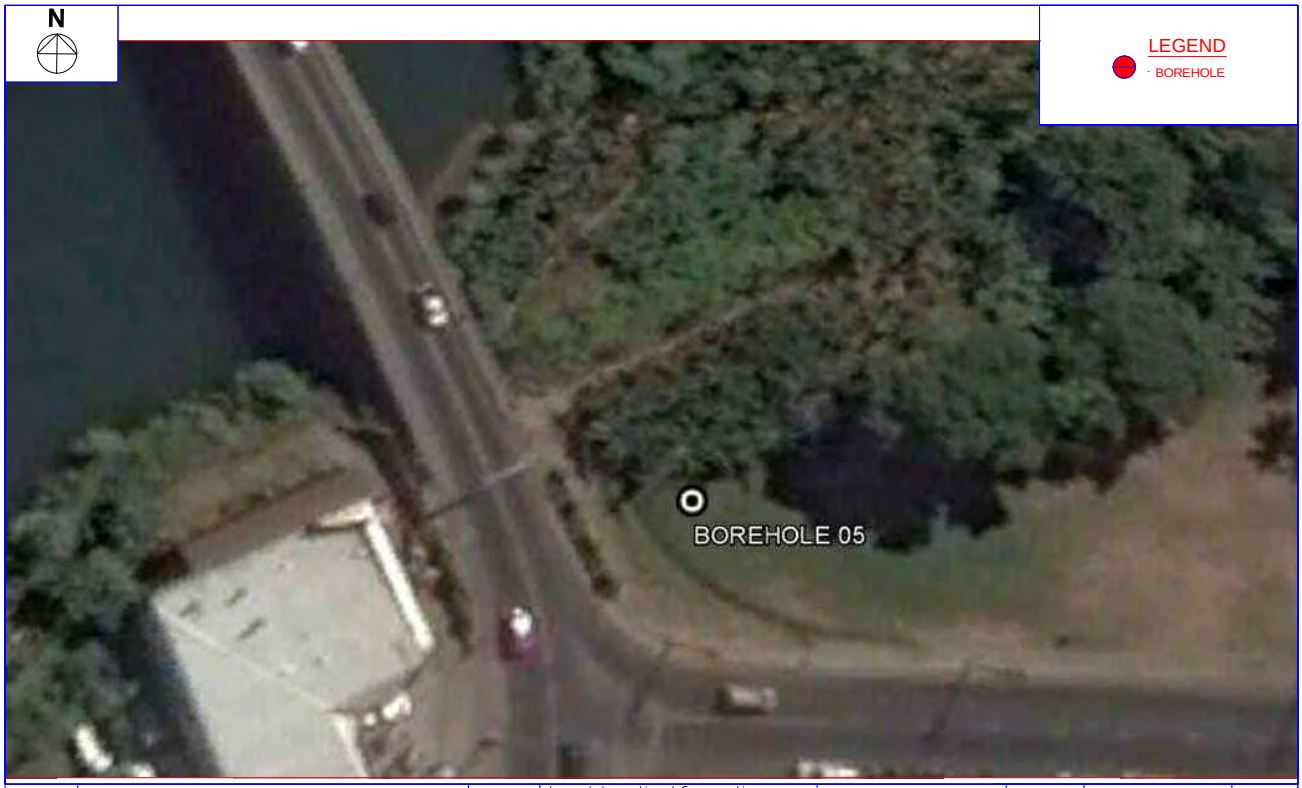
APPENDIX 5

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

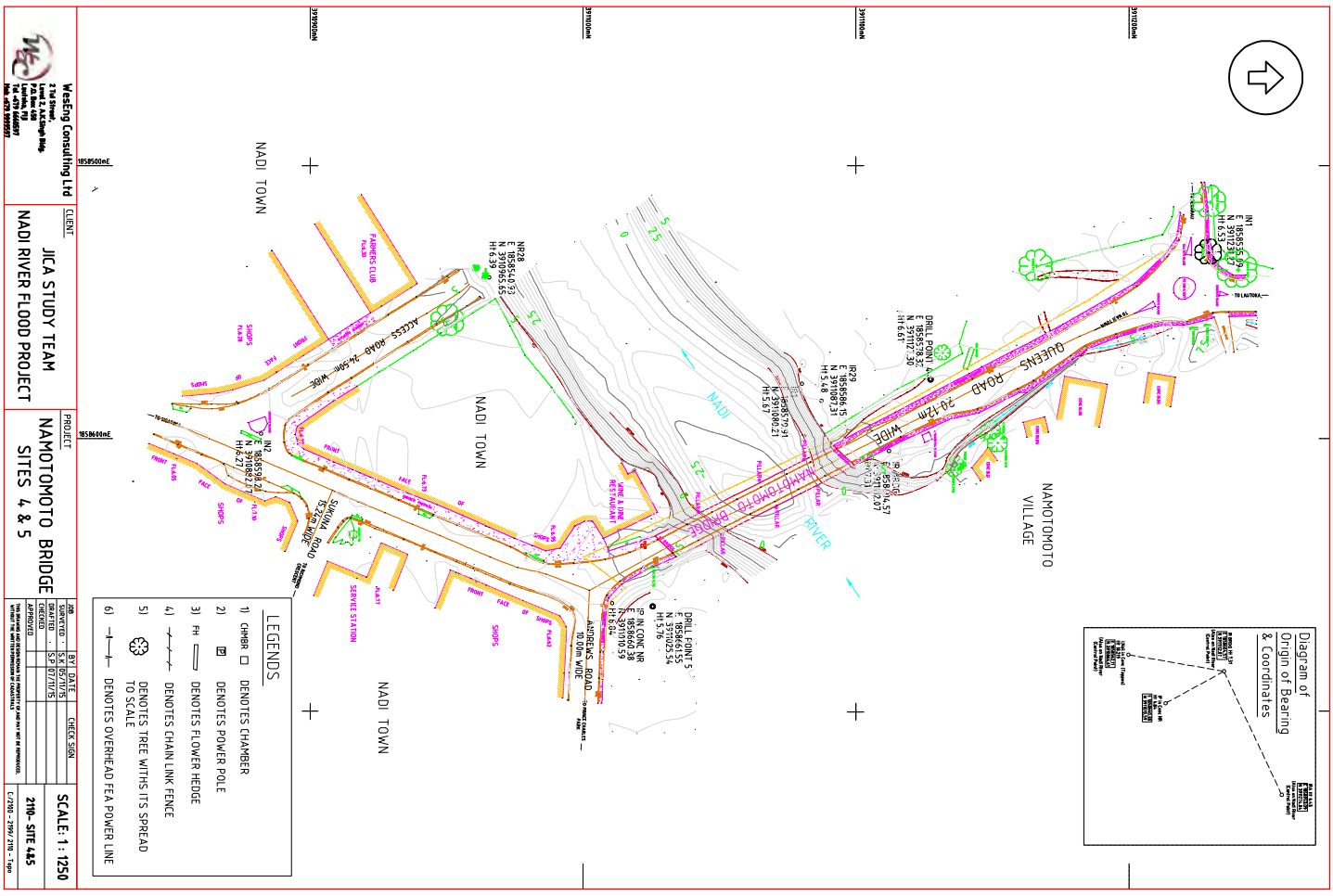
APPENDIX 5a

Test Locality Plan



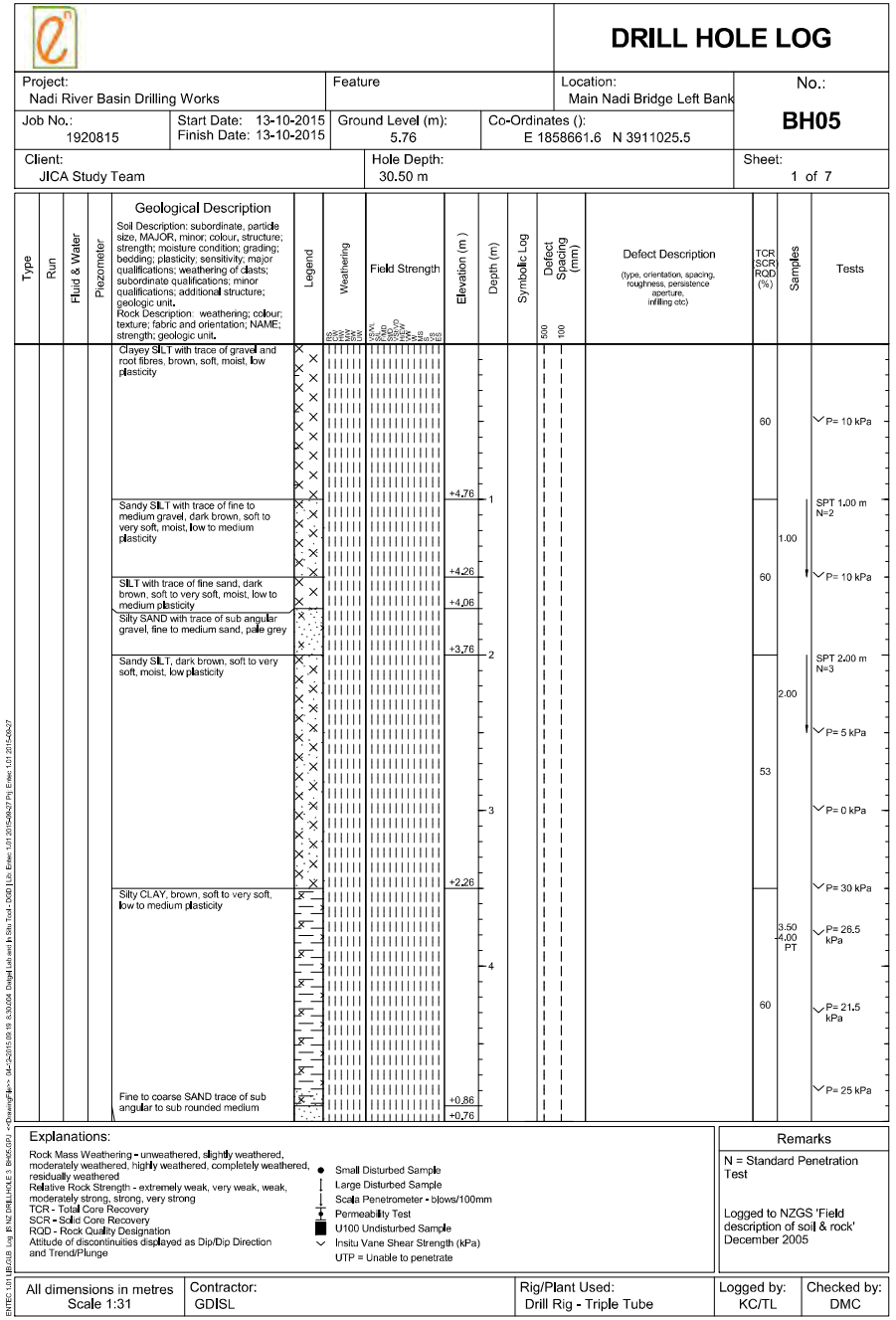
ENTEC LIMITED ENGINEERING AND SCIENCE CONSULTANTS				CLIENT:	Japan International Cooperation Agency (JICA)	NOTE: THIS DRAWING HAS BEEN REPRODUCED BY ENTEC TO SHOW THE APPROXIMATE BOREHOLE LOCATION.	DRAWN BY: SS; CHECKED BY: KC; APPROVED BY: JD; SHEET TITLE: TEST LOCALITY PLAN; SCALE: NTS; ISSUE DATE: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

D15-139



APPENDIX 5b

Engineering Borehole Log and Core Photos



DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Main Nadi Bridge Left Bank	No.: BH05
Job No.: 1920815	Start Date: 13-10-2015 Finish Date: 13-10-2015	Ground Level (m): 5.76	Co-Ordinates (): E 1858661.6 N 3911025.5
Client: JICA Study Team	Hole Depth: 30.50 m		Sheet: 1 of 7

Geological Description	Elevation (m)	Depth (m)	Defect Description	TCR SCR RQD (%)	Samples	Tests
Clayey SILT with trace of gravel and root fibres, brown, soft, moist, low plasticity	+4.76	1		60		P= 10 kPa
Sandy SILT with trace of fine to medium gravel, dark brown, soft to very soft, moist, low to medium plasticity	+4.26			60	1.00	SPT 1.00 m N=2
SILT with trace of fine sand, dark brown, soft to very soft, moist, low to medium plasticity	+4.06					P= 10 kPa
Silty SAND with trace of sub angular gravel, fine to medium sand, pale grey	+3.76	2				
Sandy SILT, dark brown, soft to very soft, moist, low plasticity	+2.26	3		53	2.00	SPT 2.00 m N=3
						P= 5 kPa
						P= 0 kPa
						P= 30 kPa
Silty CLAY, brown, soft to very soft, low to medium plasticity	+0.86	4			3.50 4.00 PT	P= 26.5 kPa
				60		P= 21.5 kPa
Fine to coarse SAND trace of sub angular to sub rounded medium	+0.76					P= 25 kPa

Explanations:

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

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

Remarks: N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Main Nadi Bridge Left Bank	**BH05**

Job No.:	Start Date: 13-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		5.76	E 1858661.6 N 3911025.5

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

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR SCR RQD (%)	Samples	Tests
				gravel, greyish brown											SPT 5.00 m N=19
				Gravelly SAND, fine to coarse gravel, sub-angular to sub-rounded, greyish dark brown				+0.26						5.00	
				Gravelly SAND, fine to medium sand, fine to medium gravel, sub-angular to sub-rounded, brown black				-0.14	6				27		
				Sandy SILT with trace of fine to medium gravel sub-angular to sub-rounded				-0.74							SPT 6.50 m N=11
				Sandy SILT with trace of gravel, fine to coarse sand, sub-angular gravel, dark brown, soft to very soft, low plasticity				-1.24	7					6.50	
				Fine to coarse SAND with fine to medium gravel, black brown				-2.24	8				47		SPT 8.00 m N=21
				SAND with fine to coarse subangular gravel				-2.74						8.00	
				Fine to coarse SAND with fine sub-angular gravel				-3.74	9				47		
				Gravelly fine to medium SAND, brown grey, loosely packed, wet				-4.24					33	9.50	SPT 9.50 m N=20

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Main Nadi Bridge Left Bank	**BH05**

Job No.:	Start Date: 13-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		5.76	E 1858661.6 N 3911025.5

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	3 of 7

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR SCR RQD (%)	Samples	Tests
				SAND with trace of fine to medium sub-angular to sub-rounded gravel					11				33		
				Organic SILT with fine to medium sand, dark grey, moist, low plasticity				-5.74						11.00	SPT 11.00 m N=18
				Silty fine to medium SAND with trace of medium to coarse sub-rounded gravel, grey				-6.24	12				33		
									13						P= 20 kPa SPT 12.50 m N=1
														12.50	
				Clayey SILT with trace of fine sand and gravel, grey, soft, medium to high plasticity				-8.24	14				30		
														14.00	SPT 14.00 m N=1
													88		P= 45 kPa

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Main Nadi Bridge Left Bank	**BH05**

Job No.:	Start Date: 13-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		5.76	E 1858661.6 N 3911025.5

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	4 of 7

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Clayey SILT with trace of fine sand and gravel, grey, soft, medium to high plasticity *(continued)*									88		P= 15 kPa
				Silty SAND with trace of fine to medium sub-angular gravel, grey, very soft to soft, moist.				-9.74							P= 30 kPa SPT 15.50 m N=4
				Sandy SILT with traces of shell fragments and gravel, grey, medium to high plasticity, gravel fine to coarse sub-angular to sub-rounded				-10.24	16				57	15.50	P= 20 kPa P= 40 kPa
				SILT with minor sand and trace of fine sub-angular gravel, grey, firm, low to medium plasticity				-11.24	17						P= 20 kPa P= 38.5 kPa
				SILT with some silt stone nodules and trace of fine sand, green grey, firm, low to high plasticity				-11.44					17.00 -17.5 PT		P= 45 kPa
									18				93		P= 31.5 kPa
															P= 21.5 kPa SPT 18.50 m N=1
				SILT with fine sand trace of organics, blackish grey, soft to very soft, moist, low to medium plasticity				-13.24	19				18.50 81		P= 36.5 kPa

Explanations:

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

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

UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Main Nadi Bridge Left Bank	**BH05**

Job No.:	Start Date: 13-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		5.76	E 1858661.6 N 3911025.5

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	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 (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				SILT with fine sand trace of organics, blackish grey, soft to very soft, moist, low to medium plasticity *(continued)*									20.00		SPT 20.00 m N=4 P= 8.5 kPa
				Silty fine to medium SAND with trace of shell fragments, grey, medium densed				-14.74					87		P= 225 kPa
				Silty fine to medium SAND with trace of shell fragments, dark brown, soft to very soft, moist, medium plasticity				-15.34	21						
				Silty fine to medium SAND with trace of medium to coarse sub-angular to sub-rounded gravel, dark brown grey, medium densed				-15.74							SPT 21.50 m N=16
				Silty CLAY with trace of medium to fine sub-angular gravel, dark grey brown, firm, low to medium plasticity.				-16.34	22				21.50 53		
				Silty SAND with trace of shell fragments and fine sub-angular gravel, dark grey, very soft to soft, low to medium plasticity				-17.24	23						SPT 23.00 m N=42
				Clayey SILT with sand and shell fragments with trace of coarse gravel and organics, grey, stiff, moist, high plasticity				-17.74					23.00 100		
				Clayey SILT, dark brown, soft to firm, moist, dense to very densed, medium to high plasticity				-18.74	24						
								-19.24					93	24.50	SPT 24.50 m N=50

Explanations:

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

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

UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 | JB-01.B | Log_B NZ DRILLHOLE 1 BH05.GPJ | <DrawingFile>> 04-12-2015 08:19 8.30.004 Default Left.wet N Stu Tool - D000 | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Main Nadi Bridge Left Bank	**BH05**

Job No.:	Start Date: 13-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		5.76	E 1858661.6 N 3911025.5

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	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 (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Fine to medium SAND with silt, trace of fine to medium sub-angular to sub-rounded gravel, dark grey, dense to very dense				-19.54							
				SILTSTONE, moderate to highly weathered, weak to very weak				-20.24	26				93		P= 85 kPa
				Clayey SILT with trace of fine sand and siltstone nodules, ligth grey brown, firm to stiff, medium to high plasticity										26.00	SPT 26.00 m N=50
													93		P= 151.5 kPa
									27						P= 275 kPa
								-21.74							P= 231 kPa
				Silty CLAY with trace of siltstone nodules and fine sand, light brown, firm to stiff, medium to high plasticity										27.50	SPT 27.50 m N=54
									28				100		P= 146.3 kPa
															P= 193 kPa
								-23.24	29						P= 121.3 kPa
				Clayey SILT with siltstone nodules, greyish brown, stiff, medium to high plasticity										29.00	SPT 29.00 m N=50
													100		
				iii				-24.14							

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Main Nadi Bridge Left Bank	**BH05**

Job No.:	Start Date: 13-10-2015 Finish Date: 13-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		5.76	E 1858661.6 N 3911025.5

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

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				iii *(continued)*											P= 300 kPa
								-24.74							
				Hole Terminated at 30.50 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005					31					30.50	SPT 30.50 m N=50
									32						
									33						
									34						

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 | JB-01-B | Log | N:\NZ DRILLHOLE 1 BH05.GPJ | <DrawingFile>> 04-12-2015 08:19 8.30.004 Default Left.wet | k:\Stu Tool - DGD | Lib: Entec 1.01 2015-09-27 | Prj: Entec 1.01 2015-09-27

Borehole 5 Core Photos (0.00m to 30.50m)

0.00m to 3.80m

3.80m to 8.00m

8.00m to 12.50m

12.50m to 17.20m

17.20m to 19.00m

19.00m to 22.10m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 5,Main Road Bridge Left Bank, Nadi, Fiji.

22.10m to 25.30m

25.30m to 27.50m

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27.0m to 30.20m

30.20m to 30.50m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 5,Main Road Bridge Left Bank, Nadi, Fiji.
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APPENDIX 5c

Laboratory Test Schedule and Laboratory Test Results

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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 /**	: 20/10/2015
SITE ADDRESS	: BH05 Nadi Bridge, Namotomoto	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH05 2.0m - 2.5m	**MATERIAL TYPE & LOCATION**	: Sandy SILT, dark brown, soft to very soft, moist, low plasticity
TEST NUMBER	: N549		

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

Moisture Content (Material passing 19mm)	Container No.	-	112	113	SPLIT SAMPLE
	Mass of Container	g	11.73	11.88	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	25.10	25.28	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	21.50	21.67	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	9.77	9.79	
	Mass of Moisture	g	3.60	3.61	
	Moisture Content	%	36.85	36.87	
	Average Moisture Content	%	36.86		

Total Mass of Dry Sample				
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil	
	Total Wet Weight (M_w)	g	384.81	
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
		M_T =	281.17	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm		N/A	0.00	100.00	150	200
1.18 mm	0.08	N/A	0.03	99.97	100	200
600 µm	2.47	N/A	0.88	99.09	80	200
425 µm	5.80	N/A	2.06	97.03	70	200
300 µm	15.08	N/A	5.36	91.67	60	200
150 µm	45.15	N/A	16.06	75.61	40	200
75 µm	49.25	N/A	17.52	58.09	25	200
Passing 75 µm	163.34	N/A	58.09	0.00	-	-
Pan Total	281.17	-	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 : 20 October 2015	Date : 25 November 2015	Date : 25November 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	20 October 2015
SITE ADDRESS	:	BH05 Nadi Bridge	**TECHNOLOGIST**	:	TL
SAMPLE LOCATION	:	BH05 5.0-5.50m	**MATERIAL TYPE & LOCATION**	:	Gravelly SAND, fine to coarse gravel, subangular-subrounded, greyish dark brown
TEST NUMBER	:	N 551			

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

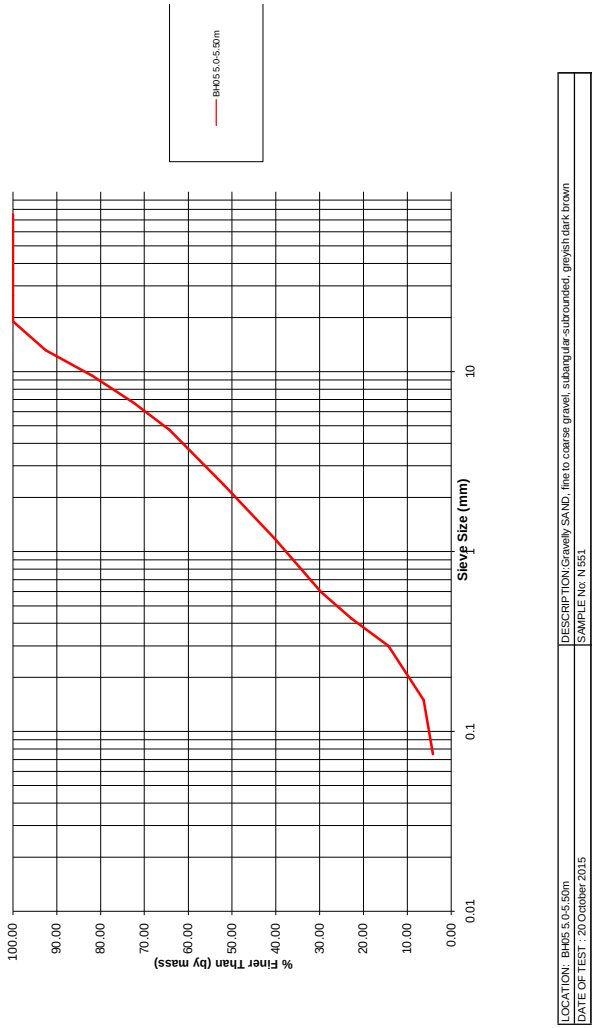
Moisture Content (Material passing 19mm)	Container No.	-	166	169	SPLIT SAMPLE		
	Mass of Container	g	11.70	11.37	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	29.07	29.41	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	27.46	27.08	Spliting Factor = $\frac{M_3}{M_4}$		
	Mass of Dry Soil	g	15.76	15.71			
	Mass of Moisture	g	1.61	2.33			
	Moisture Content	%	10.22	14.83			
	Average Moisture Content	%	12.52				

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	304.82
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	270.89

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm	20.17	N/A	7.45	92.55	600	300
9.50 mm	28.96	N/A	10.69	81.86	450	300
6.70 mm	25.78	N/A	9.52	72.35	300	300
4.75 mm	21.80	N/A	8.05	64.30	250	200
2.36 mm	33.58	N/A	12.40	51.90	150	200
1.18 mm	31.65	N/A	11.68	40.22	100	200
600 µm	28.51	N/A	10.52	29.70	80	200
425 µm	18.85	N/A	6.96	22.74	70	200
300 µm	22.71	N/A	8.38	14.35	60	200
150 µm	21.89	N/A	8.08	6.27	40	200
75 µm	5.68	N/A	2.10	4.18	25	200
Passing 75 µm	11.31	N/A	4.18	0.00	-	-
Pan Total	270.89	-	100.00	-	-	-

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

Tested by :TL	Q.A. Checked by : KB	Approved by : IG
Date 20October 2015	Date : 25 November 2015	Date : 25 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	20 October 2015
SITE ADDRESS	:	BH05 Nadi Bridge	**TECHNOLOGIST**	:	TL
SAMPLE LOCATION	:	BH05 8.0-8.50m	**MATERIAL TYPE & LOCATION**	:	SAND with fine to coarse subangular gravel
TEST NUMBER	:	N553			

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

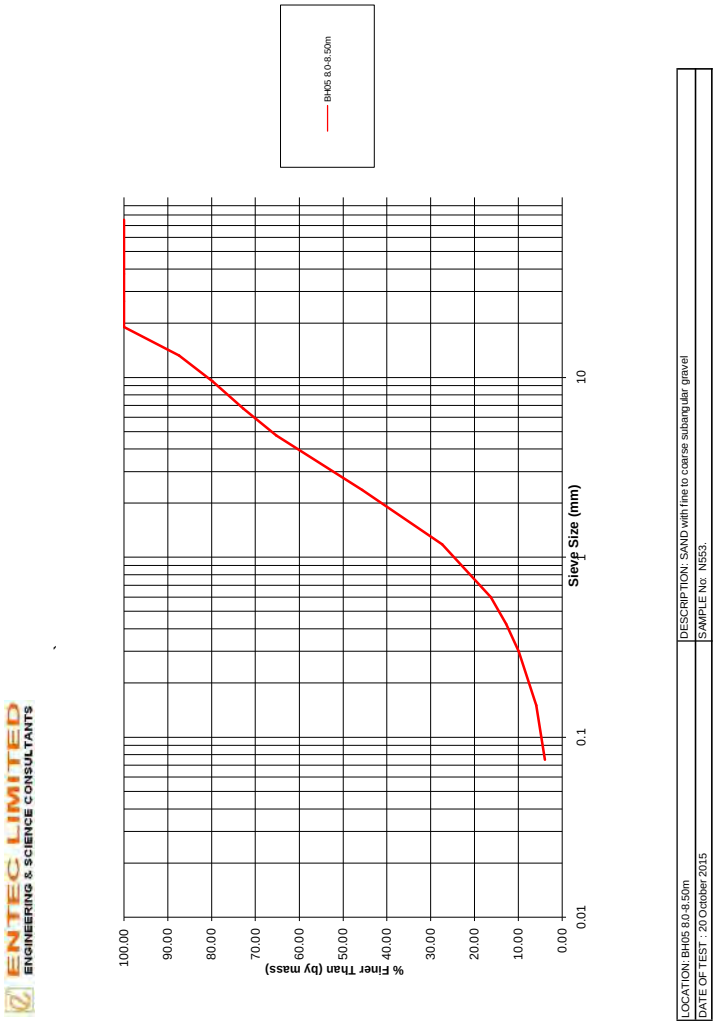
Moisture Content (Material passing 19mm)	Container No.	-	19	28	SPLIT SAMPLE
	Mass of Container	g	14.86	13.97	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	35.52	35.31	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	32.87	32.92	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	18.01	18.95	
	Mass of Moisture	g	2.65	2.39	
	Moisture Content	%	14.71	12.61	
	Average Moisture Content	%	13.66		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	310.38
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	273.07

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm	34.28	N/A	12.55	87.45	600	300
9.50 mm	20.99	N/A	7.69	79.76	450	300
6.70 mm	19.08	N/A	6.99	72.77	300	300
4.75 mm	20.57	N/A	7.53	65.24	250	200
2.36 mm	53.35	N/A	19.54	45.70	150	200
1.18 mm	49.93	N/A	18.28	27.42	100	200
600 µm	30.48	N/A	11.16	16.26	80	200
425 µm	9.35	N/A	3.42	12.83	70	200
300 µm	7.83	N/A	2.87	9.96	60	200
150 µm	11.15	N/A	4.08	5.88	40	200
75 µm	5.14	N/A	1.88	4.00	25	200
Passing 75 µm	10.92	N/A	4.00	0.00	-	-
Pan Total	273.07	-	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 :	Q.A. Checked by : KB	Approved by : IG
Date : 20 October 2015	Date : 25 November 2015	Date : 25 November 2015



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	20 October 2015
SITE ADDRESS	:	BH05 Nadi Bridge	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH05 15.5- 16.00m	**MATERIAL TYPE & LOCATION**	:	Silty SAND with gravel, grey very soft to soft, moist, gravel fine to medium subangular
TEST NUMBER	:	N556			

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

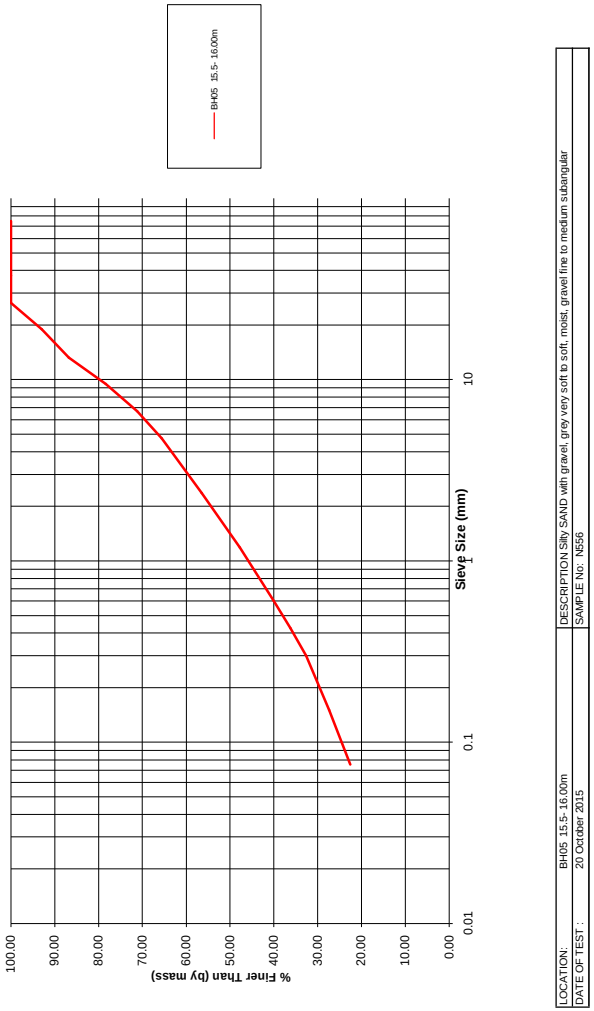
Moisture Content (Material passing 19mm)	Container No.	-	6	15	SPLIT SAMPLE
	Mass of Container	g	53.10	52.69	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	66.03	67.51	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	63.36	64.44	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	10.26	11.75	
	Mass of Moisture	g	2.67	3.07	
	Moisture Content	%	26.02	26.13	
	Average Moisture Content	%	26.08		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	224.22
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	177.85

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm	12.41	N/A	6.98	93.02		200
13.2 mm	11.08	N/A	6.23	86.79	600	300
9.50 mm	15.06	N/A	8.47	78.32	450	300
6.70 mm	12.68	N/A	7.13	71.19	300	300
4.75 mm	9.92	N/A	5.58	65.62	250	200
2.36 mm	16.30	N/A	9.17	56.45	150	200
1.18 mm	15.36	N/A	8.64	47.81	100	200
600 µm	13.79	N/A	7.75	40.06	80	200
425 µm	6.87	N/A	3.86	36.20	70	200
300 µm	6.36	N/A	3.58	32.62	60	200
150 µm	9.42	N/A	5.30	27.32	40	200
75 µm	8.56	N/A	4.81	22.51	25	200
Passing 75 µm	40.04	N/A	22.51	0.00	-	-
Pan Total	177.85	-	100.00	-	-	-

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

Tested by :RK	Q.A. Checked by : KB	Approved by : IG
Date :20 October 2015	Date : 25 November 2015	Date : 25 November 2015



LOCATION: BH05 15.5- 16.00m
DATE OF TEST : 20 October 2015

DESCRIPTION Silty SAND with gravel, grey very soft to soft, moist, gravel fine to medium subangular
SAMPLE No: N556

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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 /**	:	20 October 2015
SITE ADDRESS	:	BH05 Nadi Bridge	**TECHNOLOGIST**	:	TL
SAMPLE LOCATION	:	BH05 18.50-19.0m	**MATERIAL TYPE & LOCATION**	:	SILT, with some of silt stone nodules and trace of fine sand, green grey, firm, low to high plasticity
TEST NUMBER	:	N558			

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

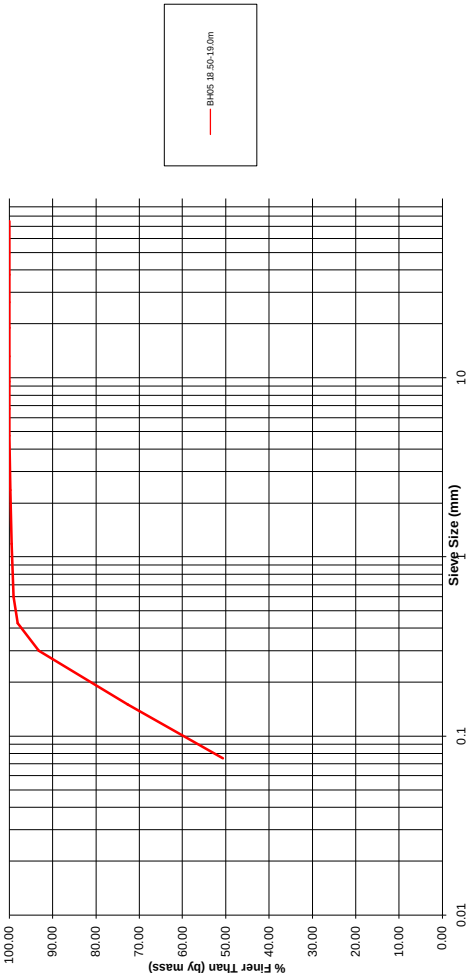
Moisture Content (Material passing 19mm)	Container No.	-	8	12	SPLIT SAMPLE
	Mass of Container	g	53.07	53.13	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	64.75	65.05	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	60.98	61.08	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	7.91	7.95	
	Mass of Moisture	g	3.77	3.97	
	Moisture Content	%	47.66	49.94	
	Average Moisture Content	%	48.80		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	203.74
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	136.92

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm	0.37	N/A	0.27	99.73	150	200
1.18 mm	0.35	N/A	0.26	99.47	100	200
600 µm	0.68	N/A	0.50	98.98	80	200
425 µm	1.23	N/A	0.90	98.08	70	200
300 µm	6.69	N/A	4.89	93.19	60	200
150 µm	28.08	N/A	20.51	72.69	40	200
75 µm	30.16	N/A	22.03	50.66	25	200
Passing 75 µm	69.36	N/A	50.66	0.00	-	-
Pan Total	136.92	-	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 : 20 October 2015	Date : 25 November 2015	Date : 25 November 2015



LOCATION:	BH05 18.50-19.0m
DATE OF TEST:	20 October 2015
DESCRIPTION	SILT, with some of silt stone nodules and trace of fine sand, green grey, firm, low to high plasticity
SAMPLE No:	N558

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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 /**	:	20 October 2015
SITE ADDRESS	:	BH05 Nadi Bridge	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH05 30.50-31.0m	**MATERIAL TYPE & LOCATION**	:	Silty SAND , sand fine, brown , moist, dense
TEST NUMBER	:	N564			

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	52.88	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	83.71	82.52	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	76.66	75.84	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	24.36	22.96	
	Mass of Moisture	g	7.05	6.68	
	Moisture Content	%	28.94	29.09	
	Average Moisture Content	%	29.02		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	310.60
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	240.74

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm		N/A	0.00	100.00	150	200
1.18 mm	1.00	N/A	0.42	99.58	100	200
600 µm	4.44	N/A	1.84	97.74	80	200
425 µm	14.90	N/A	6.19	91.55	70	200
300 µm	48.83	N/A	20.28	71.27	60	200
150 µm	79.55	N/A	33.04	38.22	40	200
75 µm	36.19	N/A	15.03	23.19	25	200
Passing 75 µm	55.83	N/A	23.19	0.00	-	-
Pan Total	240.74	-	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 : October 2015	Date : 25 November 2015	Date : 25 November 2015

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty CLAY, brown, soft to very soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N550 BH05 3.5m - 4.0m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	114	106				
Mass of Container	g	11.91	12.04				
Mass of Container + Wet Soil	g	18.07	17.33				
Mass of Container + Dry Soil	g	16.32	15.87				
Mass of Dry Soil	g	4.41	3.83				
Mass of Moisture	g	1.75	1.46				
Moisture Content	%	39.68	38.12				38.90

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		34	46				
Mass of Container	g	14.89	14.73				
Mass of Container + Wet Soil	g	21.27	20.29				
Mass of Container + Dry Soil	g	19.59	18.82				
Mass of Dry Soil	g	4.70	4.09				
Mass of Moisture	g	1.68	1.47				
Moisture Content	%	35.74	35.94				35.84

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	21	16
Container No.		20	21	22	25	31	33
Mass of Container	g	14.09	14.50	14.39	14.48	14.54	14.46
Mass of Container + Wet Soil	g	20.41	21.93	22.97	24.62	23.58	26.09
Mass of Container + Dry Soil	g	18.13	19.24	19.85	20.91	20.27	21.79
Mass of Dry Soil	g	4.04	4.74	5.46	6.43	5.73	7.33
Mass of Moisture	g	2.28	2.69	3.12	3.71	3.31	4.30
Moisture Content	%	56.44	56.75	57.14	57.70	57.77	58.66

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample			125.00			
Final length of Sample after Shrinkage			107.00			
% Shrinkage			14.40			14.40

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

Liquid Limit	57.50 %
Plastic Limit	35.84 %
Plasticity Index	21.66 %
Shrinkage Limit	14.40 %

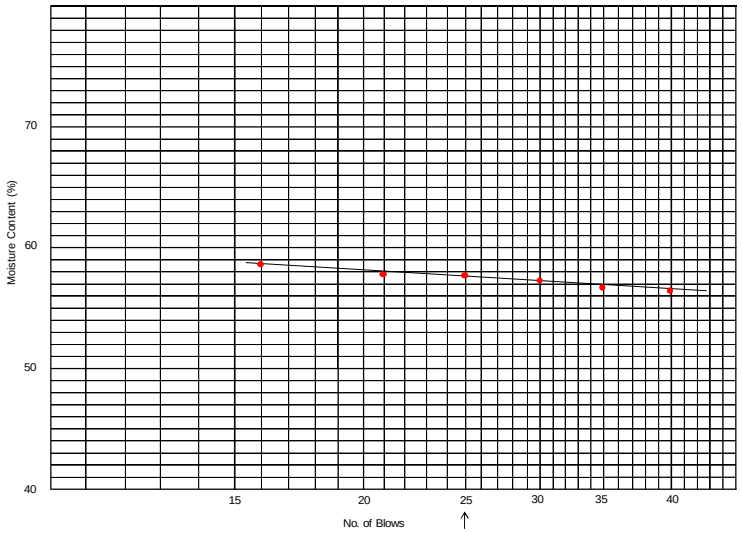
Tested By: RK
Date: 20 October 2015

Q.A. Checked By: UM
Date: 25 November 2015

Approved By:IG
Date: 25 November 2015

Form: GE-L-03

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N550

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 21 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey SILT trace of fine sand and gravel, grey, soft, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N555 BH05 14.0m - 14.5m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.		14	16				
Mass of Container	g	53.55	52.74				
Mass of Container + Wet Soil	g	69.15	70.38				
Mass of Container + Dry Soil	g	65.64	66.36				
Mass of Dry Soil	g	12.09	13.62				
Mass of Moisture	g	3.51	4.02				
Moisture Content	%	29.03	29.52				29.27

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		98	99				
Mass of Container	g	11.90	11.82				
Mass of Container + Wet Soil	g	17.90	18.12				
Mass of Container + Dry Soil	g	16.51	16.70				
Mass of Dry Soil	g	4.61	4.88				
Mass of Moisture	g	1.39	1.42				
Moisture Content	%	30.15	29.10				29.63

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	25	20	15
Container No.		103	104	134	135	136	137
Mass of Container	g	11.32	11.90	11.25	11.58	11.76	11.32
Mass of Container + Wet Soil	g	16.29	17.15	16.57	17.80	16.71	17.50
Mass of Container + Dry Soil	g	14.76	15.49	14.87	15.81	15.09	15.46
Mass of Dry Soil	g	3.44	3.59	3.62	4.23	3.33	4.14
Mass of Moisture	g	1.53	1.66	1.70	1.99	1.62	2.04
Moisture Content	%	44.48	46.24	46.96	47.04	48.65	49.28

LINEAR SHRINKAGE TEST

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

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

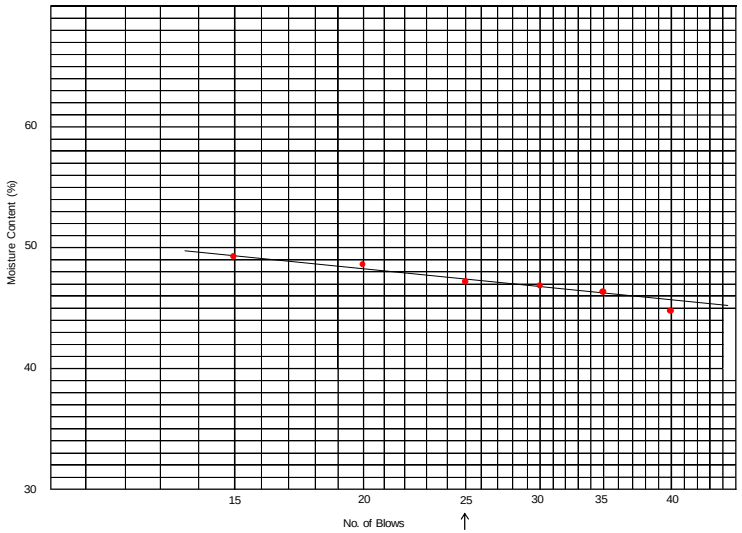
Liquid Limit	47.25 %
Plastic Limit	29.63 %
Plasticity Index	17.62 %
Shrinkage Limit	16.00 %

Tested By: RK
Date: 21 October 2015

Q.A. Checked By: UM
Date: 25 November 2015

Approved By:IG
Date: 25 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N555

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 21 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clayey SILT, dark brown, soft to firm moist, dense to very densed, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N561 BH05 24.5m - 25.0m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	5	7				
Mass of Container	g	53.38	52.79				
Mass of Container + Wet Soil	g	67.40	67.69				
Mass of Container + Dry Soil	g	63.47	63.62				
Mass of Dry Soil	g	10.09	10.83				
Mass of Moisture	g	3.93	4.07				
Moisture Content	%	38.95	37.58				38.27

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		138	139				
Mass of Container	g	11.12	11.35				
Mass of Container + Wet Soil	g	18.04	18.03				
Mass of Container + Dry Soil	g	16.05	16.08				
Mass of Dry Soil	g	4.93	4.73				
Mass of Moisture	g	1.99	1.95				
Moisture Content	%	40.37	41.23				40.80

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	36	31	26	20	15
Container No.		131	153	155	117	142	148
Mass of Container	g	11.65	11.20	11.70	11.21	11.84	11.75
Mass of Container + Wet Soil	g	16.26	15.10	15.73	15.29	15.34	16.23
Mass of Container + Dry Soil	g	14.48	13.59	14.15	13.63	13.88	14.32
Mass of Dry Soil	g	2.83	2.39	2.45	2.42	2.04	2.57
Mass of Moisture	g	1.78	1.51	1.58	1.66	1.46	1.91
Moisture Content	%	62.90	63.18	64.49	68.60	71.57	74.32

LINEAR SHRINKAGE TEST

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

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

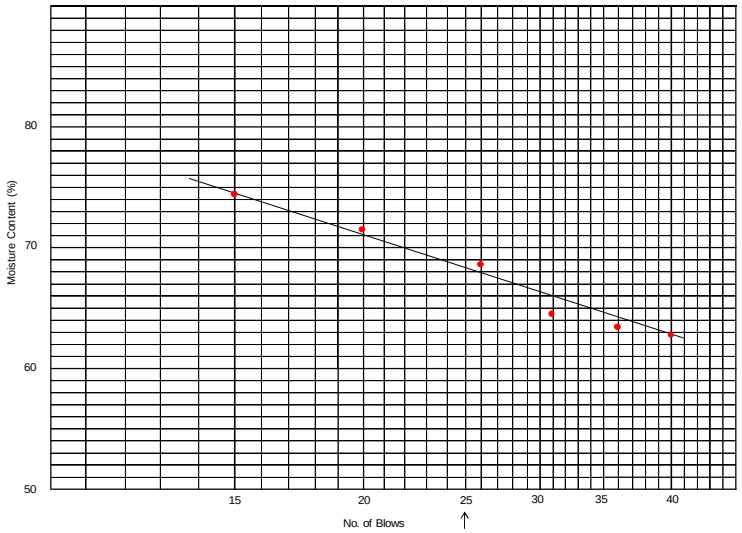
Liquid Limit	68.20 %
Plastic Limit	40.80 %
Plasticity Index	27.40 %
Shrinkage Limit	16.00 %

Tested By: RK
Date: 21 October 2015

Q.A. Checked By: UM
Date: 25 November 2015

Approved By:IG
Date: 25 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N561

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE / TESTED** :	20 October 2015
SITE ADDRESS :	Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST** :	TL/LN
SAMPLE LOCATION :	BH05 3.5m - 4.0m		
TEST NUMBER :	N550	**MATERIAL TYPE** :	Silty CLAY, brown, soft to very soft, low to medium plasticity

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

Moisture Content	Container No.	-	66	83	
	Mass of Container	g	91.00	71.30	
	Mass of Container + Wet Soil	g	123.54	104.54	
	Mass of Container + Dry Soil	g	114.22	94.97	
	Mass of Dry Soil	g	23.22	23.67	
	Mass of Moisture	g	9.32	9.57	
	Moisture Content	%	40.14	40.43	40.28

Bulk Density	Sample No.	-	N550
	Diameter of Specimen	mm	52.77
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2185.97
	Initial length of specimen Lo	mm	58.59
	Initial mass of specimen Mi	g	237.10
	Bulk Density ρ	t/m³	1.85
	Dry Density ρd	t/m³	1.32

Tested by : LN/TL	Q.A. Check by : KB	Approved by : IG
Date : 20 October 2015	Date : 25 November 2015	Date : 25 November 2015

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE / TESTED**	:	20 October 2015
SITE ADDRESS	:	Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	:	KB/LN
SAMPLE LOCATION	:	BH05 17.0m -17.5m	**MATERIAL TYPE**	:	SILT, with some of silt stone nodules and trace of fine sand, green grey, firm, low to high plasticity
TEST NUMBER	:	N557			

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

Moisture Content	Container No.	-	74	63	
	Mass of Container	g	86.81	102.12	
	Mass of Container + Wet Soil	g	273.45	270.36	
	Mass of Container + Dry Soil	g	228.87	225.57	
	Mass of Dry Soil	g	142.06	123.45	
	Mass of Moisture	g	44.58	44.79	
	Moisture Content	%	31.38	36.28	33.83

Bulk Density	Sample No.	-	N557
	Diameter of Specimen	mm	53.66
	Initial area of specimen Ao (π/4 d²)	mm²	2260.33
	Initial length of specimen Lo	mm	78.49
	Initial mass of specimen Mi	g	345.32
	Bulk Density ρ	t/m³	1.95
	Dry Density ρd	t/m³	1.45

Tested by : KB/LN	Q.A. Check by : KB	Approved by : IG
Date : 20 October 2015	Date : 25 November 2015	Date : 25 November 2015

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Moisture Content Test Results

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	:	20 October 2015
SITE ADDRESS	:	Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	:	RK/TL
MATERIAL TYPE & DESCRIPTION	:	Sandy SILT trace of fineto medium gravel, dark brown, soft to very soft, moist, low to medium plasticity	**TEST METHOD**	:	NZS 4402:1986
			SAMPLE No.	:	N548 (BH05 1.00 - 1.50m)

Moisture Content	%						
Container No.	g	150	158				
Mass of Container	g	10.76	12.13				
Mass of Container + Wet Soil	g	26.55	29.25				
Mass of Container + Dry Soil	g	23.63	25.88				
Mass of Dry Soil	g	12.87	13.75				
Mass of Moisture	g	2.92	3.37				
Moisture Content	%	22.69	24.51				23.60

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK/TL
MATERIAL TYPE & DESCRIPTION	: Silty CLAY, brown, soft to very soft, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N550 (BH05 3.5m - 4.0m)

Moisture Content	%						
Container No.	g	44	36				
Mass of Container	g	14.59	14.11				
Mass of Container + Wet Soil	g	26.43	23.86				
Mass of Container + Dry Soil	g	23.58	21.52				
Mass of Dry Soil	g	8.99	7.41				
Mass of Moisture	g	2.85	2.34				
Moisture Content	%	31.70	31.58				31.64

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK/TL
MATERIAL TYPE & DESCRIPTION	: Sandy SILT trace of gravel,fine to coarse sand, subangular gravel, dark brown, soft to very soft, low plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N552 (BH05 6.5m - 7.00m)

Moisture Content	%						
Container No.	g	149	152				
Mass of Container	g	11.74	11.48				
Mass of Container + Wet Soil	g	24.40	24.64				
Mass of Container + Dry Soil	g	22.81	22.95				
Mass of Dry Soil	g	11.07	11.47				
Mass of Moisture	g	1.59	1.69				
Moisture Content	%	14.36	14.73				14.55

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK/TL
MATERIAL TYPE & DESCRIPTION	: Gravelly SAND, brown grey, fine to medium, loosely packed, wet	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N554 (BH05 9.5m - 10.0m)

Moisture Content	%						
Container No.	g	160	151				
Mass of Container	g	11.93	12.00				
Mass of Container + Wet Soil	g	28.54	28.65				
Mass of Container + Dry Soil	g	27.00	26.90				
Mass of Dry Soil	g	15.07	14.90				
Mass of Moisture	g	1.54	1.75				
Moisture Content	%	10.22	11.74				10.98

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK/TL
MATERIAL TYPE & DESCRIPTION	: Clayey SILT trace of fine sand and gravel, grey, soft, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N555 (BH05 14.0m - 14.50m)

Moisture Content	%						
Container No.	g	157	159				
Mass of Container	g	11.86	12.18				
Mass of Container + Wet Soil	g	27.38	27.30				
Mass of Container + Dry Soil	g	23.08	23.12				
Mass of Dry Soil	g	11.22	10.94				
Mass of Moisture	g	4.30	4.18				
Moisture Content	%	38.32	38.21				38.27

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK/TL
MATERIAL TYPE & DESCRIPTION	: SILT, with some of silt stone nodules and trace of fine sand, green grey, firm, low to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N557 (BH05 17.0m - 17.5m)

Moisture Content	%						
Container No.	g	19	28				
Mass of Container	g	14.86	13.93				
Mass of Container + Wet Soil	g	23.80	23.79				
Mass of Container + Dry Soil	g	21.36	21.11				
Mass of Dry Soil	g	6.50	7.18				
Mass of Moisture	g	2.44	2.68				
Moisture Content	%	37.54	37.33				37.43

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK/TL
MATERIAL TYPE & DESCRIPTION	: SILT with fine sand trace of organics, blackish grey, soft to very soft, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N559 (BH05 20.0m - 20.50m)

Moisture Content	%						
Container No.	g	23	42				
Mass of Container	g	14.73	14.58				
Mass of Container + Wet Soil	g	34.12	34.11				
Mass of Container + Dry Soil	g	28.08	27.96				
Mass of Dry Soil	g	13.35	13.38				
Mass of Moisture	g	6.04	6.15				
Moisture Content	%	45.24	45.96				45.60

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK/TL
MATERIAL TYPE & DESCRIPTION	: Silty SAND trace of shell fragments and fine gravel, dark grey, very soft to soft, low to medium plasticity, gravel subangular	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N560 (BH05 23.0m - 23.50m)

Moisture Content	%						
Container No.	g	24	26				
Mass of Container	g	14.63	15.01				
Mass of Container + Wet Soil	g	30.60	30.56				
Mass of Container + Dry Soil	g	26.75	26.88				
Mass of Dry Soil	g	12.12	11.87				
Mass of Moisture	g	3.85	3.68				
Moisture Content	%	31.77	31.00				31.38

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK/TL
MATERIAL TYPE & DESCRIPTION	: Silty CLAY trace siltstone nodules and fine sand , light brown, firm to stiff, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N562 (BH05 27.5m - 28.00m)

Moisture Content	%						
Container No.	g	58	60				
Mass of Container	g	62.66	62.91				
Mass of Container + Wet Soil	g	90.67	89.99				
Mass of Container + Dry Soil	g	83.44	82.88				
Mass of Dry Soil	g	20.78	19.97				
Mass of Moisture	g	7.23	7.11				
Moisture Content	%	34.79	35.60				35.20

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 20 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto.	**TECHNOLOGIST**	: RK/TL
MATERIAL TYPE & DESCRIPTION	: Clayey SILT with siltstone nodules, greyish brown, stiff, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N563 BH05 29.00m - 29.50m)

Moisture Content	%						
Container No.	g	64	72				
Mass of Container	g	82.05	86.33				
Mass of Container + Wet Soil	g	132.10	132.51				
Mass of Container + Dry Soil	g	119.80	121.07				
Mass of Dry Soil	g	37.75	34.74				
Mass of Moisture	g	12.30	11.44				
Moisture Content	%	32.58	32.93				32.76

Tested By: RK/TL
Date: 20 October 2015

Q.A. Checked By: KB
Date:25 November 2015

Approved By:IG
Date:25 November 2015

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

PRINCIPAL	: Japan International Cooperation Age	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 05, Nadi Bridge, Namotomoto	**TECHNOLOGIST**	: IG
MATERIAL TYPE & DESCRIPTION	: Gravelly SAND, brown grey, fine to medium, loosely packed, wet	**TEST METHOD**	: AS 1289.6.7.3-2001
		SAMPLE No.	: N554 (BH05 9.5m - 10.0m)

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

MOISTURE CONTENT

Container No.		116
Mass of Container	g	11.72
Mass of Container + Wet	g	33.13
Mass of Container + Dry	g	29.96
Mass of Dry Soil	g	18.24
Mass of Moisture	g	3.17
Moisture Content	%	17.38
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1840
Volume of Speciman	cm^3	839.43
Wet Density	t/m^3	2.19
Dry Density	t/m^3	1.87
Maximum Dry Density	t/m^3	-
Laboratory Density ratio	%	-

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

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(^{0}c)	KT cm/min	K_{20} cm/min
1	124	10.00	22	26	0.006	0.005
2	124	10.00	22	26	0.006	0.005
3	124	10.00	21	26	0.006	0.005
4	116	10.00	18	26	0.005	0.005
5	116	10.00	17	26	0.005	0.004
6	116	10.00	17	26	0.005	0.004
7	108	10.00	15	26	0.005	0.004
8	108	10.00	15	26	0.005	0.004
9	108	10.00	15	26	0.005	0.004
10	101	10.00	14	26	0.005	0.004
11	101	10.00	14	26	0.005	0.004
12	101	10.00	14	26	0.005	0.004

Average K_{20} m/s	7.41E-07

Tested By: IG
Date: 23 October 2015

Q.A. Check By: KB
Date: 25 November 2015

Approved By: IG
Date: 25 November 2015

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Unconfined Compressive Strength

NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	20 October 2015
SITE ADDRESS	:	Site 5 Nadi Bridge, Namotomoto	**TECHNOLOGIST**	:	LN/TL
SAMPLE LOCATION	:	BH 05 3.5m - 4.0m	**MATERIAL TYPE**	:	Silty CLAY, brown, soft to very soft, low to medium plasticity
TEST NUMBER	:	N550			

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

Moisture Content	Container No.	-	84
	Mass of Container	g	85.02
	Mass of Container + Wet Soil	g	317.04
	Mass of Container + Dry Soil	g	243.04
	Mass of Dry Soil	g	158.02
	Mass of Moisture	g	74.00
	Moisture Content	%	46.83

Bulk Density	Sample No.	-	N550
	Diameter of Specimen	mm	53.72
	Initial area of specimen Ao (π/4 d^2)	mm^2	2265.38
	Initial length of specimen Lo	mm	107.44
	Initial mass of specimen Mi	g	424.50
	Bulk Density ρ	t/m^3	1.74
	Dry Density ρd	t/m^3	1.19

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\varepsilon = \frac{Cn - Co}{Lo}$	Corrected Area A = Ao/ 1-ε	Principal Stress Difference $\sigma 1 - \sigma 3 = 1000P/A$
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002265	0.00
0.50	27	0.0542	0.465	0.002276	23.81
1.00	35.0	0.0702	0.931	0.002287	30.70
1.50	41.0	0.0823	1.396	0.002297	35.82
2.00	46.0	0.0923	1.862	0.002308	39.99
2.50	51.5	0.1034	2.327	0.002319	44.58
3.00	55.5	0.1114	2.792	0.002330	47.80
3.50	58.0	0.1164	3.258	0.002342	49.71
4.00	61.5	0.1234	3.723	0.002353	52.44
4.50	64.5	0.1295	4.188	0.002364	54.77
5.00	66.0	0.1325	4.654	0.002376	55.77
5.50	68.0	0.1365	5.119	0.002388	57.17
6.00	69.5	0.1395	5.585	0.002399	58.14
6.50	71.0	0.1425	6.050	0.002411	59.10

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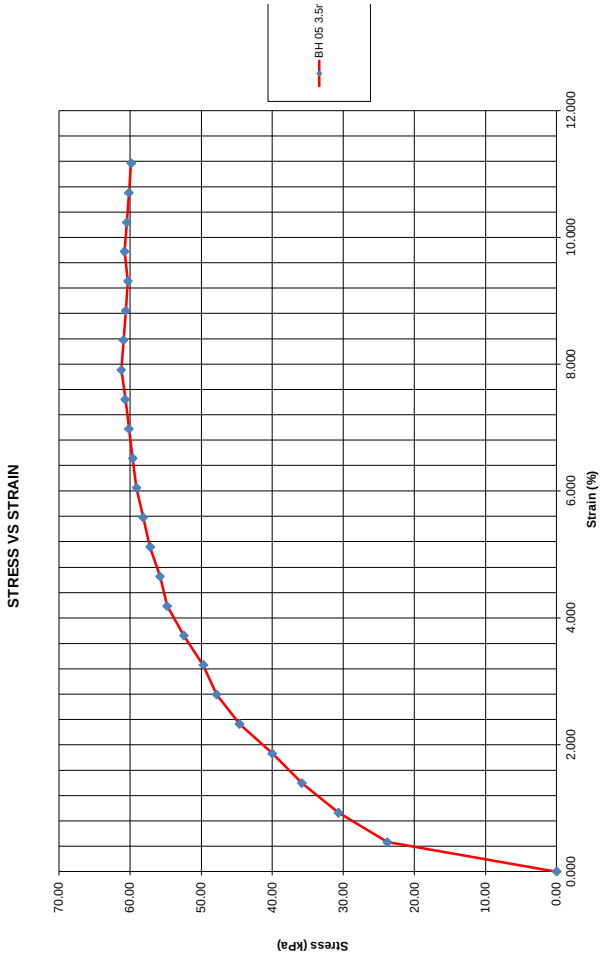

LOCATION: BH 05 3.50m - 4.00m
DATE OF TEST : 20 October 2015
DESCRIPTION: Silty CLAY, brown, soft to very soft, low to medium plasticity

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	20 October 2015
SITE ADDRESS	:	Site 5, Nadi Bridge, Namotomoto	**TECHNOLOGIST**	:	LN/KB
SAMPLE LOCATION	:	BH 05 17.0m -17.5m	**MATERIAL TYPE**	:	SILT, with some of silt stone nodules and trace of fine sand, green grey, firm, low to high plasticity
TEST NUMBER	:	N557			

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	568.65
	Mass of Container + Dry Soil	g	449.29
	Mass of Dry Soil	g	325.13
	Mass of Moisture	g	119.36
	Moisture Content	%	36.71

Bulk Density	Sample No.	-	N557
	Diameter of Specimen	mm	53.74
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2267.07
	Initial length of specimen Lo	mm	107.48
	Initial mass of specimen Mi	g	444.79
	Bulk Density ρ	t/m^3	1.83
	Dry Density ρd	t/m^3	1.34

Compression Gauge Reading	Load Gauge Reading	Load	Strain $\varepsilon = \frac{Cn - Co}{Lo}$	Corrected Area $A = Ao/\ 1-\varepsilon$	Principal Stress Difference $\sigma 1 - \sigma 3 = 1000P/A$
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002267	0.00
0.50	0	0	0.465	0.002278	0.00
1.00	26.0	0.0522	0.930	0.002288	22.81
1.50	39.0	0.0783	1.396	0.002299	34.06
2.00	53.0	0.1064	1.861	0.002310	46.06
2.50	57.0	0.1144	2.326	0.002321	49.29
3.00	69.0	0.1385	2.791	0.002332	59.39
3.50	78.0	0.1566	3.256	0.002343	66.83
4.00	83.0	0.1666	3.722	0.002355	70.75
4.50	88.0	0.1767	4.187	0.002366	74.68
5.00	91.0	0.1827	4.652	0.002378	76.84
5.50	94.0	0.1887	5.117	0.002389	78.98
6.00	97.0	0.1947	5.582	0.002401	81.09
6.50	99.0	0.1987	6.048	0.002413	82.35

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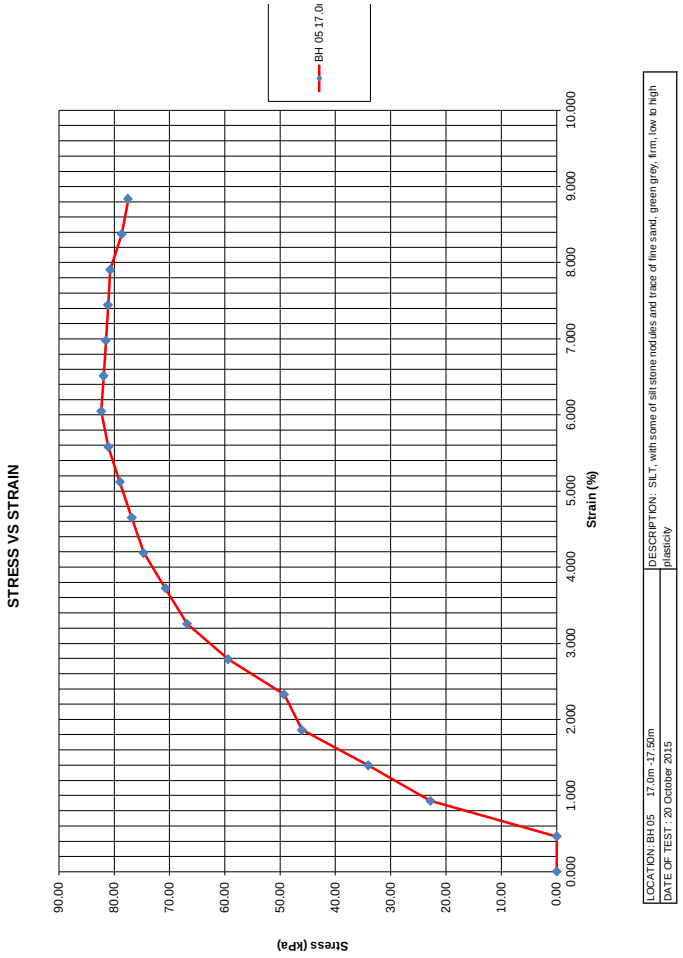

LOCATION: BH 05 17.0m -17.50m
DATE OF TEST : 20 October 2015
DESCRIPTION: SILT, with some of silt stone nodules and trace of fine sand, green grey, firm, low to high plasticity

Form GE-L-10

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Date: .13.2015
SAMPLES SENT BY: Collected from Site by ENTEC on 13.10.15
Notes:

PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS :Site 5, Nadi Bridge (BH 05), Namotomoto.
PROJECT NUMBER :1920815
TEST RESTULTS REQUIRED BY:

Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required							
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	Remarks
1920815	Site 5, Nadi Bridge (BH 05),Namotomoto.	Clayey Silt	SPT	1.00 - 1.5			1					
		Silty Sand	SPT	2.00 - 2.5				1				
		Clayey Silt	U	3.50 - 4.00		1	1		1	1	1	
		Sandy Gravel	SPT	5.00 - 5.5				1				
		Gravelly Sand	SPT	6.50 - 7.0			1					
		Gravelly Sand	SPT	8.00 - 8.5				1				
		Gravelly Sand	SPT	9.50 - 10.0	1		1					
		Gravel	SPT	11.00 - 11.20								No sample
		Clayey Silt	SPT	12.50 - 12.80								No sample
		Clayey Silt	SPT	14.00 - 14.50			1		1			
		Gravelly Sand	SPT	15.50 - 16.0				1				
		Silt trace of fine sand	U	17.00 - 17.50		1	1			1	1	
		Silty Sand	SPT	18.50 - 19.0				1				
		Silty Sand	SPT	20.00 - 20.50			1					
		Silty Sand	SPT	21.50 - 22.00								
		Silty Sand	SPT	23.00 - 23.5			1					
		Clayey Silt	SPT	24.50 - 25.0					1			
		Silty CLAY	SPT	26.00 - 26.5								
		Silty CLAY	SPT	27.50 - 28.0			1					
		Silty CLAY	SPT	29.00 - 29.5			1					
		Silty Sand	SPT	30.50 - 31.00				1				
	TOTALS				1	2	10	6	3	2	2	0
	Bill of Qunatity				1	3	10	6	3	3	3	

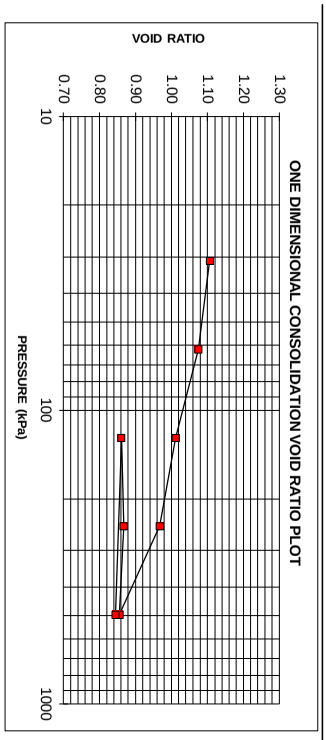
D15-165

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

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

Project Name: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works
Client Name: Japan International Cooperation Agency (JICA)
Job No: 1920815
Site Address : Namotomoto Bridge left bank
Sample Location: BH 05
Sample No: N 557
Depth: 17.0m - 17.5m
Tested By: IG
Date Tested: 21 November 2015

Sample Description: SILT, with some of silt stone nodules and trace of fine sand, green grey, firm, low to high plasticity
Sample History: Undisturbed / ~~Remoulded~~ / ~~Compacted~~ / ~~Slurried~~ / Unknown
Date Sample Collected: 13/10/15 **Temperature:** Max: 27°C Min: 25°C
Loading Cycle: 24 hrs 0 mins **Height of ring:** 23.8 mm
Diameter of ring (D) : 44.96 mm **Area of ring (A) :** 1587.61 mm²
Solid density of soil particles (Q_s) : 2.65 t/m³ (~~Measured~~ / Assumed)
Method used: Square root of time fitting method



			Initial		Final
Measured thickness of specimen, H		mm	H_i	23.8	H_f 20.69
Mass of ring + watch-glass + wet specimen		g	M_3	268.94	M_4 268.00
Mass of ring + watch-glass + dry specimen	M_5	g			253.27
Mass of ring	M_1	g			206.07
Mass of watch-glass	M_2	g			0
Mass of dry specimen $M_s = M_5 - M_1 - M_2$		g			47.2
Mass of water		g	$M_3 - M_5$	15.67	$M_4 - M_5$ 14.73
Water content, w		%	w_i	33.20	w_f 31.21
Dry density, Q_d		t/m³	Q_{di}	1.25	Q_{df} 1.44
Height of soil particles, H_s		mm			11.22
Voids ratio, e			e_i	1.12	e_f 0.84
Degree of saturation, S			S_i	78.45	S_f 97.96

Applied Pressure	Incremental deflection	Thickness of specimen	% Change in thickness	Height of voids	Voids ratio	Coefficient of consolidation	Coefficient of compressibility
kPa	*(ΔH) mm*	*mm*	*%*	*mm*		C_v *(m^2 /yr)*	M_v *(m^2 /MN)*
31	0.176	23.624	0.007	12.41	1.11	645.30	
62	0.528	23.272	0.023	12.05	1.07	375.73	0.72
124	1.236	22.564	0.055	11.35	1.01	353.21	0.84
248	1.726	22.074	0.078	10.86	0.97	54.09	0.58
496	2.982	20.818	0.143	9.60	0.86	133.63	0.51
248	2.850	20.950	0.136	9.73	0.87	0.00	-0.48
124	2.928	20.872	0.140	9.65	0.86	0.00	-0.99
496	3.110	20.690	0.150	9.47	0.84	175.99	0.35
0	0.00	23.800	0.000	12.58	1.12	0.00	

Tested by: IG/KB
Date: 21 November 2015

Q.A. Check By: UM
Date: 01 December 2015

Approved By: IG
Date: 01 December 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

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

Loading Date & Time					21/11/2015 @ 10:57hrs			22/11/2015 @ 11:00hrs			23/11/2015 @ 11:021hrs			24/11/2015 @ 12:21hrs			25/11/2015 @ 12:22hrs			26/11/2015 @ 12:31hrs		
Hanger Load					500g			1000g			2000g			4000g			8000g			4000g		
Effective Pressure					31kPa			62kPa			124kPa			247kPa			494kPa			247kPa		
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	sec	t min	√t min	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm
		0		0.00	10:57:00	2260	0.000	11:00:00	2171	0.000	11:02:00	1988	0.000	12:21:00	1624	0.000	12:22:00	1355	0.000	12:31:00	672	0.000
		6	0.100	0.316	10:57:06	2210	0.100	11:00:06	2100	0.142	11:02:06	1810	0.356	12:21:06	1580	0.088	12:22:06	1130	0.450	12:31:06	690	0.036
		15	0.250	0.500	10:57:15	2205	0.110	11:00:15	2087	0.168	11:02:15	1771	0.434	12:21:15	1530	0.188	12:22:15	1000	0.710	12:31:15	693	0.042
		30	0.500	0.707	10:57:30	2201	0.118	11:00:30	2077	0.188	11:02:30	1749	0.478	12:21:30	1503	0.242	12:22:30	950	0.810	12:31:30	697	0.050
	1		1.000	1.000	10:58:00	2198	0.124	11:01:00	2067	0.208	11:03:00	1728	0.520	12:22:00	1474	0.300	12:23:00	905	0.900	12:32:00	699	0.054
	2	15	2.250	1.500	10:59:15	2193	0.134	11:02:15	2054	0.234	11:04:15	1710	0.556	12:23:15	1451	0.346	12:24:15	877	0.956	12:33:15	600	-0.144
	4		4.000	2.000	11:01:00	2190	0.140	11:04:00	2045	0.252	11:06:00	1696	0.584	12:25:00	1435	0.378	12:26:00	837	1.036	12:35:00	601	-0.142
	6	15	6.250	2.500	11:03:15	2188	0.144	11:06:15	2038	0.266	11:08:15	1686	0.604	12:27:15	1426	0.396	12:28:15	805	1.100	12:37:15	602	-0.140
	9		9.000	3.000	11:06:00	2186	0.148	11:09:00	2033	0.276	11:11:00	1680	0.616	12:30:00	1417	0.414	12:31:00	782	1.146	12:40:00	602.2	-0.140
	16		16.00	4.000	11:13:00	2184	0.152	11:16:00	2025	0.292	11:18:00	1670	0.636	12:37:00	1406	0.436	12:38:00	762	1.186	12:47:00	603	-0.138
	30		30.00	5.480	11:27:00	2182	0.156	11:30:00	2018	0.306	11:32:00	1662	0.652	12:51:00	1394	0.460	12:52:00	728	1.254	13:01:00	603	-0.138
1			60.00	7.750	11:57:00	2179	0.162	12:00:00	2011	0.320	12:02:00	1652	0.672	13:21:00	1386	0.476	13:22:00	715	1.280	13:31:00	604	-0.136
2			120.0	10.950	12:57:00	2176	0.168	13:00:00	2004	0.334	13:02:00	1644	0.688	14:21:00	1377	0.494	14:22:00	705	1.300	14:31:00	605	-0.134
4			240.0	15.49	14:57:00	2174	0.172	15:00:00	1999	0.344	15:02:00	1636	0.704	16:21:00	1369	0.510	16:22:00	696	1.318	16:31:00	606	-0.132
8			480.0	21.91	18:57:00	2172	0.176	19:00:00	1997	0.348	19:02:00	1628	0.720	20:21:00	1364	0.520	20:22:00	684	1.342	20:31:00	606.2	-0.132
24			1440	37.95	10:57:00	2171	0.178	11:00:00	1988	0.366	11:02:00	1624	0.728	12:21:00	1355	0.538	12:22:00	672	1.366	12:31:00	608	-0.128
																				UNLOADING		
Machine Correction					0.002			0.014			0.02			0.048			0.110			0.004		
Δ H (Corrected)					0.176			0.352			0.708			0.490			1.256			-0.132		
Net Total Settlement					0.176			0.528			1.236			1.726			2.982			2.850		

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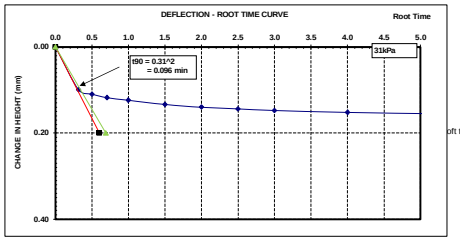
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

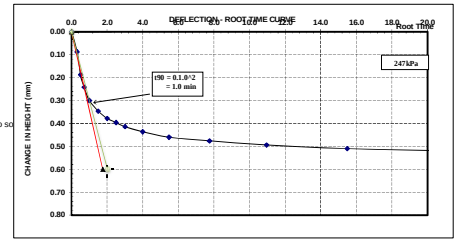
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

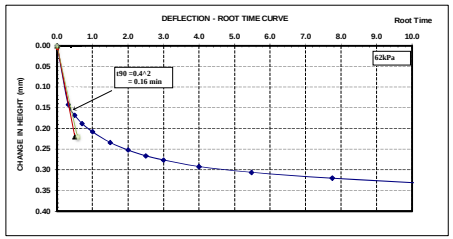
Loading Date and Time					27/11/2015 @ 12:36hrs			28/11/2015 @ 12:38hrs			N 515											
Hanger Load					2000g			8000g			6.50m-7.0m											
Effective Pressure					124kPa			494kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	BH 02	t min	√t min	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm
		0	0	0	12:36:00	608	0.000	11:38:00	625	0.000												
		6	0.100	0.300	12:36:06	628	0.040	11:38:06	590	0.070												
		15	0.250	0.316	12:36:15	632	0.048	11:38:15	580	0.090												
		30	0.500	0.707	12:36:30	635	0.054	11:38:30	564	0.122												
	1		1.000	1.000	12:37:00	636	0.056	11:39:00	561	0.128												
	2	15	2.250	1.500	12:38:15	638	0.060	11:40:15	560	0.130												
	4		4.000	2.000	12:40:00	639	0.062	11:42:00	558	0.134												
	6	15	6.250	2.500	12:42:15	641	0.066	11:44:15	555	0.140												
	9		9.000	3.000	12:45:00	642	0.068	11:47:00	554	0.142												
	16		16.00	4.000	12:52:00	643	0.070	11:54:00	552	0.146												
	30		30.00	5.480	13:06:00	644	0.072	12:08:00	549	0.152												
1			60.00	7.750	13:36:00	645	0.074	12:38:00	546	0.158												
2			120.0	10.950	14:36:00	646	0.076	13:38:00	542	0.166												
4			240.0	15.49	16:36:00	648	0.080	15:38:00	540	0.170												
8			480.0	21.91	20:36:00	650	0.084	19:38:00	533	0.184												
24			1440	37.95	12:36:00	652	0.088	11:38:00	523	0.204												
					UNLOADING			RELOADING														
Machine Correction					0.01			0.022														
Δ H (Corrected)					0.078			0.182														
Net Total Settlement					2.928			3.110														

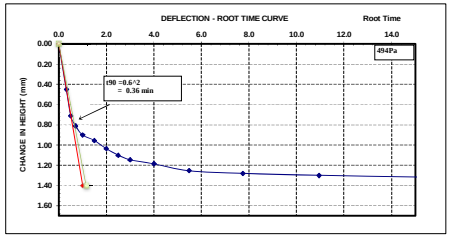
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

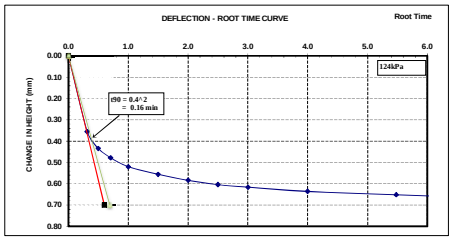
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

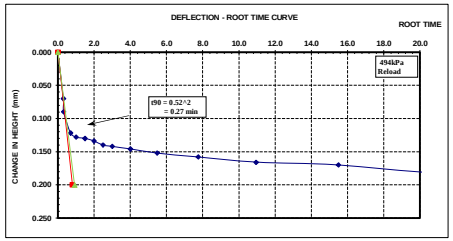












Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth			3.5 - 4.0m
Description			
Type			Silty Clay, brown, soft to very soft, low to medium plasticity.
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	63.4
Bulk Density	ρ_0	(Mg/m3)	1.61
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	50
Initial Dry Density	ρ_{di}	(Mg/m3)	1.08
Initial Voids Ratio	e_i	.	1.455
Initial Degree of Saturation	S_i	(%)	90.3
Initial Swelling	S_s	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	37
Dry Density	ρ_{df}	(Mg/m3)	1.08
Voids Ratio	e_f	.	1.459
Saturation	S_f	(%)	67
Height Settlement	ΔL_s	(mm)	-0.032

Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_v (m2/year)	Compressibility m_v (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
30	1.455	0.000	11.8		29.0	0.0		3.752	0.0087
60	1.459	-0.032	9.3	0.053	29.0	0.0		4.782	0.0087
120	1.459	-0.032	11.6		29.0	0.0		3.833	0.0087
240	1.459	-0.032	12.4		29.0	0.0		3.582	0.0087
480	1.459	-0.032	7.4		29.0	0.0		6.044	0.0087
960	1.459	-0.032	4.7		29.0	0.0		9.526	0.0087
120	1.459	-0.032			29.0	0.0			
30	1.459	-0.032			29.0	0.0			

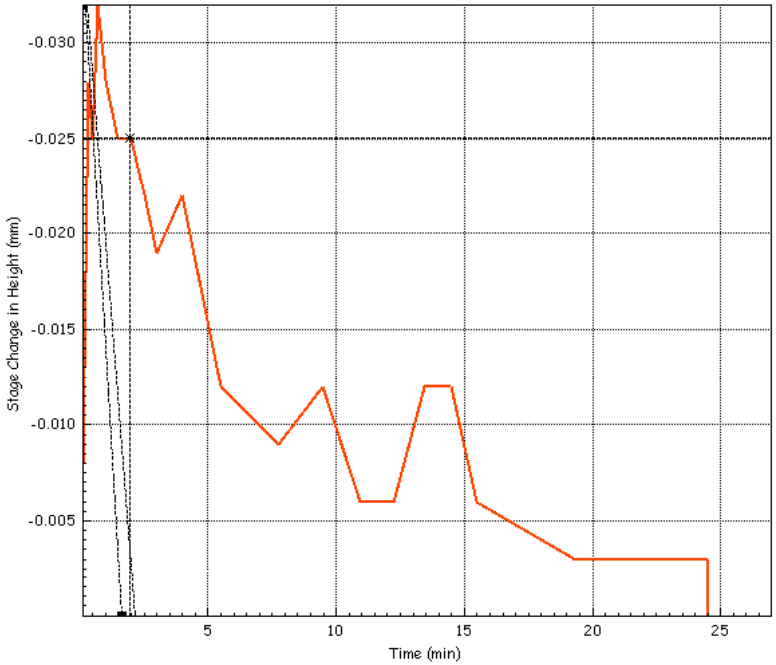
Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-15_013
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/9/2015
Jobfile	Geotechnical Engineering	Sample	N550
Client	Japan International Cooperation	Borehole	BH05 (Retest)
Operator	IG/MK	Checked	DMC
		Approved	DMC

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	30
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.000
Voids Ratio	e_f	.	1.455
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	3.752
Consolidation	C_V	(m2/year)	11.8
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

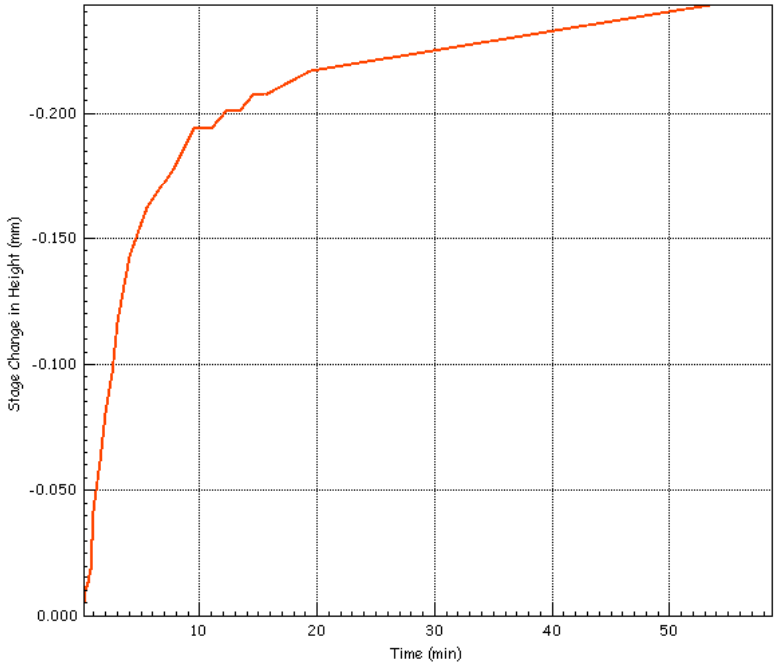


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-15_013
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/9/2015
Jobfile	Geotechnical Engineering	Sample	N550
Client	Japan International Cooperation	Borehole	BH05 (Retest)
Operator	IG/MK	Checked	DMC
		Approved	DMC

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	30
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-0.032
Voids Ratio	e_f	.	1.459
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

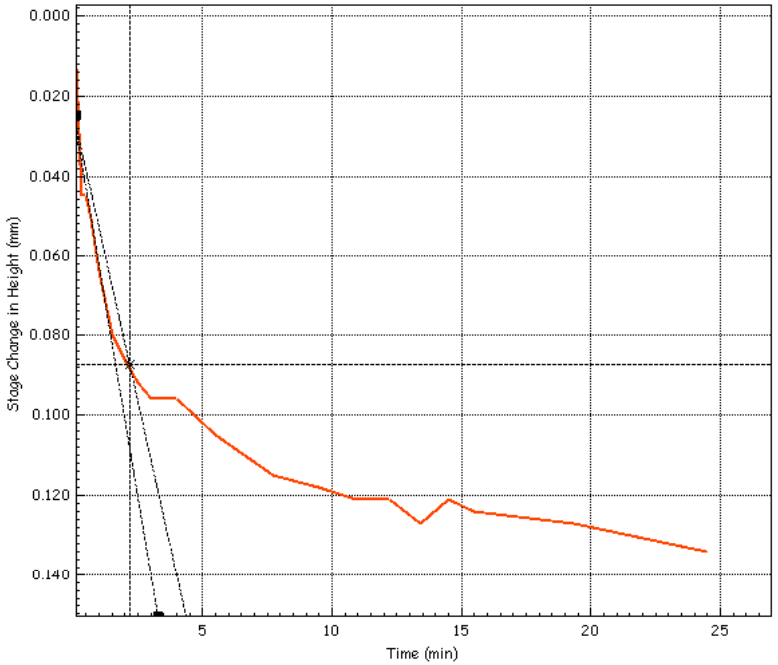


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-15_013
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/9/2015
Jobfile	Geotechnical Engineering	Sample	N550
Client	Japan International Cooperation	Borehole	BH05 (Retest)
Operator	IG/MK	Checked	DMC
		Approved	DMC

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	60
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-0.032
Voids Ratio	e_f	.	1.459
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	4.782
Consolidation	C_V	(m2/year)	9.3
Compressibility	m_V	(m2/MN)	0.053
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

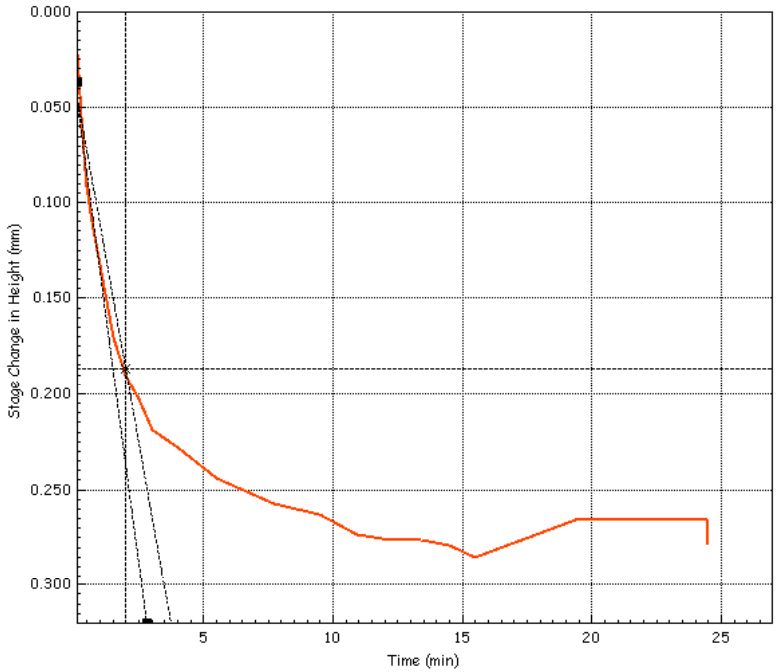


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-15_013
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/9/2015
Jobfile	Geotechnical Engineering	Sample	N550
Client	Japan International Cooperation	Borehole	BH05 (Retest)
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	120
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-0.032
Voids Ratio	e_f	.	1.459
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	3.833
Consolidation	C_V	(m2/year)	11.6
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

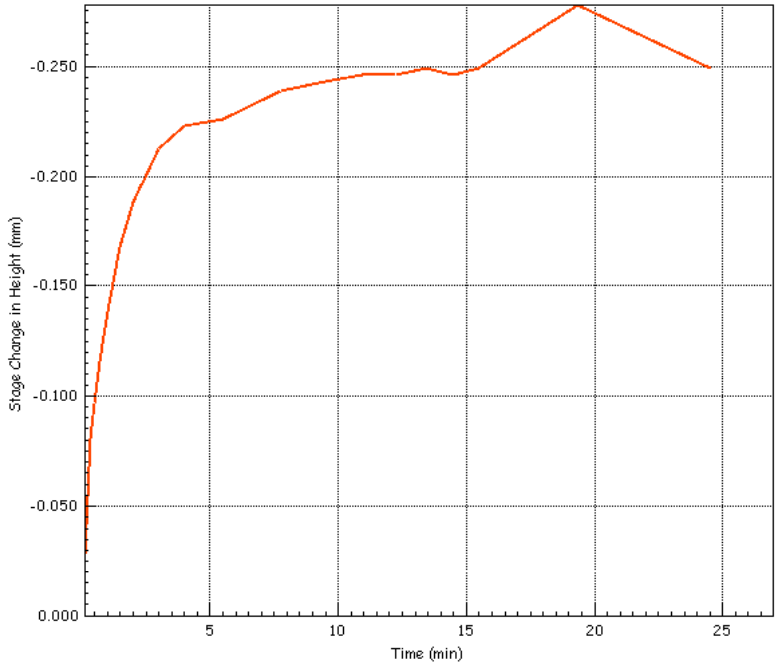


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-15_013
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/9/2015
Jobfile	Geotechnical Engineering	Sample	N550
Client	Japan International Cooperation	Borehole	BH05 (Retest)
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	120
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-0.032
Voids Ratio	e_f	.	1.459
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

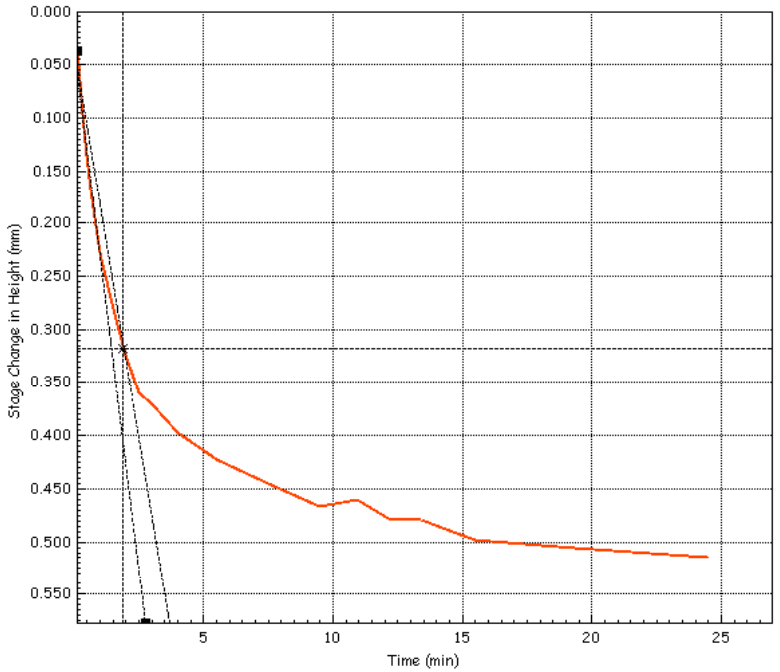


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-15_013
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/9/2015
Jobfile	Geotechnical Engineering	Sample	N550
Client	Japan International Cooperation	Borehole	BH05 (Retest)
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	240
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-0.032
Voids Ratio	e_f	.	1.459
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	3.582
Consolidation	C_V	(m2/year)	12.4
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

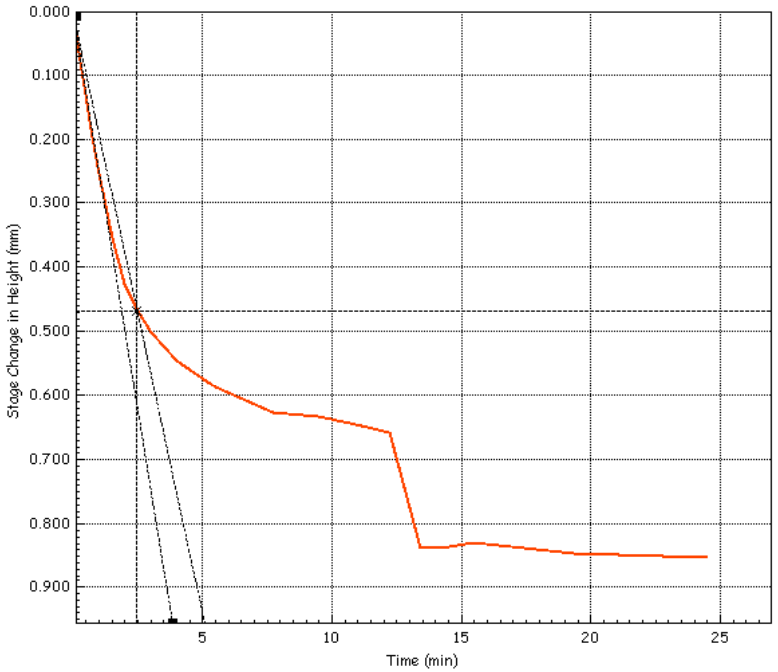


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-15_013
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/9/2015
Jobfile	Geotechnical Engineering	Sample	N550
Client	Japan International Cooperation	Borehole	BH05 (Retest)
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	480
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-0.032
Voids Ratio	e_f	.	1.459
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	6.044
Consolidation	C_V	(m2/year)	7.4
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

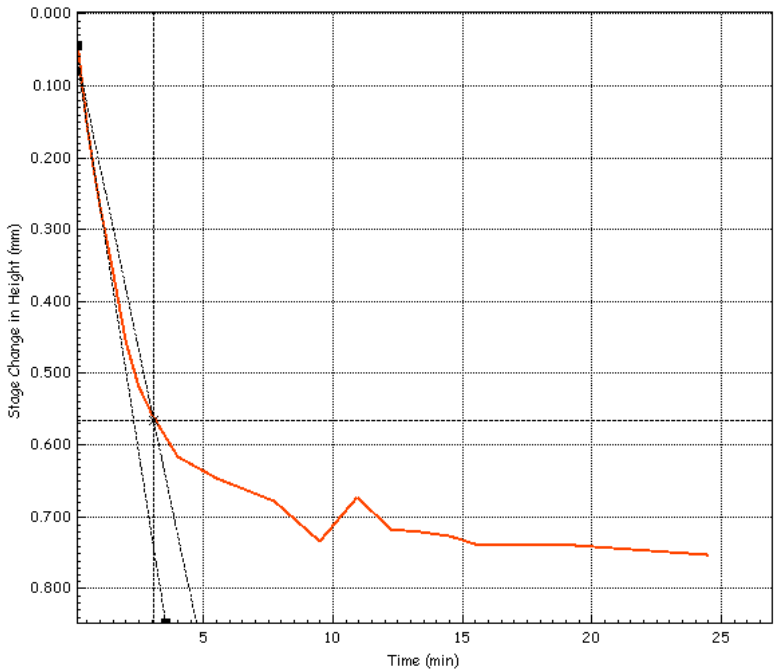


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-15_013
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/9/2015
Jobfile	Geotechnical Engineering	Sample	N550
Client	Japan International Cooperation	Borehole	BH05 (Retest)
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	960
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-0.032
Voids Ratio	e_f	.	1.459
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	9.526
Consolidation	C_V	(m2/year)	4.7
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-15_013
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	12/9/2015
Jobfile	Geotechnical Engineering	Sample	N550
Client	Japan International Cooperation	Borehole	BH05 (Retest)
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

APPENDIX 5d

Site Photos

APPENDIX 6

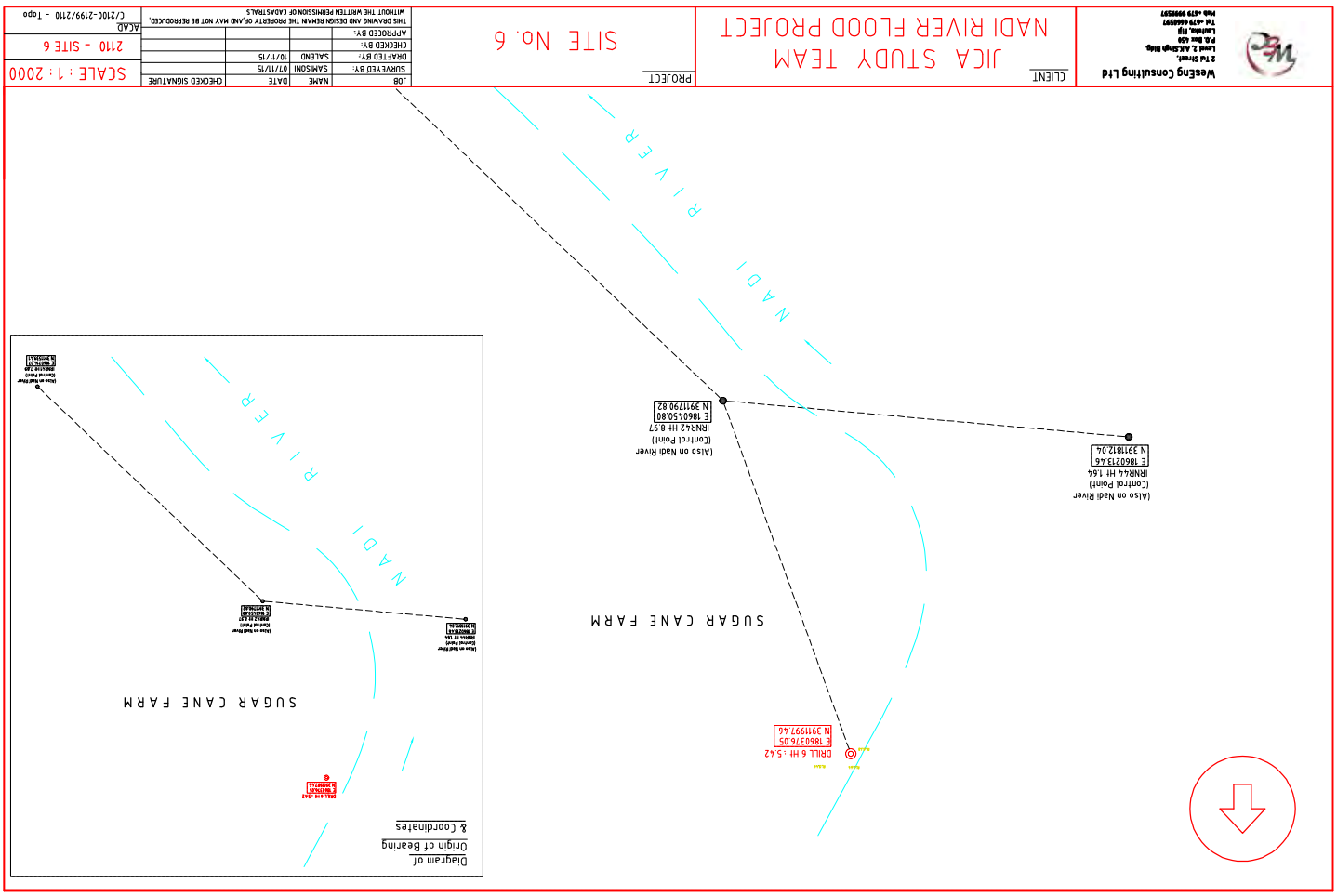
SITE 6 – Moala Saunaka Village Fiji.

APPENDIX 6a

Test Locality Plan

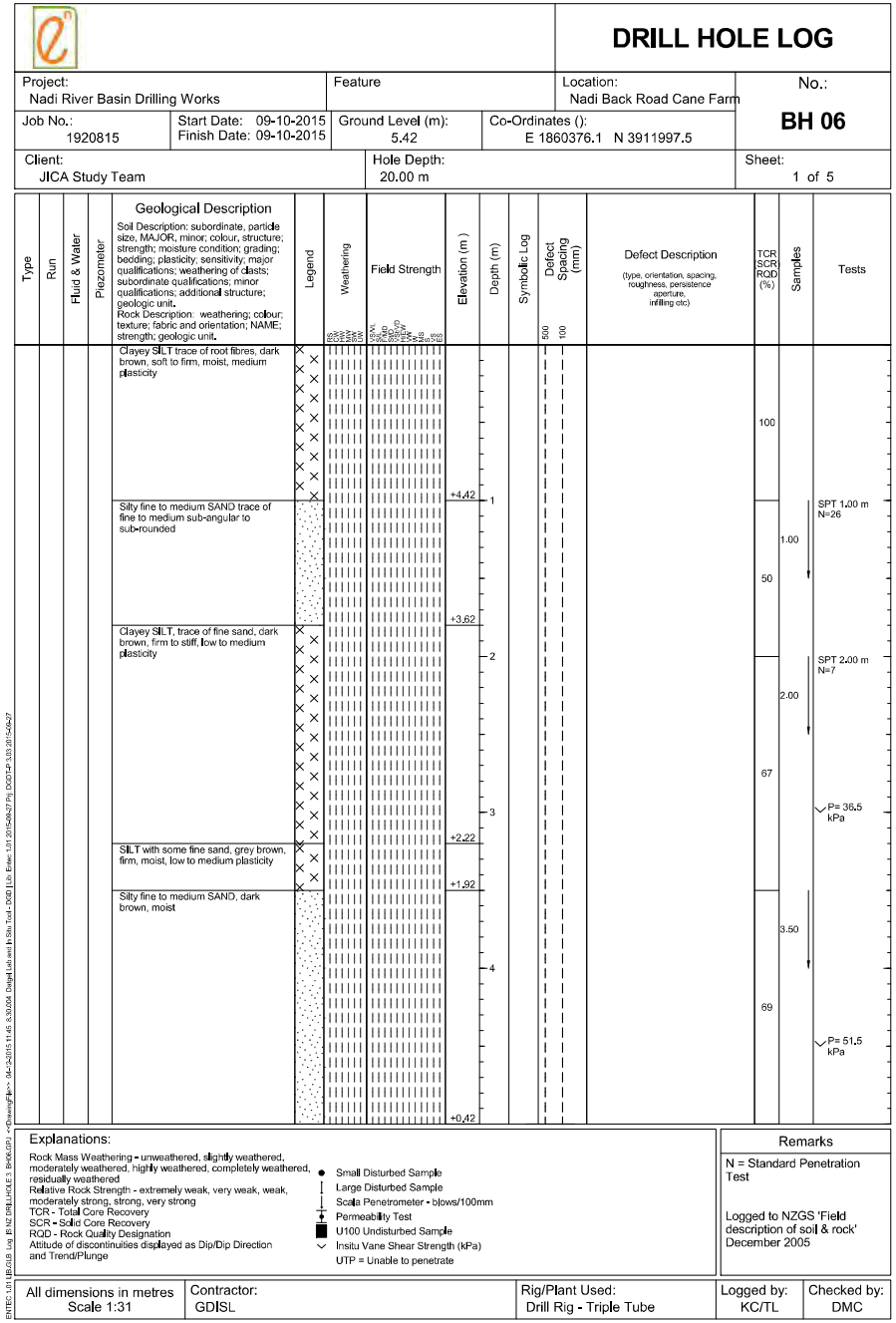
ENTEC LIMITED ENGINEERING AND SCIENCE CONSULTANTS				CLIENT:	Japan International Cooperation Agency (JICA)	NOTE: THIS DRAWING HAS BEEN REPRODUCED BY ENTEC TO SHOW THE APPROXIMATE BOREHOLE LOCATION.	DRAWN BY: SS; CHECKED BY: KC; APPROVED BY: JD; SHEET TITLE: TEST LOCALITY PLAN; SCALE: NTS; ISSUE DATE: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

D15-174



APPENDIX 6b

Engineering Borehole Log and Core Photos



DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Back Road Cane Farm	No.: BH 06
Job No.: 1920815	Start Date: 09-10-2015 Finish Date: 09-10-2015	Ground Level (m): 5.42	Co-Ordinates (): E 1860376.1 N 3911997.5
Client: JICA Study Team	Hole Depth: 20.00 m		Sheet: 1 of 5

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR SCR RQD (%)	Samples	Tests
				Clayey SILT trace of root fibres, dark brown, soft to firm, moist, medium plasticity				+4.42	1				100		
				Silty fine to medium SAND trace of fine to medium sub-angular to sub-rounded				+3.62					50	1.00	SPT 1.00 m N=26
				Clayey SILT, trace of fine sand, dark brown, firm to stiff, low to medium plasticity					2						
				SILT with some fine sand, grey brown, firm, moist, low to medium plasticity				+2.22					67	2.00	SPT 2.00 m N=7
				Silty fine to medium SAND, dark brown, moist				+1.92	3						P= 36.5 kPa
								+0.42	4				69	3.50	P= 51.5 kPa

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Nadi Back Road Cane Farm	**BH 06**

Job No.:	Start Date / Finish Date	Ground Level (m):	Co-Ordinates ():
1920815	Start Date: 09-10-2015 Finish Date: 09-10-2015	5.42	E 1860376.1 N 3911997.5

Client:	Hole Depth:	Sheet:
JICA Study Team	20.00 m	2 of 5

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to coarse SAND with fine to medium subangular to sub rounded gravel, grey white			23	5.00	SPT 5.00 m N=8
		6			
Fine to medium sub-angular GRAVEL with trace of fine sand, grey	-1.08		33	6.50	SPT 6.50 m N=8
		7			
		8	23	8.00	SPT 8.00 m N=12
		9			
Silty fine to medium SAND, trace of fine to medium sub-angular gravel	-3.98		23	9.50	SPT 9.50 m N=14

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

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

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Nadi Back Road Cane Farm	**BH 06**

Job No.:	Start Date / Finish Date	Ground Level (m):	Co-Ordinates ():
1920815	Start Date: 09-10-2015 Finish Date: 09-10-2015	5.42	E 1860376.1 N 3911997.5

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Silty fine to medium SAND, trace of fine to medium sub-angular gravel *(continued)*			23		
Silty CLAY trace of siltstone nodules and organics, green grey, firm to stiff, moist, medium to high plasticity	-5.58	11	60	11.00	SPT 11.00 m N=10; P= 91.5 kPa
		12			P= 55 kPa
		13	53	12.50; -13.00 PT	
Silty CLAY with medium to coarse sand, brownish green grey, soft, low to medium plasticity	-7.98				P= 11.5 kPa; P= 51.5 kPa
SILT with some medium to coarse sand, brownish green grey, soft, low to medium plasticity	-8.58	14	53	14.00	SPT 14.00 m N=11; P= 41.5

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

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

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Back Road Cane Farm	No.: BH 06
Job No.: 1920815	Start Date: 09-10-2015 Finish Date: 09-10-2015	Ground Level (m): 5.42	Co-Ordinates (): E 1860376.1 N 3911997.5
Client: JICA Study Team	Hole Depth: 20.00 m		Sheet: 4 of 5

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

Columns: Type | Run | Fluid & Water | Piezometer | Geological Description | Legend | Weathering (RS CW HW MW SW UW) | Field Strength (VS/VL S/L F/MD St/D VSt/VD H/EW VW W MS S VS ES) | Elevation (m) | Depth (m) | Symbolic Log | Defect Spacing (mm) (500, 100) | Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc) | TCR (SCR) RQD (%) | Samples | Tests

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with some medium to coarse sand, brownish green grey, soft, low to medium plasticity *(continued)*	-10.08		53		kPa; P= 53 kPa
Silty medium to coarse SAND, grey black	-11.28	16	67	15.50 -16.00 PT	P= 75 kPa
SILT with some medium to coarse sand trace of oragnics and fine to medium sub angular to sub rounded gravel, brown, firm, low to medium plasticity	-11.58	17			
medium SAND and trace of fine to coarse sub angular to sub rounded gravel, brown grey	-12.18			17.00	SPT 17.00 m N=50; P= 16.5 kPa; P= 58 kPa
Fine to coarse SAND with some silt, dark brown	-13.08	18	85		P= 55 kPa
Fine SAND with some silt trace of shell fragments, dark grey brown	-14.28	19	61	18.50	SPT 18.50 m N=43; P= 300 kPa
Fine SAND with some silt trace of fine to medium sub angular gravel and shell fragments, dark grey black (moderately to highly weathered,	-14.58				

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH06.GPJ <<DrawingFile>> 04-12-2015 11:45 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P 3.03 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Back Road Cane Farm	No.: BH 06
Job No.: 1920815	Start Date: 09-10-2015 Finish Date: 09-10-2015	Ground Level (m): 5.42	Co-Ordinates (): E 1860376.1 N 3911997.5
Client: JICA Study Team	Hole Depth: 20.00 m		Sheet: 5 of 5

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SANDSTONE, darkgrey black, weak to very wewak				20.00	SPT 20.00 m N=50; P= 300 kPa
Hole Terminated at 20.00 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005		21, 22, 23, 24			

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH06.GPJ <<DrawingFile>> 04-12-2015 11:45 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: DGDT-P [illegible]

Borehole 6 Core Photos (0.00m to 20.00m)

0.00m to 3.20m

3.20m to 9.50m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 6, Nadi Back Road Opposite Saunaka Village, Nadi, Fiji.

9.50m to 14.70m

14.70m to 17.60m

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS
1920815.06

17.60m to 20.00m

APPENDIX 6c

Laboratory Test Schedule and Test Results

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS : Site 06 (BH06), Nadi Back Road 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	
1920815.06	Site Six	Gravelly Silt	SPT	1.00 - 1.5			1					
		Clayey Silt	SPT	2.00 - 2.5					1			
		Sand	U	3.50 - 4.00			1	1		1	1	
		Sandy Gravel	SPT	5.00 - 5.50	1	1	1	1				
		Gravel with trace of sand	SPT	6.50 - 7.00			1	1				
		Gravel	SPT	9.50 - 10.00			1	1				
		Clay	U	12.50 - 13.00		1	1		1	1	1	
		Sandy Clay	SPT	14.00 - 14.5			1		1			
		Silty Sand	U	15.50 - 16.00		1	1	1		1	1	
		Sandy Gravel	SPT	18.50 - 19.0			1	1				
		Sandy Gravel	SPT	20.00 - 20.50			1	1				
	TOTALS				1	3	10	6	3	3	3	Total 29
	Bill of Quneity				1	3	10	6	3	3	3	29

Lab Test Schedule checked by: DMC

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Atterberg Limit Test Results

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

NATURAL MOISTURE CONTENT

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

PLASTIC LIMIT

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

LIQUID LIMIT

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

LINEAR SHRINKAGE TEST

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

Sample Preparation

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

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

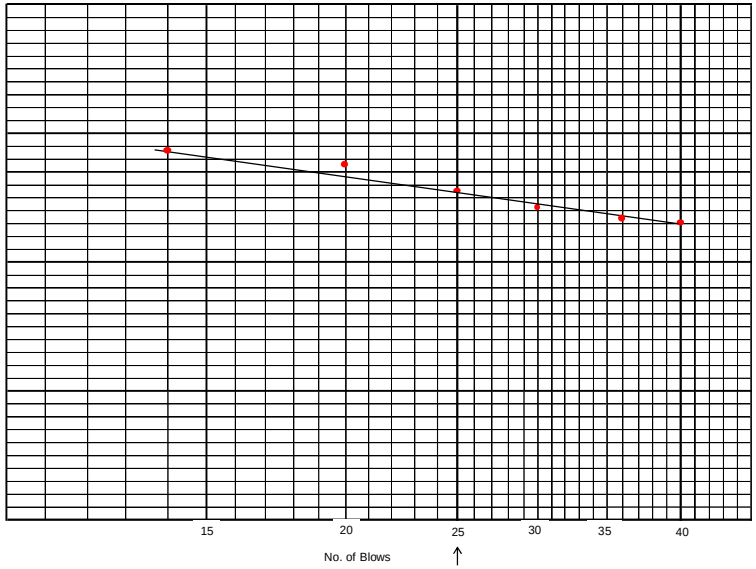
Tested By:RK
Date:13 October 2015

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

Approved By:IG
Date: 18 November 2015

Form: GE-L-03

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N512

ENTEC LIMITED
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Atterberg Limit Test Results

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

NATURAL MOISTURE CONTENT

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

PLASTIC LIMIT

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

LIQUID LIMIT

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

LINEAR SHRINKAGE TEST

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

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

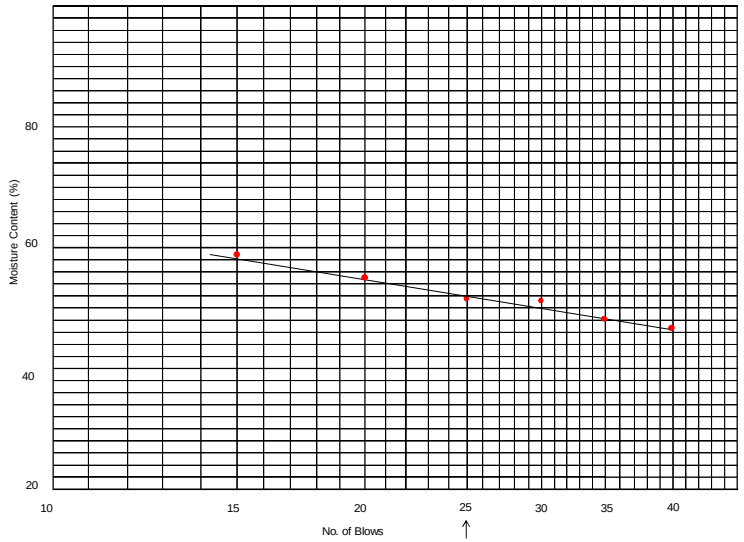
Liquid Limit	52.00 %
Plastic Limit	26.11 %
Plasticity Index	25.89 %
Shrinkage Limit	16.80 %

Tested By: KB
Date:15 October 2015

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

Approved By:IG
Date: 18 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No: N 514

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Atterberg Limit Test Results

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

NATURAL MOISTURE CONTENT

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

PLASTIC LIMIT

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

LIQUID LIMIT

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

LINEAR SHRINKAGE TEST

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

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

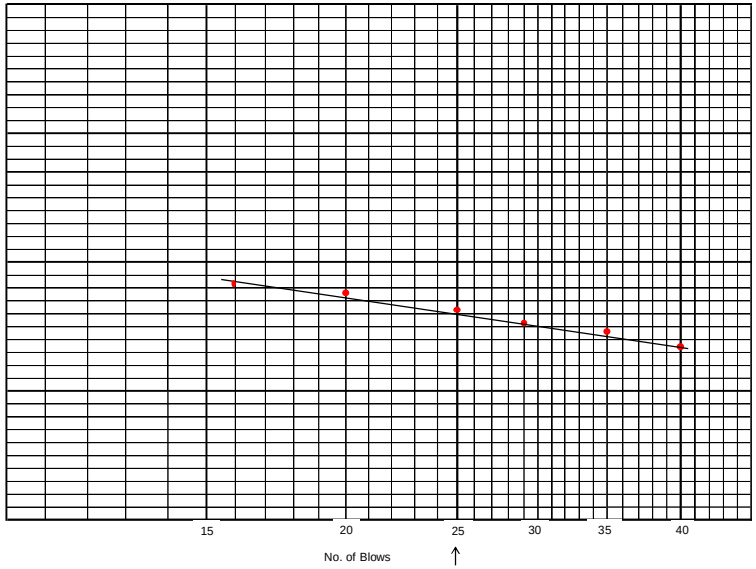
Liquid Limit	46.00 %
Plastic Limit	30.34 %
Plasticity Index	15.66 %
Shrinkage Limit	16.80 %

Tested By: LN
Date:15 October 2015

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

Approved By:*IG*
Date: 18 November 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N518

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

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

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

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

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

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

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

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

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

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

Bulk Density	Sample No.	-	N515
	Diameter of Specimen	mm	53.05
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2209.23
	Initial length of specimen Lo	mm	52.69
	Initial mass of specimen Mi	g	189.23
	Bulk Density ρ	t/m^3	1.63
	Dry Density ρd	t/m^3	1.06

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

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

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

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

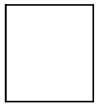
Moisture Content	Container No.	-	70	77	
	Mass of Container	g	90.08	91.32	
	Mass of Container + Wet Soil	g	195.82	196.13	
	Mass of Container + Dry Soil	g	166.00	165.95	
	Mass of Dry Soil	g	75.92	74.63	
	Mass of Moisture	g	29.82	30.18	
	Moisture Content	%	39.28	40.44	39.86

Bulk Density	Sample No.	-	N516
	Diameter of Specimen	mm	53.43
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2240.99
	Initial length of specimen Lo	mm	56.34
	Initial mass of specimen Mi	g	210.20
	Bulk Density ρ	t/m^3	1.66
	Dry Density ρd	t/m^3	1.19

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

Oedometer Settlement Test

Sample Details



sketch showing specimen location in original sample

Depth			3.50m - 3.76m
Description			Sample 1 of 3 from Borehole B2
Type			Default
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	66.4
Bulk Density	ρ_0	(Mg/m3)	1.69
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

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

Final Conditions

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

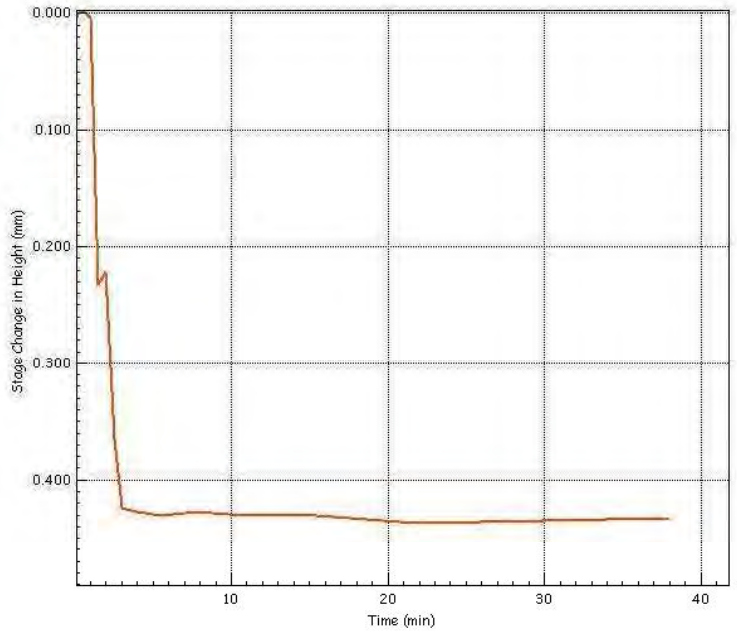
Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
30	1.133	0.433	3.2	0.722	27.0	0.0	3.171		0.0087
60	1.118	0.564	3.1	0.223	27.0	0.0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

Notes

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

Oedometer Consolidation Settlement Report

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

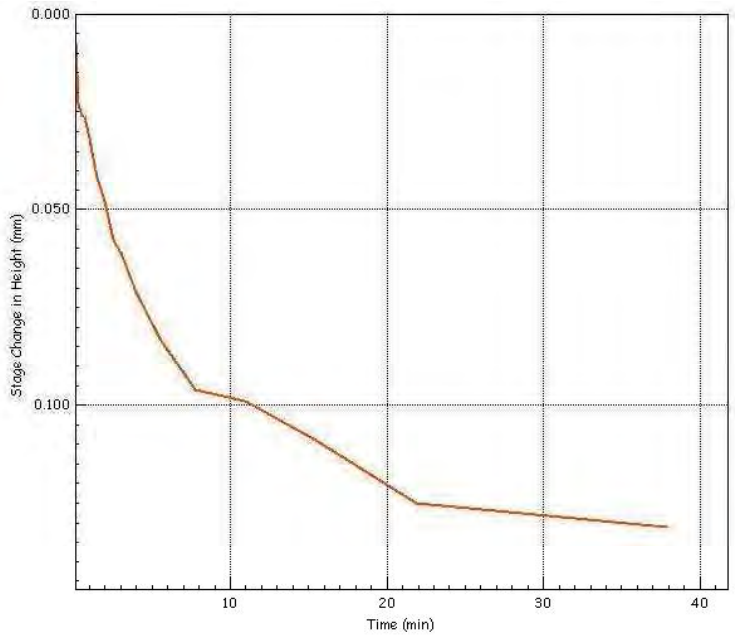


Test Method	AS 1289.6.6.1-1998		Test Name	ODO-01	
			Database: .\SQLEXPRESS \ ENTEC		
Site Reference	1920815		Test Date	10/27/2015	
Jobfile	Geotechnical Engineering Investigation		Sample	N513	
Client	Japan International Cooperation Agency		Borehole	BH02	
Operator	IG/MK	Checked DMC		Approved	DMC

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

Oedometer Consolidation Settlement Report

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



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

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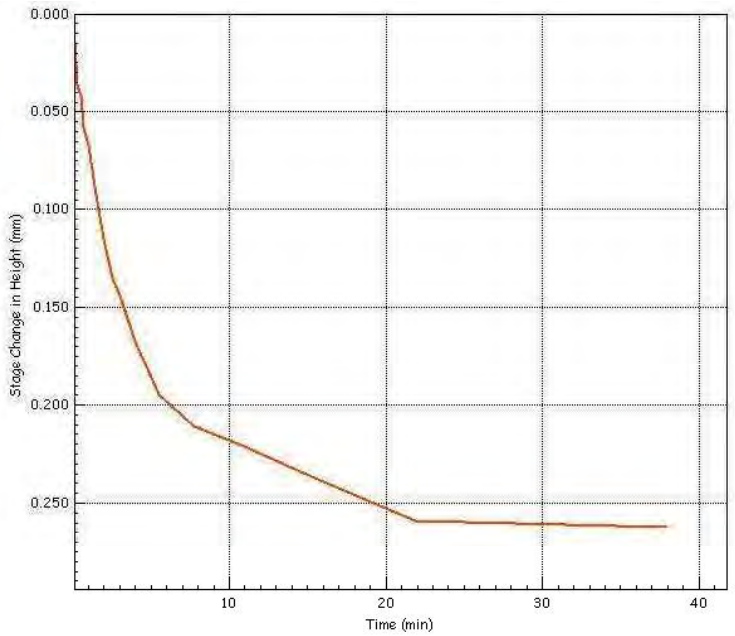
Oedometer Consolidation Settlement Report

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

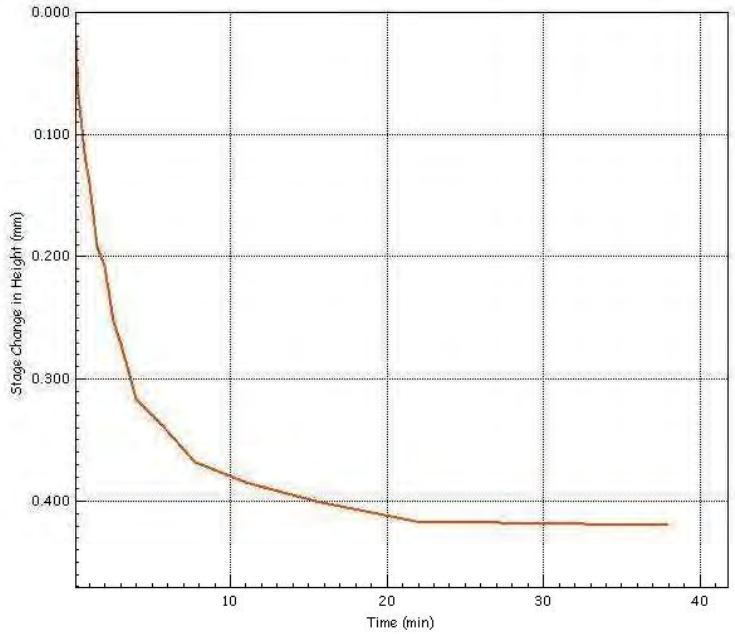


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator IG/MK	Checked DMC	Approved DMC	

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

Oedometer Consolidation Settlement Report

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

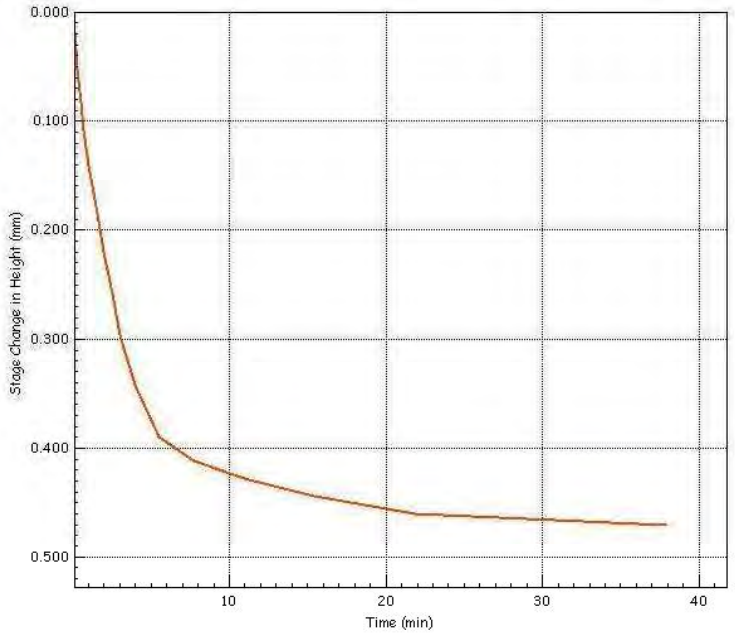


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator IG/MK	Checked DMC	Approved DMC	

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

Oedometer Consolidation Settlement Report

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

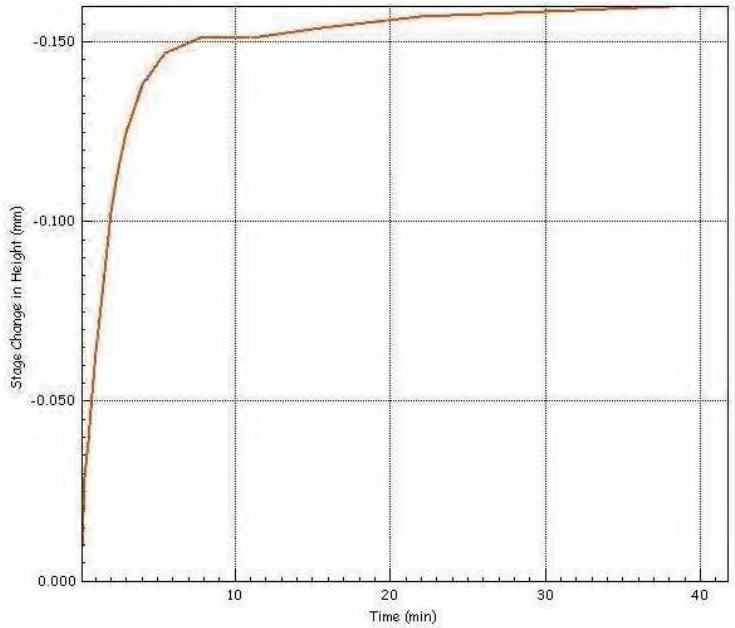


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator IG/MK	Checked DMC	Approved DMC	

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

Oedometer Consolidation Settlement Report

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

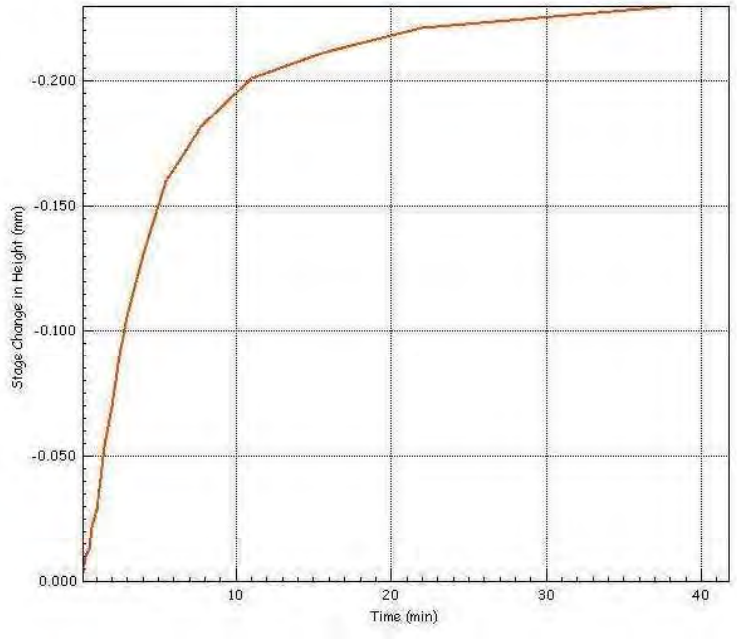


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-01
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	10/27/2015
Jobfile	Geotechnical Engineering Investigation	Sample	N513
Client	Japan International Cooperation Agency	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

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

Oedometer Consolidation Settlement Report

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



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

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

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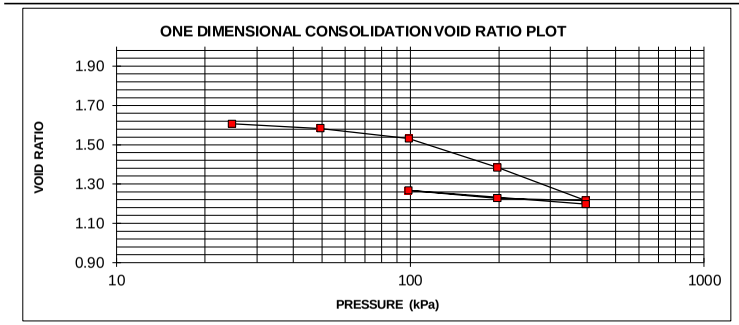
Determination of The One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

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

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



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

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

Tested by: IG
Date: 27 October 2015

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

Approved By: IG
Date: 18 November 2015

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Loading Date & Time		27/10/20135 @ 09:33hrs			28/10/2015 @ 09:39hrs			29/10/2015 @ 09:41hrs			30/10/2015 @ 10:46hrs			31/10/2015 @ 10:50hrs			01/11/2015 @ 10:53hrs		
Hanger Load		400g			800g			1600g			3200g			6400g			3200g		
Effective Pressure		24.7kPa			49.4kPa			98.8kPa			197.6kPa			395.2kPa			197.6kPa		
Time Elapsed hrs	min	Clock Time/t	Dial Gauge	H x10 mm	Clock Time/t	Dial Gauge	H x10 mm	Clock Time/t	Dial Gauge	H x10 mm	Clock Time/t	Dial Gauge	H x10 mm	Clock Time/t	Dial Gauge	H x10 mm	Clock Time/t	Dial Gauge	H x10 mm
	0	, dark grey, very soft t	2251		9:39:00	2163		9:41:00	2050		10:46	1800	0.000	10:50	1111	0.000	11:53	333	0.000
	0.100	09:33:06	2209	0.084	09:39:06	2118	0.090	09:41:06	1970	0.160	10:46:06	1740	0.120	10:50:06	1090	0.042	11:53:06	353	0.040
	0.250	09:33:15	2203	0.096	09:39:15	2110	0.106	09:41:15	1955	0.190	10:46:15	1600	0.400	10:50:15	1045	0.132	11:53:15	357	0.048
	0.500	09:33:30	2198	0.106	09:39:30	2103	0.120	09:41:30	1945	0.210	10:46:30	1565	0.470	10:50:30	1000	0.222	11:53:30	362	0.058
1	1.000	09:34:00	2194	0.114	09:40:00	2097	0.132	09:42:00	1929	0.242	10:47:00	1500	0.600	10:51:00	942	0.338	11:54:00	366	0.066
2	1.500	09:35:15	2188	0.126	09:41:15	2094	0.138	09:43:15	1916	0.268	10:48:15	1456	0.688	10:52:15	849	0.524	11:55:15	371	0.076
4	2.000	09:37:00	2185	0.132	09:43:00	2091	0.144	09:45:00	1905	0.290	10:50:00	1407	0.786	10:54:00	773	0.676	11:57:00	373	0.080
6	2.500	09:39:15	2182	0.138	09:45:15	2087	0.152	09:47:15	1898	0.304	10:52:15	1377	0.846	10:56:15	712	0.798	11:59:15	375	0.084
9	3.000	09:42:00	2180	0.142	09:48:00	2084	0.158	09:50:00	1893	0.314	10:55:00	1353	0.894	10:59:00	666	0.890	12:02:00	376	0.086
16	4.000	09:49:00	2179	0.144	09:55:00	2079	0.168	09:57:00	1883	0.334	11:02:00	1318	0.964	11:06:00	604	1.014	12:09:00	377	0.088
30	5.480	10:03:00	2177	0.148	10:09:00	2074	0.178	10:11:00	1876	0.348	11:16:00	1283	1.034	11:20:00	551	1.120	12:23:00	378	0.090
1	60.00 7.750	10:33:00	2174	0.154	10:39:00	2071	0.184	10:41:00	1861	0.378	11:46:00	1249	1.102	11:50:00	500	1.222	12:53:00	380	0.094
2	120.0 10.950	11:33:00	2171	0.160	11:39:00	2066	0.194	11:41:00	1848	0.404	12:46:00	1216	1.168	12:50:00	453	1.316	13:53:00	382	0.098
4	240.0 15.49	13:33:00	2169	0.164	13:39:00	2061	0.204	13:41:00	1834	0.432	14:46:00	1181	1.238	14:50:00	410	1.402	15:53:00	383	0.100
8	480.0 21.91	17:33:00	2166	0.170	17:39:00	2056	0.214	17:41:00	1819	0.462	18:46:00	1152	1.296	18:50:00	378	1.466	19:53:00	386	0.106
24	1440 37.95	09:33:00	2163	0.176	09:39:00	2050	0.226	09:41:00	1800	0.500	10:46:00	1111	1.378	10:50:00	333	1.556	11:53:00	388	0.110
																	UNLOADING		
Machine Correction			0.054			0.020			0.024			0.034			0.036			0.004	
Δ H (Corrected)			0.122			0.206			0.476			1.344			1.520			0.106	
Net Total Settlement			0.122			0.328			0.804			2.148			3.668			3.562	

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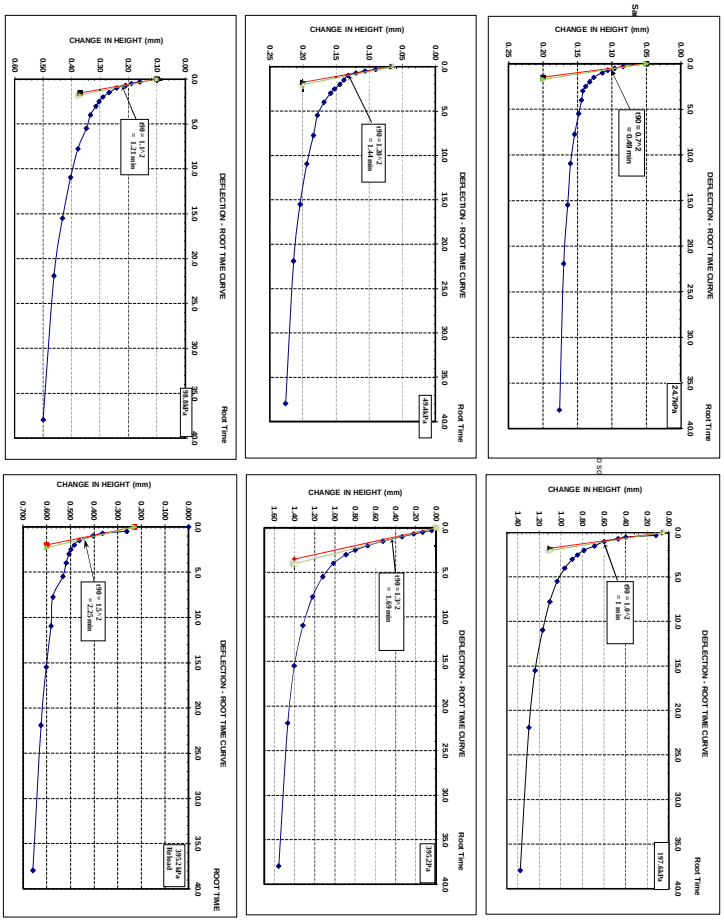
NZS 4402 : 1986 Test 7.1

Loading Date and Time					02/11/2015 @ 11:54hrs			03/11/2015 @ 11:56hrs			N 515											
Hanger Load					1600g			6400g			6.50m-7.0m											
Effective Pressure					98.8kPa			395.2kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	BH 020	t min	√t min	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm
		0	0	0	11:54	388	0.000	11:56	571	0.000												
		6	dark grey, very so		11:54:06	390	0.004	11:56:06	500	0.142												
		15	0.250	0.500	11:54:15	407	0.038	11:56:15	440	0.262												
		30	0.500	0.707	11:54:30	413	0.050	11:56:30	389	0.364												
	1		1.000	1.000	11:55:00	419	0.062	11:57:00	369	0.404												
	2	15	2.250	1.500	11:56:15	428	0.080	11:58:15	340	0.462												
	4		4.000	2.000	11:58:00	433	0.090	12:00:00	329	0.484												
	6	15	6.250	2.500	12:00:15	436	0.096	12:02:15	322	0.498												
	9		9.000	3.000	12:03:00	440	0.104	12:05:00	318	0.506												
	16		16.00	4.000	12:10:00	443	0.110	12:12:00	312	0.518												
	30		30.00	5.480	12:24:00	446	0.116	12:26:00	305	0.532												
1			60.00	7.750	12:54:00	450	0.124	12:56:00	284	0.574												
2			120.0	10.950	13:54:00	454	0.132	13:56:00	280	0.582												
4			240.0	15.49	15:54:00	559	0.342	15:56:00	270	0.602												
8			480.0	21.91	19:54:00	564	0.352	19:56:00	259	0.624												
24			1440	37.95	11:54:00	571	0.366	11:56:00	242	0.658												
					UNLOADING			RELOADING														
Machine Correction					0.01			0.022														
△ H (Corrected)					0.356			0.636														
Net Total Settlement					3.206			3.842														



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Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

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

Initial Conditions

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

Final Conditions

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

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

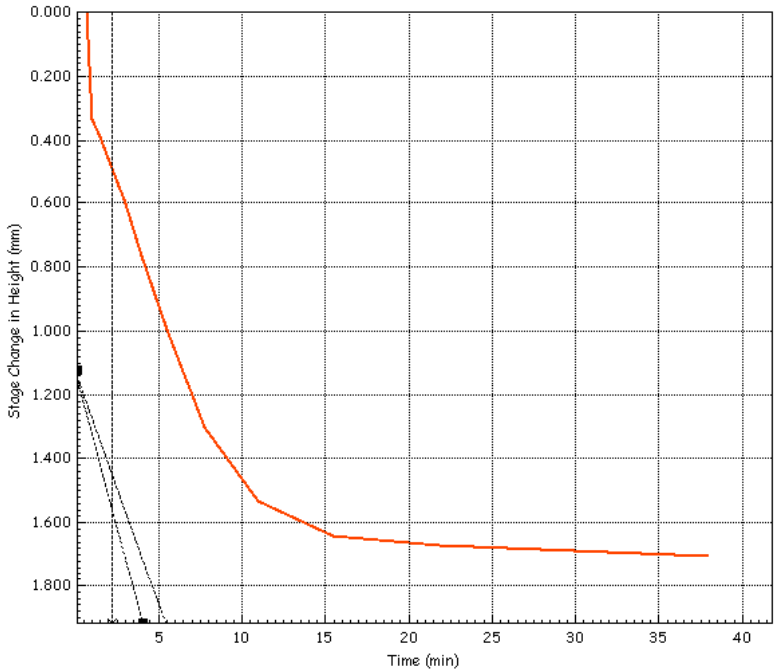
Notes

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

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

Oedometer Consolidation Settlement Report

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



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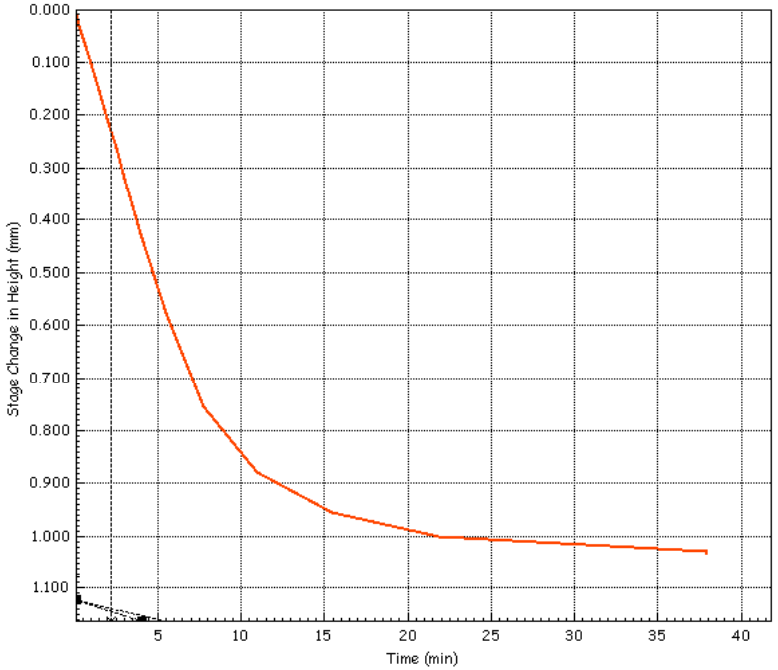
Entec Limited, Level 2 Mid CIty, Cnr Cumming Street & Renwick Road, Suva

Oedometer Consolidation Settlement Report

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



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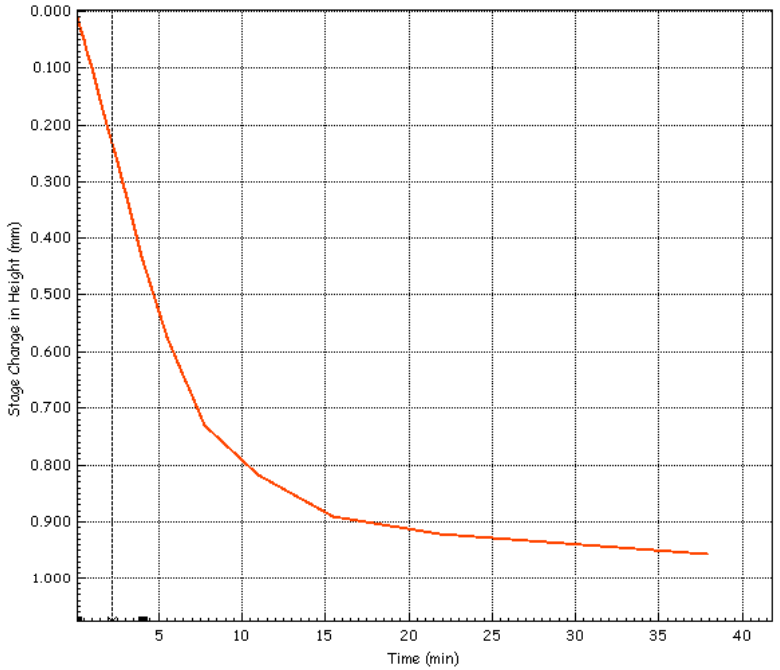
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
		Approved	DMC

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

Oedometer Consolidation Settlement Report

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



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Site Reference	1920815	Test Date	11/3/2015
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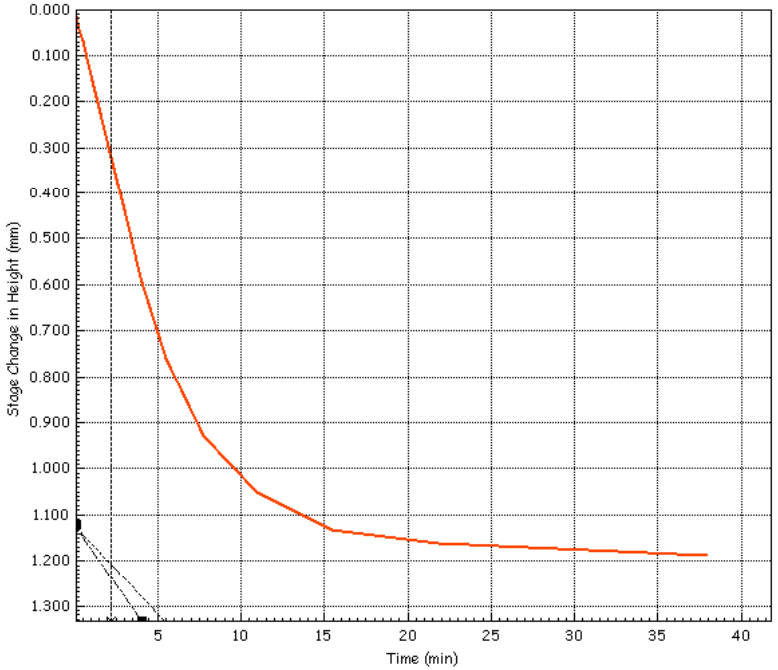
		Approved	DMC

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

Oedometer Consolidation Settlement Report

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

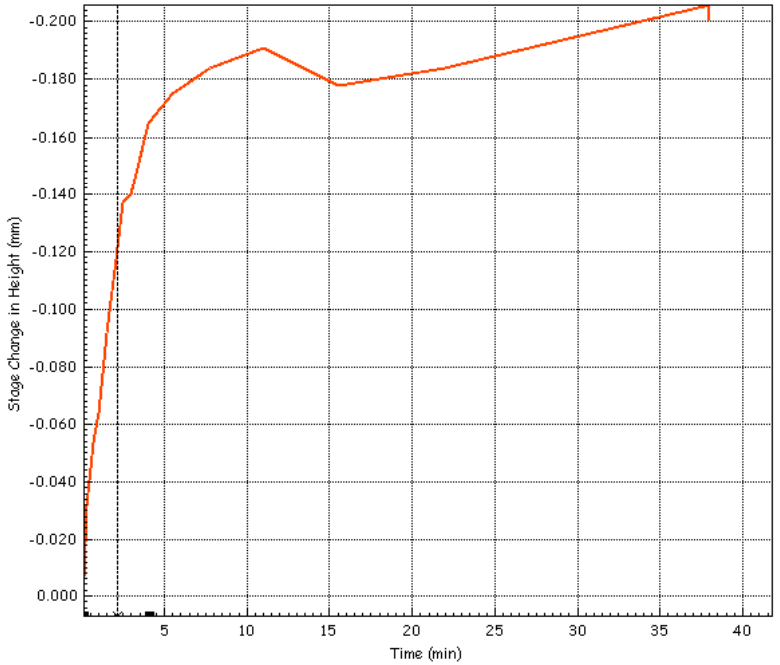


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-02
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

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



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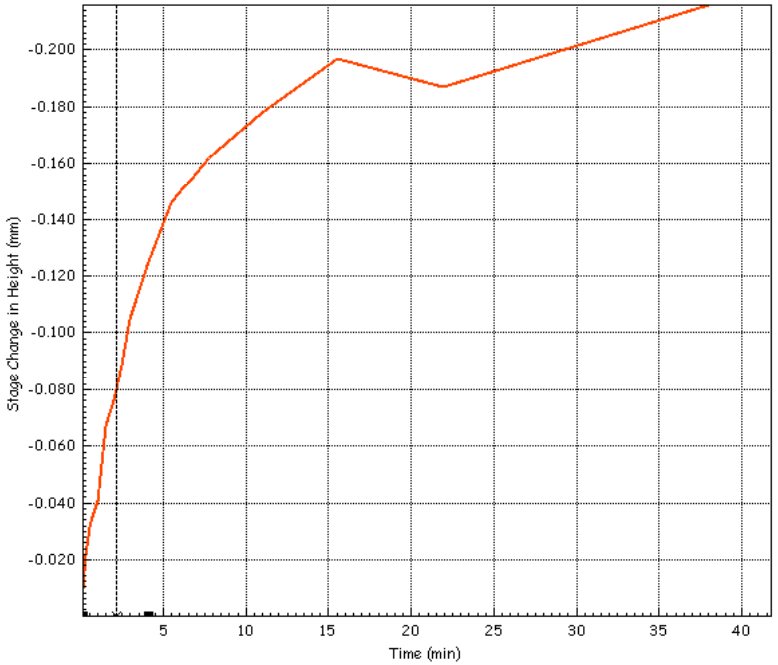
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

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



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		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
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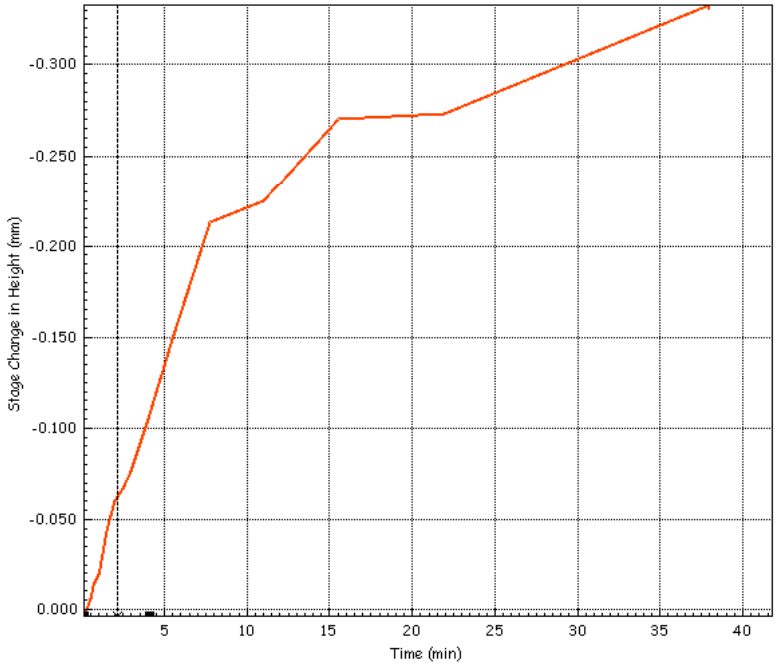
Approved	DMC		

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

Oedometer Consolidation Settlement Report

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



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		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/3/2015
Jobfile	Geotechnical Engineering	Sample	N516
Client	Japan International Cooperation	Borehole	BH02
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Approved	DMC		

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

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Moisture Content Test Results

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

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

Tested By:LN
Date: 13 October 2015

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

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

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

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

Tested By:IG
Date:10 October 2015

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

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

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

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

Tested By:LN
Date: 13 October 2015

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

Approved By: IG
Date:18 November 2015

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Moisture Content Test Results

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

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

Tested By:IG
Date:10 October 2015

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

Approved By: IG
Date:18 November 2015

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Moisture Content Test Results

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

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

Tested By:IG
Date:10 October 2015

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

Approved By: IG
Date:18 November 2015

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Moisture Content Test Results

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

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

Tested By:LN
Date: 13 October 2015

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

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

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

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

Tested By:LN
Date: 13 October 2015

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

Approved By: IG
Date:18 November 2015

ENTEC LIMITED
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Moisture Content Test Results

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

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

Tested By:LN
Date: 13 October 2015

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

Approved By: IG
Date:18 November 2015

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Moisture Content Test Results

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

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

Tested By:LN
Date: 13 October 2015

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

Approved By: IG
Date:18 November 2015

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Moisture Content Test Results

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

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

Tested By:LN
Date: 13 October 2015

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

Approved By: IG
Date:18 November 2015

Form GE-L-07

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

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

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

MOISTURE CONTENT

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

DENSITY

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

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

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(^{0}c)	KT cm/min	K_{20} cm/min
1	120	5.00	22	26	0.013	0.011
2	120	5.00	21	26	0.012	0.011
3	120	5.00	20	26	0.011	0.010
4	110	5.00	15	26	0.009	0.008
5	110	5.00	14	26	0.009	0.008
6	110	5.00	14	26	0.009	0.008
7	100	5.00	11	26	0.008	0.007
8	100	5.00	10	26	0.007	0.006
9	100	5.00	8	26	0.006	0.005
10	95	5.00	5	26	0.004	0.003
11	95	5.00	4	26	0.003	0.003
12	95	5.00	3	26	0.002	0.002

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

Tested By: IG
Date: 15 October 2015

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

Approved By: IG
Date:18 November 2015

Form: GE-L-03

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

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

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

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

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

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

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

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

Form GE-L-06

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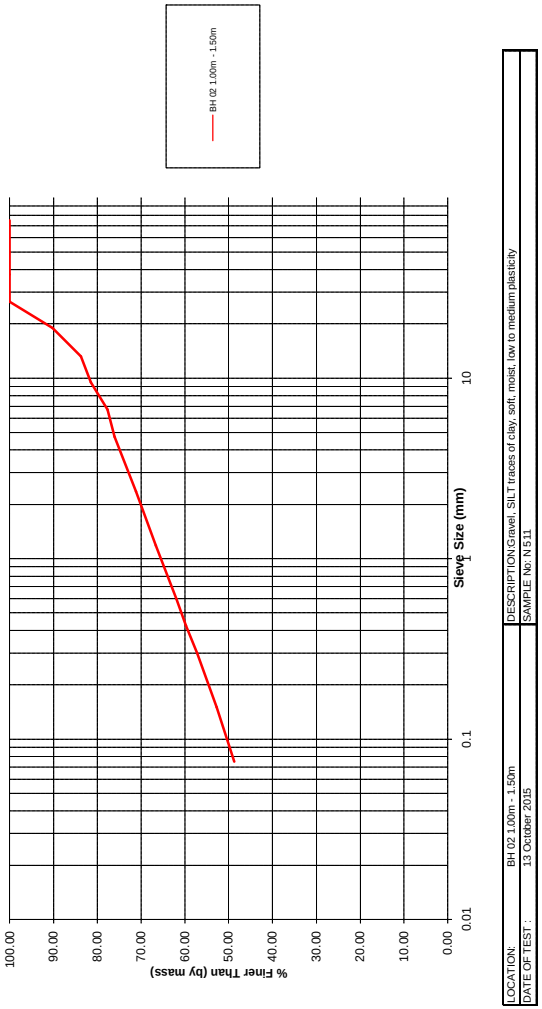

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

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

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

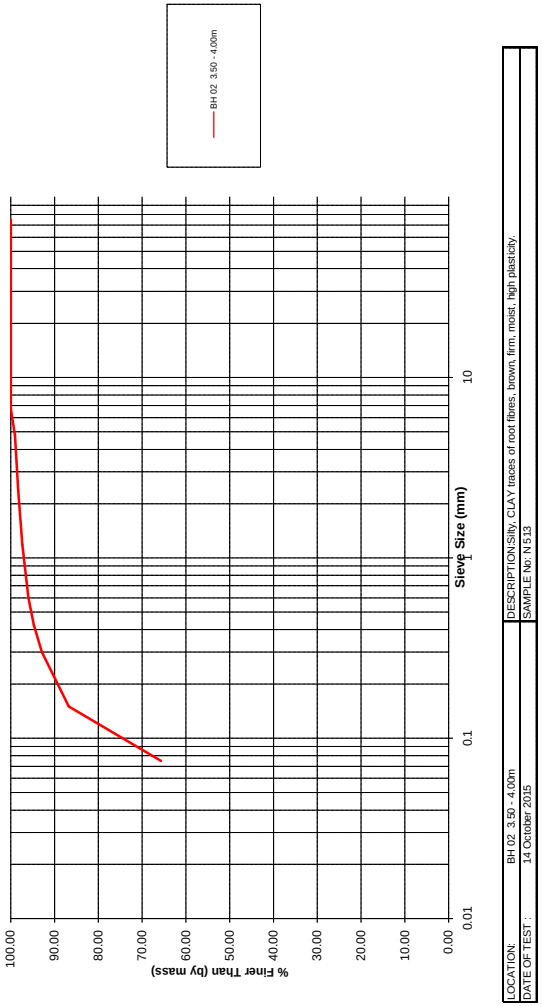
Moisture Content (Material passing 19mm)					SPLIT SAMPLE		
	Container No.	-	10	6			
	Mass of Container	g	52.26	53.04	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	109.91	119.98	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	93.83	101.23	Spliting Factor = $\frac{M_3}{M_4}$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

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

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

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

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



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

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

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

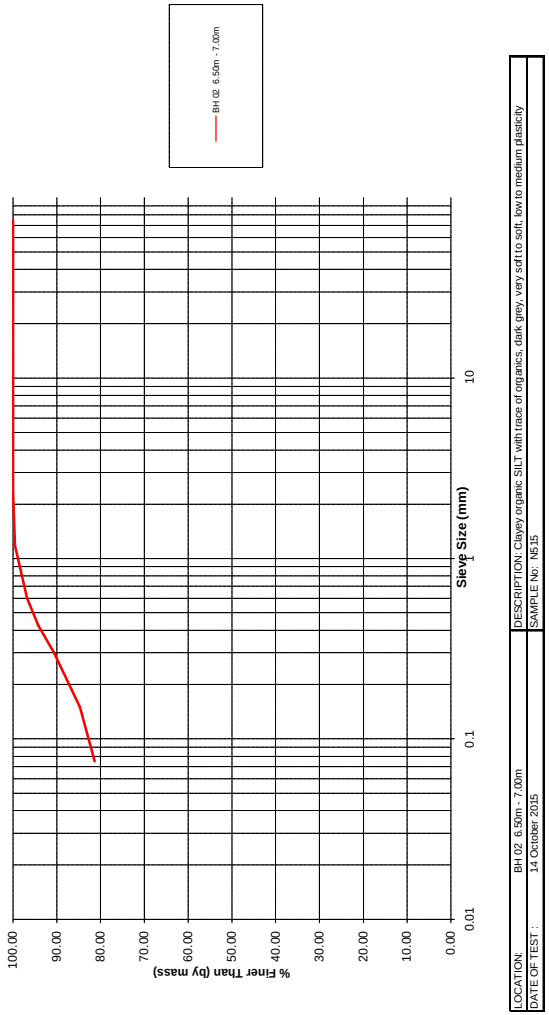
Moisture Content (Material passing 19mm)	Container No.	-	5	7	SPLIT SAMPLE		
	Mass of Container	g	53.34	52.76	Mass Passing Last Sieve:	-	gM_3
	Mass of Container + Wet Soil	g	87.27	90.12	Mass after Spliting:	-	gM_4
	Mass of Container + Dry Soil	g	74.50	76.35	Spliting Factor = $\frac{M_3}{M_4}$		
	Mass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

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

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

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

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



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Form GE-L-06

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

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

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

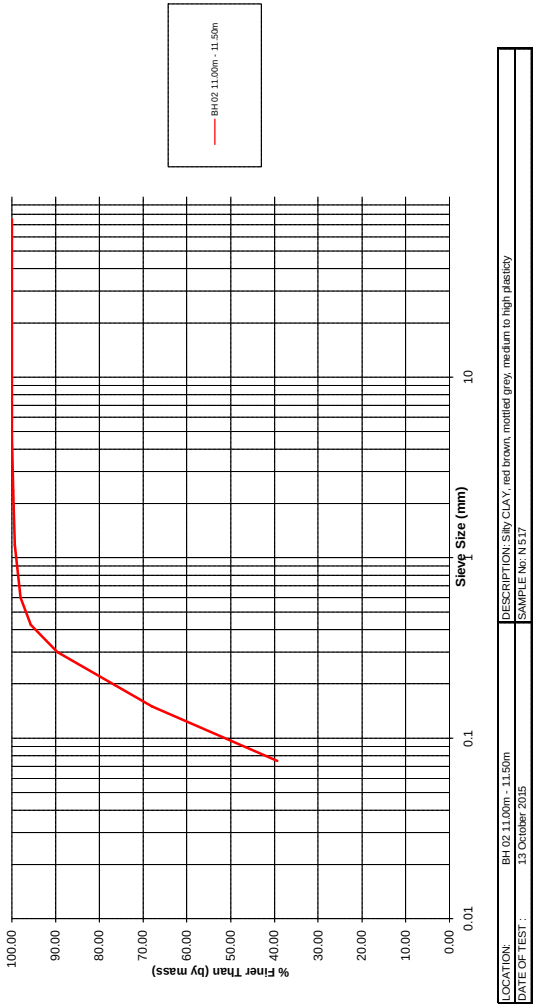
Moisture Content (Material passing 19mm)	Container No.	-	69	83	SPLIT SAMPLE
	Mass of Container	g	90.25	71.20	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	116.28	108.05	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	109.74	98.75	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass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

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

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

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

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



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

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

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

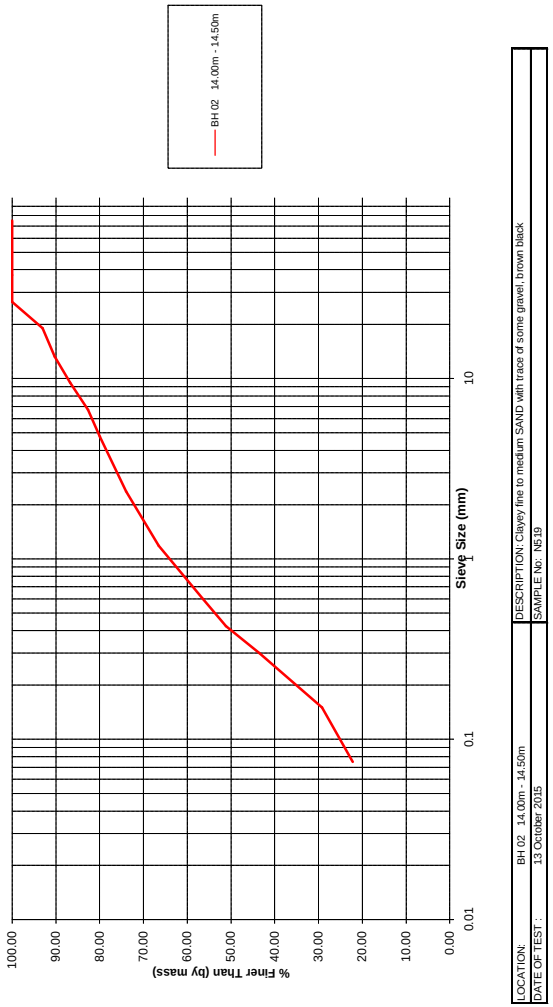
Moisture Content (Material passing 19mm)	Container No.	-	87	89	SPLIT SAMPLE
	Mass of Container	g	116.49	121.19	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	182.52	183.59	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	171.45	172.46	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass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

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

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

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

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



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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

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

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

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

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

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

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

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

Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth			3.5 - 4.0m
Description			
Type			Silty medium to coarse SAND, grey black.
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	63.0
Bulk Density	ρ_0	(Mg/m3)	1.60
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

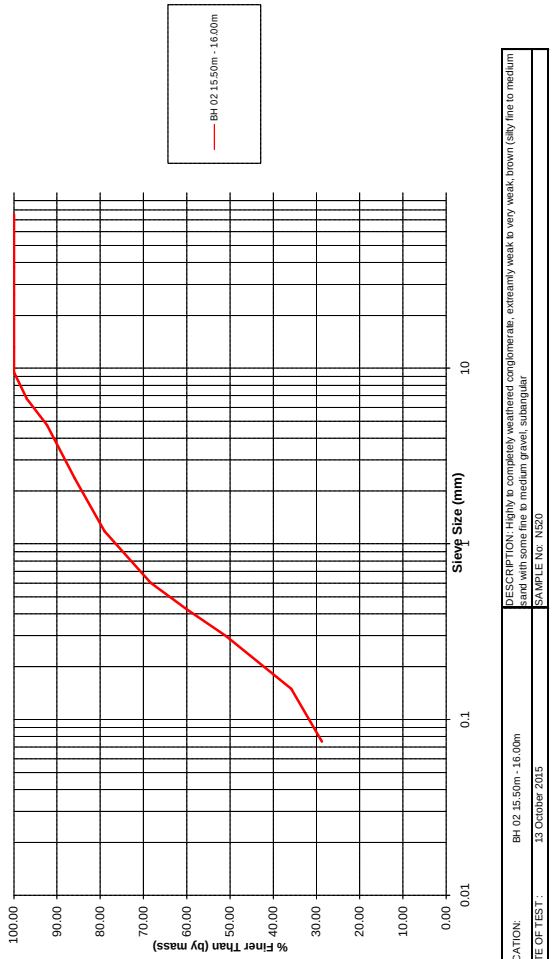
Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	34
Initial Dry Density	ρ_{di}	(Mg/m3)	1.19
Initial Voids Ratio	e_i	.	1.220
Initial Degree of Saturation	S_i	(%)	74.7
Initial Swelling	S_s	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	33
Dry Density	ρ_{df}	(Mg/m3)	1.03
Voids Ratio	e_f	.	1.564
Saturation	S_f	(%)	55
Height Settlement	ΔL_s	(mm)	-3.104

Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
30	1.133	0.778	23.8	1.297	27.0	0.0		1.797	0.0087
60	1.564	-3.104	16571.3	6.732	27.0	0.0		0.003	0.0087
120	1.564	-3.104	278.2		27.0	0.0		0.213	0.0087
240	1.117	0.921	257.2	1.452	27.0	0.0		0.192	0.0087
480	1.086	1.201	169.4	0.061	27.0	0.0		0.235	0.0087
120	1.564	-3.104			27.0	0.0			
30	1.564	-3.104			27.0	0.0			

Notes

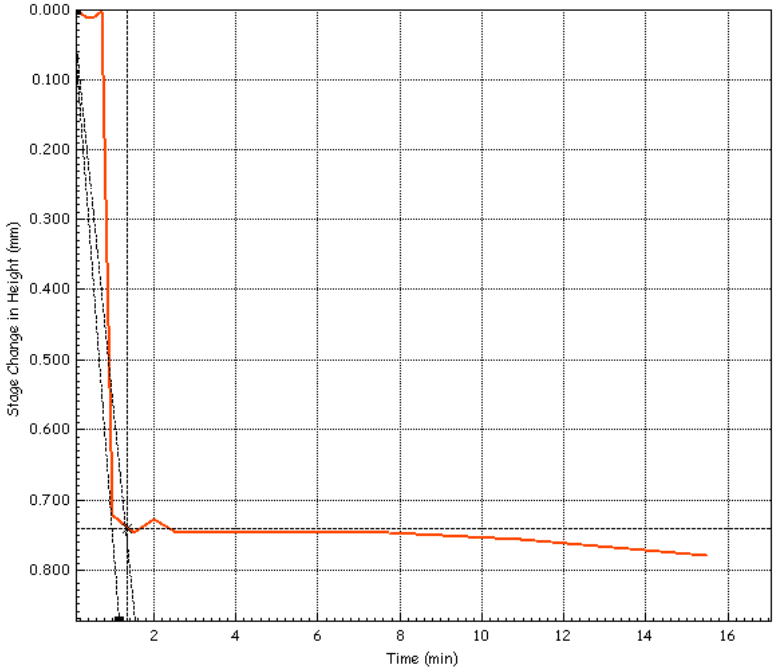


LOCATION: BH 02 15.50m - 16.00m
DATE OF TEST: 13 October 2015
DESCRIPTION: Highly to completely weathered conglomerate, extreamly weak to very weak, brown (silty fine to medium sand with some fine to medium gravel, subangular
SAMPLE No: N520

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-06_002
		Database:	.\SQLEXPRESS \ ENTEC
Site Reference	1920815	Test Date	11/23/2015
Jobfile	Geotechnical Engineering	Sample	N567
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
		Approved	DMC

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	30
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.778
Voids Ratio	e_f	.	1.133
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	1.797
Consolidation	C_V	(m2/year)	23.8
Compressibility	m_V	(m2/MN)	1.297
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

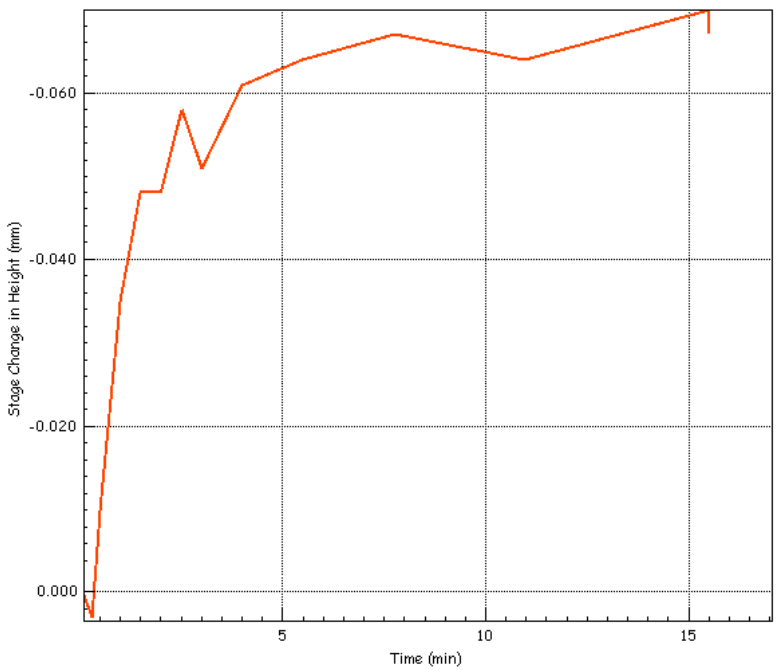


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-06_002
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/23/2015
Jobfile	Geotechnical Engineering	Sample	N567
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	30
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-3.101
Voids Ratio	e_f	.	1.564
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

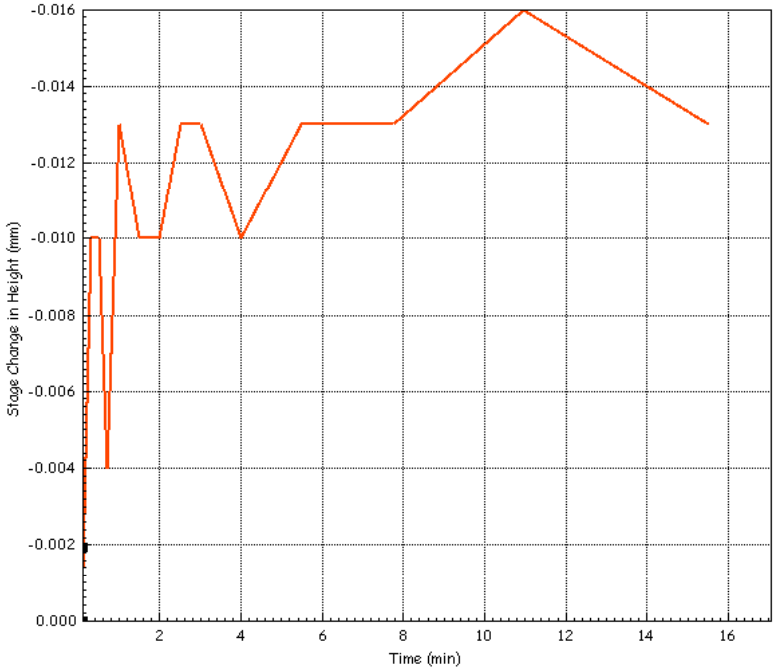


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-06_002
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/23/2015
Jobfile	Geotechnical Engineering	Sample	N567
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	60
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-3.097
Voids Ratio	e_f	.	1.563
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.003
Consolidation	C_V	(m2/year)	16565.8
Compressibility	m_V	(m2/MN)	6.720
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

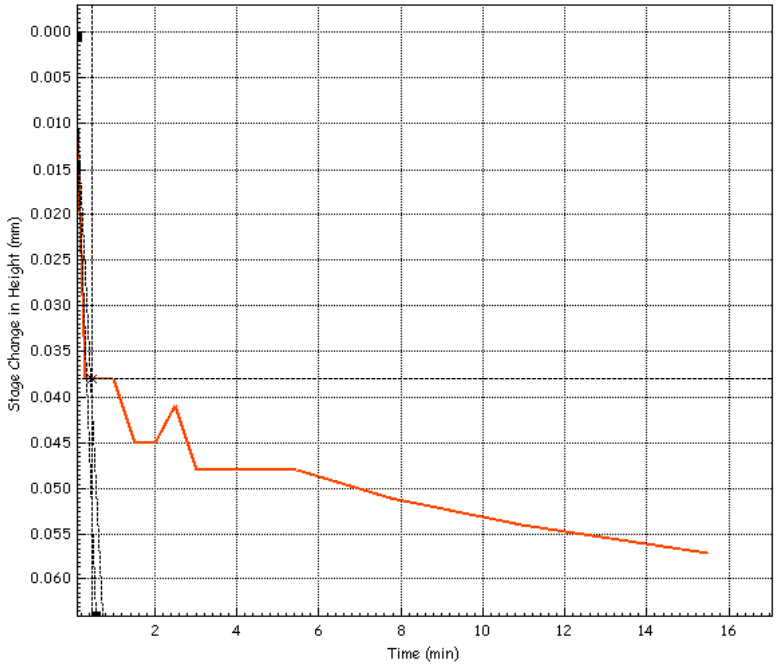


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-06_002
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/23/2015
Jobfile	Geotechnical Engineering	Sample	N567
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	120
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-3.097
Voids Ratio	e_f	.	1.563
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.213
Consolidation	C_V	(m2/year)	278.0
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

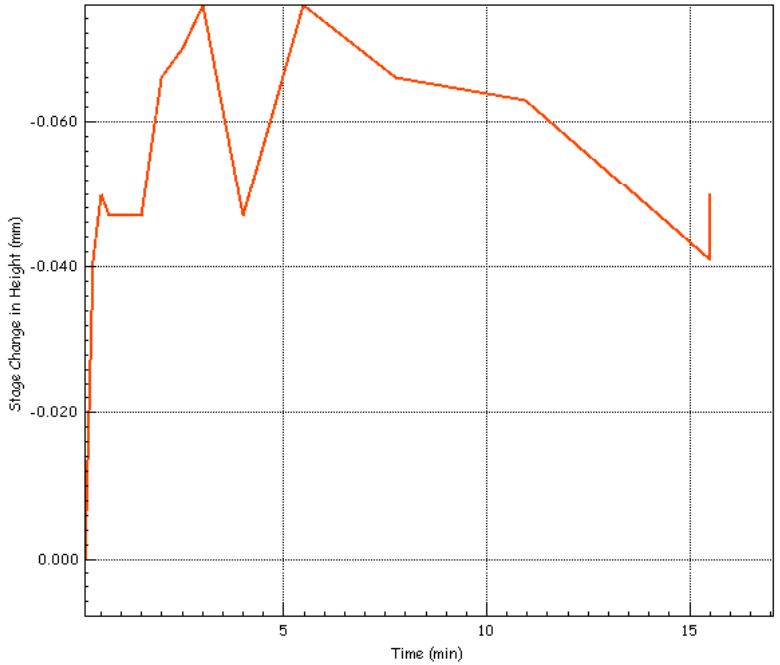


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-06_002
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/23/2015
Jobfile	Geotechnical Engineering	Sample	N567
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	120
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-3.097
Voids Ratio	e_f	.	1.563
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

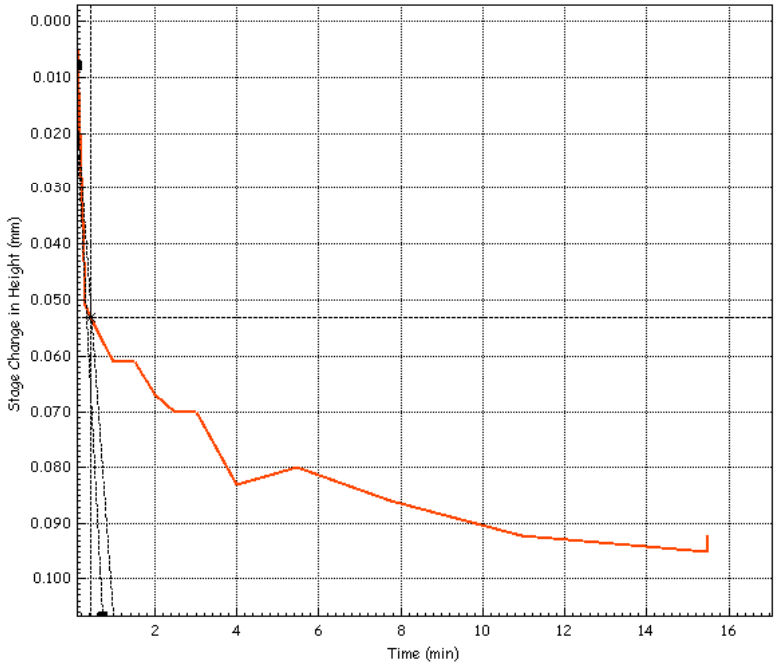


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-06_002
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/23/2015
Jobfile	Geotechnical Engineering	Sample	N567
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	240
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.921
Voids Ratio	e_f	.	1.117
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.192
Consolidation	C_V	(m2/year)	257.1
Compressibility	m_V	(m2/MN)	1.451
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

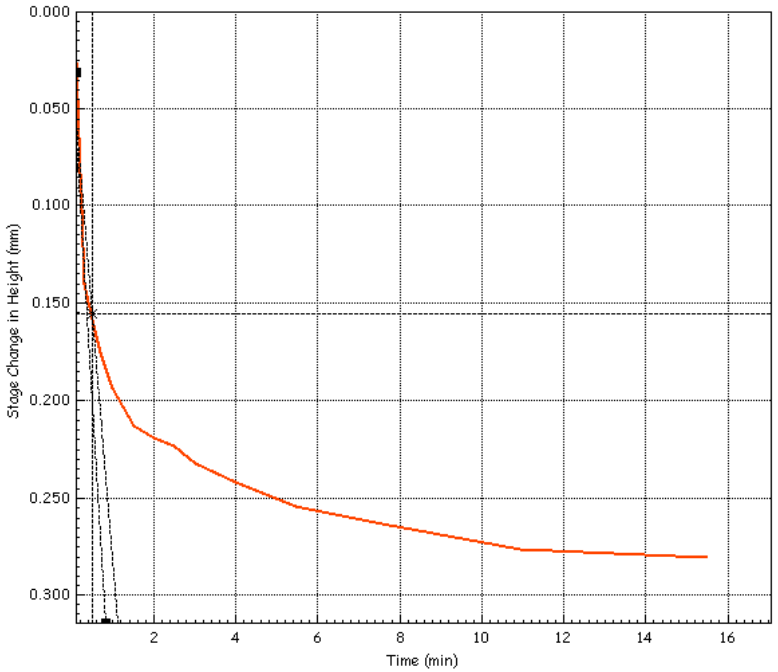


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-06_002
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/23/2015
Jobfile	Geotechnical Engineering	Sample	N567
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	480
Initial Temperature	T_i	(oC)	27.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.201
Voids Ratio	e_f	.	1.086
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.235
Consolidation	C_V	(m2/year)	169.4
Compressibility	m_V	(m2/MN)	0.061
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-06_002
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/23/2015
Jobfile	Geotechnical Engineering	Sample	N567
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth	15.5 - 16.0m		
Description			
Type	Silty medium to coarse SAND , black brown grey.		
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	63.0
Bulk Density	ρ_0	(Mg/m3)	1.60
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	40
Initial Dry Density	ρ_{di}	(Mg/m3)	1.14
Initial Voids Ratio	e_i	.	1.321
Initial Degree of Saturation	S_i	(%)	81.2
Initial Swelling	S_S	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	31
Dry Density	ρ_{df}	(Mg/m3)	1.34
Voids Ratio	e_f	.	0.973
Saturation	S_f	(%)	83
Height Settlement	ΔL_s	(mm)	2.993

Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
50	1.247	0.631	152.0	0.631	29.0	0.0		0.283	0.0087
100	1.195	1.082	236.5	0.466	29.0	0.0		0.172	0.0087
200	1.137	1.586	159.8	0.266	29.0	0.0		0.242	0.0087
400	1.054	2.297	162.3	0.193	29.0	0.0		0.223	0.0087
800	1.651	-2.851	223.7	0.727	29.0	0.0		0.204	0.0087
200	0.955	3.148			29.0	0.0			
50	0.973	2.993			29.0	0.0			

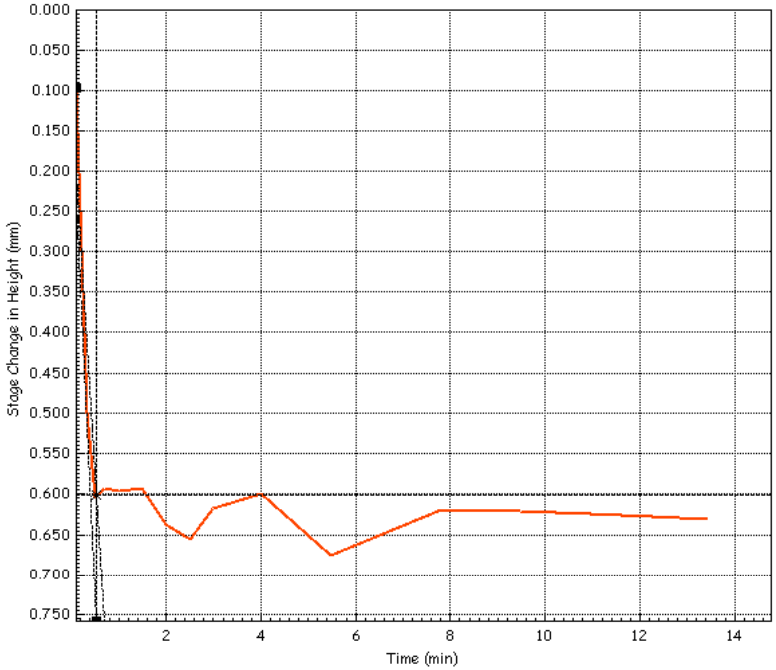
Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-07_004
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/25/2015
Jobfile	Geotechnical Engineering	Sample	N572
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	50
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.631
Voids Ratio	e_f	.	1.247
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.283
Consolidation	C_V	(m2/year)	152.0
Compressibility	m_V	(m2/MN)	0.631
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

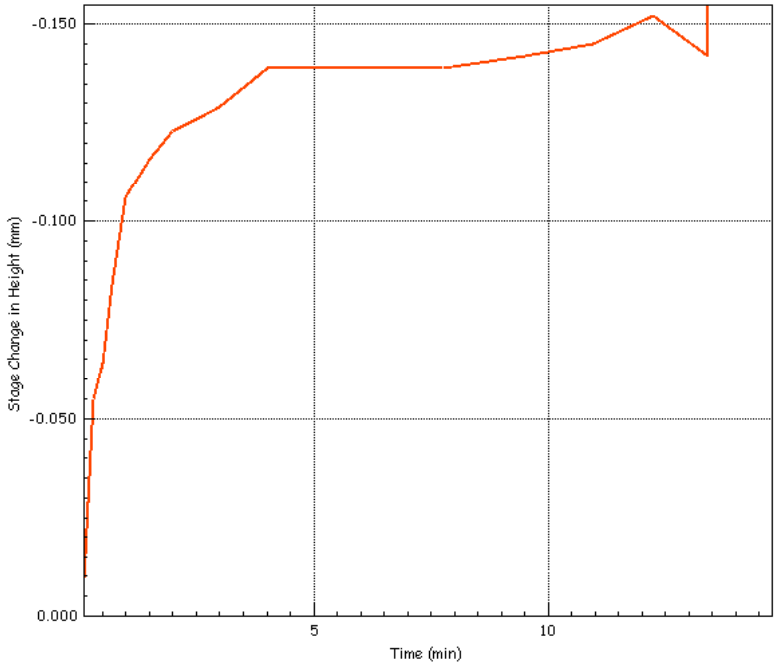


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-07_004
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/25/2015
Jobfile	Geotechnical Engineering	Sample	N572
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	50
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.993
Voids Ratio	e_f	.	0.973
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

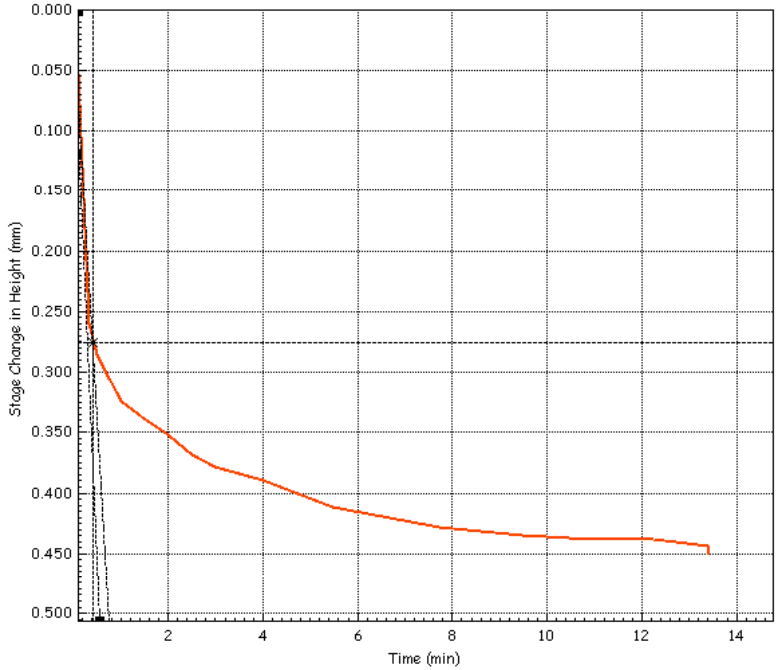


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-07_004
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/25/2015
Jobfile	Geotechnical Engineering	Sample	N572
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.082
Voids Ratio	e_f	.	1.195
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.172
Consolidation	C_V	(m2/year)	236.5
Compressibility	m_V	(m2/MN)	0.466
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

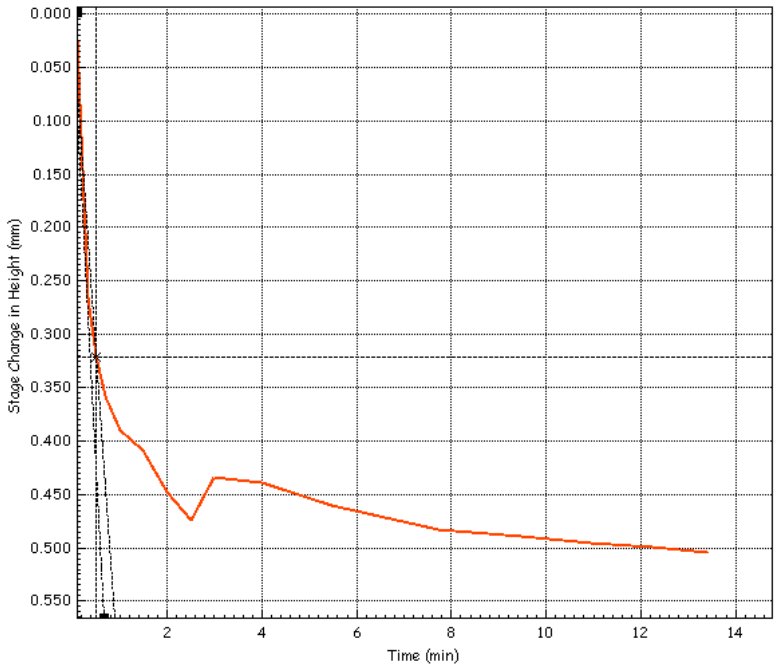


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-07_004
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/25/2015
Jobfile	Geotechnical Engineering	Sample	N572
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.586
Voids Ratio	e_f	.	1.137
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.242
Consolidation	C_V	(m2/year)	159.8
Compressibility	m_V	(m2/MN)	0.266
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

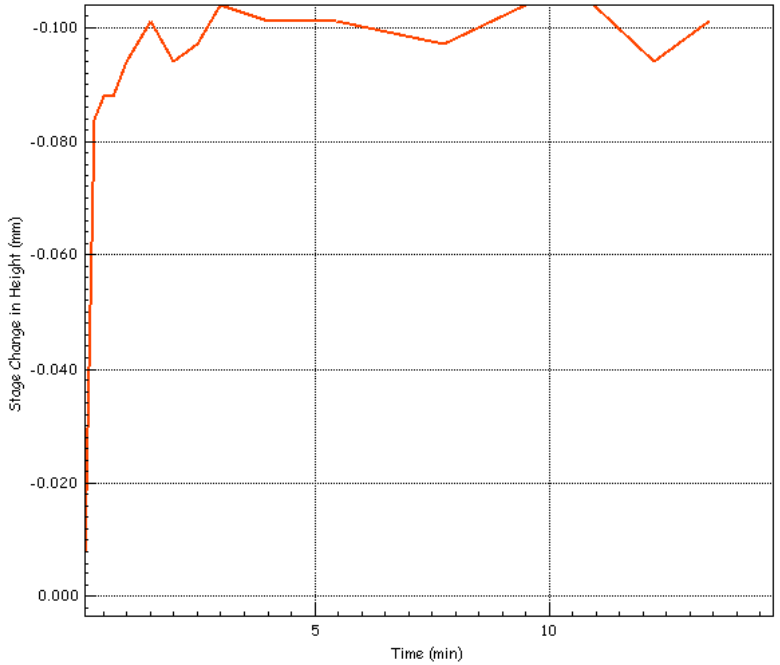


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-07_004
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/25/2015
Jobfile	Geotechnical Engineering	Sample	N572
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	3.148
Voids Ratio	e_f	.	0.955
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

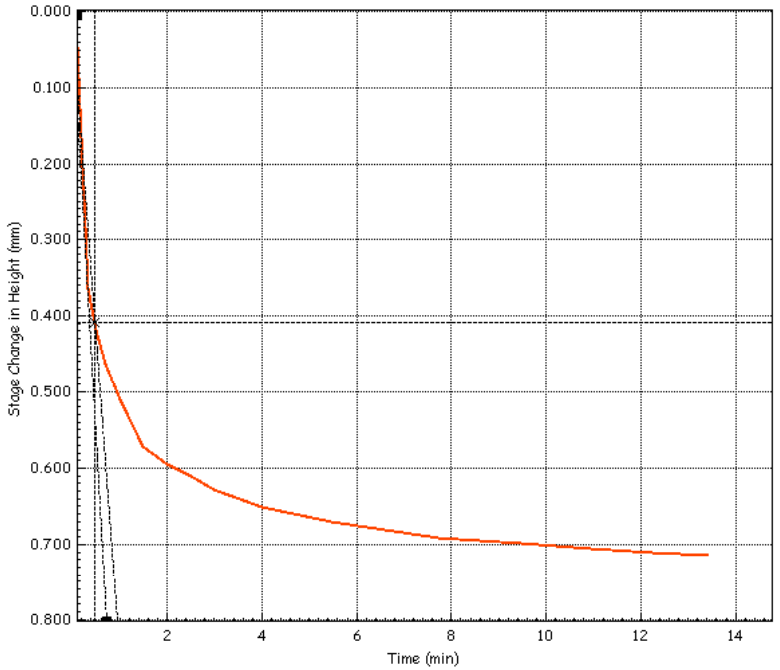


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-07_004
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/25/2015
Jobfile	Geotechnical Engineering	Sample	N572
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.297
Voids Ratio	e_f	.	1.054
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.223
Consolidation	C_V	(m2/year)	162.3
Compressibility	m_V	(m2/MN)	0.193
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

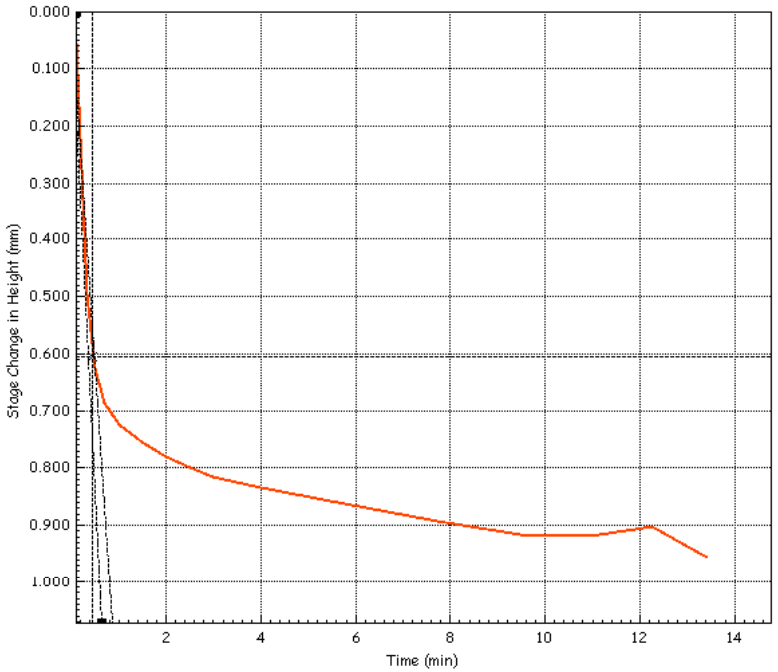


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-07_004
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/25/2015
Jobfile	Geotechnical Engineering	Sample	N572
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	800
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-2.851
Voids Ratio	e_f	.	1.651
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.204
Consolidation	C_V	(m2/year)	223.7
Compressibility	m_V	(m2/MN)	0.727
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-07_004
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/25/2015
Jobfile	Geotechnical Engineering	Sample	N572
Client	Japan International Cooperation	Borehole	BH06
Operator	IG/MK	Checked	DMC
		Approved	DMC

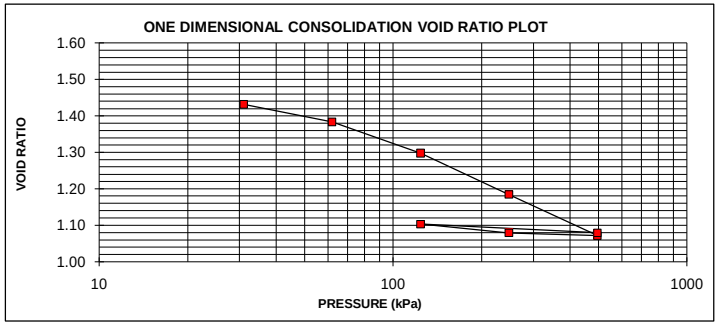
Entec Limited, Level 2 Mid CIty, Cnr Cumming Street & Renwick Road, Suva

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

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

Project Name:	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**Sample No:**	N 570
Client Name:	Japan International Cooperation Agency (JICA)	**Depth:**	12.5m - 13.0m
Job No:	1920815	**Tested By:**	IG
Site Address :	Nadi Back Road Farm (opposite Saunaka Village)	**Date Tested:**	29 November 2015
Sample Location:	**BH 06**		

Sample Description: Silty CLAY trace of siltstone nodules and organic, green grey, firm to stif, moist medium plasticity
Sample History: Undisturbed / ~~Remoulded~~ / ~~Compacted~~ / ~~Slurried~~ / ~~Unknown~~
Date Sample Collected: 08/10/15 **Temperature:** Max: 27°C Min: 25°C
Loading Cycle: 24 hrs 0 mins **Height of ring:** 23.8 mm
Diameter of ring *(D)*: 44.96 mm **Area of ring *(A)*:** 1587.61 mm^2
Solid density of soil particles *(Q_s)*: 2.65 t/m^3 (~~Measured~~ / Assumed)
Method used: Square root of time fitting method



			Initial		Final
Measured thickness of specimen, *H*		mm	H_i	23.8	H_f 19.99
Mass of ring + ~~watch glass~~ + wet specimen		g	M_3	264.4	M_4 263.48
Mass of ring + ~~watch glass~~ + dry specimen	M_5	g	246.52		
Mass of ring	M_1	g	206.07		
~~Mass of watch glass~~	M_2	g	0		
Mass of dry specimen	$M_s = M_5 - M_1 - M_2$	g	40.45		
Mass of water		g	$M_3 - M_5$	17.88	$M_4 - M_5$ 16.96
Water content, *w*		%	w_i	44.20	w_f 41.93
Dry density, Q_d		t/m^3	Q_{di}	1.07	Q_{df} 1.27
Height of soil particles, H_s		mm	9.61		
Voids ratio, *e*			e_i	1.48	e_f 1.08
Degree of saturation, *S*			S_i	79.39	S_f 102.92

Applied Pressure *kPa*	Incremental deflection *(ΔH) mm*	Thickness of specimen *mm*	% Change in thickness *%*	Height of voids *mm*	Voids ratio	Coefficient of consolidation C_v (m^2/yr)	Coefficient of compressibility M_v (m^2/MN)
31	0.424	23.376	0.018	13.76	1.43	361.04	
62	0.884	22.916	0.039	13.30	1.38	288.57	1.20
124	1.710	22.090	0.077	12.48	1.30	338.53	1.16
248	2.798	21.002	0.133	11.39	1.18	145.72	0.95
496	3.884	19.916	0.195	10.30	1.07	305.75	0.66
248	3.814	19.986	0.191	10.37	1.08	0.00	-0.65
124	3.578	20.222	0.177	10.61	1.10	0.00	-1.21
496	3.806	19.994	0.190	10.38	1.08	19.72	0.43
0	0.00	23.800	0.000	14.19	1.48	0.00	

Tested by: IG/KB
Date: 21 November 2015

Q.A. Check By: UM
Date: 01 December 2015

Approved By: IG
Date: 01 December 2015

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Determination of the One-Dimensional Consolidation Properties

NZS 4402 : 1986 Test 7.1

Loading Date & Time					30/11/2015 @ 8:13hrs			01/12/2015 @ 8:15hrs			02/12/2015 @ 8:171hrs			03/12/2015 @ 08:20hrs			04/12/2015 @ 08:23hrs			05/12/2015 @ 08:25hrs		
Hanger Load					500g			1000g			2000g			4000g			8000g			4000g		
Effective Pressure					31kPa			62kPa			124kPa			247kPa			494kPa			247kPa		
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	sec	t min	√t min	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm	Time/4	Gauge	x10 mm
		0		0.00	08:13:00	2036	0.000	08:15:00	1823	0.000	08:17:00	1586	0.000	08:20:00	1163	0.000	08:23:00	1647	0.000	08:25:00	1049	0.000
		6	0.100	0.316	08:13:06	1930	0.212	08:15:06	1726	0.194	08:17:06	1380	0.412	08:20:06	930	0.466	08:23:06	1372	0.550	08:25:06	1068	0.038
		15	0.250	0.500	08:13:15	1910	0.252	08:15:15	1710	0.226	08:17:15	1340	0.492	08:20:15	800	0.726	08:23:15	1335	0.624	08:25:15	1072	0.046
		30	0.500	0.707	08:13:30	1900	0.272	08:15:30	1702	0.242	08:17:30	1320	0.532	08:20:30	781	0.764	08:23:30	1305	0.684	08:25:30	1074	0.050
	1		1.000	1.000	08:14:00	1892	0.288	08:16:00	1694	0.258	08:18:00	1311	0.550	08:21:00	768	0.790	08:24:00	1293	0.708	08:26:00	1075	0.052
	2	15	2.250	1.500	08:15:15	1882	0.308	08:17:15	1676	0.294	08:19:15	1298	0.576	08:22:15	755	0.816	08:25:15	1269	0.756	08:27:15	1077	0.056
	4		4.000	2.000	08:17:00	1874	0.324	08:19:00	1669	0.308	08:21:00	1283	0.606	08:24:00	735	0.856	08:27:00	1242	0.810	08:29:00	1078	0.058
	6	15	6.250	2.500	08:19:15	1868	0.336	08:21:15	1661	0.324	08:23:15	1269	0.634	08:26:15	714	0.898	08:29:15	1224	0.846	08:31:15	1079	0.060
	9		9.000	3.000	08:22:00	1863	0.346	08:24:00	1654	0.338	08:26:00	1260	0.652	08:29:00	707	0.912	08:32:00	1209	0.876	08:34:00	1080	0.062
	16		16.00	4.000	08:29:00	1857	0.358	08:31:00	1643	0.360	08:33:00	1247	0.678	08:36:00	690	0.946	08:39:00	1182	0.930	08:41:00	1081	0.064
	30		30.00	5.480	08:43:00	1851	0.370	08:45:00	1633	0.380	08:47:00	1232	0.708	08:50:00	670	0.986	08:53:00	1153	0.988	08:55:00	1082	0.066
1			60.00	7.750	09:13:00	1846	0.380	09:15:00	1621	0.404	09:17:00	1217	0.738	09:20:00	654	1.018	09:23:00	1125	1.044	09:25:00	1083	0.068
2			120.0	10.950	10:13:00	1841	0.390	10:15:00	1612	0.422	10:17:00	1203	0.766	10:20:00	640	1.046	10:23:00	1100	1.094	10:25:00	1084	0.070
4			240.0	15.49	12:13:00	1835	0.402	12:15:00	1603	0.440	12:17:00	1190	0.792	12:20:00	624	1.078	12:23:00	1082	1.130	12:25:00	1084.5	0.071
8			480.0	21.91	16:13:00	1828	0.416	16:15:00	1594	0.458	16:17:00	1178	0.816	16:20:00	609	1.108	16:23:00	1066	1.162	16:25:00	1085	0.072
24			1440	37.95	08:13:00	1823	0.426	08:15:00	1586	0.474	08:17:00	1163	0.846	08:20:00	595	1.136	08:23:00	1049	1.196	08:25:00	1086	0.074
																				UNLOADING		
Machine Correction					0.002			0.014			0.02			0.048			0.110			0.004		
Δ H (Corrected)					0.424			0.460			0.826			1.088			1.086			0.070		
Net Total Settlement					0.424			0.884			1.710			2.798			3.884			3.814		

D15-215

ENTEC LIMITED
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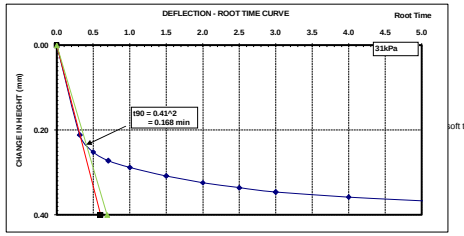
Determination of the One-Dimensional Consolidation Properties

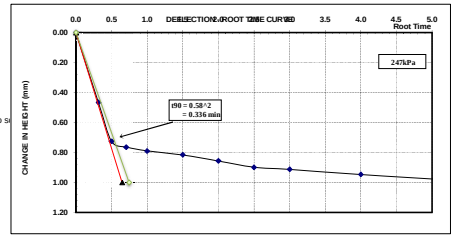
NZS 4402 : 1986 Test 7.1

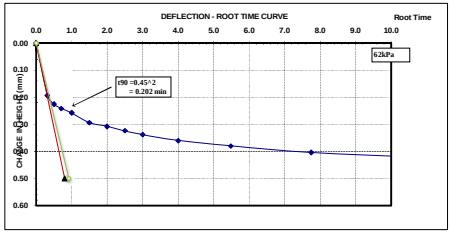
Loading Date and Time					07/12/2015 @ 08:00hrs			08/12/2015 @ 08:03hrs														
Hanger Load					1000g			8000g														
Effective Pressure					124kPa			494kPa														
Time Elapsed					Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H	Clock	Dial	H
hrs	min	BH 02	t min	√t min	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm	△Time/4	Gauge	x10 mm
		0	0	0	08:00:00	1086	0.000	08:03:00	1209	0.000												
		6	0.100	0.300	08:00:06	1123	0.074	08:03:06	1190	0.038												
		15	0.250	0.316	08:00:15	1133	0.094	08:03:15	1176	0.066												
		30	0.500	0.707	08:00:30	1140	0.108	08:03:30	1162	0.094												
	1		1.000	1.000	08:01:00	1145	0.118	08:04:00	1151	0.116												
	2	15	2.250	1.500	08:02:15	1151	0.130	08:05:15	1139	0.140												
	4		4.000	2.000	08:04:00	1159	0.146	08:07:00	1131	0.156												
	6	15	6.250	2.500	08:06:15	1163	0.154	08:09:15	1125	0.168												
	9		9.000	3.000	08:09:00	1168	0.164	08:12:00	1123	0.172												
	16		16.00	4.000	08:16:00	1174	0.176	08:19:00	1119	0.180												
	30		30.00	5.480	08:30:00	1181	0.190	08:33:00	1114	0.190												
1			60.00	7.750	09:00:00	1188	0.204	09:03:00	1108	0.202												
2			120.0	10.950	10:00:00	1195	0.218	10:03:00	1103	0.212												
4			240.0	15.49	12:00:00	1193	0.214	12:03:00	1098	0.222												
8			480.0	21.91	16:00:00	1203	0.234	16:03:00	1092	0.234												
24			1440	37.95	08:00:00	1209	0.246	08:03:00	1084	0.250												
					UNLOADING			RELOADING														
Machine Correction					0.01			0.022														
Δ H (Corrected)					0.236			0.228														
Net Total Settlement					3.578			3.806														

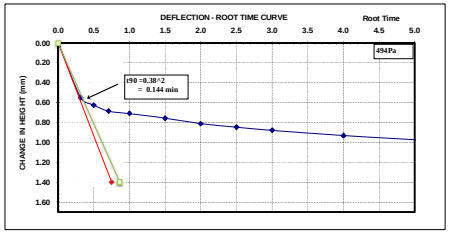
ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

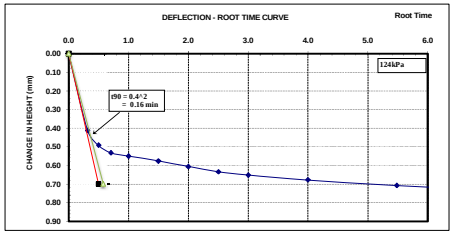
Determination of the One-Dimensional Consolidation Properties
NZS 4402 : 1986 Test 7.1

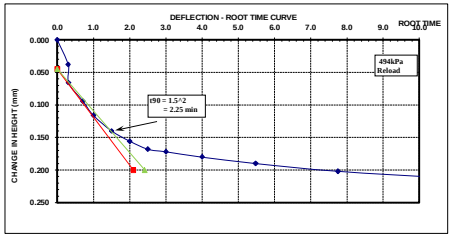












Page 4 of 4

APPENDIX 6d

Site Photos

APPENDIX 7

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

APPENDIX 7a

Test Locality Plan

APPENDIX 7b

Engineering Borehole Log and Core Photos

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Old Queens Road Bridge	**BH07**

Job No.:	Start Date: 14-10-2015 Finish Date: 14-10-2015	Ground Level (m):	Co-Ordinates ():	Sheet:
1920815		11.67	E 1861833.8 N 3913476.2	1 of 5

Client: JICA Study Team

Hole Depth: 20.00 m

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Clayey SILT with some fine to medium sand and trace of fine sub-rounded gravel, dark brown, firm to stiff, moist, low plasticity									44		
				Silty CLAY, dark brown, soft to firm, moist, medium to high plasticity				+10.67	1				50	1.00	SPT 1.00 m N=7 P= 300 kPa
				Clayey SILT with trace of root fibres, dark brown, soft to firm, moist, medium plasticity				+9.67	2				100	2.00	SPT 2.00 m N=5 P= 8.5 kPa P= 51.05 kPa P= 230 kPa
				SILT with some fine sand, dark brown, soft, moist, low to medium plasticity				+8.17	3				87	3.50 - 4.00 PT	P= 21.5 kPa
				SILT with fine sand and trace of iron staining, light brown, stiff, moist, low to medium pasticity				+7.17	4						P= 55 kPa
								+6.67							

Explanations:

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

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

UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Old Queens Road Bridge	**BH07**

Job No.:	Start Date: 14-10-2015 Finish Date: 14-10-2015	Ground Level (m):	Co-Ordinates ():	Sheet:
1920815		11.67	E 1861833.8 N 3913476.2	2 of 5

Client: JICA Study Team

Hole Depth: 20.00 m

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Clayey SILT with trace of fine sand and fine sub-angular gravel, pale brown										5.00	SPT 5.00 m N=35 P= 300 kPa
				Fine to coarse SAND with fine to medium sub-rounded to subangular gravel with trace of silt (highly to completely weathered SANDSTONE, very weak to weak)				+6.17	6				100		P= 55 kPa P= 300 kPa
				SILT with fine to medium sand with trace of medium sub-angular gravel, dark brown				+5.47						6.50	P= 300 kPa SPT 6.50 m N=31
				Clay SILT with trace of silt stone nodules and iron staining, light brown, firm to stiff, medium to high plasticity				+4.67	7				85		P= 73 kPa P= 141 kPa P= 40 kPa
									8					8.00	SPT 8.00 m N=40
									9				100		P= 246 kPa
				Clayey SILT with trace of silt stone nodules and iron staining, light brown, firm to stiff, medium to high plasticity (highly to completely weathered SILTSTONE, light brown, weak to very weak)				+2.17					100	9.50	P= 141.5 kPa SPT 9.50 m N=45

Explanations:

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

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

UTP = Unable to penetrate

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Old Queens Road Bridge	No.: **BH07**
Job No.: 1920815	Start Date: 14-10-2015 Finish Date: 14-10-2015	Ground Level (m): 11.67	Co-Ordinates (): E 1861833.8 N 3913476.2
Client: JICA Study Team	Hole Depth: 20.00 m		Sheet: 3 of 5

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

Geological Description	Elevation (m) at base	Depth (m)
Clayey SILT with trace of silt stone nodules and iron staining, light brown, firm to stiff, medium to high plasticity (highly to completely weathered SILTSTONE, light brown, weak to very weak) *(continued)*	-0.83	11, 12
Silty CLAY with trace of fine gravel and silt stone nodules, light brown, firm to stiff, low to medium plasticity	-1.63	13
Silty CLAY with some shel fragments and fine to medium subangular to subrounded gravel and trace of sand	-2.33	14
Fine to coarse sub angular to sub rounded GRAVEL with trace of coarse sand		

TCR: 100, 100, 100, 60

Samples: 11.00, 12.50

Tests: P= 193 kPa; P= 223 kPa; P= 266.5 kPa; SPT 11.00 m N=40; P= 173 kPa; P= 136 kPa; P= 165 kPa; SPT 12.50 m N=36; P= 106.5 kPa; P= 166.5 kPa; SPT 14.00 m N=51

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Old Queens Road Bridge	No.: **BH07**
Job No.: 1920815	Start Date: 14-10-2015 Finish Date: 14-10-2015	Ground Level (m): 11.67	Co-Ordinates (): E 1861833.8 N 3913476.2
Client: JICA Study Team	Hole Depth: 20.00 m		Sheet: 4 of 5

Geological Description	Elevation (m) at base	Depth (m)
Fine to coarse sub angular to sub rounded GRAVEL with trace of coarse sand *(continued)*	-5.33	16, 17
Silty fine SAND with some fine to medium subangular gravel	-6.03	
Clayey SILT with trace of coarse sand, pale grey, stiff, low to medium plasticity (highly to completely weathered SILTSTONE, pale grey, weak to very weak)	-7.33	18, 19
Fine to coarse SAND with some fine to medium subangular to rounded gravel and trace of silt, reddish brown	-7.83	
Fine to coarse SAND with some medium to coarse sunrounded gravel, light grey brown	-8.33	

Hole Terminated at 20.00 m
N = Standard Penetration Test

TCR: 60, 27, 90, 90

Samples: 15.50, 17.00, 18.00

Tests: SPT 15.50 m N=50; SPT 17.00 m N=50; P= 168 kPa; SPT 18.50 m N=56; P= 161.5 kPa

Explanations: (as sheet 3)

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Old Queens Road Bridge	BH07

Job No.:	Start Date: 14-10-2015 Finish Date: 14-10-2015	Ground Level (m):	Co-Ordinates ():
1920815		11.67	E 1861833.8 N 3913476.2

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

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Soil Description: subordinate, particle size, MAJOR, minor; colour, structure; strength; moisture condition; grading; bedding; plasticity; sensitivity; major qualifications; weathering of clasts; subordinate qualifications; minor qualifications; additional structure; geologic unit. Rock Description: weathering; colour; texture; fabric and orientation; NAME; strength; geologic unit.		RS XW HW MW SW DW	EL VL VS S F St VSt H EH		21 22 23 24		500 100			20.00	SPT 20.00 m N=50 P= 300 kPa

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

Borehole 7 Core Photos (0.00m to 3.20m)

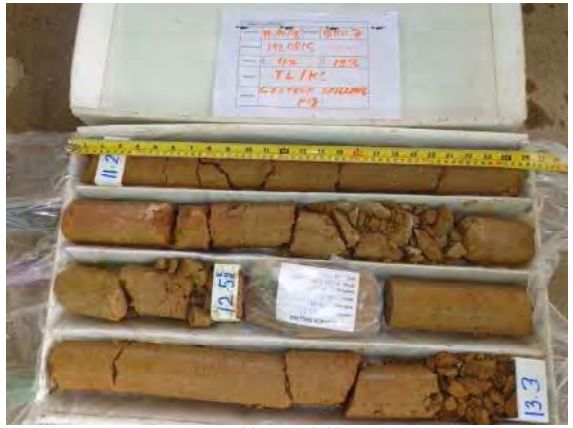
0.00m to 3.80m

3.80m to 6.20m

6.20m to 9.20m

9.20m to 11.20m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 7, Old Queens Road Bridge Left Bank, Nadi, Fiji.



11.20m to 13.30m

13.30m to 17.80m

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1920815.07

17.80m to 20.00m

APPENDIX 7c

Laboratory Test Schedule and Test Results

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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS :Site 7, (BH 07)
PROJECT NUMBER : 1920815
TEST RESULTS REQUIRED BY:

Date:
SAMPLES SENT BY:
Notes:

Lab test Schedule

Project No.	Site	Soil Type	Sample type	SPT N Value	Depth (m)	Lab Tests Required: Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	Remarks
1920815	Site 7, (BH 07)	Clayey SILT	SPT		1.0-1.4			1		1			
		Clayey SILT	SPT		2.0-2.35								
		Sandy SILT	U		3.5-4.0		1	1	1		1	1	
		Sandy SILT	SPT		5.0-5.5			1	1		1		
		Silty CLAY	SPT		6.5-7.0			1		1			
		Silty CLAY	SPT		8.0-8.4								
		Silty CLAY	SPT		9.5-10.0			1	1				
		Silty CLAY	SPT		11.0-11.5			1		1			
		Clayey SILT	SPT		12.5-13.0		1		1				
		Sandy GRAVEL	SPT		14.0-14.5	1							
		Sandy GRAVEL	SPT		15.5 - 16.0			1					
		Highly weathered SANDSTONE	SPT		17.0-17.50			1	1				
		Silty SAND	SPT		18.5-19.0			1	1				
		Silty SAND	SPT		20.0-20.5			1					
	TOTALS					1	1	10	6	3	1	1	0
	Bill of Qunatity					1	3	10	6	3	3	3	

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

Lab Testing Schudle to be sent with samples
Lab Test Schedule checked by: DMC
Date:

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 25 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: TL
MATERIAL TYPE & DESCRIPTION	: Clayey SILT trace of root fibres, dark brown, soft to firm, moist, medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N 576 BH 07 2.0m - 2.35m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	50	51				
Mass of Container	g	3.62	3.54				
Mass of Container + Wet Soil	g	12.18	12.87				
Mass of Container + Dry Soil	g	10.45	11.01				
Mass of Dry Soil	g	6.83	7.47				
Mass of Moisture	g	1.73	1.86				
Moisture Content	%	25.33	24.90				25.11

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		99	97				
Mass of Container	g	11.84	11.56				
Mass of Container + Wet Soil	g	17.11	16.94				
Mass of Container + Dry Soil	g	15.94	15.77				
Mass of Dry Soil	g	4.10	4.21				
Mass of Moisture	g	1.17	1.17				
Moisture Content	%	28.54	27.79				28.16

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	30	26	21	15
Container No.		98	133	134	135	136	137
Mass of Container	g	11.90	11.30	11.27	11.62	11.78	11.32
Mass of Container + Wet Soil	g	23.10	21.96	23.91	21.47	21.82	20.12
Mass of Container + Dry Soil	g	19.78	18.72	20.09	18.42	18.70	17.32
Mass of Dry Soil	g	7.88	7.42	8.82	6.80	6.92	6.00
Mass of Moisture	g	3.32	3.24	3.82	3.05	3.12	2.80
Moisture Content	%	42.13	43.67	43.31	44.85	45.09	46.67

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample	140.00					
Final length of Sample after Shrinkage	124.00					
% Shrinkage	11.43					11.43

Sample Preparation

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

Liquid Limit	44.20 %
Plastic Limit	28.16 %
Plasticity Index	16.04 %
Shrinkage Limit	11.43 %

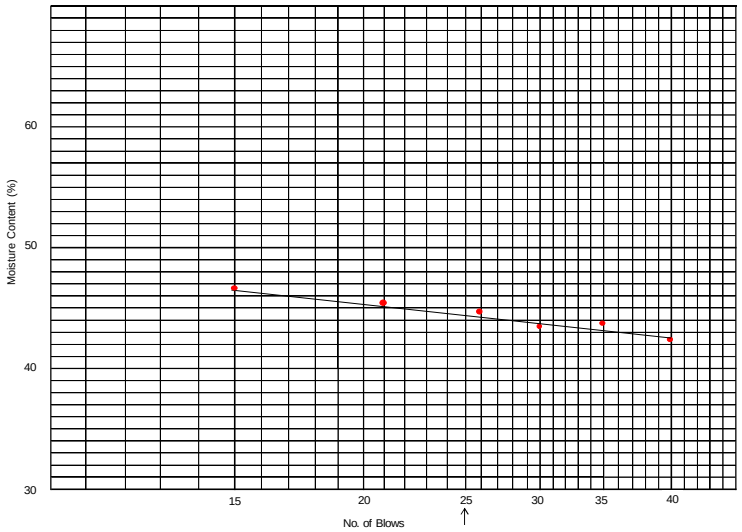
Tested By: TL
Date: 25 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By:IG
Date: 02 December 2015

Form: GE-L-03

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N576

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Cone Penetration Limit Test Results
NZS 4402:1986 Test 2.5

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	:	24 October 2015
SITE ADDRESS	:	Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	:	UM
SAMPLE LOCATION	:	BH07 6.5m - 7.0m			
TEST NUMBER	:	N579	**MATERIAL TYPE & LOCATION**	:	SILT with fine to medium sand trace of medium sub angular gravel, dark brown

DETERMINATION OF THE CONE PENETRATION LIMIT AND WATER CONTENT

TEST No.		1		2			3		4		5		
Initial Dial Gauge Reading	mm	0	0	0	0	0	0	0	0	0			
Final Dial Gauge Reading	mm	14.50	14.20	20.42	19.55	19.37	25.09	24.86	10.72	10.99			
Cone Penetration	mm	14.50	14.20	20.42	19.55	19.37	25.09	24.86	10.72	10.99			
Average Cone Penetration	mm	14.35		19.78			24.98		10.86				
Container No.		155		110			146		144				
Mass of Container	g	11.70		11.89			11.77		11.99				
Mass of Container + Wet Soil	g	22.03		24.94			18.39		22.37				
Mass of Container + Dry Soil	g	19.31		21.21			16.41		19.64				
Mass of Dry Soil	g	7.61		9.32			4.64		7.65				
Mass of Moisture	g	2.72		3.73			1.98		2.73				
Moisture Content	%	35.74		40.02			42.67		35.69				

LINEAR SHRINKAGE TEST

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

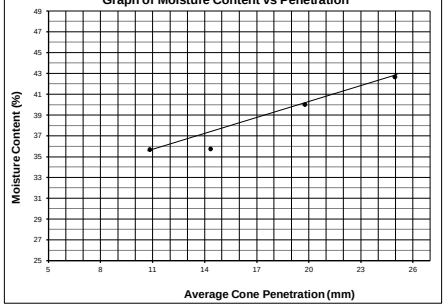
DETERMINATION OF THE WATER CONTENT

Container No.		120	100
Mass of Container	g	11.74	11.78
Mass of Container + Wet Soil	g	22.02	21.02
Mass of Container + Dry Soil	g	19.62	18.87
Mass of Dry Soil	g	7.88	7.09
Mass of Moisture	g	2.40	2.15
Moisture Content	%	30.46	30.32
Average Moisture Content	%	30.39	

DETERMINATION OF THE PLASTIC LIMIT

Container No.		154	108
Mass of Container	g	11.26	11.27
Mass of Container + Wet Soil	g	21.15	18.79
Mass of Container + Dry Soil	g	18.85	17.04
Mass of Dry Soil	g	7.59	5.77
Mass of Moisture	g	2.30	1.75
Moisture Content	%	30.30	30.33
Average Moisture Content	%	30.32	

Graph of Moisture Content vs Penetration



Water Content	=	30.39
Cone Penetration Limit	=	38.53
Plastic Limit	=	30.32
Plasticity Index	=	8.21
Shrinkage Limit	=	11.20

Tested By: UM
Date: 24 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 07	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Silty CLAY trace of fine gravel and silt stone nodules, light brown, firm to stif, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N581 BH07 (12.5-13.0m)

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	46	34				
Mass of Container	g	14.71	14.89				
Mass of Container + Wet Soil	g	25.85	26.28				
Mass of Container + Dry Soil	g	22.33	22.71				
Mass of Dry Soil	g	7.62	7.82				
Mass of Moisture	g	3.52	3.57				
Moisture Content	%	46.19	45.65				45.92

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		125	127				
Mass of Container	g	11.89	11.56				
Mass of Container + Wet Soil	g	17.44	17.84				
Mass of Container + Dry Soil	g	15.63	15.80				
Mass of Dry Soil	g	3.74	4.24				
Mass of Moisture	g	1.81	2.04				
Moisture Content	%	48.40	48.11				48.25

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	29	24	20	15
Container No.		166	132	161	156 121		126
Mass of Container	g	11.72	11.78	11.74	11.86	11.65	12.83
Mass of Container + Wet Soil	g	22.82	20.20	21.28	21.63	23.97	23.90
Mass of Container + Dry Soil	g	18.75	16.98	17.58	17.74	18.94	19.34
Mass of Dry Soil	g	7.03	5.20	5.84	5.88	7.29	6.51
Mass of Moisture	g	4.07	3.22	3.70	3.89	5.03	4.56
Moisture Content	%	57.89	61.92	63.36	66.16	69.00	70.05

LINEAR SHRINKAGE TEST

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

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

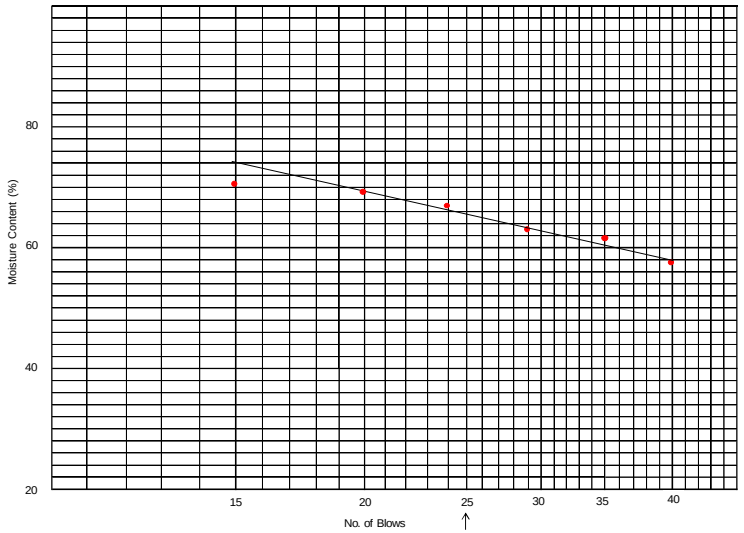
Liquid Limit	65.70 %
Plastic Limit	48.25 %
Plasticity Index	17.45 %
Shrinkage Limit	13.60 %

Tested By: LN
Date :23 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By:IG
Date: 02 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N581

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE / TESTED**	:	23 October 2015
SITE ADDRESS	:	Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH07 3.5-4.0m	**MATERIAL TYPE**	:	SILT with some fine sand dark brown, soft, moist, low to medium plasticity
TEST NUMBER	:	N577			

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

Moisture Content	Container No.	-	76	68	
	Mass of Container	g	86.31	74.09	
	Mass of Container + Wet Soil	g	165.62	167.87	
	Mass of Container + Dry Soil	g	148.43	147.46	
	Mass of Dry Soil	g	62.12	73.37	
	Mass of Moisture	g	17.19	20.41	
	Moisture Content	%	27.67	27.82	27.75

Bulk Density	Sample No.	-	N577
	Diameter of Specimen	mm	53.50
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm^2	2246.87
	Initial length of specimen Lo	mm	56.36
	Initial mass of specimen Mi	g	245.54
	Bulk Density ρ	t/m^3	1.94
	Dry Density ρd	t/m^3	1.52

Tested by : KB	Q.A. Check by : KB	Approved by : IG
Date : 23 October 2015	Date : 02 December 2015	Date : 02 December 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty CLAY, dark brown, soft to firm, moist, medium to high plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N575 BH07 1.0m - 1.4m

Moisture Content	%						
Container No.	g	10	11				
Mass of Container	g	52.26	52.88				
Mass of Container + Wet Soil	g	94.43	94.43				
Mass of Container + Dry Soil	g	85.95	86.13				
Mass of Dry Soil	g	33.69	33.25				
Mass of Moisture	g	8.48	8.30				
Moisture Content	%	25.17	24.96				25.07

Tested By: RK
Date: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with some fine sand dark brown, soft, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N577 BH07 3.5m - 4.0m

Moisture Content	%						
Container No.	g	66	96				
Mass of Container	g	90.99	101.36				
Mass of Container + Wet Soil	g	137.59	126.86				
Mass of Container + Dry Soil	g	127.55	121.28				
Mass of Dry Soil	g	36.56	19.92				
Mass of Moisture	g	10.04	5.58				
Moisture Content	%	27.46	28.01				27.74

Tested By: RK
Date: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clay SILT with trace of fine sand and fine sub-angular gravel, pale brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N578 BH07 5.0m - 5.5m

Moisture Content	%						
Container No.	g	93	94				
Mass of Container	g	88.63	88.07				
Mass of Container + Wet Soil	g	106.08	106.11				
Mass of Container + Dry Soil	g	101.43	101.40				
Mass of Dry Soil	g	12.80	13.33				
Mass of Moisture	g	4.65	4.71				
Moisture Content	%	36.33	35.33				35.83

Tested By: RK
Date: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SILT with fine to medium sand trace of medium sub angular gravel, dark brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N579 BH07 6.5m - 7.0m

Moisture Content	%						
Container No.	g	122	123				
Mass of Container	g	11.71	11.60				
Mass of Container + Wet Soil	g	20.50	20.51				
Mass of Container + Dry Soil	g	18.77	18.74				
Mass of Dry Soil	g	7.06	7.14				
Mass of Moisture	g	1.73	1.77				
Moisture Content	%	24.50	24.79				24.65

Tested By: RK
Date: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Clay SILT with trace of silt stone nodules and iron staining, light, brown, firm to stiff, medium to high plasticty (highly to completely weathered, SILT STONE, light brown, weak to very weak	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N580 BH07 9.5m - 10.0m

Moisture Content	%						
Container No.	g	111	100				
Mass of Container	g	11.67	11.71				
Mass of Container + Wet Soil	g	23.14	23.18				
Mass of Container + Dry Soil	g	20.47	20.53				
Mass of Dry Soil	g	8.80	8.82				
Mass of Moisture	g	2.67	2.65				
Moisture Content	%	30.34	30.05				30.19

Tested By: RK
Date: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Silty CLAY trace of fine gravel and silt stone nodules, light brown, firm to stif, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N581 BH07 12.5m - 13.0m

Moisture Content	%						
Container No.	g	126	127				
Mass of Container	g	12.82	11.56				
Mass of Container + Wet Soil	g	25.10	25.47				
Mass of Container + Dry Soil	g	21.28	21.17				
Mass of Dry Soil	g	8.46	9.61				
Mass of Moisture	g	3.82	4.30				
Moisture Content	%	45.15	44.75				44.95

Tested By: RK
Date: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: Fine to coarse sub-angular to sub-rounded GRAVEL with trace of coarse sand	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N583 BH07 15.5m - 16.0m

Moisture Content	%						
Container No.	g	116	120				
Mass of Container	g	11.71	11.68				
Mass of Container + Wet Soil	g	26.83	26.83				
Mass of Container + Dry Soil	g	24.69	24.75				
Mass of Dry Soil	g	12.98	13.07				
Mass of Moisture	g	2.14	2.08				
Moisture Content	%	16.49	15.91				16.20

Tested By: RK
Date: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: Silty fine SAND with some fine to medium sub-angular gravel	**SAMPLE No.**	: N584 BH07 17.0m - 17.50m

Moisture Content	%						
Container No.	g	125	108				
Mass of Container	g	11.87	11.28				
Mass of Container + Wet Soil	g	19.50	19.52				
Mass of Container + Dry Soil	g	17.63	17.50				
Mass of Dry Soil	g	5.76	6.22				
Mass of Moisture	g	1.87	2.02				
Moisture Content	%	32.47	32.48				32.47

Tested By: RK
Date: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: Clay SILT with trace of coarse sand, pale grey , stiff, low to medium plasticity (highly to completely weathered, SILTSTONE,pale grey, weak to very weak)	**SAMPLE No.**	: N585 BH07 18.5m - 19.0m

Moisture Content	%						
Container No.	g	166	169				
Mass of Container	g	11.70	11.37				
Mass of Container + Wet Soil	g	20.06	20.07				
Mass of Container + Dry Soil	g	17.75	17.69				
Mass of Dry Soil	g	6.05	6.32				
Mass of Moisture	g	2.31	2.38				
Moisture Content	%	38.18	37.66				37.92

Tested By: RK
Date: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

Form GE-L-07

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
MATERIAL TYPE & DESCRIPTION	: SAND fine to coarse with some medium sub-angular to sub-rounded gravel, light grey brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N586 BH07 20.0m - 20.5m

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: 22 October 2015

Q.A. Checked By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

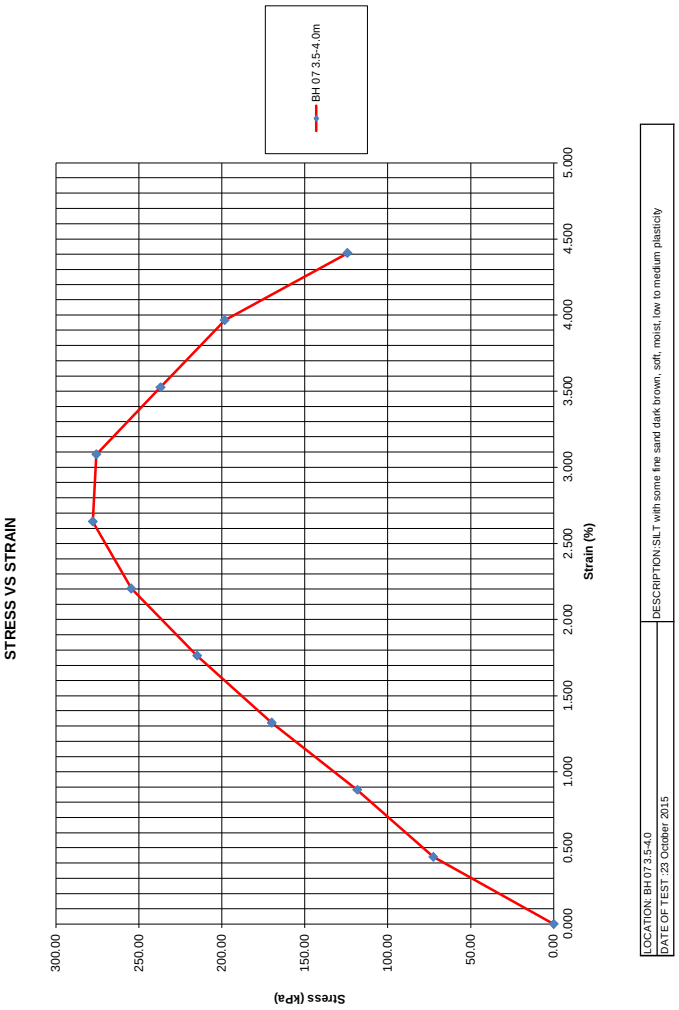
PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	23 October 2015
SITE ADDRESS	:	Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH 07 3.5-4.0m	**MATERIAL TYPE**	:	SILT with some fine sand dark brown, soft, moist, low to medium plasticity
TEST NUMBER	:	N577			

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

Moisture Content	Container No.	-	95
	Mass of Container	g	89.90
	Mass of Container + Wet Soil	g	268.81
	Mass of Container + Dry Soil	g	237.22
	Mass of Dry Soil	g	147.32
	Mass of Moisture	g	31.59
	Moisture Content	%	21.44

Bulk Density	Sample No.	-	N577
	Diameter of Specimen	mm	53.96
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2285.67
	Initial length of specimen Lo	mm	113.45
	Initial mass of specimen Mi	g	502.79
	Bulk Density ρ	t/m³	1.94
	Dry Density ρd	t/m³	1.60

Compression Gauge Reading	**Load Gauge Reading**	**Load**	**Strain ε= Cn - Co / Lo**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference σ1 - σ3 = 1000P/A**
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002286	0.00
0.50	83	0.1666	0.441	0.002296	72.57
1.00	136.0	0.2730	0.881	0.002306	118.39
1.50	196.0	0.3935	1.322	0.002316	169.88
2.00	249.0	0.5000	1.763	0.002327	214.90
2.50	297.0	0.5948	2.204	0.002337	254.50
3.00	326.0	0.6521	2.644	0.002348	277.75
3.50	325.0	0.6501	3.085	0.002358	275.65
4.00	280.0	0.5612	3.526	0.002369	236.87
4.50	235.0	0.4718	3.967	0.002380	198.23
5.00	148.0	0.2971	4.407	0.002391	124.26



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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 /**	:	21 October 2015
SITE ADDRESS	:	Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH07 3.5-4.0m	**MATERIAL TYPE & LOCATION**	:	SILT with some fine sand dark brown, soft, moist, low to medium plasticity
TEST NUMBER	:	N577			

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

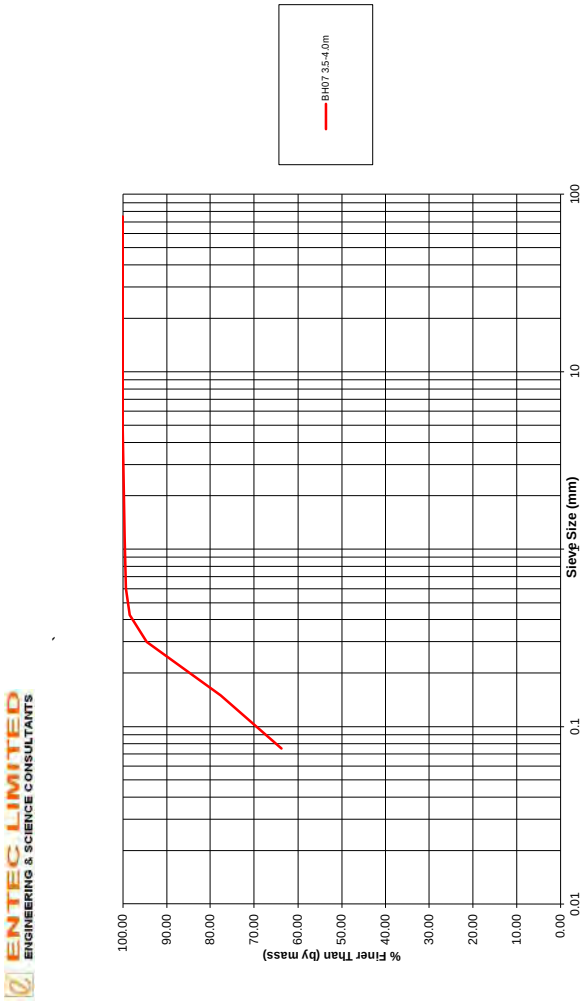
Moisture Content (Material passing 19mm)	Container No.	-	10	11	SPLIT SAMPLE
	Mass of Container	g	52.29	52.89	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	64.57	63.14	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	62.40	61.34	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	10.11	8.45	
	Mass of Moisture	g	2.17	1.80	
	Moisture Content	%	21.46	21.30	
	Average Moisture Content	%	21.38		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	300.67
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	247.70

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm	0.42	N/A	0.17	99.83	150	200
1.18 mm	0.60	N/A	0.24	99.59	100	200
600 µm	0.71	N/A	0.29	99.30	80	200
425 µm	2.13	N/A	0.86	98.44	70	200
300 µm	9.77	N/A	3.94	94.50	60	200
150 µm	41.71	N/A	16.84	77.66	40	200
75 µm	34.36	N/A	13.87	63.79	25	200
Passing 75 µm	158.00	N/A	63.79	0.00	-	-
Pan Total	247.70	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 21 October 2015	Date :02 December 2015	Date :02 December 2015



DESCRIPTION: SILT with some fine sand dark brown, soft, moist, low to medium plasticity

SAMPLE No: N577

LOCATION: BH06 3.5-4.0m

DATE OF TEST : 21 October 2015

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Form GE-L-06

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	22 October 2015
SITE ADDRESS	:	Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH07 5.0-5.50m	**MATERIAL TYPE & LOCATION**	:	Clay SILT with trace of fine sand and fine sub-angular gravel, pale brown
TEST NUMBER	:	N578			

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

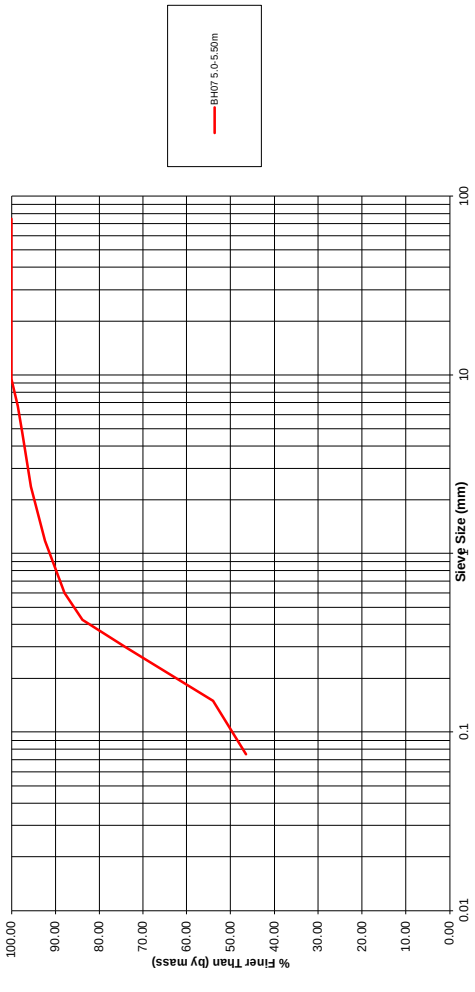
Moisture Content (Material passing 19mm)	Container No.	-	8	6	SPLIT SAMPLE
	Mass of Container	g	53.06	53.08	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	71.79	72.18	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	67.76	68.36	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	14.70	15.28	
	Mass of Moisture	g	4.03	3.82	
	Moisture Content	%	27.41	25.00	
	Average Moisture Content	%	26.21		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	318.36
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	252.25

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm	3.55	N/A	1.41	98.59	300	300
4.75 mm	2.73	N/A	1.08	97.51	250	200
2.36 mm	4.75	N/A	1.88	95.63	150	200
1.18 mm	8.44	N/A	3.35	92.28	100	200
600 µm	11.03	N/A	4.37	87.91	80	200
425 µm	10.49	N/A	4.16	83.75	70	200
300 µm	24.57	N/A	9.74	74.01	60	200
150 µm	50.46	N/A	20.00	54.01	40	200
75 µm	18.89	N/A	7.49	46.52	25	200
Passing 75 µm	117.34	N/A	46.52	0.00	-	-
Pan Total	252.25	-	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 : 22 October 2015	Date :02 December 2015	Date :02 December 2015



DESCRIPTION: Clay SILT with trace of fine sand and fine sub-angular gravel, pale brown
SAMPLE No: N578
LOCATION: BH07 5.0-5.50m
DATE OF TEST: 22 October 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	22 October 2015
SITE ADDRESS	:	Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH07 9.5-10.0m	**MATERIAL TYPE & LOCATION**	:	Clay SILT with trace of silt stone nodules and iron staining, light, brown, firm to stiff, medium to high plasticity (highly to completely weathered, SILT STONE, light brown, weak to very weak
TEST NUMBER	:	N580			

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

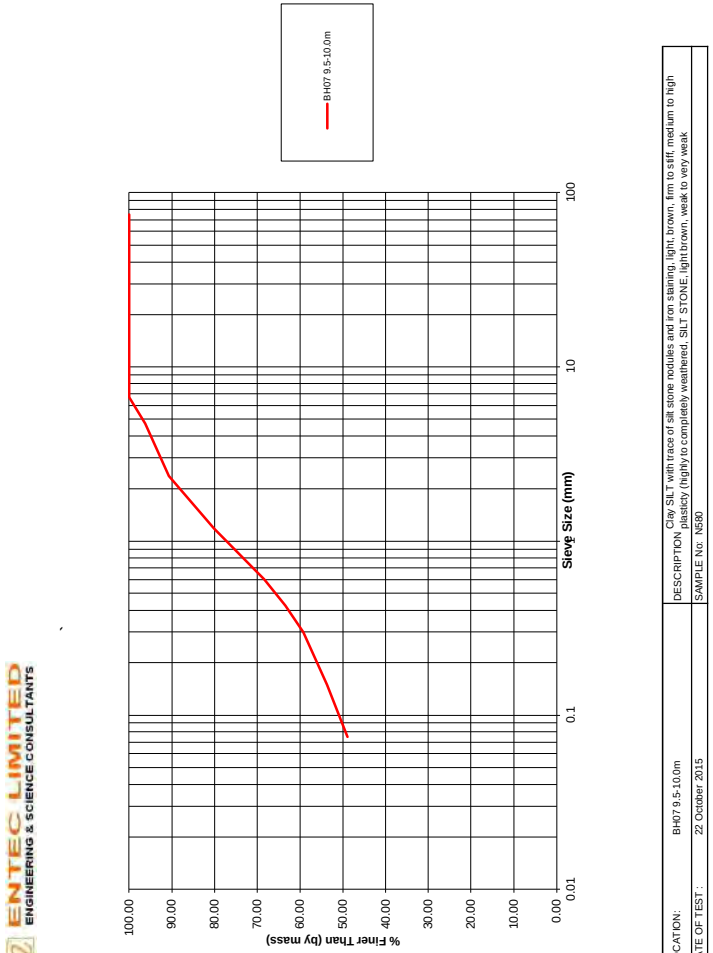
Moisture Content (Material passing 19mm)	Container No.	-	113	112	SPLIT SAMPLE
	Mass of Container	g	11.89	11.77	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	18.75	19.08	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	16.60	16.93	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	4.71	5.16	
	Mass of Moisture	g	2.15	2.15	
	Moisture Content	%	45.65	41.67	
	Average Moisture Content	%	43.66		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	396.94
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	276.31

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm	10.45	N/A	3.78	96.22	250	200
2.36 mm	15.41	N/A	5.58	90.64	150	200
1.18 mm	29.02	N/A	10.50	80.14	100	200
600 µm	32.62	N/A	11.81	68.33	80	200
425 µm	13.40	N/A	4.85	63.48	70	200
300 µm	11.68	N/A	4.23	59.26	60	200
150 µm	15.28	N/A	5.53	53.73	40	200
75 µm	13.39	N/A	4.85	48.88	25	200
Passing 75 µm	135.06	N/A	48.88	0.00	-	-
Pan Total	276.31	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 22 October 2015	Date : 02 December 2015	Date : 02 December 2015



DESCRIPTION	Clay SILT with trace of silt stone nodules and iron staining, light, brown, firm to stiff, medium to high plasticity (highly to completely weathered, SILT STONE, light brown, weak to very weak
SAMPLE No:	N580
LOCATION:	BH07 9.5-10.0m
DATE OF TEST :	22 October 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	22 October 2015
SITE ADDRESS	:	Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH07 14.0-14.5m	**MATERIAL TYPE & LOCATION**	:	Fine to coarse sub-angular to sub-rounded GRAVEL with trace of coarse sand
TEST NUMBER	:	N582			

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

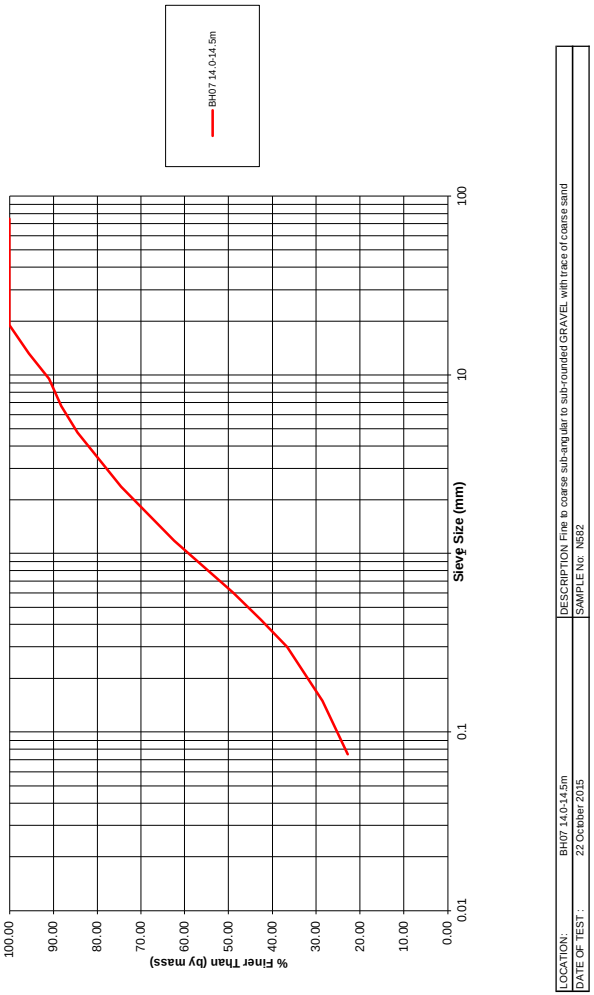
Moisture Content (Material passing 19mm)	Container No.	-	12	15	SPLIT SAMPLE
	Mass of Container	g	53.11	52.69	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	88.82	89.49	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	83.69	84.07	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	30.58	31.38	
	Mass of Moisture	g	5.13	5.42	
	Moisture Content	%	16.78	17.27	
	Average Moisture Content	%	17.02		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	393.74
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	336.46

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm	15.17	N/A	4.51	95.49	600	300
9.50 mm	15.01	N/A	4.46	91.03	450	300
6.70 mm	9.49	N/A	2.82	88.21	300	300
4.75 mm	12.55	N/A	3.73	84.48	250	200
2.36 mm	33.45	N/A	9.94	74.54	150	200
1.18 mm	40.99	N/A	12.18	62.36	100	200
600 µm	45.34	N/A	13.48	48.88	80	200
425 µm	21.02	N/A	6.25	42.63	70	200
300 µm	20.28	N/A	6.03	36.60	60	200
150 µm	27.07	N/A	8.05	28.56	40	200
75 µm	19.47	N/A	5.79	22.77	25	200
Passing 75 µm	76.62	N/A	22.77	0.00	-	-
Pan Total	336.46	-	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 : 22 October 2015	Date :02 December 2015	Date :02 December 2015



DESCRIPTION Fine to coarse sub-angular to sub-rounded GRAVEL with trace of coarse sand
SAMPLE No: N582
LOCATION: BH07 14.0-14.5m
DATE OF TEST : 22 October 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	: Japan International Cooperation Agency	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	: 23 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH06 17.0-17.50m	**MATERIAL TYPE & LOCATION**	: Silty fine SAND with some fine to medium sub-angular gravel
TEST NUMBER	: N584		

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

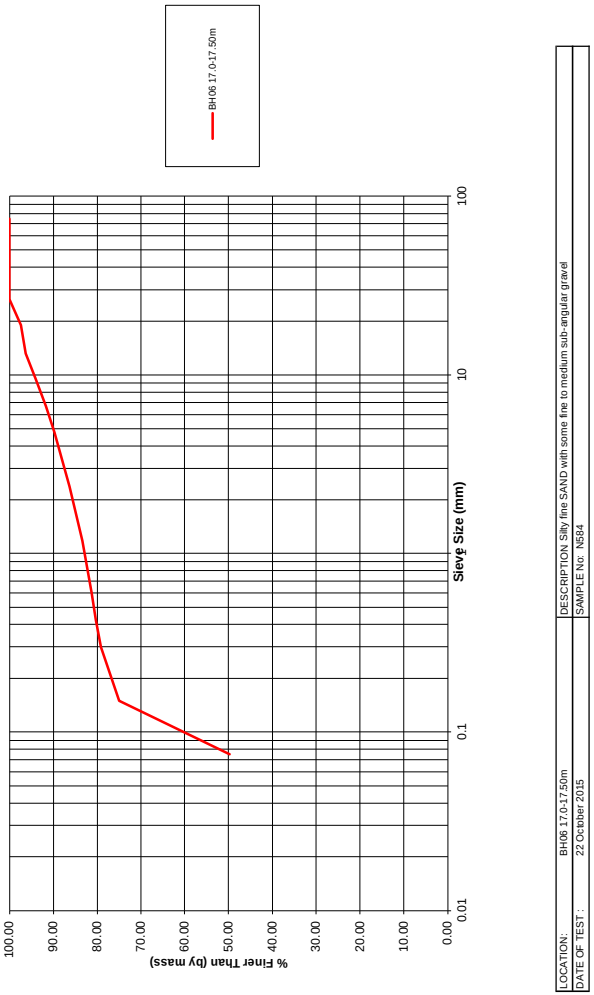
Moisture Content (Material passing 19mm)	Container No.	-	42	44	SPLIT SAMPLE
	Mass of Container	g	14.57	14.58	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	33.45	34.36	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	29.00	29.57	Spliting Factor M_3 / M_4
	Mass of Dry Soil	g	14.43	14.99	
	Mass of Moisture	g	4.45	4.79	
	Moisture Content	%	30.84	31.95	
	Average Moisture Content	%	31.40		

Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	334.93
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	254.90

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm	6.78	N/A	2.66	97.34		200
13.2 mm	2.50	N/A	0.98	96.36	600	300
9.50 mm	5.92	N/A	2.32	94.04	450	300
6.70 mm	6.10	N/A	2.39	91.64	300	300
4.75 mm	4.95	N/A	1.94	89.70	250	200
2.36 mm	8.88	N/A	3.48	86.22	150	200
1.18 mm	7.11	N/A	2.79	83.43	100	200
600 µm	5.33	N/A	2.09	81.34	80	200
425 µm	2.62	N/A	1.03	80.31	70	200
300 µm	3.14	N/A	1.23	79.08	60	200
150 µm	10.57	N/A	4.15	74.93	40	200
75 µm	64.43	N/A	25.28	49.65	25	200
Passing 75 µm	126.57	N/A	49.65	0.00	-	-
Pan Total	254.90	-	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 : 22 October 2015	Date : 02 December 2015	Date : 02 December 2015



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Wet Sieve Analysis
(NZS 4407:1991 (Test 3.8.1

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	22 October 2015
SITE ADDRESS	:	Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	:	RK
SAMPLE LOCATION	:	BH07 18.5-19.0m	**MATERIAL TYPE & LOCATION**	:	Clay SILT with trace of coarse sand, pale grey , stiff, low to medium plasticity (highly to completely weathered, SILTSTONE,pale grey, weak to very weak)
TEST NUMBER	:	N585			

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

Moisture Content (Material passing 19mm)	Container No.	-	36	23	SPLIT SAMPLE
	Mass of Container	g	14.09	14.72	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	32.35	33.06	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	28.09	28.79	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	14.00	14.07	
	Mass of Moisture	g	4.26	4.27	
	Moisture Content	%	30.43	30.35	
	Average Moisture Content	%	30.39		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	200.21
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	153.55

Test Sieve Size mm	Mass of Dry Soil Retained (M_{Si})	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm	2.08	N/A	1.35	98.65	250	200
2.36 mm	11.75	N/A	7.65	90.99	150	200
1.18 mm	18.35	N/A	11.95	79.04	100	200
600 µm	21.77	N/A	14.18	64.86	80	200
425 µm	10.17	N/A	6.62	58.24	70	200
300 µm	14.77	N/A	9.62	48.62	60	200
150 µm	21.53	N/A	14.02	34.60	40	200
75 µm	10.01	N/A	6.52	28.08	25	200
Passing 75 µm	43.12	N/A	28.08	0.00	-	-
Pan Total	153.55	-	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 :RK	Q.A. Checked by : KB	Approved by : IG
Date : 21 October 2015	Date : 02 November 2015	Date : 02 November 2015

LOCATION :	BH07 18.5-19.0m
DATE OF TEST :	22 October 2015
DESCRIPTION	Clay SILT with trace of coarse sand, pale grey , stiff (low to medium plasticity (highly to completely weathered, SILTSTONE,pale grey,weak to very weak)
SAMPLE No:	N585

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

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 30 October 2015
SITE ADDRESS	: Site 07, Old Queens Road bridge - Left Bank	**TECHNOLOGIST**	: IG/TL
MATERIAL TYPE & DESCRIPTION	: Fine to coarse sub-angular to sub-rounded GRAVEL with trace of coarse sand	**TEST METHOD**	: AS 1289.6.7.3-2001
		SAMPLE No.	: N582 (BH07 14.0m - 14.5m)

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

MOISTURE CONTENT

Container No.		35
Mass of Container	g	14.29
Mass of Container + Wet	g	27.62
Mass of Container + Dry	g	25.49
Mass of Dry Soil	g	11.20
Mass of Moisture	g	2.13
Moisture Content	%	19.02
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1460
Volume of Speciman	cm^3	703.72
Wet Density	t/m^3	2.07
Dry Density	t/m^3	1.74
Maximum Dry Density	t/m^3	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm^2	113.10
Cross sectional area of soil	cm^2	50.27
Length of soil speciman	cm	14.00

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(°c)	KT cm/min	K_{20} cm/min
1	104	4.00	380	26	0.254	0.226
2	104	4.00	380	26	0.254	0.226
3	104	4.00	370	26	0.248	0.220
4	95	4.00	290	26	0.213	0.189
5	95	4.00	290	26	0.213	0.189
6	95	4.00	280	26	0.205	0.183
7	84	4.00	220	26	0.182	0.162
8	84	4.00	210	26	0.174	0.155
9	84	4.00	210	26	0.174	0.155
10	76	4.00	190	26	0.174	0.155
11	76	4.00	190	26	0.174	0.155
12	76	4.00	190	26	0.174	0.155

Average K_{20} m/s	3.01E-05

Tested By: IG/TL
Date: 30 October 2015

Q.A. Check By: KB
Date: 02 December 2015

Approved By: IG
Date: 02 December 2015

Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth		3.5m - 4.0m	
Description			
Type		Silt with some fine sand, dark brown,firm,moist,low plasticity.	
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	63.0
Bulk Density	ρ_0	(Mg/m3)	1.60
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	24
Initial Dry Density	ρ_{di}	(Mg/m3)	1.29
Initial Voids Ratio	e_i	.	1.053
Initial Degree of Saturation	S_i	(%)	61.1
Initial Swelling	S_S	(kPa)	0

Final Conditions

Final Moisture	ω_f%	(%)	19
Dry Density	ρ_{df}	(Mg/m3)	1.53
Voids Ratio	e_f	.	0.730
Saturation	S_f	(%)	70
Height Settlement	ΔL_s	(mm)	3.148

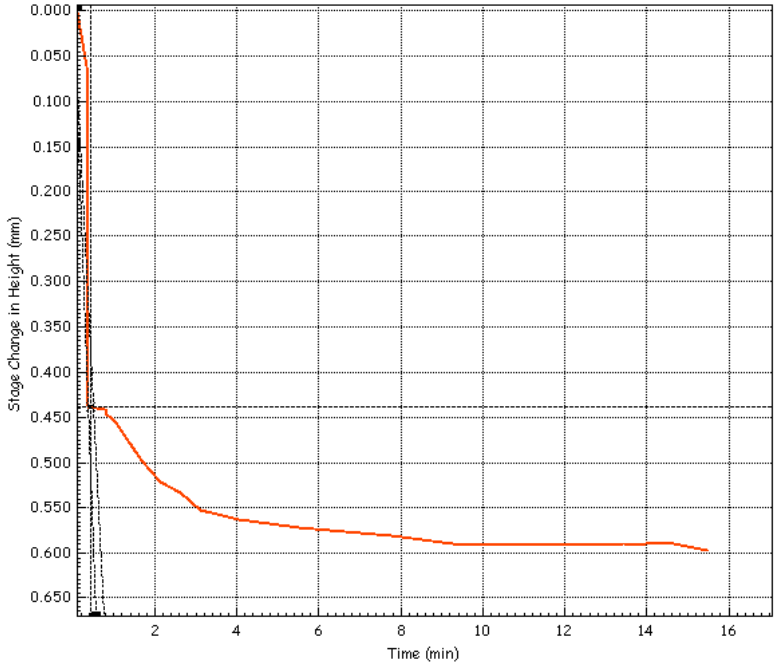
Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
100	0.992	0.597	215.4	0.299	29.0	0.0		0.200	0.0087
200	0.730	3.148	155.2	1.315	29.0	0.0		0.235	0.0087
400	0.730	3.148	48.7		29.0	0.0		0.647	0.0087
800	0.730	3.148	65.9		29.0	0.0		0.478	0.0087
1600	0.730	3.148	69.7		29.0	0.0		0.452	0.0087
400	0.730	3.148			29.0	0.0			
100	0.730	3.148			29.0	0.0			

Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-08_005
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/26/2015
Jobfile	Geotechnical Engineering	Sample	N577
Client	Japan International Cooperation	Borehole	BH07
Operator	IG/MK	Checked	DMC
Approved	DMC		

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.597
Voids Ratio	e_f	.	0.992
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.200
Consolidation	C_V	(m2/year)	215.4
Compressibility	m_V	(m2/MN)	0.299
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

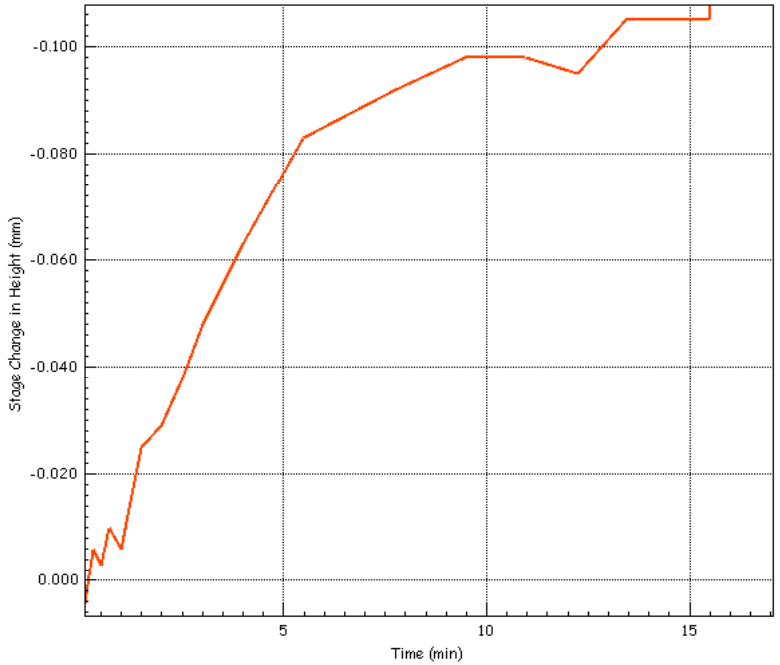


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-08_005
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/26/2015
Jobfile	Geotechnical Engineering	Sample	N577
Client	Japan International Cooperation	Borehole	BH07
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	3.142
Voids Ratio	e_f	.	0.731
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

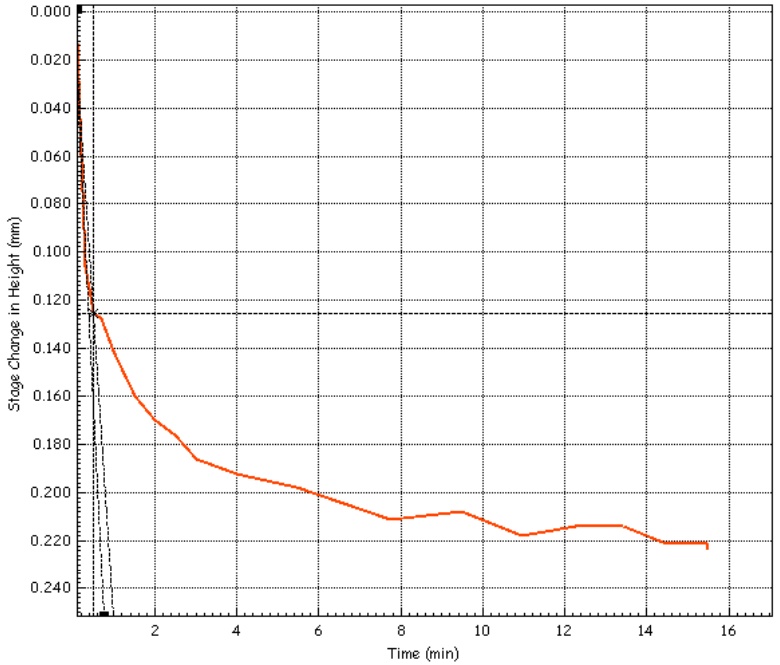


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-08_005
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/26/2015
Jobfile	Geotechnical Engineering	Sample	N577
Client	Japan International Cooperation	Borehole	BH07
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	3.135
Voids Ratio	e_f	.	0.731
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.235
Consolidation	C_V	(m2/year)	155.3
Compressibility	m_V	(m2/MN)	1.308
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

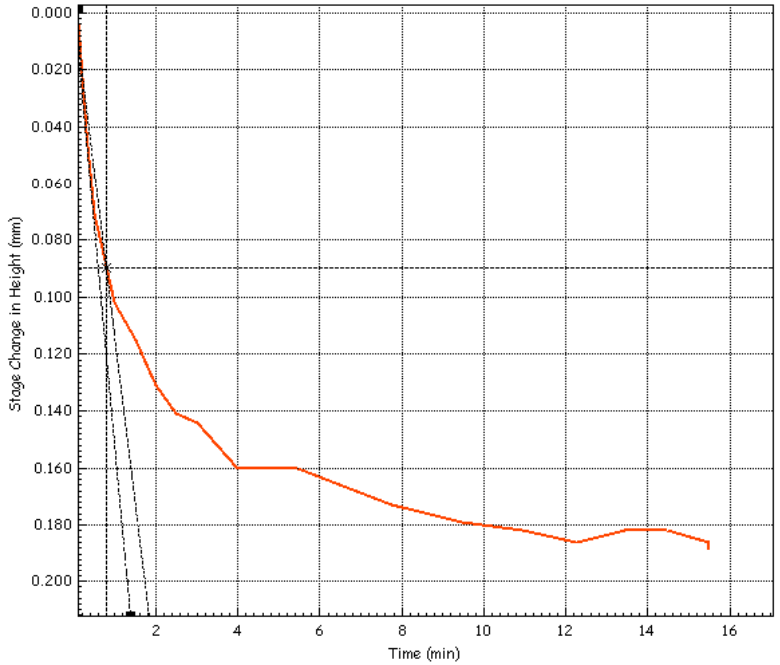


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-08_005
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/26/2015
Jobfile	Geotechnical Engineering	Sample	N577
Client	Japan International Cooperation	Borehole	BH07
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	3.139
Voids Ratio	e_f	.	0.731
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.647
Consolidation	C_V	(m2/year)	48.8
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

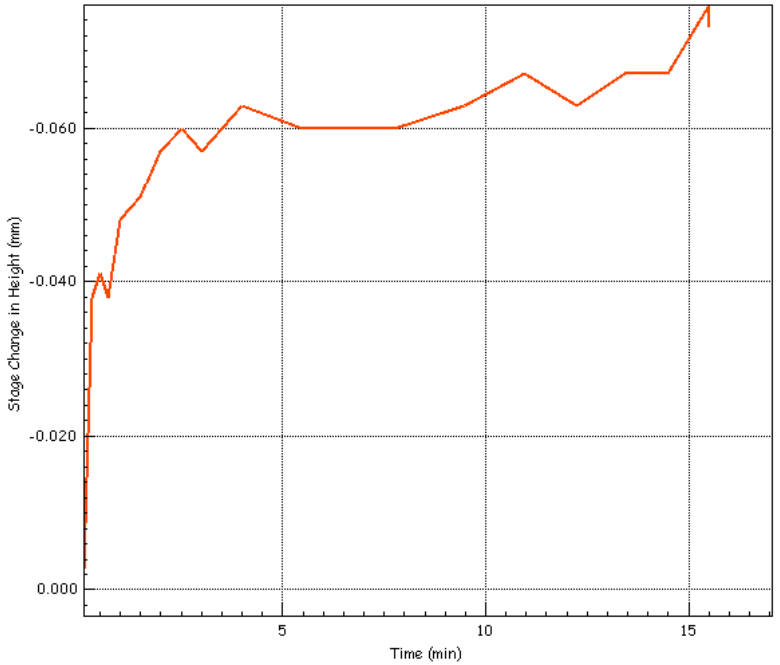


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-08_005
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/26/2015
Jobfile	Geotechnical Engineering	Sample	N577
Client	Japan International Cooperation	Borehole	BH07
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	3.139
Voids Ratio	e_f	.	0.731
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

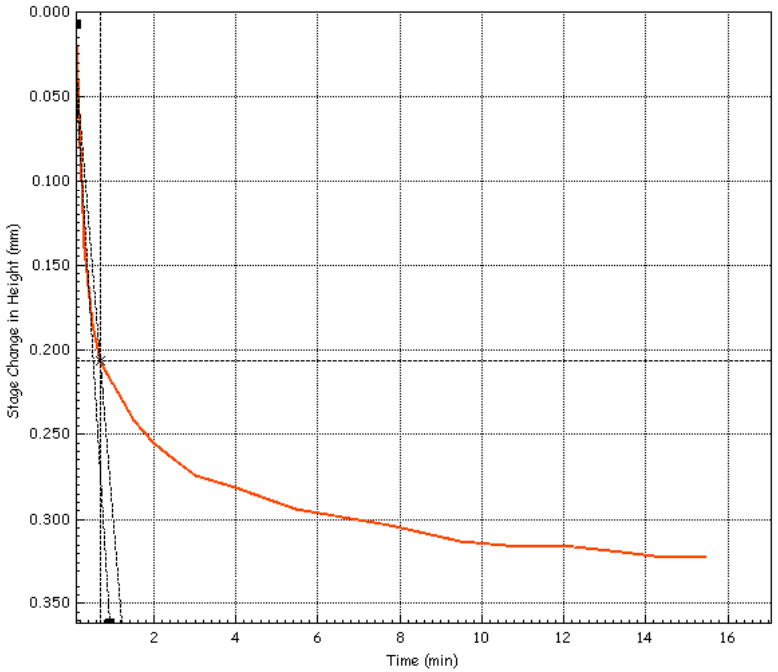


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-08_005
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/26/2015
Jobfile	Geotechnical Engineering	Sample	N577
Client	Japan International Cooperation	Borehole	BH07
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	800
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	3.139
Voids Ratio	e_f	.	0.731
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.478
Consolidation	C_V	(m2/year)	66.0
Compressibility	m_V	(m2/MN)	0.000
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

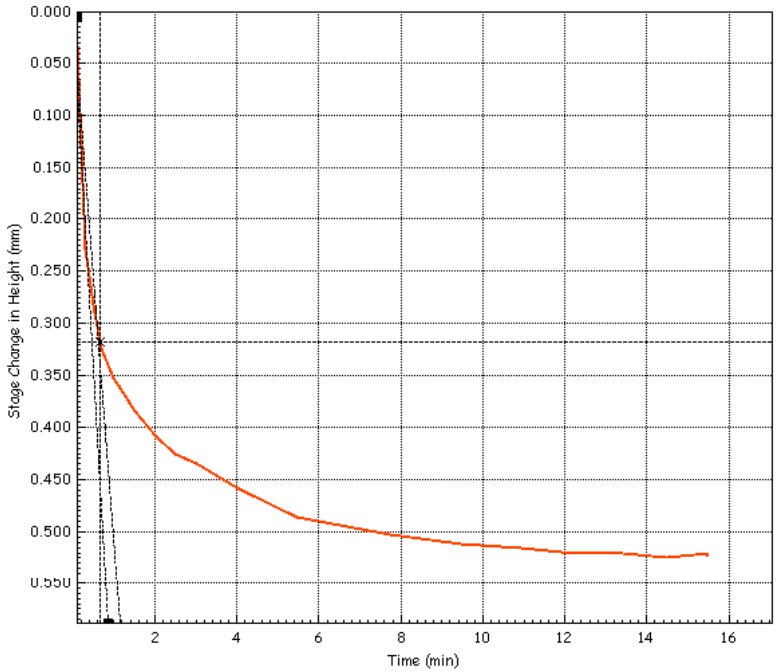


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-08_005
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/26/2015
Jobfile	Geotechnical Engineering	Sample	N577
Client	Japan International Cooperation	Borehole	BH07
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	1600
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	3.139
Voids Ratio	e_f	.	0.731
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.452
Consolidation	C_V	(m2/year)	69.8
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-08_005
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/26/2015
Jobfile	Geotechnical Engineering	Sample	N577
Client	Japan International Cooperation	Borehole	BH07
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

APPENDIX 7d

Site Photos

APPENDIX 8

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

APPENDIX 8a

Test Locality Plan

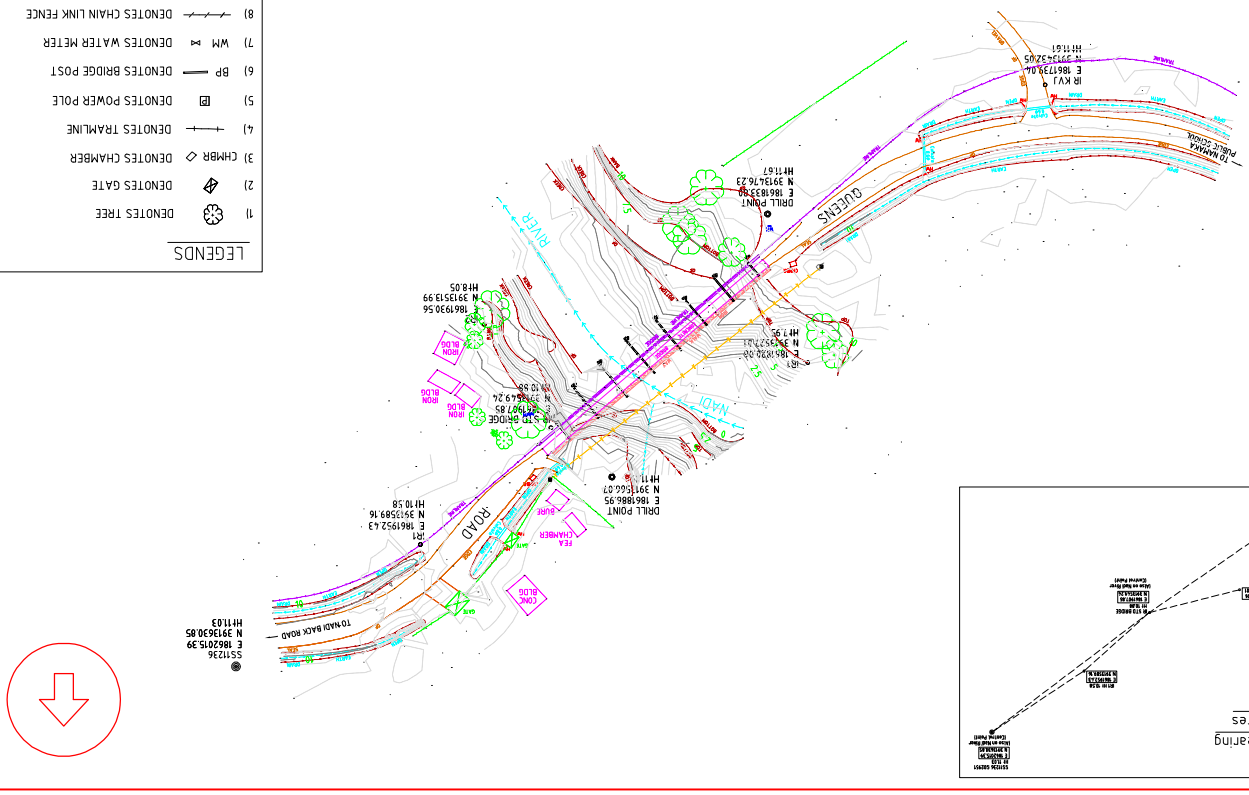
ENTEC LIMITED ENGINEERING AND SCIENCE CONSULTANTS				CLIENT:	Japan International Cooperation Agency (JICA)	NOTE: THIS DRAWING HAS BEEN REPRODUCED BY ENTEC TO SHOW THE APPROXIMATE BOREHOLE LOCATION.	DRAWN BY	SS	A3
							CHECKED BY	KC	
Level 2, Mid City Plaza Cnr. Cumming St & Renwick Road P.O Box 12309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

D15-247

Weeng Consulting Ltd 18 KVJ 2 1st Street, Lautoka, Fiji P.O. Box 458 Tel: +679 6660597 Mob: +679 9998897	CLIENT: JICA STUDY TEAM	PROJECT: NADI BACK ROAD BRIDGE SITES 7 & 8			
			JOB	NAME	DATE
			SURVEYED BY:	SAMISONI	09/10/15
			DRAFTED BY:	JOVILISI	20/10/15
			CHECKED BY:		
			APPROVED BY:		
			THIS DRAWING AND DESIGN REMAIN THE PROPERTY OF, AND MAY NOT BE REPRODUCED, WITHOUT THE WRITTEN PERMISSION OF CADASTRALS		
SCALE : 1 : 1250	2110- NBR 7&8	A4AD	CHECKED SIGNATURE		
C/2100-2199/2110 - Topo					

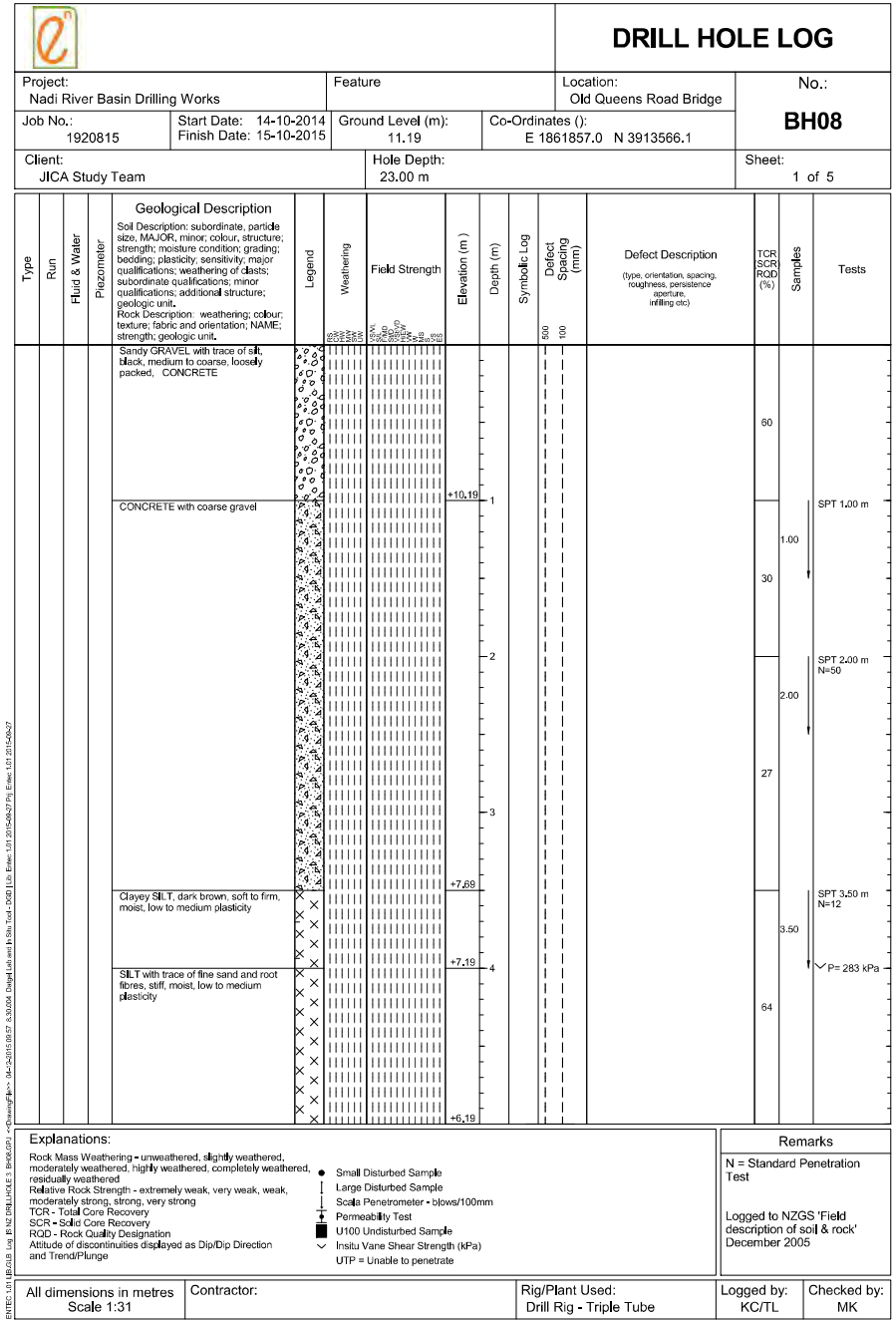
LEGENDS

1) DENOTES TREE
2) DENOTES GATE
3) CHMBR DENOTES CHAMBER
4) DENOTES TRAMLINE
5) DENOTES POWER POLE
6) BP DENOTES BRIDGE POST
7) WM DENOTES WATER METER
8) DENOTES CHAIN LINK FENCE
9) HW DENOTES CONCRETE HEADWALL
10) DENOTES OVERHEAD FEA POWER LINE



APPENDIX 8b

Engineering Borehole Log and Core Photos



DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Old Queens Road Bridge	No.: BH08
Job No.: 1920815	Start Date: 14-10-2014 Finish Date: 15-10-2015	Ground Level (m): 11.19	Co-Ordinates (): E 1861857.0 N 3913566.1
Client: JICA Study Team	Hole Depth: 23.00 m		Sheet: 1 of 5

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc)	TCR SCR RQD (%)	Samples	Tests
				Sandy GRAVEL with trace of silt, black, medium to coarse, loosely packed, CONCRETE				+10.19	1				60		
				CONCRETE with coarse gravel									30	1.00	SPT 1.00 m
									2						SPT 2.00 m N=50
													27	2.00	
								+7.69	3						
				Clayey SILT, dark brown, soft to firm, moist, low to medium plasticity				+7.19						3.50	SPT 3.50 m N=12
				SILT with trace of fine sand and root fibres, stiff, moist, low to medium plasticity					4				64		P= 283 kPa
								+6.19							

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Old Queens Road Bridge	No.: **BH08**
Job No.: 1920815	Start Date: 14-10-2014 Finish Date: 15-10-2015	Ground Level (m): 11.19	Co-Ordinates (): E 1861857.0 N 3913566.1
Client: JICA Study Team	Hole Depth: 23.00 m		Sheet: 2 of 5

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with some fine to coare sand, dark brown, soft, moist, low plasticity			67	5.00	SPT 5.00 m N=9; P= 78 kPa
		6			
SILT with coarse sand trace of root fibres, dark brown, stiff, low to medium plasticity	+4.69		33	6.50-7.00	P= 275 kPa; P= 51.5 kPa
		7			
Silty fine to coarse SAND, dark brown	+3.19	8	49	8.00	P= 173 kPa; SPT 8.00 m N=14
		9			
Medium to coarse SAND with some coarse sub-angular to sub-rounded gravel	+1.69		25	9.50	SPT 9.50 m N=35
	+1.19				

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

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

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH08.GPJ <<DrawingFile>> 04-12-2015 09:57 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Old Queens Road Bridge	No.: **BH08**
Job No.: 1920815	Start Date: 14-10-2014 Finish Date: 15-10-2015	Ground Level (m): 11.19	Co-Ordinates (): E 1861857.0 N 3913566.1
Client: JICA Study Team	Hole Depth: 23.00 m		Sheet: 3 of 5

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
Fine to medium sub-angular to sub-rounded GRAVEL with some coarse sand			25		
Coarse SAND with fine to medium sub-angular to sub-rounded gravel	+0.19	11	33	11.00	SPT 11.00 m N=26
		12			
Silty fine to coarse SAND, brown moist, low plasticity	-1.31			12.50	SPT 12.50 m N=41
Highly to completely weathered SANDSTONE, brownish, weak to very weak, (fine to medium SAND with some silt and trace of iron stain brown)	-1.81	13	81		P= 300 kPa; P= 160 kPa; P= 150 kPa
SILT with some siltstone nodules and fine sub-angular gravel with trace of clay, pale brown, soft to firm, low to medium plasticity (highly to completely weathered, SILTSTONE, pale brown, weak to very weak)	-2.81	14	100	14.00	SPT 14.00 m N=47; P= 93.5 kPa
	-3.81				

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

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

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH08.GPJ <<DrawingFile>> 04-12-2015 09:57 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Old Queens Road Bridge	BH08

Job No.:	Start Date / Finish Date	Ground Level (m):	Co-Ordinates ():
1920815	Start Date: 14-10-2014 Finish Date: 15-10-2015	11.19	E 1861857.0 N 3913566.1

Client:	Hole Depth:	Sheet:
JICA Study Team	23.00 m	4 of 5

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

Columns: Type | Run | Fluid & Water | Piezometer | Geological Description | Legend | Weathering (RS CW HW MW SW UW) | Field Strength (VS/VL S/L F/MD St/D VSt/VD H/EW VW W MS S VS ES) | Elevation (m) | Depth (m) | Symbolic Log | Defect Spacing (mm) (500 100) | Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc) | TCR (SCR) RQD (%) | Samples | Tests

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with some shell fragments and minor fine sub-angular gravel, brown, stiff, low plasticity (highly to completely weathered SILTSTONE, brown, very weak)	-4.31		100		P= 223 kPa
Silty fine to medium sub-angular GRAVEL with trace of coarse sand, brown	-5.81	16	27	15.50	SPT 15.50 m N=50
Coarse SAND with some fine sub-rounded gravel, pale grey brown	-7.31	17, 18	33	17.00	SPT 17.00 m N=50
SILT with trace of fine sand and fine sub-angular gravels and shell fragments, light brown, soft, moist, low to medium plasticity	-7.81	19		18.50	SPT 18.50 m N=50
SILT with some coarse sand and minor fine to medium sub-angular to sub rounded gravel with trace of shell fragments, grey, wet, low to medium plasticity	-8.81		75		

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH08.GPJ <<DrawingFile>> 04-12-2015 09:57 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Old Queens Road Bridge	BH08

Job No.:	Start Date / Finish Date	Ground Level (m):	Co-Ordinates ():
1920815	Start Date: 14-10-2014 Finish Date: 15-10-2015	11.19	E 1861857.0 N 3913566.1

Client:	Hole Depth:	Sheet:
JICA Study Team	23.00 m	5 of 5

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

Columns: Type | Run | Fluid & Water | Piezometer | Geological Description | Legend | Weathering (RS CW HW MW SW UW) | Field Strength (VS/VL S/L F/MD St/D VSt/VD H/EW VW W MS S VS ES) | Elevation (m) | Depth (m) | Symbolic Log | Defect Spacing (mm) (500 100) | Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc) | TCR (SCR) RQD (%) | Samples | Tests

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	Samples	Tests
SILT with some coarse sand and trace of fine sub-angular gravel and shell fragments, grey, stiff to hard, moist, low to medium plasticity (highly to completely weathered SILTSTONE, grey green, weak to very weak)	-10.31	21	93	20.00	SPT 20.00 m N=50 P= 105 kPa
SILT with trace of fine to coarse sand and siltstone nodules, grey green, stiff to hard, moist, low to medium plasticity (highly to completely weathered SILTSTONE, grey green, weak to very weak)	-11.81	22	100	21.50	SPT 21.50 m N=50 P= 233 kPa
Hole Terminated at 23.00 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005		23, 24		23.00	SPT 23.00 m N=50

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

ENTEC 1.01 LIB.GLB Log IS NZ DRILLHOLE 3 BH08.GPJ <<DrawingFile>> 04-12-2015 09:57 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Entec 1.01 2015-09-27 Prj: Entec 1.01 2015-09-27

Borehole 8 Core Photos (0.00m to 23.00m)

0.00m to 4.40m

4.40m to 8.60m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 8, Old Queens Road Bridge Right Bank, Nadi, Fiji.

8.6.90m to 13.50m

13.50m to 17.00m

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS
1920815.08

17.00m to 21.90m

21.90m to 23.00m

APPENDIX 8c

Laboratory Test Schedule and Test Results

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS :Site 08 (BH 08), Old Queens Road Bridge
Date: 18 December 2015

Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required: Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	Remarks
1920815	Site 8, (BH 08)	Concrete with coarse gravel	SPT	1.0 - 1.5			1					
		Concrete with coarse gravel	SPT	2.0 - 2.5				1				
		Silty Sand	SPT	5.0-5.5			1	1				
		Silty Sand	U	6.5-7.0		1				1	1	
		Sand	SPT	8.0 - 8.3	1		1	1				
		Gravel	SPT	9.5 - 10.0				1				
		Sandy Gravel	SPT	11.0-11.5			1	1				
		Silty Sand	SPT	12.5-13.0			1					
		Silty Sand /Sandy Silt	SPT	14.0-14.5			1					
		Silty GRAVEL	SPT	15.5 - 16.0			1	1	1			
		Clayey Silt	SPT	18.5 - 19.0			1		1			
		Silty Sand	SPT	21.5 - 21.90			1					
		Clayey Silt	SPT	23.0 - 23.4			1		1			
	TOTALS				1	1	10	6	3	1	1	Total
	Bill of Quantity				1	3	10	6	3	3	3	23 / 29

Lab Test Schedule checked by: DMC

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 22 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: Silty fine to medium sub-angular GRAVEL trace of coarse sand, brown	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N596 BH08 15.5m -16.0m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	24	44				
Mass of Container	g	14.61	14.60				
Mass of Container + Wet Soil	g	27.28	26.13				
Mass of Container + Dry Soil	g	24.88	24.04				
Mass of Dry Soil	g	10.27	9.44				
Mass of Moisture	g	2.40	2.09				
Moisture Content	%	23.37	22.14				22.75

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		110	111				
Mass of Container	g	11.92	11.65				
Mass of Container + Wet Soil	g	19.33	18.98				
Mass of Container + Dry Soil	g	17.22	16.89				
Mass of Dry Soil	g	5.30	5.24				
Mass of Moisture	g	2.11	2.09				
Moisture Content	%	39.81	39.89				39.85

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	35	29	26	19	14
Container No.		129	134	144	153	155	163
Mass of Container	g	11.53	11.26	11.96	11.23	11.70	11.72
Mass of Container + Wet Soil	g	24.65	18.04	21.42	20.86	21.20	26.03
Mass of Container + Dry Soil	g	20.06	15.58	17.89	17.17	17.45	20.17
Mass of Dry Soil	g	8.53	4.32	5.93	5.94	5.75	8.45
Mass of Moisture	g	4.59	2.46	3.53	3.69	3.75	5.86
Moisture Content	%	53.81	56.94	59.53	62.12	65.22	69.35

LINEAR SHRINKAGE TEST

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

Sample Preparation

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

Liquid Limit	61.00 %
Plastic Limit	39.85 %
Plasticity Index	21.15 %
Shrinkage Limit	18.40 %

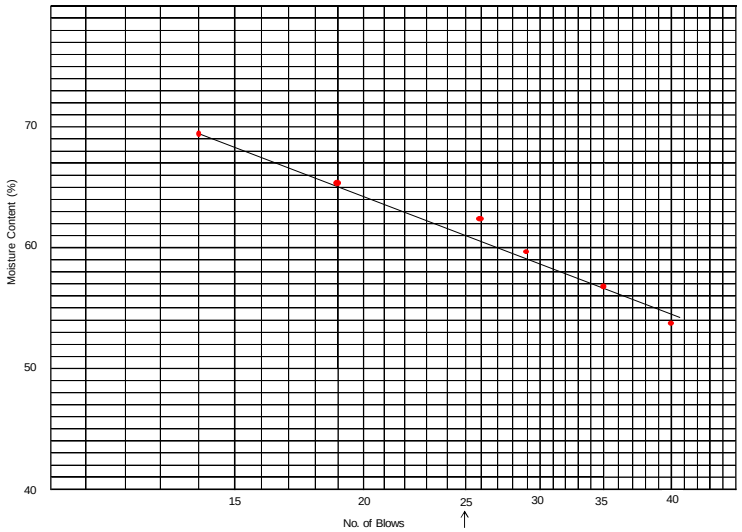
Tested By: LN
Date: 26 October 2015

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

Approved By:IG
Date: 03 December 2015

Form: GE-L-03

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N596

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 26 October 2015
SITE ADDRESS	: BH08 Old Queens Road Bridge- Right Bank	**TECHNOLOGIST**	: LN
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand and fine sub-angular gravels and shell fragments, light brown, soft, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N597 BH08 18.5-19.0m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	111	122				
Mass of Container	g	11.66	11.75				
Mass of Container + Wet Soil	g	26.68	27.91				
Mass of Container + Dry Soil	g	22.39	23.26				
Mass of Dry Soil	g	10.73	11.51				
Mass of Moisture	g	4.29	4.65				
Moisture Content	%	39.98	40.40				40.19

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		38	39				
Mass of Container	g	14.74	14.18				
Mass of Container + Wet Soil	g	18.63	18.19				
Mass of Container + Dry Soil	g	17.59	17.09				
Mass of Dry Soil	g	2.85	2.91				
Mass of Moisture	g	1.04	1.10				
Moisture Content	%	36.49	37.80				37.15

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	36	30	25	20	16
Container No.		19	18	25	28 29		33
Mass of Container	g	14.85	14.61	14.44	13.98	14.29	14.46
Mass of Container + Wet Soil	g	20.41	20.18	21.01	20.72	22.03	21.99
Mass of Container + Dry Soil	g	18.56	18.33	18.69	18.29	19.14	19.08
Mass of Dry Soil	g	3.71	3.72	4.25	4.31	4.85	4.62
Mass of Moisture	g	1.85	1.85	2.32	2.43	2.89	2.91
Moisture Content	%	49.87	49.73	54.59	56.38	59.59	62.99

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample				125		
Final length of Sample after Shrinkage				110		
% Shrinkage				12.00		12.00

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

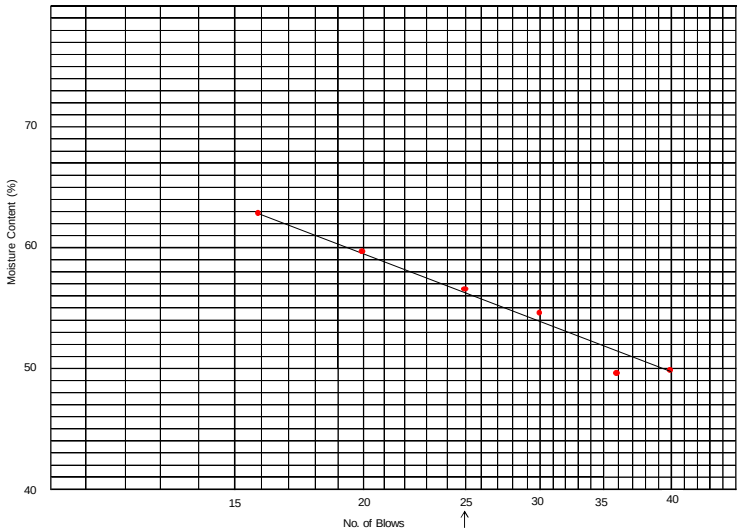
Liquid Limit	56.20 %
Plastic Limit	37.15 %
Plasticity Index	19.05 %
Shrinkage Limit	12.00 %

Tested By:RK
Date: 26 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: N597

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 26 October 2015
SITE ADDRESS	: BH08 Old Queens Road Bridge- Right Bank	**TECHNOLOGIST**	: RK
		TEST METHOD	: NZS 4402:1986 (amended version)
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine to coarse sand and silt stone nodlues, grey green, stiff to hard, moist, low to medium plasticity (highly to completely weathered, SILTSTONE, grey green, weak to very weak)	**SAMPLE No.**	: N599 BH09 23.0-23.4m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
Container No.	g	117	153				
Mass of Container	g	11.12	11.21				
Mass of Container + Wet Soil	g	20.46	22.11				
Mass of Container + Dry Soil	g	17.92	19.12				
Mass of Dry Soil	g	6.80	7.91				
Mass of Moisture	g	2.54	2.99				
Moisture Content	%	37.35	37.80				37.58

PLASTIC LIMIT

TEST No.		1	2				Average
Container No.		35	30				
Mass of Container	g	14.27	13.45				
Mass of Container + Wet Soil	g	20.13	19.00				
Mass of Container + Dry Soil	g	18.41	17.41				
Mass of Dry Soil	g	4.14	3.96				
Mass of Moisture	g	1.72	1.59				
Moisture Content	%	41.55	40.15				40.85

LIQUID LIMIT

TEST No.		1	2	3	4	5	6
Number of Blows		40	36	31	24	20	15
Container No.		20	45	23	42	32	24
Mass of Container	g	14.12	14.47	14.75	14.55	14.55	14.62
Mass of Container + Wet Soil	g	23.26	23.49	25.60	29.71	25.69	27.43
Mass of Container + Dry Soil	g	19.97	20.22	21.62	24.12	21.41	22.54
Mass of Dry Soil	g	5.85	5.75	6.87	9.57	6.86	7.92
Mass of Moisture	g	3.29	3.27	3.98	5.59	4.28	4.89
Moisture Content	%	56.24	56.87	57.93	58.41	62.39	61.74

LINEAR SHRINKAGE TEST

Mould No.	1	2	3	4	5	Average
Initial length of Sample			140.00			
Final length of Sample after Shrinkage			127.00			
% Shrinkage			9.29			9.29

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

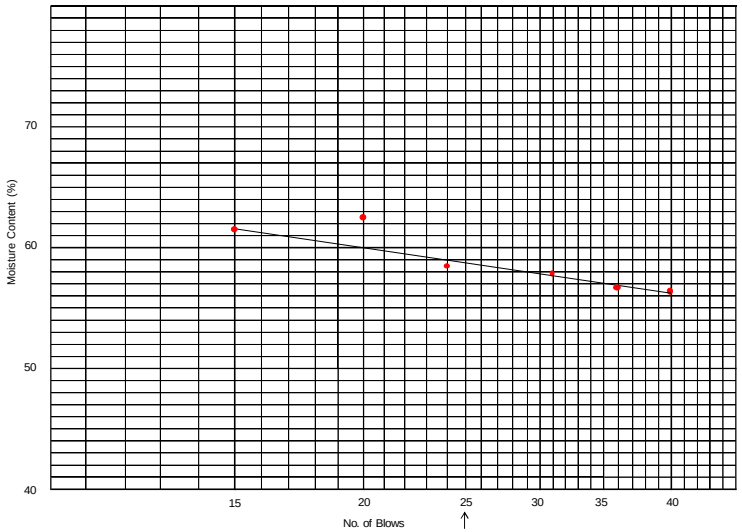
Liquid Limit	58.80 %
Plastic Limit	40.85 %
Plasticity Index	17.95 %
Shrinkage Limit	9.29 %

Tested By:RK
Date: 26 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:N599

Form: GE-L-03

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

PRINCIPAL :	Japan International Cooperation Agency (JICA)	**PROJECT No.** :	1920815
PROJECT NAME :	Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE / TESTED** :	24 October 2015
SITE ADDRESS :	Site 08, RHS of the Bridge.	**TECHNOLOGIST** :	KB/LN
SAMPLE LOCATION :	BH08 6.50m - 7.00m	**MATERIAL TYPE** :	SILT with coarse sand trace of root fibre, dark brown, stiff, low to medium plasticity
TEST NUMBER :	N590		

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

Moisture Content	Container No.	-	75	65	
	Mass of Container	g	89.77	87.18	
	Mass of Container + Wet Soil	g	199.56	173.75	
	Mass of Container + Dry Soil	g	176.83	156.26	
	Mass of Dry Soil	g	87.06	69.08	
	Mass of Moisture	g	22.73	17.49	
	Moisture Content	%	26.11	25.32	25.71

Bulk Density	Sample No.	-	N590
	Diameter of Specimen	mm	53.63
	Initial area of specimen Ao ($\pi/4\ d^2$)	mm²	2257.80
	Initial length of specimen Lo	mm	46.84
	Initial mass of specimen Mi	g	196.50
	Bulk Density ρ	t/m³	1.86
	Dry Density ρd	t/m³	1.48

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

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: CONCRETE with coarse gravel	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N587 BH08 1.0m - 1.5m

Moisture Content	%						
Container No.	g	82	77				
Mass of Container	g	90.21	99.35				
Mass of Container + Wet Soil	g	130.54	139.18				
Mass of Container + Dry Soil	g	125.25	133.80				
Mass of Dry Soil	g	35.04	34.45				
Mass of Moisture	g	5.29	5.38				
Moisture Content	%	15.10	15.62				15.36

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with some fine to coarse sand , dark brown, soft moist low plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N589 BH08 5.0m - 5.5m

Moisture Content	%						
Container No.	g	70	73				
Mass of Container	g	90.08	70.13				
Mass of Container + Wet Soil	g	111.45	104.85				
Mass of Container + Dry Soil	g	107.12	97.70				
Mass of Dry Soil	g	17.04	27.57				
Mass of Moisture	g	4.33	7.15				
Moisture Content	%	25.41	25.93				25.67

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: Silty fine to coarse SAND dark brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N591 BH08 8.0m - 8.3m

Moisture Content	%						
Container No.	g	62	69				
Mass of Container	g	72.22	90.26				
Mass of Container + Wet Soil	g	112.30	127.42				
Mass of Container + Dry Soil	g	103.55	119.46				
Mass of Dry Soil	g	31.33	29.20				
Mass of Moisture	g	8.75	7.96				
Moisture Content	%	27.93	27.26				27.59

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: Coarse SAND with fine to medium sub-angular to sub rounded gravel	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N593 BH08 11.0m - 11.5m

Moisture Content	%						
Container No.	g	71	85				
Mass of Container	g	86.30	88.73				
Mass of Container + Wet Soil	g	140.37	135.09				
Mass of Container + Dry Soil	g	132.52	128.84				
Mass of Dry Soil	g	46.22	40.11				
Mass of Moisture	g	7.85	6.25				
Moisture Content	%	16.98	15.58				16.28

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: Silty fine to coarse SAND, brown moist, low plasticity	**SAMPLE No.**	: N594 BH08 12.5m - 13.0m

Moisture Content	%						
Container No.	g	79	78				
Mass of Container	g	87.12	78.52				
Mass of Container + Wet Soil	g	118.20	114.70				
Mass of Container + Dry Soil	g	109.03	103.90				
Mass of Dry Soil	g	21.91	25.38				
Mass of Moisture	g	9.17	10.80				
Moisture Content	%	41.85	42.55				42.20

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: SILT with some silt stone nodules and fine sub angular gravel with trace clay, pale brown , soft to firm, low to medium plasticity, (highly to completely weathered, SILT STONE, pale brown, weak to very weak)	**SAMPLE No.**	: N595 BH08 14.0m - 14.5m

Moisture Content	%						
Container No.	g	57	59				
Mass of Container	g	63.46	63.71				
Mass of Container + Wet Soil	g	86.97	87.87				
Mass of Container + Dry Soil	g	81.89	82.84				
Mass of Dry Soil	g	18.43	19.13				
Mass of Moisture	g	5.08	5.03				
Moisture Content	%	27.56	26.29				26.93

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: Silty fine to medium sub-angular GRAVEL trace of coarse sand, brown	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N596 BH08 15.5m - 16.0m

Moisture Content	%						
Container No.	g	64	83				
Mass of Container	g	82.04	71.20				
Mass of Container + Wet Soil	g	121.56	120.50				
Mass of Container + Dry Soil	g	113.01	109.64				
Mass of Dry Soil	g	30.97	38.44				
Mass of Moisture	g	8.55	10.86				
Moisture Content	%	27.61	28.25				27.93

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand and fine sub-angular gravels and shell fragments, light brown, soft, moist, low to medium plasticity	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N597 BH07 18.5m - 19.0m

Moisture Content	%						
Container No.	g	61	56				
Mass of Container	g	62.16	62.57				
Mass of Container + Wet Soil	g	81.28	80.31				
Mass of Container + Dry Soil	g	75.93	75.18				
Mass of Dry Soil	g	13.77	12.61				
Mass of Moisture	g	5.35	5.13				
Moisture Content	%	38.85	40.68				39.77

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine to coarse sand and silt stone nodlues, grey green, stiff to hard, moist, low to medium plasticity (highly to completely weathered, SILTSTONE, grey green, weak to very weak)	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N598 BH08 21.5m - 21.9m

Moisture Content	%						
Container No.	g	1	16				
Mass of Container	g	52.73	52.76				
Mass of Container + Wet Soil	g	74.65	73.31				
Mass of Container + Dry Soil	g	69.86	68.76				
Mass of Dry Soil	g	17.13	16.00				
Mass of Moisture	g	4.79	4.55				
Moisture Content	%	27.96	28.44				28.20

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge	**TECHNOLOGIST**	: KB
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine to coarse sand and silt stone nodlues, grey green, stiff to hard, moist, low to medium plasticity (highly to completely weathered, SILTSTONE, grey green, weak	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: N599 BH08 23.0m - 23.4m

Moisture Content	%						
Container No.	g	9	3				
Mass of Container	g	53.51	52.42				
Mass of Container + Wet Soil	g	74.38	74.92				
Mass of Container + Dry Soil	g	68.74	68.94				
Mass of Dry Soil	g	15.23	16.52				
Mass of Moisture	g	5.64	5.98				
Moisture Content	%	37.03	36.20				36.62

Tested By: KB
Date: 23 October 2015

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

Approved By: IG
Date:03 Decenber 2015

Form GE-L-07

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

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	:	28 October 2015
SITE ADDRESS	:	Site 08, RHS of the Bridge	**TECHNOLOGIST**	:	IG
MATERIAL TYPE & DESCRIPTION	:	Silty fine to coarse SAND dark brown	**TEST METHOD**	:	AS 1289.6.7.3-2001
			SAMPLE No.	:	N591 (BH08 8.0m - 8.5m)

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

MOISTURE CONTENT

Container No.		9
Mass of Container	g	53.50
Mass of Container + Wet	g	72.59
Mass of Container + Dry	g	68.63
Mass of Dry Soil	g	15.13
Mass of Moisture	g	3.96
Moisture Content	%	26.17
Optimum moisture content	%	-
Laboratory moisture ratio	%	-

DENSITY

Mass of Specimen	g	1650
Volume of Speciman	cm^3	824.35
Wet Density	t/m^3	2.00
Dry Density	t/m^3	1.59
Maximum Dry Density	t/m^3	-
Laboratory Density ratio	%	-

Area of stand pipe (dia. 12mm)	mm^2	113.10
Cross sectional area of soil	cm^2	50.27
Length of soil speciman	cm	16.40

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(^{0}c)	KT cm/min	K_{20} cm/min
1	110	5.00	15	26	0.009	0.008
2	110	5.00	15	26	0.009	0.008
3	110	5.00	15	26	0.009	0.008
4	104	5.00	14	26	0.009	0.008
5	104	5.00	14	26	0.009	0.008
6	104	5.00	14	26	0.009	0.008
7	98	5.00	14	26	0.009	0.008
8	98	5.00	14	26	0.009	0.008
9	98	5.00	14	26	0.009	0.008
10	94	5.00	14	26	0.010	0.009
11	94	5.00	13	26	0.009	0.008
12	94	5.00	14	26	0.010	0.009

Average K_{20} m/s	1.35E-06

Tested By: IG
Date: 28 October 2015

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

Approved By: IG
Date: 03 December 2015

Form: GE-L-03

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	24 October 2015
SITE ADDRESS	:	Site 08, RHS of the Bridge.	**TECHNOLOGIST**	:	KB
SAMPLE LOCATION	:	BH 08 6.5-7.0m	**MATERIAL TYPE**	:	SILT with coarse sand trace of root fibre, dark brown, stiff, low to medium plasticity
TEST NUMBER	:	N590			

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

Moisture Content	Container No.	-	92
	Mass of Container	g	91.39
	Mass of Container + Wet Soil	g	506.85
	Mass of Container + Dry Soil	g	429.63
	Mass of Dry Soil	g	338.24
	Mass of Moisture	g	77.22
	Moisture Content	%	22.83

Bulk Density	Sample No.	-	N590
	Diameter of Specimen	mm	53.67
	Initial area of specimen Ao (π/4 d^2)	mm^2	2261.17
	Initial length of specimen Lo	mm	104.00
	Initial mass of specimen Mi	g	426.64
	Bulk Density ρ	t/m^3	1.81
	Dry Density ρd	t/m^3	1.48

Compression Gauge Reading	**Load Gauge Reading**	**Load**	**Strain $\varepsilon = \frac{Cn - Co}{Lo}$**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference $\sigma 1 - \sigma 3 = 1000P/A$**
mm		(kN)	%	m^2	kPa
0.00	0	0	0.000	0.002261	0.00
0.50	14	0.0281	0.481	0.002272	12.37
1.00	27.0	0.0542	0.962	0.002283	23.74
1.50	41.0	0.0843	1.442	0.002294	36.74
2.00	56.0	0.1124	1.923	0.002306	48.75
2.50	74.0	0.1485	2.404	0.002317	64.10
3.00	97.0	0.1947	2.885	0.002328	83.62
3.50	127.0	0.2550	3.365	0.002340	108.98
4.00	164.0	0.3293	3.846	0.002352	140.03
4.50	184.0	0.3694	4.327	0.002363	156.30
5.00	200.0	0.4016	4.808	0.002375	169.07
5.50	284.0	0.5691	5.288	0.002387	238.37
6.00	317.0	0.6343	5.769	0.002400	264.33

Form GE-L-10

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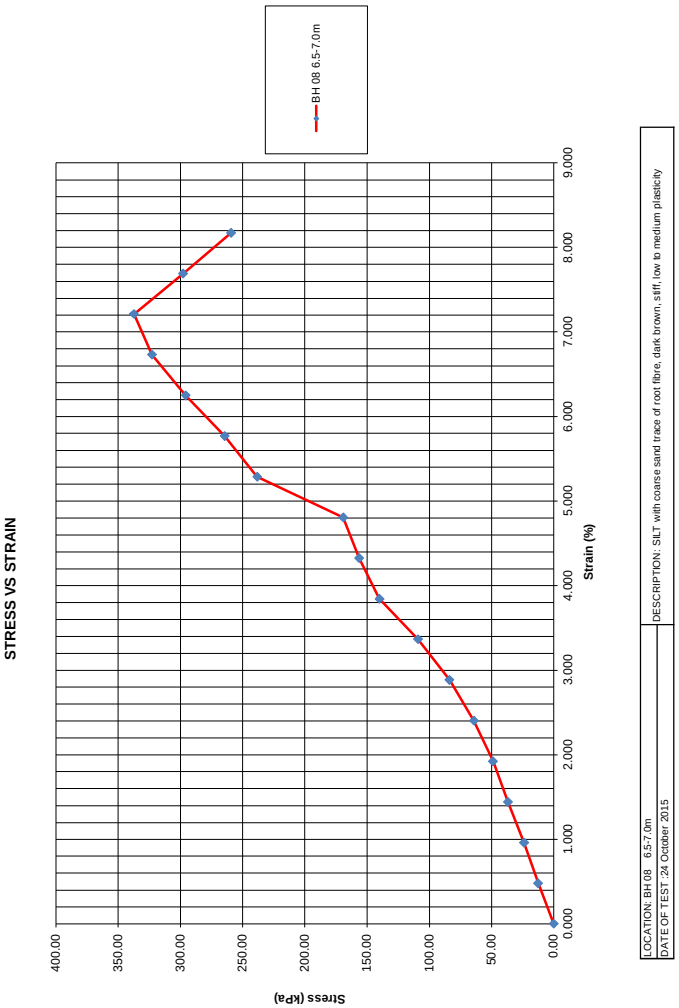
STRESS VS STRAIN



DESCRIPTION: SILT with coarse sand trace of root fibre, dark brown, stiff, low to medium plasticity

LOCATION: BH 08 6.5-7.0m
DATE OF TEST :24 October 2015

Form GE-L-10

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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 /**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge.	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH08 2.0-2.5m	**MATERIAL TYPE & LOCATION**	: CONCRETE with coarse gravel
TEST NUMBER	: N588		

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

Moisture Content (Material passing 19mm)	Container No.	-	13	14	SPLIT SAMPLE
	Mass of Container	g	52.90	53.57	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	77.13	75.84	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	71.98	71.31	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	19.08	17.74	
	Mass of Moisture	g	5.15	4.53	
	Moisture Content	%	26.99	25.54	
	Average Moisture Content	%	26.26		

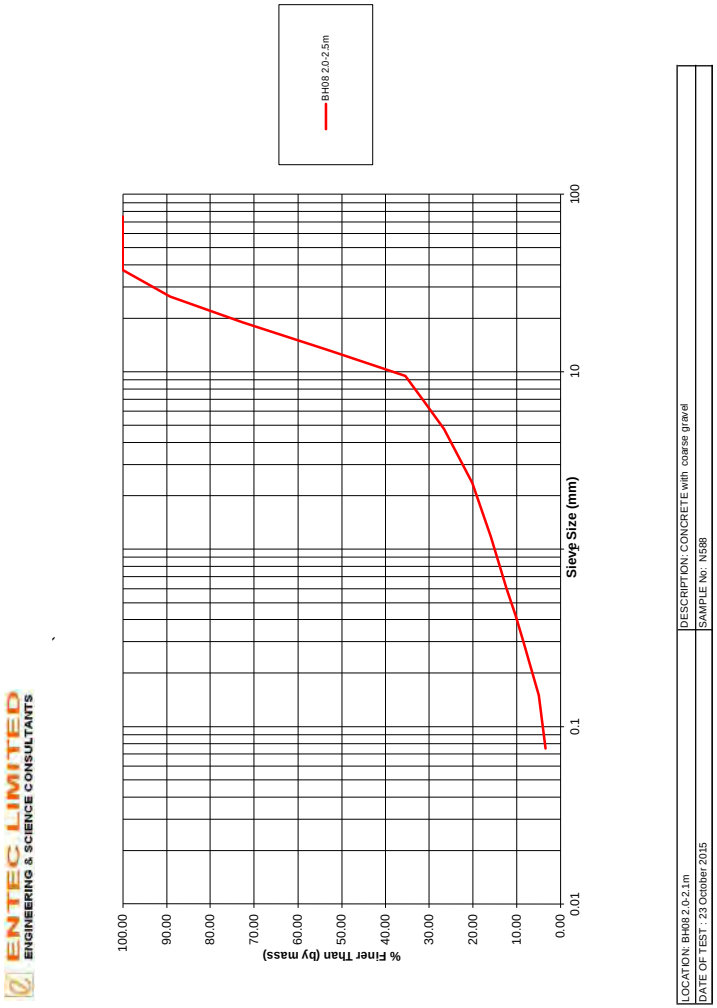
Total Mass of Dry Sample			
Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
Total Wet Weight (M_w)	g	228.67
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	181.11

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm	19.41	N/A	10.72	89.28		300
19.0mm	30.29	N/A	16.73	72.56		200
13.2 mm	35.47	N/A	19.59	52.97	600	300
9.50 mm	31.83	N/A	17.58	35.40	450	300
6.70 mm	7.98	N/A	4.41	30.99	300	300
4.75 mm	7.99	N/A	4.41	26.58	250	200
2.36 mm	11.68	N/A	6.45	20.13	150	200
1.18 mm	7.66	N/A	4.23	15.90	100	200
600 µm	6.38	N/A	3.52	12.38	80	200
425 µm	3.71	N/A	2.05	10.33	70	200
300 µm	3.40	N/A	1.88	8.45	60	200
150 µm	6.25	N/A	3.45	5.00	40	200
75 µm	2.78	N/A	1.54	3.46	25	200
Passing 75 µm	6.28	N/A	3.46	0.00	-	-
Pan Total	181.11	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 23 October 2015	Date : 03 December 2015	Date : 03 December 2015

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 /**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge.	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH08 5.0-5.5m	**MATERIAL TYPE & LOCATION**	: SILT with some fine to coarse sand , dark brown, soft moist low plasticity
TEST NUMBER	: N589		

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

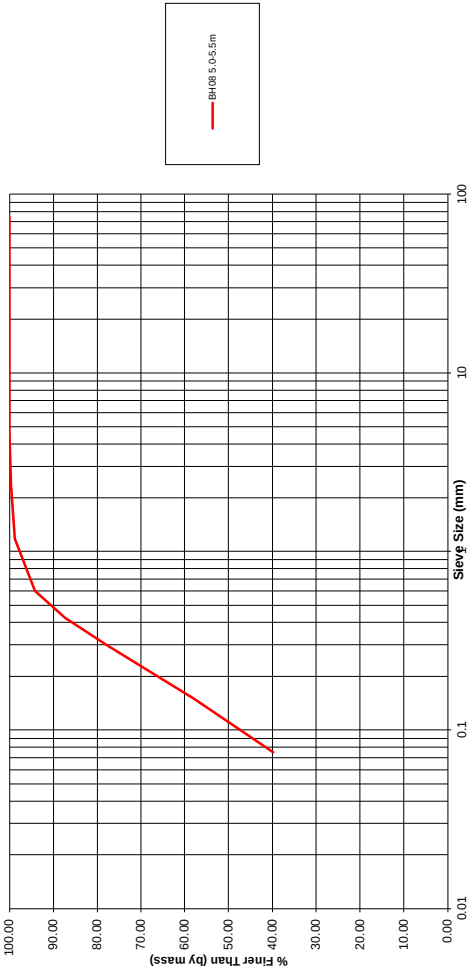
Moisture Content (Material passing 19mm)	Container No.	-	115	168	SPLIT SAMPLE
	Mass of Container	g	11.74	11.55	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	21.44	21.45	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	19.28	19.25	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	7.54	7.70	
	Mass of Moisture	g	2.16	2.20	
	Moisture Content	%	28.65	28.57	
	Average Moisture Content	%	28.61		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	266.03
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	206.85

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		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	0.65	N/A	0.31	99.69	150	200
1.18 mm	1.86	N/A	0.90	98.79	100	200
600 µm	9.54	N/A	4.61	94.17	80	200
425 µm	14.01	N/A	6.77	87.40	70	200
300 µm	19.76	N/A	9.55	77.85	60	200
150 µm	41.30	N/A	19.97	57.88	40	200
75 µm	37.29	N/A	18.03	39.86	25	200
Passing 75 µm	82.44	N/A	39.86	0.00	-	-
Pan Total	206.85	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 23 October 2015	Date : 03 December 2015	Date : 03 December 2015



DESCRIPTION SILT with some fine to coarse sand , dark brown, soft moist low plasticity
SAMPLE No: N589

LOCATION: BH08 5.0-5.5m
DATE OF TEST : 23 October 2015

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Wet Sieve Analysis
(NZS 4407:1991 (Test 3.8.1

PRINCIPAL	: Japan International Cooperation Agency	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge.	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH08 8.0-8.3m	**MATERIAL TYPE & LOCATION**	: Silty fine to coarse SAND dark brown
TEST NUMBER	: N591		

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

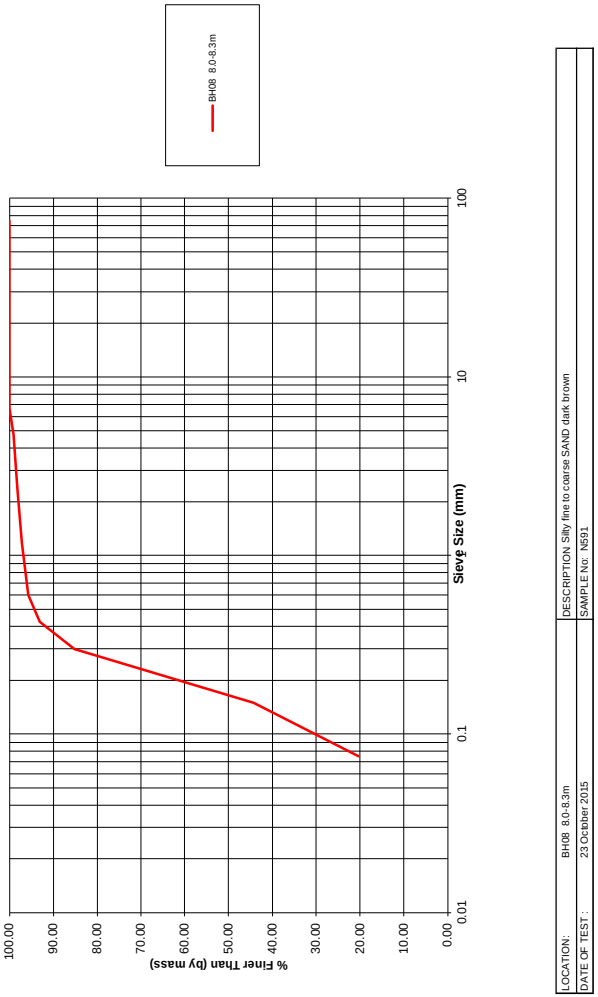
Moisture Content (Material passing 19mm)	Container No.	-	62	69	SPLIT SAMPLE
	Mass of Container	g	72.22	90.26	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	112.30	127.42	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	103.55	119.46	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	31.33	29.20	
	Mass of Moisture	g	8.75	7.96	
	Moisture Content	%	27.93	27.26	
	Average Moisture Content	%	27.59		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	255.80
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	200.48

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm	1.84	N/A	0.92	99.08	250	200
2.36 mm	1.76	N/A	0.88	98.20	150	200
1.18 mm	2.12	N/A	1.06	97.15	100	200
600 µm	2.95	N/A	1.47	95.68	80	200
425 µm	5.03	N/A	2.51	93.17	70	200
300 µm	15.96	N/A	7.96	85.21	60	200
150 µm	82.12	N/A	40.96	44.24	40	200
75 µm	47.97	N/A	23.93	20.32	25	200
Passing 75 µm	40.73	N/A	20.32	0.00	-	-
Pan Total	200.48	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 23 October 2015	Date : 03 December 2015	Date : 03 December 2015



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Wet Sieve Analysis
(NZS 4407:1991 (Test 3.8.1

PRINCIPAL	: Japan International Cooperation Agency	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge.	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH08 9.5-10.0m	**MATERIAL TYPE & LOCATION**	: Medium to coarse SAND with some coarse sub-angular to sub-rounded gravel
TEST NUMBER	: N592		

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

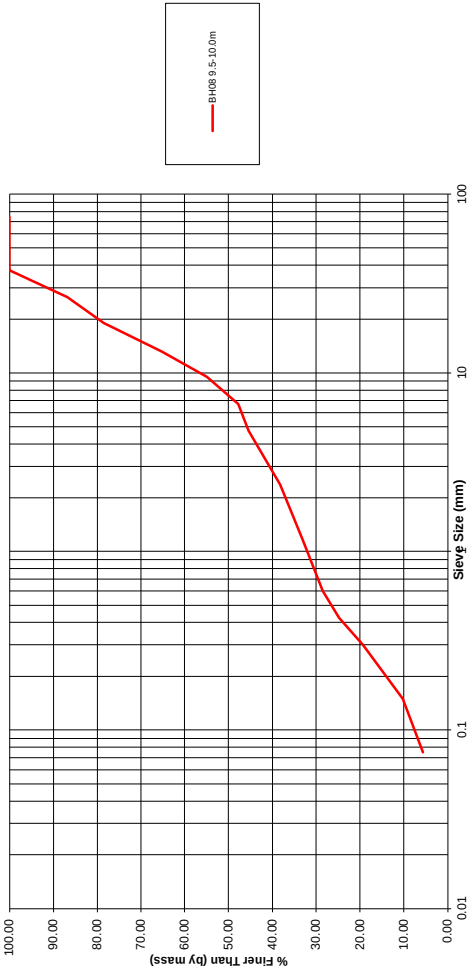
Moisture Content (Material passing 19mm)	Container No.	-	131	139	SPLIT SAMPLE
	Mass of Container	g	11.65	11.33	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	27.16	27.83	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	24.90	25.58	Spliting Factor = M_3 / M_4
	Mass of Dry Soil	g	13.25	14.25	
	Mass of Moisture	g	2.26	2.25	
	Moisture Content	%	17.06	15.79	
	Average Moisture Content	%	16.42		

Total Mass of Dry Sample	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	383.51
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	329.41

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm	43.35	N/A	13.16	86.84		300
19.0mm	27.75	N/A	8.42	78.42		200
13.2 mm	43.58	N/A	13.23	65.19	600	300
9.50 mm	33.67	N/A	10.22	54.97	450	300
6.70 mm	23.57	N/A	7.16	47.81	300	300
4.75 mm	7.76	N/A	2.36	45.45	250	200
2.36 mm	23.87	N/A	7.25	38.21	150	200
1.18 mm	16.54	N/A	5.02	33.19	100	200
600 µm	15.40	N/A	4.68	28.51	80	200
425 µm	12.21	N/A	3.71	24.81	70	200
300 µm	18.03	N/A	5.47	19.33	60	200
150 µm	30.12	N/A	9.14	10.19	40	200
75 µm	15.12	N/A	4.59	5.60	25	200
Passing 75 µm	18.44	N/A	5.60	0.00	-	-
Pan Total	329.41	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 23 October 2015	Date :03 December 2015	Date :03 December 2015



LOCATION: BH08 9.5-10.0m
DATE OF TEST: 23 October 2015
DESCRIPTION Medium to coarse SAND with some coarse sub-angular to sub-rounded gravel
SAMPLE No: N592

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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 /**	: 23 October 2015
SITE ADDRESS	: Site 08, RHS of the Bridge.	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH08 11.0-11.5m	**MATERIAL TYPE & LOCATION**	: Coarse SAND with fine to medium sub-angular to sub rounded gravel
TEST NUMBER	: N593		

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

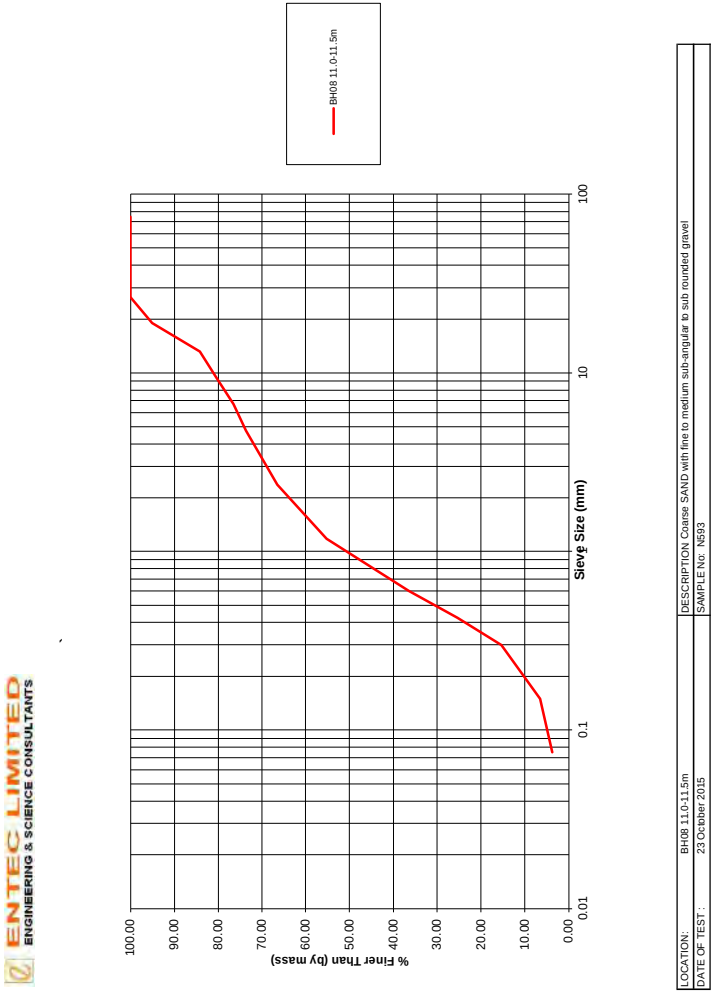
Moisture Content (Material passing 19mm)	Container No.	-	142	148	SPLIT SAMPLE
	Mass of Container	g	11.82	11.74	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	24.53	24.05	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	22.64	22.02	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	10.82	10.28	
	Mass of Moisture	g	1.89	2.03	
	Moisture Content	%	17.47	19.75	
	Average Moisture Content	%	18.61		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	286.06
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	241.18

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm	11.81	N/A	4.90	95.10		200
13.2 mm	26.40	N/A	10.95	84.16	600	300
9.50 mm	8.70	N/A	3.61	80.55	450	300
6.70 mm	9.68	N/A	4.01	76.54	300	300
4.75 mm	6.88	N/A	2.85	73.68	250	200
2.36 mm	17.22	N/A	7.14	66.54	150	200
1.18 mm	27.43	N/A	11.37	55.17	100	200
600 µm	45.17	N/A	18.73	36.44	80	200
425 µm	26.74	N/A	11.09	25.36	70	200
300 µm	24.08	N/A	9.98	15.37	60	200
150 µm	21.34	N/A	8.85	6.52	40	200
75 µm	6.94	N/A	2.88	3.65	25	200
Passing 75 µm	8.79	N/A	3.65	0.00	-	-
Pan Total	241.18	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 23 October 2015	Date : 03 December 2015	Date : 03 December 2015



DESCRIPTION Coarse SAND with fine to medium sub-angular to sub rounded gravel
SAMPLE No: N593
LOCATION: BH08 11.0-11.5m
DATE OF TEST : 23 October 2015

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Wet Sieve Analysis
(NZS 4407:1991 (Test 3.8.1

PRINCIPAL	: Japan International Cooperation Agency	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	: 23 October 2015
SITE ADDRESS	: Site 08, Old Queens Road Bridge - Right Bank	**TECHNOLOGIST**	: RK
SAMPLE LOCATION	: BH08 15.5-16.0m	**MATERIAL TYPE & LOCATION**	: Silty fine to medium sub-angular GRAVEL trace of coarse sand, brown
TEST NUMBER	: N596		

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

Moisture Content (Material passing 19mm)	Container No.	-	118	129	SPLIT SAMPLE
	Mass of Container	g	11.76	11.55	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	19.71	19.35	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	18.05	17.64	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	6.29	6.09	
	Mass of Moisture	g	1.66	1.71	
	Moisture Content	%	26.39	28.08	
	Average Moisture Content	%	27.23		

Total Mass of Dry Sample			
	Mass of dry sample retained on 19mm test sieve (M_1)	g	Nil
	Total Wet Weight (M_w)	g	401.70
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	315.72

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm	52.22	N/A	16.54	83.46		300
19.0mm		N/A	0.00	83.46		200
13.2 mm	39.99	N/A	12.67	70.79	600	300
9.50 mm	19.52	N/A	6.18	64.61	450	300
6.70 mm	21.53	N/A	6.82	57.79	300	300
4.75 mm	18.92	N/A	5.99	51.80	250	200
2.36 mm	38.11	N/A	12.07	39.73	150	200
1.18 mm	28.43	N/A	9.00	30.72	100	200
600 µm	22.92	N/A	7.26	23.46	80	200
425 µm	9.40	N/A	2.98	20.49	70	200
300 µm	8.69	N/A	2.75	17.73	60	200
150 µm	12.26	N/A	3.88	13.85	40	200
75 µm	9.60	N/A	3.04	10.81	25	200
Passing 75 µm	34.13	N/A	10.81	0.00	-	-
Pan Total	315.72	-	100.00	-	-	-

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

Tested by : RK	Q.A. Checked by : KB	Approved by : IG
Date : 23 October 2015	Date : 03 December 2015	Date : 03 December 2015

Oedometer Settlement Test

Sample Details

sketch showing specimen location in original sample

Depth			6.5 - 7.0m
Description			
Type			Silt with coarse sand trace of root fibre, dark brown,stiff,low to medium
Initial Height	L_0	(mm)	20.0
Initial Diameter	D_0	(mm)	50.0
Initial Weight	W_0	(gr)	60.5
Bulk Density	ρ_0	(Mg/m3)	1.54
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	30
Initial Dry Density	ρ_{di}	(Mg/m3)	1.19
Initial Voids Ratio	e_i	.	1.228
Initial Degree of Saturation	S_i	(%)	63.7
Initial Swelling	S_s	(kPa)	0

Final Conditions

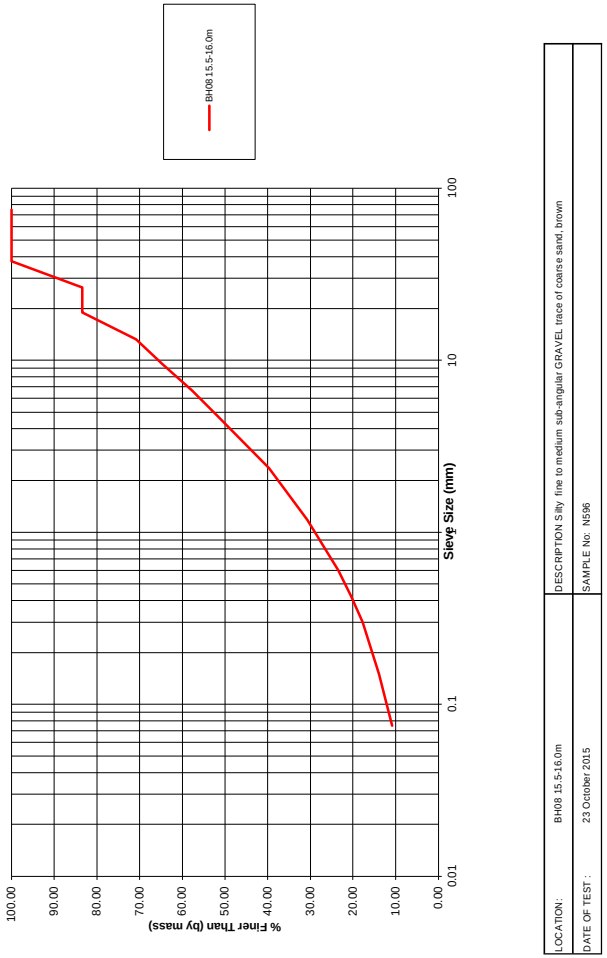
Final Moisture	ω_f%	(%)	27
Dry Density	ρ_{df}	(Mg/m3)	1.43
Voids Ratio	e_f	.	0.858
Saturation	S_f	(%)	84
Height Settlement	ΔL_s	(mm)	3.323

Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_V (m2/year)	Compressibility m_V (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
50	1.230	-0.022	5556.1	0.022	29.0	0.0		0.008	0.0087
100	0.858	3.323	144.9	3.341	29.0	0.0		0.258	0.0087
200	0.858	3.323	64.2		29.0	0.0		0.481	0.0087
400	0.858	3.323	109.5		29.0	0.0		0.282	0.0087
800	0.858	3.323	109.5		29.0	0.0		0.282	0.0087
1600	0.858	3.323	72.3		29.0	0.0		0.427	0.0087
400	0.858	3.323			29.0	0.0			
100	0.858	3.323			29.0	0.0			

Notes

Test Method	AS 1289.6.6.1-1998	Test Name	ODO-09_006
		Database:	.\SQLEXPRESS \ ENTEC
Site Reference	1920815	Test Date	11/27/2015
Jobfile	Geotechnical Engineering	Sample	N590
Client	Japan International Cooperation	Borehole	BH08
Operator	IG/MK	Checked	DMC
		Approved	DMC

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



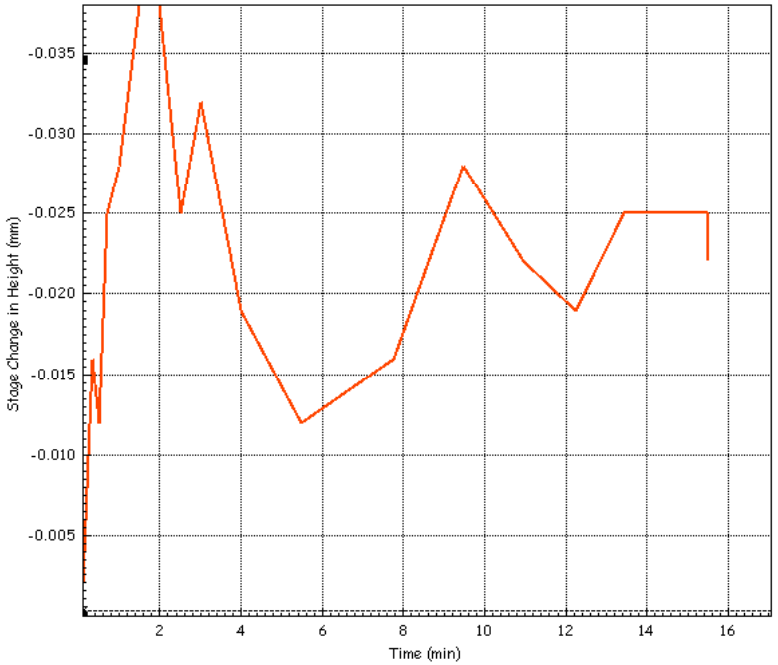
LOCATION: BH08 15.5-16.0m
DATE OF TEST : 23 October 2015
DESCRIPTION Silty fine to medium sub-angular GRAVEL trace of coarse sand, brown
SAMPLE No: N596

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Form GE-L-06

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	50
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-0.022
Voids Ratio	e_f	.	1.033
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.008
Consolidation	C_V	(m2/year)	4805.9
Compressibility	m_V	(m2/MN)	0.024
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

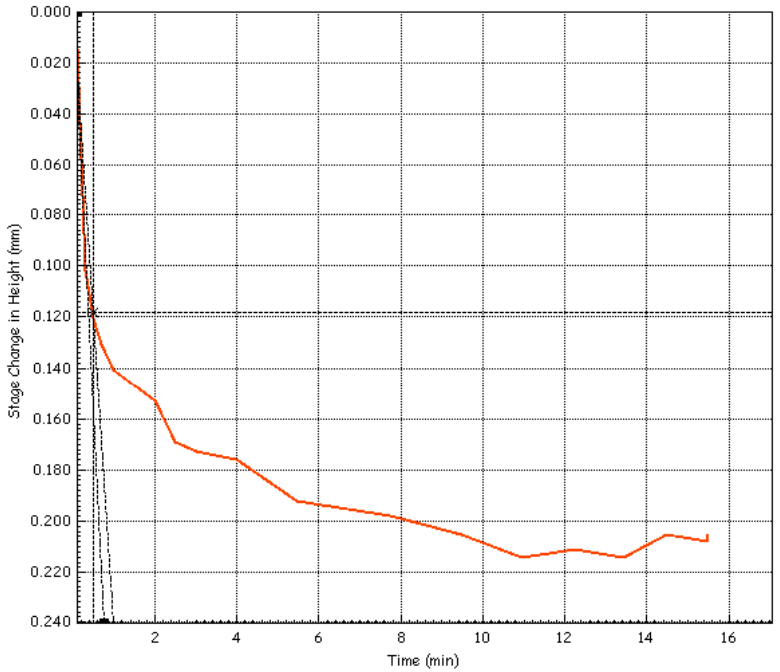


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-09_006
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/27/2015
Jobfile	Geotechnical Engineering	Sample	N590
Client	Japan International Cooperation	Borehole	BH08
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.164
Voids Ratio	e_f	.	0.794
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.258
Consolidation	C_V	(m2/year)	132.2
Compressibility	m_V	(m2/MN)	2.348
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

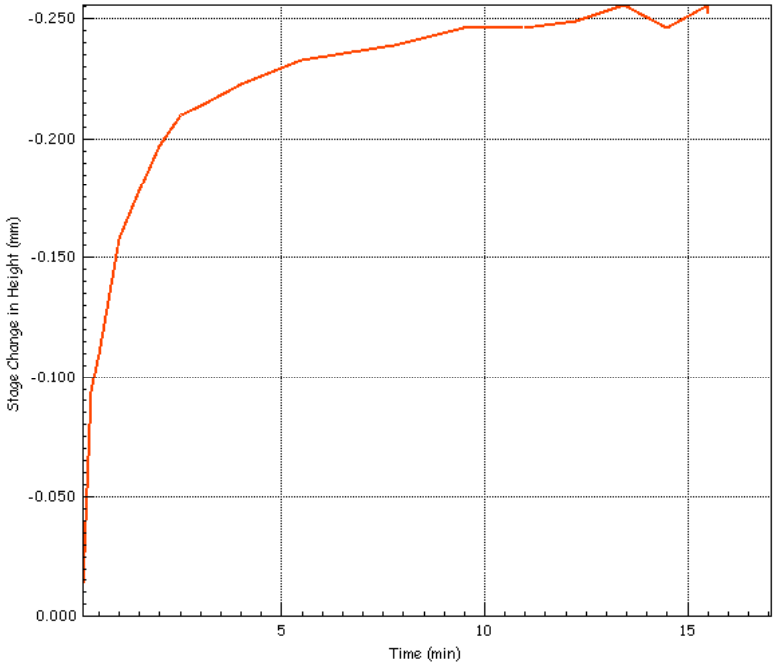


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-09_006
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/27/2015
Jobfile	Geotechnical Engineering	Sample	N590
Client	Japan International Cooperation	Borehole	BH08
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.171
Voids Ratio	e_f	.	0.794
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	



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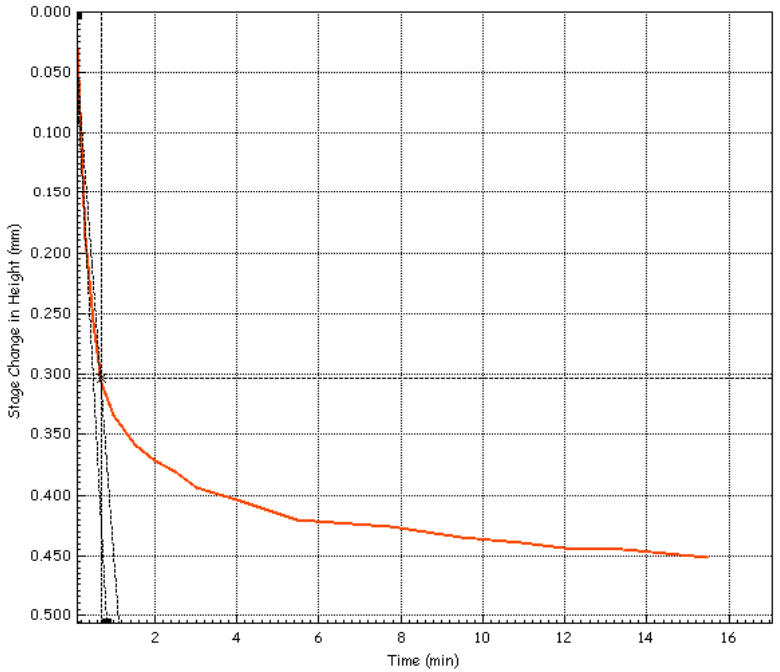
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/27/2015
Jobfile	Geotechnical Engineering	Sample	N590
Client	Japan International Cooperation	Borehole	BH08
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.161
Voids Ratio	e_f	.	0.795
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.481
Consolidation	C_V	(m2/year)	62.4
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



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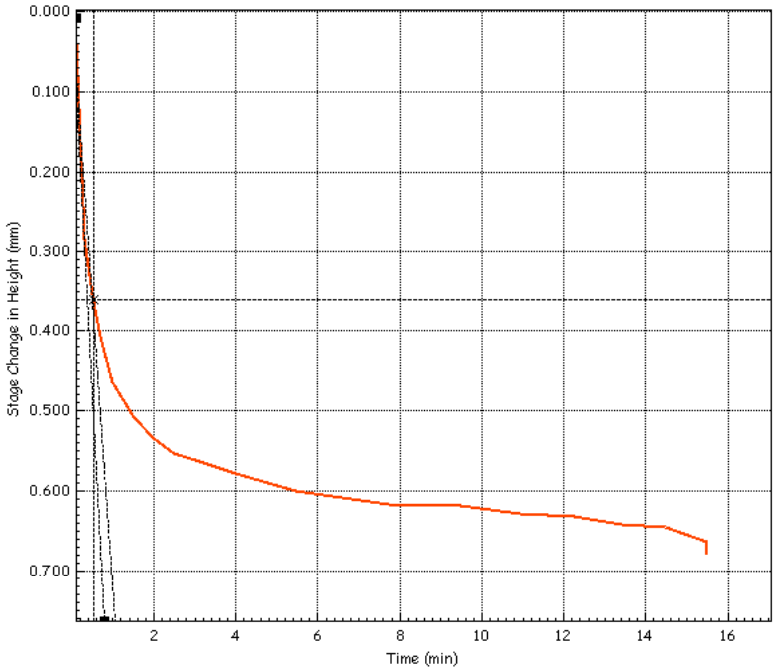
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/27/2015
Jobfile	Geotechnical Engineering	Sample	N590
Client	Japan International Cooperation	Borehole	BH08
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.161
Voids Ratio	e_f	.	0.795
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.282
Consolidation	C_V	(m2/year)	106.4
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



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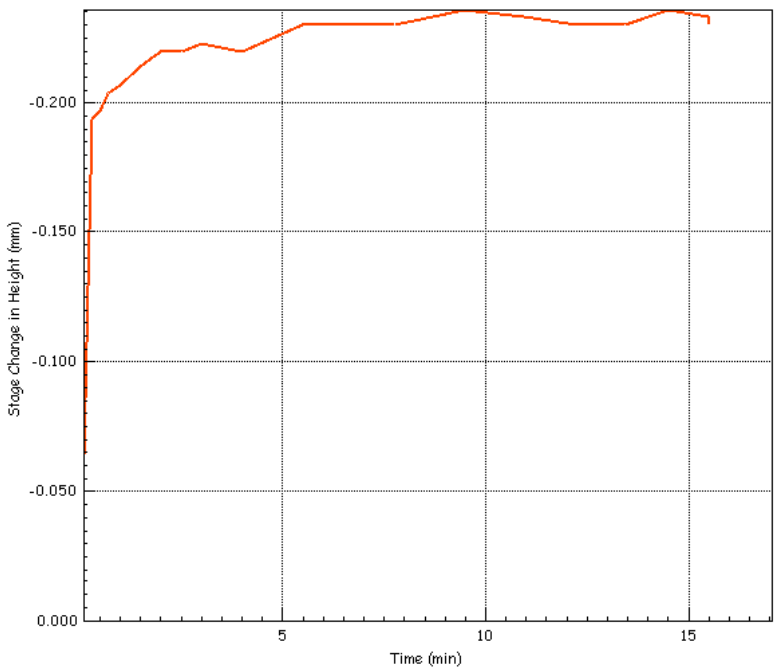
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/27/2015
Jobfile	Geotechnical Engineering	Sample	N590
Client	Japan International Cooperation	Borehole	BH08
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.164
Voids Ratio	e_f	.	0.794
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	



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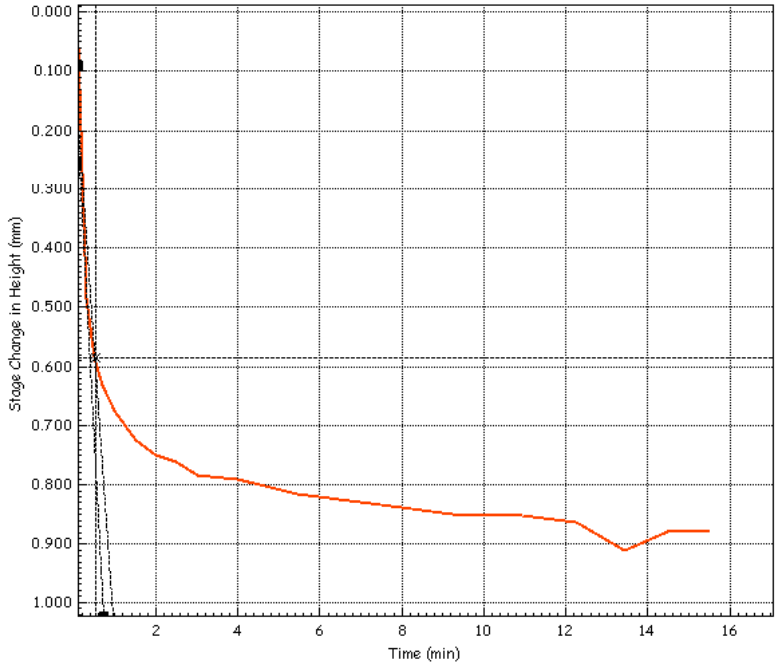
Site Reference	1920815	Test Date	11/27/2015
Jobfile	Geotechnical Engineering	Sample	N590
Client	Japan International Cooperation	Borehole	BH08
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	800
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.164
Voids Ratio	e_f	.	0.794
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.282
Consolidation	C_V	(m2/year)	106.3
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



Test Method	AS 1289.6.6.1-1998	Test Name	ODO-09_006
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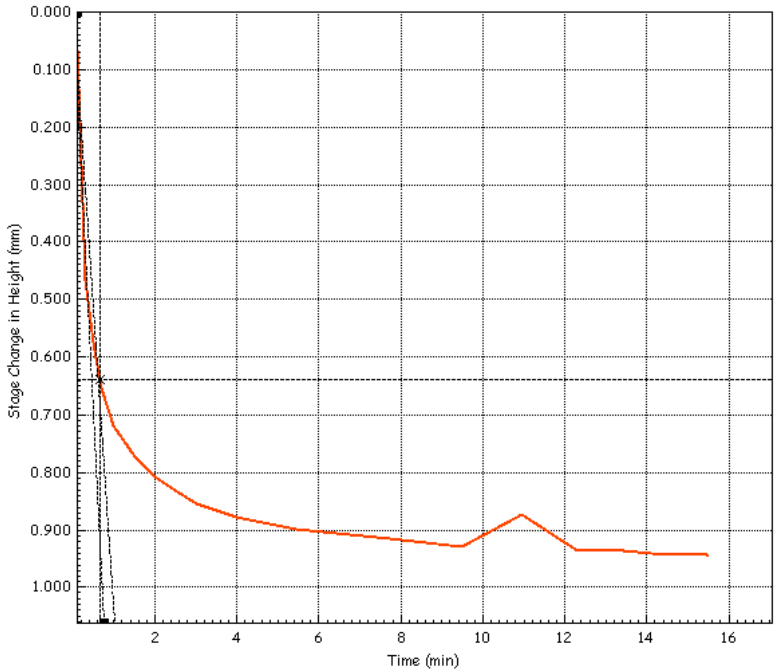
Site Reference	1920815	Test Date	11/27/2015
Jobfile	Geotechnical Engineering	Sample	N590
Client	Japan International Cooperation	Borehole	BH08
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	1600
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.168
Voids Ratio	e_f	.	0.794
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.427
Consolidation	C_V	(m2/year)	70.2
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



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Site Reference	1920815	Test Date	11/27/2015
Jobfile	Geotechnical Engineering	Sample	N590
Client	Japan International Cooperation	Borehole	BH08
Operator	IG/MK	Checked	DMC
Approved	DMC		

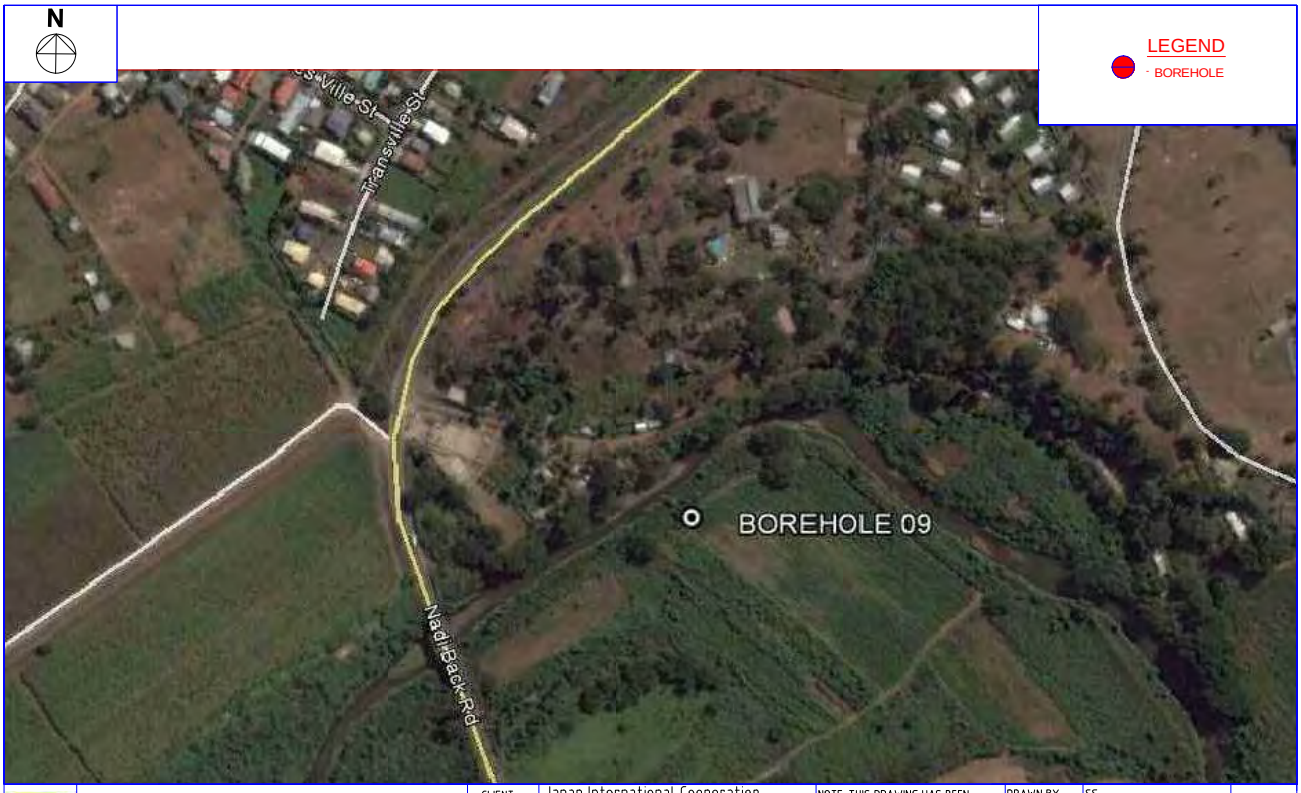
Entec Limited, Level 2 Mid CIty, Cnr Cumming Street & Renwick Road, Suva

APPENDIX 9

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

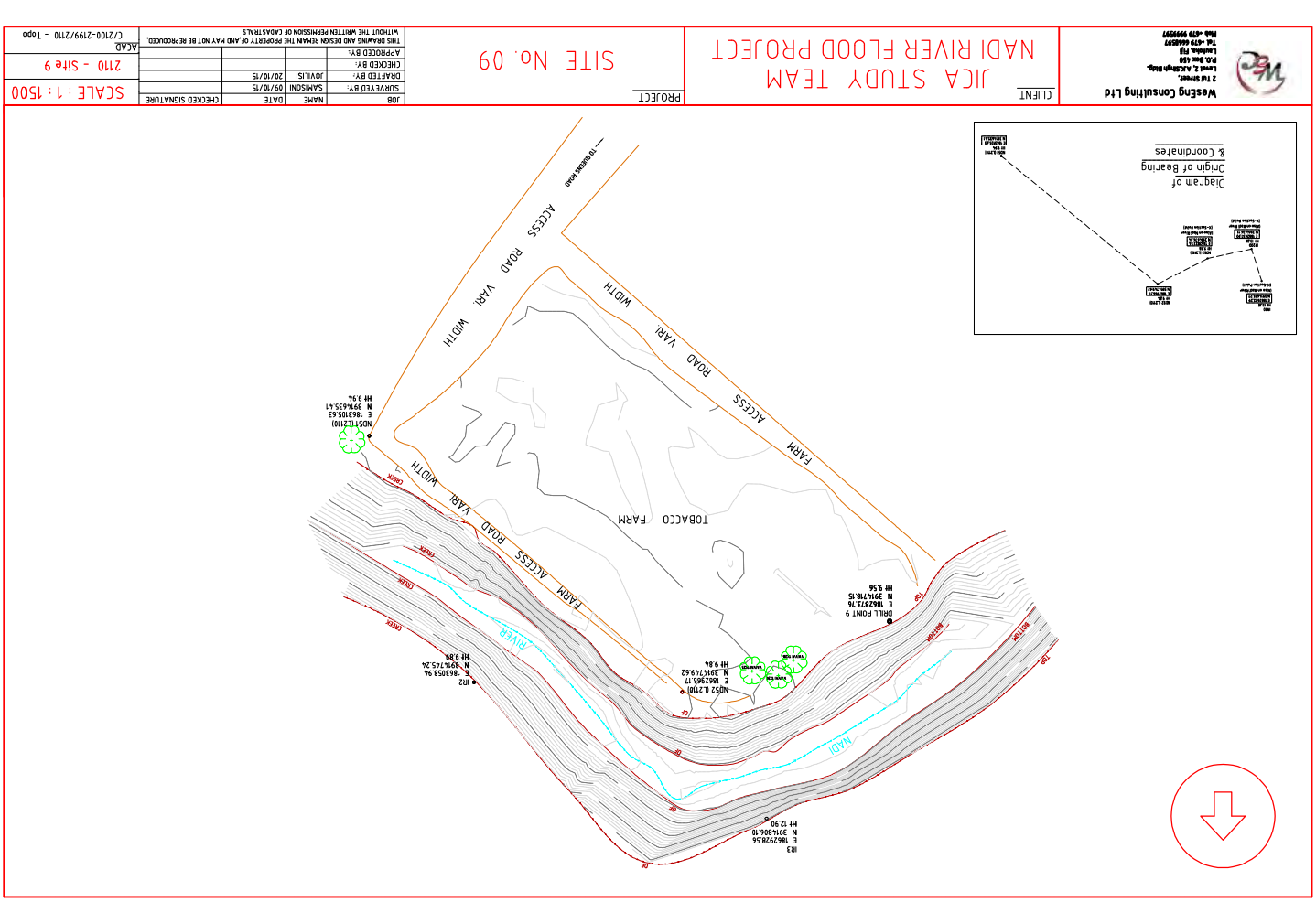
APPENDIX 9a

Test Locality Plan



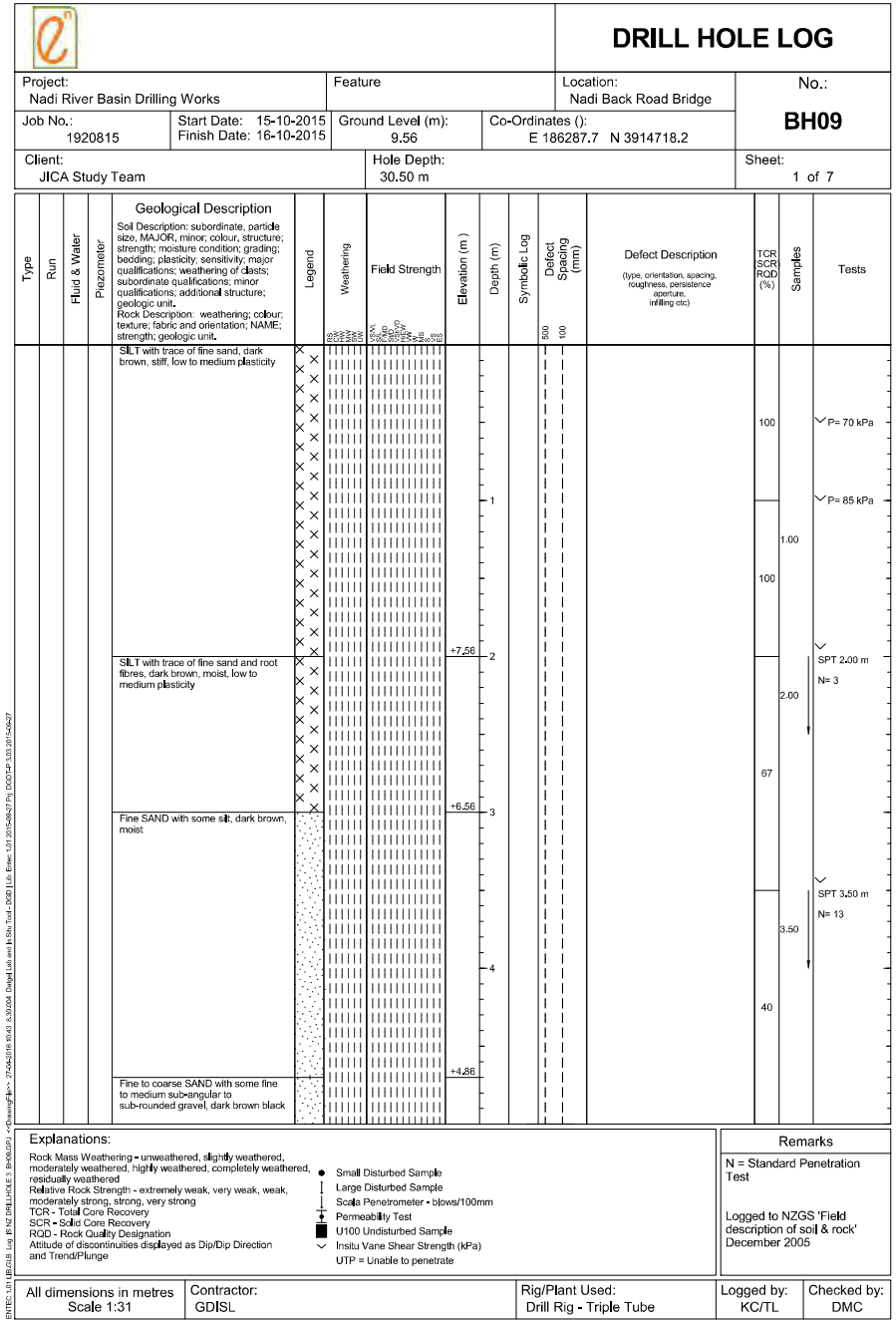
ENTEC LIMITED ENGINEERING AND SCIENCE CONSULTANTS				CLIENT:	Japan International Cooperation Agency (JICA)	NOTE: THIS DRAWING HAS BEEN REPRODUCED BY ENTEC TO SHOW THE APPROXIMATE BOREHOLE LOCATION.	DRAWN BY	SS	A3
							CHECKED BY	KC	
Level 2, Mid City Plaza Cnr. Cumming St & Renwick Road P.O Box 12309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

D15-275



APPENDIX 2

Engineering Borehole Log and Core Photos



DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Back Road Bridge	No.: BH09
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: 1 of 7

Depth (m)	Elevation (m)	Geological Description	Tests
0		SILT with trace of fine sand, dark brown, stiff, low to medium plasticity	P= 70 kPa; P= 85 kPa
1	+7.56	SILT with trace of fine sand and root fibres, dark brown, moist, low to medium plasticity	SPT 2.00 m N= 3
2	+6.56	Fine SAND with some silt, dark brown, moist	SPT 3.50 m N= 13
3	+4.86	Fine to coarse SAND with some fine to medium sub-angular to sub-rounded gravel, dark brown black	
4			

TCR / SCR / RQD (%)	Samples
100	1.00
100	
67	2.00
40	3.50

Explanations:

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

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

Remarks: N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Back Road Bridge	No.: BH09
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: 2 of 7

Geological Description	Elevation (m)	Depth (m)	TCR (%)	Samples	Tests
Fine to coarse SAND with some fine to medium sub-angular to sub-rounded gravel, dark brown black *(continued)*	+3.06	6.50	40	5.00	SPT 5.00 m N= 24
NO CORE	+1.56	8.00	0	6.50	SPT 6.50 m N= 9
Fine to medium sub-angular to sub-rounded GRAVEL with minor coarse sand, grey pale brown	+0.06	9.50	27	8.00	SPT 8.00 m N= 17
Coarse SAND with trace of medium sub-angular gravel, grey pale brown			13	9.50	SPT 9.50 m N= 26

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

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

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

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

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

DRILL HOLE LOG

Project: Nadi River Basin Drilling Works	Feature	Location: Nadi Back Road Bridge	No.: BH09
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: 3 of 7

Geological Description	Elevation (m)	Depth (m)	TCR (%)	Samples	Tests
Coarse SAND with trace of medium sub-angular gravel, grey pale brown *(continued)*	-1.44	11.00	13		
Fine to medium sub-angular to sub-rounded GRAVEL with trace of coarse sand, grey	-2.94	12.50	27	11.00	SPT 11.00 m N= 19
SILT with some coarse sand and minor fine to medium sub-angular gravel and trace of root fibres, dark grey black, soft, low plasticity	-3.44	13.00		12.50	SPT 12.50 m N= 25
Fine to medium sub-angular to sub-rounded GRAVEL with trace of coarse sand	-4.44	14.00	20		
SILT with some fine sand and minor fine sub-angular gravel and trace of shell fragments, grey, soft, moist, low to medium plasticity	-4.94	14.50	40	14.00	SPT 14.00 m N= 14
Fine to medium sub-angular GRAVEL, grey pale brown	-5.24				

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

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

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Nadi Back Road Bridge	**BH09**

Job No.:	Start Date: / Finish Date:	Ground Level (m):	Co-Ordinates ():	
1920815	15-10-2015 / 16-10-2015	9.56	E 186287.7 N 3914718.2	

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	4 of 7

Type	Run	Fluid & Water	Piezometer	Geological Description	Legend	Weathering	Field Strength	Elevation (m)	Depth (m)	Symbolic Log	Defect Spacing (mm)	Defect Description	TCR SCR RQD (%)	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)*									40		
				SILT with some fine sand and minor shell fragments, grey, soft to firm, moist, low to medium plasticity				-5.94							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.				-6.44	16				100		P= 280 kPa
									17						P= 300 kPa SPT 17.00 m N= 30
									18				30		P= 128 kPa P= 230 kPa
								-9.44	19						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)									93		P= 300 kPa

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project:	Feature	Location:	No.:
Nadi River Basin Drilling Works		Nadi Back Road Bridge	**BH09**

Job No.:	Start Date: / Finish Date:	Ground Level (m):	Co-Ordinates ():	
1920815	15-10-2015 / 16-10-2015	9.56	E 186287.7 N 3914718.2	

Client:	Hole Depth:	Sheet:
JICA Study Team	30.50 m	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 RQD (%)	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) *(continued)*											SHP=2800 kPa
														20.00	N= 50
								-11.14							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)									87		P= 300 kPa
									21						P= 300 kPa
														21.50	SPT 21.50 m N= 45
									22				100		P= 300 kPa
									23						P= 300 kPa P= 145 kPa
															P= 125 kPa SPT 23.50 m N= 30
									24				100	23.50	P= 100 kPa
													93	24.50	SPT 24.50 m N= 39

Explanations:

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

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

Remarks

N = Standard Penetration Test

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

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

DRILL HOLE LOG

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	**BH09**
Client: JICA Study Team	Hole Depth: 30.50 m		Sheet: 6 of 7

Column headings: Type | Run | Fluid & Water | Piezometer | Geological Description | Legend | Weathering (RS CW HW MW SW UW) | Field Strength (VS/VL S/L F/MD St/D VSt/VD H/EW VW W MS S VS ES) | Elevation (m) | Depth (m) | Symbolic Log | Defect Spacing (mm) (500, 100) | Defect Description (type, orientation, spacing, roughness, persistence aperture, infilling etc) | TCR (SCR) RQD (%) | Samples | Tests

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

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	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)*	-16.14		93		P= 280 kPa
Coarse SAND with some silt and shell fragments, dark grey	-16.44	26			
Clayey SILT with some coarse sand and trace of shell fragmemts, grey pale brown, stiff, low to medium plasticity	-17.34		87	26.00	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	-20.04	27, 28, 29	100, 100	27.50, 29.00	P= 300 kPa; P= 170 kPa; SPT 27.50 m N= 50; P= 300 kPa; P= 300 kPa; P= 175 kPa; SPT 29.00 m N= 39; P= 263 kPa

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

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

Remarks
N = Standard Penetration Test

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

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

DRILL HOLE LOG

Project: 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	**BH09**
Client: JICA Study Team	Hole Depth: 30.50 m		Sheet: 7 of 7

Geological Description	Elevation (m)	Depth (m)	TCR (SCR) RQD (%)	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)*	-20.94		100		P= 165 kPa
Hole Terminated at 30.50 m N = Standard Penetration Test Logged to NZGS 'Field description of soil & rock' December 2005		31, 32, 33, 34		30.50	SPT 30.50 m N= 38

Explanations:
Rock Mass Weathering - unweathered, slightly weathered, moderately weathered, highly weathered, completely weathered, residually weathered
Relative Rock Strength - extremely weak, very weak, weak, moderately strong, strong, very strong
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation
Attitude of discontinuities displayed as Dip/Dip Direction and Trend/Plunge
Small Disturbed Sample; Large Disturbed Sample; Scala Penetrometer - blows/100mm; Permeability Test; U100 Undisturbed Sample; Insitu Vane Shear Strength (kPa); UTP = Unable to penetrate
Remarks
N = Standard Penetration Test
Logged to NZGS 'Field description of soil & rock' December 2005

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

Borehole 9 Core Photos (0.00m to 31.50m)

0.00m to 3.50m

3.50m to 12.50m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 9, Nadi Back Road Tobacco Farm, Nadi, Fiji.

12.50m to 17.00m

17.00m to 20.00m

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1920815.09

20.00m to 22.30m

22.30m to 24.50m

FACTUAL REPORT – APPENDIX 2
Nadi River Basin Project, SITE 9, Nadi Back Road Tobacco Farm, Nadi, Fiji.

24.50m to 26.90m

26.90m to 29.00m

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29.0m to 30.50m

APPENDIX 9c

Laboratory Test Schedule and Test Results

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PRINCIPAL : JICA
PROJECT NAME : Nadi River Project Drilling Works
SITE ADDRESS :Site 09 (BH09), Nadi Back Road Bridge
DATE: 18 December 2015

Lab test Schedule

Project No.	Site	Soil Type	Sample type	Depth (m)	Lab Tests Required						Remarks
					Permeability	Density	Moisture Content	PSD	Atterberg	UCS	Consolidation	
1920815	Site 9, (BH 09)	Silt with trace of fine sand	U	1.0 - 1.5		1				1	1	
		Sandy Silt	SPT	2.0 - 2.5			1					
		Silty Sand	SPT	3.5 - 4.0	1		1	1	1			
		Sandy Gravel	SPT	5.0-5.5			1					
		Gravelly Sand	SPT	6.5-7.0				1				
		Sandy Gravel	SPT	9.5 - 10.0				1				
		Gravel	SPT	14.0-14.5				1				
		Sandy Silt	SPT	15.5 - 16.0			1		1			
		Silt, shell fragments	SPT	17.0-17.5			1					
		Weathered sandy silt	SPT	20.0 - 20.5			1					
		Silt with fine sand	SPT	21.5 - 22.0			1	1	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					
	TOTALS				1	1	10	6	3	1	1	23
	Bill of Quantity				1	3	10	6	3	3	3	29

Lab Test Schedule checked by: DMC

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 25 October 2015
SITE ADDRESS	: Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	: TL
MATERIAL TYPE & DESCRIPTION	: SILT with trace of fine sand and root fibres, dark brown, moist low to medium plasticity	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: 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	6
Number of Blows		40	36	30	25	20	16
Container No.		141	147	149	150	158	176
Mass of Container	g	11.67	11.62	11.76	10.76	12.14	11.78
Mass of Container + Wet Soil	g	17.55	18.43	20.07	18.63	22.15	18.77
Mass of Container + Dry Soil	g	15.79	16.36	17.48	16.15	18.98	16.55
Mass of Dry Soil	g	4.12	4.74	5.72	5.39	6.84	4.77
Mass of Moisture	g	1.76	2.07	2.59	2.48	3.17	2.22
Moisture Content	%	42.72	43.67	45.28	46.01	46.35	46.54

LINEAR SHRINKAGE TEST

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

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

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

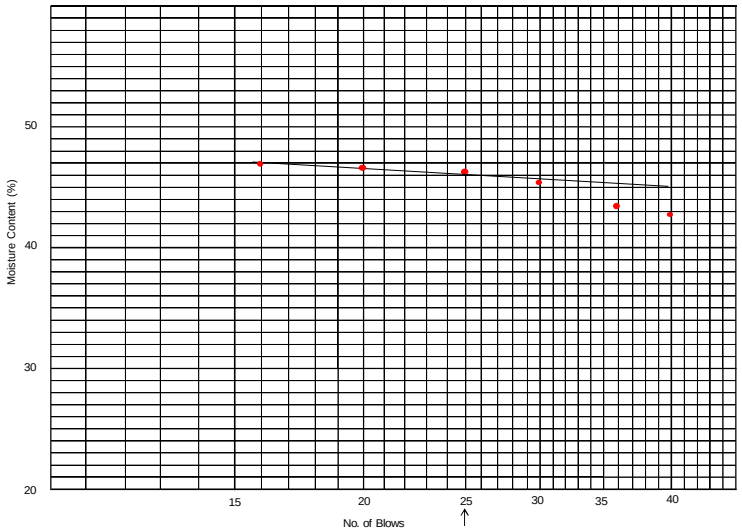
Tested By: TL
Date: 25 October 2015

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

Approved By:IG
Date: 03 December 2015

Form: GE-L-03

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N601

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 25 October 2015
SITE ADDRESS	: Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	: TL
MATERIAL TYPE & DESCRIPTION	: 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	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N608 BH09 17.0-17.5m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
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

TEST No.		1	2				Average
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

TEST No.		1	2	3	4	5	6
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

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

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

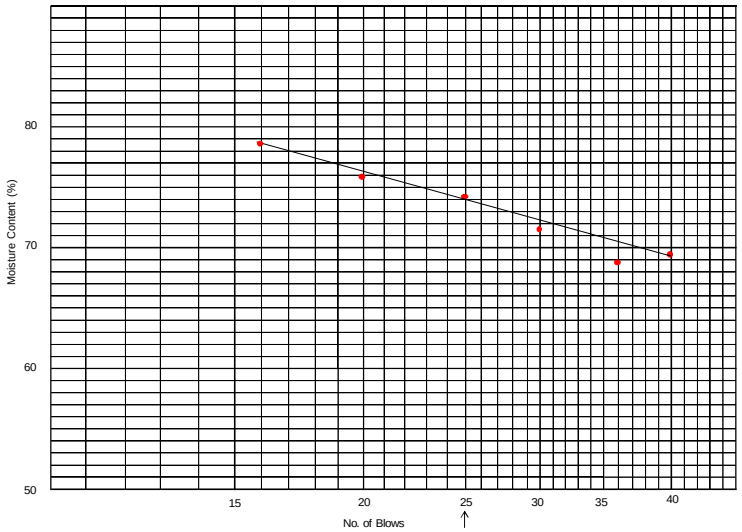
Liquid Limit	74.00 %
Plastic Limit	45.01 %
Plasticity Index	28.99 %
Shrinkage Limit	16.80 %

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

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Atterberg Limit Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Basin Drilling Works	**DATE**	: 25 October 2015
SITE ADDRESS	: Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	: TL
MATERIAL TYPE & DESCRIPTION	: 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	**TEST METHOD**	: NZS 4402:1986 (amended version)
		SAMPLE No.	: N611 BH09 23.5-24.0m

NATURAL MOISTURE CONTENT

TEST No.		1	2				Average
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

TEST No.		1	2				Average
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

TEST No.		1	2	3	4	5	6
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

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

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

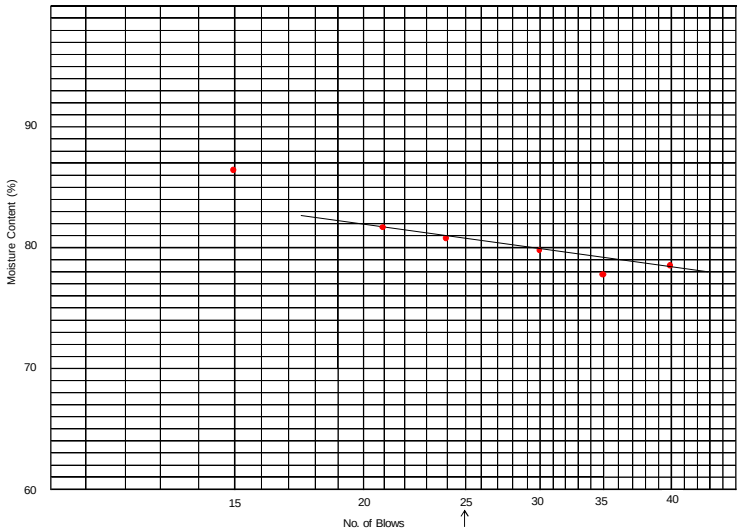
Liquid Limit	80.70 %
Plastic Limit	40.35 %
Plasticity Index	40.35 %
Shrinkage Limit	20.80 %

Tested By: LN
Date :23 October 2015

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

Approved By:IG
Date: 03 December 2015

Graph of Moisture Content vs No. of Blows



Project No: 1920815
Sample No:N611

Form: GE-L-03

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BULK DENSITY
NZS 4402:1986 (Test 5.1.3)

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

SAMPLE HISTORY : 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 Ao ($\pi/4\ d^2$)	mm²	2289.91
	Initial length of specimen Lo	mm	52.97
	Initial mass of specimen Mi	g	226.07
	Bulk Density ρ	t/m³	1.86
	Dry Density ρd	t/m³	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

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Moisture Content Test Results

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

ENTEC LIMITED
ENGINEERING & SCIENCE CONSULTANTS

Moisture Content Test Results

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

Form GE-L-07

Page 1 of 1

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Moisture Content Test Results

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

ENTEC LIMITED
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Moisture Content Test Results

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

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 24 October 2015
SITE ADDRESS	: Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	: AP
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: 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	**SAMPLE No.**	: 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

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 24 October 2015
SITE ADDRESS	: Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	: AP
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: 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	**SAMPLE No.**	: 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

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 24 October 2015
SITE ADDRESS	: Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	: AP
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: 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	**SAMPLE No.**	: 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

ENTEC LIMITED
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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 24 October 2015
SITE ADDRESS	: Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	: AP
		TEST METHOD	: NZS 4402:1986
MATERIAL TYPE & DESCRIPTION	: 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	**SAMPLE No.**	: 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

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Moisture Content Test Results

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

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Moisture Content Test Results

PRINCIPAL	: Japan International Cooperation Agency (JICA)	**PROJECT No.**	: 1920815
PROJECT NAME	: Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	: 24 October 2015
SITE ADDRESS	: Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	: AP
MATERIAL TYPE & DESCRIPTION	: 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	**TEST METHOD**	: NZS 4402:1986
		SAMPLE No.	: 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

Form GE-L-07

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

PRINCIPAL	:	Japan International Cooperation Agency (JICA)	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works	**DATE**	:	29 November 2015
SITE ADDRESS	:	Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	:	IG
MATERIAL TYPE & DESCRIPTION	:	Fine to coarse SAND with some fine to medium sub-angular to sub-rounded gravel, dark brown black	**TEST METHOD**	:	AS 1289.6.7.3-2001
			SAMPLE No.	:	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 Speciman	cm^3	819.33
Wet Density	t/m^3	2.18
Dry Density	t/m^3	1.93
Maximum Dry Density	t/m^3	-
Laboratory Density ratio	%	-

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

TEST #	Constant Head h (cm)	Elapsed Time (t)min	Out Flow Volume Q (cm^3)	Water temp T(^{0}c)	KT cm/min	K_{20} 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_{20} 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

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Unconfined Compressive Strength
NZS 4402:1986 (Test 6.3.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling Works.	**DATE TESTED**	:	24 October 2015
SITE ADDRESS	:	Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	:	KB/LN
SAMPLE LOCATION	:	BH 09 1.0m-1.50m	**MATERIAL TYPE**	:	SILT with trace of fine sand, dark brown, stiff, low to medium plasticity
TEST NUMBER	:	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 Ao (π/4 d^2)	mm^2	2311.16
	Initial length of specimen Lo	mm	104.00
	Initial mass of specimen Mi	g	416.08
	Bulk Density ρ	t/m^3	1.73
	Dry Density ρd	t/m^3	1.37

Compression Gauge Reading	**Load Gauge Reading**	**Load**	**Strain $\varepsilon = \frac{Cn - Co}{Lo}$**	**Corrected Area A = Ao/ 1-ε**	**Principal Stress Difference $\sigma 1 - \sigma 3 = 1000P/A$**
mm		(kN)	%	m^2	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

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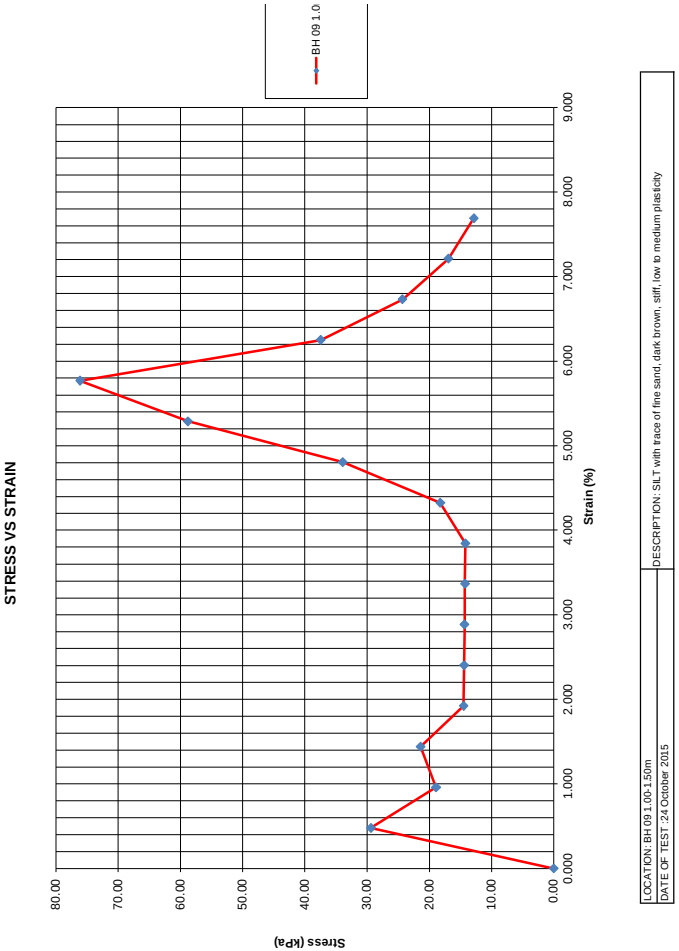

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

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

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

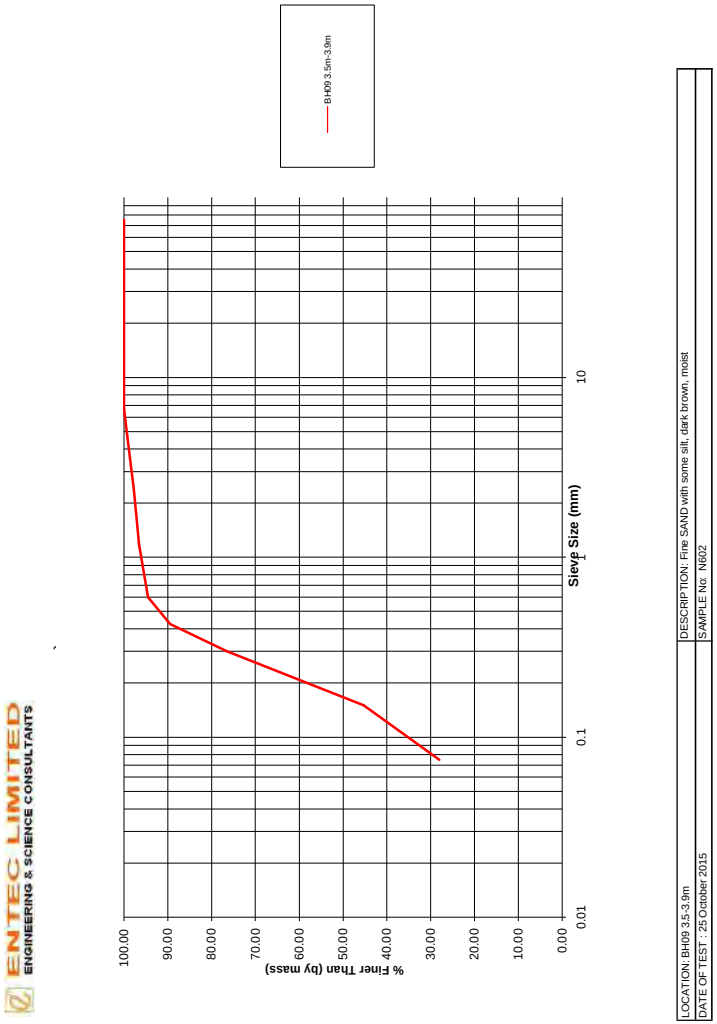
Moisture Content (Material passing 19mm)	Container No.	-	7	12	SPLIT SAMPLE
	Mass of Container	g	52.78	53.13	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	74.91	74.11	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	71.00	70.51	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of 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_1)	g	Nil
Total Wet Weight (M_w)	g	200.47
Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
	M_T =	165.56

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm	1.18	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



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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 6.5-7.0m	**MATERIAL TYPE & LOCATION**	:	Fine to coarse SAND with some fine to medium sub-angular to sub-rounded gravel, dark brown black
TEST NUMBER	:	N604			

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

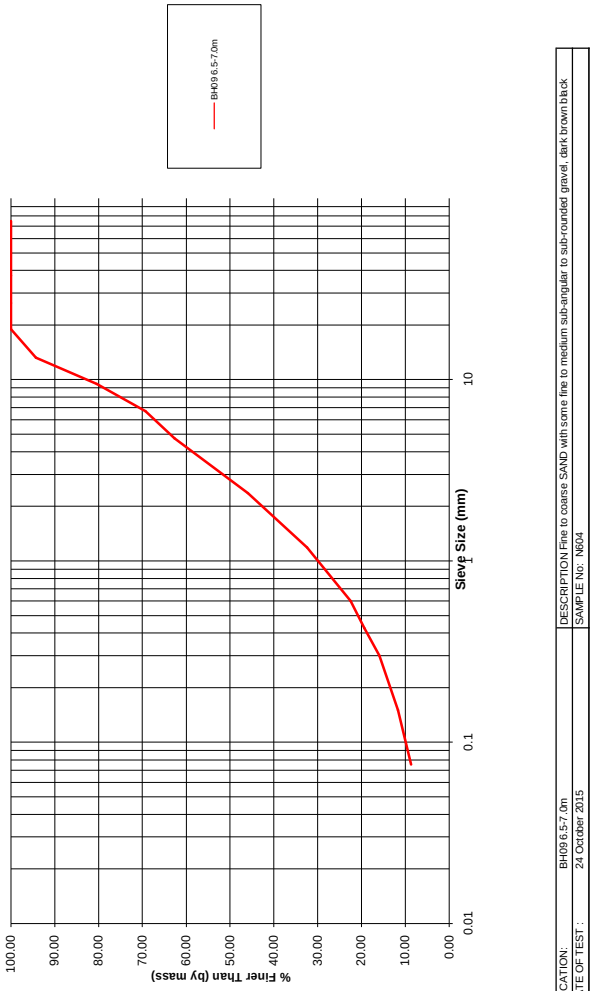
Moisture Content (Material passing 19mm)	Container No.	-	24	23	SPLIT SAMPLE	
	Mass of Container	g	14.58	14.71	Mass Passing Last Sieve: -	gM_3
	Mass of Container + Wet Soil	g	27.92	27.55	Mass after Spliting: -	gM_4
	Mass of Container + Dry Soil	g	26.14	25.97	Spliting Factor = M_3/M_4	
	Mass of Dry Soil	g	11.56	11.26		
	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_1)		g	Nil
	Total Wet Weight (M_w)		g	245.95
	Total Mass of dry sample (M_T)		$M_T = \frac{100M_w}{100 + w}$	
		M_T =	214.40	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm	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



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 3.8.1)

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 9.5m-10.0m	**MATERIAL TYPE & LOCATION**	:	Coarse SAND with trace of medium sub-angular gravel, grey pale brown
TEST NUMBER	:	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_3
	Mass of Container + Wet Soil	g	68.29	68.73	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	65.25	65.63	Spliting Factor M_3 / M_4 =
	Mass of Dry Soil	g	12.95	12.76	
	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_1)	g	Nil
	Total Wet Weight (M_w)	g	314.43
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	253.81

Test Sieve Size mm	Mass of Dry Soil Retained (M_b)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm	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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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 14.0-14.50m	**MATERIAL TYPE & LOCATION**	:	SILT with some fine sand and minor fine subangular gravel and trace of shell fragments, grey , soft , moist, low to medium plasticity
TEST NUMBER	:	N606			

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

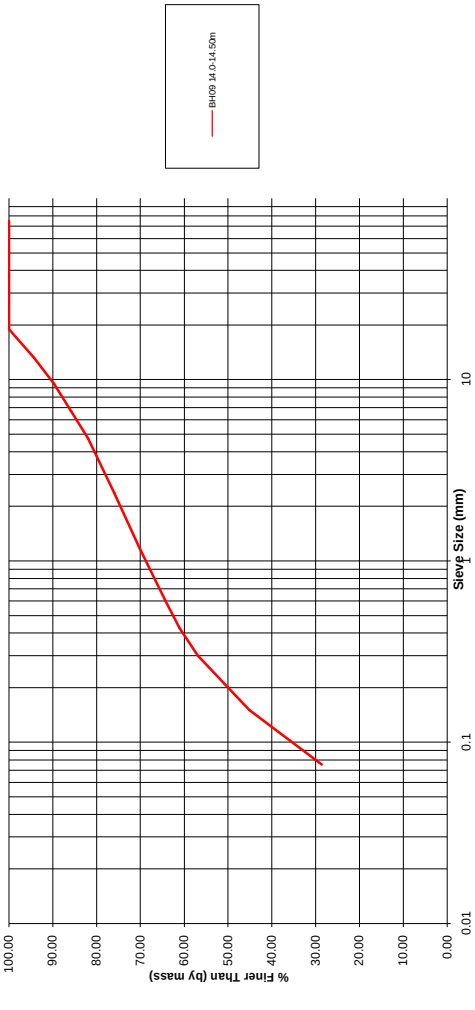
Moisture Content (Material passing 19mm)	Container No.	-	15	16	SPLIT SAMPLE
	Mass of Container	g	52.70	52.76	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	82.99	82.85	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	76.19	75.79	Spliting Factor M_3 / = M_4
	Mass of Dry Soil	g	23.49	23.03	
	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_1)	g	Nil	
	Total Wet Weight (M_w)	g	350.06	
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
		M_T =	269.69	

Test Sieve Size mm	Mass of Dry Soil Retained (M_{Di})	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		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



DESCRIPTION SILT with some fine sand and minor fine subangular gravel and trace of shell fragments, grey , soft , moist.
SAMPLE No: N606
LOCATION: BH09 14.0-14.50m
DATE OF TEST : 24 October 2015

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Wet Sieve Analysis
NZS 4407:1991 (Test 3.8.1)

PRINCIPAL	:	Japan International Cooperation Agency	**PROJECT No.**	:	1920815
PROJECT NAME	:	Geotechnical Engineering Investigation for Nadi River Project Drilling	**DATE /**	:	24 October 2015
SITE ADDRESS	:	Site 09- Upstream Nadi Back Road Bridge	**TECHNOLOGIST**	:	TL
SAMPLE LOCATION	:	BH09 21.5-22.0m	**MATERIAL TYPE & LOCATION**	:	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
TEST NUMBER	:	N610			

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

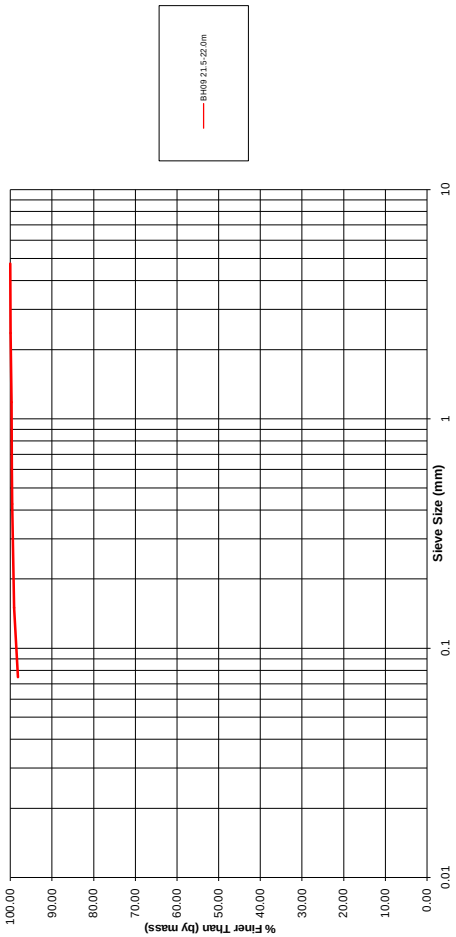
Moisture Content (Material passing 19mm)	Container No.	-	8	9	SPLIT SAMPLE
	Mass of Container	g	53.06	53.52	Mass Passing Last Sieve: - gM_3
	Mass of Container + Wet Soil	g	78.87	78.60	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	71.77	71.70	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	18.71	18.18	
	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_1)	g	Nil	
	Total Wet Weight (M_w)	g	312.57	
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$		
		M_T =	226.58	

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm		N/A	0.00	100.00	600	300
9.50 mm		N/A	0.00	100.00	450	300
6.70 mm		N/A	0.00	100.00	300	300
4.75 mm		N/A	0.00	100.00	250	200
2.36 mm	0.09	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



LOCATION:	BH09 21.5-22.0m
DESCRIPTION:	Clayey SILT with trace of shell fragments and fine s.sand, dark grey green, stiff, moist low to medium plasticity (highly to completely weathered SILTSTONE grey green, weak to very weak
DATE OF TEST :	25 October 2015
SAMPLE No:	N610

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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 meduim 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_3
	Mass of Container + Wet Soil	g	77.54	77.60	Mass after Spliting: - gM_4
	Mass of Container + Dry Soil	g	70.85	70.75	Spliting Factor $\frac{M_3}{M_4}$ =
	Mass of Dry Soil	g	18.14	18.32	
	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_1)	g	Nil
	Total Wet Weight (M_w)	g	368.28
	Total Mass of dry sample (M_T)	$M_T = \frac{100M_w}{100 + w}$	
		M_T =	268.55

Test Sieve Size mm	Mass of Dry Soil Retained (M_D)	Corrected Mass	Percentage Retained = (Mass/M_T) x 100	Total Percentage Passing	Maximum Sieve Load (Sieve Diameter 200mm)	Sieve Diameter
	g	g	%	%	g	mm
75.0mm		N/A	0.00	100.00		300
50.0mm		N/A	0.00	100.00		300
37.5mm		N/A	0.00	100.00		300
26.5mm		N/A	0.00	100.00		300
19.0mm		N/A	0.00	100.00		200
13.2 mm	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

Oedometer Settlement Test

Sample Details			
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_0 (mm)	20.0
	Initial Diameter	D_0 (mm)	50.0
	Initial Weight	W_0 (gr)	63.1
	Bulk Density	ρ_0 (Mg/m3)	1.61
	Particle Density	ρ_s (Mg/m3)	2.65

Initial Conditions			
Settlement Input	L_{IP}	(mm)	CH 3
Initial Moisture	ω_i%	(%)	22
Initial Dry Density	ρ_{di}	(Mg/m3)	1.32
Initial Voids Ratio	e_i	.	1.005
Initial Degree of Saturation	S_i	(%)	56.9
Initial Swelling	S_s	(kPa)	0

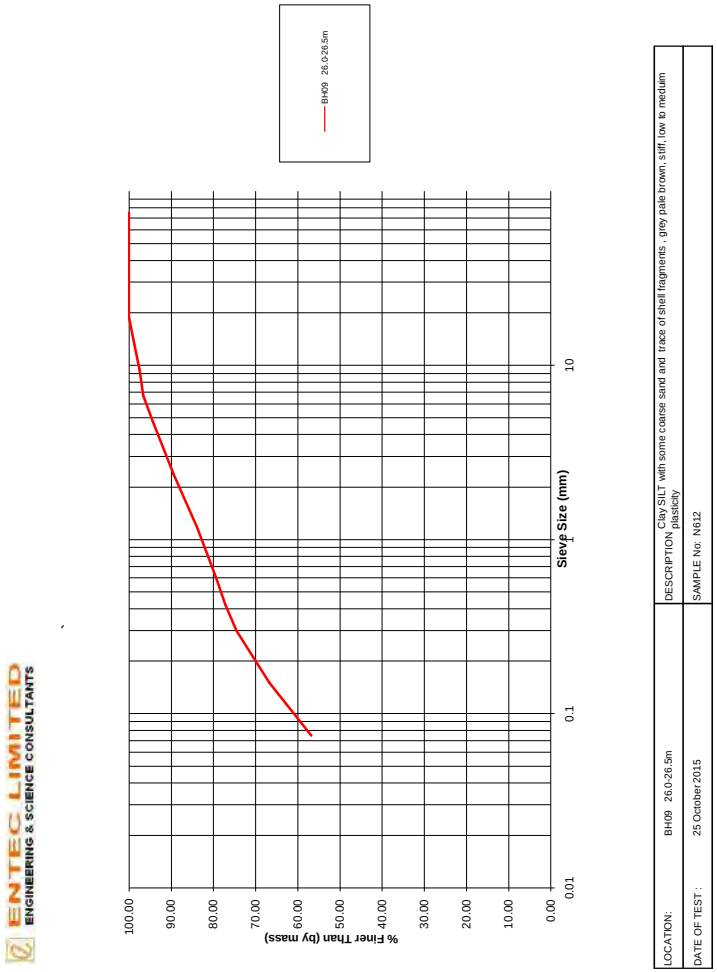
Final Conditions			
Final Moisture	ω_f%	(%)	23
Dry Density	ρ_{df}	(Mg/m3)	1.15
Voids Ratio	e_f	.	1.297
Saturation	S_f	(%)	46
Height Settlement	ΔL_s	(mm)	-2.909

Vertical Stress σ'_i (kPa)	Voids Ratio e_f .	Height ΔL_s (mm)	Consolidation C_v (m2/year)	Compressibility m_v (m2/MN)	Initial T_i (oC)	Final T_f (oC)	t50 Time t_{50} (min)	t90 Time t_{90} (min)	Secondary C_{SEC} (m2/MN)
50	1.006	-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
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/29/2015
Jobfile	Geotechnical Engineering	Sample	N600
Client	Japan International Cooperation	Borehole	BH09
Operator	IG/MK	Checked	DMC
		Approved	DMC

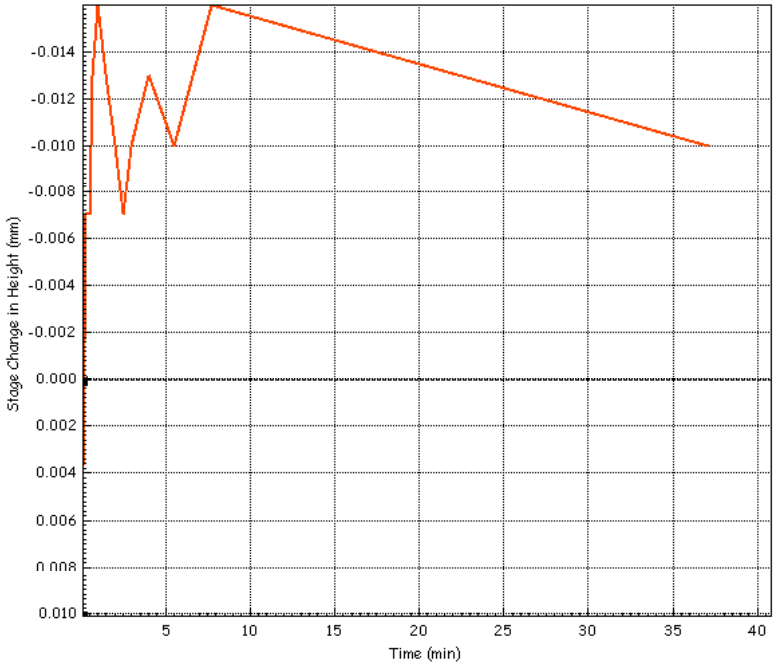
Entec Limited, Level 2 Mid CIty, Cnr Cumming Street & Renwick Road, Suva



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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	50
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-0.010
Voids Ratio	e_f	.	1.004
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.002
Consolidation	C_V	(m2/year)	22211.1
Compressibility	m_V	(m2/MN)	0.010
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

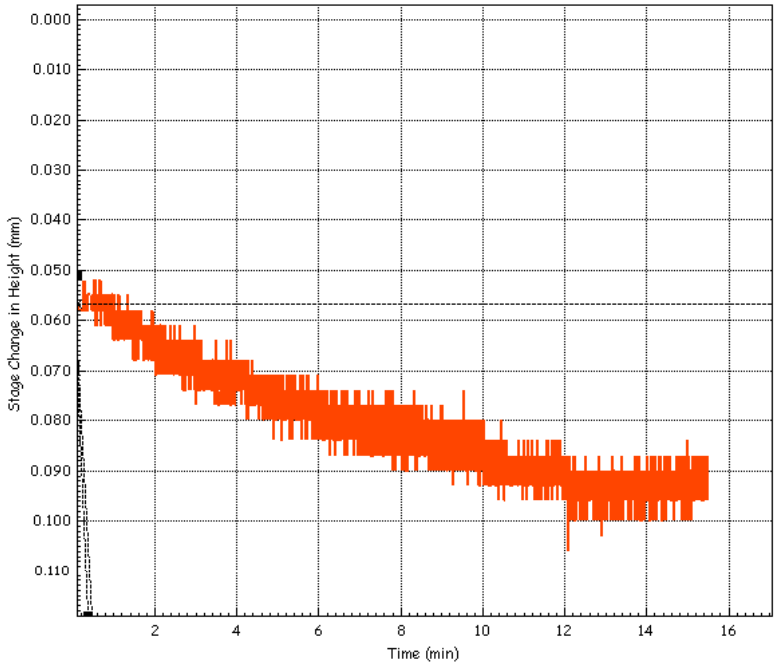


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/29/2015
Jobfile	Geotechnical Engineering	Sample	N600
Client	Japan International Cooperation	Borehole	BH09
Operator	IG/MK	Checked	DMC
		Approved	DMC

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-2.909
Voids Ratio	e_f	.	1.297
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.004
Consolidation	C_V	(m2/year)	12779.2
Compressibility	m_V	(m2/MN)	2.898
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

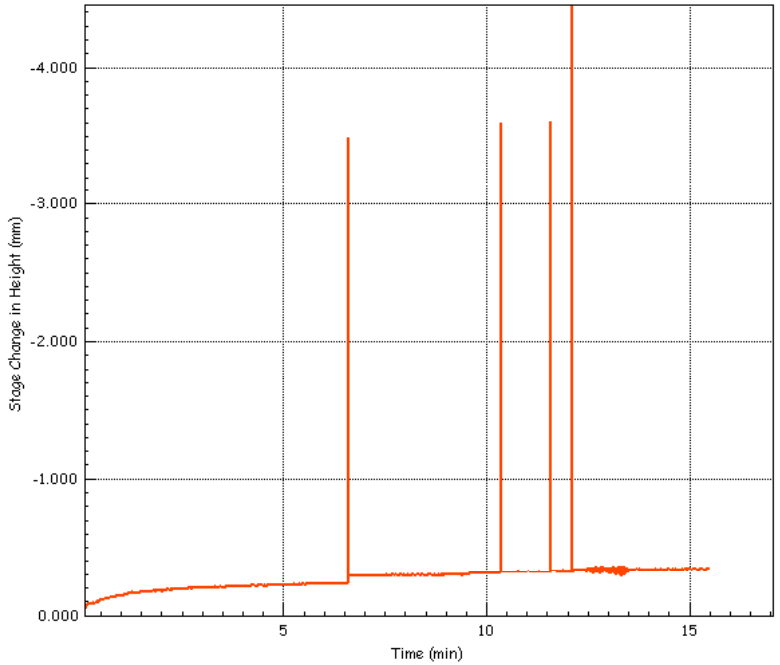


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/29/2015
Jobfile	Geotechnical Engineering	Sample	N600
Client	Japan International Cooperation	Borehole	BH09
Operator	IG/MK	Checked	DMC
		Approved	DMC

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	100
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-2.916
Voids Ratio	e_f	.	1.295
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

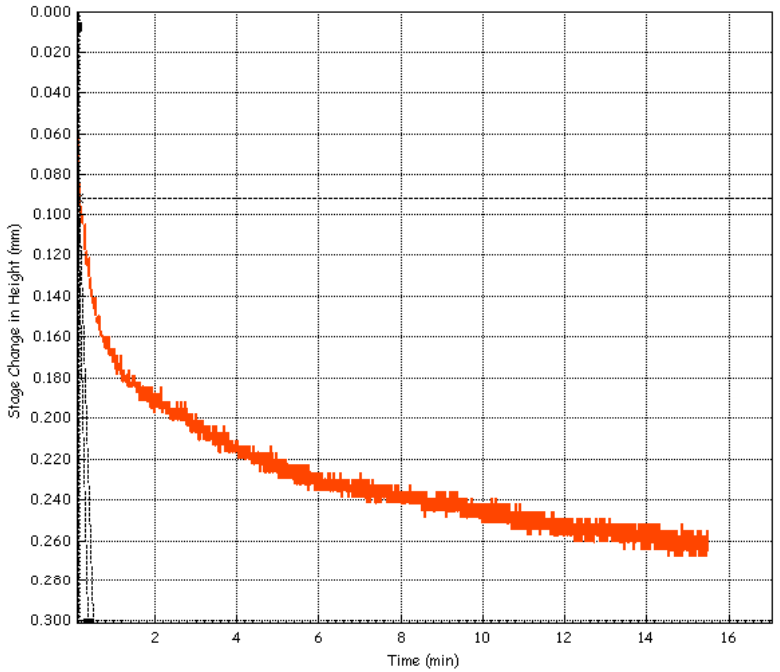


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/29/2015
Jobfile	Geotechnical Engineering	Sample	N600
Client	Japan International Cooperation	Borehole	BH09
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	200
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	0.351
Voids Ratio	e_f	.	0.968
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.017
Consolidation	C_V	(m2/year)	2957.0
Compressibility	m_V	(m2/MN)	1.425
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

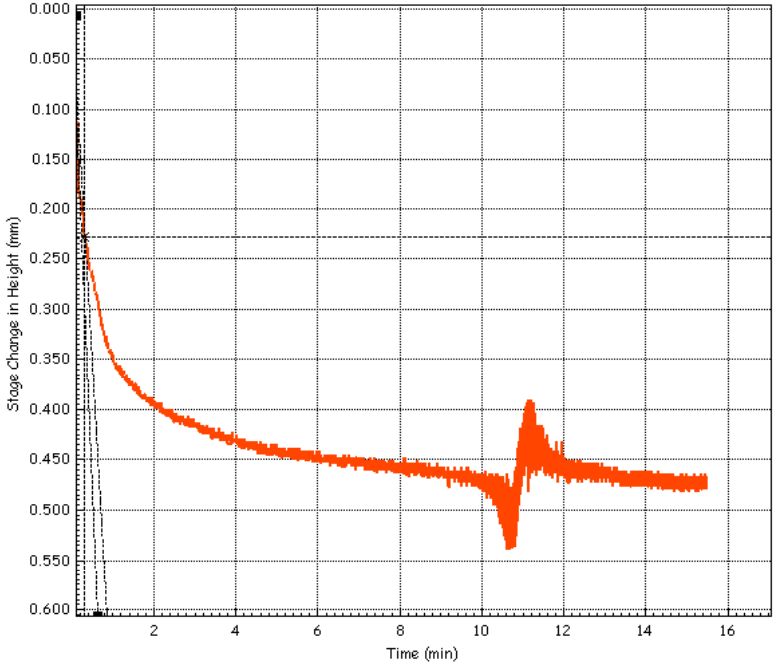


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/29/2015
Jobfile	Geotechnical Engineering	Sample	N600
Client	Japan International Cooperation	Borehole	BH09
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	-2.913
Voids Ratio	e_f	.	1.295
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.089
Consolidation	C_V	(m2/year)	564.8
Compressibility	m_V	(m2/MN)	0.831
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

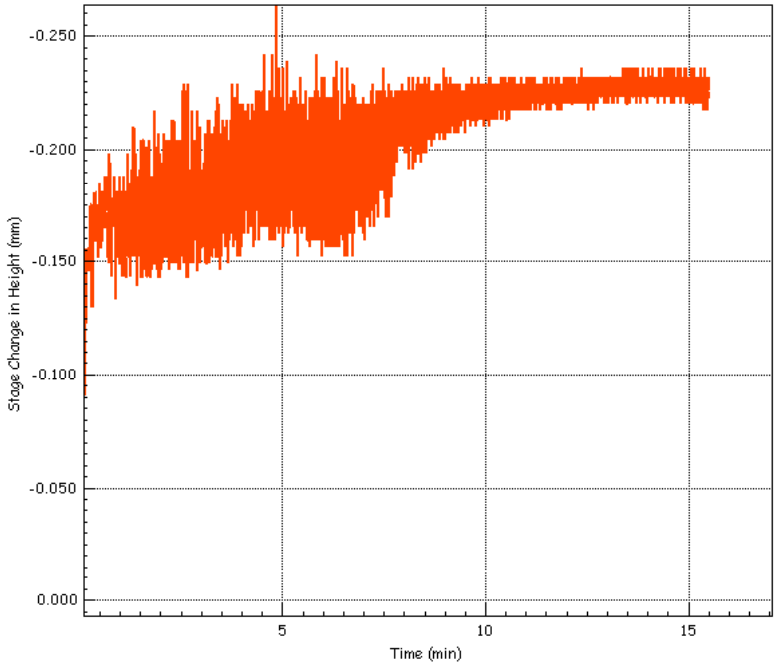


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/29/2015
Jobfile	Geotechnical Engineering	Sample	N600
Client	Japan International Cooperation	Borehole	BH09
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	400
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.224
Voids Ratio	e_f	.	0.781
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	
Consolidation	C_V	(m2/year)	
Compressibility	m_V	(m2/MN)	
Secondary Compression	C_{SEC}	(m2/MN)	

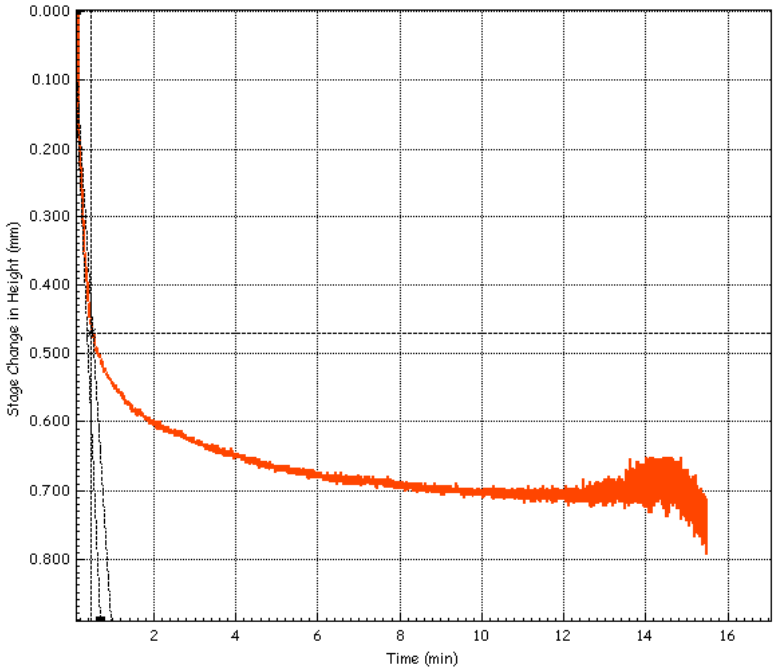


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/29/2015
Jobfile	Geotechnical Engineering	Sample	N600
Client	Japan International Cooperation	Borehole	BH09
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	800
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	1.614
Voids Ratio	e_f	.	0.842
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.219
Consolidation	C_V	(m2/year)	216.2
Compressibility	m_V	(m2/MN)	0.494
Secondary Compression	C_{SEC}	(m2/MN)	0.0087

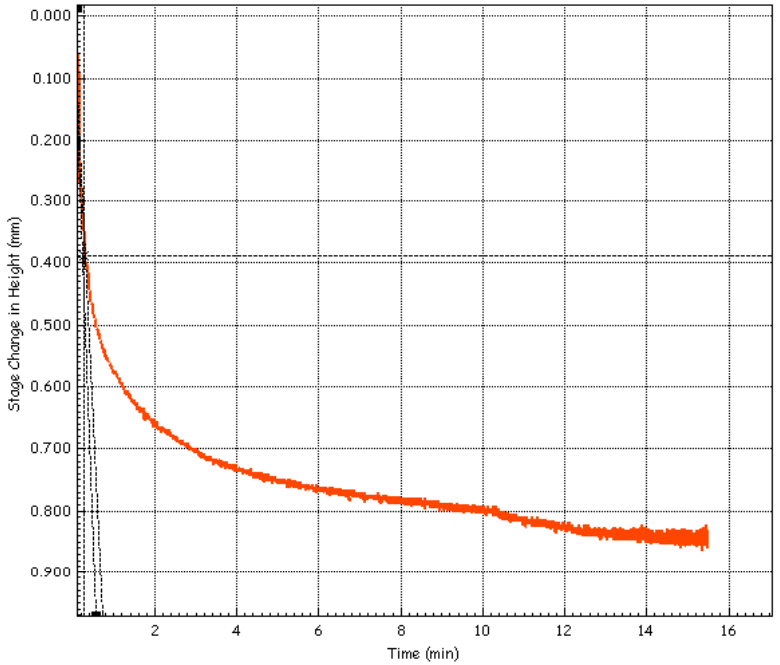


Test Method	AS 1289.6.6.1-1998	Test Name	ODO-10_007
		Database: .\SQLEXPRESS \ ENTEC	
Site Reference	1920815	Test Date	11/29/2015
Jobfile	Geotechnical Engineering	Sample	N600
Client	Japan International Cooperation	Borehole	BH09
Operator	IG/MK	Checked	DMC
Approved	DMC		

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

Oedometer Consolidation Settlement Report

Vertical Stress	σ'_i	(kPa)	1600
Initial Temperature	T_i	(oC)	29.0
Frame Correction	L_{CORR}	(mm)	0.000
Height Settlement	ΔL_s	(mm)	2.456
Voids Ratio	e_f	.	0.757
Final Temperature	T_f	(oC)	0.0
t50 Time	t_{50}	(min)	
t90 Time	t_{90}	(min)	0.078
Consolidation	C_V	(m2/year)	459.3
Compressibility	m_V	(m2/MN)	0.057
Secondary Compression	C_{SEC}	(m2/MN)	0.0087



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