

5. 参考資料

No.	Name of Document	Style	Published by
1	Estatísticas do Distritos	PDF	Instituto Nacional de Estatística
2	Multiple Indicator Cluster Survey	PDF	Instituto Nacional de Estatística
3	District Administration map, Gurue	Copy	Gurue district
4	District Administration map, Ile	Copy	Ile district
5	Strategic Development Plan for the Zambezia Province	PDF	Government of Zambezia Province
6	Potencial Opportunities of Zambezia	PDF	Government of Zambezia Province
7	Orcamento do Sector de Estradas para 2011	Copy	FE
8	Lei de Terras [1] 1997/19	PDF	Mozambican government
9	Politica de Reassentamento do Sector de Estradas	PDF	ANE
10	Resolution No. 10_95 on the National Land Policy	PDF	Mozambican government
11	Reglammento Lei de tierras 98/66	PDF	Mozambican government
12	Sample report for RRP(Estudo de Viabilidade, Avaliacoes de Impacto Ambiental e Social, Desenho e Supervisao de Obras da Estrada Namialo a Metoro, Provincias de Nampula e Cabo Delgado, Mozambique)	Copy	ANE
13	Lei do Ambiente_1997/20	PDF	Mozambican government
14	Regulamento relativo ao Processo de Avaliação do Impacto Ambiental_2004/45	PDF	Mozambican government
15	Handbook on Environmental Assessment Legislation in the SADC Region(Extracted Mozambique)	PDF	Development Bank of Southern Africa and Southern African Institute for Environmental Assessment (SAIEA)
16	Programa nacional do meio ambiente95_5	PDF	Mozambican government
17	Resolucion 95/5, Politica Nacional de Ambiente	PDF	Mozambican government
18	Anexo Tecnico ao Regulamento da Lei de Tarras (Diploma ministerial No.29-A/2000)	PDF	FAO based on Mozambican government
19	Sample report for EIA(Estudo de Viabilidade, Avaliacoes de Impacto Ambiental e Social, Desenho e Supervisao de Obras da Estrada Namialo a Metoro, Provincias de Nampula e Cabo Delgado, Mozambique)	Copy	ANE
20	Sample report for Environmental Management Plan(Plano de gesion Ambiental do Project de Rehabilitacion da Estrada Namacurra-Rio Ligonha, Provincia da Zambezia)	Copy	ANE

No.	Name of Document	Style	Published by
21	Project Specification of Rehabilitation of the Road between Namacurra and Nampevo	Copy	Euro Fund
22	Final Report of Rehabilitation of Road N103 between Gurue and Magige in Zambezia Province	Copy	ANE
23	ANE's Design Standards (Draft)	Copy	ANE
24	Rainfall of Cuamba, Ile, Grue	Copy	Institute Nacional de Meteorologia
25	Temperature of Cuamba, Ile, Grue	Copy	Institute Nacional de Meteorologia
26	Seismic data of Zambezia Province	Copy	Ministerio dos recursos minerais

6. その他の資料・情報

6.1 第1次現地調査時（2011年4月19日）

Memorandum of Agreement
between
Outline Design Study Team and National Road Administration (ANE)
on
the Project for the Construction of Bridges between Ile and Cuamba

Both Parties agreed the following items based on the discussion on 19th April 2011.

- (1) The approach road for the bridge at the location of existing bridge shall be 50m at both side in principle and at the location parallel to the existing bridge shall be adjusted to the existing road as shown Figure-1.
- (2) Bridge length of each location are determined based on the maximum discharge of each river analyzed through the study and are summarized tentatively in Table-1.
- (3) The bridge widths are 9.6m for two lane bridge and 5.2m for one lane bridge as shown in Table-2 and Figure-2.
- (4) The ratio of embankment slope for the approach road shall be gentler than 1:1.5.
- (5) Ducts for accommodated public utilities such as optical fiber cables shall be taken into account in the design.
- (6) Vertical clearance over H.W.L shall be one meter.
- (7) Following standard will be applied for the study.
 1. Design Standard
 - ANE's Design Standards (Draft)
 - Code of Practice for the Design of Road Bridges and Culverts issued by SATCC
 - Design Specification for Highway Bridges issued by Japan Road Association (JRA)
 - Technical Recommendations for Highways (South Africa)



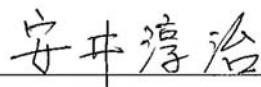
- Code of Practice for the Design of Highway Bridges and Culverts (TMH7 Part 3)
- Code of Practice for the Design of Foundation for Buildings (SABS 0161-1980)
- Code of Practice for the Structural Use of Concrete (SABS 0100-1)
- Code of Practice for Pile Foundations (SABS 088-1972)

2. Design Load

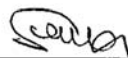
- Dead Load
Dead load specified by SATCC shall be applied.
- Live Load
NA, NB, NC live load specified by SATCC shall be applied.
- Other Load
Other load including seismic coefficient, wind shall be in accordance with ANE's Bridge Design Manual.

3. Basic Concept for Design

- High Water Level
High water level will be determined based on the hydrological study in the outline design study.
- Bridge Type
Pre-stressed concrete bridge and/or Reinforcement Concrete bridge will be adopted for the Project.



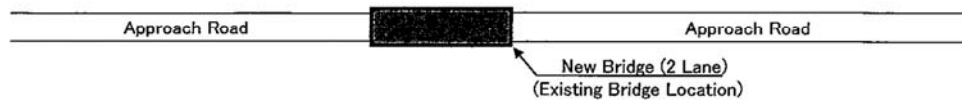
Mr. Junji Yasui
Chief Consultant
JICA Preparatory Survey Team
(Outline Design Study)



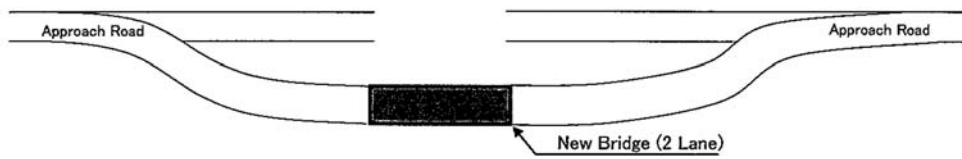
Mr. Ismael Sulemane
Director of Projects
National Road Administration
The Republic of Mozambique

Figure-1 Proposed Bridge Location (Tentative)

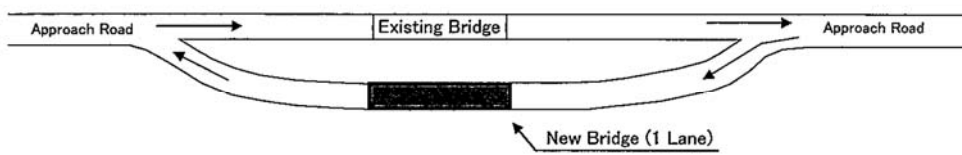
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Type-B (No.1, No.11, No.12, No.13)

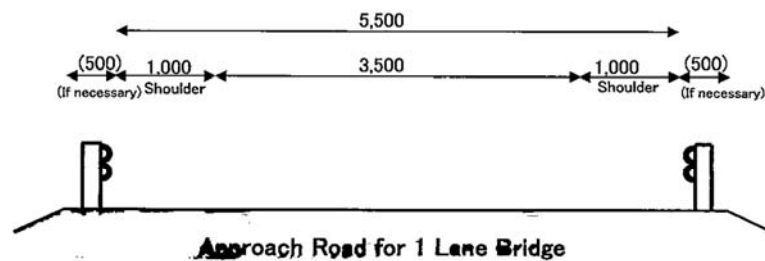
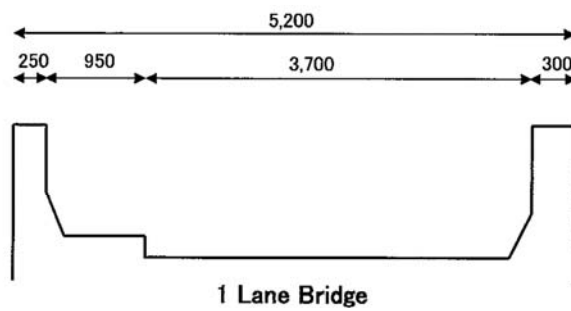
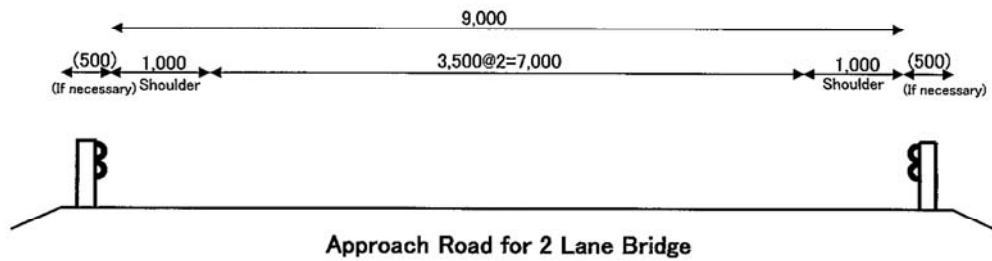
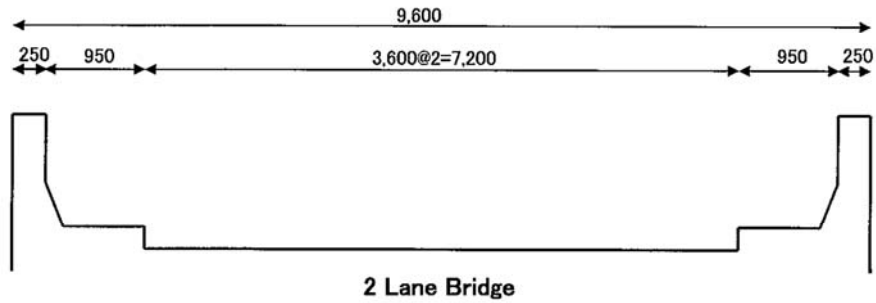


Type-C (No.2, No.4)



Top

Figure-2 Proposed Bridge Width (Tentative)



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Table- 2 Proposed Bridge Plan (Tentative)

Bridge Name		Existing Bridge		Proposed Plan					
		Length	Width	Type	Length	Span	Width	Lane	
No.1	Mutabasse	95.0	5.1	Prestressed Concrete	105	35+35+35=105	3	9.6	2
No.2	Muliquela	66.0	5.1	Prestressed Concrete	70	35+35=70	2	5.2	1
No.3	Matacasse	15.0	4.2	Reinforced Concrete	15	15	1	9.6	2
No.4	Lua	37.0	5.1	Prestressed Concrete	35	35	1	5.2	1
No.5	Ualasse	15.0	4.2	Reinforced Concrete	15	15	1	9.6	2
No.6	Licungo	35.0	5.2	Prestressed Concrete	35	35	1	9.6	2
No.7	Nivaco	6.2	7.1	Reinforced Concrete	15	15	1	9.6	2
No.8	Matsitse	15.0	4.2	Reinforced Concrete	30	15+15=30	1	9.6	2
No.9	Namisagua	18.0	4.2	Reinforced Concrete	30	15+15=30	2	9.6	2
No.10	Nuhusse	24.0	4.2	Reinforced Concrete	30	15+15=30	2	9.6	2
No.11	Lurio	55.0	3.8	Prestressed Concrete	70	35+35=70	3	9.6	2
No.12	Muassi	10.0	5.2	Reinforced Concrete	15	15	1	9.6	2
No.13	Namutimbua	20.0	4.2	Reinforced Concrete	30	15+15=30	2	9.6	2

JP

6.2 第2次現地調査時（2011年11月2日）

**Memorandum of Agreement
between
Outline Design Study Team and National Road Administration (ANE)
on
the Project for the Construction of Bridges between Ile and Cuamba**

Both Parties agreed the following items based on the discussion on 1st November 2011.

- (1) ANE requests to change the abnormal live load NB24 to NB36 for designing bridges on the road. Incidentally, the carriage way width of the one-lane bridge shall be changed to 3.75 meter from 3.6 meter as shown in the following figure.

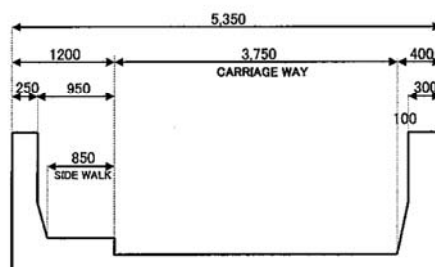


Figure 1. Typical cross section of one-lane bridge (Adjusted to NB load)

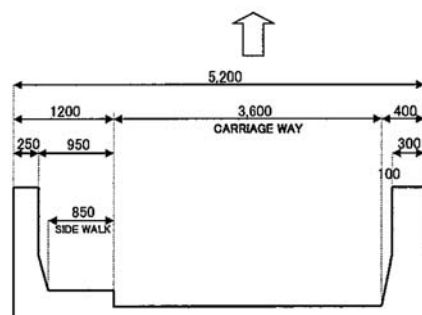


Figure 2. Typical cross section of one-lane bridge (Agreed at the previous meeting for signing technical memorandum on 19th Apr, 2011)

- (2) ANE requests that the bridge name plates installed on the concrete handrails should be made from granite, marble or concrete.

安井淳治

Mr. Junji Yasui
Chief Consultant
JICA Preparatory Survey Team
(Outline Design Study)

Ismael Sulemane

Mr. Ismael Sulemane
Director of Projects
National Road Administration
The Republic of Mozambique

6.3 地質調査結果

6.3.1 概要

地質調査は現地再委託により実施し、橋梁基礎形式の検討、支持層の検討に必要な地質・地層状況を把握するためにボーリング掘削、標準貫入試験、土質資料採取及び室内試験を行った。これらの試験により基本設計に必要な地質縦断面図、土質柱状図、室内試験結果が収集された。以下に地質調査結果を整理する。

表 6.3 地質調査内容

種類	調査内容・数量	
ボーリング調査	<u>ボーリング本数</u>	地上部 29本 河川部 8本 合 計 37本
	<u>標準貫入試験 サンプリング</u>	全ボーリング位置で実施 乱した試料および不攪乱試料 岩のコア採取
室内試験	<u>物理試験</u>	密度試験 含水比試験 粒度試験 液性限界・塑性限界試験
	<u>せん断試験</u>	一軸圧縮試験（岩および粘性土）



写真 6.3.1 地質調査状況(BH3-1)



写真 6.3.2 採取資料(BH3-1)



写真 6.3.3 地質調査状況(BH6-1)

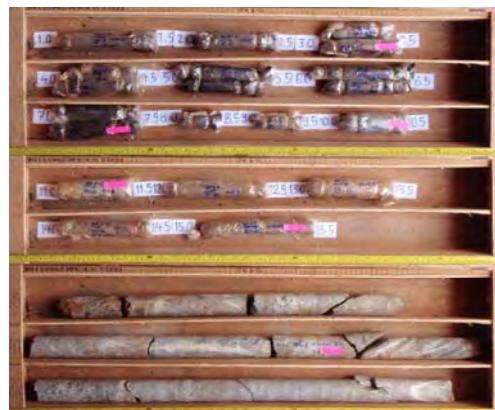
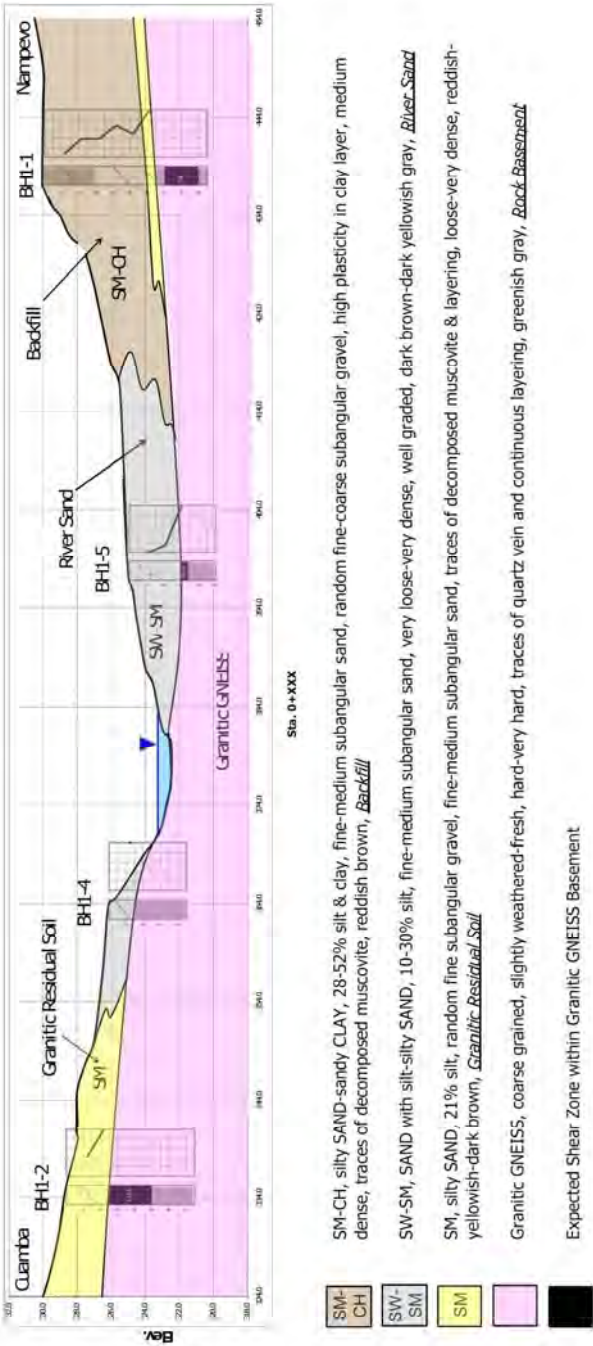


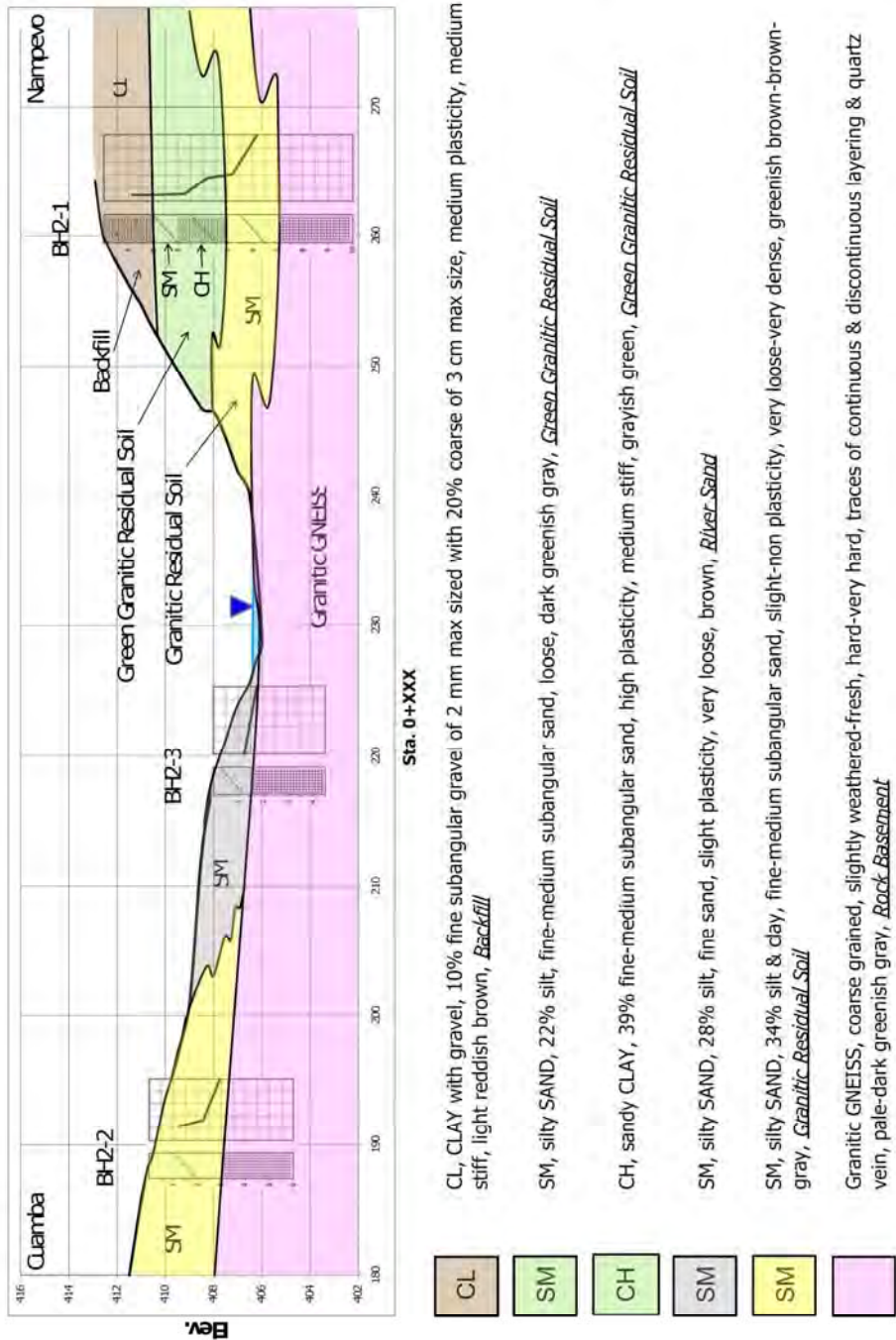
写真 6.3.4 採取資料(BH6-1)

6.3.2 想定地質縦断面図

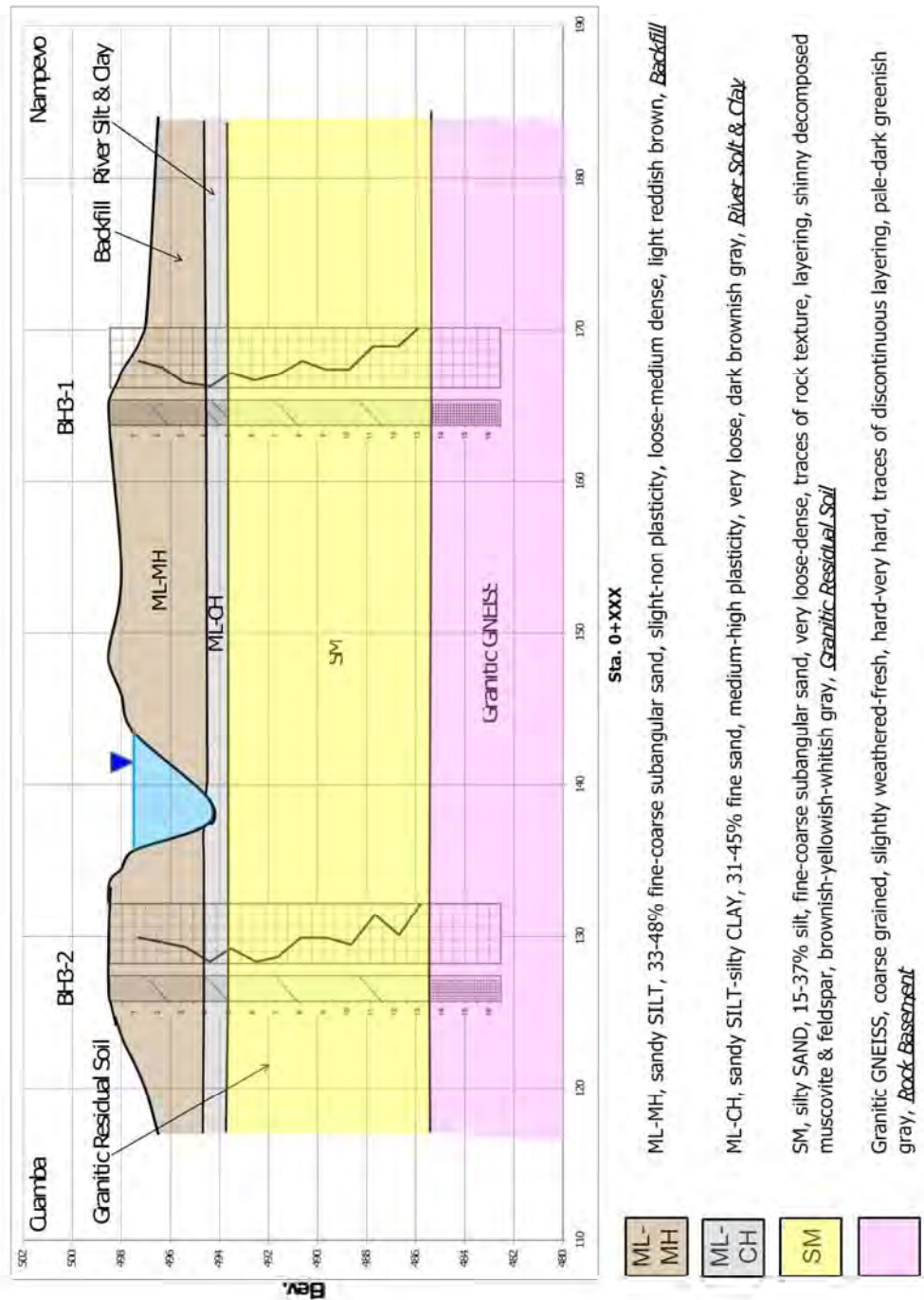
No.1 Mutabasse



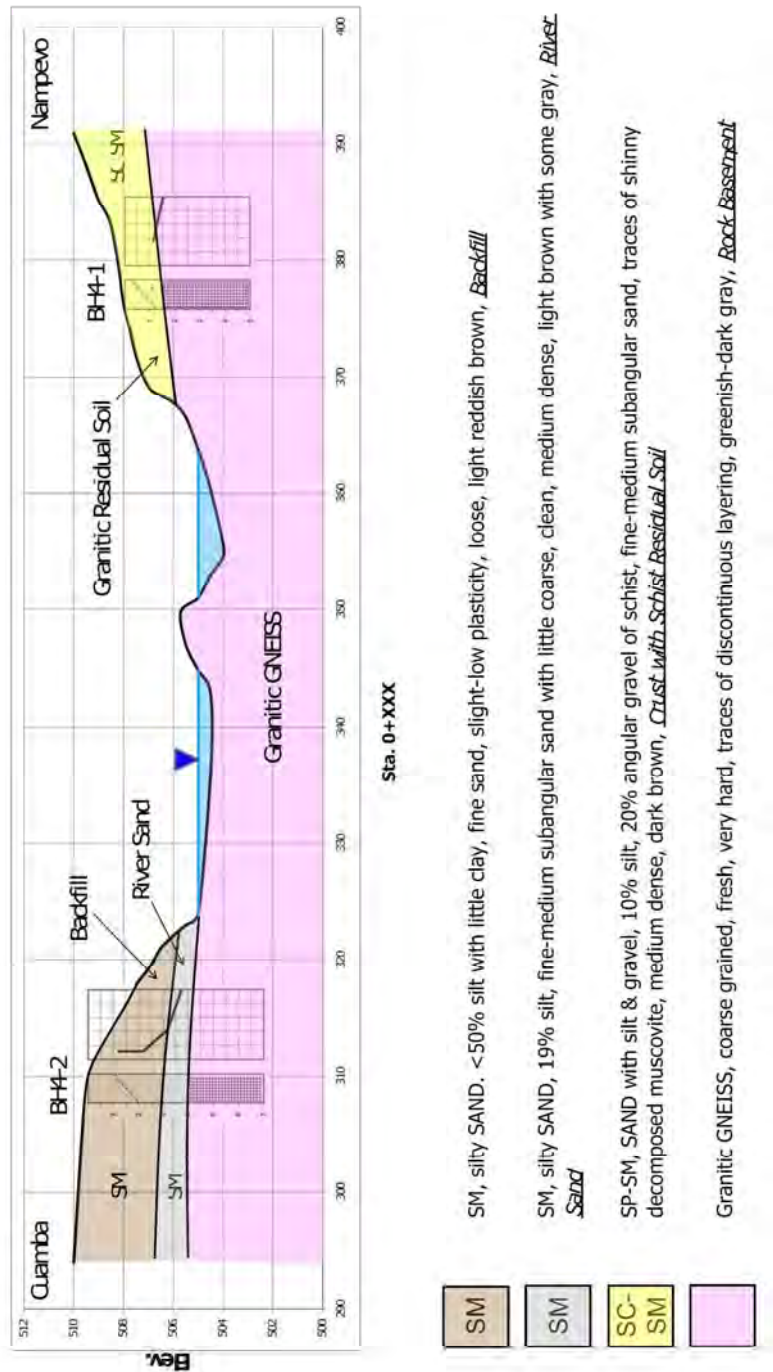
No.2 Muliquela



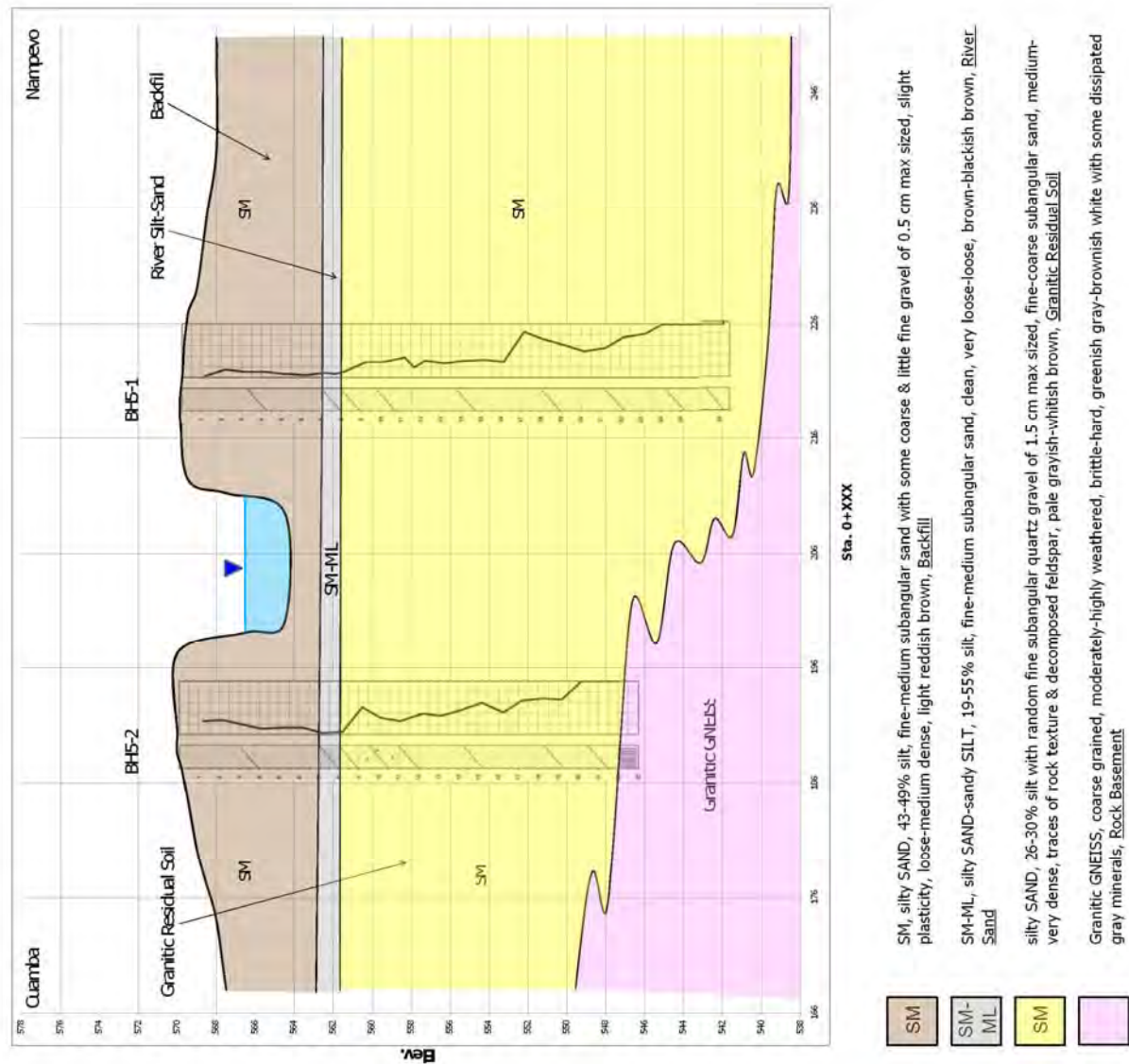
No.3 Matacasse



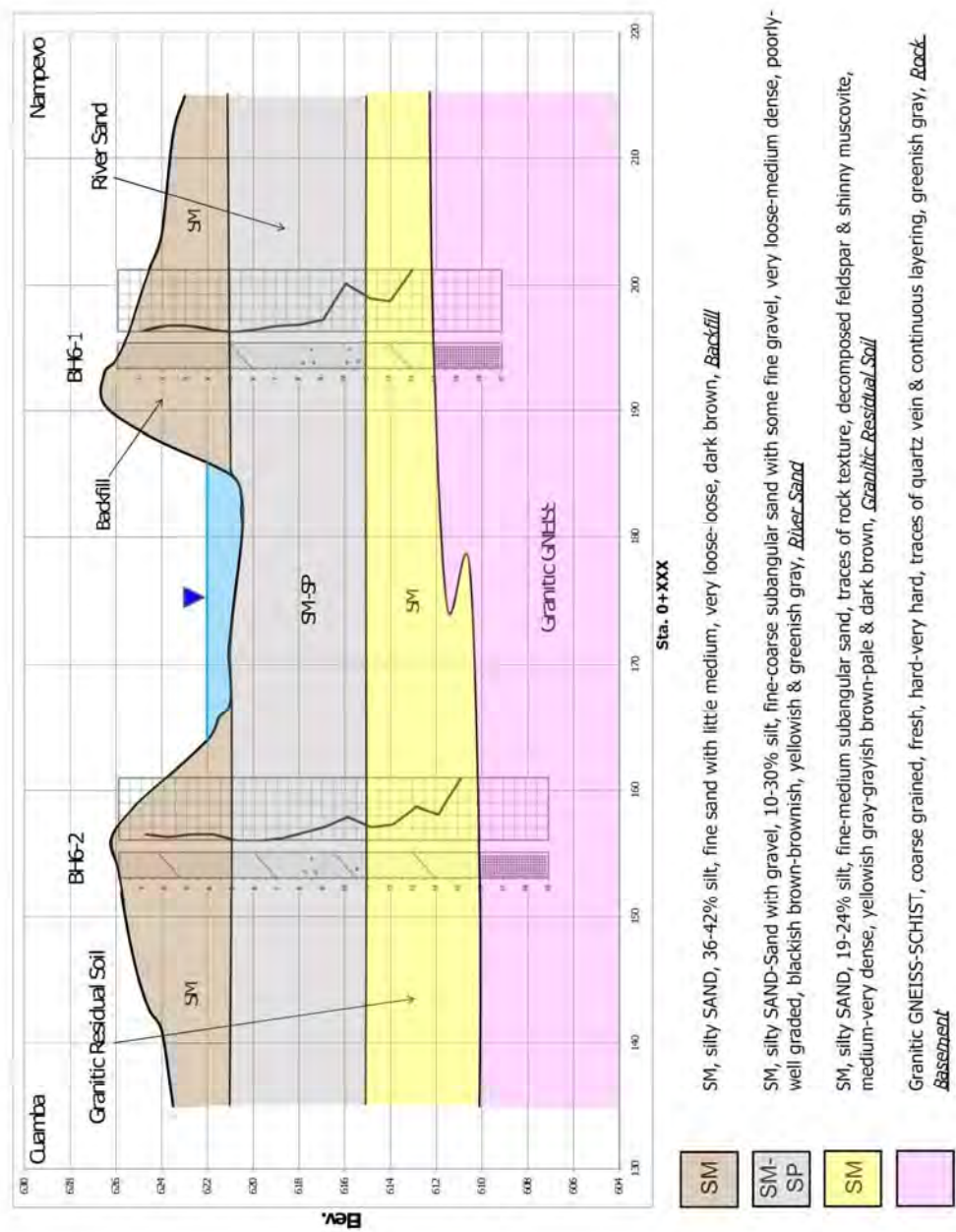
No.4 Lua



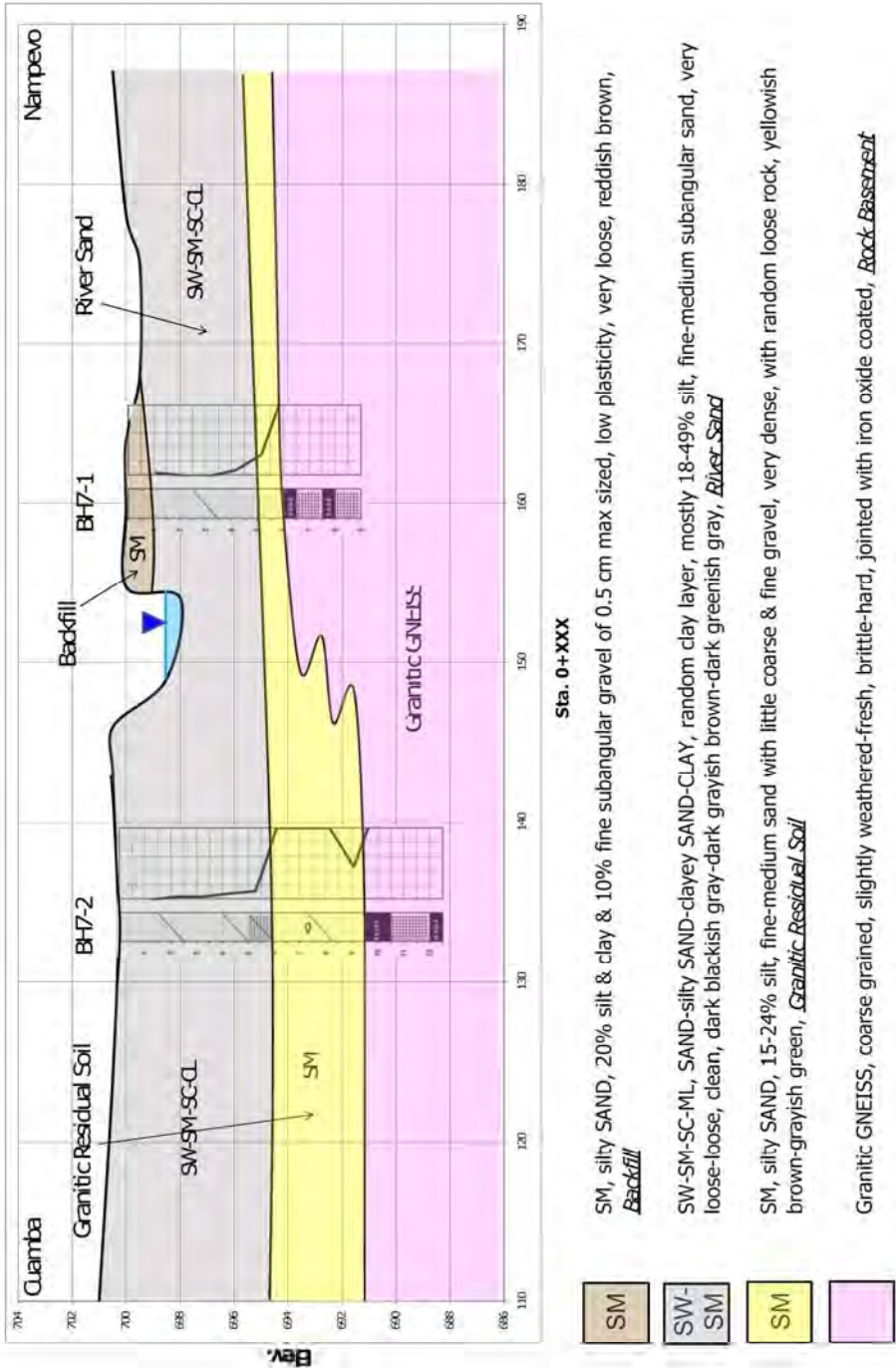
No.5 Ualasse



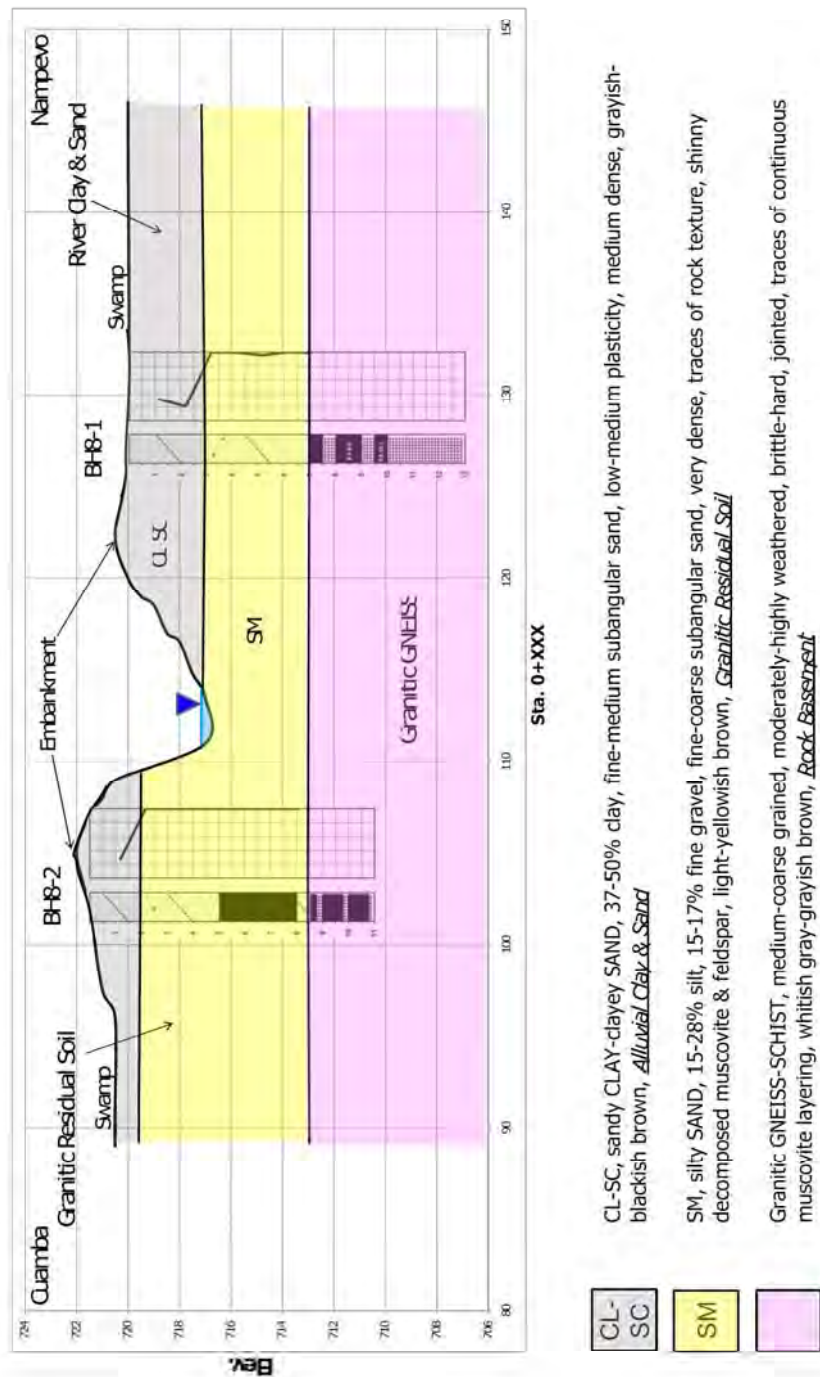
No.6 Licungo



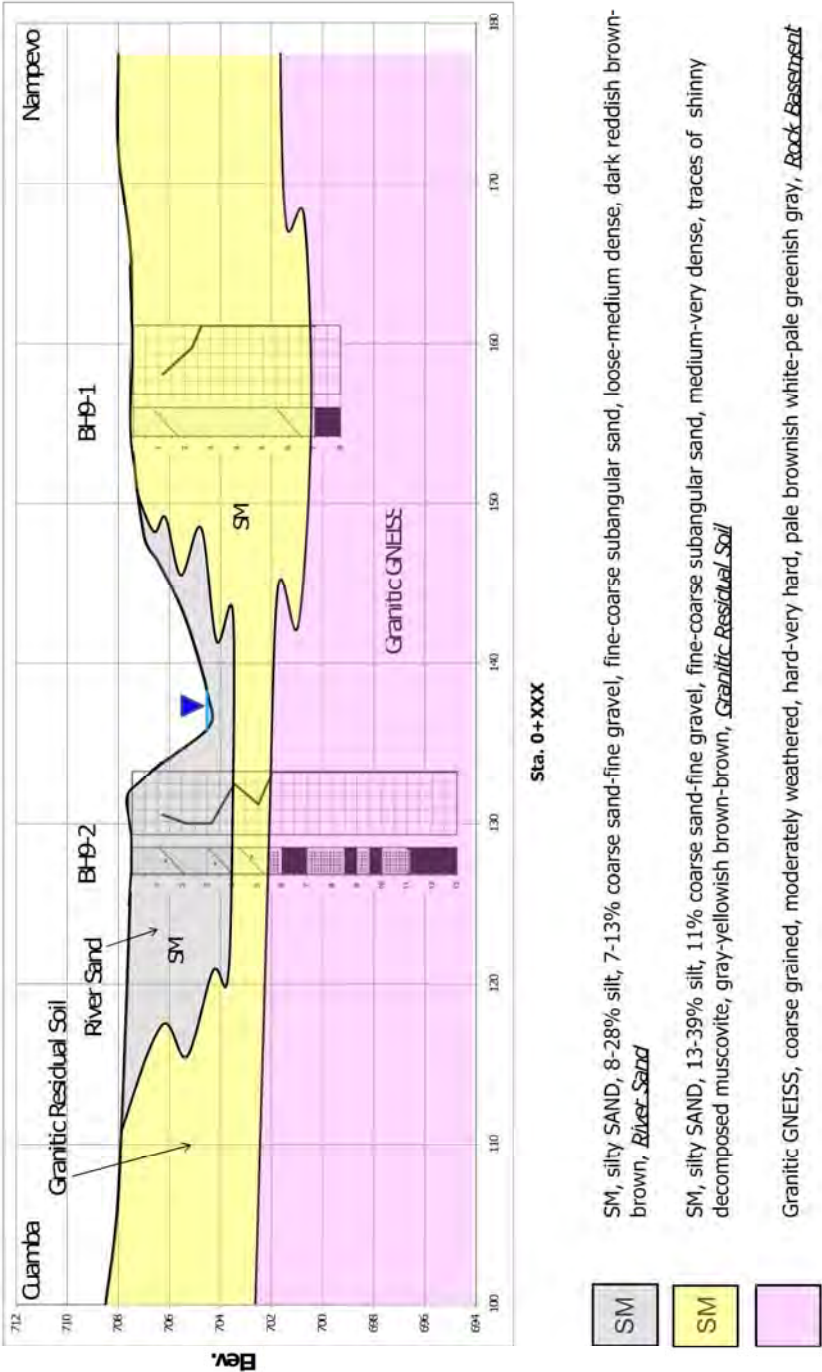
No.7 Nivaco



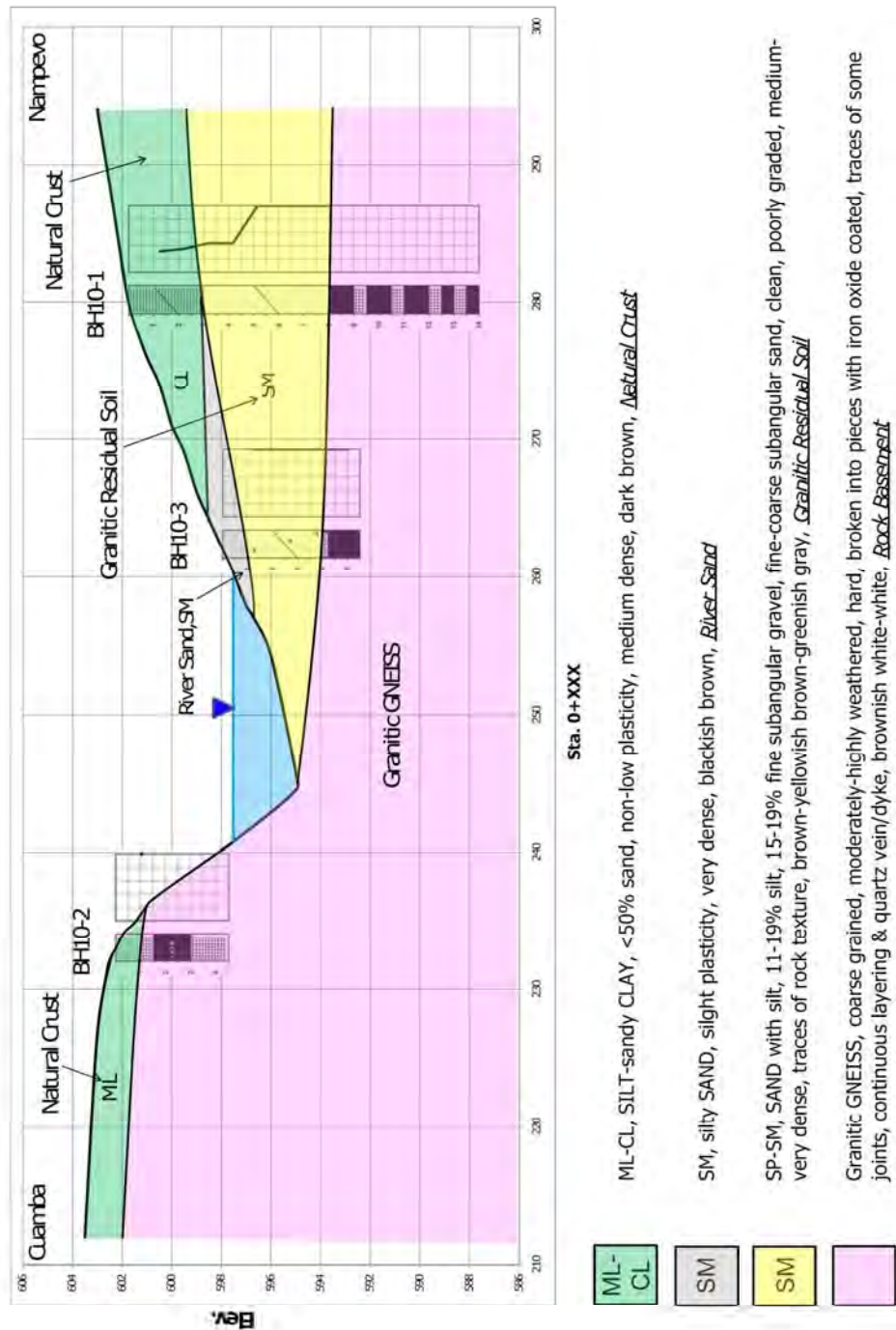
No.8 Matsitse



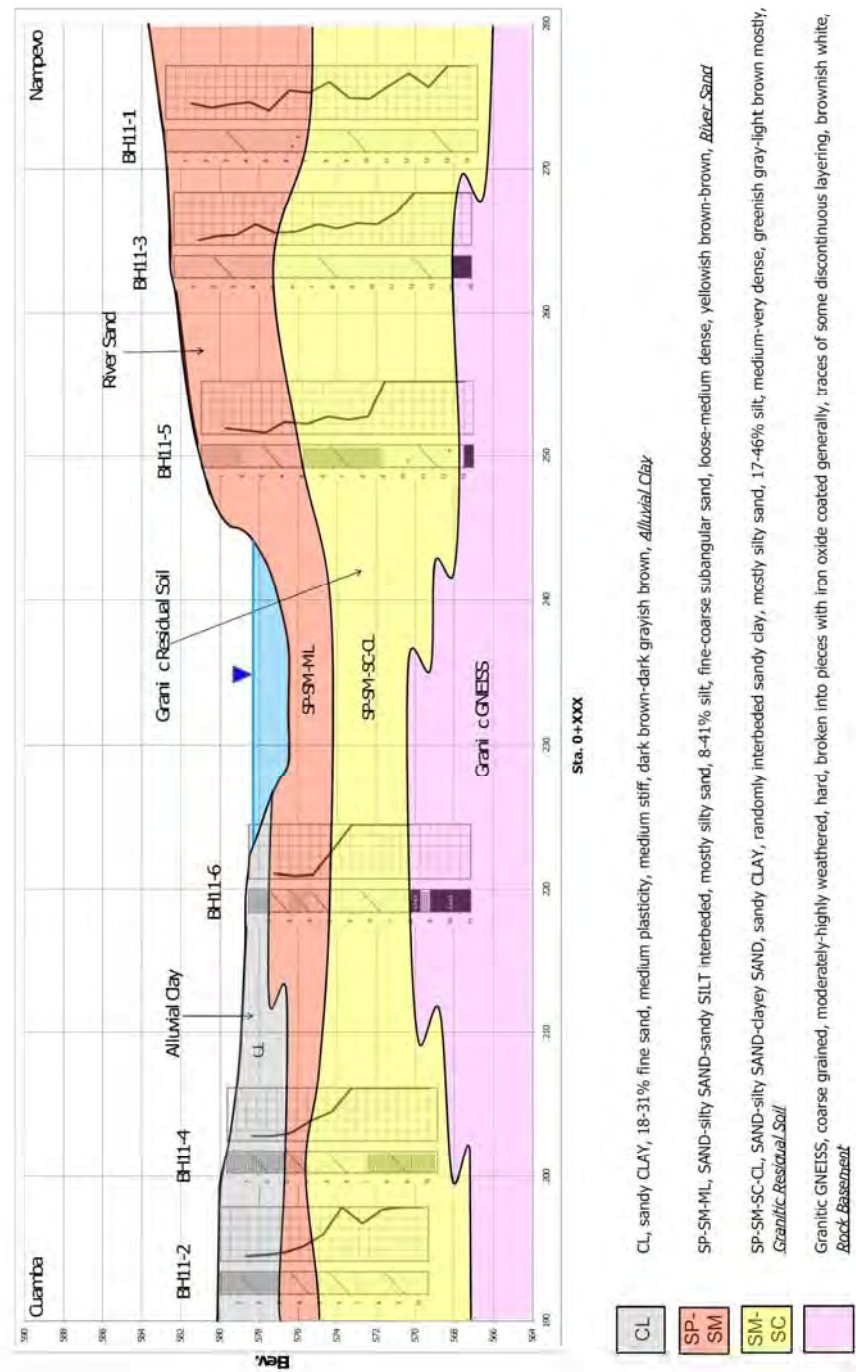
No.9 Namisagua



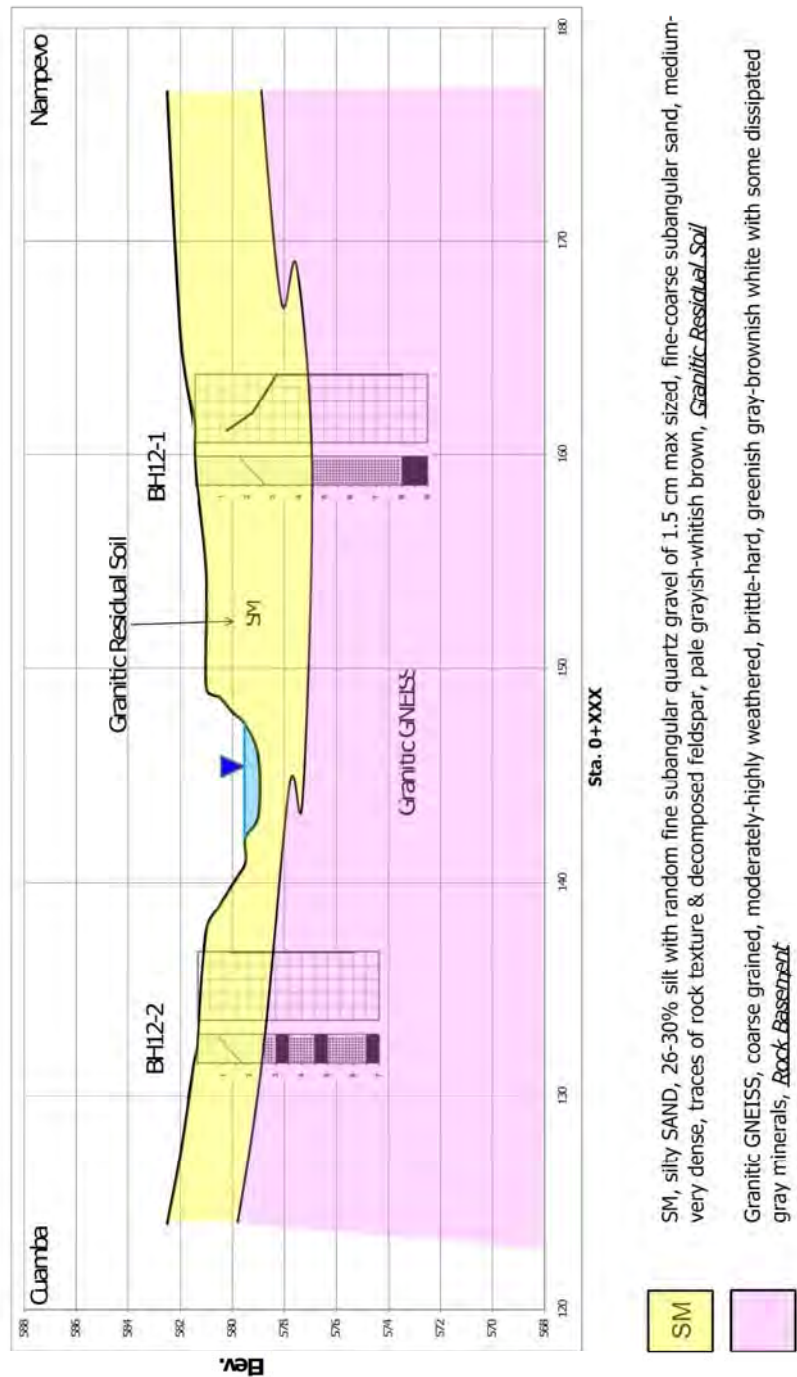
No.10 Nuhusse



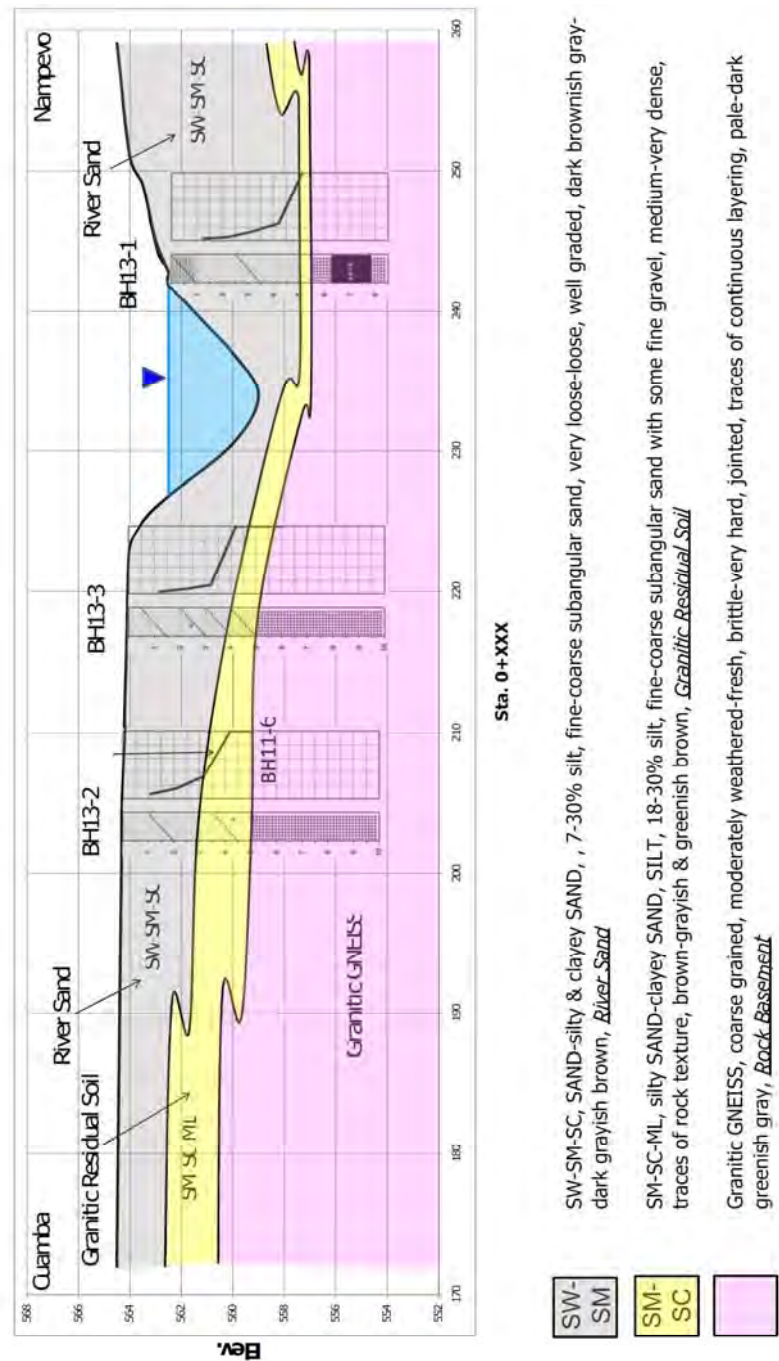
No.11 Lurio



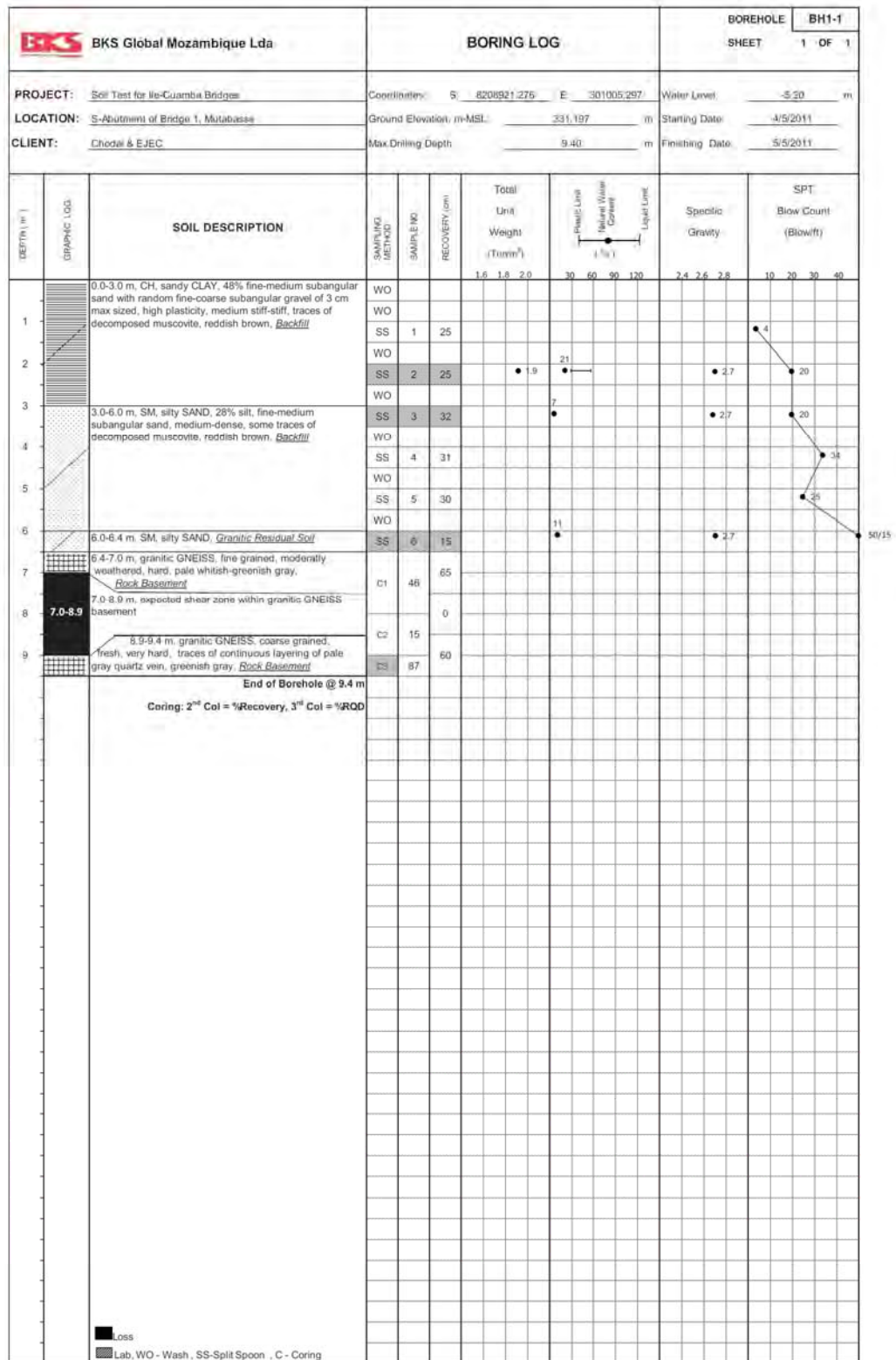
No.12 Muassi



No.13 Namutinbua



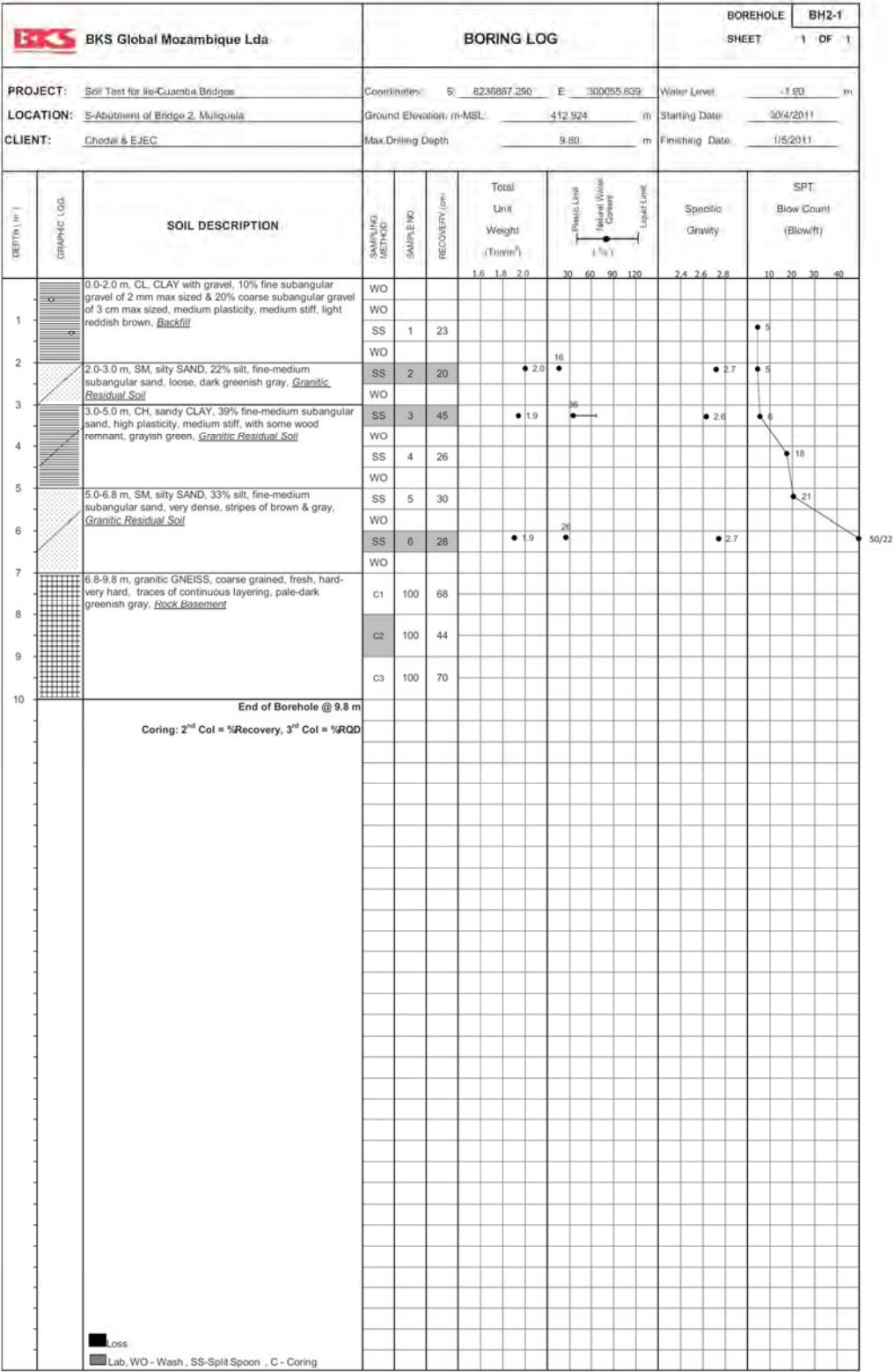
6.3.3 ボーリング柱状図

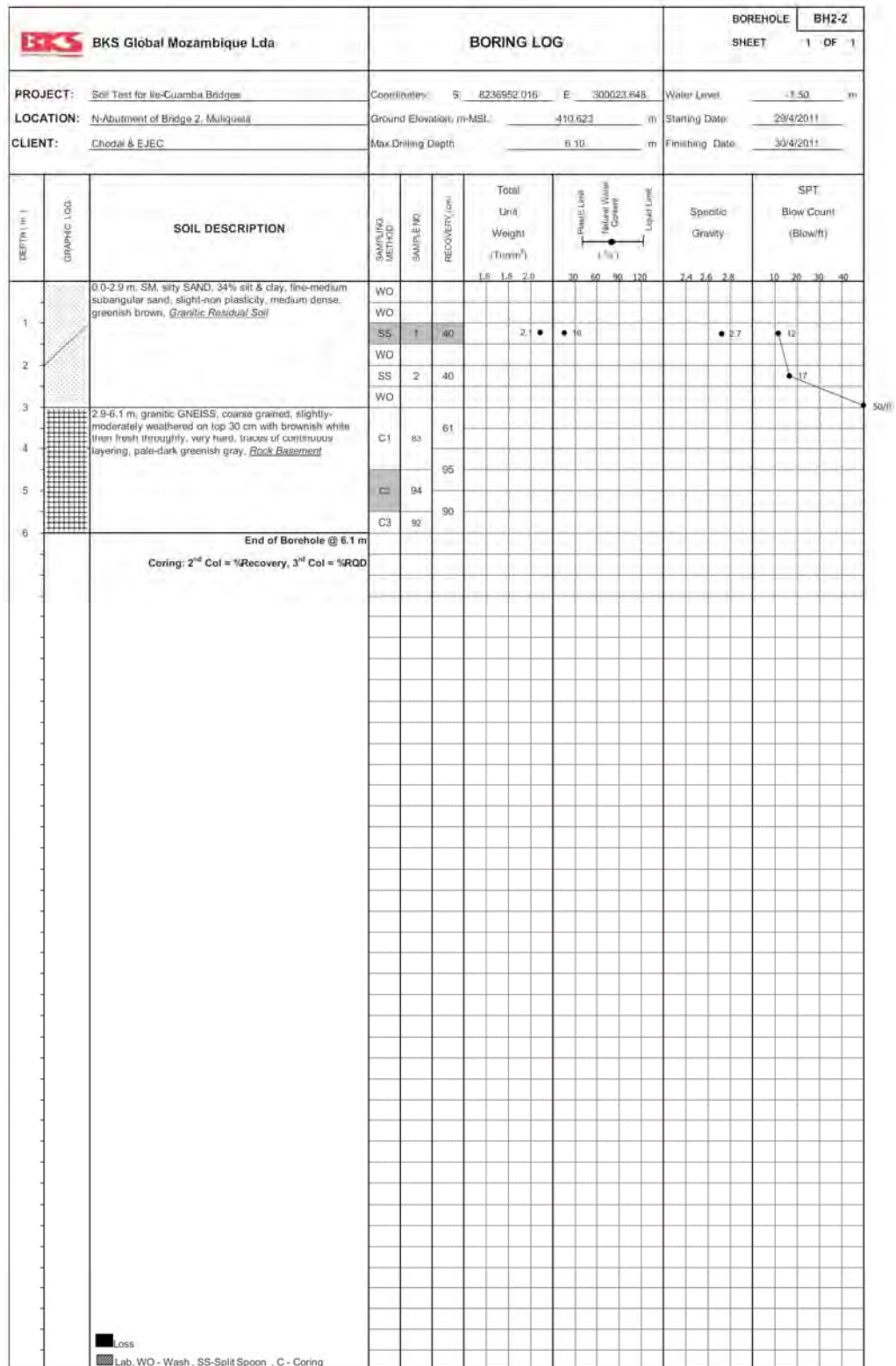


BKS Global Mozambique Lda			BORING LOG				BOREHOLE BH1-2		
							SHEET	1 OF 1	
PROJECT: Soil Test for Ile-Cuamba Bridges			Coordinates: S: 8209019.095 E: 300960.382				Water Level: -1.40 m		
LOCATION: N-Abutment of Bridge 1, Mutabasse			Ground Elevation, m-MSL: 328.647 m				Starting Date: 3/5/2011		
CLIENT: Chodai & EJEC			Max. Drilling Depth: 7.60 m				Finishing Date: 3/5/2011		
DEPTH (m)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO	RECOVERY (cm)	Total Unit Weight (Tonn/m³)	Plastic Limit (Liquid Limit - Plastic Limit)	Specific Gravity	SPT Blow Count (Blow/ft)
						1.5 1.8 2.0	30 60 90 120	2.4 2.6 2.8	10 20 30 40
1		0.0-2.3m, SM, silty SAND, 21% silt with random fine subangular gravel of 2 cm max sized, fine-medium subangular sand, traces of decomposed muscovite & layering, medium-very dense, striped color of yellowish brown-brown-pale grayish white, <u>Granitic Residual Soil</u>	WO						
2			WO						
			SS	1	30	2.0	15	2.8	21
3		2.3-5.0 m, expected shear zone within granitic GNEISS basement	WO						
	2.3-5.0		SS	2	30				50/25
4			C1	Loss					
5		5.0-7.6 m, granitic GNEISS, coarse grained, highly weathered on top 20 cm then fresh thoroughly & very hard, traces of continuous layering, greenish gray, <u>Rock Basement</u>	C2	Loss					
6			C3	Loss					
			C4	Loss	39				
7			C4	83	89				
			C5	92	43				
End of Borehole @ 7.6 m									
Coring: 2 nd Col = %Recovery, 3 rd Col = %RQD									

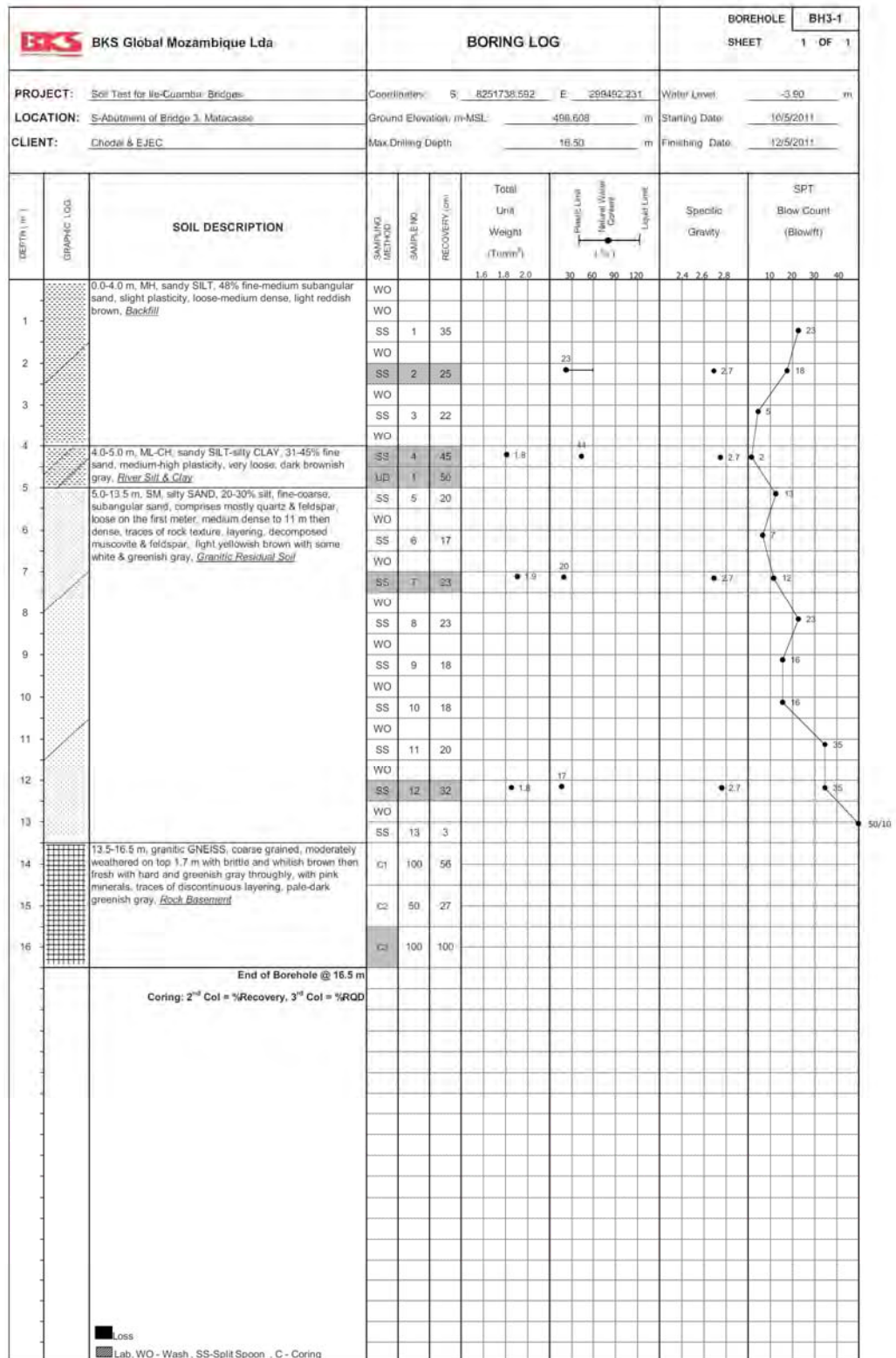
BKS Global Mozambique Lda		BORING LOG				BOREHOLE BH1-3		
						SHEET 1 OF 1		
PROJECT: Soil Test for Ite-Cuamba Bridges		Coordinates: S: 8208995.887 E: 300999.983				Water Level: -0.60 m		
LOCATION: N(R)-Riverside of Bridge 1, Mutabasso		Ground Elevation, m-MSL: 324.439 m				Starting Date: 6/5/2011		
CLIENT: Chodai & EJEC		Max. Drilling Depth: 4.40 m				Finishing Date: 6/5/2011		
DEPTH (m)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (Tonn/m ³)	Specific Gravity	SPT Blow Count (Blow/ft)
1		0.0-1.4 m. SW-SM SAND with silt & gravel, 27% fine subangular gravel of 2 cm max sized, 10% silt, fine-medium subangular sand, well graded, very dense, brown-greenish gray, <u>River Sand</u>	WO			1.5 1.8 2.0	2.4 2.6 2.8	10 20 30 40
2	1.4-3.0	1.4-3.0 m. expected shear zone within granitic GNEISS basement	WO	1	25		2.7	50/11
3		3.0-4.4 m. granitic GNEISS, coarse grained, moderate-highly weathered on top 40 cm & fresh thoroughly, hard-very hard, traces of discontinuous layering of pink quartz vein, pale pinkish-greenish gray, <u>Rock Basement</u>	C1	Loss				
4			C2	Loss				
			C3	0	96			
End of Borehole @ 4.4 m								
Coring: 2 nd Col = %Recovery, 3 rd Col = %RQD								
Loss Lab, WO - Wash, SS-Split Spoon, C - Coring								

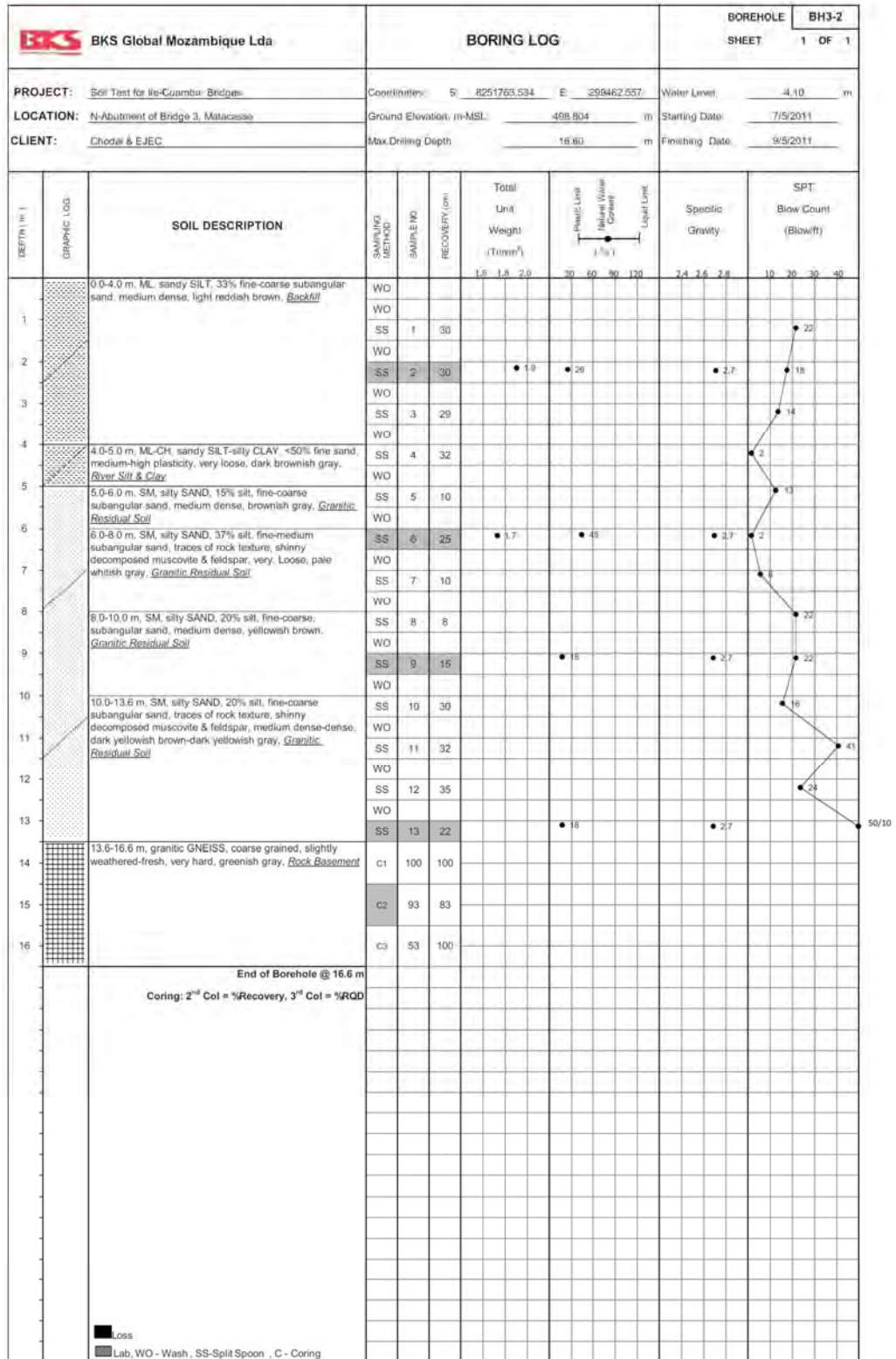
BKS Global Mozambique Lda			BORING LOG				BOREHOLE BH1-4		
							SHEET 1	OF 1	
PROJECT: Soil Test for Ite-Cuamba Bridges			Coordinates: S: 8208991.846 E: 300972.127		Water Level: -1.20 m				
LOCATION: N(L)-Riverside of Bridge 1, Mutabasse			Ground Elevation, m-MSL: 326.231		Starting Date: 1/5/2011				
CLIENT: Chodal & EJEC			Max. Drilling Depth: 4.40		Finishing Date: 2/5/2011				
DEPTH (m)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (T/m³)	Penetration Unit (kg/cm²)	Specific Gravity	SPT Blow Count (Blow/ft)
1		0.0-1.4 m, SM, silty SAND, 30% silt, fine-medium subangular sand, very dense, dark brown, <u>River Sand</u>	WO			1.6 1.8 2.0	30 60 90 120	2.4 2.6 2.8	10 20 30 40
			WO						
			SS	1	40	2.0 ●	● 17	● 2.7	● 50/25
2		1.4-4.4 m, granitic GNEISS, coarse grained, slightly weathered-fresh, hard, not obvious traces of discontinuous layering, pale greenish gray, <u>Rock Basement</u>	C1	100	92				
3			C2	100	81				
			C3	100					
4			C4	100	53				
End of Borehole @ 4.4 m									
Coring: 2 nd Col = %Recovery, 3 rd Col = %RQD									





BKS Global Mozambique Lda		BORING LOG				BOREHOLE BH2-3	
						SHEET 1 OF 1	
PROJECT: Soil Test for Ite-Cuamba Bridges		Coordinates: S: 8236924.456 E: 300034.812				Water Level: -0.60 m	
LOCATION: N-Riverside of Bridge 2, Maliquela		Ground Elevation, m-MSL: 407.996 m				Starting Date: 28/4/2011	
CLIENT: Choda & EJEC		Max. Drilling Depth: 4.70 m				Finishing Date: 29/4/2011	

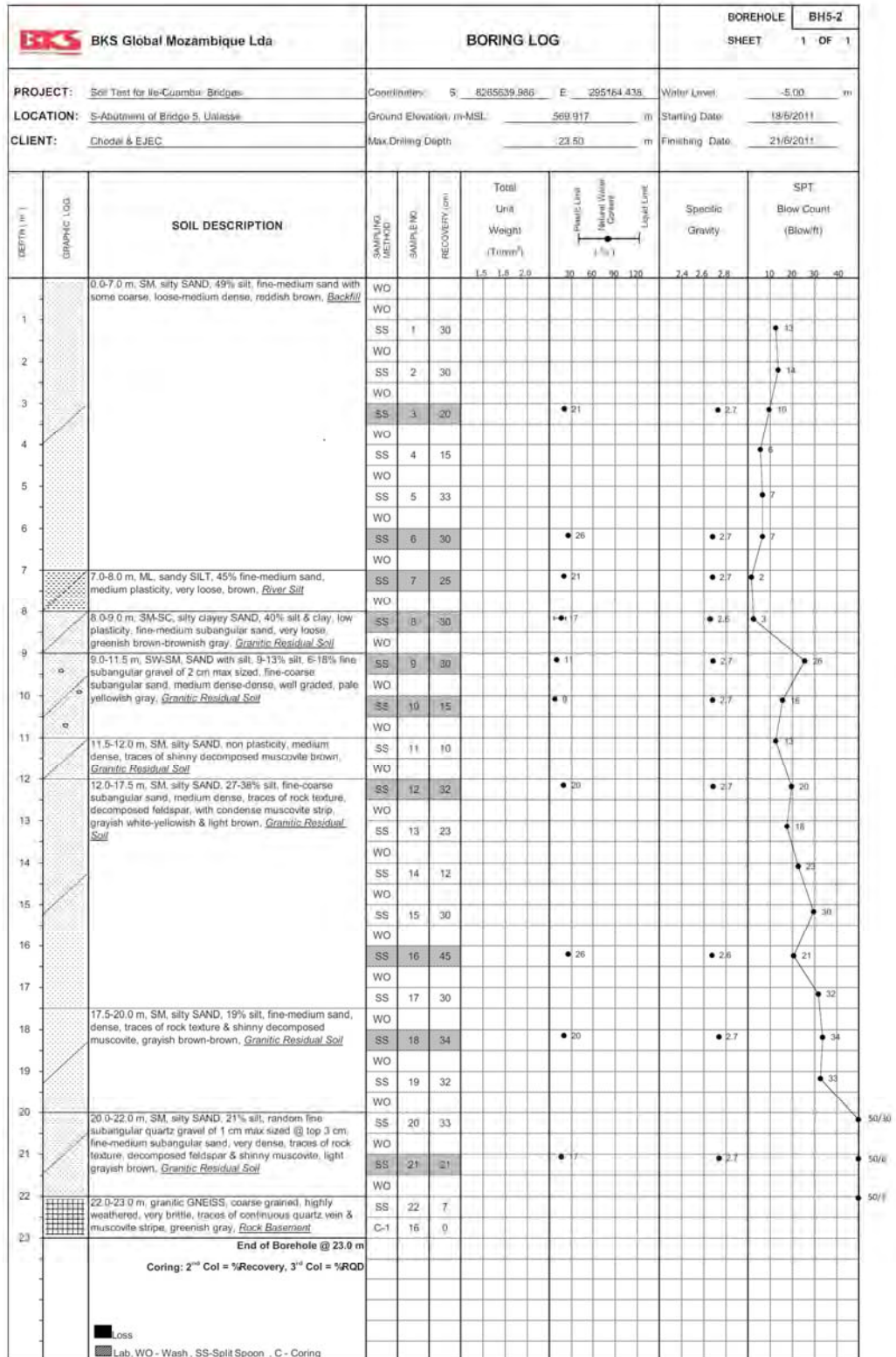


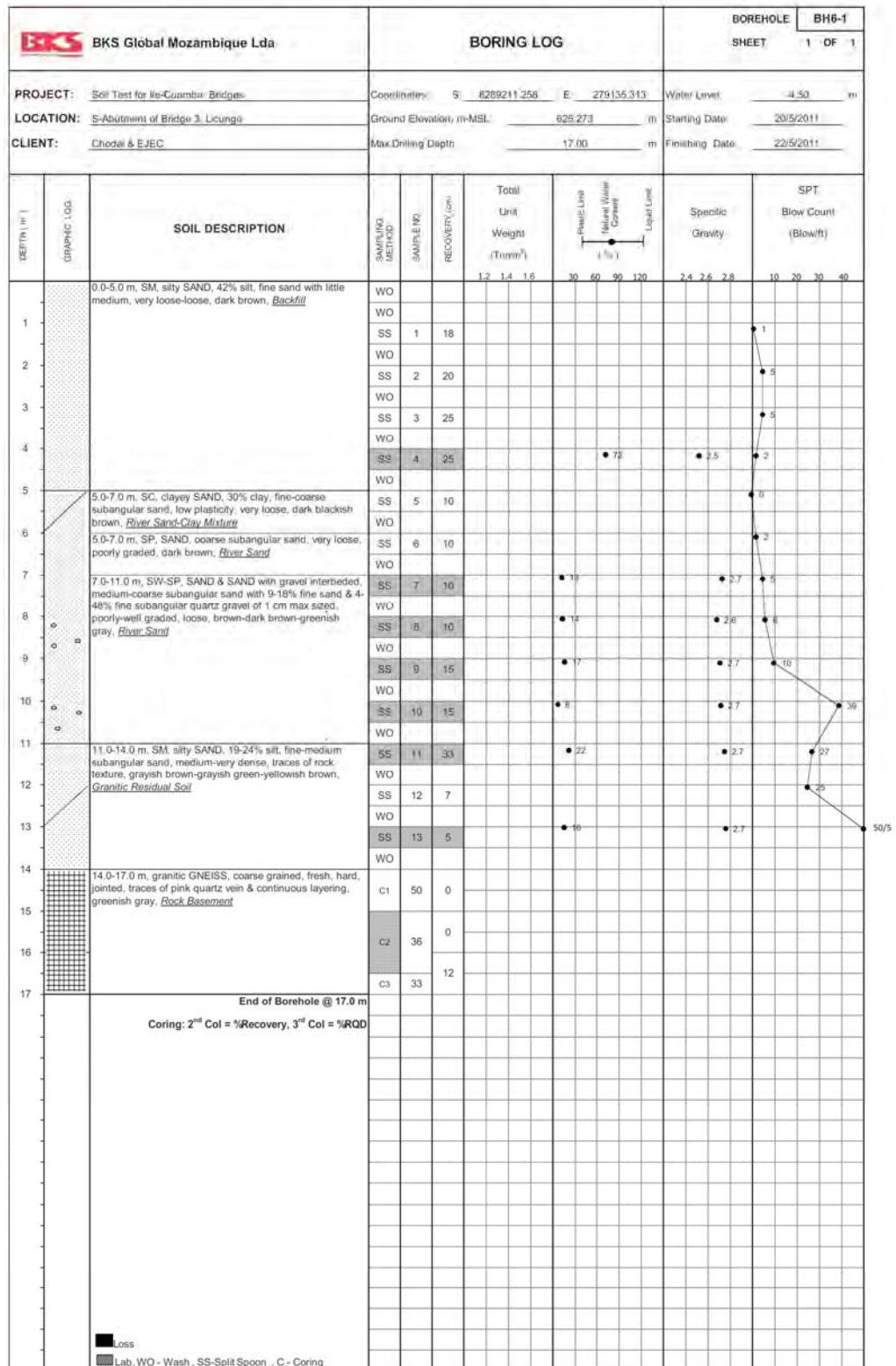


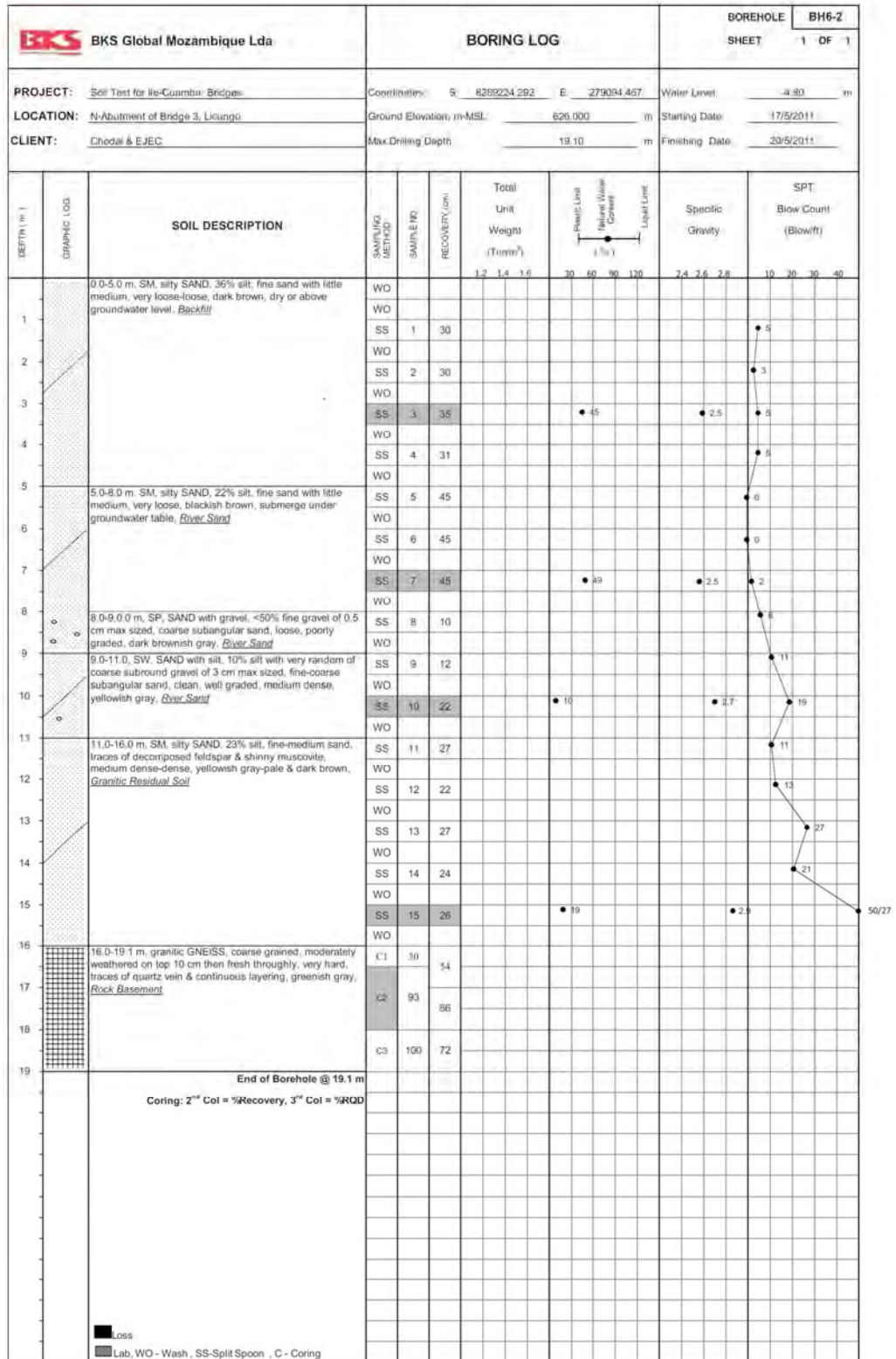
BKS Global Mozambique Lda		BORING LOG				BOREHOLE BH4-1			
						SHEET 1 OF 1			
PROJECT: Soil Test for Ite-Cuamba Bridges		Coordinates: S: 8252727.030 E: 297090.913				Water Level: -1.00 m			
LOCATION: S-Abutment of Bridge 4, Lua		Ground Elevation, m-MSL: 507.985 m				Starting Date: 22/4/2011			
CLIENT: Chodai & EJEC		Max. Drilling Depth: 5.00 m				Finishing Date: 23/4/2011			
DEPTH (m)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (T/mm ³)	Penetration (mm)	Specific Gravity	SPT Blow Count (Blow/ft)
0.0-1.5 m		SP-SM SAND with silt&gravel, 10% silt, 20% angular gravel of schist, fine-medium subangular sand, traces of shiny decomposed muscovite, medium dense, dark brown. <i>Crust with Schist Residual Soil</i>	WO			1.2 1.4 1.6	30 60 90 120	2.4 2.6 2.8	10 20 30 40
1			WO						
1.5-5.0 m		granitic GNEISS, coarse grained, moderately weathered on top 0.5 m then fresh throughly, very hard, with trace of discontinuous layering, greenish gray-dark gray. <i>Rock Basement</i>	WO	1	34		14	2.4	18
2			C1	100	85				
3				100	100				
4			C2	100	100				
5									
End of Borehole @ 5.0 m									
Coring: 2 nd Col = %Recovery, 3 rd Col = %RQD									
Loss Lab, WO - Wash, SS-Split Spoon, C - Coring									

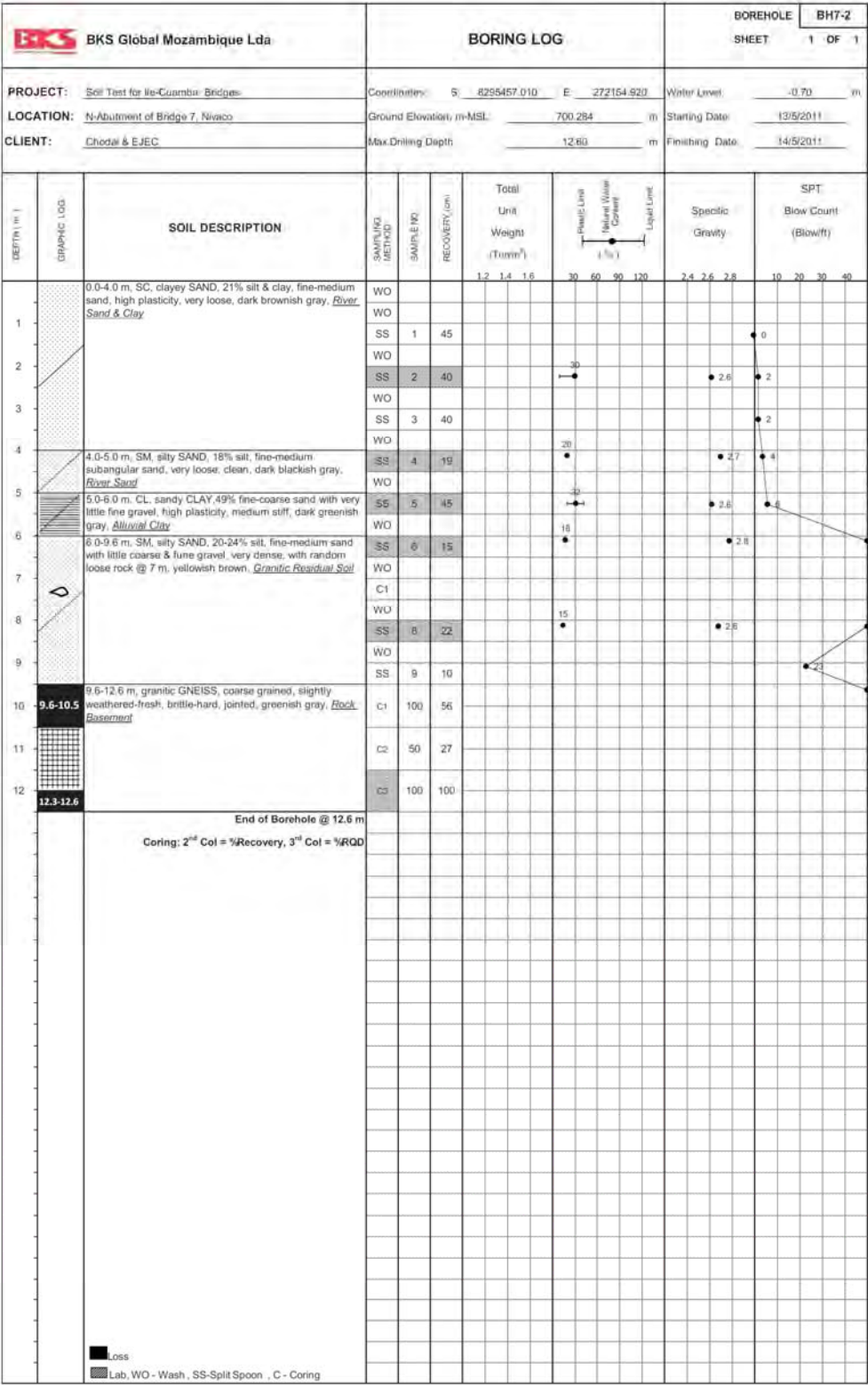
BKS Global Mozambique Lda		BORING LOG				BOREHOLE BH4-3			
						SHEET 1 OF 1			
PROJECT: Soil Test for Ite-Cuamba Bridges		Coordinates: S: 8252705.259 E: 297055.465				Water Level: -0.50 m			
LOCATION: S-Riverside of Bridge 4, Lua		Ground Elevation, m-MSL: 506.186 m				Starting Date: 26/4/2011			
CLIENT: Chodai & EJEC		Max. Drilling Depth: 4.30 m				Finishing Date: 27/4/2011			
DEPTH (m)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (Tonn/m ³)	Penetration (kg/cm ²)	Specific Gravity	SPT Blow Count (Blow/ft)
1		0.0-1.3 m, SM, silty SAND, 35% silt; fine sand with little medium & coarse, slight plasticity, very dense, dark brownish gray, <u>River Sand</u>	WO			1.2 1.4 1.6	30 60 90 120	2.4 2.6 2.8	10 20 30 40
2		1.3-4.3 m, granitic GNEISS, coarse grained, slightly weathered on top 30 cm & fresh throughly, hard-very hard, with pink quartz vein @ 2.0-2.2 & 3.0-3.4 m, traces of discontinuous layering, pale-dark greenish gray, <u>Rock Basement</u>	SS	1	30		37	2.8	50/15
3			C1	100	61				
4			C2	100	100				
			C3	100	100				
End of Borehole @ 4.3 m									
Coring: 2 nd Col = %Recovery, 3 rd Col = %RQD									
Loss Lab, WO - Wash, SS-Split Spoon, C - Coring									

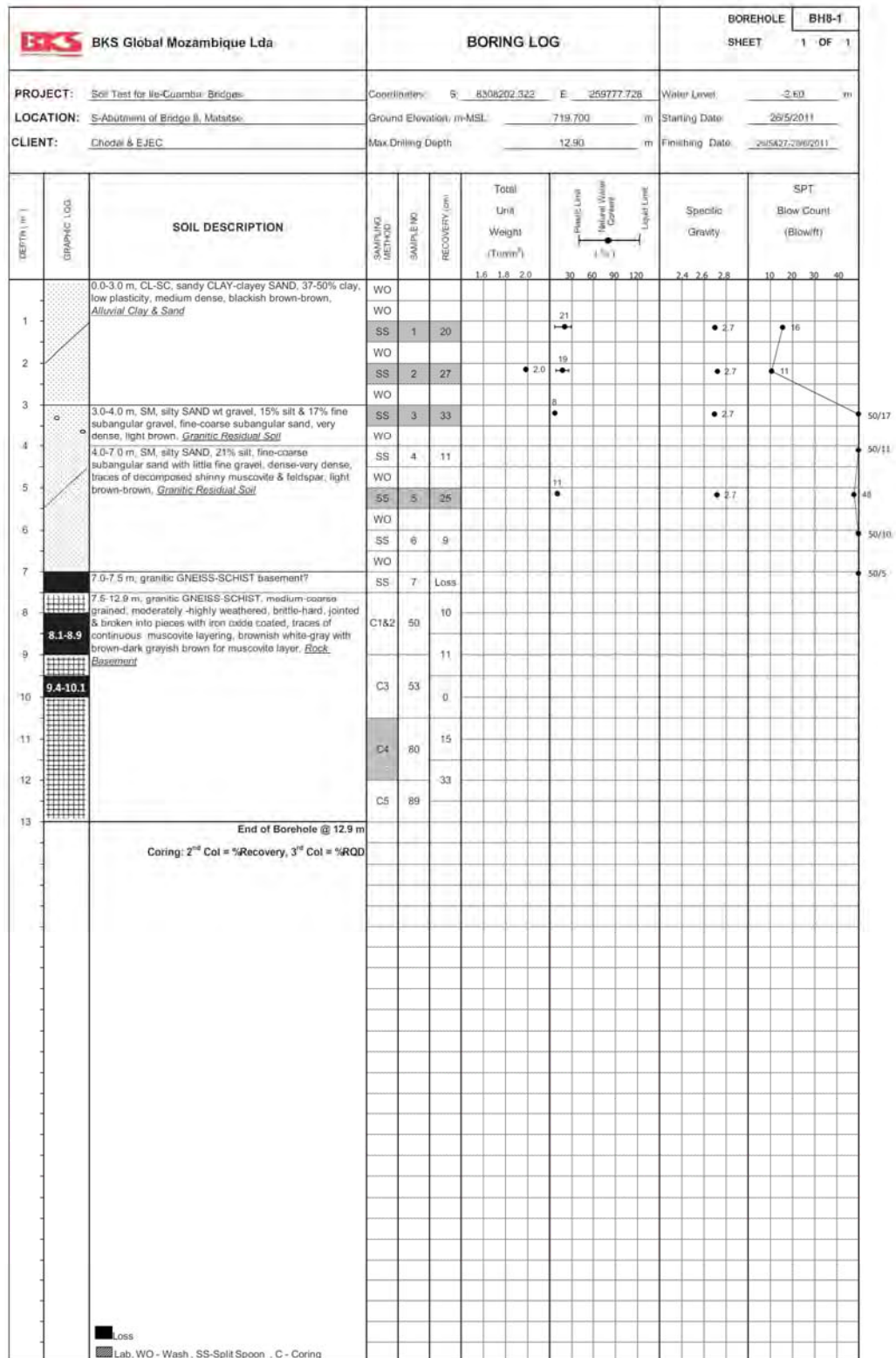
BKS Global Mozambique Lda			BORING LOG				BOREHOLE BH5-1		
							SHEET 1 OF 2		
PROJECT: Soil Test for Ile-Cuamba Bridges			Coordinates: S: 8285611.369 E: 285199.796				Water Level: -4.40 m		
LOCATION: S-Abutment of Bridge 5, Uaiasse			Ground Elevation, m-MSL: 569.957 m				Starting Date: 18/4/2011		
CLIENT: Chodai & EJEC			Max. Drilling Depth: 26.50 m				Finishing Date: 22/4&23/6/2011		
DEPTH (m)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (%)	Total Unit Weight (T/mm³)	Plastic Limit (Liquid Limit) (Water Content) (%)	Specific Gravity	SPT Blow Count (Blow/ft)
0.0-7.0 m		SM, silty SAND, 43% silt, fine-medium subangular sand with some coarse & little fine gravel of 0.5 cm max sized, slight plasticity, loose-medium dense, light reddish brown, <u>Backfill</u>	WO			1.5 1.6 2.0	30 60 90 120	2.4 2.6 2.8	10 20 30 40
1			WO						
2			SS	1	24				2
3			WO			1.9	19	2.7	8
4			SS	2	29				
5			WO			2.0	25	2.7	6
6			SS	3	20				
7			WO						6
8			SS	4	20				
9			WO						4
10			SS	5	20				
11			WO						3
12			SS	6	45				
13			WO			2.1	18	2.6	5
14		7.0-8.0 m, SM, silty SAND, 19% silt, fine-medium, subangular sand, clean, loose, blackish brown, <u>Peyer Sand</u>	SS	7/1	30				
15			SS	7/2	33				4
16		8.0-9.0 m, SM, silty SAND, <50% silt, fine sand, slight plasticity, loose, pale greenish gray, <u>Granitic Residual Soil</u>	SS	8	23				6
17			WO						
18		9.0-11.0 m, SM, silty SAND, 30% silt, fine-coarse subangular sand with little fine gravel of 3 mm max sized, medium dense, whitish gray, <u>Granitic Residual Soil</u>	SS	9	43	1.9	17	2.6	15
19			WO						15
20			SS	10	20				
21			WO						19
22			SS	11/1	32				
23			SS	11/2	25				10
24			WO			1.7	34	2.7	16
25			SS	12	34				
26			WO						14
27			SS	13	35				
28			WO						16
29			SS	14	34				
30			WO						17
31			SS	15	38				
32			WO						15
33			SS	16	26				
34			WO						4
35			SS	17	30		12	2.7	
36			WO						36
37			SS	18	26				
38			WO						31
39			SS	19	23				
40			WO						25
41			SS	20	32				
42			WO			1.8	24	2.7	26
43			SS	21	45				
44			WO						38
45			SS	22	30				
46			WO						41
47			SS	23	38				
48			WO						50/24
49			SS	24	20		12	2.6	
50			WO						
51			SS	25	35		26	2.7	50/25
52			WO						



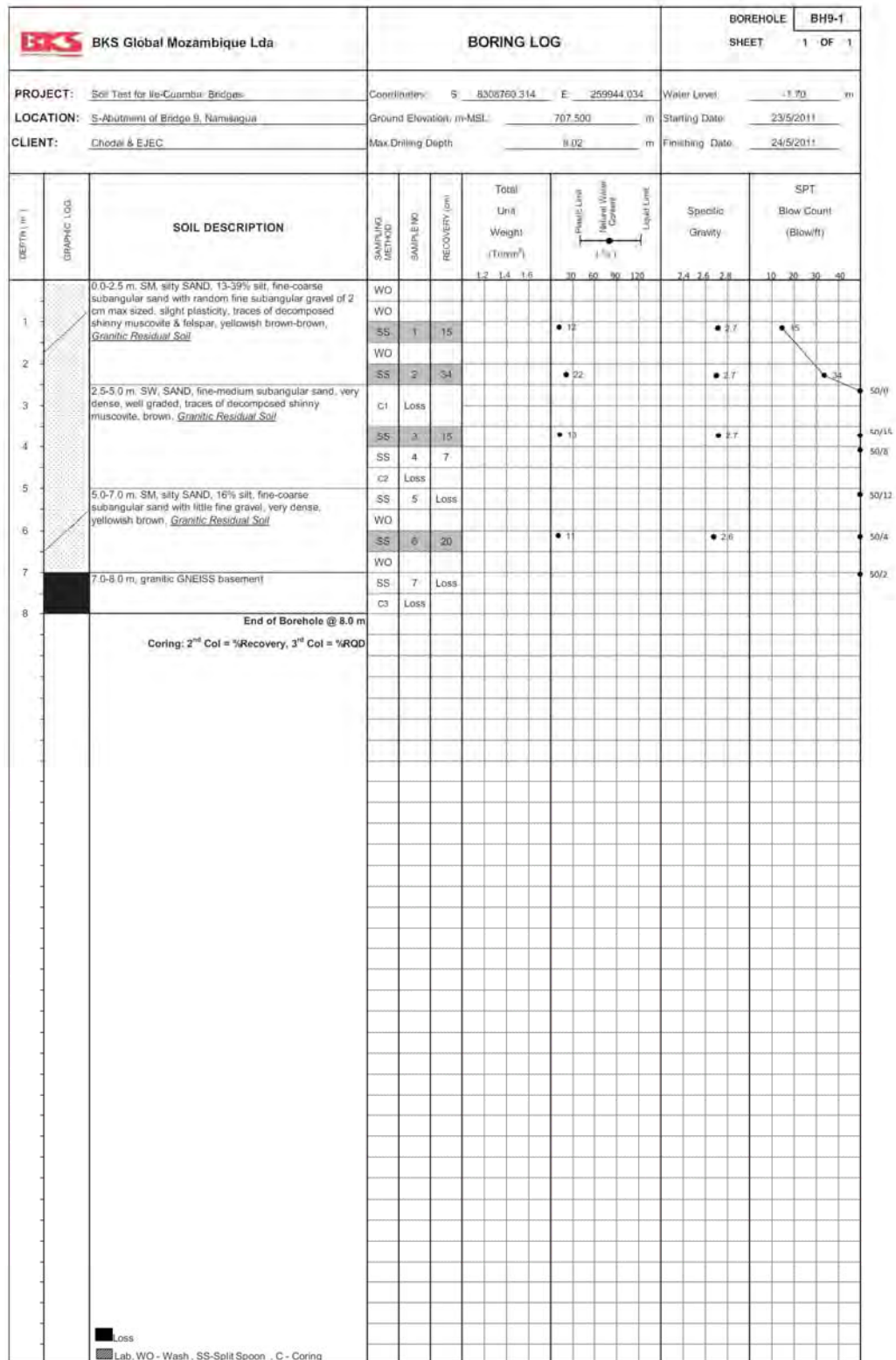


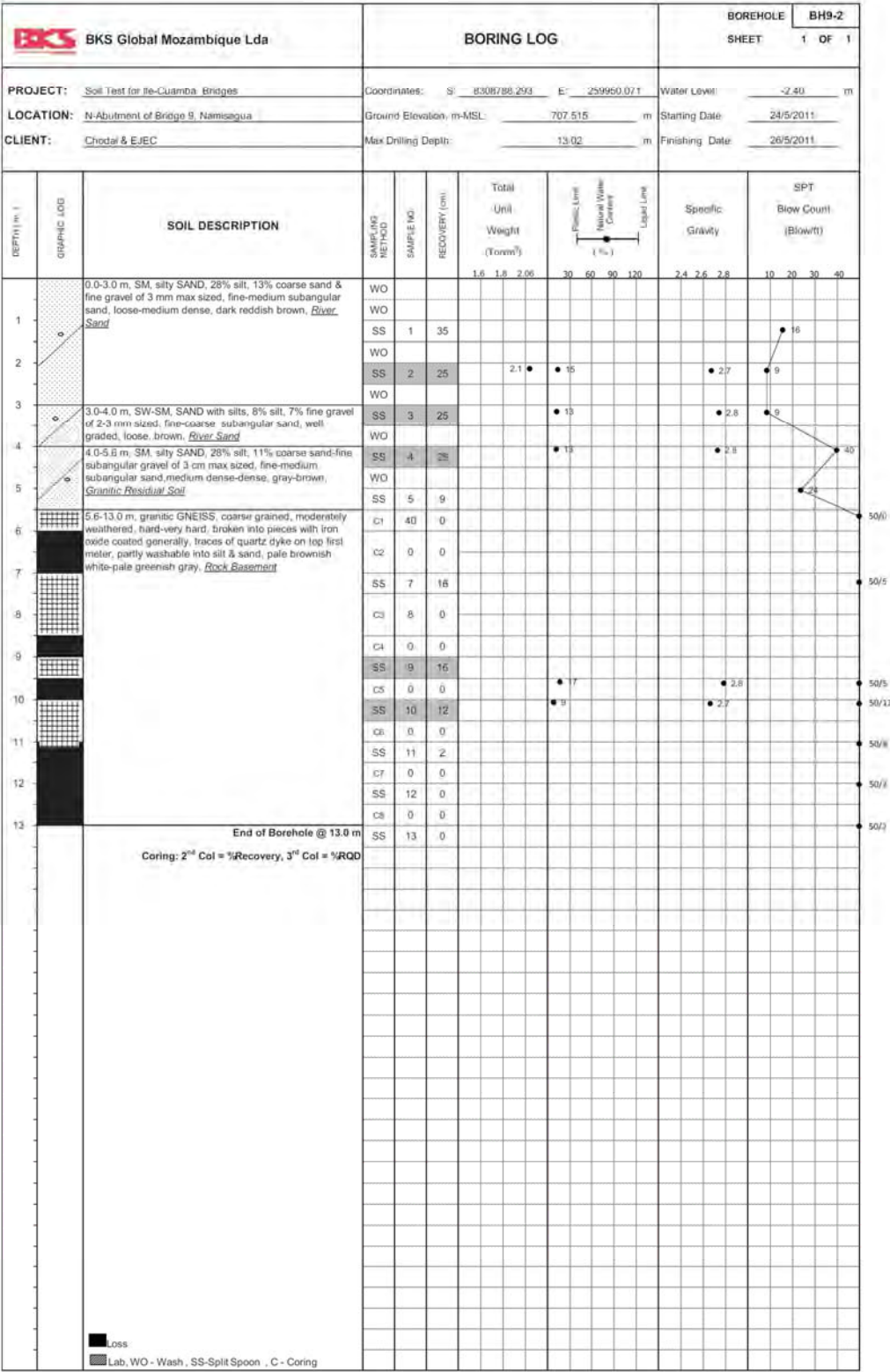


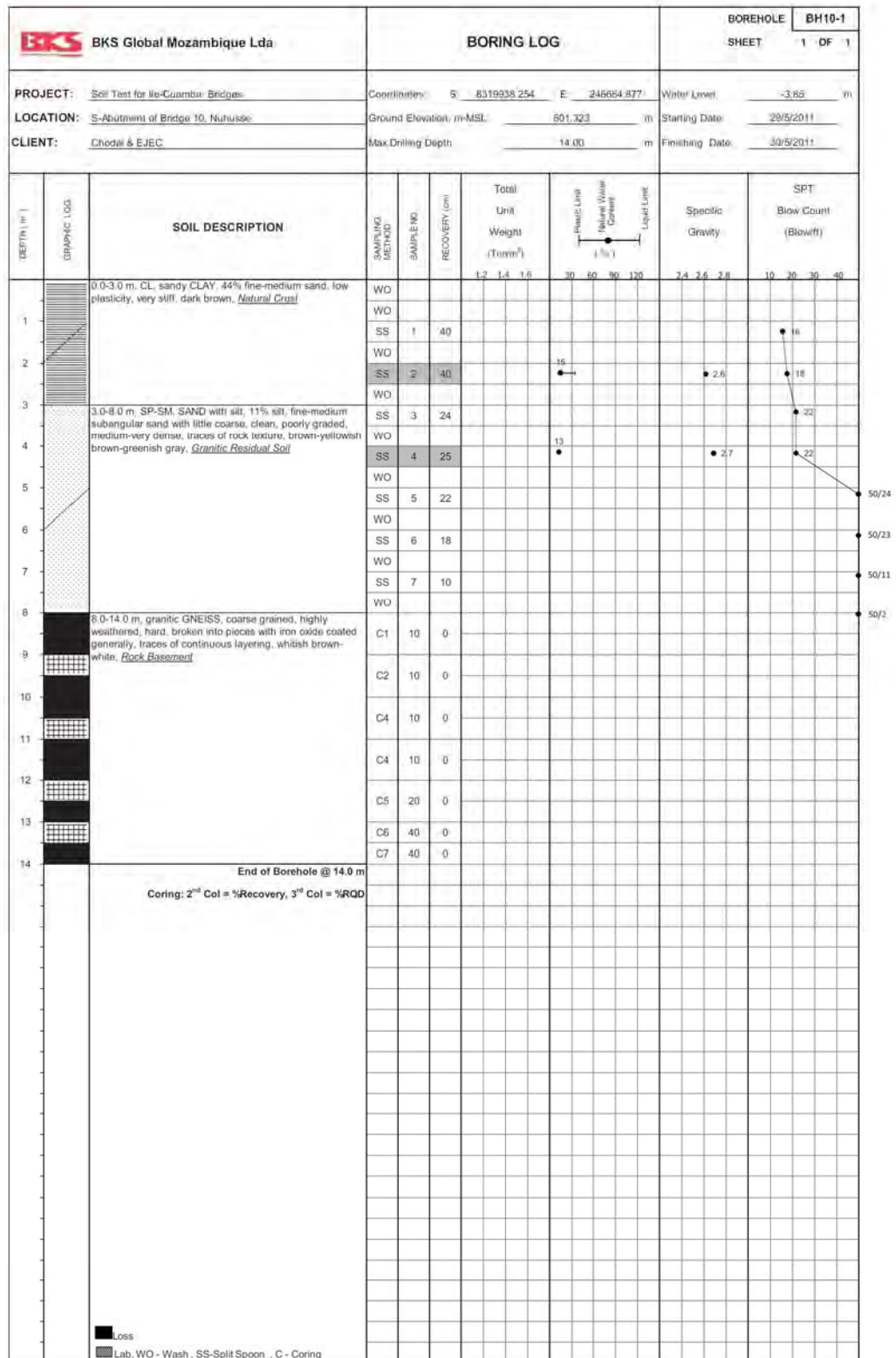




BKS Global Mozambique Lda		BORING LOG				BOREHOLE BH8-2				
						SHEET 1 OF 1				
PROJECT: Soil Test for Ile-Cuambara Bridges		Coordinates: S 8308227.682 E 259773.500				Water Level: -1.80 m				
LOCATION: N-Abutment of Bridge 8, Matatse		Ground Elevation, m-MSL: 721.500 m				Starting Date: 27/5/2011				
CLIENT: Chodai & EJEC		Max. Drilling Depth: 9.00 m				Finishing Date: 27/5/2011				
DEPTH (m)	GRAPHIC LOG	SOIL DESCRIPTION		SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (Tonn/m³)	Plastic Limit (Liquid Limit - Plastic Limit) (%)	Specific Gravity	SPT Blow Count (Blow/ft)
1		0.0-2.0 m, SC, clayey SAND, 45% clay, fine-medium subangular sand with very random fine angular quartz gravel of 1 cm max sized, low-medium plasticity, medium dense, grayish brown, <i>Alluvial Clay & Sand</i>	WO				1.2 1.4 1.6	30 60 90 120	2.4 2.6 2.8	10 20 30 40
2		2.0-3.0 m, SM, silty SAND wt gravel, 15% silt, 15% fine subangular gravel, fine-medium sand, very dense, yellowish brown, <i>Granitic Residual Soil</i>	SS	1	30			15	2.7	15
3		3.0-5.0 m, SM, silty SAND, 21-28% silt, fine-medium sand, very dense, traces of granitic rock texture & decomposed feldspar to be silt, light-yellowish brown, <i>Granitic Residual Soil</i>	SS	2	25			8	2.7	50/20
4		5.0-8.0 m, Granitic Residual Soil	SS	3	33			16	2.7	50/24
5			SS	4	40			12	2.7	50/27
6			WO							50/5
7			SS	5	Loss					50/4
8			WO							50/5
9			SS	6	Loss					50/5
10			WO							50/5
11			SS	7	Loss					50/5
12			WO							50/5
13			SS	8	10					50/5
14			C1	40	0					50/5
15			C2	10	0					50/5
16			C3	10	0					50/5
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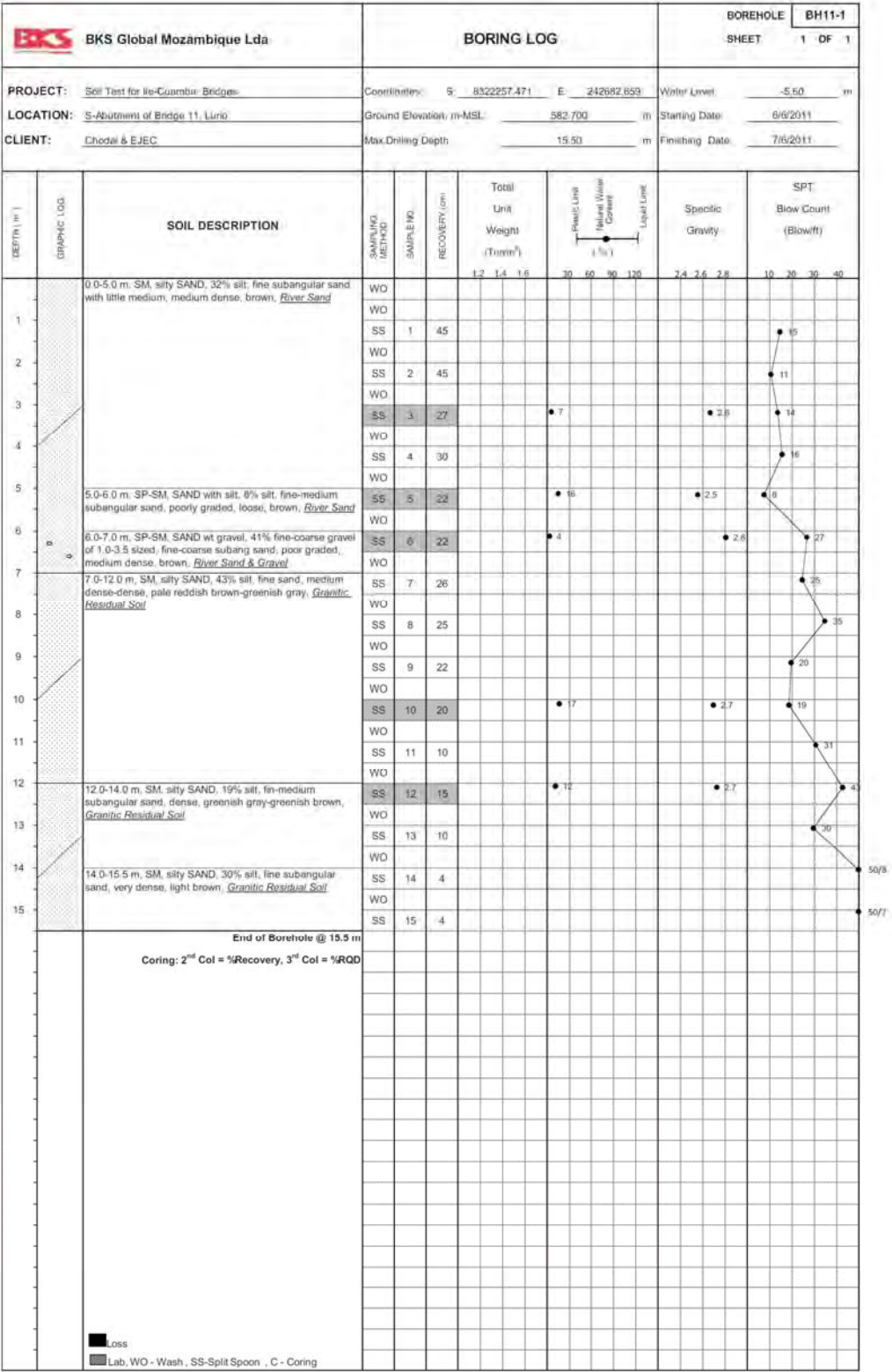


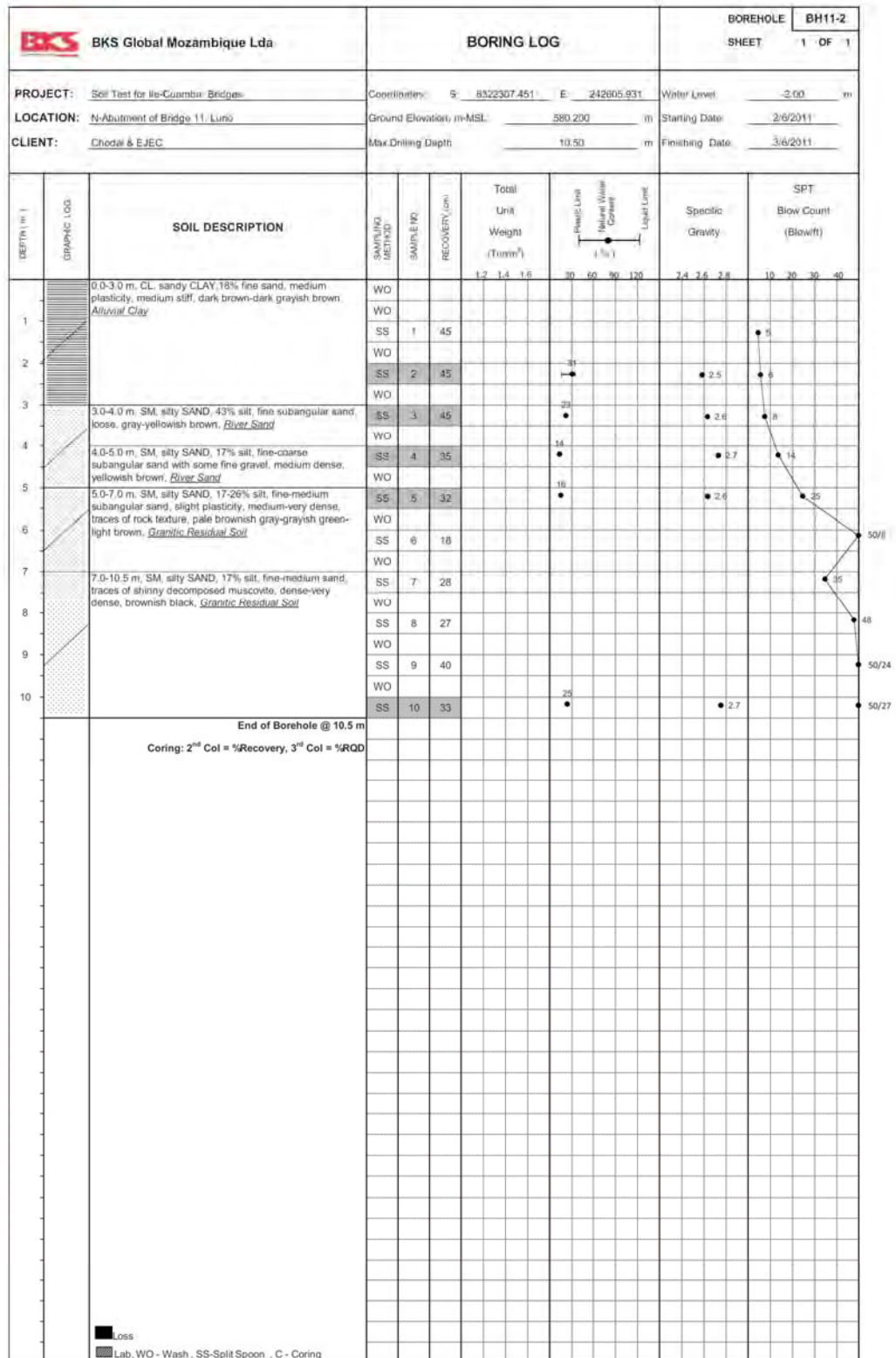


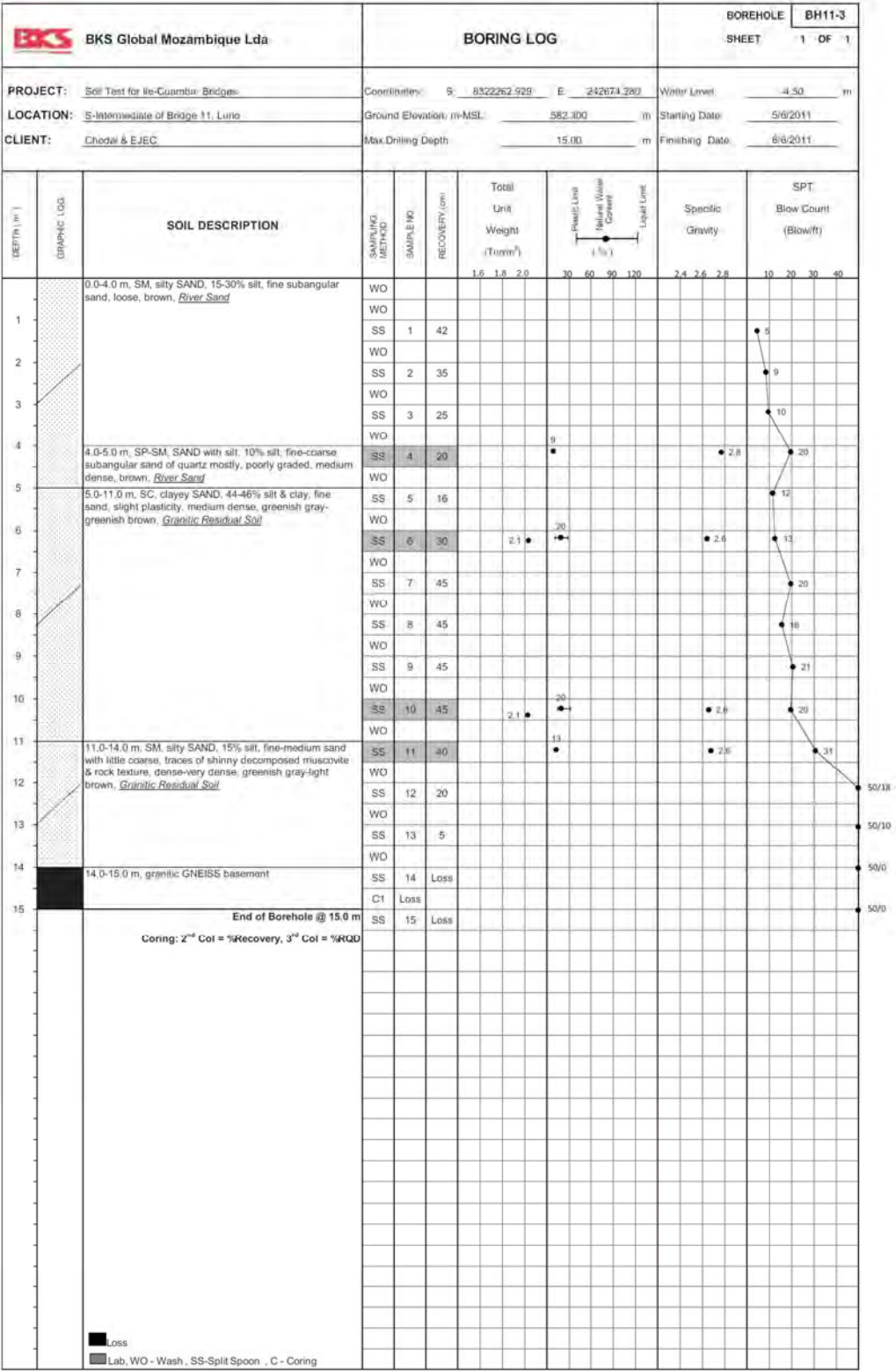


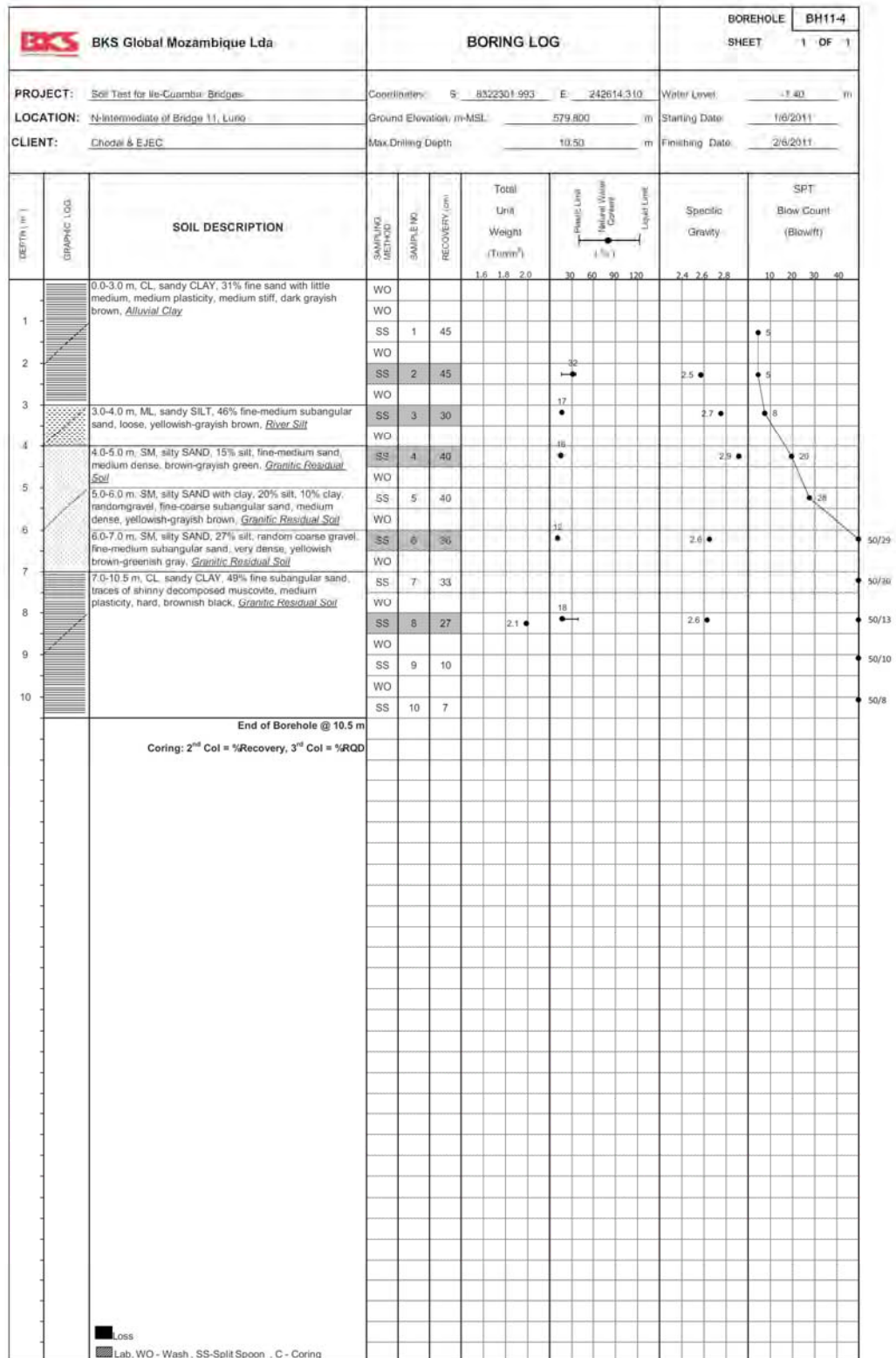
BKS Global Mozambique Lda			BORING LOG				BOREHOLE BH10-Z		
							SHEET	1 OF 1	
PROJECT: Soil Test for Ite-Cuamba Bridges			Coordinates: S 8319967.221 E 248640.890				Water Level: -0.70 m		
LOCATION: N-Abutment of Bridge 10, Nuhussa			Ground Elevation, m-MSL: 601.872 m				Starting Date: 26/5/2011		
CLIENT: Choda & EJEC			Max.Drilling Depth: 4.30 m				Finishing Date: 31/5/2011		
DEPTH (m)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO	RECOVERY (%)	Total Unit Weight (T/m³)	Plastic Limit (Liquid Limit) (Water Content)	Specific Gravity	SPT Blow Count (Blow/ft)
		0.0-1.3 m: ML SILT, non plasticity, medium dense, dark brown. <u>Natural Crust</u>	WD			1.2 1.4 1.6	30 60 90 120	2.4 2.6 2.8	10 20 30 40
1		1.3-4.3 m: granitic GNEISS, coarse grained, moderately-highly weathered, hard, broken into pieces with iron oxide coated generally, traces of some joints, continuous layering & pink quartz vein, brownish white-white, lowest 3 cm is dark greenish gray rock. <u>Rock Basement</u>	SS	1	Loss				
2			C1	10	0				
3			C2	0	0				
4			C3	20	0				
			C4	0	0				
End of Borehole @ 4.3 m									
Coring: 2 nd Col = %Recovery, 3 rd Col = %RQD									

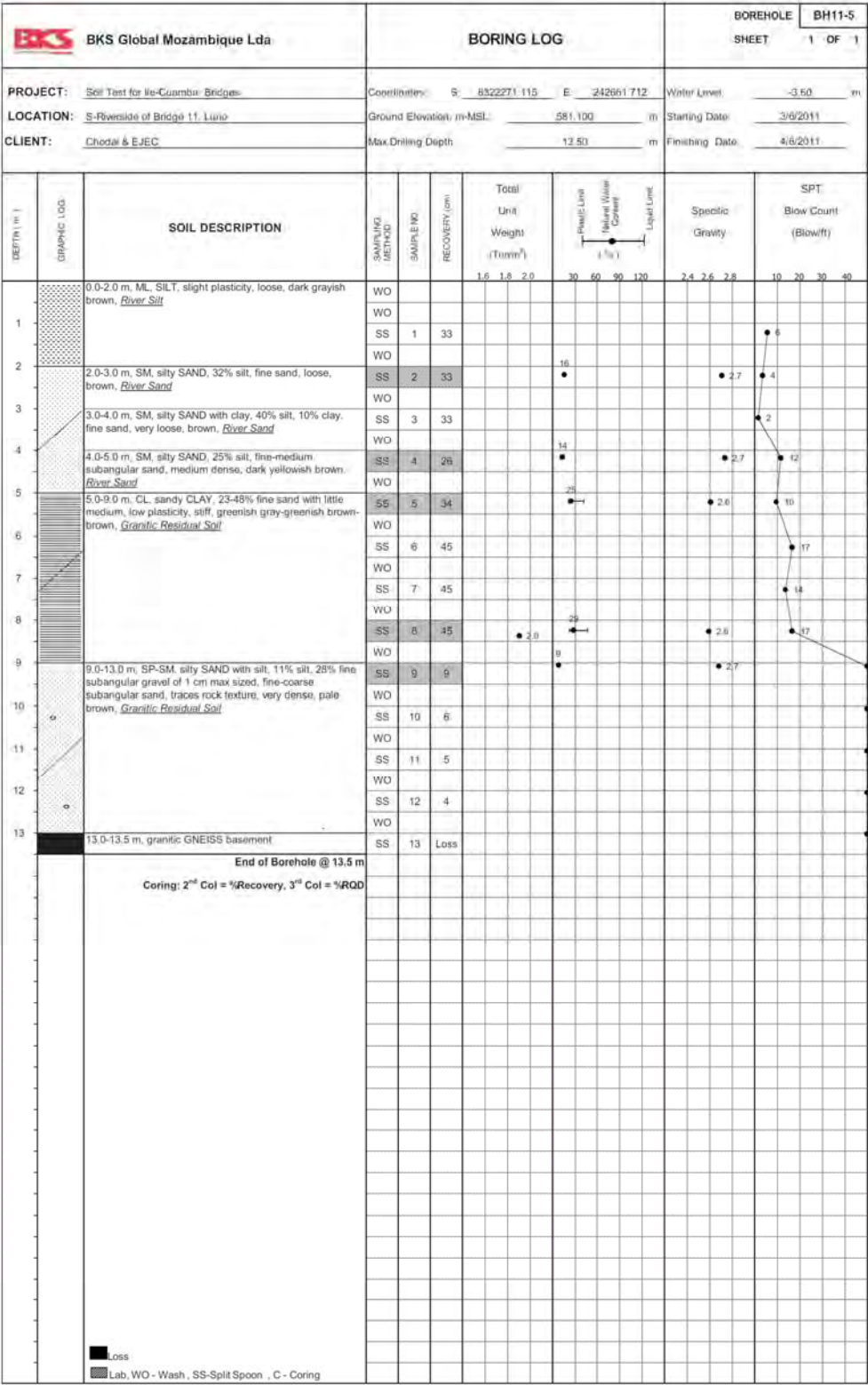
BKS Global Mozambique Lda			BORING LOG				BOREHOLE BH10-3		
							SHEET 1	OF 1	
PROJECT: Soil Test for Ile-Cuamba Bridges			Coordinates: S: 8319948.254 E: 248667.478				Water Level: -1.20 m		
LOCATION: S-Riverside of Bridge 10, Nuhusse			Ground Elevation, m-MSL: 597.488 m				Starting Date: 29/5/2011		
CLIENT: Chodal & EJEC			Max. Drilling Depth: 5.50 m				Finishing Date: 29/5/2011		
DEPTH (m)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (T/mm³)	Plastic Limit (Liquid Limit - Plastic Limit)	Specific Gravity	SPT Blow Count (Blow/ft)
0.0-1.0 m		SM, silty SAND, slight plasticity, very dense, blackish brown, <u>River Sand</u>	WO			1.2 1.4 1.6	30 60 90 120	2.4 2.6 2.8	10 20 30 40
1.0-4.0 m		SM, silty SAND with gravel, 16-19% silt, 15-19% fine subangular gravel of 2-3 mm with random 1 cm max sized of brown quartz, fine-coarse subangular sand, very dense, traces of rock texture, yellowish-light brown & greenish gray, <u>Granitic Residual Soil</u>	SS	1	40		6	2.7	50/13
2.0-3.0 m			WO	2	10				50/12
3.0-4.0 m			SS	3	13		10	2.8	50/12
4.0-5.5 m		QUARTZ dyke within granitic GNEISS basement	WO	4	2				50/8
5.0-5.5 m			SS	5	Loss				50/4
End of Borehole @ 5.5 m									
Coring: 2 nd Col = %Recovery, 3 rd Col = %RQD									

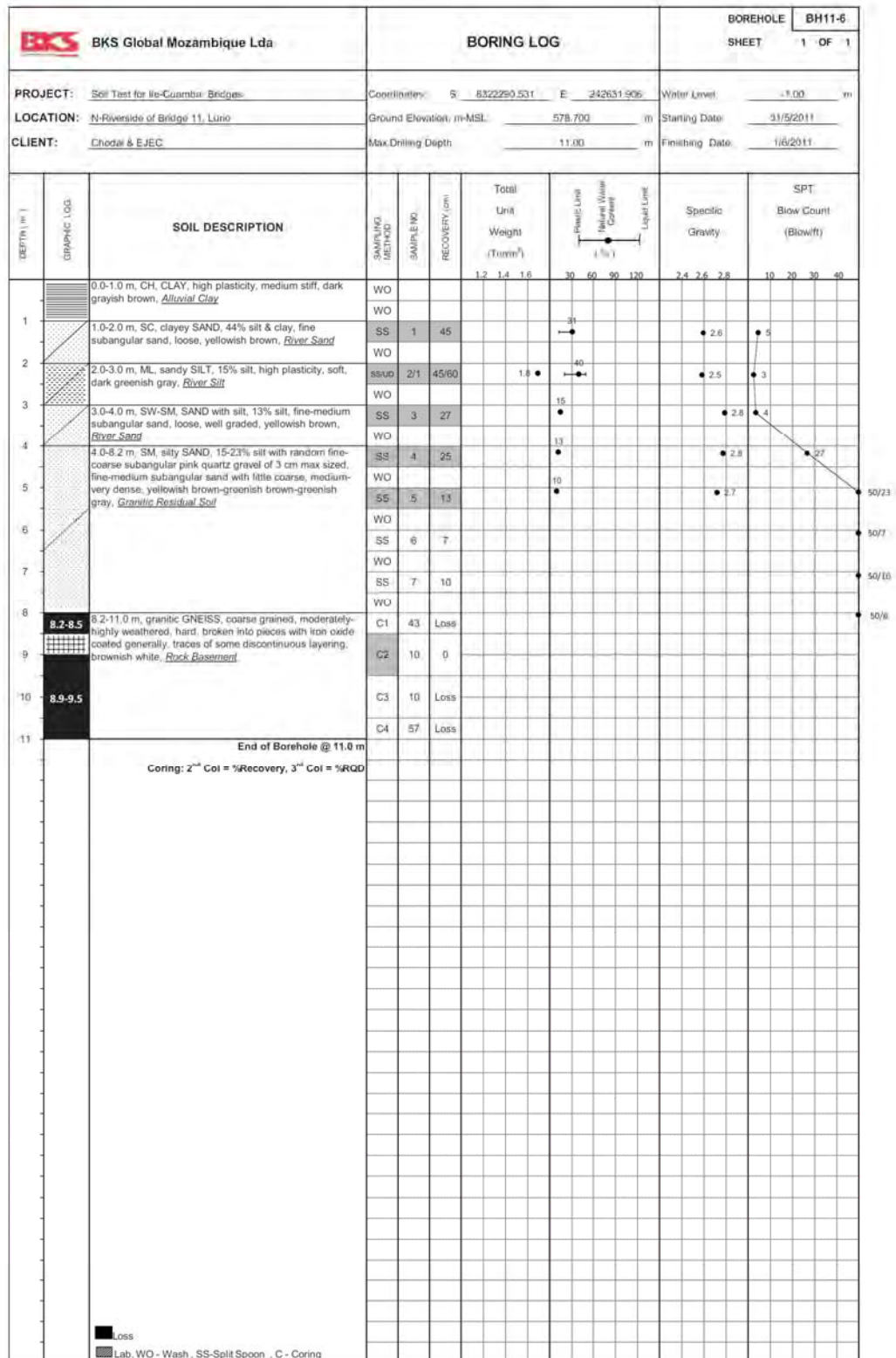


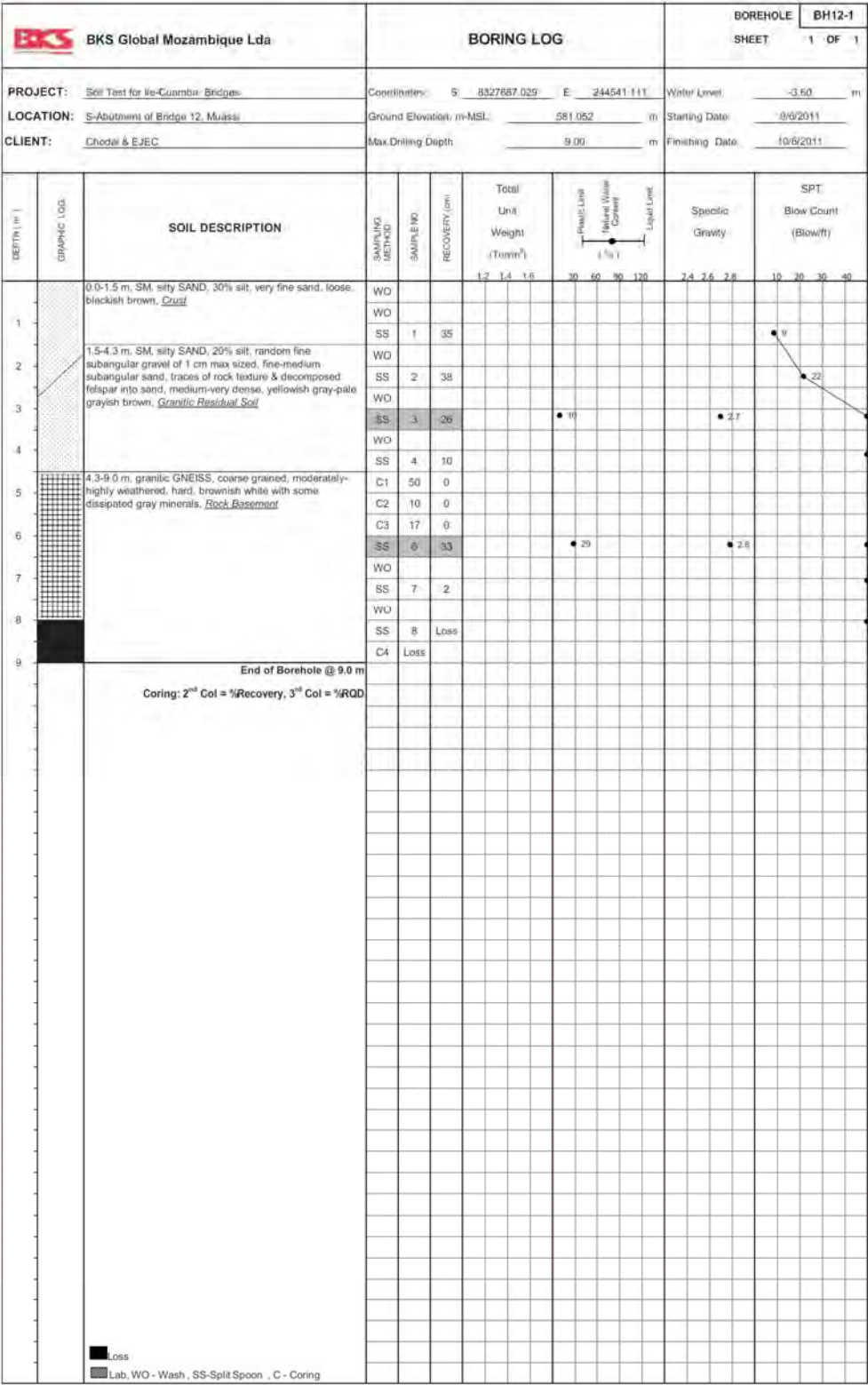












BKS Global Mozambique Lda			BORING LOG				BOREHOLE BH13-1	
							SHEET 1 OF 1	
PROJECT: Soil Test for Ile-Cuamba Bridges			Coordinates: S: 8359526.491 E: 235113.340				Water Level: -1.80 m	
LOCATION: S-Abutment of Bridge 13, Namutimbua			Ground Elevation, m-MSL: 562.700 m				Starting Date: 16/6/2011	
CLIENT: Chodel & EJEC			Max. Drilling Depth: 8.30 m				Finishing Date: 16/6/2011	

