



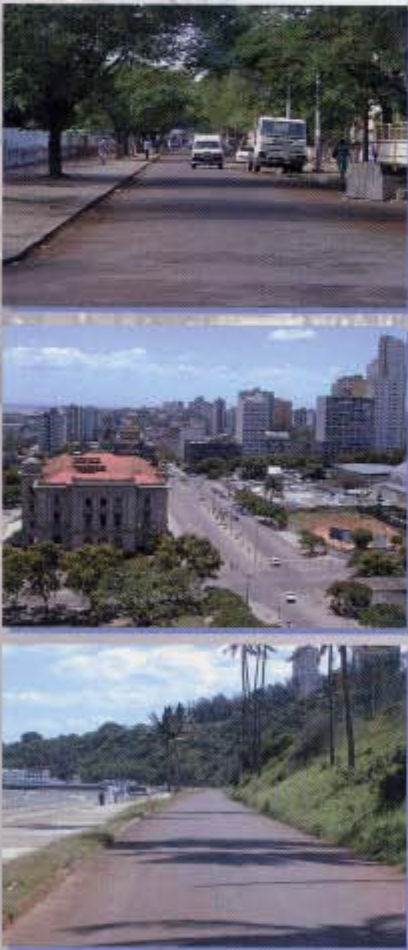
JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)



MUNICIPAL COUNCIL OF MAPUTO
THE CITY OF MAPUTO
THE REPUBLIC OF MOZAMBIQUE

No.

THE STUDY ON THE MASTER PLAN AND FEASIBILITY STUDY FOR THE ROAD DEVELOPMENT OF THE CITY OF MAPUTO IN THE REPUBLIC OF MOZAMBIQUE



FINAL REPORT
APPENDIX

October 2001



Oriental Consultants Company Limited



Japan Engineering Consultants Company Limited

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JR
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Chapter 15 Appendix

Geotechnical Investigation

- 15.1 Borehole Log
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- 15.3 CBR / Pavement Structure Survey
- 15.4 Soil Test Results

Appendix 15.1 Borehole Log

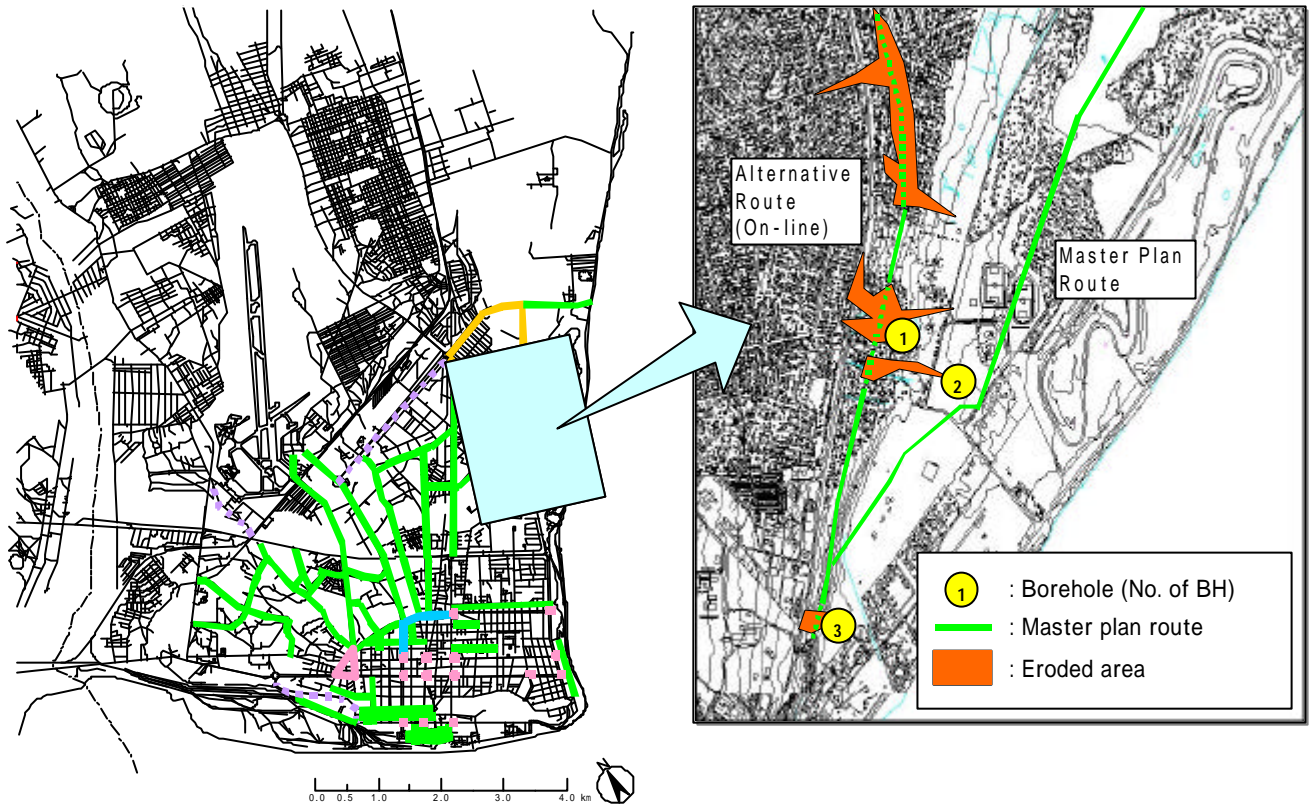


Figure Location of Borehole

Summary Drilling Log

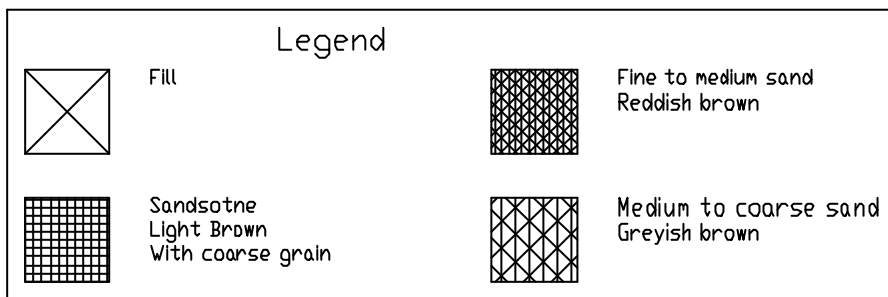
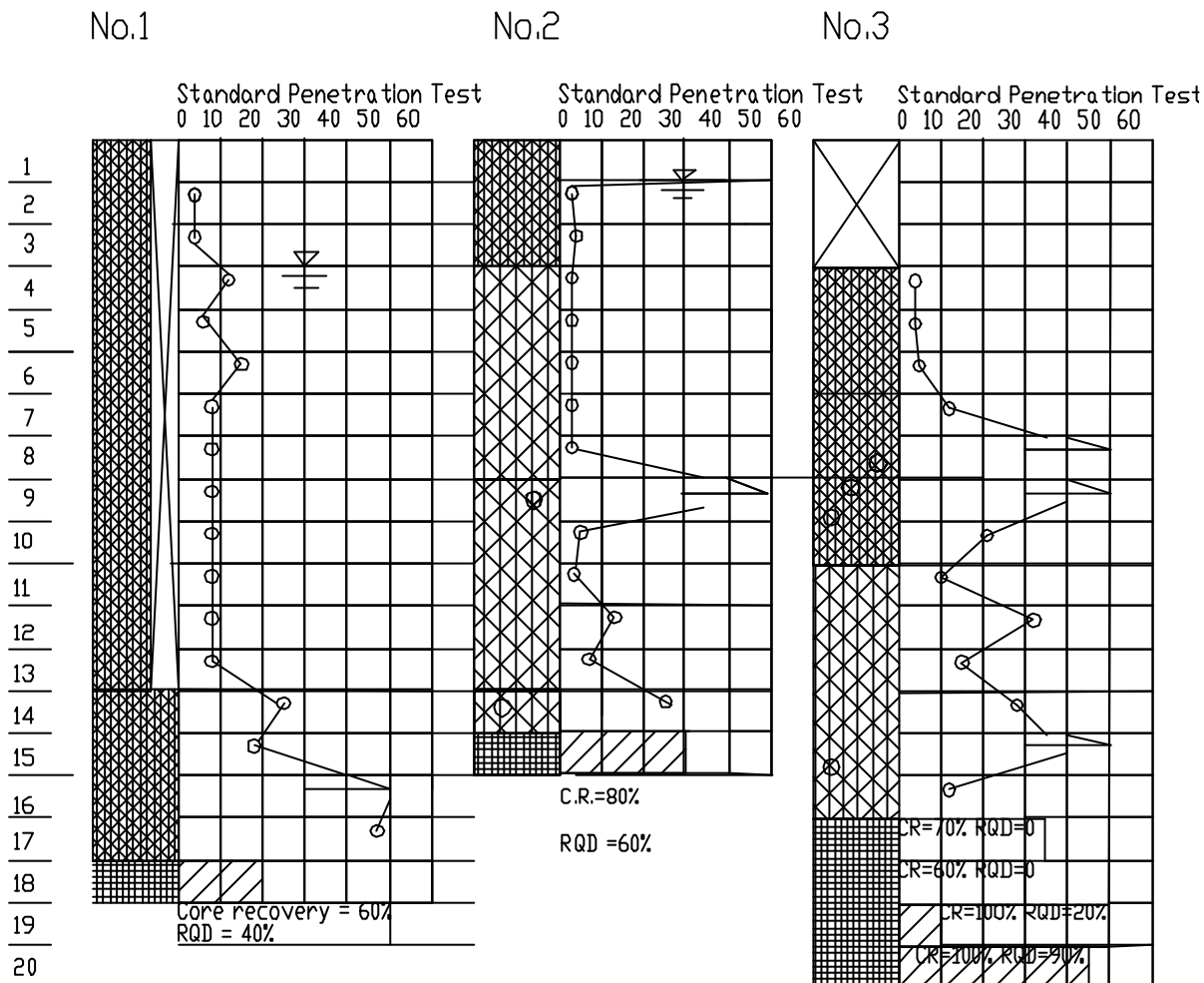
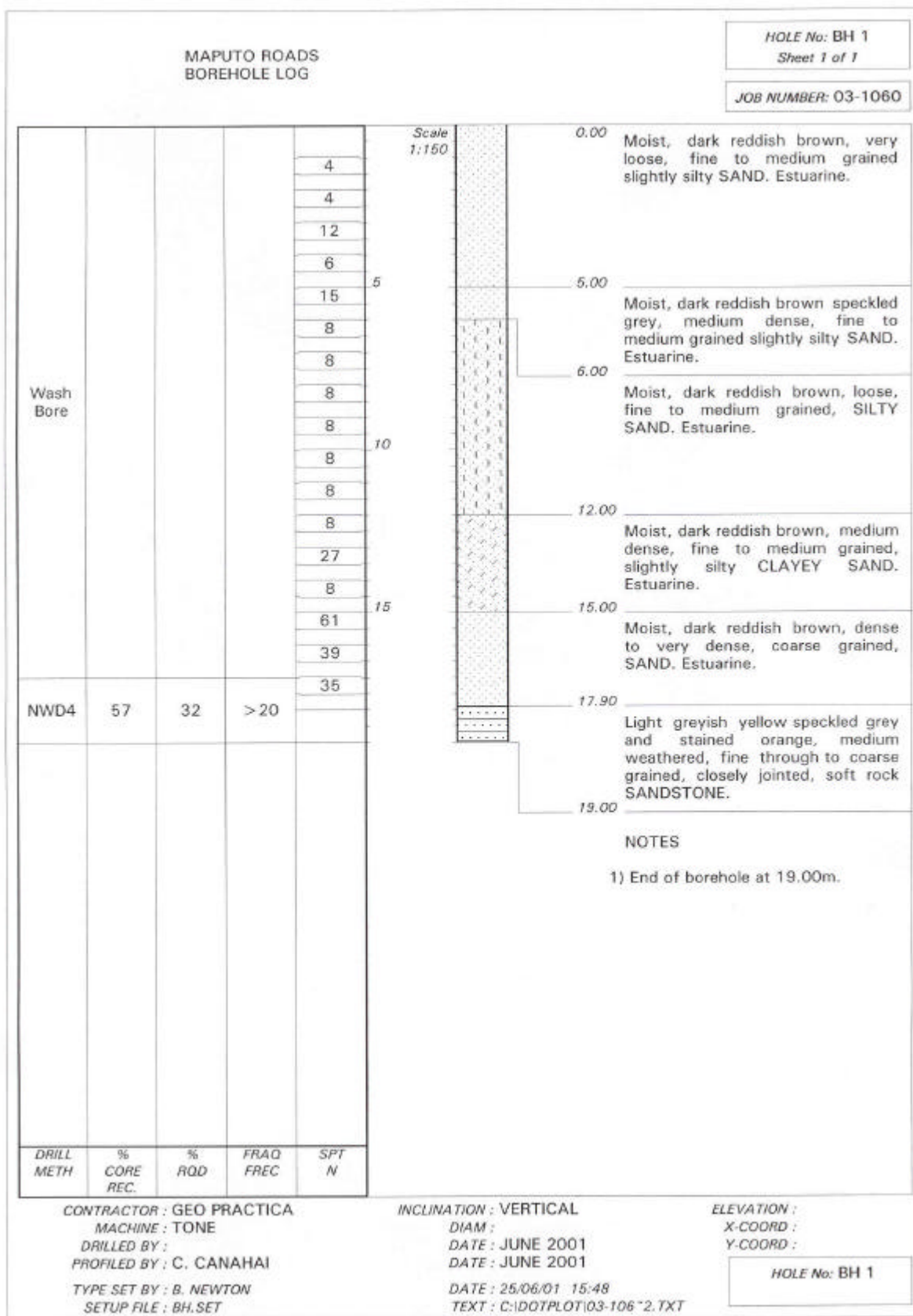


Figure Drilling Logs



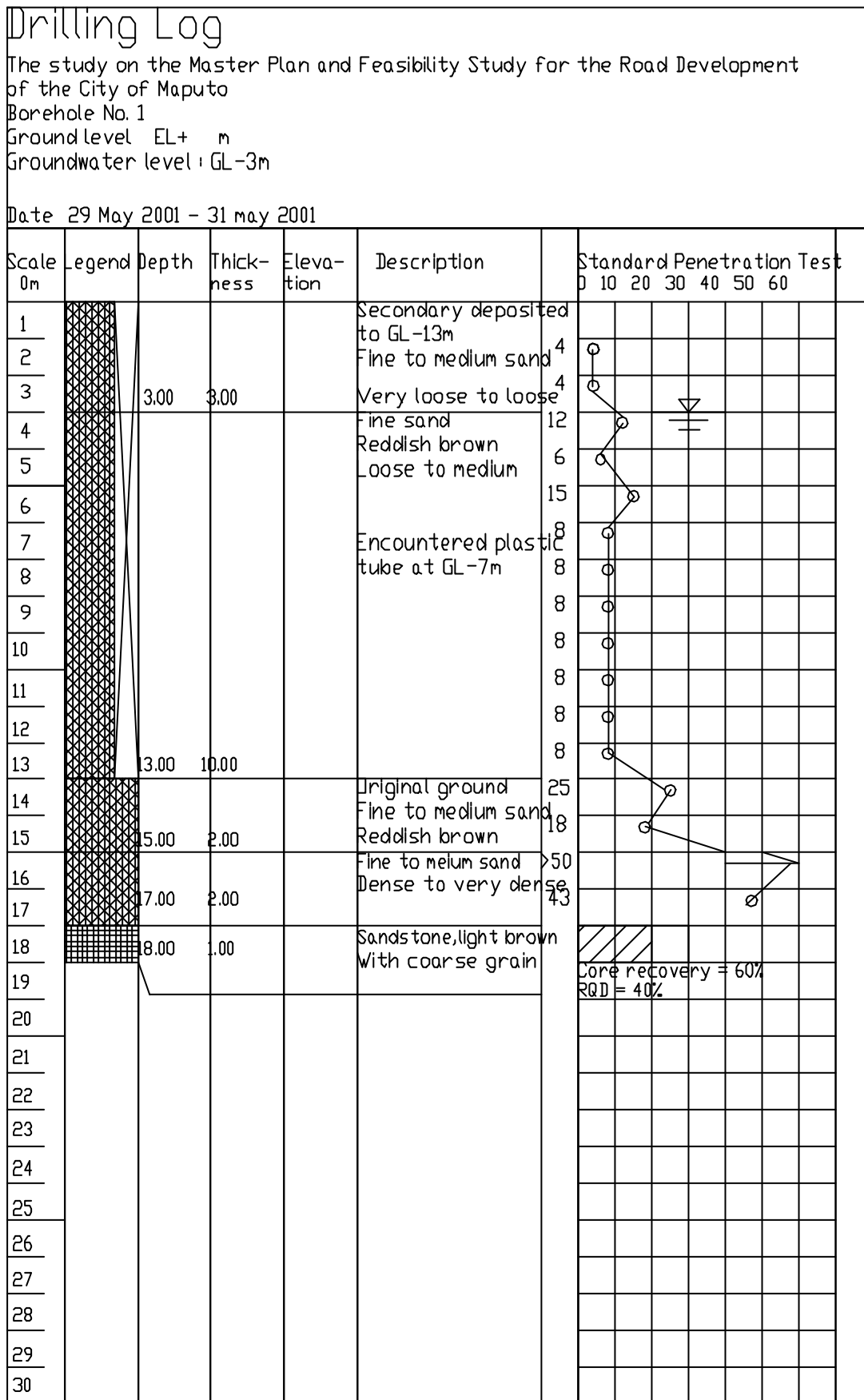
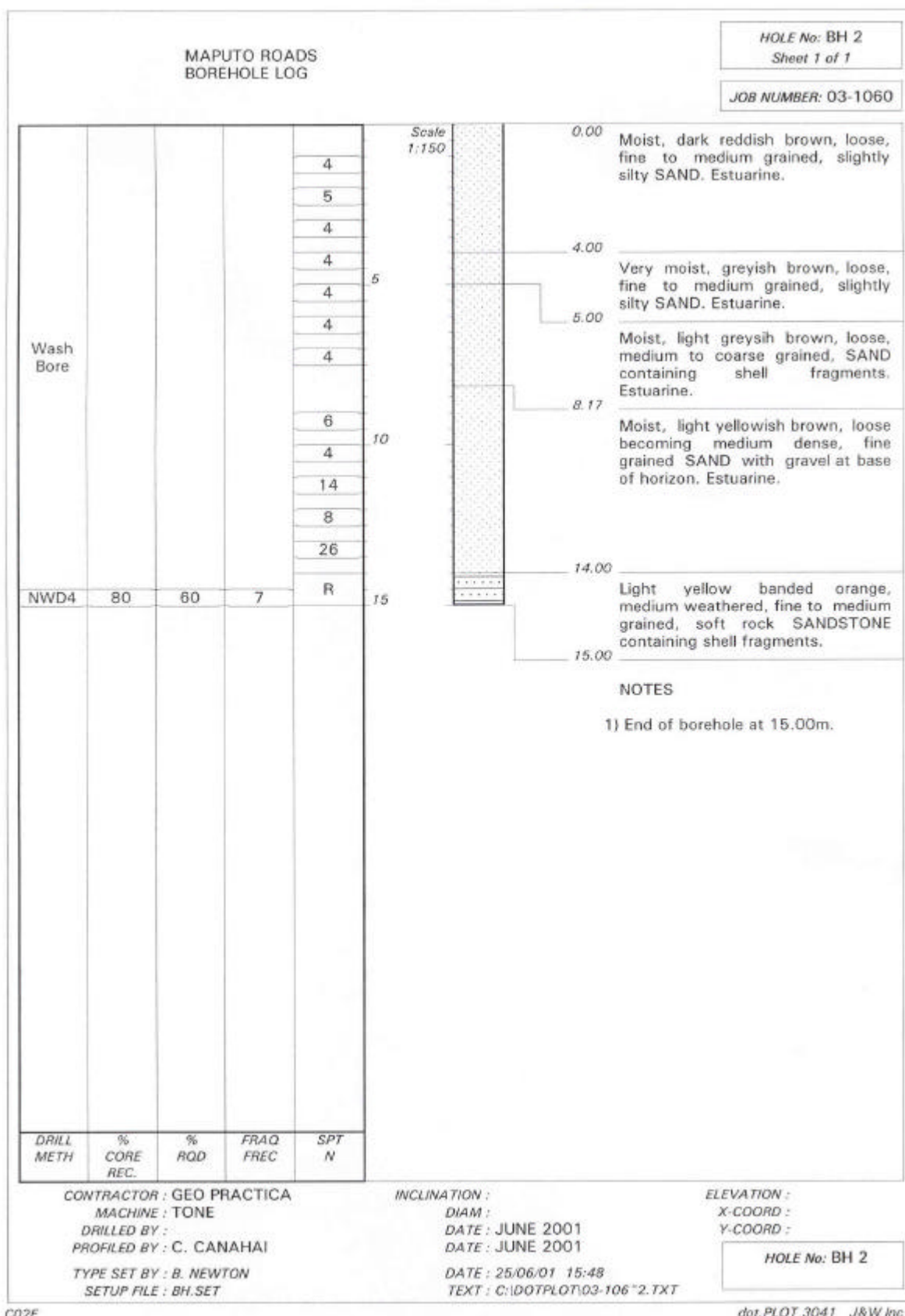




Photo Drilling Core at Borehole Bo.1



Photo Drilling Rig at Borehole No.1 and Accommodation



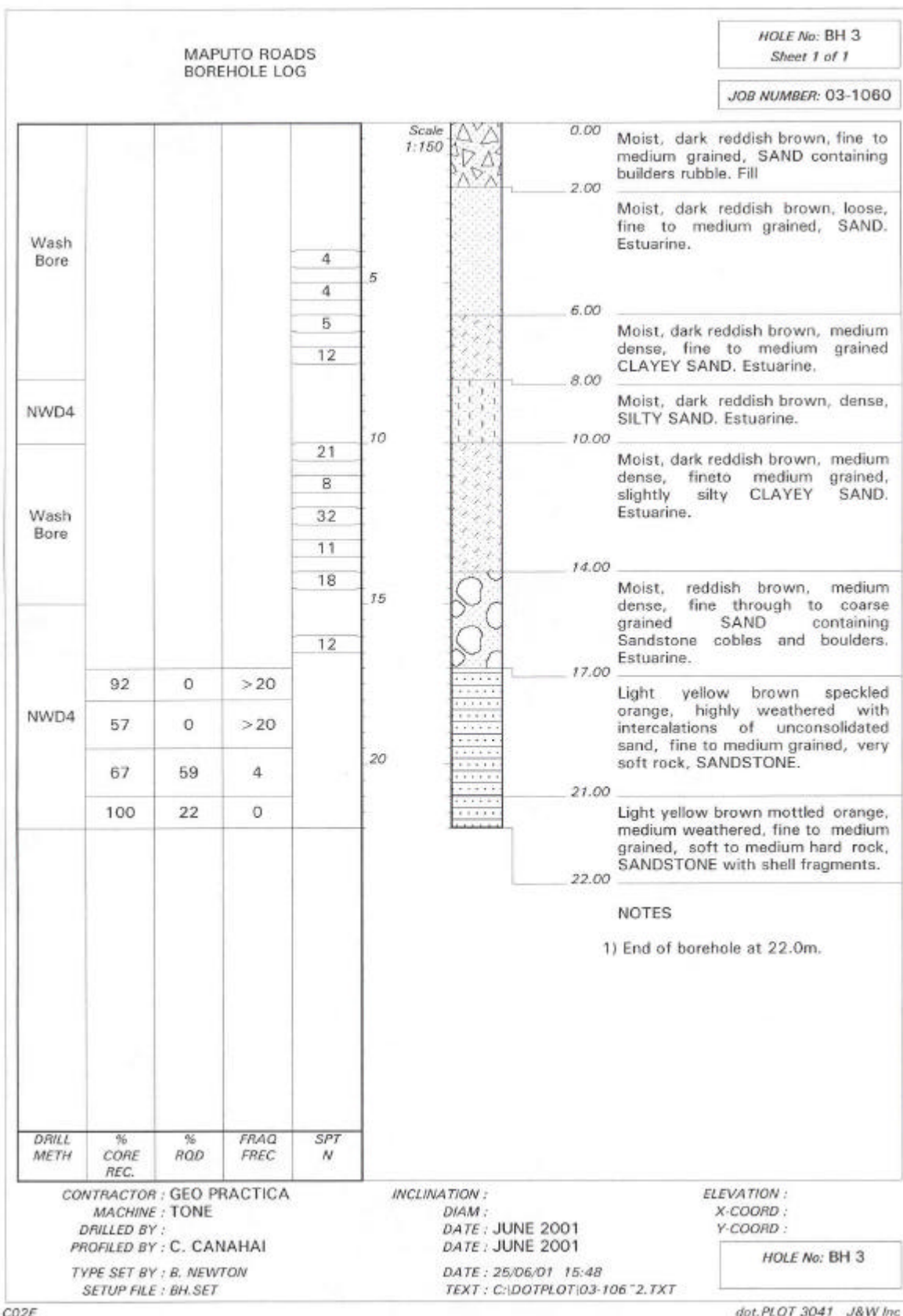
Drilling Log										
The Study on the Master Plan and Feasibility Study for the Road Development of the City of Maputo										
Borehole No. 2										
Elevation: EL+ m										
Groundwater table: GL- 1m										
Driller: Geotechnical Services Pty Ltd										
Date 31 May 2001 - 3 Jun 2001										
Scale 0m	Legend	Depth	Thick- ness	Eleva- tion	Description	Standard Penetration Test				
						0	10 20 30 40 50 60			
1		3.00	3.00		Fine to medium sand	4	4			
2					Reddish brown					
3					Very loose to loose					
4		8.00	5.00		Medium to coarse	4	4			
5					Beach sand with a trace of shell fragment					
6								brownish grey		
7					Very loose					
8								Refusal		
9					Medium to coarse sand					
10								Brownish grey		
11					Residual soil					
12		Occasionally with								
13			sandstone fragment							
14		Coarse sand								
15			Decomposed sandstone							
16								C.R.=80%	RQD =60%	
17			Sandstone, light brown							
18										Moderately weathered
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										



Photo Drilling Cores at Borehole No.2



Photo Drilling Rig at Borehole No.2 with Close-up View



Drilling Log						
The Study on the Master Plan and Feasibility Study for the Road Development of the City of Maputo						
Borehole No.3						
Elevation: EL+ m						
Groundwater Table : GL-3m						
Driller : Geotechnical Services Pty Ltd						
Date : 4 June 2001 - 7 June 2001						
Scale 0m	Legend	Depth	Thick- ness	Eleva- tion	Description	Standard Penetration Test 0 10 20 30 40 50 60
1		3.00	3.00		Fill with boulders Fine to coarse grain Light brown	
2						
3						
4		6.00	3.00		Fine to medium sand Reddish brown	4
5						4
6						5
7						12
8						Refusal
9						Refusal
10	21					
11		10.00	4.00		Fine to medium sand reddish brown with some gravels of sandstone	10
12						32
13						15
14						28
15						Refusal
16						12
17		16.00	6.00		Medium sand Greyish brown Residual soils from sandstone Medium dense	CR=70% RQD=0
18						CR=60% RQD=0
19						CR=100% RQD=20%
20						CR=100% RQD=90%
21		20.00	4.00		Sandstone, light brown Containing fragment of igneous rocks Completely fractured at top portion	
22						
23						
24						
25						
26						
27						
28						
29						
30						

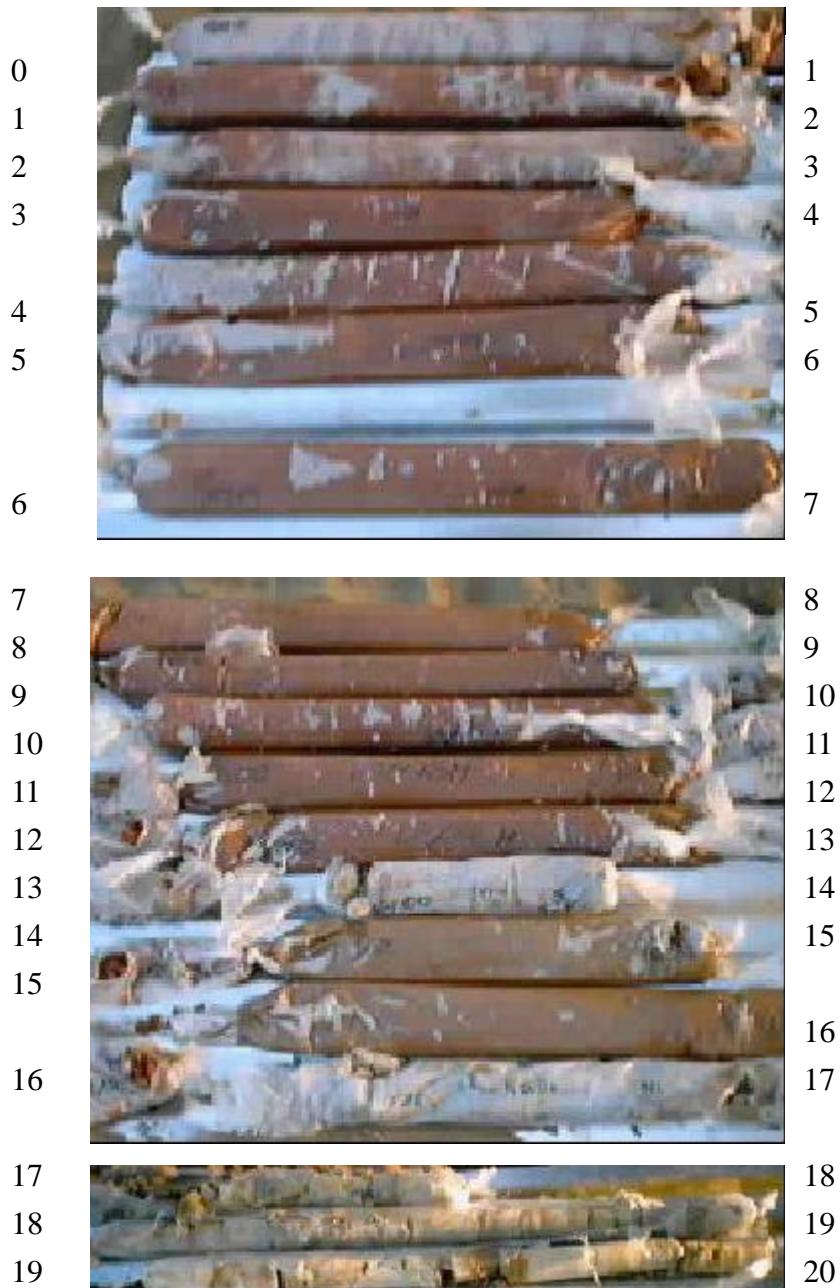


Photo Drilling Cores at Borehole No.3



Photo Drilling at Borehole No.3 and SPT Scene

Appendix 15.2 Slope Stability Analysis

1. Back Calculation of C and

Following parameter were chosen for slope stability analysis:

- 1) Fill : $c=0$, $\phi=30$
- 2) Cut slope : $c=25\text{kN/m}^2$, $\phi=30$

Back-calculated assuming vertical slope with a height of 10m, no groundwater and no crack

Apparent Cohesion* C, kN/m ²	Internal friction ,	Unit weight , kN/m ³	Safety Factor	
50	0	17	1.128	
40	10	17	1.076	
30	20	17	0.991	
25	30	17	1.001	Employed in following analysis
20	40	17	0.999	

2. Safety Factor for Proposed Embankment

Embankment	C, kN/m ²	ϕ ,	V, m	H, m	Top clay, m	Length of horizontal drain, m	Safety factor	Case Number	Judge ment		
Fill	0	30	15	15	3	0	0.595	1			
						10	1.014*	2			
				22.5	3	0	0.655	3			
						8	1.154	4			
						10	1.244	5	OK		
				30	3	0	0.744	6			
						7	1.239	7	OK		
			10			10	3	0	0.803	12	
								6	1.174*	13	
						15	3	0	0.861	14	
								4	1.217	15	OK
						20	3	0	0.960	16	
								3	1.244	17	OK
						Cut	25	30	15		
3	1.243	9	OK								
22.5	1.226	10	OK								
10	1.404	18	OK								
0	1.2										

*Additional measures are required to obtain the minimum safety factor of 1.2.

Appendix 15.3 CBR / Pavement Structure Survey

15.3.1 CBR Survey

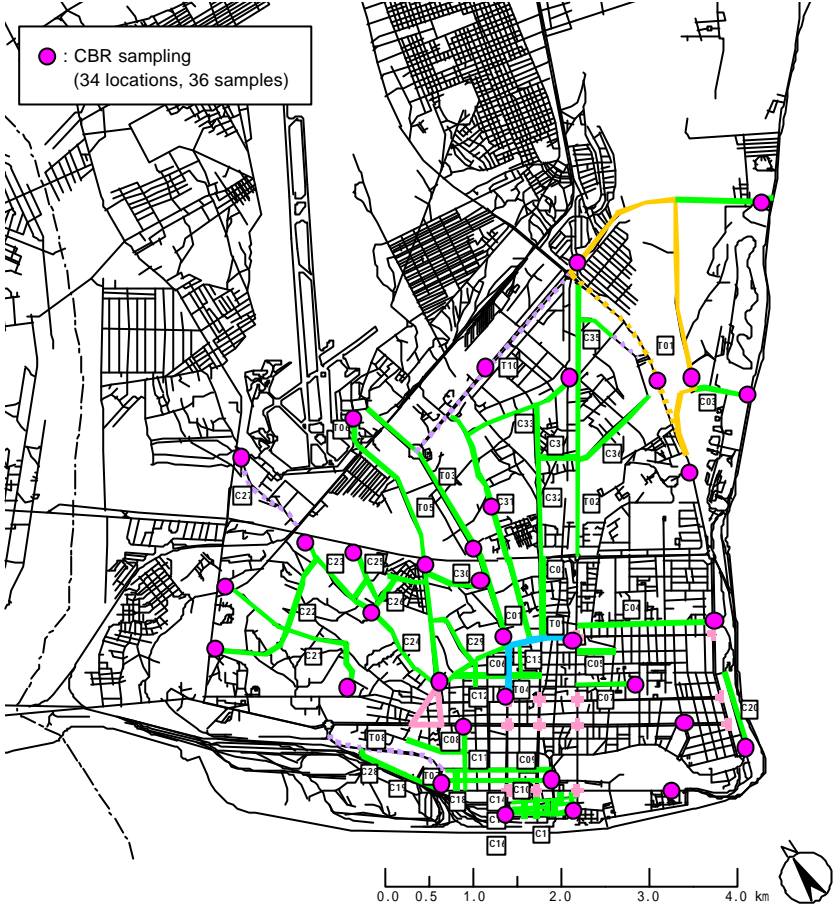
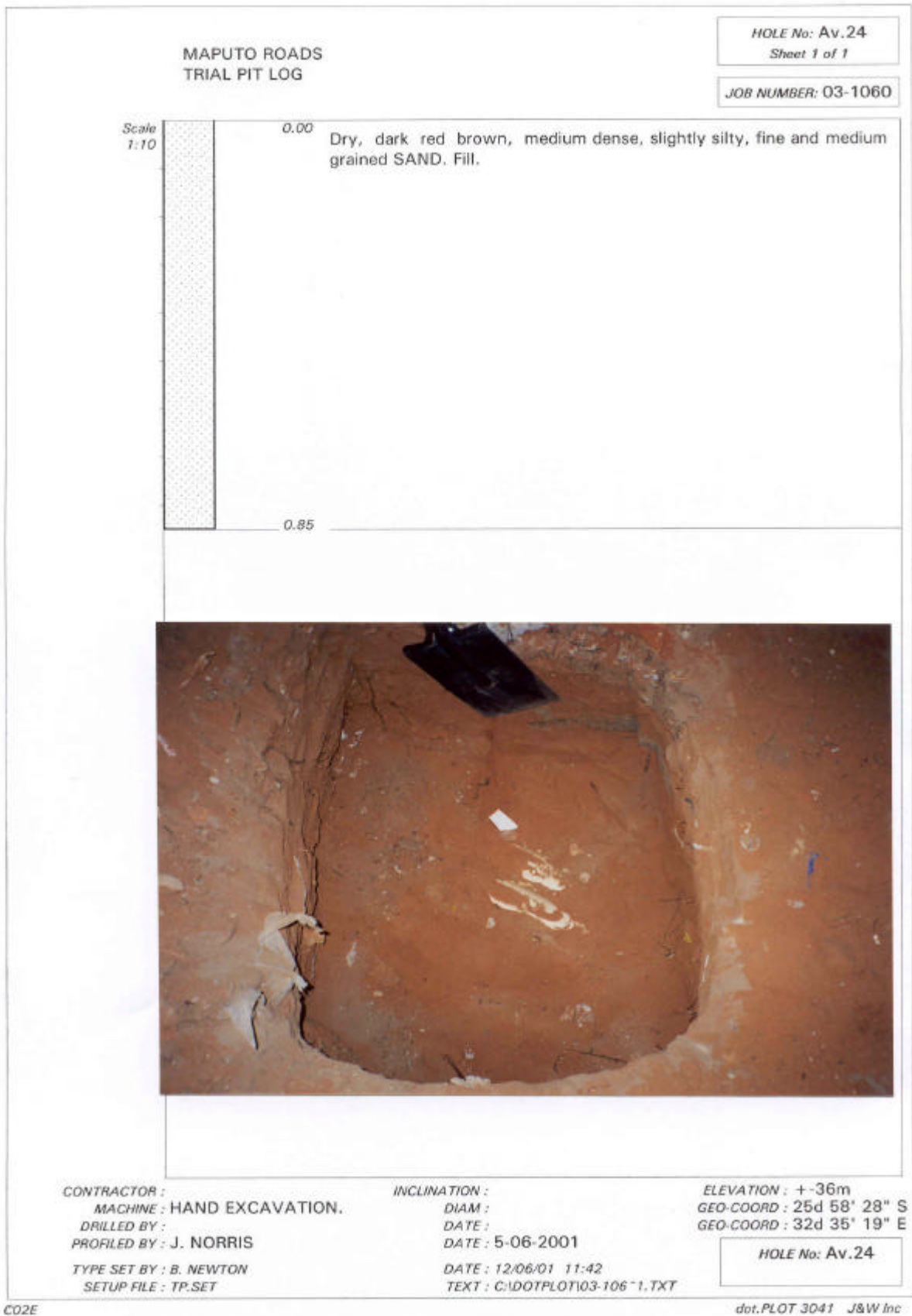
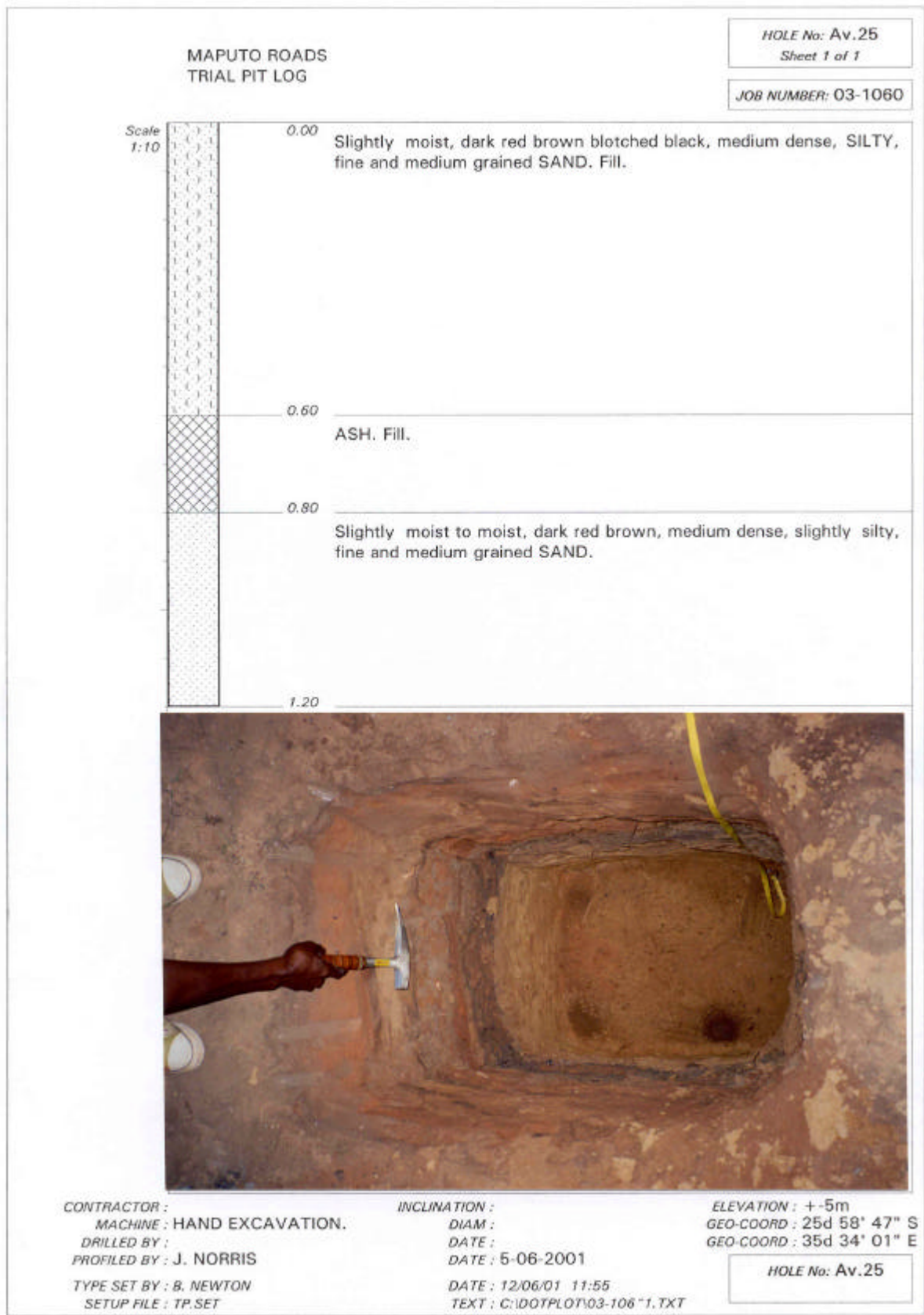


Figure Location of CBR Sampling





C02E

dot.PLOT 3041 J&W Inc

