

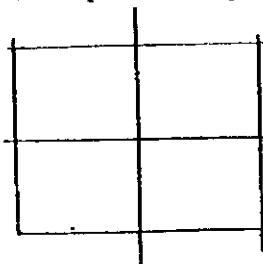
**MATERIALS LABORATORY
TRIAxIAL COMPRESSION TEST**

ON SAMPLE 762mm LONG AND 38mm DIA.

Loc. No. BH-1 20.90-21.35M Name MANCOCI BRIDGE Date 13-3-98
 Sample No. N03 Tube No. _____ Length _____ Dia. _____
 Wet Weight 183 g gm. Bulk Density _____ kg/m³ _____
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 200 KN/ m² Rate of Strain _____ per cent per min

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11-40		0.0
5	17		11-419		0.167
10	25		11-439		0.333
15	32		11-458		0.500
20	36		11-477		0.667
25	42		11-497		0.833
30	47		11-516		1.0
45	63		11-574		1.5
60	80		11-639		2.0
75	100		11-697		2.5
80	107		11-761		3.0
105	141		11-819		3.5
120	161		11-884		4.0
135	180		11-948		4.5
150	198		12-013		5.0
165	214		12-077		5.5
180	228		12-142	267.381	6.0
210	254		12-211	294.740	7.0
240	275		12-400	315.788	8.0
270	292		12-529	331.857	9.0
300	306		12-658	344.224	10.0
330	303		12-787	337.411	11.0
360			12-961		12.0
390			13-110		13.0
420			13-277		14.0
450			13-419		15.0
480			13-581		16.0
50			13-742		17.0
540			13-923		18.0
570			14-097		19.0
600			14-258		20.0
630			14-445		21.0
660			14-632		22.0
690			14-819		23.0
720			15-019		24.0
750			15-219		25.0

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging _____
2. Shear Plane (Angle) _____
3. Vertical Cracks _____

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure

A B.P.P. 224 K/m²
BLUEWISH GREY SAND
CLAYEY SAND

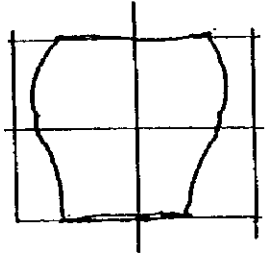
MATERIALS LABORATORY
TRIAxIAL COMPRESSION TEST
 ON SAMPLE 762mm LONG AND 381mm DIA.

Loc. No. BH1 Name _____ Date 12-3-98
 Sample No. _____ Tube No. _____ Length _____ Dia. _____
 Wet Weight 177.0 gm. Bulk Density _____ kg/m³
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 100 KN/m² Rate of Strain _____ per cent per min

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11.40		0.0
5	10		11.419		0.167
10	15		11.439		0.333
15	18		11.458		0.500
20	21		11.477		0.667
25	22		11.497		0.833
30	24		11.516		1.0
45	30		11.574		1.5
60	35		11.639		2.0
75	40		11.697		2.5
80	41		11.761		3.0
105	49		11.819		3.5
120	54		11.884		4.0
135	59		11.948		4.5
150	64		12.013		5.0
165	68		12.077		5.5
180	73		12.142		6.0
210	81		12.271		7.0
240	89		12.400		8.0
270	97		12.529		9.0
300	105		12.658		10.0
330	112		12.787		11.0
360	120		12.961		12.0
390	128		13.110		13.0
420	135		13.277		14.0
450	142		13.419		15.0
480	149		13.581		16.0
510	156		13.742		17.0
540	162		13.923	165.579	18.0
570	167		14.097	168.684	19.0
600	171		14.258	170.774	20.0
630	170		14.445	167.578	21.0
660			14.632		22.0
690			14.819		23.0
720			15.019		24.0
750			15.219		25.0

209 - 21.35M

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.

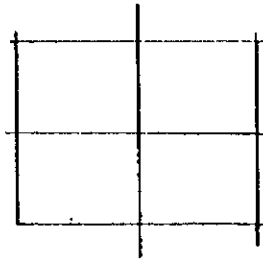
170.774 kg/m²

**MATERIALS LABORATORY
 TRIAXIAL COMPRESSION TEST
 ON SAMPLE 762mm LONG AND 38.1mm DIA.**

Loc. No. B-4-1 Name MANGOCHI BRIDGE Date _____
 Sample No. _____ Tube No. _____ Length _____ Dia. _____
 Wet Weight 175 gm. Bulk Density _____ kg/m³ _____
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 50 KN/m² Rate of Strain _____ per cent per mi

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11-40		0.0
5	8		11-419		0.167
10	10		11-439		0.333
15	13		11-458		0.500
20	15		11-477		0.667
25	17		11-497		0.833
30	19		11-516		1.0
45	24		11-574		1.5
60	29		11-639		2.0
75	34		11-697		2.5
80	39		11-761		3.0
105	44		11-819		3.5
120	48		11-884		4.0
135	52		11-948		4.5
150	55		12-013		5.0
165	59		12-077		5.5
180	62		12-142		6.0
210	67		12-211		7.0
240	71		12-400		8.0
270	73		12-529		9.0
300	75		12-658		10.0
330	76		12-787		11.0
360	77		12-961		12.0
390	79		13-110		13.0
420	80		13-277	85.74278	14.0
450	82		13-419	87.012	15.0
480	82		13-581	85.974	16.0
50	82		13-742		17.0
540			13-923		18.0
570			14-097		19.0
600			14-258		20.0
630			14-445		21.0
660			14-632		22.0
690			14-819		23.0
720			15-019		24.0
750			15-219		25.0

Laboratory Assistant's
 Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks _____

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.

→ 87.012 kg/m²

LABORATORY TEST RESULTS

PROJECT: MANGOCHI BRIDGE SITE

LOCATION: .

BH PIT	SNO.	DEPTH (metres)	PARTICLE SIZE DISTRIBUTION PERCENTAGE PASSING BS SIEVE SIZE										ATTERBERG LIMITS		CLASSIFI CATION	TEST												
			MILLIMETRES										L.L.			P.I.	BULK DENS. kg/m ³	M/C RESISTANCE kN/m ²	SHEARING ANGLE Degrees									
19.0	13.2	9.5	4.75	2.36	600	425	300	150	0.75	%	L.L.	P.I.	%	A-7-6(9)	A-2-4(0)					A-2-4(0)	A-7-6(4)	A-7-6(8)	A-2-6(1)	A-1-b(0)	A-6-(7)	A-7-6(8)	21.99	15.028
BH2	1	0.00-3.45	100	99	97	79	73	67	59	44	57	31																
	2	3.45-5.45			100	97	55	54	23	25	17	N																
	3	5.45-8.20	100	100	98	71	19	10	7	2	1	N																
	4	8.20-12.91			100	99	97	78	71	67	61	39	42															
	5	12.9-19.65			100	99	98	86	81	75	65	48	46															
	6	22.85-27.60			100	98	94	63	57	53	44	28	28															
	7	27.60-28.88			100	98	88	95	37	32	9	N																
	8	28.88-30.00	100	97	97	96	93	92	91	90	53	36																
	1	17.00-17.45			100	99	82	75	68	58	46	49																

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH2 Date 14/03/1
 Sample No. 1 Depth 0.00-3.45m Description _____
 Sieving _____

Total Weight of dry Sample: 738.3 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max ^o Sieve Load g
75.50 mm						
63.0 mm						4500
53.0 mm						3500
37.5 mm						2500
26.5mm						2000
19.0 mm						1500
13.2 mm				100		1000
9.5 mm	2.6	2.6	0.4	99.6	100	750
6.7 mm						500
4.75 mm	5.6	8.2	1.1	98.9	99	
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	12.8	21.0	2.8	97.2	97	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	132.2	153.2	20.8	79.2	79	75
No. 36 (.425 mm)	49.9	203.1	27.5	72.5	73	75
No. 52 (.300 mm)	38.9	242.0	32.8	67.2	67	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	64.2	306.2	41.5	58.5	59	40
No. 200 (.075 mm)	107.0	435	58.5	44.0	44	25
Passing No. 200 (.075 mm)	325.1	44.0				
Total	738.3	100				

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH 2 Date _____
 Sample No. 2 Depth 3.45-5.45m Description _____
 Sieving _____

Total Weight of dry Sample: 1193.7 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max ^o Sieve Load g
75.50 mm						
63.0 mm						4500
53.0 mm						3500
37.5 mm						2500
26.5mm						2000
19.0 mm						1500
13.2 mm						1000
9.5 mm						750
6.7 mm						500
4.75 mm	1.2	1.2	0.1	99.9	100	
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	33.0	34.2	2.9	97.1	97	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	500.6	534.8	44.8	55.2	55	75
No. 36 (.425 mm)	20.8	555.6	46.5	53.5	54	75
No. 52 (.300 mm)	121.0	676.6	56.7	43.3	43	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	216.9	893.5	74.9	25.1	25	40
No. 200 (.075 mm)	95.0	988.5	82.8	17.2	17	25
Passing No. 200 (.075 mm)	205.2	17.2				
Total	1193.7	100				

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH 2 Date 13/03/98
 Sample No. 3 Depth 5.45-8.20m Description _____
 Sieving _____

Total Weight of dry Sample: 1208.7 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max ^o Sieve Load g
75.50 mm						
63.0 mm						4500
53.0 mm						3500
37.5 mm						2500
26.5mm						2000
19.0 mm						1500
13.2 mm	4.2	4.2	0.3	99.7	100	1000
9.5 mm	1.5	5.7	0.5	99.5	100	750
6.7 mm						500
4.75 mm	21.1	26.8	2.2	97.8	98	
Passing 4.75 mm						
Rifted Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	324.7	351.5	29.1	70.9	71	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	624.4	975.9	80.7	19.3	19	75
No. 36 (.425 mm)	110.6	1086.5	89.9	10.1	10	75
No. 52 (.300 mm)	44.0	1130.5	93.5	6.5	7	50
No. 72 (.212 mm)						30
No. 100 (.150 mm)	52.9	1183.4	97.9	2.1	2	40
No. 200 (.075 mm)	18.8	1202.2	99.5	0.5	1	25
Passing No. 200 (.075 mm)	6.5	0.5				
Total	1208.7	100				

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BHS Date 15/03/98
 Sample No. 4 Depth 8.20-12.91m Description _____
 Sieving _____

Total Weight of dry Sample: 734.0 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained %	Per cent Retained	Total Passing %	Remarks	Max ^o Sieve Load g
75.50 mm						
63.0 mm						4500
53.0 mm						3500
37.5 mm						2500
26.5mm						2000
19.0 mm						1500
13.2 mm						1000
9.5 mm						750
6.7 mm						500
4.75 mm	4.3	4.3	0.6	99.4	99	
Passing 4.75 mm						
Riffed Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	14.6	18.9	2.6	97.4	97	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	141.9	160.8	21.9	78.1	78	75
No. 36 (.425 mm)	49.4	210.2	28.6	71.4	71	75
No. 52 (.300 mm)	32.0	242.2	33.0	67.0	67	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	46.0	288.2	39.3	60.7	61	40
No. 200 (.075 mm)	157.7	445.9	60.7	39.3	39	25
Passing No. 200 (.075 mm)	288.1	39.3				
Total	734.0	100				

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH 8 Date 15/03/98
 Sample No. 5 Depth 12.91 - 19.65m Description _____
 Sieving _____

Total Weight of dry Sample: 992.4 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max* Sieve Load g
75.50 mm						
63.0 mm						
53.0 mm						4500
37.5 mm						3500
26.5mm						2500
19.0 mm						2000
13.2 mm						1500
9.5 mm	2.6	2.6	0.3	99.7	100	1000
6.7 mm						750
4.75 mm	3.1	5.7	0.6	99.4	99	500
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	16.5	22.2	2.2	97.8	98	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	113.0	135.2	13.6	86.4	86	75
No. 36 (.425 mm)	54.2	189.4	19.1	80.9	81	75
No. 52 (.300 mm)	58.1	247.5	24.9	75.1	75	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	103.0	350.5	35.3	64.7	65	40
No. 200 (.075 mm)	168.2	518.7	52.3	47.7	48	25
Passing No. 200 (.075 mm)	473.7	47.7				
Total	992.4	100				

W. A. A.

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH2 Date 15/08/98
 Sample No. 6 Depth 22.85-27.60m Description _____
 Sieving _____

Total Weight of dry Sample: 412.3 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max ^o Sieve Load g
75.50 mm						
63.0 mm						4500
53.0 mm						3500
37.5 mm						2500
26.5mm						2000
19.0 mm						1500
13.2 mm						1000
9.5 mm						750
6.7 mm						500
4.75 mm	6.7	6.7	1.6	98.4	98	
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	18.1	24.8	6.0	94.0	94	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	126.2	157.0	36.6	63.4	63	75
No. 36 (.425 mm)	26.5	177.5	43.1	56.9	57	75
No. 52 (.300 mm)	17.6	195.1	47.3	52.7	53	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	37.6	232.7	56.4	43.6	44	40
No. 200 (.075 mm)	65.9	298.6	72.4	27.6	28	25
Passing No. 200 (.075 mm)	113.7	27.6				
Total	412.3	100				

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH2 Date 15/03/98
 Sample No. 7 Depth 27-60-28-88 Description _____
 Sieving _____

Total Weight of dry Sample: 801.8 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max* Sieve Load g
75.50 mm						
63.0 mm						
53.0 mm						4500
37.5 mm						3500
26.5mm						2500
19.0 mm						2000
13.2 mm						1500
9.5 mm						1000
6.7 mm						750
4.75 mm	14.5	14.5	1.8	98.2	98	500
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	78.3	92.8	11.6	88.4	88	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	343.2	43.60	54.0	46.0	46	75
No. 36 (.425 mm)	66.9	502.9	62.7	37.3	37	75
No. 52 (.300 mm)	43.4	546.3	68.1	31.9	32	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	73.5	619.8	77.3	22.7	23	40
No. 200 (.075 mm)	111.6	731.4	91.2	8.8	9	25
Passing No. 200 (.075 mm)	70.4	8.8				
Total	801.8	100				

W. & A.

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH2 Date 15/-03/98
 Sample No. 8 Depth 28-88-30.00 Description _____
 Sieving _____

Total Weight of dry Sample: 444.5 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max ^o Sieve Load g
75.50 mm						
63.0 mm						
53.0 mm						4500
37.5 mm						3500
26.5mm						2500
19.0 mm						2000
13.2 mm	12.6	12.6	2.8	97.2	97	1500
9.5 mm						1000
6.7 mm						750
4.75 mm	0.6	13.2	3.0	97.0	97	500
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	3.1	16.3	3.7	96.3	96	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	16.8	33.1	7.4	92.6	93	75
No. 36 (.425 mm)	3.1	36.2	8.1	91.9	92	75
No. 52 (.300 mm)	2.6	38.8	8.7	91.3	91	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	7.6	46.4	10.4	89.6	90	40
No. 200 (.075 mm)	161.8	208.2	46.8	53.2	53	25
Passing No. 200 (.075 mm)	236.3	53.2				
Total	444.5	100				

W. & A.

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH 2 Date 13/03/98
 Sample No. 1 (u/100) Depth 17.00-17.45 Description _____
 Sieving _____

Total Weight of dry Sample: 658.8 g Dry.

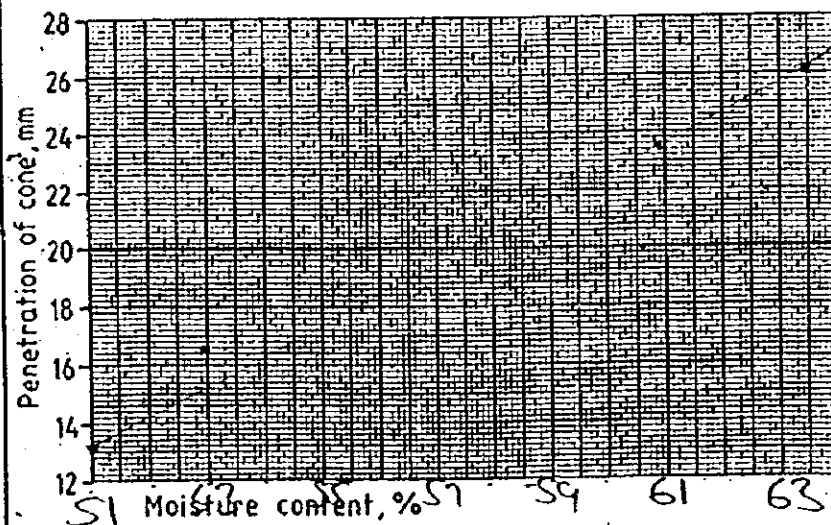
B.S. Sieve Size	Weight Retained g	Weight Retained %	Per cent Retained	Total Passing %	Remarks	Max ^o Sieve Load g
75.50 mm						
63.0 mm						
53.0 mm						4500
37.5 mm						3500
26.5mm						2500
19.0 mm						2000
13.2 mm						1500
9.5 mm						1000
6.7 mm				100		750
4.75 mm	1.3	1.3	0.2	99.8	100	500
Passing 4.75 mm						
Riffed Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	5.7	7.0	1.1	98.9	99	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	109.3	116.3	17.7	82.3	82	75
No. 36 (.425 mm)	48.9	165.2	25.1	74.9	75	75
No. 52 (.300 mm)	44.4	209.6	31.8	68.2	68	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	68.0	277.6	42.1	57.9	58	40
No. 200 (.075 mm)	75.8	353.4	53.6	46.4	46	25
Passing No. 200 (.075 mm)	305.4	46.4				
Total	658.8	100				

W. & A.

Location <i>Morgau Bridge site</i>	Job ref.	
	Borehole/ Pit no.	<i>BH 2</i>
Soil description <i>soft clayey grey silty clay</i>	Sample no.	<i>1</i>
	Depth	<i>0.00 m</i> <i>3.45</i>
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		<i>G9K</i>		<i>112</i>		
Mass of wet soil + container	g	<i>11.09</i>		<i>10.68</i>		
Mass of dry soil + container	g	<i>9.92</i>		<i>9.53</i>		
Mass of container	g	<i>5.46</i>		<i>5.44</i>		
Mass of moisture	g	<i>1.17</i>		<i>1.1</i>		
Mass of dry soil	g	<i>4.46</i>		<i>4.14</i>		
Moisture content	%	<i>26.2</i>		<i>25.1</i>		<i>26</i>

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Final dial gauge reading	mm	<i>13.2</i>	<i>16.6</i>	<i>23.5</i>	<i>26.2</i>
Average penetration	mm				
Container no.		<i>39</i>	<i>26</i>	<i>41</i>	<i>44</i>
Mass of wet soil + container	g	<i>29.32</i>	<i>28.56</i>	<i>22.42</i>	<i>29.60</i>
Mass of dry soil + container	g	<i>22.60</i>	<i>16.68</i>	<i>17.64</i>	<i>21.76</i>
Mass of container	g	<i>9.42</i>	<i>9.36</i>	<i>9.26</i>	<i>9.72</i>
Mass of moisture	g	<i>6.72</i>	<i>3.88</i>	<i>4.98</i>	<i>7.64</i>
Mass of dry soil	g	<i>13.18</i>	<i>7.32</i>	<i>8.18</i>	<i>12.04</i>
Moisture content	%	<i>51.0</i>	<i>53.0</i>	<i>60.9</i>	<i>63.5</i>



Sample preparation *		
as received		
washed on 425 μm sieve		
air dried at °C		
oven dried at °C		
not known		
Proportion retained on 425 μm sieve %		
Liquid limit	<i>57.1</i>	% <i>57</i>
Plastic limit	<i>26.4</i>	%
Plasticity index	<i>30.7</i>	<i>31</i>
* Delete as appropriate		
Operator	Checked	Approved

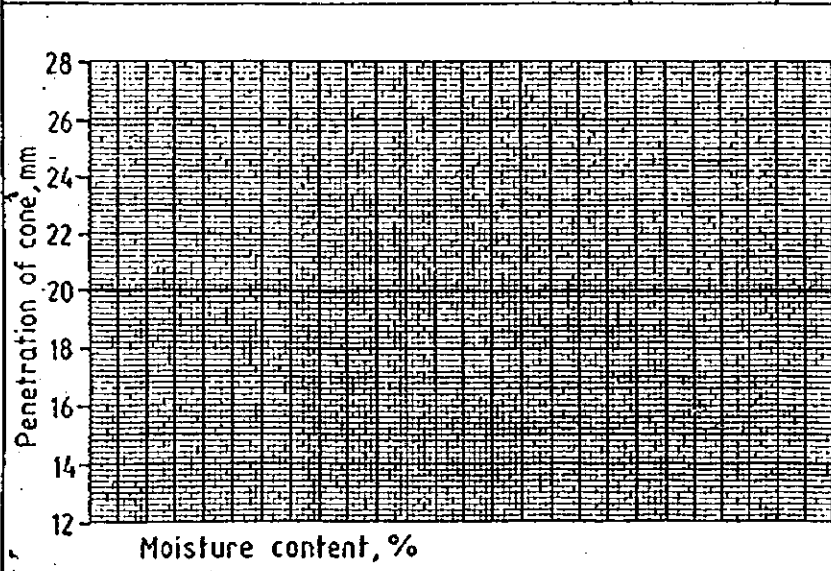
Liquid limit (cone penetrometer) and plastic limit

Form 2.C

Location Mangochi Pondige	Job ref.	
	Borehole/ Pit no.	BH 2
Soil description	Sample no.	2
	Depth	3.45m S-4S
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.						
Mass of wet soil + container	g					
Mass of dry soil + container	g					
Mass of container	g					
Mass of moisture	g					
Mass of dry soil	g					
Moisture content	%					

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm				
Final dial gauge reading	mm				
Average penetration	mm				
Container no.					
Mass of wet soil + container	g				
Mass of dry soil + container	g				
Mass of container	g				
Mass of moisture	g				
Mass of dry soil	g				
Moisture content	%				



Sample preparation *

as received

washed on 425 µm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 µm sieve %

Liquid limit %

Plastic limit %

Plasticity Index

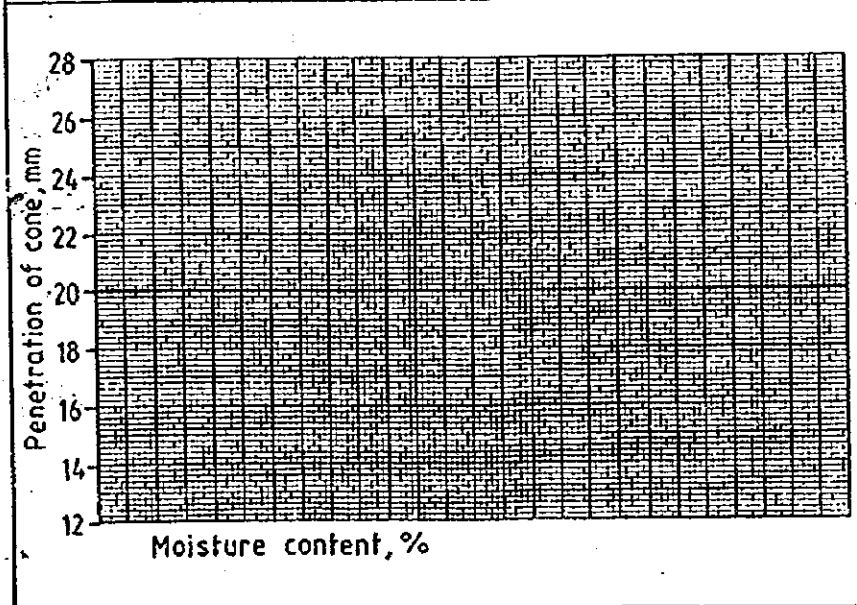
* Delete as appropriate

Operator	Checked	Approved

Location	Mangochi Bridge	Job ref.	
		Borehole/ Pit no.	BH2
Soil description	Very dense whitish grey coarse sand	Sample no.	3
		Depth	5.4m - 8.2m
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date	

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.						
Mass of wet soil + container	g					
Mass of dry soil + container	g					
Mass of container	g					
Mass of moisture	g					
Mass of dry soil	g					
Moisture content	%					

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm				
Final dial gauge reading	mm				
Average penetration	mm				
Container no.					
Mass of wet soil + container	g				
Mass of dry soil + container	g				
Mass of container	g				
Mass of moisture	g				
Mass of dry soil	g				
Moisture content	%				



Sample preparation *

as received

washed on 425 μm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 μm sieve %

Liquid limit %

Plastic limit %

Plasticity Index

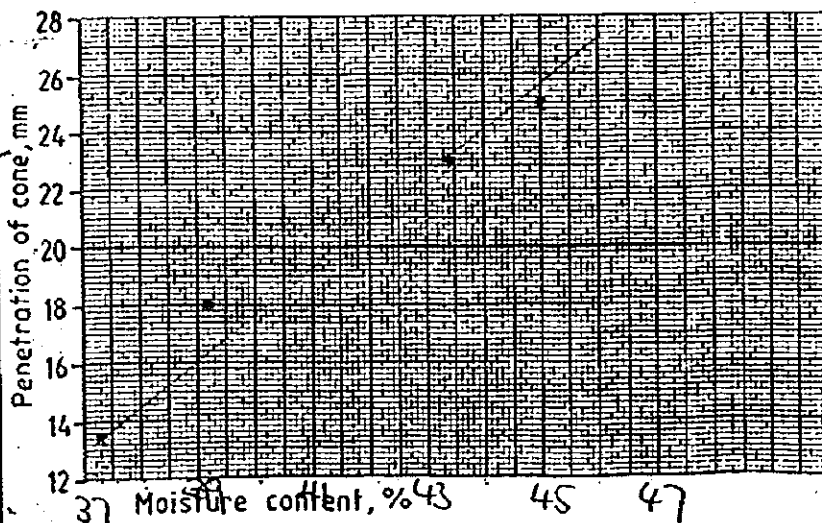
* Delete as appropriate

Operator	Checked	Approved

Location: Mangochi Bridge	Job ref.	
	Borehole/ Pit no.	BH 2
Soil description: firm to stiff grey sandy silty	Sample no.	4
	Depth	8.20 m 129
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date: 15-3-98

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		22K		69		
Mass of wet soil + container	g	9.34		9.68		
Mass of dry soil + container	g	8.86		9.22		
Mass of container	g	6.36		6.68		
Mass of moisture	g	0.48		0.46		
Mass of dry soil	g	2.5		2.54		
Moisture content	%	19.2		18.1		18.7

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	0	0	0	0
Final dial gauge reading	mm	13.5	18.0	28.0	25.0
Average penetration	mm				
Container no.		238	74	63T	36C
Mass of wet soil + container	g	31.26	27.144	33.36	25.16
Mass of dry soil + container	g	25.34	22.38	28.00	20.20
Mass of container	g	9.46	9.48	15.66	9.18
Mass of moisture	g	5.92	5.06	5.36	4.96
Mass of dry soil	g	15.88	12.9	12.34	11.02
Moisture content	%	37.3	39.2	43.4	45.0



Sample preparation *

as received
 washed on 425 µm sieve
 air dried at °C
 oven dried at °C
 not known
 Proportion retained
 on 425 µm sieve %

Liquid limit **41.5** % 42

Plastic limit **18.7** %

Plasticity Index **22.8** 23

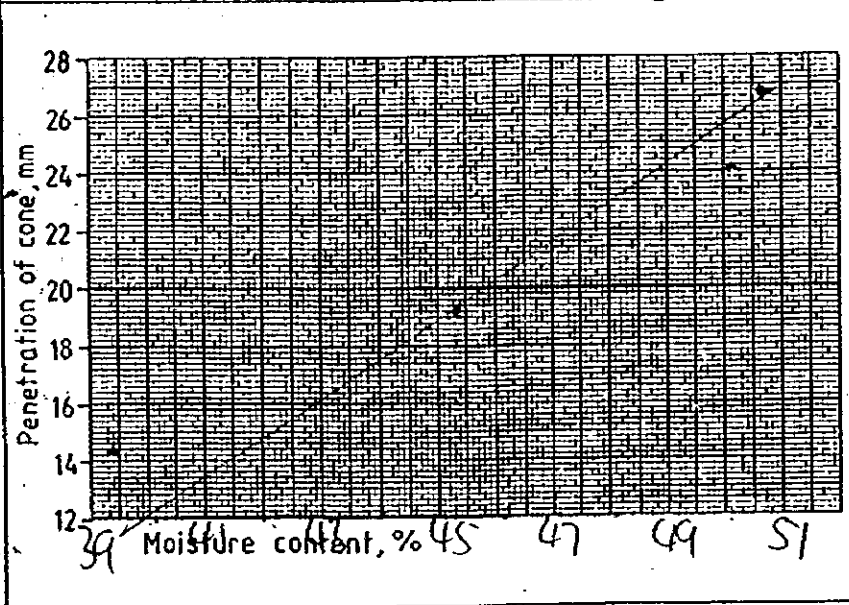
* Delete as appropriate

Operator Checked Approved

Location Moneghet Bridge	Job ref.	
Soil description dense darkish grey silty sandy clay	Borehole/ Pit no.	BH 2
	Sample no.	5
	Depth	12.9m - 196
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date 15-03-98

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.			130		13	
Mass of wet soil + container	g		8.54		9.08	
Mass of dry soil + container	g		7.88		8.44	
Mass of container	g		4.80		5.42	
Mass of moisture	g		0.66		0.64	
Mass of dry soil	g		3.08		3.02	
Moisture content	%		21.4		21.2	18.1 21.3

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	0	0	0	0
Final dial gauge reading	mm	14.3	19.1	24.1	26.7
Average penetration	mm				
Container no.		X	WH 4	5	130
Mass of wet soil + container	g	17.58	20.60	21.12	19.08
Mass of dry soil + container	g	13.98	15.88	15.88	14.26
Mass of container	g	4.84	5.46	5.42	4.76
Mass of moisture	g	3.6	4.72	5.24	4.82
Mass of dry soil	g	9.14	10.42	10.46	9.5
Moisture content	%	39.4	45.3	50.1	50.7

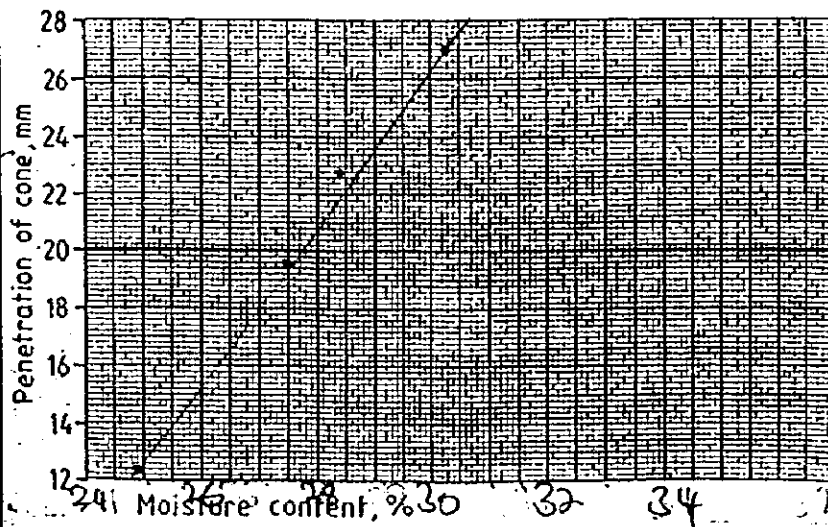


Sample preparation *		
as received		
washed on 425 µm sieve		
air dried at °C		
oven dried at °C		
not known		
Proportion retained on 425 µm sieve %		
Liquid limit	45.6	% 46
Plastic limit	21.3	%
Plasticity index	24.3	24
* Delete as appropriate		
Operator	Checked	Approved

Location Mangochi Bridge	Job ref.	
	Borehole/ Pit no.	BH 2
Soil description Whitish grey clayey silty sand	Sample no.	6
	Depth	2285-m 27.60
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4 ^a	Date 15.3.1998

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		CH		118		
Mass of wet soil + container	g	15.78		13.68		
Mass of dry soil + container	g	15.24		12.60		
Mass of container	g	5.45		5.44		
Mass of moisture	g	1.15		1.08		
Mass of dry soil	g	9.78		7.16		
Moisture content	%	14.9		15.1		

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	0	0	0	0
Final dial gauge reading	mm	12.4	14.5	22.9	27.0
Average penetration	mm				
Container no.		N31A	U	68	22
Mass of wet soil + container	g	23.02	19.66	17.02	22.30
Mass of dry soil + container	g	20.38	17.44	15.30	19.28
Mass of container	g	9.78	9.38	9.24	9.32
Mass of moisture	g	2.64	2.22	1.72	3.02
Mass of dry soil	g	10.6	8.06	6.06	9.96
Moisture content	%	24.9	27.5	28.4	30.3



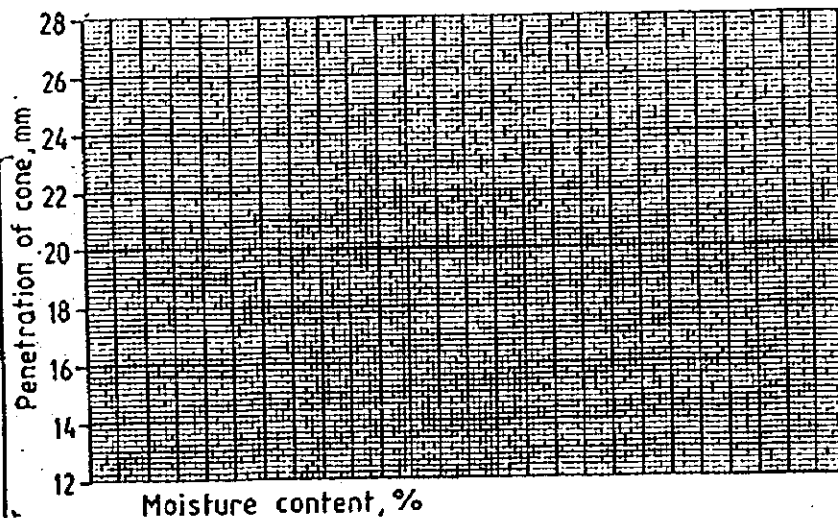
Sample preparation *		
as received		
washed on 425 µm sieve		
air dried at °C		
oven dried at °C		
not known		
Proportion retained on 425 µm sieve %		
Liquid limit	27.7	%
Plastic limit	15.0	%
Plasticity index	12.7	
* Delete as appropriate		
Operator	Checked	Approved

28
13

Location	Mangochi Bridge.	Job ref.	
		Borehole/ Pit no.	BH 2
Soil description	Very dense whitish grey medium to coarse sand.	Sample no.	7
		Depth	27.60 - 28.5
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date	

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.						
Mass of wet soil + container	g					
Mass of dry soil + container	g					
Mass of container	g					
Mass of moisture	g					
Mass of dry soil	g					
Moisture content	%					

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm				
Final dial gauge reading	mm				
Average penetration	mm				
Container no.					
Mass of wet soil + container	g				
Mass of dry soil + container	g				
Mass of container	g				
Mass of moisture	g				
Mass of dry soil	g				
Moisture content	%				



Sample preparation *		
as received		
washed on 425 µm sieve		
air dried at °C		
oven dried at °C		
not known		
Proportion retained on 425 µm sieve %		
Liquid limit		%
Plastic limit		%
Plasticity Index		
* Delete as appropriate		
Operator	Checked	Approved

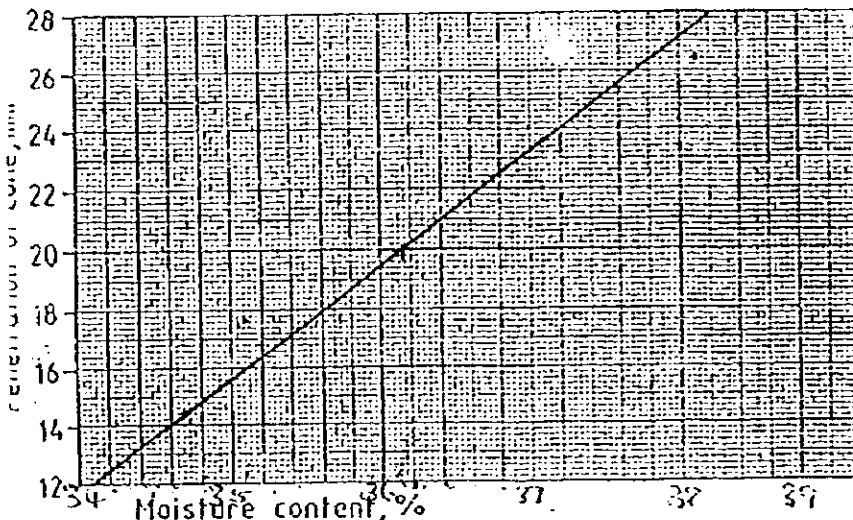
Liquid limit (cone penetrometer) and plastic limit

Form 2.C

Location	Mangochi Bridge	Job ref.	
		Borehole/ Pit no.	BH2
Soil description	Very dense yellowish grey clayey silt. (med stone)	Sample no.	8
		Depth	28.88 - 30.00
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4	Date	15-3-98

PLASTIC LIMIT		Test no.	1	2	3	4	Average
Container no.			65		6B		
Mass of wet soil + container	g		11.62		12.06		
Mass of dry soil + container	g		10.82		11.18		
Mass of container	g		6.52		6.74		
Mass of moisture	g		0.8		0.88		
Mass of dry soil	g		4.3		4.34		
Moisture content	%		18.6		20.3		19.5

LIQUID LIMIT		Test no.	1	2	3	4
Initial dial gauge reading	mm		0	0	0	0
Final dial gauge reading	mm		4.2	19.7	23.7	26.5
Average penetration	mm					
Container no.			X2	90	15	17
Mass of wet soil + container	g		24.92	26.94	25.92	34.00
Mass of dry soil + container	g		21.02	24.08	21.48	27.26
Mass of container	g		9.78	15.98	9.52	9.56
Mass of moisture	g		3.9	2.86	4.44	6.74
Mass of dry soil	g		11.24	8.1	11.96	17.7
Moisture content	%		34.7	35.3	37.1	38.1



Sample preparation		
as received		
washed on 425 µm sieve		
air dried at °C		
oven dried at °C		
not known		
Proportion retained on 425 µm sieve %		
Liquid limit	36.2	%
Plastic limit	19.5	%
Plasticity Index	16.7	
* Delete as appropriate		
Operator	Checked	Approved

36
17

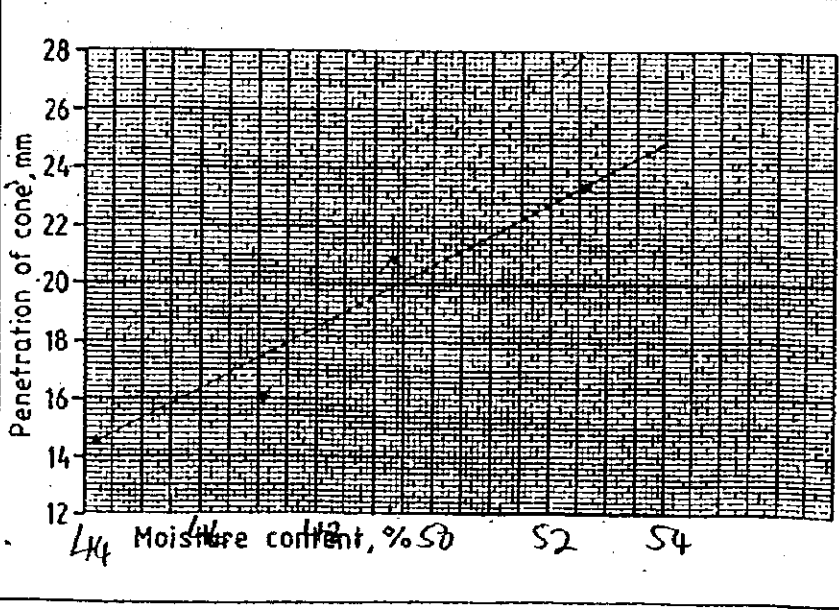
Liquid limit (cone penetrometer) and plastic limit

Form 2.C

Location <u>Margach Bridge site</u>	Job ref.	
	Borehole/ Pit no.	<u>BH2</u>
Soil description <u>Dense darkish grey silty sandy clay.</u>	Sample no.	<u>4/100</u>
	Depth	<u>17.05 - 17.45</u>
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date
		<u>15-3-97</u>

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		<u>G3</u>		<u>C3</u>		
Mass of wet soil + container	g	<u>11.86</u>		<u>11.82</u>		
Mass of dry soil + container	g	<u>10.64</u>		<u>10.62</u>		
Mass of container	g	<u>5.46</u>		<u>5.34</u>		
Mass of moisture	g	<u>1.22</u>		<u>1.2</u>		
Mass of dry soil	g	<u>5.18</u>		<u>5.28</u>		
Moisture content	%	<u>23.6</u>		<u>22.7</u>		<u>23.2</u>

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Final dial gauge reading	mm	<u>45</u>	<u>6.0</u>	<u>20.9</u>	<u>23.4</u>
Average penetration	mm				
Container no.		<u>N33</u>	<u>9</u>	<u>A32</u>	<u>7</u>
Mass of wet soil + container	g	<u>21.54</u>	<u>24.82</u>	<u>26.48</u>	<u>31.16</u>
Mass of dry soil + container	g	<u>17.80</u>	<u>19.98</u>	<u>20.20</u>	<u>23.70</u>
Mass of container	g	<u>9.26</u>	<u>9.70</u>	<u>9.28</u>	<u>9.52</u>
Mass of moisture	g	<u>3.74</u>	<u>4.84</u>	<u>5.68</u>	<u>7.46</u>
Mass of dry soil	g	<u>8.44</u>	<u>10.28</u>	<u>11.52</u>	<u>14.18</u>
Moisture content	%	<u>44.3</u>	<u>47.1</u>	<u>49.3</u>	<u>52.6</u>



Sample preparation *

as received

washed on 425 µm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 µm sieve %

Liquid limit 49.3 %

Plastic limit 23.2 %

Plasticity Index 26.1

* Delete as appropriate

Operator	Checked	Approved

49

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Triaxial Test Mohr Circles

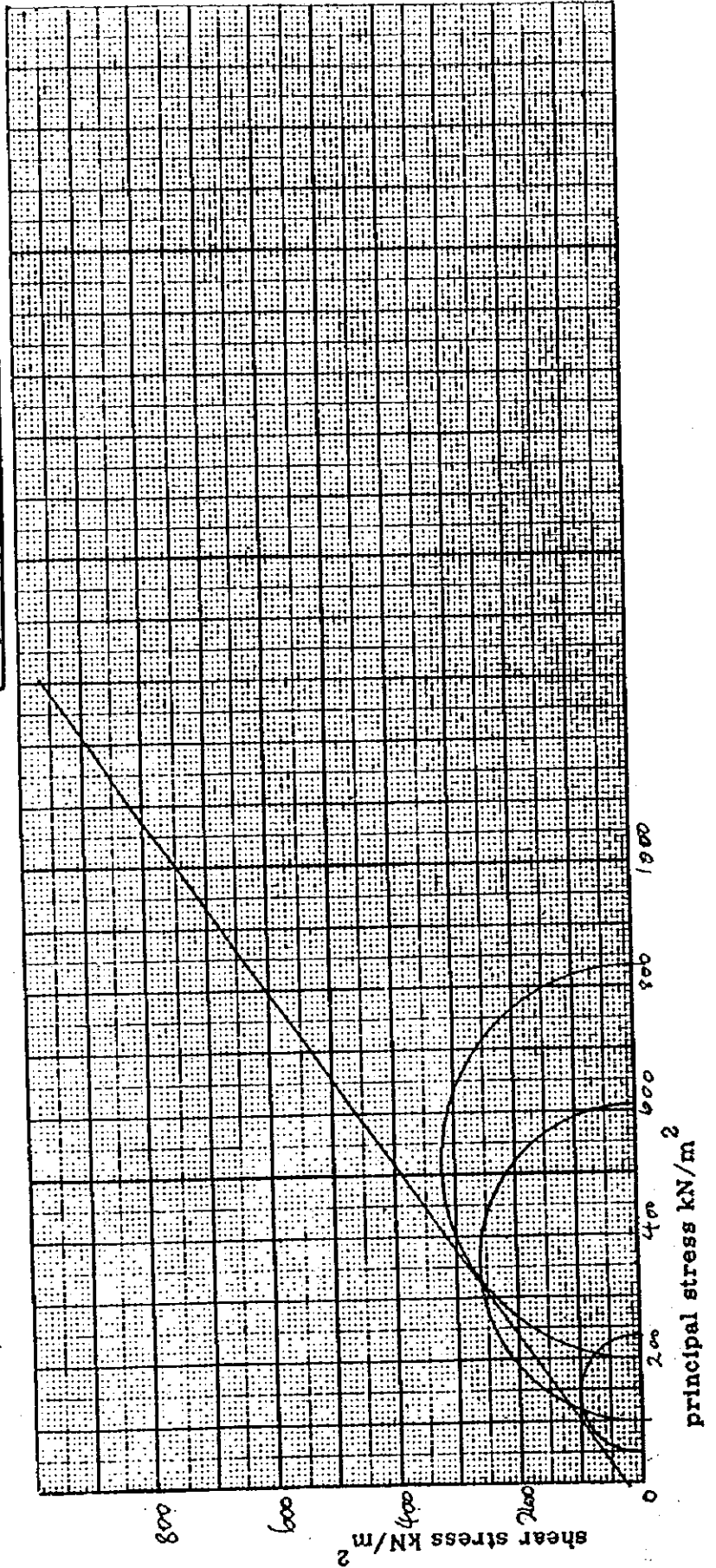
Form K18M

Mangochi bridge
Depth 17.0 - 17.45m

Bulk density = 2139 kg/m^3
 $M/c = 15.0\%$
 $c = 28.0 \text{ (kN/m}^2)$
 $\phi = 37.5^\circ$

sample no.	1
Location no.	BH2a
date:	14-3-1998

spec ident.	cell/p ₂ kN/m ²	stress kN/m ²	$\sigma_1 - \sigma_3$ kN/m ²	σ_3 kN/m ²	σ_1 kN/m ²
1	50	184.5			234.5
2	100	503.0			603.0
3	200	638.5			838.5



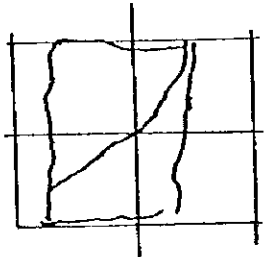
MATERIALS LABORATORY TRIAxIAL COMPRESSION TEST

ON SAMPLE 762mm LONG AND 381mm DIA.

Loc. No. BH2-17.00-17.45M Name MANGOLAI BRIDGE Date 14-03-98
 Sample No. 1 Tube No. _____ Length _____ Dia. _____
 Wet Weight 176 gm. Bulk Density _____ kg/m³
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 50 KN/m² Rate of Strain _____ per cent per min

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11-40		0.0
5	33		11-419		0.167
10	44		11-439		0.333
15	52		11-458		0.500
20	59		11-477		0.667
25	65		11-497		0.833
30	71		11-516		1.0
45	85		11-574		1.5
60	99		11-639		2.0
75	110		11-697		2.5
80	120		11-761		3.0
105	130		11-819		3.5
120	137		11-884		4.0
135	143		11-948		4.5
150	148		12-013		5.0
165	152		12-077	179.213	5.5
180	155		12-142	181.772	6.0
210	159		12-271	184.503	7.0
240	160		12-400	183.731	8.0
270	160.5		12-529	182.408	9.0
300	160		12-658	179.987	10.0
330	160		12-787	178.571	11.0
360			12-961		12.0
390			13-110		13.0
420			13-277		14.0
450			13-419		15.0
480			13-581		16.0
50			13-742		17.0
540			13-923		18.0
570			14-097		19.0
600			14-258		20.0
630			14-445		21.0
660			14-632		22.0
690			14-819		23.0
720			15-019		24.0
750			15-219		25.0

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.

184.503 KN/m²

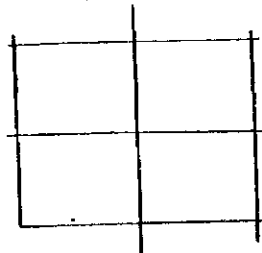
MATERIALS LABORATORY TRIAXIAL COMPRESSION TEST

ON SAMPLE 762mm LONG AND 38.1mm DIA.

Exp. No. BH 2 17.00 - 17.45 Name MANGOCHI BRIDGE Date 14-03-98
 Sample No. 3 Tube No. _____ Length _____ Dia. _____
 Wet Weight 188 gm. Bulk Density _____ kg/m³
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 100 KN/m² Rate of Strain _____ per cent per min

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11.40		0.0
5	72		11.419		0.167
10	103		11.439		0.333
15	127		11.458		0.500
20	152		11.477		0.667
25	172		11.497		0.833
30	190		11.516		1.0
45	237		11.574		1.5
60	280		11.639		2.0
75	314		11.697		2.5
90	342		11.761		3.0
105	367		11.819		3.5
120	389		11.884		4.0
135	405		11.948		4.5
150	416		12.013		5.0
165	422		12.077	497.552	5.5
180	427		12.142	500.752	6.0
210	433.5		12.271	503.031	7.0
240	435		12.400	499.520	8.0
270	435		12.529	494.377	9.0
300			12.658		10.0
330			12.787		11.0
360			12.961		12.0
390			13.110		13.0
420			13.277		14.0
450			13.419		15.0
480			13.581		16.0
50			13.742		17.0
540			13.923		18.0
570			14.097		19.0
600			14.258		20.0
630			14.445		21.0
660			14.632		22.0
690			14.819		23.0
720			15.019		24.0
750			15.219		25.0

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks _____

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.

503.031 KN/m²

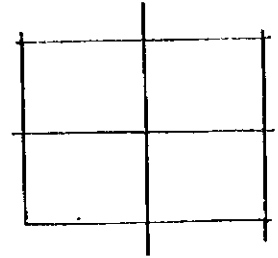
MATERIALS LABORATORY TRIAxIAL COMPRESSION TEST

ON SAMPLE 76.2mm LONG AND 38.1mm DIA.

Loc. No. BH2 17.00-17.45M Name MANGOCH BRIDGE Date 14-03-98
 Sample No. 8401 Tube No. _____ Length _____ Dia. _____
 Wet Weight 189.0 gm. Bulk Density _____ kg/m³ _____
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 200 KN/m² Rate of Strain _____ per cent per mi

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11.40		0.0
5	40		11.419		0.167
10	58		11.439		0.333
15	72		11.458		0.500
20	90		11.477		0.667
25	111		11.497		0.833
30	135		11.516		1.0
45	187		11.574		1.5
60	222		11.639		2.0
75	253		11.697		2.5
80	280		11.761		3.0
105	304		11.819		3.5
120	327		11.884		4.0
135	347		11.948		4.5
150	368		12.013		5.0
165	386		12.077		5.5
180	404		12.142		6.0
210	438		12.271		7.0
240	468		12.400		8.0
270	496		12.529		9.0
300	520		12.658		10.0
330	542		12.787		11.0
360	558		12.961		12.0
390	576		13.110		13.0
420	590		13.277	632.758	14.0
450	601		13.419	637.734	15.0
480	609		13.581	638.515	16.0
50	616		13.742	638.287	17.0
540	620		13.923	634.080	18.0
570	624		14.097	630.294	19.0
600	627		14.258	626.173	20.0
630	630		14.445	621.024	21.0
660	631		14.632	614.060	22.0
690	631		14.819	606.311	23.0
720			15.019		24.0
750			15.219		25.0

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks _____

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.

638.515 KN/m²

LABORATORY TEST RESULTS

LOCATION: ..

PROJECT: .. MANGOCHI BRIDGE SITE

BH PIT No.	SAMP DEPTH (metres)	PARTICLE.. SIZE DISTRIBUTION							ATTERBERG LIMITS		CLASSIFI CATION	TEST				
		PERCENTAGE PASSING BS SIEVE SIZE							L.L.	P.I.		TRIAXIAL/BOX SHEAR	M/C	SHEARING		
		MILLIMETRES	9.5	4.75	2.36	.600	.425	.300	.150	.075	%	%	BULK DENS. kg/m ³	%	RESISTANCE kN/m ²	ANGLE Degrees
BH3	1	0.00-2.42	100	99	96	57	46	42	37	29	54	32				
	2	2.42-4.85	100	60	78	19	11	9	6	3	N	P				
	3	4.85-8.75	100	99	100	99	85	78	72	63	49	34				
	4	8.75-11.20	100	98	70	21	16	14	12	7	N	P				
	5	11.20-12.95	100	99	99	91	88	87	83	37	35	15				
	6	12.95-14.87	100	100	100	71	55	45	36	24	37	22				
	7	14.87-20.90	100	100	100	90	84	80	68	46	43	25				
	8	20.90-30.00	100	99	91	40	28	23	16	9	N	P				
	1	6.70-7.15	100	98	93	90	83	69	54		30		1972	19.9	75	18
	2	20.97-21.42	100	95	89	66	57	49	32	14	N	P				

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH3 Date 26/03/98
 Sample No. 1 Depth 0.00 - 2.42 m Description _____
 Sieving _____

Total Weight of dry Sample: 967.5 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Mass Sieve Load g
75.00 mm						
63.0 mm						4500
53.0 mm						3500
37.5 mm						2500
26.5 mm						2000
19.0 mm						1500
13.2 mm						1000
9.5 mm						750
6.7 mm				100		500
4.75 mm	7.5	7.5	0.8	99.2	99	
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						200
No. 7 (2.36 mm)	27.4	34.9	3.6	96.4	96	200
No. 14 (1.18 mm)						200
No. 25 (.600 mm)	382.7	417.6	43.2	56.8	57	200
No. 36 (.425 mm)	104.3	521.9	53.9	46.1	46	200
No. 52 (.300 mm)	38.2	560.1	57.9	42.1	42	200
No. 72 (.212 mm)						200
No. 100 (.150 mm)	48.0	608.1	62.9	37.1	37	200
No. 200 (.075 mm)	79.5	687.6	71.1	28.9	29	200
Passing No. 200 (.075 mm)	279.9	28.9				
Total						

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH3 Date 28/03/98
 Sample No. 2 Depth 2.42 - 4.85m Description _____
 Sieving _____

Total Weight of dry Sample: 909.1 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max ^o Sieve Load g
75.50 mm						
63.0 mm						4500
53.0 mm						3500
37.5 mm						2500
26.5mm						2000
19.0 mm						1500
13.2 mm				100		1000
9.5 mm	2.8	2.8	0.3	99.7	100	750
6.7 mm						500
4.75 mm	33.5	36.3	39.9	60.1	60	
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	165.5	201.8	22.2	77.8	78	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	531.2	473.0	80.6	19.4	19	75
No. 36 (.425 mm)	78.9	811.9	89.3	10.7	11	75
No. 52 (.300 mm)	20.2	832.1	91.5	8.5	9	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	22.7	854.8	94.0	6.0	6	40
No. 200 (.075 mm)	26.7	880.5	96.9	3.1	3	25
Passing No. 200 (.075 mm)	28.6	3.1				
Total						

W. & A.

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH 3 Date 28/03/98
 Sample No. 3 Depth 4.85-8.75m. Description _____
 Sieving _____

Total Weight of dry Sample: 908.3 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained %	Per cent Retained	Total Passing %	Remarks	Mass Sieve Load g
75.50 mm						
63.0 mm						
53.0 mm						4500
37.5 mm						3500
26.5mm						2500
19.0 mm						2000
13.2 mm						1500
9.5 mm						1000
6.7 mm				100		750
4.75 mm	2.1	2.1	0.2	99.8	100	500
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	4.5	6.6	0.7	99.3	99	200
No. 14 (1.18 mm)						150
No. 25 (.600 mm)	129.8	136.4	15.0	85.0	85	5
No. 36 (.425 mm)	66.7	203.1	22.4	77.6	78	5
No. 52 (.300 mm)	50.2	253.3	27.9	72.1	72	5
No. 72 (.212 mm)						5
No. 100 (.150 mm)	82.1	335.4	36.9	63.1	63	5
No. 200 (.075 mm)	130.9	466.3	51.3	48.7	49	5
Passing No. 200 (.075 mm)	442.0	48.7				
Total						

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location B#3 Date 26/03/98
 Sample No. 5 Depth 11.20-12.95m Description _____
 Sieving _____

Total Weight of dry Sample: 541.7 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Mass Sieve Load g
75.0 mm						
63.0 mm						
53.0 mm						450
37.5 mm						350
26.5mm						250
19.0 mm						200
13.2 mm						150
9.5 mm						100
6.7 mm				100		75
4.75 mm	3.1	3.1	0.6	99.4	99	50
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						30
No. 7 (2.36 mm)	5.0	8.1	1.5	98.5	99	20
No. 14 (1.18 mm)						10
No. 25 (.600 mm)	39.9	48.0	8.9	91.1	91	5
No. 36 (.425 mm)	15.3	63.3	11.7	88.3	88	5
No. 52 (.300 mm)	8.6	71.9	13.3	86.7	87	5
No. 72 (.212 mm)						5
No. 100 (.150 mm)	18.8	90.7	16.7	83.3	83	5
No. 200 (.075 mm)	249.1	339.8	62.7	37.3	37	5
Passing No. 200 (.075 mm)	201.9	37.3				
Total						

W. A. R.

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location B13 Date 26/03/98
 Sample No. 6 Depth 12.95-14.87 m Description _____
 Sieving _____

Total Weight of dry Sample: 931.0 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained %	Per cent Retained	Total Passing %	Remarks	Max ^o Sieve Load g
75.50 mm						
63.0 mm						4500
53.0 mm						3500
37.5 mm						2500
26.5 mm						2000
19.0 mm						1500
13.2 mm						1000
9.5 mm						750
6.7 mm						500
4.75 mm	0.1	0.1	0.0	100	100	
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	4.9	5.0	0.5	99.5	100	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	261.8	266.8	28.7	71.3	71	75
No. 36 (.425 mm)	156.9	423.7	45.5	54.5	55	75
No. 52 (.300 mm)	89.1	512.8	55.1	44.9	45	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	85.9	598.7	64.3	35.7	36	40
No. 200 (.075 mm)	212.4	711.1	76.4	23.6	24	25
Passing No. 200 (.075 mm)	219.9	23.6				
Total						

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH3 Date 28/03/98
 Sample No. 7 Depth 14-87-20-90m Description _____
 Sieving _____

Total Weight of dry Sample: 858.6 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max ^e Sieve Load g
75.50 mm						
63.0 mm						
53.0 mm						4500
37.5 mm						3500
26.5mm						2500
19.0 mm						2000
13.2 mm						1500
9.5 mm						1000
6.7 mm				100		750
4.75 mm	0.1	0.1	0.0	100	100	500
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	3.1	3.2	0.4	99.6	100	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	86.2	89.4	10.4	89.6	90	75
No. 36 (.425 mm)	45.3	134.7	15.7	84.3	84	75
No. 52 (.300 mm)	36.2	170.9	19.9	80.1	80	50
No. 72 (.212 mm)						30
No. 100 (.150 mm)	104.7	275.6	32.1	67.9	68	40
No. 200 (.075 mm)	190.5	466.1	54.3	45.7	46	25
Passing No. 200 (.075 mm)	398.5	45.7				
Total						

W. & A.

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH3 Date 28/03/98
 Sample No. 8 Depth 20.90-30.00 Description _____
 Sieving _____

Total Weight of dry Sample: 1040.3 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained %	Per cent Retained	Total Passing %	Remarks	Max Sieve Load g
75.50 mm						
63.0 mm						
53.0 mm						4500
37.5 mm						3500
26.5mm						2500
19.0 mm						2000
13.2 mm						1500
9.5 mm						1000
6.7 mm				100		750
4.75 mm	14.9	14.9	1.4	98.6	99	500
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	77.1	92	8.8	91.2	91	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	529.3	621.3	59.7	40.8	40	75
No. 36 (.425 mm)	126.2	747.5	71.9	28.1	28	75
No. 52 (.300 mm)	53.3	800.8	76.9	23.1	23	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	42.7	873.5	83.9	16.1	16	50
No. 200 (.075 mm)	77.2	950.7	91.4	8.6	9	25
Passing No. 200 (.075 mm)	89.6	8.6				
Total						

W. A. A.

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Site Operator _____
 Location BH3 Date 26/03/98
 Sample No. 1 Depth 6-70-7-15m Description _____
 Sieving _____

Total Weight of dry Sample: 627.3 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Mass Sieve Load g
75.50 mm						
63.0 mm						
53.0 mm						4500
37.5 mm						3500
26.5mm)						2500
19.0 mm						2000
13.2 mm						1500
9.5 mm						1000
6.7 mm						750
4.75 mm						500
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	3.0	3.0	0.5	99.5	100	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	11.1	14.1	2.2	97.8	98	75
No. 36 (.425 mm)	30.5	44.6	7.1	92.9	93	75
No. 52 (.300 mm)	21.1	65.7	10.5	89.5	90	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	44.4	107.1	17.1	82.9	83	40
No. 200 (.075 mm)	88.3	195.4	31.1	68.9	69	25
Passing No. 200 (.075 mm)	431.9	68.9				
Total						

W. & A.

MATERIALS LABORATORY
SIEVE ANALYSIS OF SOIL

Site Mangochi Bridge Operator _____
 Location BH3 Date 30/03/98
 Sample No. (2) 11/100 Depth 20-97-21-42 Description _____
 Sieving _____

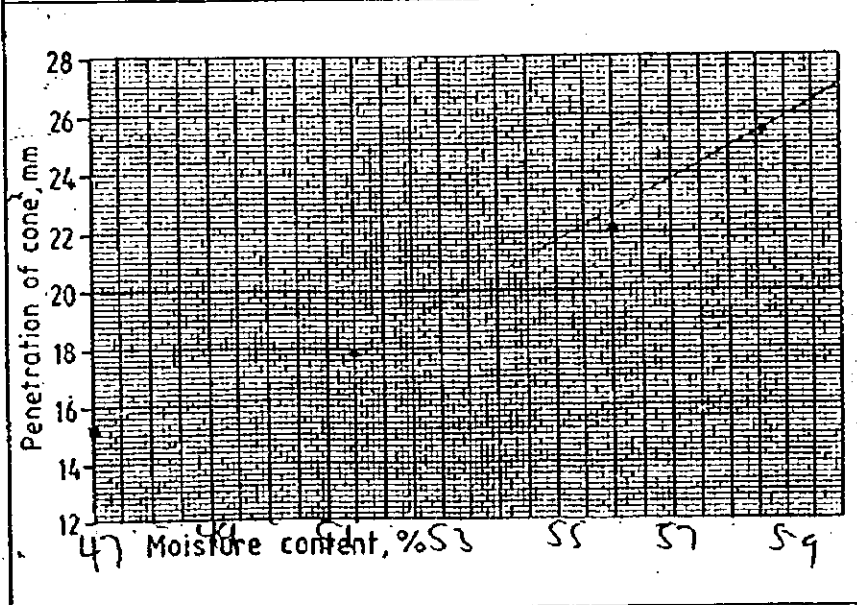
Total Weight of dry Sample: 957.4 g Dry.

B.S. Sieve Size	Weight Retained g	Weight Retained g	Per cent Retained	Total Passing %	Remarks	Max Sieve Load g
75.50 mm						
63.0 mm						
53.0 mm						4500
37.5 mm						3500
26.5mm						2500
19.0 mm						2000
13.2 mm						1500
9.5 mm						1000
6.7 mm				100		750
4.75 mm	44.9	44.9	4.7	95.3	95	500
Passing 4.75 mm						
Riffled Sample 4.75 mm Passing						
3.35 mm						300
No. 7 (2.36 mm)	61.9	106.8	11.0	89.0	89	200
No. 14 (1.18 mm)						100
No. 25 (.600 mm)	218.3	325.1	33.9	66.1	66	75
No. 36 (.425 mm)	90.9	416.0	43.5	56.5	57	75
No. 52 (.300 mm)	68.1	484.1	50.6	49.4	49	50
No. 72 (.212 mm)						50
No. 100 (.150 mm)	164.4	648.5	67.7	32.3	32	40
No. 200 (.075 mm)	171.4	819.9	85.6	14.4	14	25
Passing No. 200 (.075 mm)	137.5	14.4				
Total						

Location <i>Margach Bridge site</i>	Job ref.	
	Borehole/ Pit no.	<i>BH3</i>
Soil description <i>Very soft dark grey - sandy clay.</i>	Sample no.	<i>1</i>
	Depth	<i>0.00 m - 2.42</i>
Test method <i>BS 1377 : Part 2 : 1990 : 4.3/4.4*</i>	Date	<i>24.3.98</i>

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		<i>N19</i>		<i>N20</i>		
Mass of wet soil + container	g	<i>11.38</i>		<i>11.74</i>		
Mass of dry soil + container	g	<i>10.50</i>		<i>10.84</i>		
Mass of container	g	<i>6.42</i>		<i>6.46</i>		
Mass of moisture	g	<i>0.88</i>		<i>0.9</i>		
Mass of dry soil	g	<i>4.08</i>		<i>4.38</i>		
Moisture content	%	<i>21.6</i>		<i>20.5</i>		<i>21.1</i>

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Final dial gauge reading	mm	<i>15.2</i>	<i>17.9</i>	<i>22.1</i>	<i>25.4</i>
Average penetration	mm				
Container no.		<i>36c</i>	<i>74</i>	<i>70</i>	<i>9</i>
Mass of wet soil + container	g	<i>20.90</i>	<i>35.40</i>	<i>41.58</i>	<i>32.98</i>
Mass of dry soil + container	g	<i>23.96</i>	<i>26.58</i>	<i>29.98</i>	<i>24.38</i>
Mass of container	g	<i>9.18</i>	<i>9.48</i>	<i>9.26</i>	<i>9.70</i>
Mass of moisture	g	<i>6.94</i>	<i>8.82</i>	<i>11.6</i>	<i>8.6</i>
Mass of dry soil	g	<i>14.78</i>	<i>17.12</i>	<i>20.72</i>	<i>14.68</i>
Moisture content	%	<i>47.0</i>	<i>51.5</i>	<i>56.0</i>	<i>58.6</i>



Sample preparation *

as received

washed on 425 µm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 µm sieve %

Liquid limit *53.5* % *57*

Plastic limit *21.1* %

Plasticity index *32.4* *32*

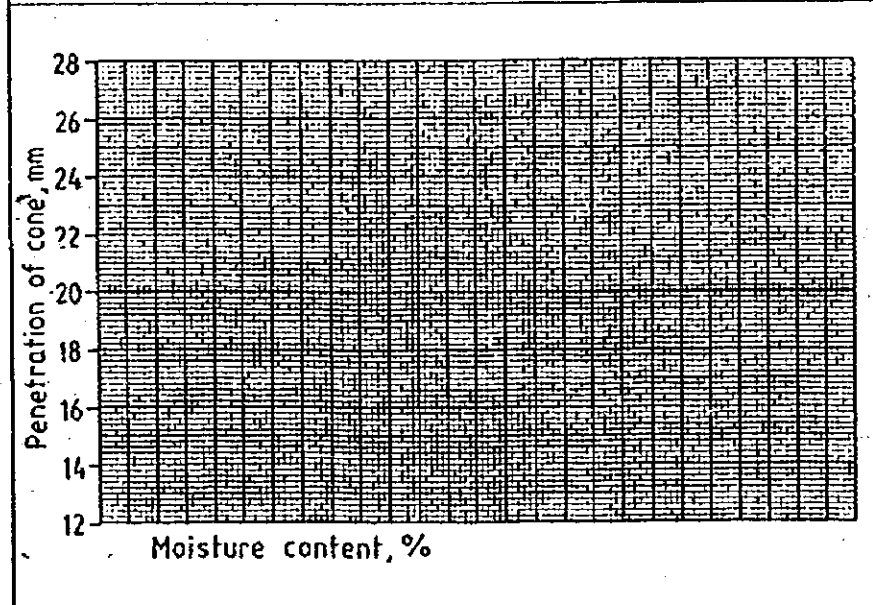
* Delete as appropriate

Operator	Checked	Approved

Location	Mangochi Bridge Site	Job ref.	
		Borehole/ Pit no.	BH 3
Soil description	loose brownish medium to coarse quartzes sand	Sample no.	2
		Depth	2.42m + 0.85
Test method	BS 1377 Part 2 : 1990 : 4.3/4.4 ^a	Date	

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.						
Mass of wet soil + container	g					
Mass of dry soil + container	g					
Mass of container	g					
Mass of moisture	g					
Mass of dry soil	g					
Moisture content	%					

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	0	0	0	0
Final dial gauge reading	mm				
Average penetration	mm				
Container no.					
Mass of wet soil + container	g				
Mass of dry soil + container	g				
Mass of container	g				
Mass of moisture	g				
Mass of dry soil	g				
Moisture content	%				



Sample preparation *

as received

washed on 425 μm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 μm sieve %

Liquid limit %

Plastic limit %

Plasticity index

* Delete as appropriate

Operator	Checked	Approved

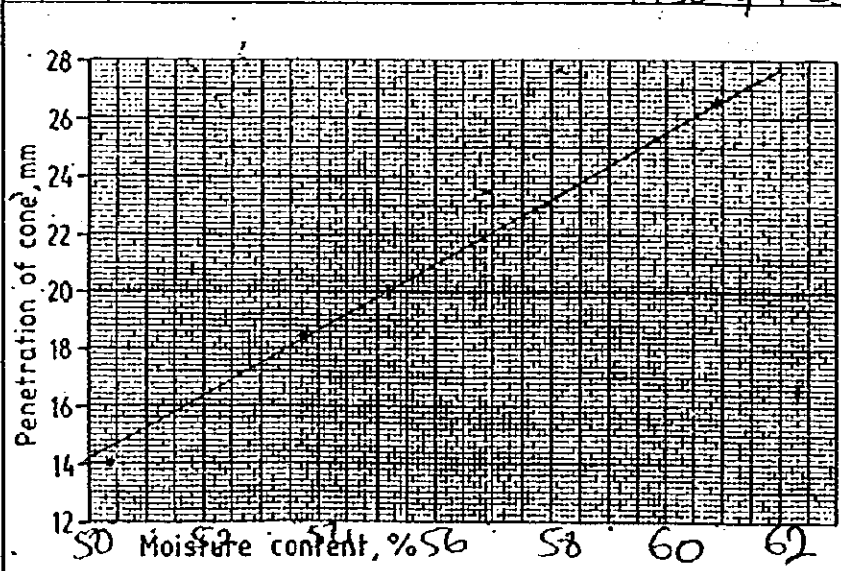
Liquid limit (cone penetrometer) and plastic limit

Form E.9

Location	Mangochi Bridge etc	Job ref.	
		Borehole/ Pit no.	BH3
Soil description	firm to stiff grey sandy clay	Sample no.	3
		Depth	4.85m - 8.75
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4	Date	

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		N130		N15		
Mass of wet soil + container	g	12.48		12.22		
Mass of dry soil + container	g	11.44		11.20		
Mass of container	g	6.50		6.32		
Mass of moisture	g	1.04		1.02		
Mass of dry soil	g	4.90		4.88		
Moisture content	%	21.1		20.9		21.0

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	0	0	0	0
Final dial gauge reading	mm	41	18.5	23.5	26.6
Average penetration	mm				
Container no.		S-3	212	41	39
Mass of wet soil + container	g	36.60	47.56	37.22	45.00
Mass of dry soil + container	g	27.44	34.18	27.08	31.54
Mass of container	g	9.24	9.26	9.26	9.44
Mass of moisture	g	9.18	13.38	10.14	13.46
Mass of dry soil	g	18.2	24.92	17.82	22.1
Moisture content	%	50.4	53.7	56.9	60.9



Sample preparation *

as received

washed on 425 μm sieve

air dried at °C

oven dried at °C

not known

Proportion retained

on 425 μm sieve %

Liquid limit 55.2 %

Plastic limit 21.0 %

Plasticity index 34.2

* Delete as appropriate

Operator	Checked	Approved

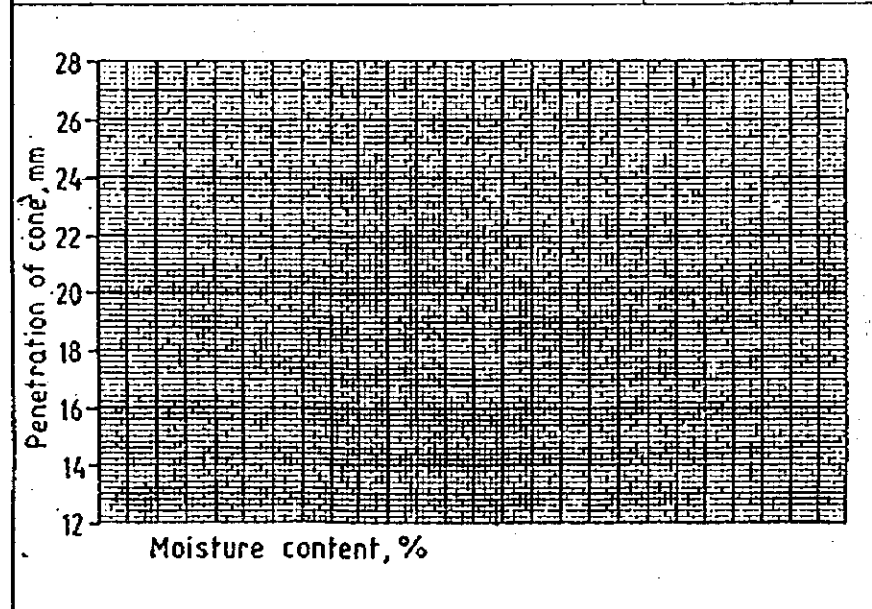
55

34

Location <i>Mangochi Bridge Sup</i>	Job ref.	
	Borehole/ Pit no.	<i>BH3</i>
Soil description <i>Dense brownish grey silty sand.</i>	Sample no.	<i>24</i>
	Depth	<i>0.75m - 1.2</i>
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4 ²	
		Date

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.						
Mass of wet soil + container	g					
Mass of dry soil + container	g					
Mass of container	g					
Mass of moisture	g					
Mass of dry soil	g					
Moisture content	%					

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm				
Final dial gauge reading	mm				
Average penetration	mm				
Container no.					
Mass of wet soil + container	g				
Mass of dry soil + container	g				
Mass of container	g				
Mass of moisture	g				
Mass of dry soil	g				
Moisture content	%				

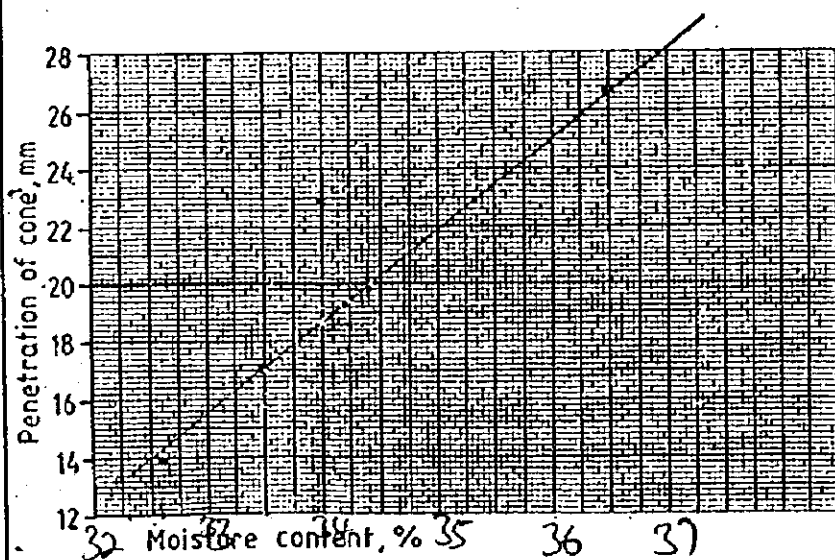


Sample preparation *		
as received		
washed on 425 µm sieve		
air dried at °C		
oven dried at °C		
not known		
Proportion retained on 425 µm sieve %		
Liquid limit	%	
Plastic limit	%	
Plasticity Index		
* Delete as appropriate		
Operator	Checked	Approved

Location <i>Margachi Bridge site</i>	Job ref.	
	Borehole/ Pit no.	<i>BH-3</i>
Soil description <i>Dense grey clayey silt</i>	Sample no.	<i>85</i>
	Depth	<i>11.20 - 12.0</i>
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date <i>24-3-78</i>

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		<i>99</i>		<i>147</i>		
Mass of wet soil + container	g	<i>13.36</i>		<i>14.96</i>		
Mass of dry soil + container	g	<i>12.20</i>		<i>13.56</i>		
Mass of container	g	<i>6.42</i>		<i>6.52</i>		
Mass of moisture	g	<i>1.14</i>		<i>1.4</i>		
Mass of dry soil	g	<i>5.78</i>		<i>7.04</i>		
Moisture content	%	<i>19.7</i>		<i>19.9</i>		<i>19.8</i>

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Final dial gauge reading	mm	<i>134</i>	<i>17.1</i>	<i>22.9</i>	<i>26.7</i>
Average penetration	mm				
Container no.		<i>88A</i>	<i>A1</i>	<i>40</i>	<i>H33</i>
Mass of wet soil + container	g	<i>32.22</i>	<i>31.92</i>	<i>52.92</i>	<i>38.22</i>
Mass of dry soil + container	g	<i>26.64</i>	<i>26.32</i>	<i>43.54</i>	<i>30.58</i>
Mass of container	g	<i>9.64</i>	<i>9.60</i>	<i>15.98</i>	<i>9.36</i>
Mass of moisture	g	<i>5.58</i>	<i>5.6</i>	<i>9.38</i>	<i>7.72</i>
Mass of dry soil	g	<i>17.0</i>	<i>16.72</i>	<i>27.56</i>	<i>21.14</i>
Moisture content	%	<i>32.8</i>	<i>33.5</i>	<i>34.0</i>	<i>36.5</i>



Sample preparation *

as received

washed on 425 μm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 μm sieve %

Liquid limit *37.7* % *35*

Plastic limit *19.8* %

Plasticity Index *14.9* *15*

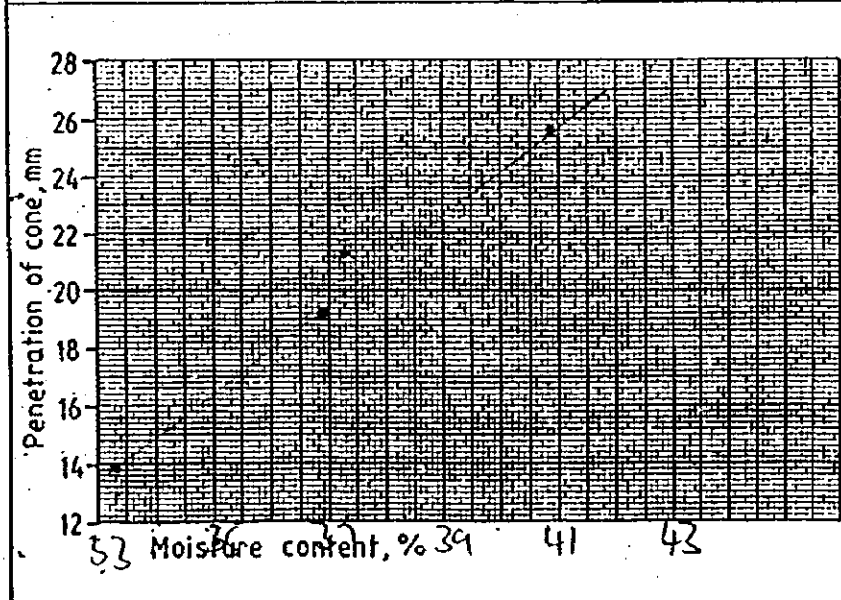
* Delete as appropriate

Operator	Checked	Approved

Location Mangochi Bridge site	Job ref.	
	Borehole/ Pit no.	BH 3
Soil description Dense yellowish grey silty clayey sand.	Sample no.	6-
	Depth	12.95-14.87^m
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date 24-3-94

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		112		127		
Mass of wet soil + container	g	9.66		11.10		
Mass of dry soil + container	g	9.22		10.48		
Mass of container	g	6.30		6.46		
Mass of moisture	g	0.44		0.62		
Mass of dry soil	g	2.92		4.02		
Moisture content	%	15.1		15.4		15.3

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	0	0	0	0
Final dial gauge reading	mm	13.9	19.2	21.3	25.6
Average penetration	mm				
Container no.		142	8281	23	138
Mass of wet soil + container	g	39.96	42.24	30.46	36.54
Mass of dry soil + container	g	32.50	33.46	24.90	28.70
Mass of container	g	10.08	9.60	9.98	9.52
Mass of moisture	g	7.46	8.78	5.56	7.84
Mass of dry soil	g	22.42	23.86	14.92	19.18
Moisture content	%	33.3	36.8	37.3	40.9



Sample preparation *

as received

washed on 425 μm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 μm sieve %

Liquid limit **37.4** %

Plastic limit **15.3** %

Plasticity Index

* Delete as appropriate

Operator	Checked	Approved

37
22

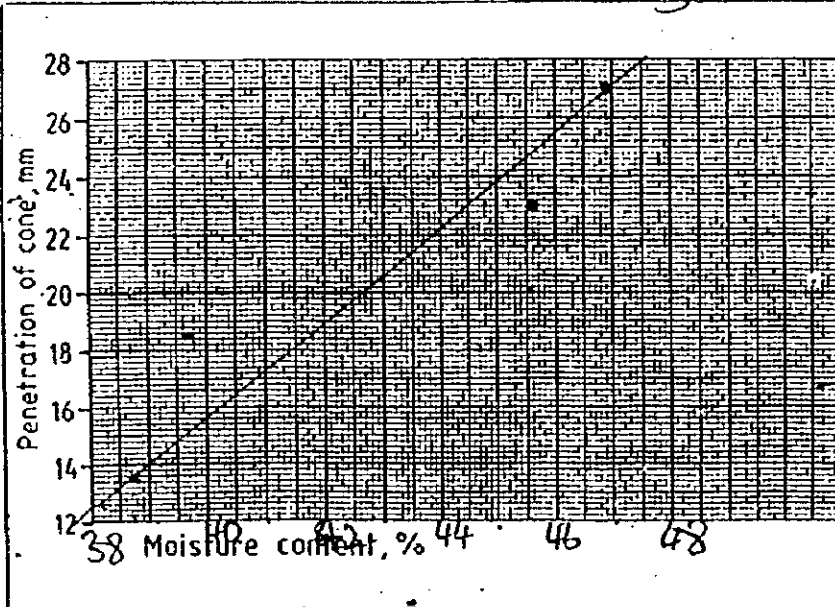
Liquid limit (cone penetrometer) and plastic limit

Form 2.C

Location <i>Margoch Bridge Site</i>	Job ref.	
	Borehole/ Pit no.	<i>BH 3</i>
Soil description <i>Hard grey silty sandy clay.</i>	Sample no.	<i>7</i>
	Depth	<i>14.8m</i> - 20
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date
		<i>24-2-98</i>

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		<i>392</i>		<i>65</i>		
Mass of wet soil + container	g	<i>10.00</i>		<i>9.78</i>		
Mass of dry soil + container	g	<i>9.88</i>		<i>9.80</i>		
Mass of container	g	<i>6.36</i>		<i>6.50</i>		
Mass of moisture	g	<i>0.62</i>		<i>0.68</i>		
Mass of dry soil	g	<i>3.52</i>		<i>2.8</i>		
Moisture content	%	<i>17.6</i>		<i>17.1</i>		<i>17.4</i>

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Final dial gauge reading	mm	<i>185</i>	<i>185</i>	<i>230</i>	<i>270</i>
Average penetration	mm				
Container no.		<i>C2</i>	<i>19</i>	<i>N9</i>	<i>E4</i>
Mass of wet soil + container	g	<i>35.52</i>	<i>38.14</i>	<i>33.82</i>	<i>48.10</i>
Mass of dry soil + container	g	<i>27.44</i>	<i>30.2</i>	<i>26.14</i>	<i>32.36</i>
Mass of container	g	<i>6.60</i>	<i>9.44</i>	<i>9.28</i>	<i>9.48</i>
Mass of moisture	g	<i>8.08</i>	<i>8.24</i>	<i>7.68</i>	<i>10.74</i>
Mass of dry soil	g	<i>20.84</i>	<i>20.76</i>	<i>16.86</i>	<i>22.88</i>
Moisture content	%	<i>38.8</i>	<i>39.7</i>	<i>45.6</i>	<i>46.9</i>



Sample preparation *

as received
 washed on 425 μm sieve
 air dried at °C
 oven dried at °C
 not known
 Proportion retained
 on 425 μm sieve %

Liquid limit *42.7* % *43*
 Plastic limit *17.4* %
 Plasticity index *25.3* *25*

* Delete as appropriate

Operator	Checked	Approved

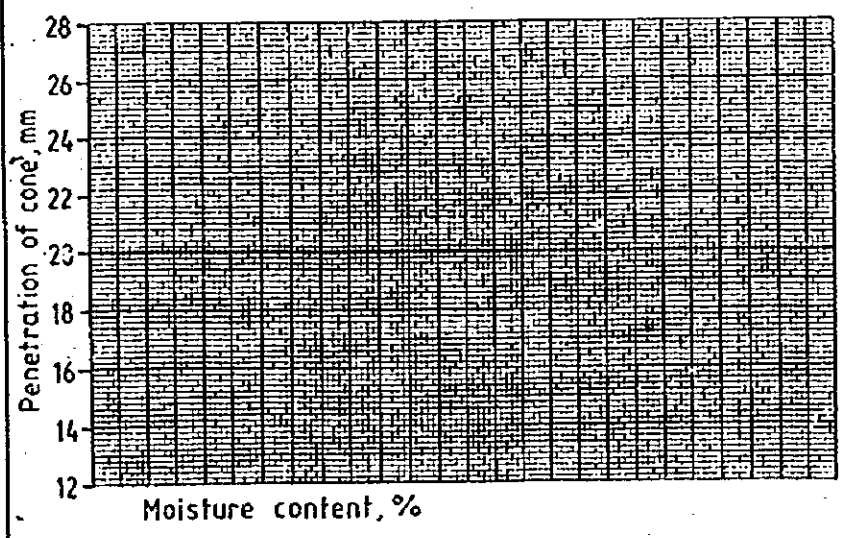
Liquid limit (cone penetrometer) and plastic limits

Form 2.0

Location <i>Margoch Bridge site</i>	Job ref.	
	Borehole/ Pit no.	<i>B1+3</i>
Soil description <i>very dense whitish grey silty sand</i>	Sample no.	<i>8</i>
	Depth	<i>20-40-300</i>
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date <i>24-2-98</i>

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.						
Mass of wet soil + container	g					
Mass of dry soil + container	g					
Mass of container	g					
Mass of moisture	g					
Mass of dry soil	g					
Moisture content	%					

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	0	0	0	0
Final dial gauge reading	mm				
Average penetration	mm				
Container no.		<i>C2</i>	<i>79</i>	<i>N9</i>	<i>E4</i>
Mass of wet soil + container	g				
Mass of dry soil + container	g				
Mass of container	g	<i>6.60</i>	<i>7.44</i>	<i>7.28</i>	<i>7.48</i>
Mass of moisture	g				
Mass of dry soil	g				
Moisture content	%				



Sample preparation *

as received

washed on 425 μm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 μm sieve %

Liquid limit %

Plastic limit %

Plasticity Index

* Delete as appropriate

Operator	Checked	Approved

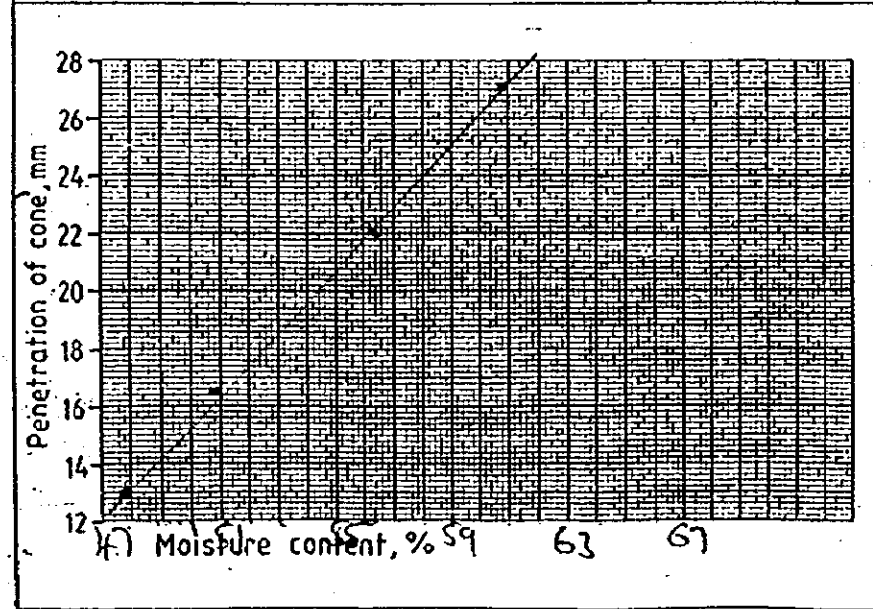
Liquid limit (cons penetrometer) and plastic limit

Form 2.C

Location Mangochi Bridge Site	Job ref.	
	Borehole/ Pit no.	BH 2
Soil description	Sample no.	U/100
	Depth	6.70 m 15
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		63		C4		
Mass of wet soil + container	g	10.22		9.86		
Mass of dry soil + container	g	9.30		8.98		
Mass of container	g	5.46		5.46		
Mass of moisture	g	0.92		0.88		
Mass of dry soil	g	3.84		3.52		
Moisture content	%	24.0		25.0		24.5

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	0	0	0	0
Final dial gauge reading	mm	13.0	16.5	22.0	27.1
Average penetration	mm				
Container no.		N38	90	36C	44
Mass of wet soil + container	g	41.64	32.26	45.92	40.12
Mass of dry soil + container	g	31.24	26.78	32.68	28.62
Mass of container	g	9.50	16.00	9.20	9.72
Mass of moisture	g	10.4	5.48	13.24	11.5
Mass of dry soil	g	21.74	10.78	23.48	18.9
Moisture content	%	47.8	50.8	56.4	60.8



Sample preparation *

as received

washed on 425 μm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 μm sieve %

Liquid limit **54.3** %

Plastic limit **24.5** %

Plasticity index **29.8**

* Delete as appropriate

Operator	Checked	Approved

574
30

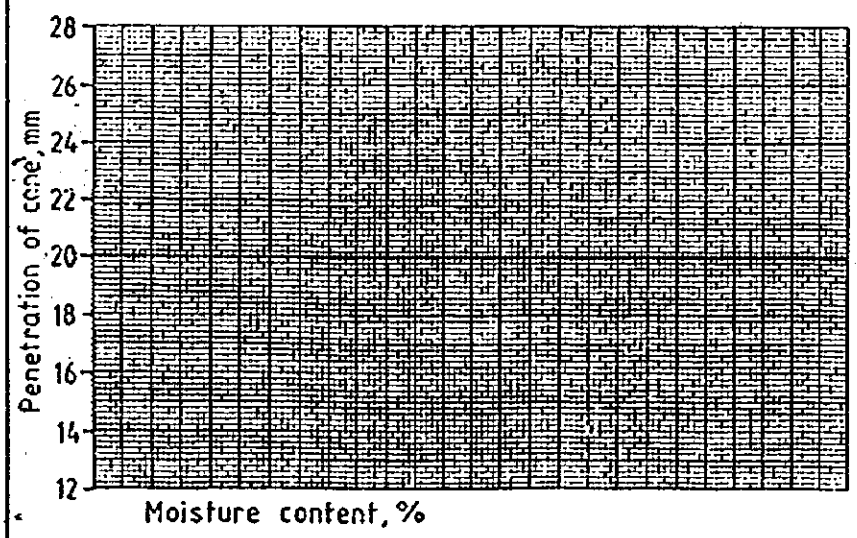
Liquid limit (cone penetrometer) and plastic limit

Form 2.0

Location Mangochi Bridge Ste.	Job ref.	-----
	Borehole/ Pit no.	BH-3
Soil description	Sample no.	41100
	Depth	20.97m 21.45
Test method	BS 1377 : Part 2 : 1990 : 4.3/4.4*	Date

PLASTIC LIMIT	Test no.	1	2	3	4	Average
Container no.		X₀		69		
Mass of wet soil + container	g					
Mass of dry soil + container	g					
Mass of container	g	5.26		5.44		
Mass of moisture	g					
Mass of dry soil	g					
Moisture content	%					

LIQUID LIMIT	Test no.	1	2	3	4
Initial dial gauge reading	mm	0	0	0	0
Final dial gauge reading	mm				
Average penetration	mm				
Container no.		18	22	39	32B1
Mass of wet soil + container	g				
Mass of dry soil + container	g				
Mass of container	g	9.52	9.34	9.44	9.60
Mass of moisture	g				
Mass of dry soil	g				
Moisture content	%				



Sample preparation *

as received

washed on 425 µm sieve

air dried at °C

oven dried at °C

not known

Proportion retained on 425 µm sieve %

Liquid limit %

Plastic limit %

Plasticity index

* Delete as appropriate

Operator	Checked	Approved



Mohr Circles

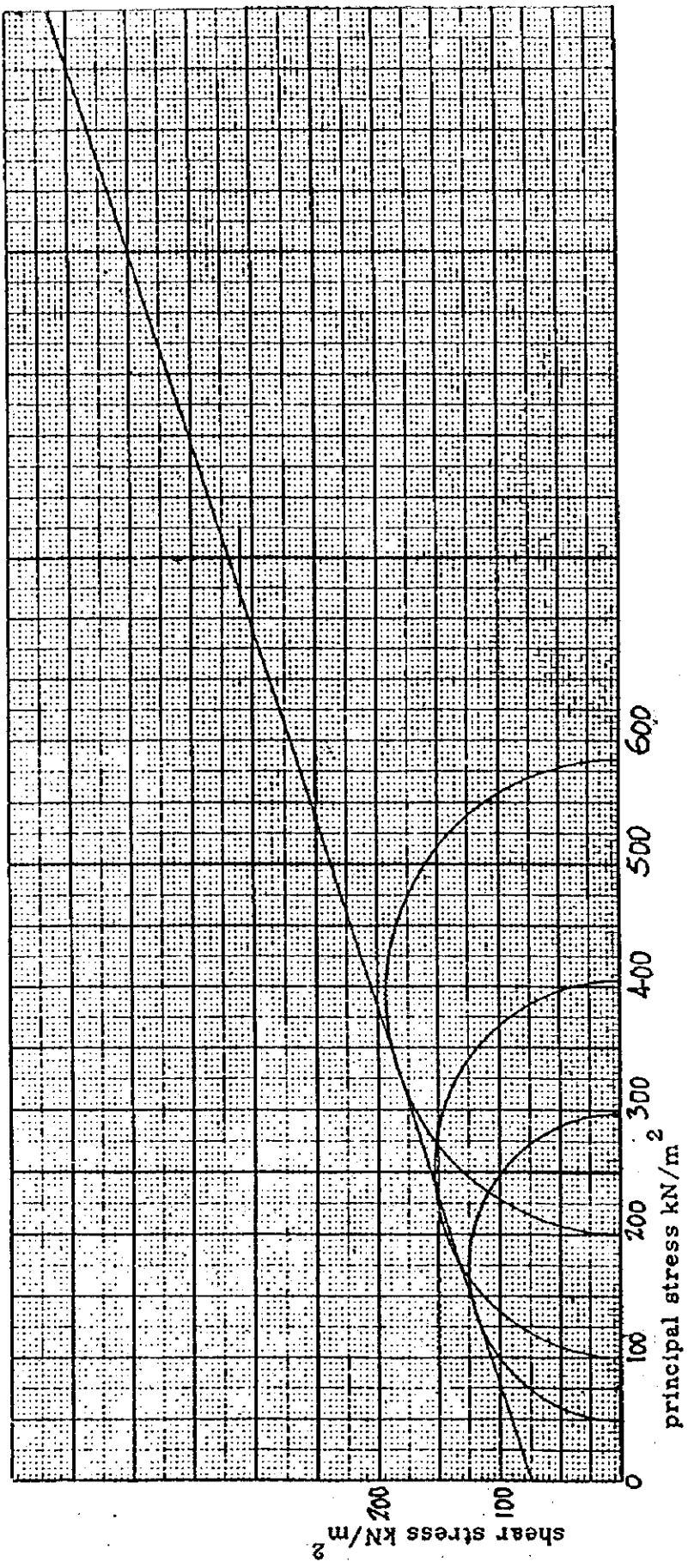
Bulk density = 1972 kg/m³
 = 75 kN/m²
 = 18°
 = 19.9%

MANGGOCHI BRIDGE SITE

sample no.	
Location no. BH3	
date: 28-03-98	

6.7 - 7.15 M

spec ident.	cell/p kN/m ²	stress kN/m ²	$\sigma_1 - \sigma_3$ kN/m ²	σ_3 kN/m ²	σ_1 kN/m ²
1	50	247.9	247.9	50	297.9
2	100	306.3	306.3	100	406.3
3	200	381.4	381.4	200	581.4



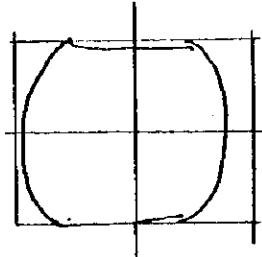
**MATERIALS LABORATORY
 TRIAXIAL COMPRESSION TEST**

ON SAMPLE 762mm LONG AND 381mm DIA.

Loc. No. BH-3 Name MANJOCHI BRIDGE Date 28-3-98
 Sample No. 6.70-7.15m Tube No. _____ Length _____ Dia. _____
 Wet Weight 170 gm. Bulk Density _____ kg/m³
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 50 KN/m² Rate of Strain _____ per cent per min

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11-40		0.0
5	30		11-419		0.167
10	40		11-439		0.333
15	46		11-458		0.500
20	50		11-477		0.667
25	56		11-497		0.833
30	61		11-516		1.0
45	74		11-574		1.5
60	85		11-639		2.0
75	97		11-697		2.5
80	108		11-761		3.0
105	120		11-819		3.5
120	131		11-884		4.0
135	143		11-948		4.5
150	154		12-013		5.0
165	163		12-077		5.5
180	173		12-142		6.0
210	187		12-271		7.0
240	197		12-400		8.0
270	204		12-529		9.0
300	209		12-658		10.0
330	213		12-787		11.0
360	216		12-961		12.0
390	219		13-110		13.0
420	223		13-277		14.0
450	227		13-419		15.0
480	231		13-581		16.0
510	234.5		13-742	<u>247.9</u>	17.0
540	238	243.4	13-923		18.0
570	241.5	243.9	14-097		19.0
600	245	249.7	14-258		20.0
630	248	244.5	14-445	244.5	21.0
660	252	245.2	14-632	245.2	22.0
690	257	246.9	14-819	246.9	23.0
720	260.5	246.9	15-019	246.9	24.0
750	265.0	247.9	15-219	247.9	25.0

Laboratory Assistant's
 Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.

- (1) 50KN = 247.9 KN/m²
- (2) 100KN = 306.3 "
- (3) 200KN = 381.4 "

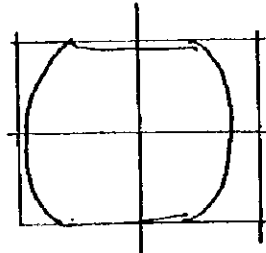
MATERIALS LABORATORY TRIAXIAL COMPRESSION TEST

ON SAMPLE 762mm LONG AND 381mm DIA.

Exp. No. BH-3 Name MANJOCHI BRIDGE Date 28-3-98
 Sample No. 6.70-7.15 Tube No. _____ Length _____ Dia. _____
 Wet Weight 170 gm. Bulk Density _____ kg/m³
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 50 KN/m² Rate of Strain _____ per cent per mi

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11.40		0.0
5	30		11.419		0.167
10	40		11.439		0.333
15	46		11.458		0.500
20	50		11.477		0.667
25	56		11.497		0.833
30	61		11.516		1.0
45	74		11.574		1.5
60	85		11.639		2.0
75	97		11.697		2.5
80	108		11.761		3.0
105	120		11.819		3.5
120	131		11.884		4.0
135	143		11.948		4.5
150	154		12.013		5.0
165	163		12.077		5.5
180	173		12.142		6.0
210	187		12.271		7.0
240	197		12.400		8.0
270	204		12.529		9.0
300	209		12.658		10.0
330	213		12.787		11.0
360	216		12.961		12.0
390	219		13.110		13.0
420	223		13.277		14.0
450	227		13.419		15.0
480	231		13.581		16.0
510	234.5		13.742	247.9	17.0
540	238	243.4	13.923		18.0
570	241.5	243.9	14.097		19.0
600	245	244.7	14.258		20.0
630	248	244.5	14.445	244.5	21.0
660	252	245.2	14.632	245.2	22.0
690	257	246.9	14.819	246.9	23.0
720	260.5	246.9	15.019	246.9	24.0
750	265.0	247.9	15.219	247.9	25.0

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks _____

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.

(1) 50KN = 247.9 KN/m²

(2) 100KN = 306.3 "

(3) 200KN = 381.4 "

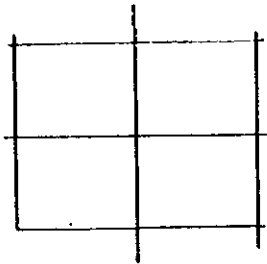
MATERIALS LABORATORY TRIAXIAL COMPRESSION TEST

ON SAMPLE 762mm LONG AND 381mm DIA.

Loc. No. BH3 Name Mangoli Bridge Site Date 28-3-78
 Sample No. 6.10-7.75m Tube No. _____ Length _____ Dia. _____
 Wet Weight 175 gm. Bulk Density _____ kg/m³
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 100 KN/m² Rate of Strain _____ per cent per min

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11.40		0.0
5	28		11.419		0.167
10	52		11.439		0.333
15	72		11.458		0.500
20	86		11.477		0.667
25	98		11.497		0.833
30	108		11.516		1.0
45	130		11.574		1.5
60	154		11.639		2.0
75	173		11.697		2.5
90	192		11.761		3.0
105	208		11.819		3.5
120	221		11.884		4.0
135	233		11.948		4.5
150	242		12.013		5.0
165	250		12.077		5.5
180	256		12.142	300.217	6.0
210	264		12.271	306.344	7.0
240	265		12.400	304.305	8.0
270	265		12.529	301.172	9.0
300			12.658		10.0
330			12.787		11.0
360			12.961		12.0
390			13.110		13.0
420			13.277		14.0
450			13.419		15.0
480			13.581		16.0
50			13.742		17.0
540			13.923		18.0
570			14.097		19.0
600			14.258		20.0
630			14.445		21.0
660			14.632		22.0
690			14.819		23.0
720			15.019		24.0
750			15.219		25.0

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks _____

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.

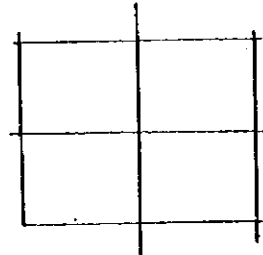
MATERIALS LABORATORY TRIAXIAL COMPRESSION TEST

ON SAMPLE 76.2mm LONG AND 38.1mm DIA.

Loc. No. BH-3 Name MANGOCHI BRIDGE Date 28-3-58
 Sample No. 6.7 Tube No. 7.15m Length _____ Dia. _____
 Wet Weight 177.0 gm. Bulk Density _____ kg/m³
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Factor _____
 Cell Pressure 200 KN/m² Rate of Strain _____ per cent per min

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11.40		0.0
5	42		11.419		0.167
10	66		11.439		0.333
15	82		11.458		0.500
20	95		11.477		0.667
25	107		11.497		0.833
30	118		11.516		1.0
45	147		11.574		1.5
60	171		11.639		2.0
75	190		11.697		2.5
80	206		11.761		3.0
105	221		11.819		3.5
120	232		11.884		4.0
135	244		11.948		4.5
150	253		12.013		5.0
165	262		12.077		5.5
180	271		12.142		6.0
210	284		12.271		7.0
240	296		12.400		8.0
270	306		12.529		9.0
300	315		12.658		10.0
330	322		12.787		11.0
360	330		12.961		12.0
390	337		13.110		13.0
420	343		13.277		14.0
450	351		13.419		15.0
480	357		13.581		16.0
510	364		13.742		17.0
540	370		13.923		18.0
570	374		14.097		19.0
600	380		14.258	379.499	20.0
630	386		14.445	380.500	21.0
660	392		14.632	381.420	22.0
690	394		14.819	378.584	23.0
720	396		15.019	375.439	24.0
750	398		15.219	372.378	25.0

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks _____

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.



Triaxial Test Mohr Circles

MANGROCH BEADIE SITE

DEPTH 20.97 - 21.42 m

BULK DENSITY = 2040 kg/m³

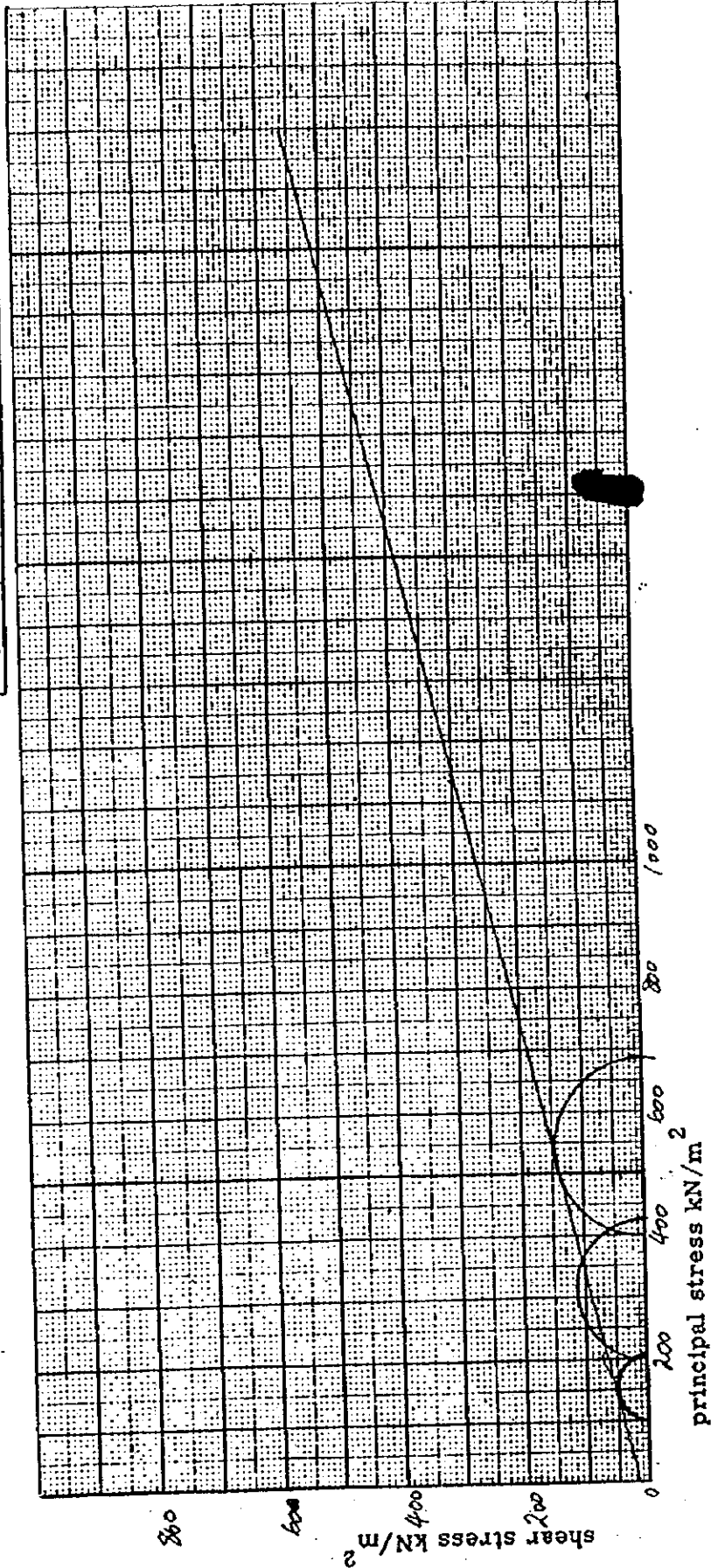
M/c = 15.4%

C = 10 (kN/m²)

φ = 14%

sample no.	B43
Location no.	
date:	28 - 3 - 1998

spec ident.	cell/p kN/m ²	stress kN/m ²	σ ₁ - σ ₃ kN/m ²	σ ₃ kN/m ²	σ ₁ kN/m ²
1	100	102.284		202.284	
2	200	228.436		428.436	
3	400	285.622		685.622	



2057 kg/m³ 2042103/123

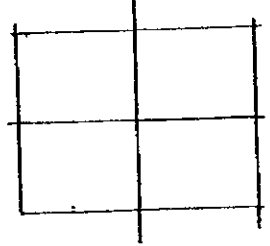
MATERIALS LABORATORY TRIAxIAL COMPRESSION TEST

ON SAMPLE 762mm LONG AND 381mm DIA.

Loo. No. BH-3 Name MANCINI BRIDGE Date 28-3-98
 Sample No. 20.77-21.42 m Tube No. _____ Length _____ Dia. _____
 Wet Weight 125.0 gm. Bulk Density _____ kg/m³
 Moisture Content _____ %
 Proving Ring No. 32 Proving Ring Constant _____ at Failure
 Cell Pressure 100 KN/m² Rate of Strain _____ per cent per mi

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11.40		0.0
5	5		11.419		0.167
10	8		11.439		0.333
15	10		11.458		0.500
20	12		11.477		0.667
25	14		11.497		0.833
30	16		11.516		1.0
45	20		11.574		1.5
60	25		11.639		2.0
75	30		11.697		2.5
80	35		11.761		3.0
105	39		11.819		3.5
120	43		11.884		4.0
135	48		11.948		4.5
150	53		12.013		5.0
165	58		12.077	102.284	5.5
180	62		12.142		6.0
210	72		12.211		7.0
240	82		12.400	94.162	8.0
270	90		12.529	102.284	9.0
300	89		12.658	100.118	10.0
330	85		12.787	94.653	11.0
360			12.961		12.0
390			13.110		13.0
420			13.277		14.0
450			13.419		15.0
480			13.581		16.0
50			13.742		17.0
540			13.923		18.0
570			14.097		19.0
600			14.258		20.0
630			14.445		21.0
660			14.632		22.0
690			14.819		23.0
720			15.019		24.0

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

- 1. Plastic Bulging
- 2. Shear Plane (Angle)
- 3. Vertical Cracks _____

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

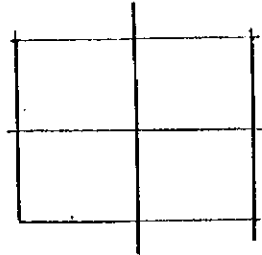
*Indicate type of failure.

MATERIALS LABORATORY
TRIAxIAL COMPRESSION TEST
 ON SAMPLE 76.2mm LONG AND 38.1mm DIA.

Loc. No. B43 Name _____ Date _____
 Sample No. 20 Tube No. _____ Length _____ Dia. _____
 Wet Weight _____ gm. Bulk Density _____ kg/m³
 Moisture Content _____ %
 Proving Ring No. _____ Proving Ring Constant _____ at Failure
 Cell Pressure 200 KN/m² Rate of Strain _____ per cent per min

Strain Dial	Stress Dial	Load kg	Area cm ²	Compressive Stress	Strain %
0	0		11.40		0.0
5	15		11.419		0.167
10	20		11.439		0.333
15	22		11.458		0.500
20	25		11.477		0.667
25	27		11.497		0.833
30	30		11.516		1.0
45	36		11.574		1.5
60	43		11.639		2.0
75	52		11.697		2.5
90	61		11.761		3.0
105	68		11.819		3.5
120	77		11.884		4.0
135	86		11.948		4.5
150	95		12.013		5.0
165	104		12.077		5.5
180	114		12.142		6.0
210	132		12.271		7.0
240	149		12.400		8.0
270	165		12.529		9.0
300	180		12.658		10.0
330	194		12.787		11.0
360	206		12.961	226.319	12.0
390	210		13.110	228.087	13.0
420	213		13.277	228.436	14.0
450	214		13.419	227.079	15.0
480	250		13.581	262.116	16.0
510	262		13.742	262.115	17.0
540	272		13.923	276.177	18.0
570	279		14.097	281.814	19.0
600	286		14.258	285.622	20.0
630	289		14.445	289.882	21.0
660	292		14.632	284.160	22.0
690	295		14.819	283.458	23.0
720	297		15.019	281.579	24.0
750	298		15.219	278.814	25.0

Laboratory Assistant's
Description of Sample



Sketch of Sample after failure

*Conditions at failure

1. Plastic Bulging
2. Shear Plane (Angle)
3. Vertical Cracks

Compressive Strength _____ kg

_____ kg

Failure Strain _____ %

*Indicate type of failure.

200 KN = 228.436

400 KN = 285.622

400