

Appendix 6 References

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6.1 Technical Notes

The Preparatory Survey on the Project for New Bagamoyo Road
Japan International Cooperation Agency (JICA)

Memorandum

Subject: Technical Note No.1 of Design Values to be used for the Preparatory Survey on the Project for Widening of New Bagamoyo Road

The Japan International Cooperation Agency (JICA) Preparatory Survey Team will propose the following principal standard for the design for the captioned project.

Description	Units	Value
Road Design		
Classification of the target road section	-	Trunk Road (Urban district)
Design Speed	Km/hr	60
Numbers of Lane	No.	4
Width of Right of Way (RoW)	-	Existing concrete edge post of RoW will guide in Principal. However it shall follow the width of RoW since there is not the existing post in the project.
Morocco JCT – Mwenge JCT	m	RoW as public place due to the Ownership map the attached herewith.
Mwenge JCT – Tegeta Bridge	m	60 :Except for Military Barrack stretch. Planned road width shall be appropriate road section considered with cost effective and affected to the Military Barrack stretch as much as possible.
Tegeta Bridge – Tegeta JCT	m	45
Carriageway/Foot Path Width per a lane	m	Carriageway:3.5/Foot Path:1.5
Shoulder width	m	0.5
Camber (Cross-slope) on Carriageway	%	2.5
Camber (Cross-slope) on Shoulder	%	2.5
Minimum Radius of Horizontal	m	150

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Curve			
Maximum Gradient		%	5
Maximum Superelevation		%	6
Side slope for Fills		ratio	(Vertical : Horizontal) 1:1.5 ~ 1:4.0 (depend on the height of fills , soil type and road side environmental condition)
Back slope for	Hard Rock	Ratio	(Vertical : Horizontal) 1:0.5
	Decomposed Rock	Ratio	1:1.0
	Other than Rock/soil	Ratio	1:1.5 ~ 1:2.0 (depend on soil type) Note: Benching should be done at 7.0m intervals
Pavement Design Life		-	15 years (as the same as Kilwa road)
Pavement Type (Carriageway)		-	Asphalt Concrete (AC)
Pavement Type (Shoulder)		-	AC
Bridge Design			
Name and Location			Mlalakuwa Bridge: 4.9km from Morocco Lugalo Bridge: 7.8km from Morocco Tegeta Bridge: 15.6km from Morocco
Design Standard			BS5400
Design Loading			HA and HB (37.5Units)
Seismic Coefficient			KH=0.05
Carriage Width		m	Ref. attached figure
Footway Width		m	Ref. attached figure
Freeboard: Allowance from the bottom of planned girder to high water level		m	Minimum 0.6m
Type of Bridge		-	Determined after examination
Existing Bridges			Ref. attached table

Note:

- The width of the space for Bus Rapid Transit (BRT)
Space of 9.0m wide shall be provided for BRT.
- Proposed horizontal road alignment center will be traced on the existing road center between Morocco JCT and Mwenge JCT as much as possible with minimizing the

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resettlement. And proposed horizontal carriage way alignment center between Mwenge JCT and Tegeta JCT will be traced on the existing center as much as possible with minimizing the resettlement in the RoW. (Refer to the attached herewith the concept of the road alignment between BP and Sta.8km, i.e. 9 pages)

3. Type of Intersection

It will be determined based on traffic volume to be counted whether traffic signals are installed or not, and which type of intersection layout will be taken.

4. Safety facilities

4-1 Hump (Bump)

It shall not be adopted in the project because the target road section is a part of the trunk road. Therefore TANROADS should consider the safety measure for the pedestrian crossing.

4-2 Lighting

It will be adopted for safety measure to car running between Morocco JCT and Mwenge JCT but the number of the lighting shall be examined.

4-3 Service Road

It will be adopted with 3.0m wide in principal. However if there are important structures which will affect as the much impact, the service road might be omitted.

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A. Standard Bridge Cross-section

Each dimension and cross fall of bridge cross-section are as shown below.

In case two bridges are installed parallel, the clear space is 1500mm.

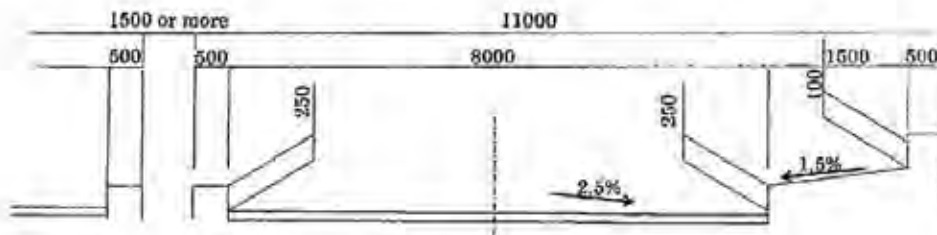
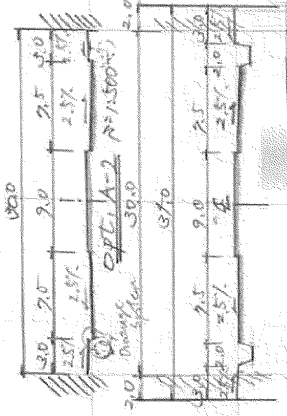


Figure 1 Standard Bridge Cross-section

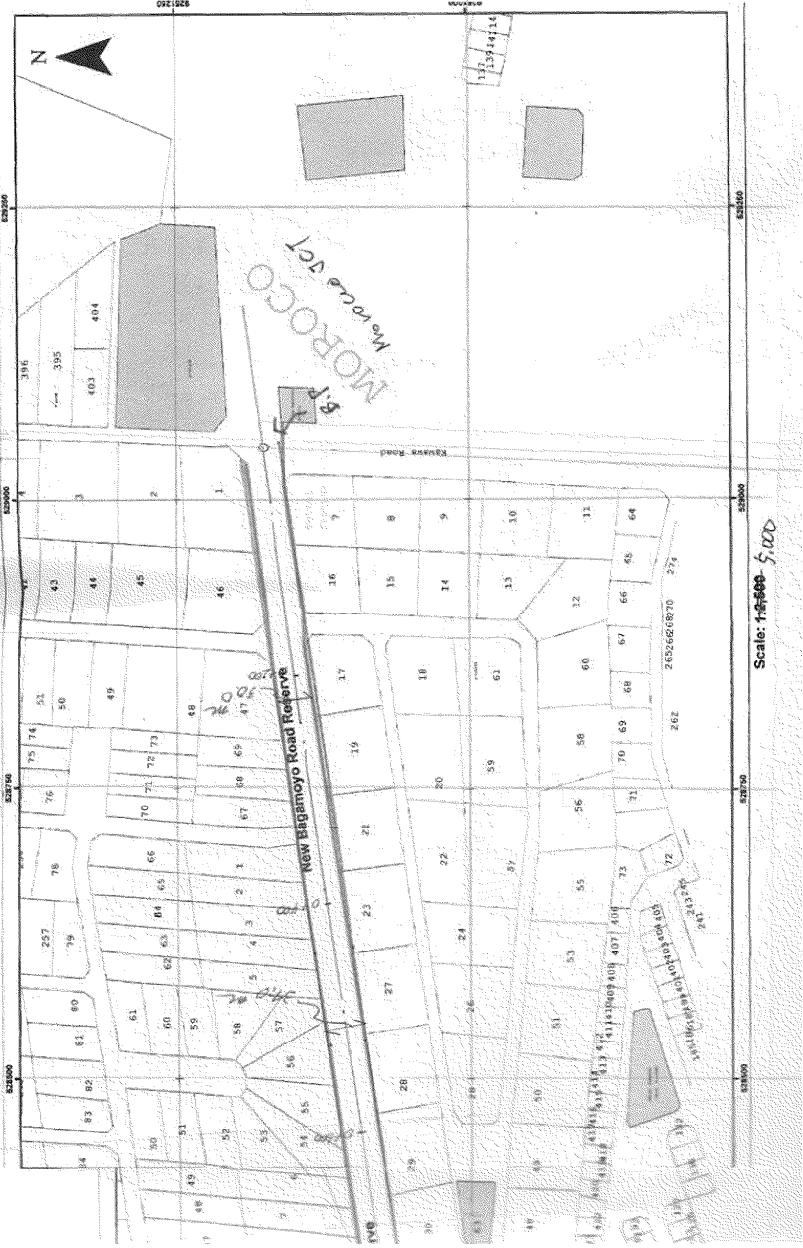
B. Existing Bridges (Data source: TANROADS Bridge Inventory)

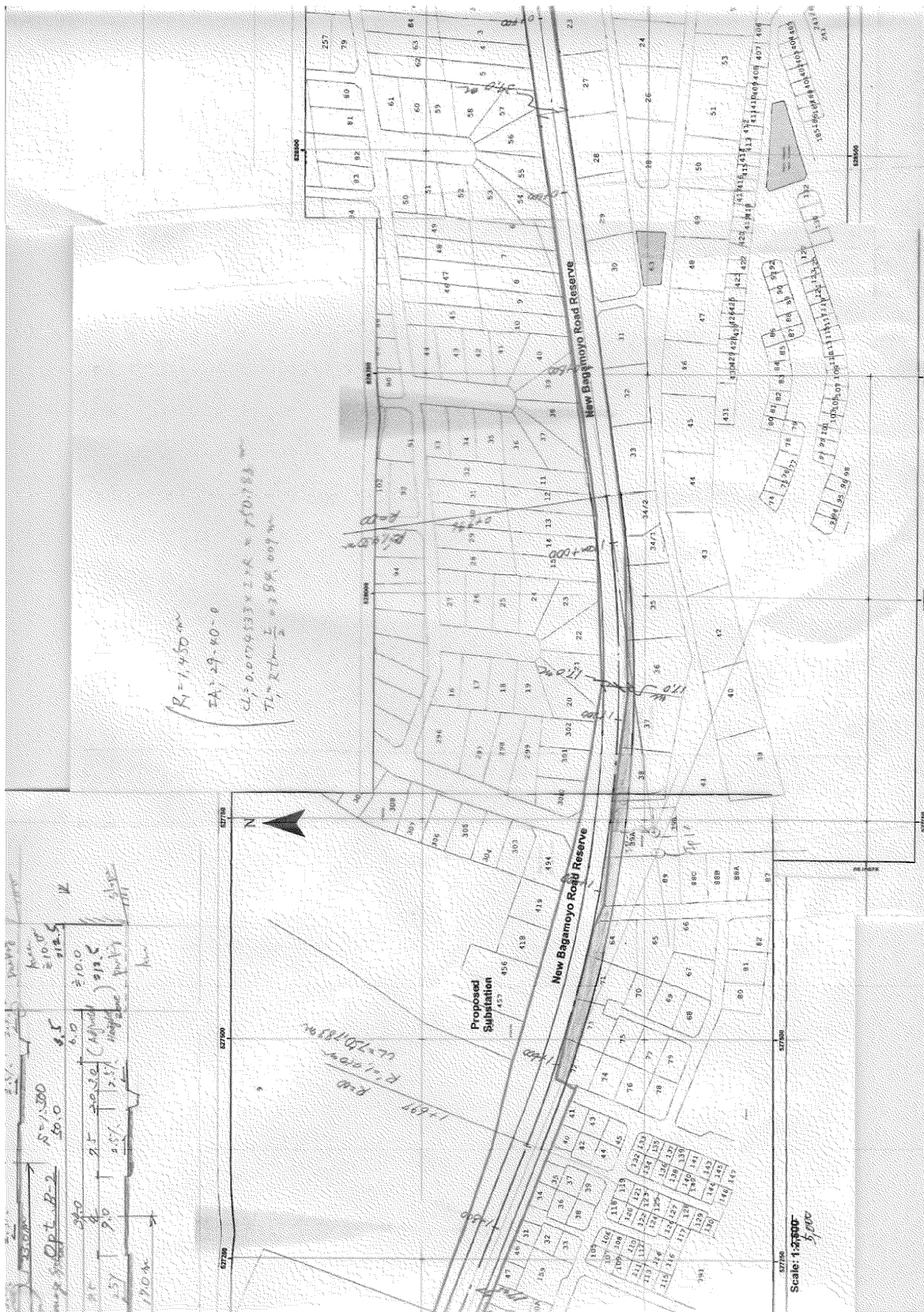
	Mlalakuwa Br.	Lugalo Br.	Tegeta Br.
Year of construction	unknown	unknown	1995
Axle load limit (ton)	10.00	10.00	10.00
Carriage width (m)	6.80	7.45	8.20
Span length (m)	11.80+12.20	17.85	6.89+7.00+7.00+6.80
Bridge type	Simply supported composite bridge steel girder	Simply supported composite bridge steel girder	Simply supported solid slab bridge concrete

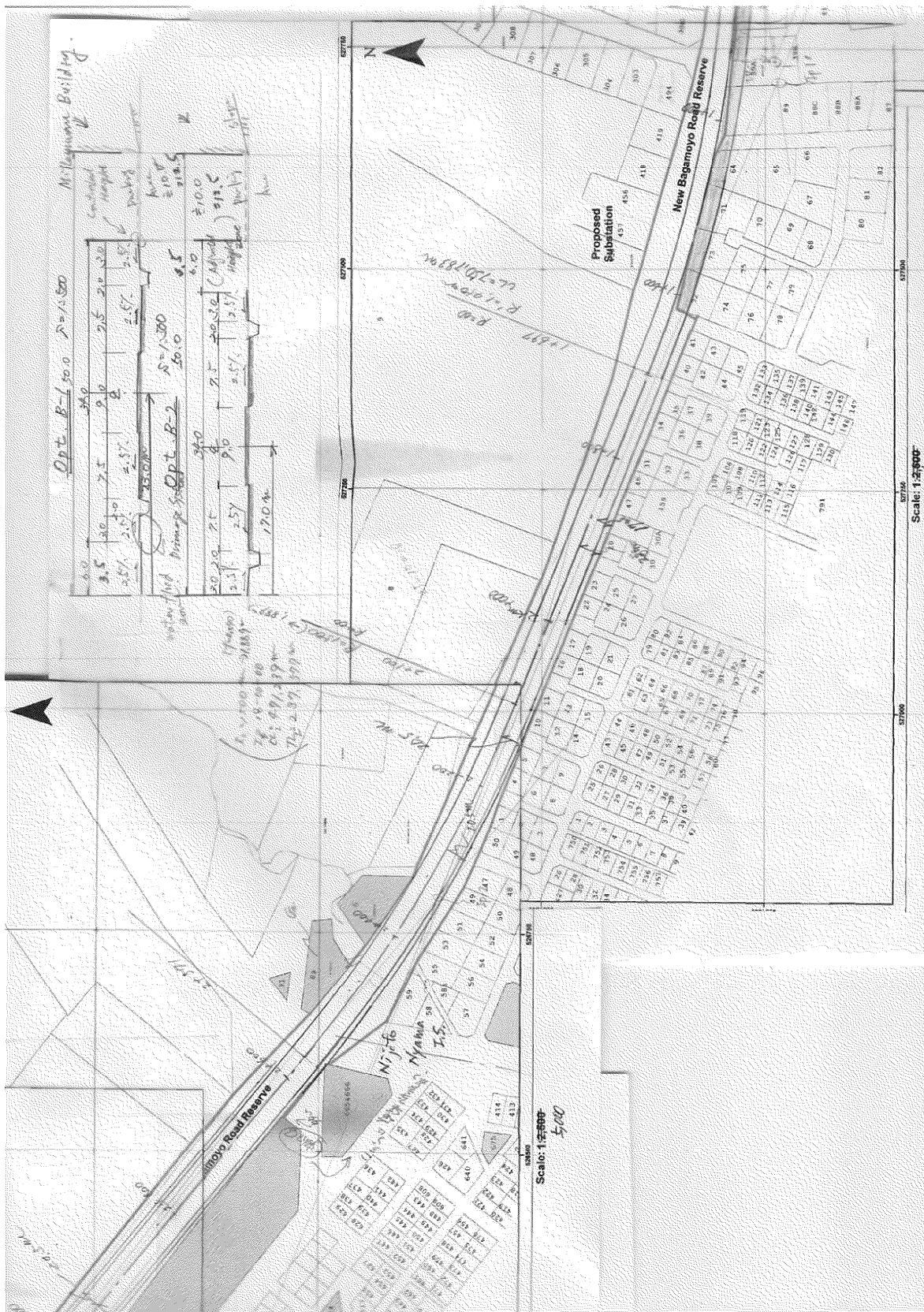
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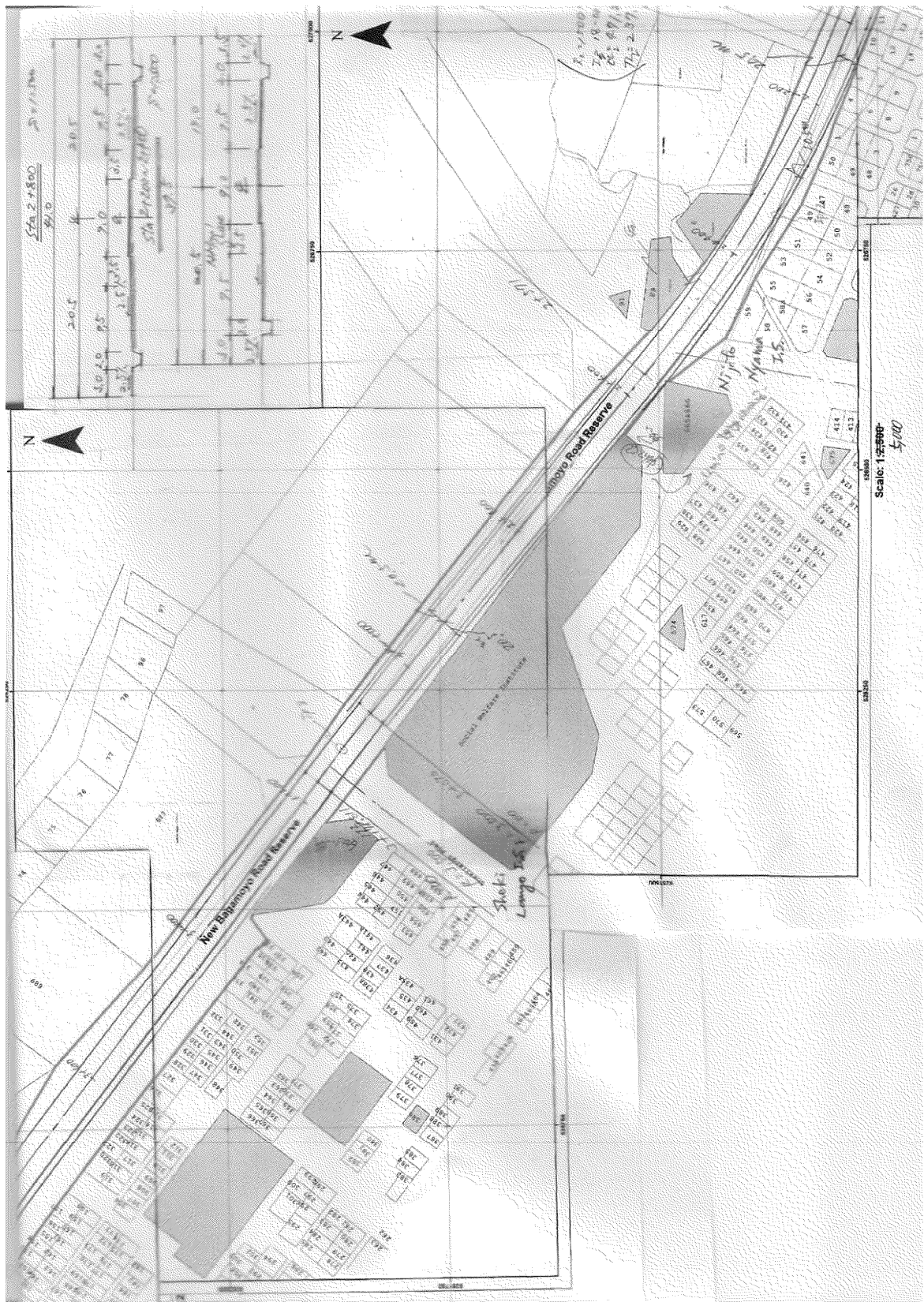


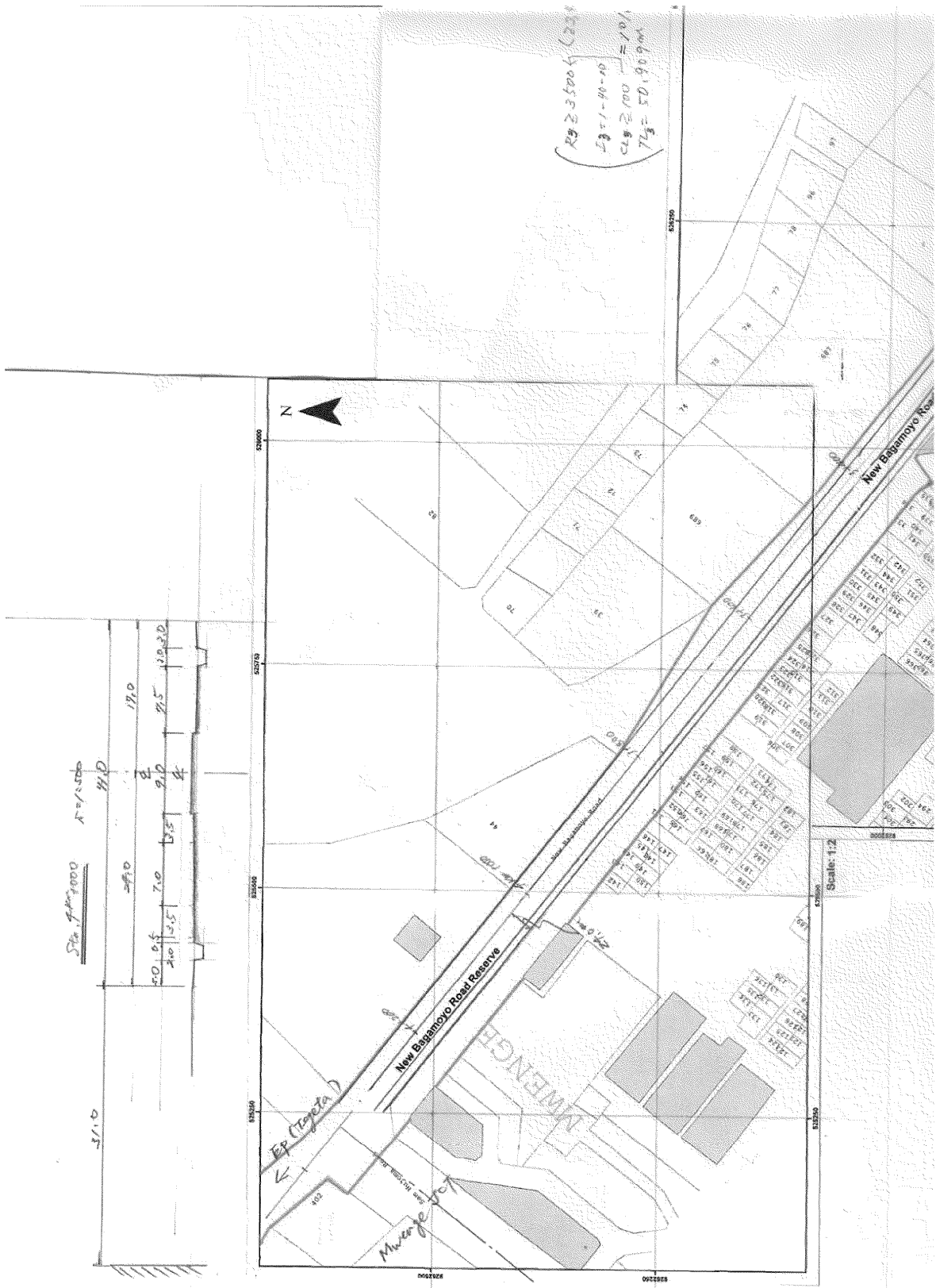
Opt. A-3
Considered with Additional Lane.
for 30m wide car width
in Morocco JCT.

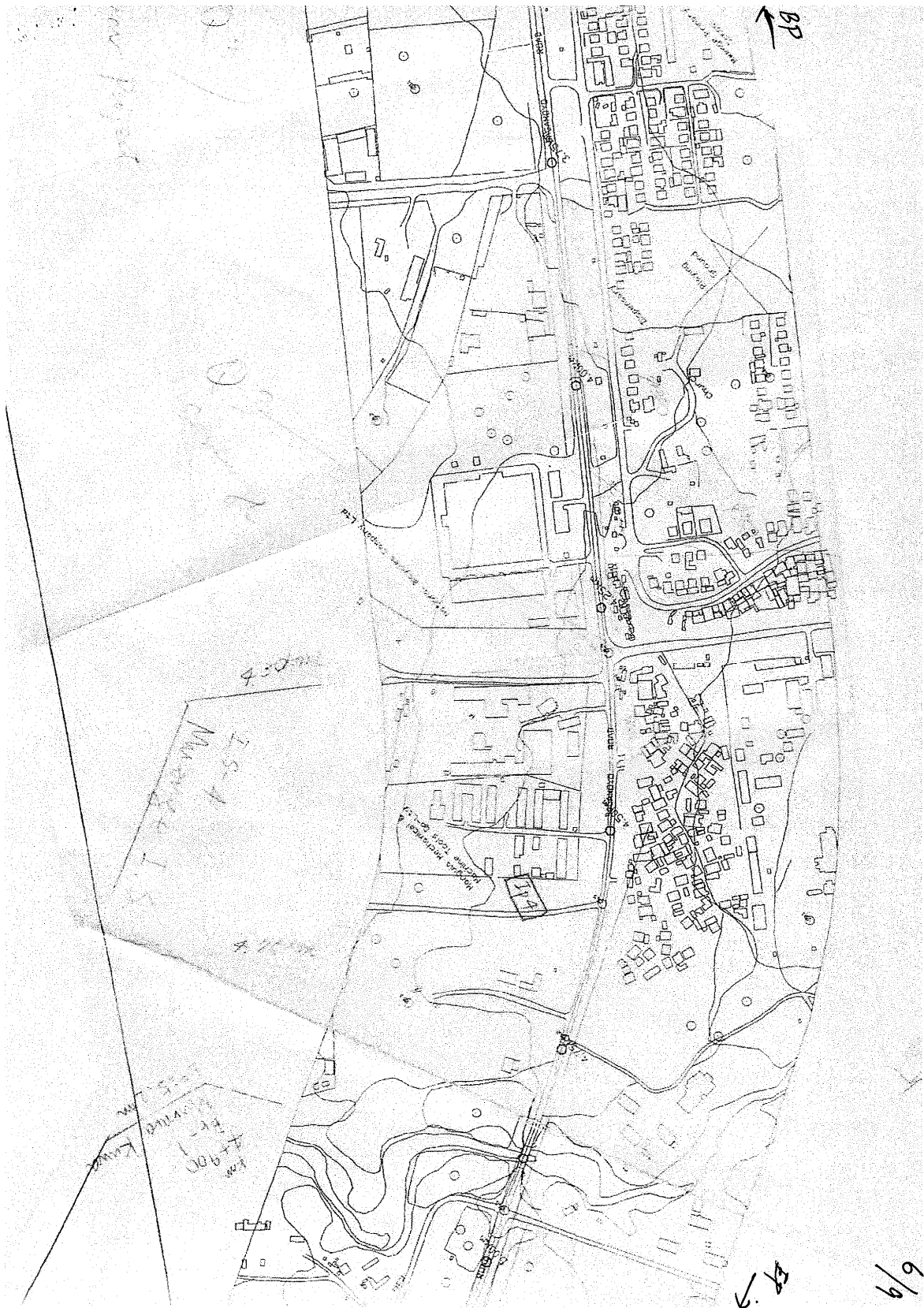


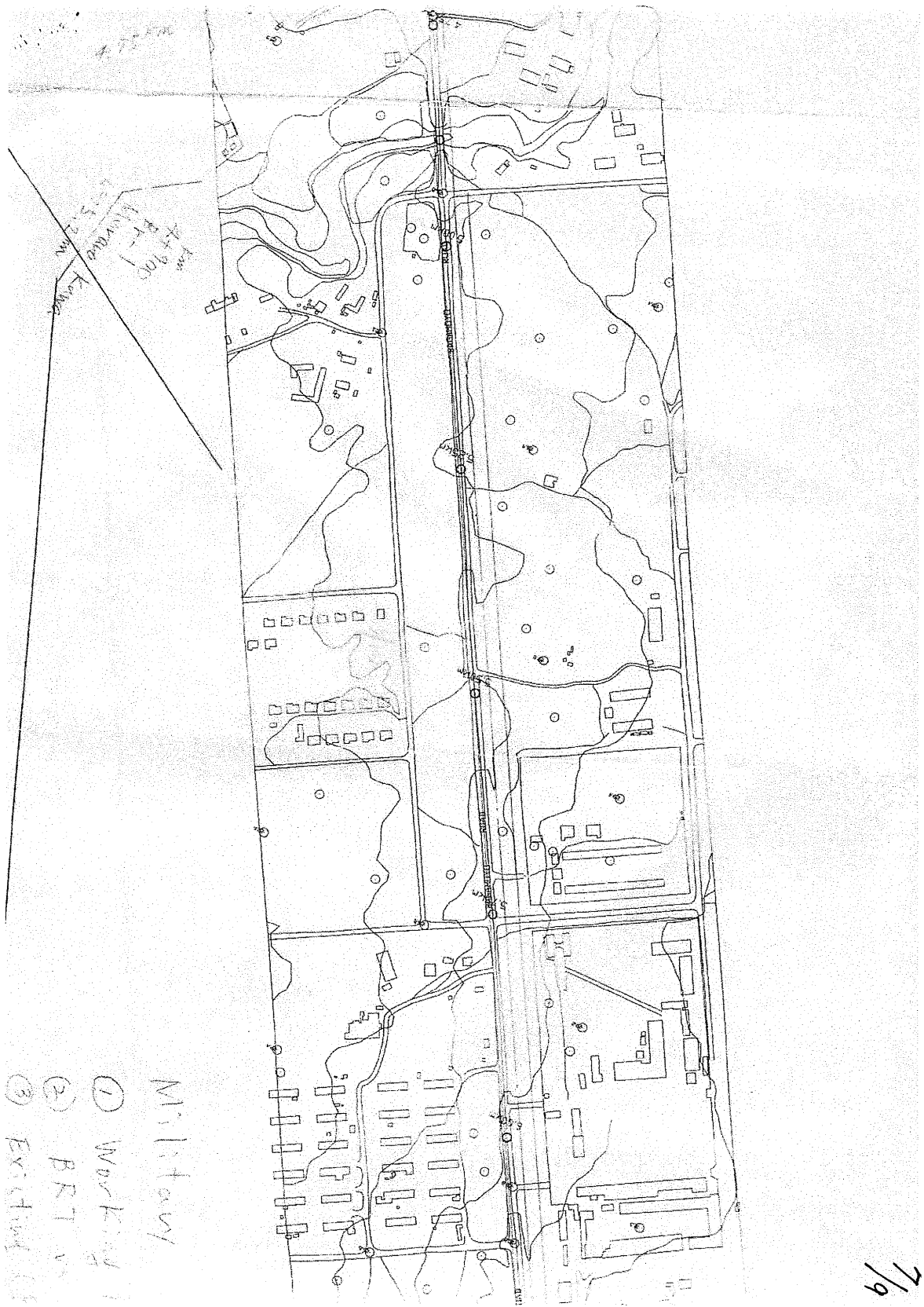






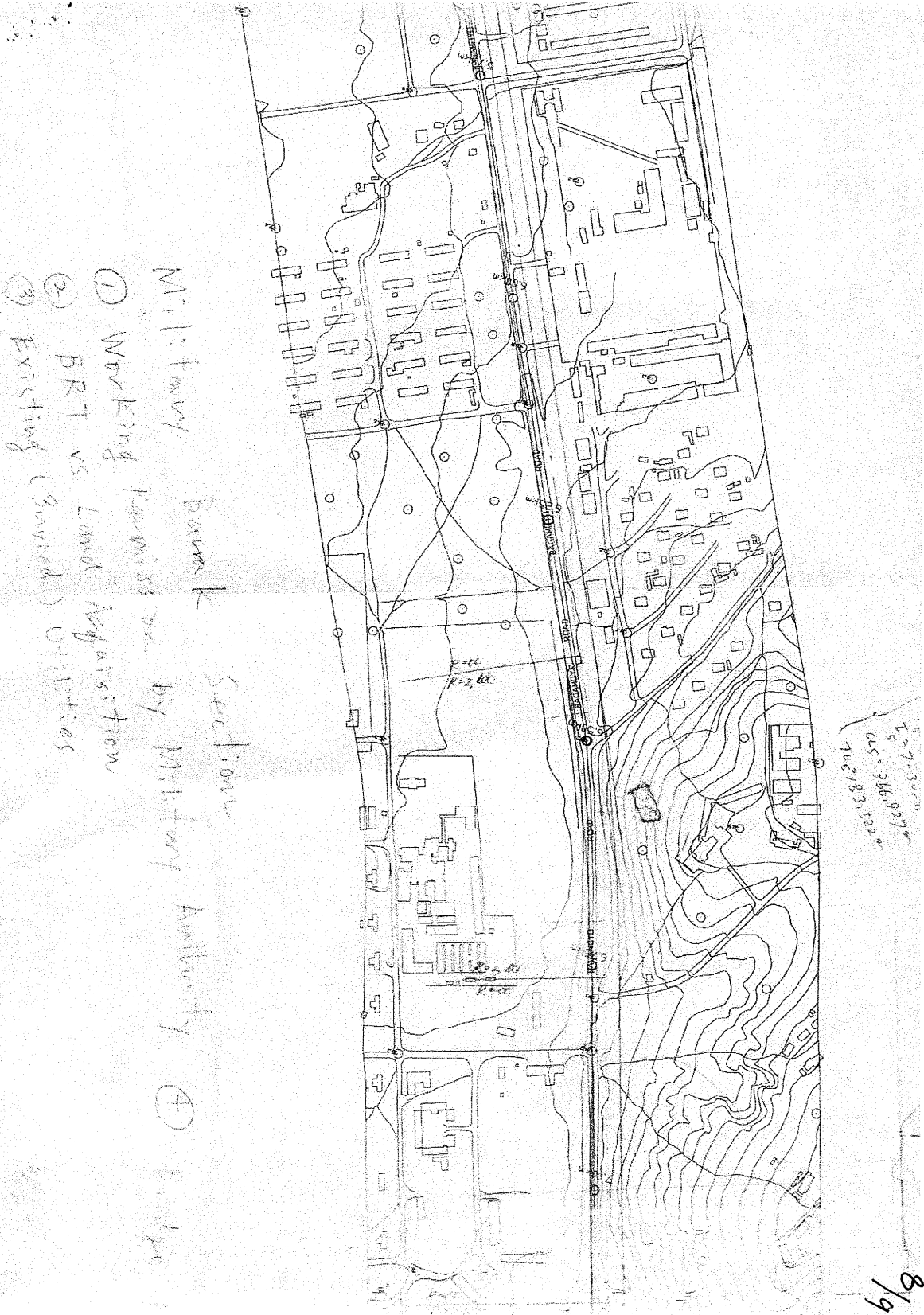


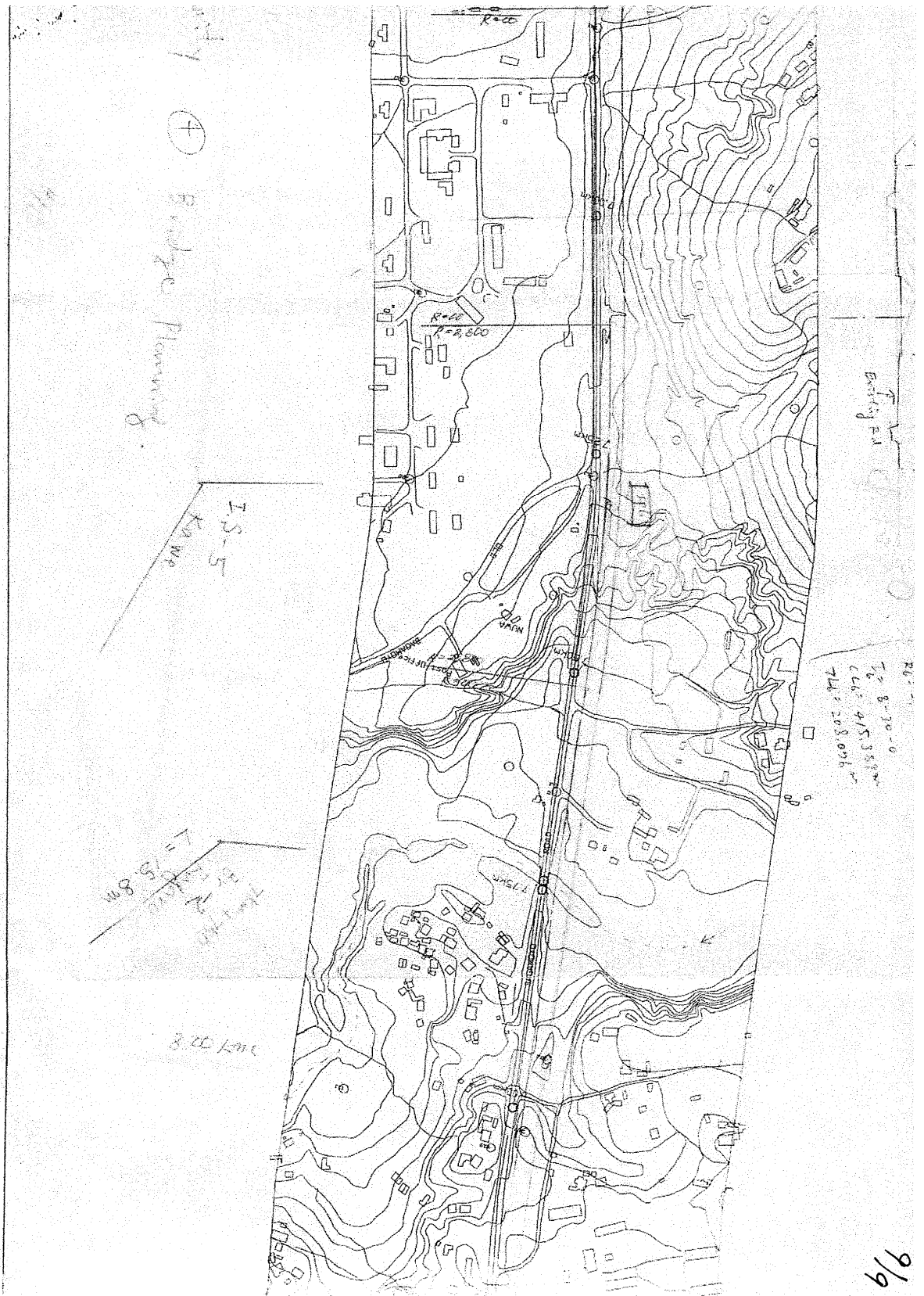




- Military
- (1) WORKING
 - (2) PRT
 - (3) EXISTING

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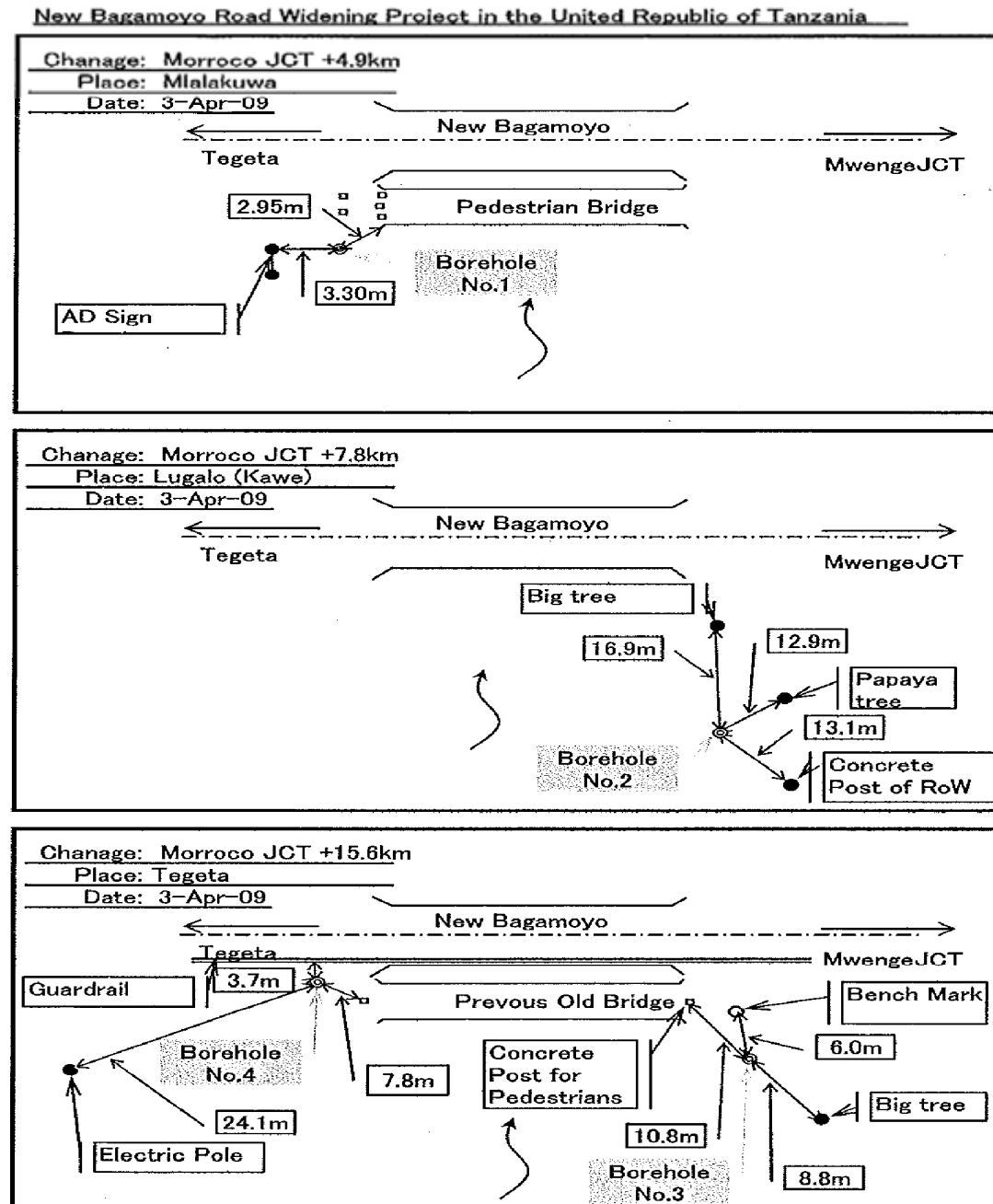
6.2 Geological (Boring) Test Results

(1) Boring Locations

Geotechnical Investigation Report for
Mlalakuwa, Lugalo and Tegeta bridges

TANROADS

Appendix 1: Boreholes location plan





(2) Borehole Log

NORPLAN Tanzania Ltd			BOREHOLE LOG SHEET					
CLIENT: TANROADS			BOREHOLE NO. 1		BORING METHOD: Rotary mud circulation CASSING USED: NII GROUND ELEVATION:			
PROJECT: NEW BAGAMOYO ROAD								
SITE: MLALAKUWA BRIDGE								
LOCATION: MLALAKUWA RIVER								
DATE DRILLED: 24/04/09 - 28/04/09								
BOL (m)	LEGEND	GROUND WATER LEVEL (m)	DESCRIPTION OF STRATA	SOIL SAMPLES		Depth m	STANDARD PENETRATION TEST (S.P.T)	
				No.	Type		Blows per 150mm	N - VALUE
0.0			Reddish GRAVEL FILL	1	B	0.0-1.0		
1.0			Reddish GRAVEL FILL	2	D ₁₀₁	1.0-1.45	5/150, 4/150, 10/150	14
2.0			Reddish GRAVEL FILL	3	D ₁₀₁	2.0-2.45	9/150, 8/150, 7/150	15
3.0			Medium dense grayish clayey SAND	4	D ₁₀₁	3.0-3.45	5/150, 6/150, 7/150	13
4.0			Medium dense grayish clayey SAND	5	D ₁₀₁	4.0-4.45	6/150, 4/150, 7/150	11
5.0			Medium dense grayish clayey SAND	6	D ₁₀₁	5.0-5.45	4/150, 5/150, 6/150	13
6.0			Medium dense grayish gravelly clayey SAND	7	D ₁₀₁	6.0-6.45	9/150, 4/150, 12/150	22
7.0			Grayish clayey fine SAND	8	UD	7.0-7.45	Sample lost	
8.0			Coarse grayish clayey SAND	9	D ₁₀₁	7.45-7.90	12/150, 12/150, 14/150	30
9.0			Medium dense grayish gravelly clayey SAND	10	UD	8.50-8.95		
10.0			Medium dense grayish gravelly clayey SAND	11	D ₁₀₁	8.95-9.40	10/150, 11/150, 13/150	34
11.0			Medium dense grayish gravelly clayey SAND	12	D ₁₀₁	10.0-10.45	8/150, 8/150, 15/150	23
11.3		8.3	Medium dense grayish gravelly clayey SAND	13	D ₁₀₁	11.0-11.45	7/150, 8/150, 13/150	21
12.0			Yellowish gray gravelly fine SAND Water bearing strata	14	D ₁₀₁	12.0-12.45	11/150, 11/150, 14/150	25
13.0			Yellowish gray gravelly SAND Water bearing strata	15	D ₁₀₁	13.0-13.45	16/150, 23/150, 20/150	41
14.0			Yellowish gray gravelly fine SAND Water bearing strata	16	D ₁₀₁	14.0-14.45	20/150, 25/150, 23/150	50
15.0			Yellowish gray gravelly fine SAND Water bearing strata	17	D ₁₀₁	15.0-15.45	19/150, 27/150, 22/100	45
16.0			Yellowish gray gravelly fine to coarse SAND Water bearing strata	18	D ₁₀₁	16.0-16.45	16/150, 17/150, 22/150	39
17.0			Whitish gravelly coarse SAND Water bearing strata	19	D ₁₀₁	17.0-17.45	20/150, 33/150, 27/150	28
18.0			Whitish gravelly coarse SAND Water bearing strata	20	D ₁₀₁	18.0-18.45	20/150, 30/150, 30/150	30

LEGEND

U1 Undisturbed soil sample
 SPT test location
 SPT sample

NORPLAN Tanzania Ltd			BOREHOLE LOG SHEET					
CLIENT: TANROADS PROJECT: NEW BAGAMOYO ROAD WIDENING SITE: LUGALO BRIDGE LOCATION: MBEZI RIVER DATE DRILLED: 06/04/09-10/04/09			BOREHOLE NO. 2 BORING METHOD: Rotary mud circulation CASING USED: GROUND ELEVATION:					
DEPTH (m)	LEGEND	GROUNDWATER LEVEL (m)	DESCRIPTION OF STRATA	SOIL SAMPLES		Depth (m)	STANDARD PENETRATION TEST Blows per 150mm	N ₆₀ VALUE
				No.	Type			
			Top soil (brownish clayey silt SAND)					
1.0			Medium dense, silty, gray clayey SAND	1	D _{uv}	1.0-1.45	5/150, 7/150, 11/150	10
2.0			Medium dense, grayish gravelly clayey SAND	2	D _{uv}	2.0-2.45	6/150, 9/150, 13/150	23
3.0		Dry	Dense, grayish gravelly clayey SAND	3	UO	2.0-3.45	(121 blows)	
4.0			Very dense, grayish gravelly clayey SAND	4	D _{uv}	2.45-3.90	13/150, 24/150, 34/150	36
5.0			Very dense, grayish gravelly clayey SAND	5	D _{uv}	3.5-4.95	18/150, 28/150, 39/150	39
6.0			Very dense, grayish gravelly clayey SAND	6	D _{uv}	5.5-5.95	19/150, 24/150, 30/150	34
7.0			Very dense, grayish gravelly clayey SAND	7	UO	6.0-8.45	(44 blows)	
8.0			Very dense, grayish gravelly clayey SAND	8	D _{uv}	8.45-8.90	6/150, 16/150, 25/150	38
9.0			Very dense, grayish gravelly clayey SAND	9	D _{uv}	7.45-7.90	7/150, 17/150, 28/150	43
10.0			Very dense, grayish gravelly clayey SAND	10	D _{uv}	8.50-8.95	20/150, 31/150, 35/150	49
11.0			Very dense, grayish gravelly clayey SAND	11	D _{uv}	9.50-9.95	12/150, 28/150, 31/150	51
12.0			Very dense, grayish gravelly clayey SAND	12	D _{uv}	10.50-10.95	11/150, 19/150, 27/150	43
13.0			Very dense, grayish gravelly clayey SAND	13	D _{uv}	11.5-11.95	10/150, 18/150, 35/150	34
14.0			Very dense, grayish gravelly clayey SAND	14	D _{uv}	12.5-12.95	12/150, 16/150, 24/150	42
15.0			Very dense, grayish gravelly clayey SAND	15	D _{uv}	13.5-13.95	23/150, 28/150, 42/150	49
16.0			Very dense, grayish gravelly clayey SAND	16	D _{uv}	14.5-14.95	14/150, 28/150, 32/150	39

LEGEND	
	U4 Undisturbed soil sample
	SPT test location
	SPT disturbed sample

CLIENT: TANROADS
 PROJECT: NEW BAGAMOYO ROAD
 SITE: TEGETA BRIDGE
 LOCATION: TEGETA RIVER
 DATE DRILLED:

BOREHOLE NO. 3
 BORING METHOD: Rotary real circulation
 CASING USED: Nil
 GROUND ELEVATION:

B.O.L. (m)	LOG NO.	GROUNDWATER LEVEL (m)	DESCRIPTION OF STRATA	AGE SAMPLES		Depth (m)	STANDARD PENETRATION TEST	
				No.	Type		Blow per foot	1/4' value
			Top soil with CARBACE					
1.5			Loose grayish brown silt SAND	1	Dist	1.0-1.45	8/85, 21/85, 31/85	5
3.0			Medium dense, yellowish brown silt SAND	2	Dist	2.0-2.45	5/85, 7/85, 10/85	17
3.0		3.7	Medium dense, grayish clayey SAND	3	Dist	3.0-3.45	7/85, 7/85, 31/85	19
4.0			Very dense, grayish clayey SAND	4	Dist	4.0-4.45	21/85, 24/85, 25/85	54
5.0			Very dense, whitish gray gravelly clayey SAND	5	Dist	5.0-5.45	31/85, 15/85, 21/85	36
6.0			Very dense, grayish clayey SAND	6	UD	6.0-6.45	(77 blows)	
7.0			DR, grayish sandy CLAY	7	Dist	6.45-6.90	4/85, 5/85, 8/85	13
8.0			Dense, whitish, WEATHERED CORAL LIMESTONE	8	Dist	7.5-7.95	15/85, 16/85, 12/85	23
9.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	9	Dist	8.50-8.95	12/85, 22/85, 25/85	36
10.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	10	Dist	9.50-9.95	15/85, 24/85, 25/85	50
11.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	11	Dist	11.0-11.45	12/85, 18/85, 20/85	58
12.0			Medium dense, whitish, WEATHERED CORAL LIMESTONE	12	Dist	12.0-12.45	3/85, 19/85, 52/85	23
13.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	13	Dist	13.0-13.45	12/85, 15/85, 22/85	37
14.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	14	Dist	14.0-14.45	8/85, 15/85, 14/85	30
15.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	15	Dist	15.0-15.45	21/85, 18/85, 49/85	67
16.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	16	Dist	16.0-16.45	12/85, 15/85, 20/85	49
17.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	17	Dist	17.0-17.45	11/85, 23/85, 36/85	69

LEGEND
 UI Undisturbed soil sample
 SPT test location
 D SPT SPT sample

NORPLAN Tanzania Ltd		BOREHOLE LOG SHEET						
CLIENT: TANROADS PROJECT: NEW BAGAMOYO ROAD SITE: TEGETA BRIDGE LOCATION: TEGETA RIVER DATE DRILLED:				BOREHOLE NO. 4 BORING METHOD: Rotary mud circulation CASING USED: NE GROUND ELEVATION:				
BGL (m)	LEGEND	GROUND WATER LEVEL (m)	DESCRIPTION OF STRATA	SOIL SAMPLES		Depth m	STANDARD PENETRATION TEST (S.P.T)	
				No	Type		Blows per 150mm	N ₆₀ Value
0.0			Top soil (reddish clayey GRAVEL)					
1.0			Loose brownish fine SAND	1	D _{uns}	1.0-1.45	2/150, 2/150, 4/150	6
2.0			Medium dense brownish fine SAND	2	F _{uns}	2.0-2.45	5/150, 8/150, 7/150	13
3.0			Loose, brownish fine to coarse SAND	3	D _{uns}	3.0-3.45	2/150, 3/150, 5/150	8
4.0			Medium dense, grayish clayey SAND	4	D _{uns}	4.0-4.45	7/150, 8/150, 12/150	20
5.0		5.0	Dense, grayish clayey SAND	5	D _{uns}	5.0-5.45	7/150, 14/150, 17/150	21
6.0			Dense, grayish clayey SAND	6	UD	6.0-6.45		
7.0			Dense, grayish clayey SAND	7		6.45-6.90	6/150, 13/150, 10/150	20
8.0			Very dense, grayish clayey SAND	8	D _{uns}	7.55-7.95	18/150, 28/150, 24/150	32
9.0			SWF, grayish sandy CLAY	9	D _{uns}	8.50-8.95	7/150, 8/150, 7/150	18
10.0			SWF, grayish sandy CLAY	10	UD	9.50-9.95		
11.0			SWF, grayish sandy CLAY	11	D _{uns}	9.95-10.40	5/150, 4/150, 7/150	11
12.0			Dense, whitish weathered CORAL LIMESTONE	12	D _{uns}	11.0-11.45	12/150, 11/150, 12/150	23
13.0			Dense, whitish weathered CORAL LIMESTONE	13	D _{uns}	12.0-12.45	11/150, 6/150, 6/150	12
14.0			Dense, whitish weathered CORAL LIMESTONE	14	D _{uns}	13.0-13.45	10/150, 14/150, 23/150	27
15.0			Dense, whitish weathered CORAL LIMESTONE	15	D _{uns}	14.0-14.45	5/150, 5/150, 11/150	15
16.0			Dense, whitish weathered CORAL LIMESTONE	16	D _{uns}	15.0-15.45	10/150, 10/150, 10/150	30
17.0			Dense, whitish weathered CORAL LIMESTONE	17	D _{uns}	16.0-16.45	7/150, 7/150, 8/150	19
18.0			Dense, whitish weathered CORAL LIMESTONE	18	D _{uns}	17.0-17.45	18/150, 11/150, 18/150	18
19.0			Very dense, clayey SAND	19	D _{uns}	18.0-18.45	21/150, 19/150, 35/150	34
20.0			Very dense, clayey SAND	20	D _{uns}	19.0-19.45	18/150, 23/150, 29/150	32
21.0			Very dense, clayey SAND	21	D _{uns}	20.45-20.49	19/150, 19/150, 30/150	49
22.0			Very dense, clayey SAND	22	D _{uns}	21.0-21.45	17/150, 20/150, 26/150	38
23.0			Very dense, clayey SAND	23	D _{uns}	22.0-22.45	19/150, 29/150, 30/150	79
23.4								

LEGEND	
	1M Undisturbed soil sample
	SPT test location
	SPT sample