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7-1 テクニカルノート

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:

1. The width of the space for Bus Rapid Transit (BRT)
Space of 9.0m wide shall be provided for BRT.
2. 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

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.

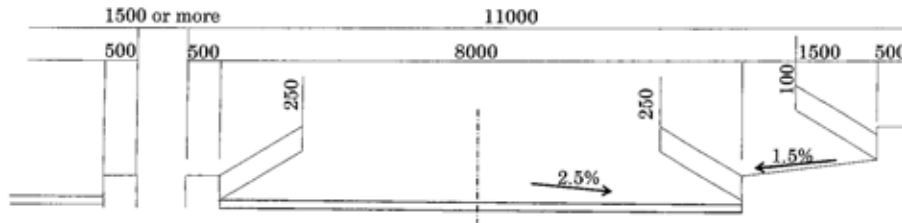
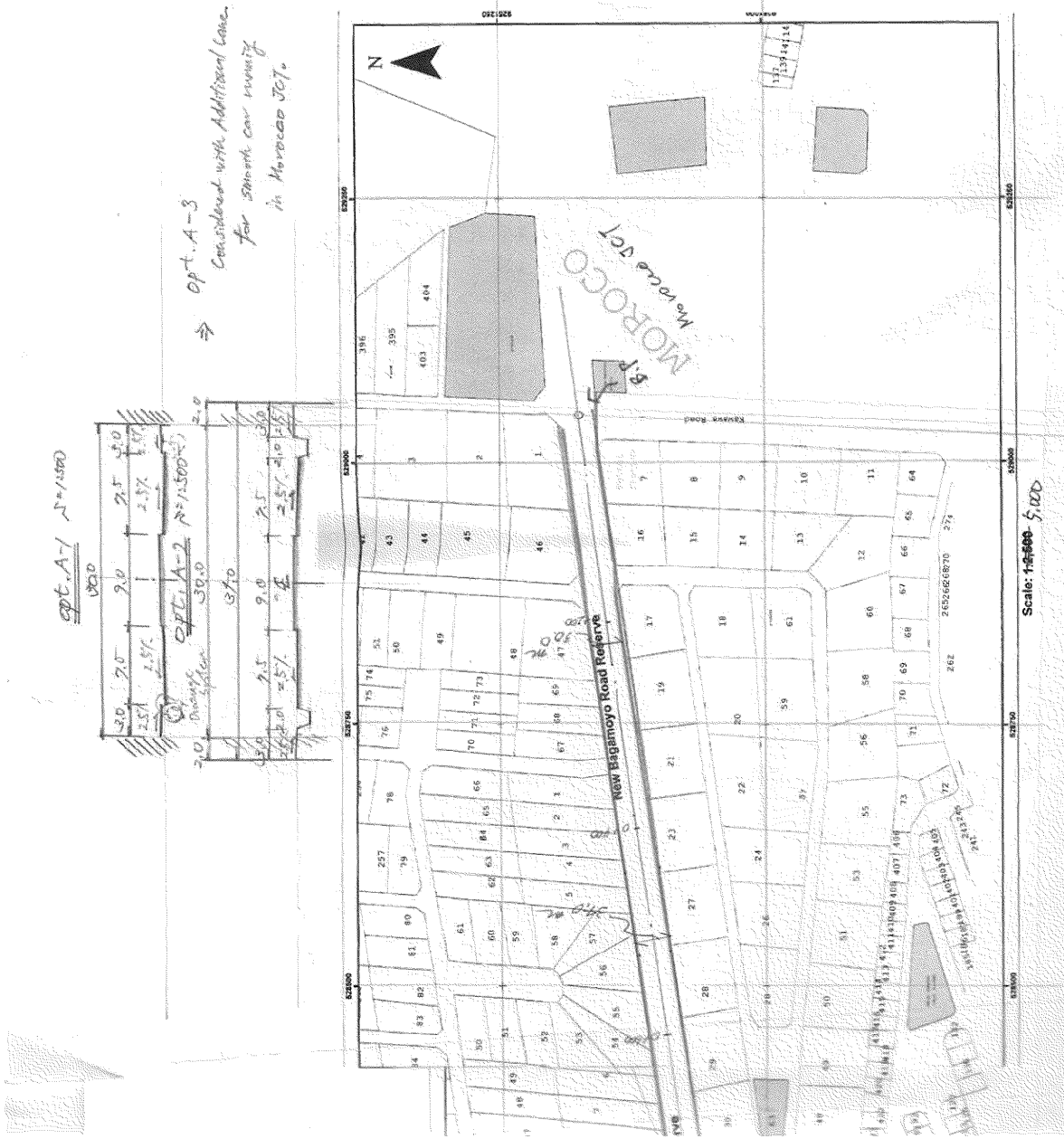
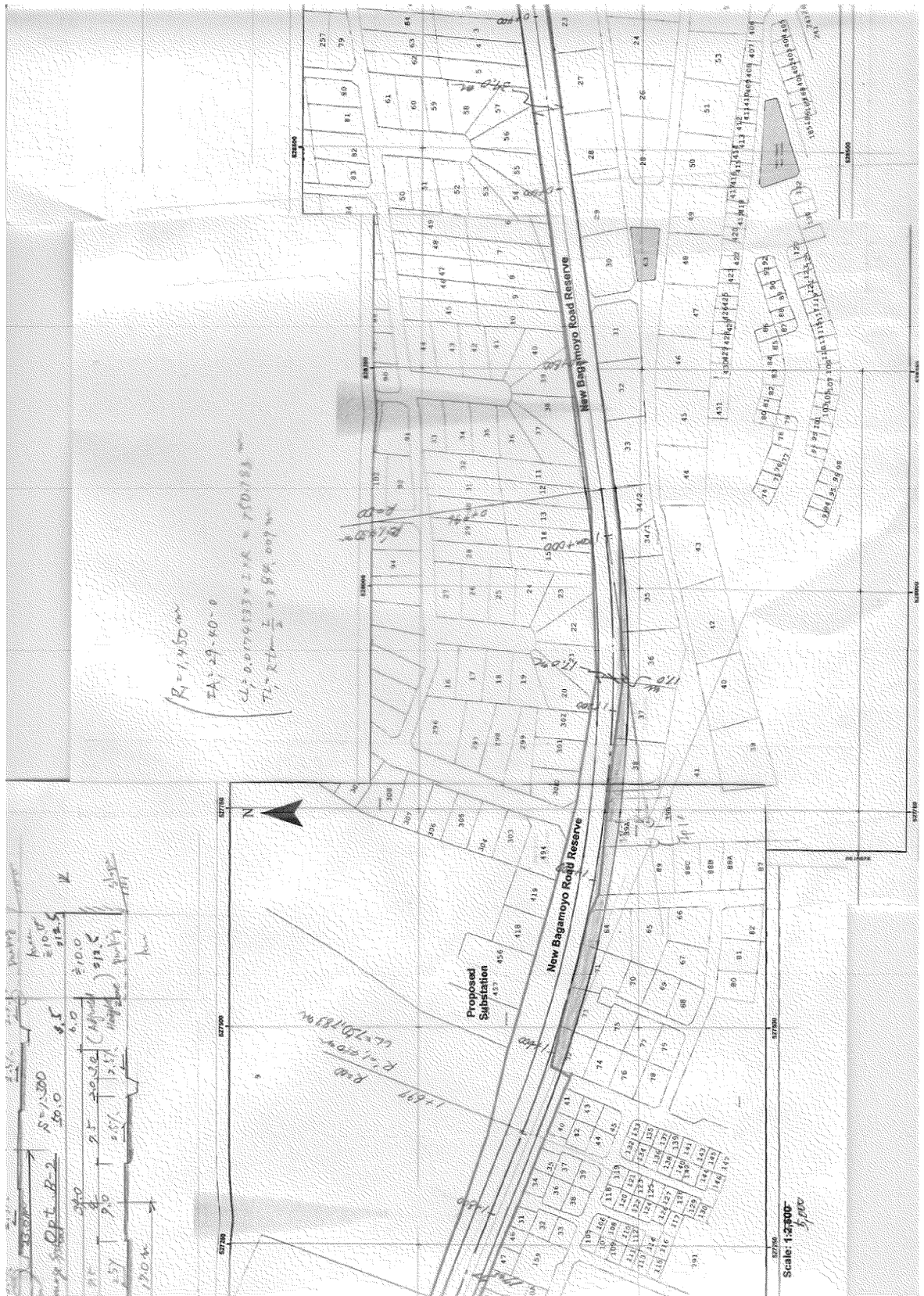


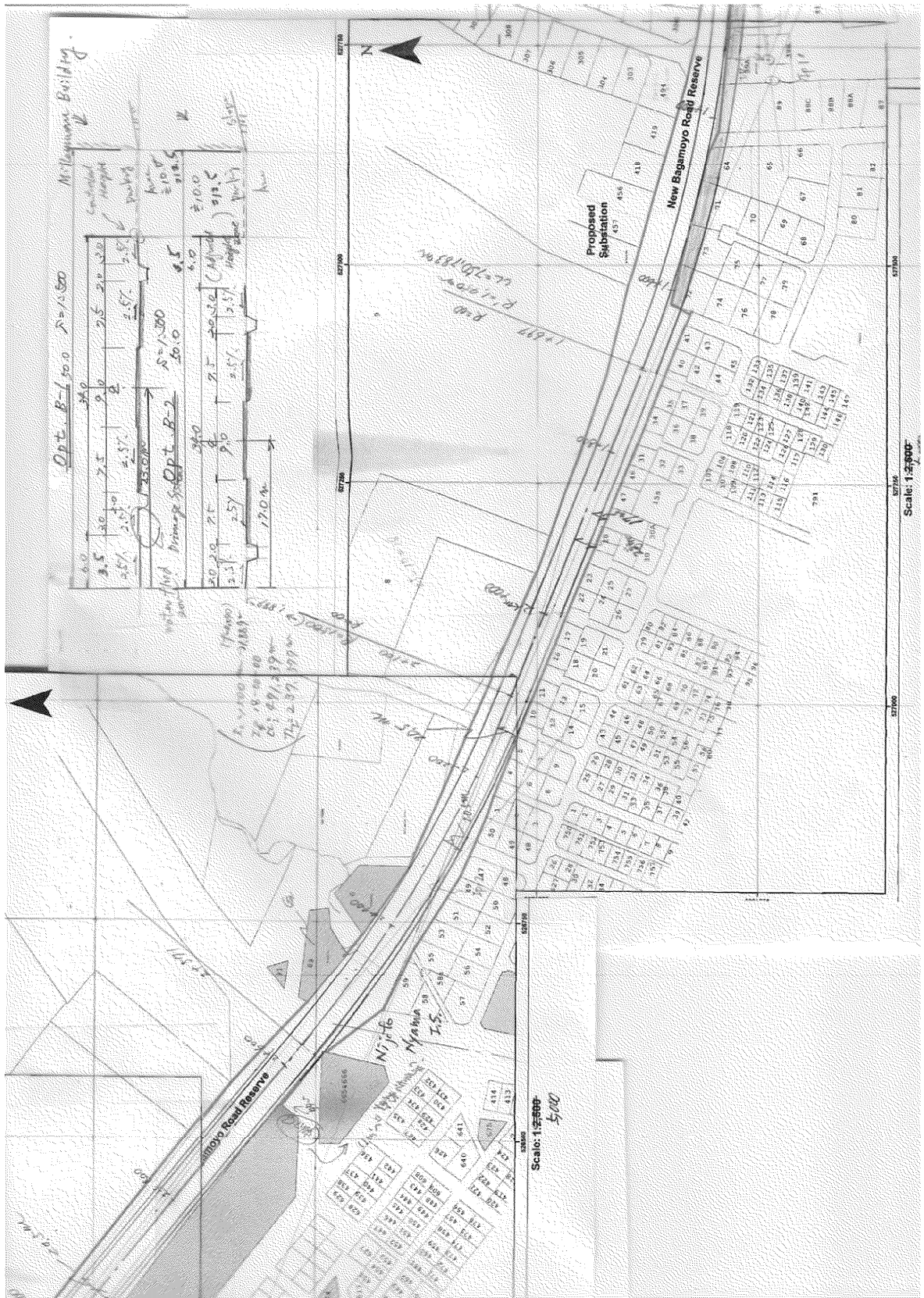
Figure 1 Standard Bridge Cross-section

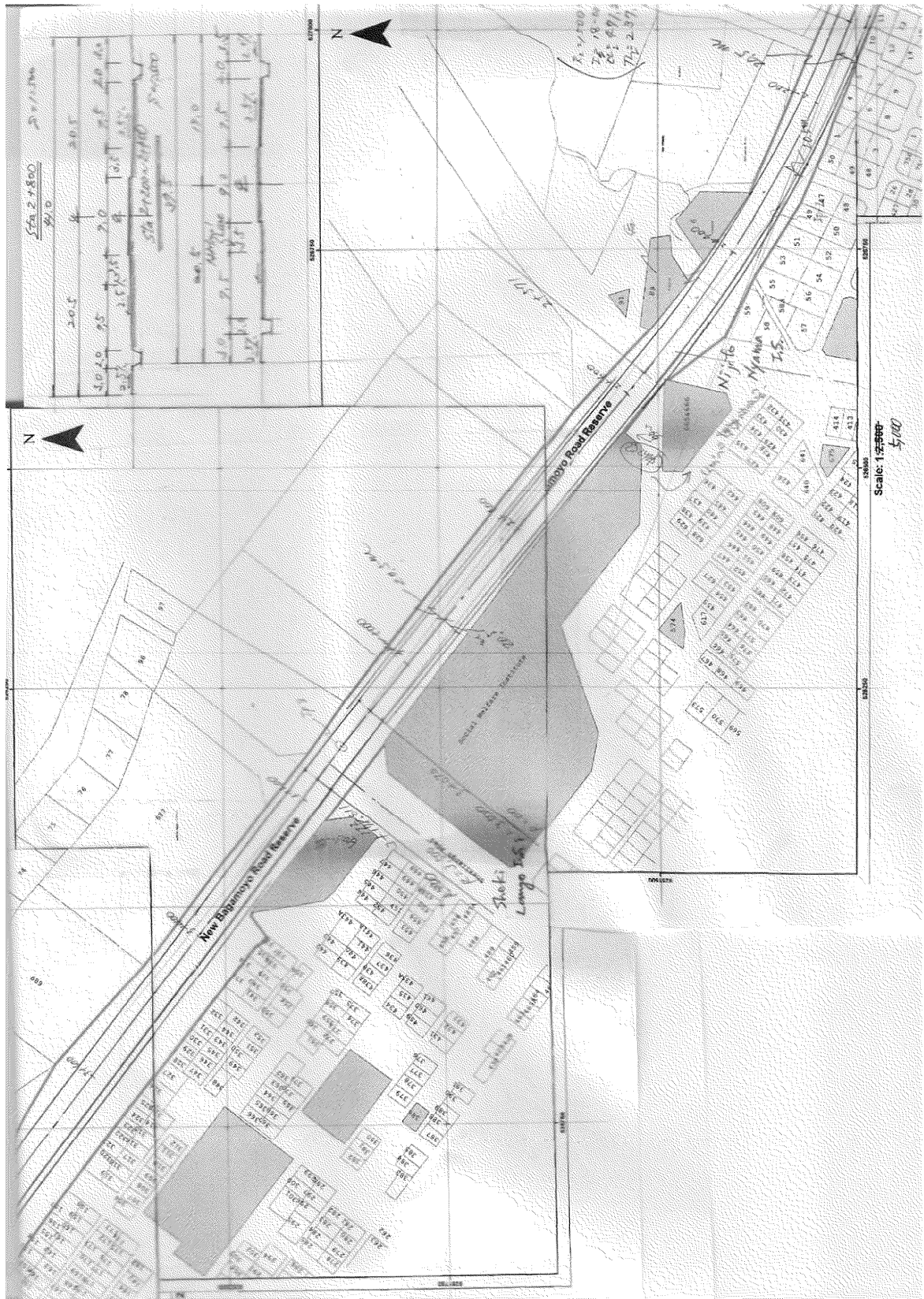
B. Existing Bridges (Data source: TANROADS Bridge Inventory)

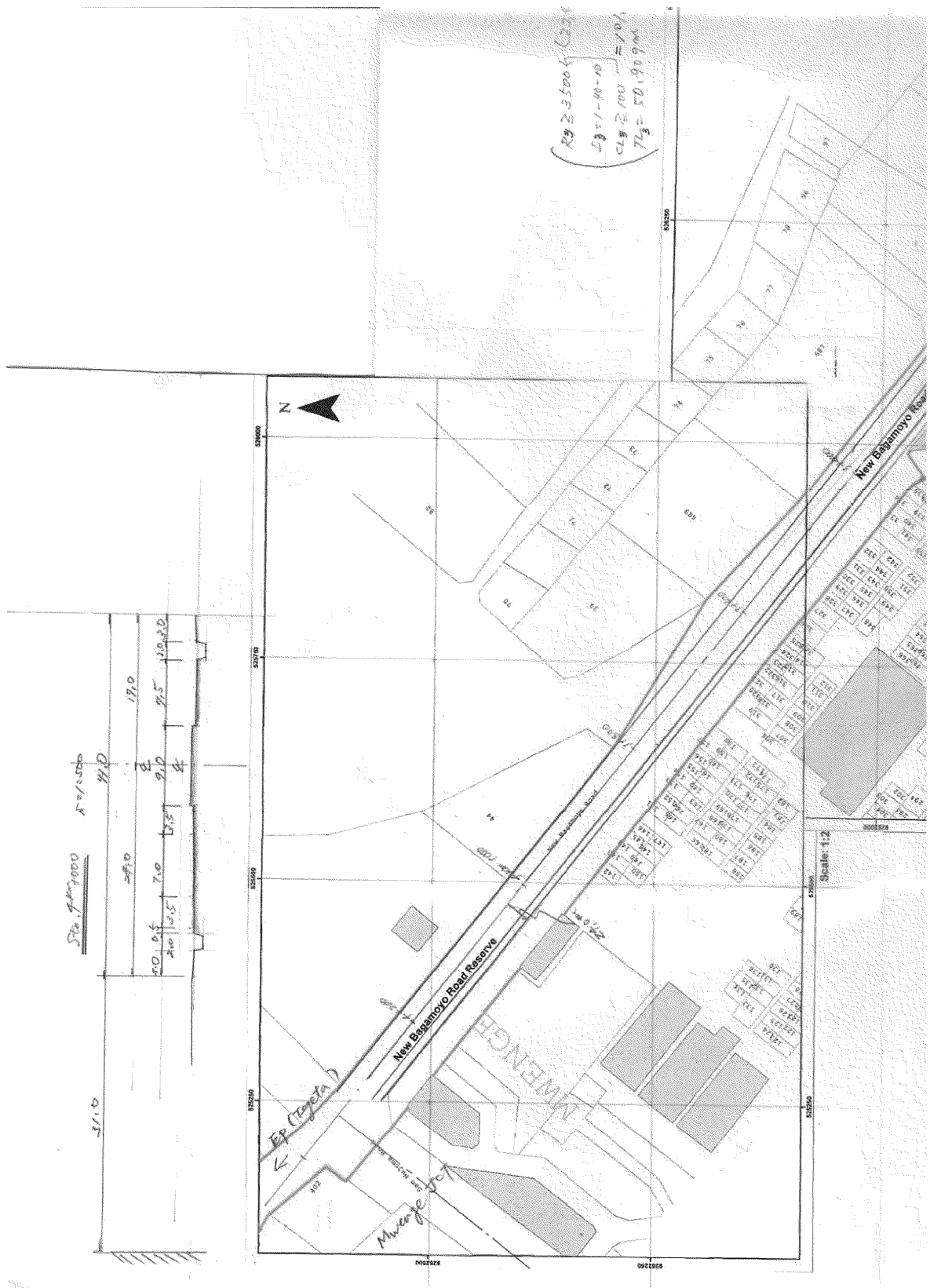
	Mlalakuwa Br.	Lugalo Br.	Tegeta Br.
Year of construction	unknown	unknown	1995
Axle load limit (ton)	10.00	10.00	10.00
Carriage width (m)	6.80	7.45	8.20
Span length (m)	11.80+12.20	17.85	6.89+7.00+7.00+6.80
Bridge type	Simply supported composite bridge :steel girder	Simply supported composite bridge :steel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

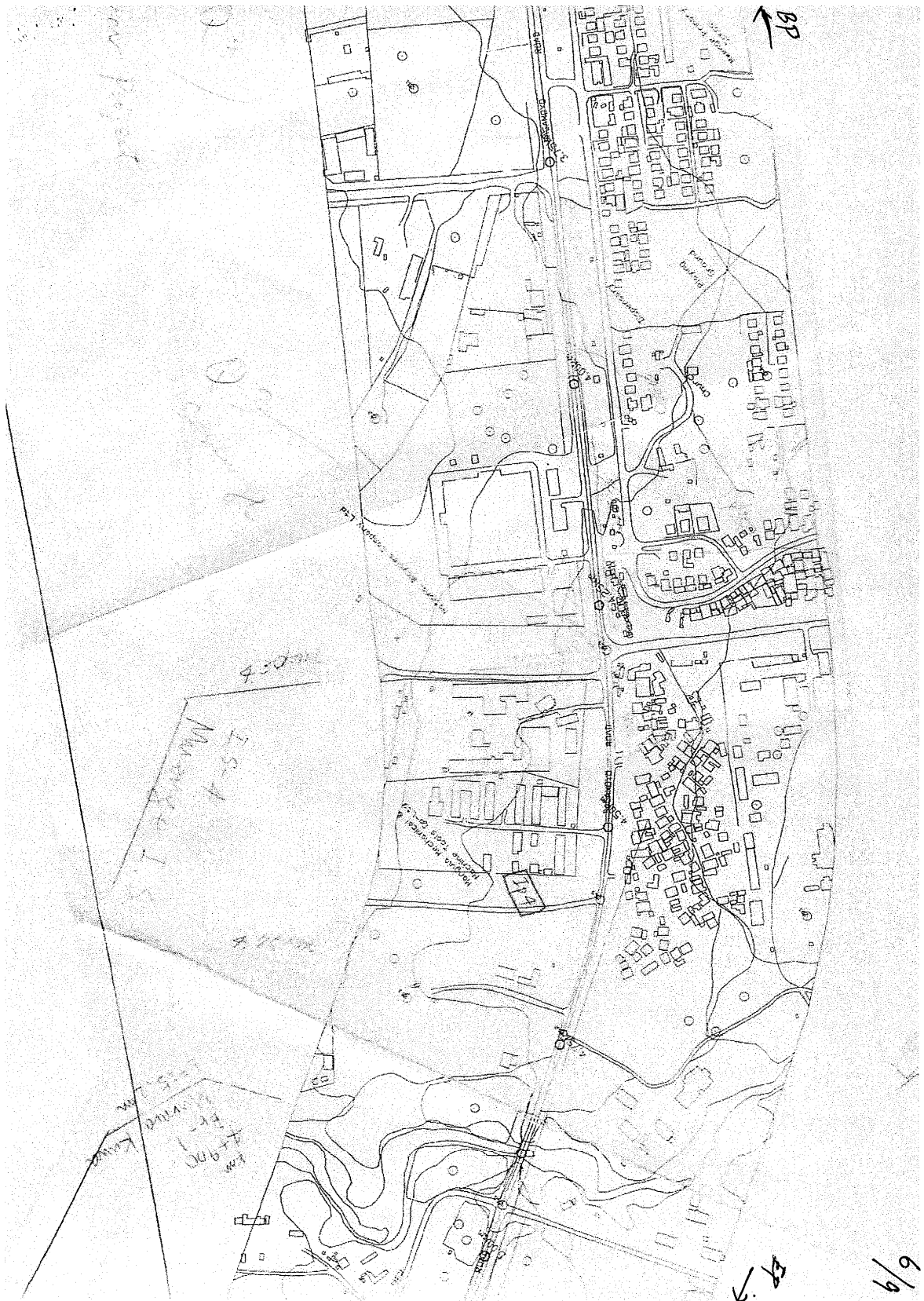


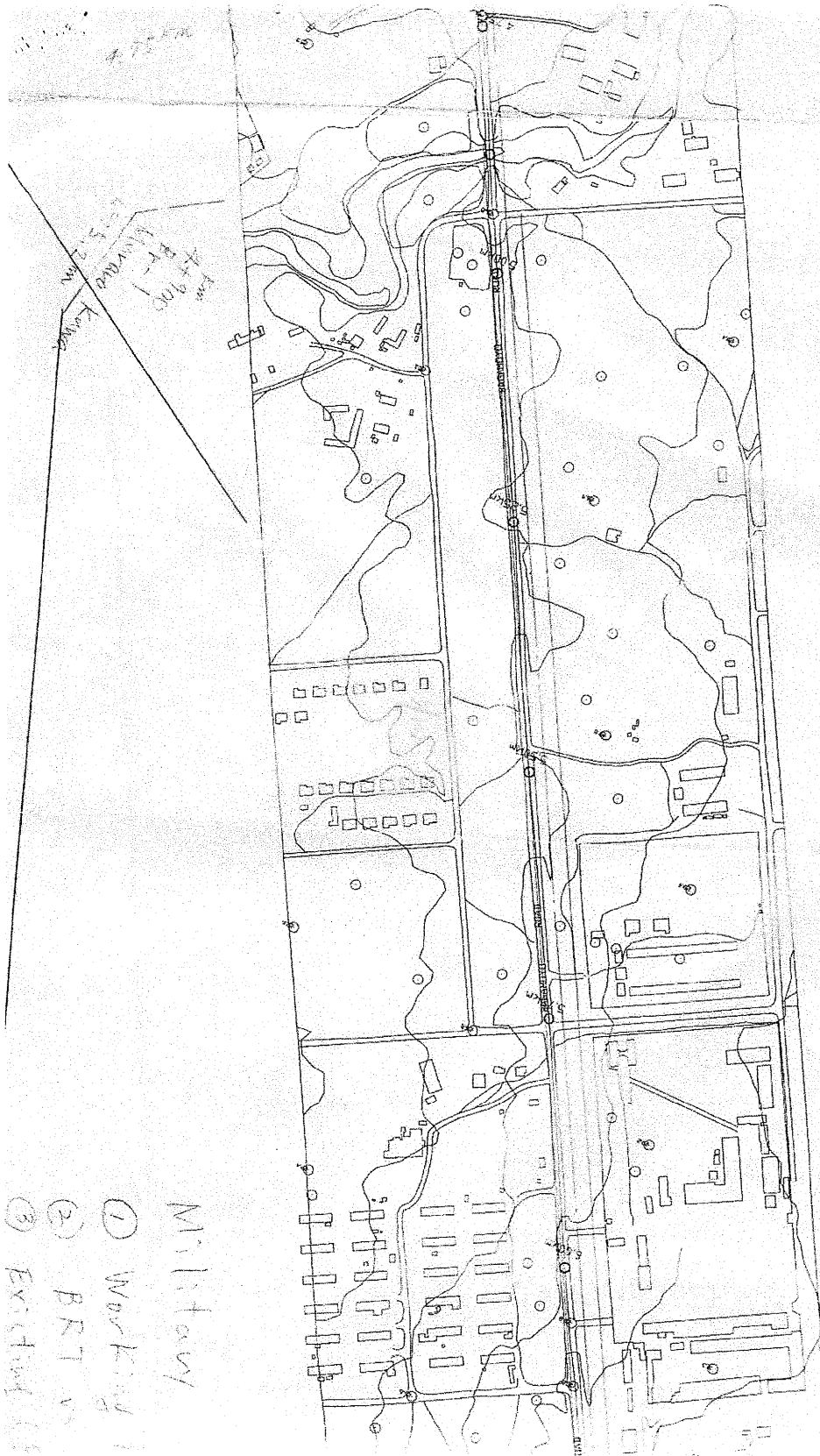


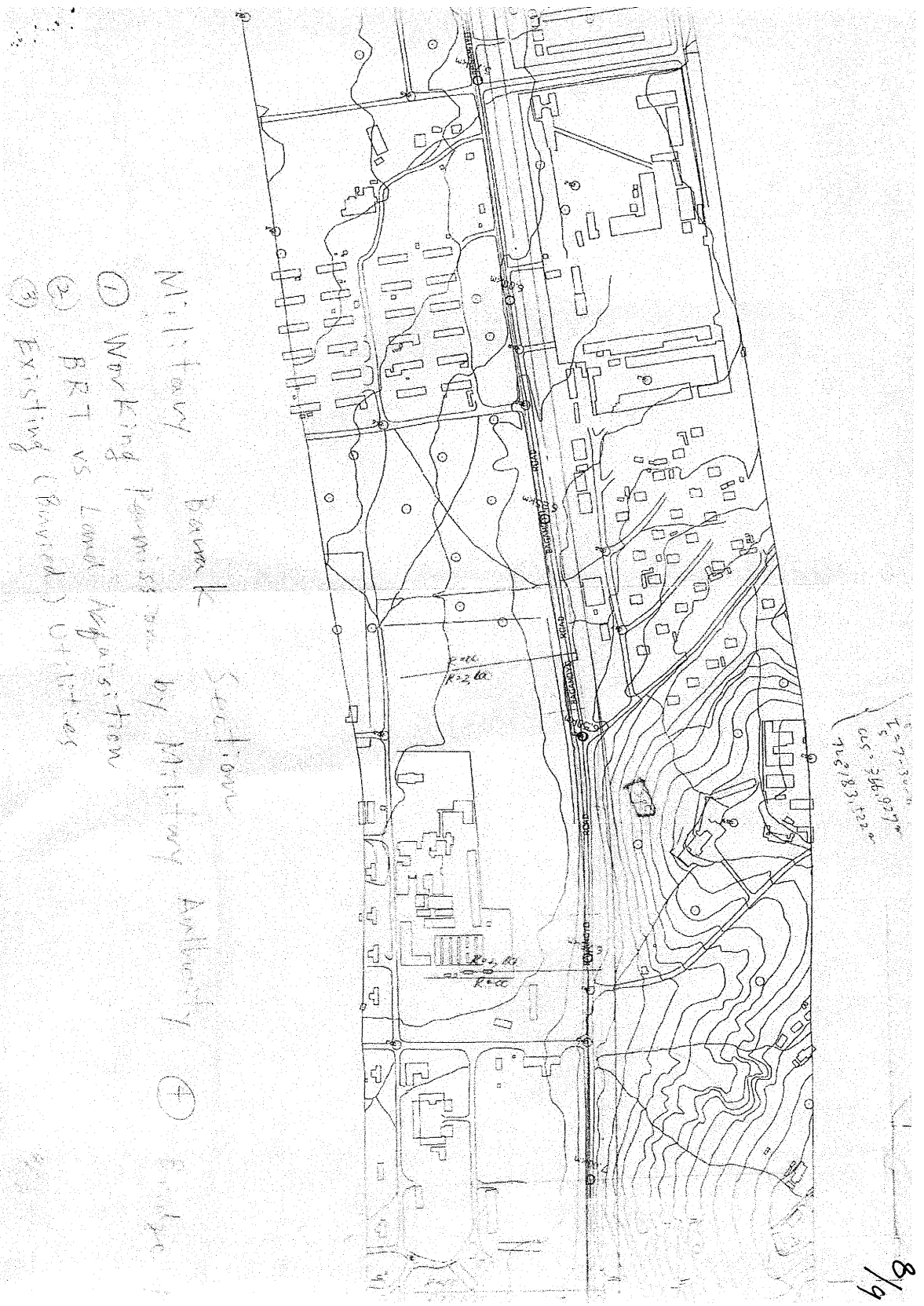




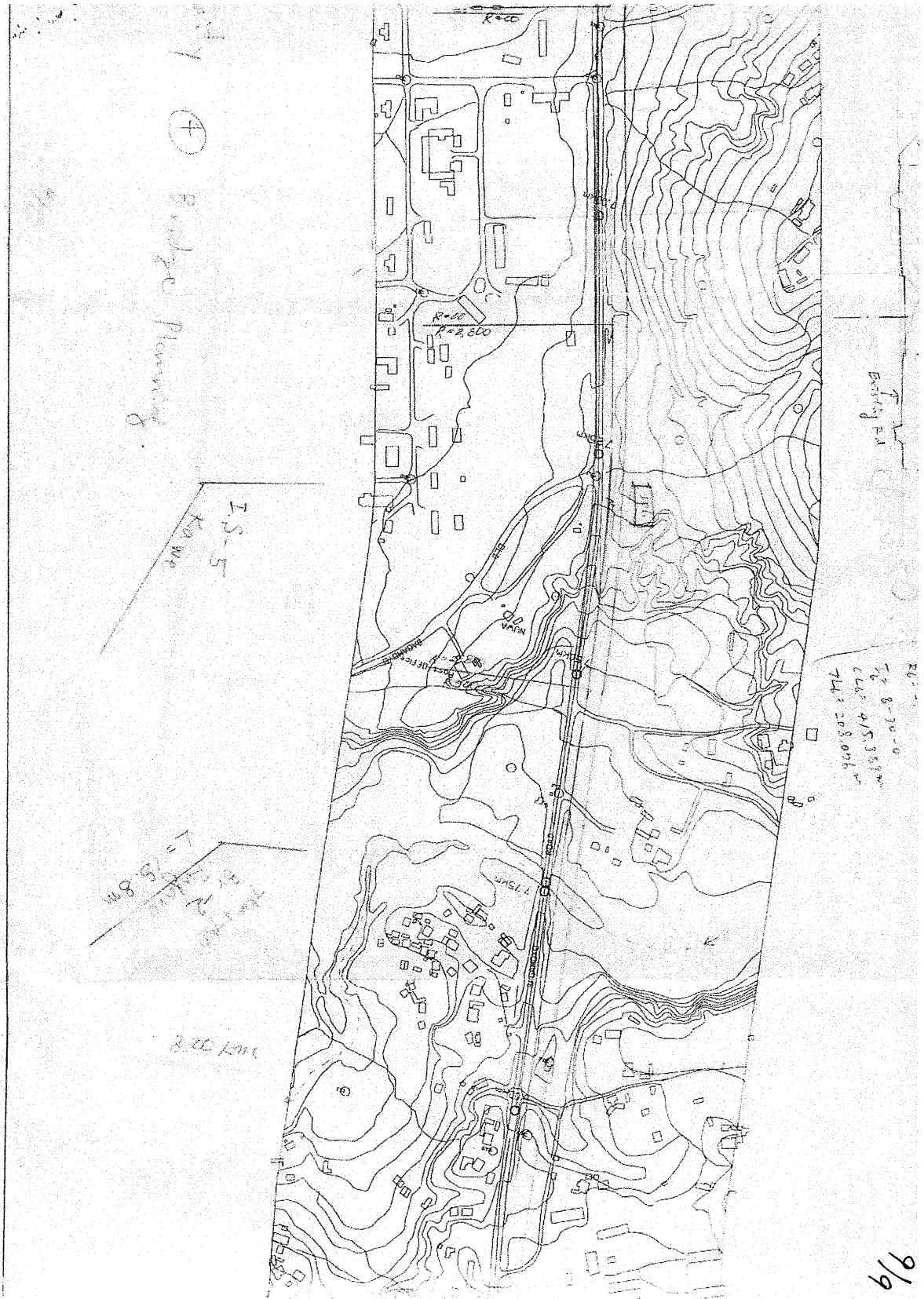








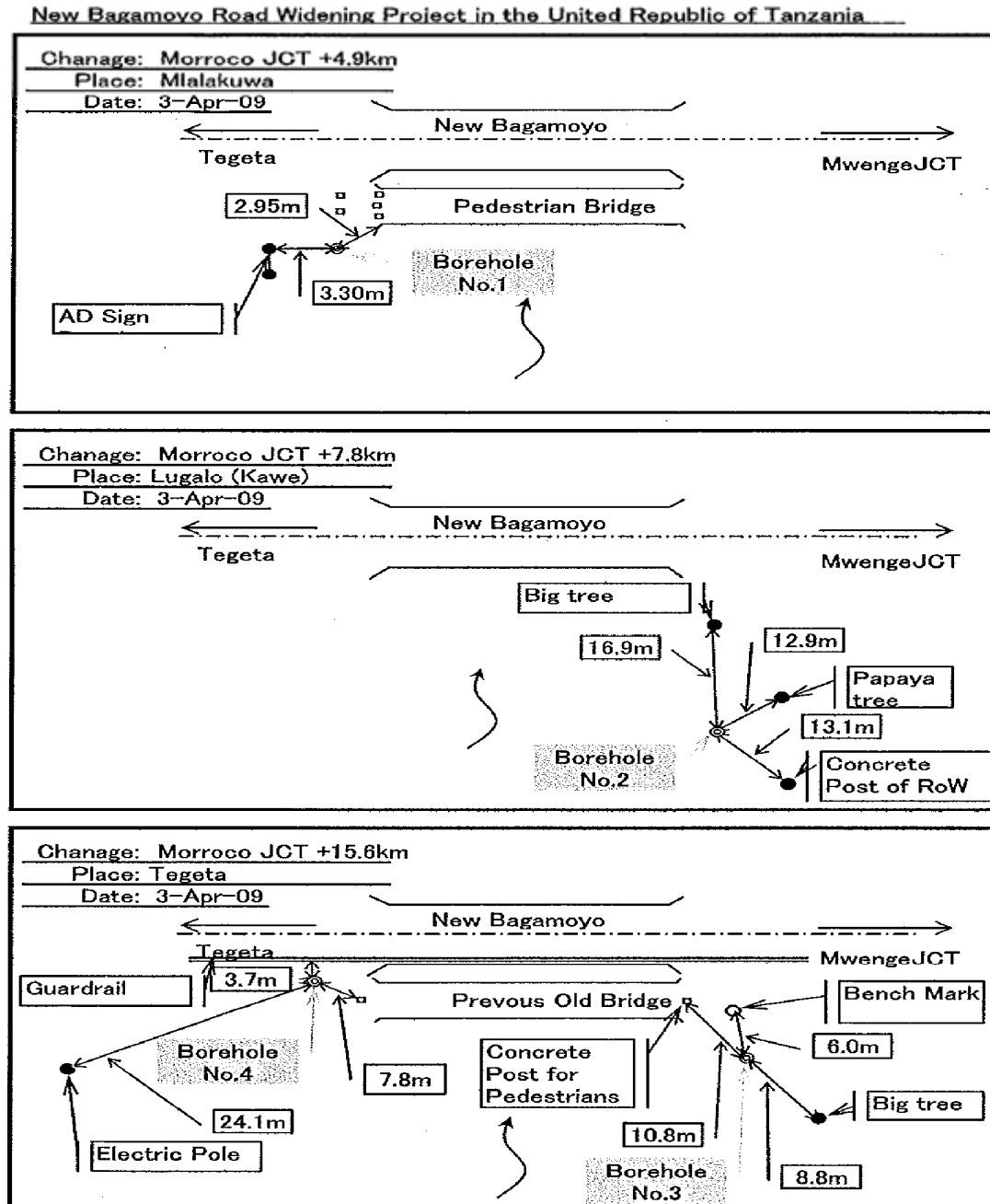
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7-2 地質(ボーリング)試験結果

(1) ボーリング位置

Appendix 1: Boreholes location plan



(2) 柱状图

NORPLAN Tanzania Ltd			BOREHOLE LOG SHEET					
CLIENT: TANROADS PROJECT: NEW BAGAMOYO ROAD SITE: MLALAKUWA BRIDGE LOCATION: MLALAKUWA RIVER DATE DRILLED: 24/04/09 - 28/04/09			BOREHOLE NO. 1 BORING METHOD: Rotary (mud circulation) CASSING USED: NII 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 - VALUE
0.0			Reddish GRAVEL FILL	1	B	0.0-1.0		
1.0			Reddish GRAVEL FILL	2	D _{SPT}	1.0-1.45	5/150, 4/150, 10/150	14
2.0			Reddish GRAVEL FILL	3	D _{SPT}	2.0-2.45	9/150, 3/150, 7/150	15
3.0		9.8	Medium dense grayish clayey SAND	4	D _{SPT}	3.0-3.45	5/150, 6/150, 7/150	12
4.0			Medium dense grayish clayey SAND	5	D _{SPT}	4.0-4.45	6/150, 4/150, 7/150	11
5.0			Medium dense grayish clayey SAND	6	D _{SPT}	5.0-5.45	4/150, 5/150, 8/150	17
6.0			Medium dense grayish gravelly clayey SAND	7	D _{SPT}	6.0-6.45	9/150, 8/150, 13/150	22
7.0			Grayish clayey fine SAND	8	UD	7.0-7.45	Sample lost	
8.0			Dense grayish clayey SAND	9	D _{SPT}	7.45-7.90	12/150, 12/150, 10/150	30
9.0			Medium dense grayish gravelly clayey SAND	10	UD	8.50-8.95		
9.0			Medium dense grayish gravelly clayey SAND	11	D _{SPT}	8.95-9.40	10/150, 11/150, 13/150	24
10.0			Medium dense grayish gravelly clayey SAND	12	D _{SPT}	10.0-10.45	8/150, 2/150, 15/150	23
11.0			Medium dense grayish gravelly clayey SAND	13	D _{SPT}	11.0-11.45	7/150, 8/150, 13/150	21
12.0			Yellowish gray gravelly fine SAND Water bearing strata	14	D _{SPT}	12.0-12.45	11/150, 11/150, 14/150	25
13.0			Yellowish gray gravelly SAND Water bearing strata	15	D _{SPT}	13.0-13.45	19/150, 23/150, 20/150	61
14.0			Yellowish gray gravelly fine SAND Water bearing strata	16	D _{SPT}	14.0-14.45	20/150, 25/150, 23/150	58
15.0			Yellowish gray gravelly fine SAND Water bearing strata	17	D _{SPT}	15.0-15.45	18/150, 37/150, 22/100	>52
16.0			Yellowish gray gravelly fine to coarse SAND Water bearing strata	18	D _{SPT}	16.0-16.45	16/150, 17/150, 22/150	39
17.0			Whitish gravelly coarse SAND Water bearing strata	19	D _{SPT}	17.0-17.45	20/150, 33/150, 37/150	70
18.0			Whitish gravelly coarse SAND water bearing strata	20	D _{SPT}	18.0-18.45	26/150, 36/150, 50/150	86




LEGEND

- U4 Undisturbed soil sample
- SPT test location
- D SPT SPT sample

NORPLAN Tanzania Ltd			BOREHOLE LOG SHEET					
CLIENT: TANROADS PROJECT: NEW BAGAMOYO ROAD WIDENING SITE: LUGALO BRIDGE LOCATION: MBEZI RIVER DATE DRILLED: 06/04/09-09/04/09			BOREHOLE NO. 2 BORING METHOD: Rotary mud circulation CASSING USED: GROUND ELEVATION:					
DEPTH (m)	LEGEND	GROUNDWATER LEVEL (m)	DESCRIPTION OF STRATA	SOIL SAMPLES		Depth m	STANDARD PENETRATION TEST	
				no	Type		Blows per 150mm	N - VALUE
1.0			Top soil (brownish clayey silt SAND)					
1.0			Medium dense reddish gray clayey SAND	1	D _{UT}	1.8-5.45	5/150, 7/150, 11/150	18
2.0			Medium dense, grayish gravelly clayey SAND	2	D _{UT}	2.8-2.45	8/150, 9/150, 13/150	22
3.0		Dry	Dense, grayish gravelly clayey SAND	3	UD	3.0-3.45	(131 Blows)	
4.0			Very dense, grayish gravelly clayey SAND	4	D _{UT}	3.45-3.90	12/150, 24/150, 26/150	38
5.0			Very dense, grayish gravelly clayey SAND	5	D _{UT}	4.5-4.95	16/150, 29/150, 30/150	59
6.0			Very dense, grayish gravelly clayey SAND	6	D _{UT}	5.5-5.95	16/150, 24/150, 30/150	54
7.0			Very dense, grayish gravelly clayey SAND	7	UD	6.8-8.45	(44 Blows)	
8.0			Very dense, grayish gravelly clayey SAND	8	D _{UT}	8.45-8.90	9/150, 16/150, 28/150	26
9.0			Very dense, grayish gravelly clayey SAND	9	D _{UT}	7.45-7.90	7/150, 17/150, 28/150	45
10.0			Very dense, grayish gravelly clayey SAND	10	D _{UT}	8.50-8.95	20/150, 31/150, 35/150	66
11.0			Very dense, grayish gravelly clayey SAND	11	D _{UT}	9.50-9.95	12/150, 20/150, 31/150	51
12.0			Very dense, grayish gravelly clayey SAND	12	D _{UT}	10.50-10.95	11/150, 16/150, 27/150	42
13.0			Very dense, grayish gravelly clayey SAND	13	D _{UT}	11.5-11.95	18/150, 16/150, 35/150	54
14.0			Very dense, grayish gravelly clayey SAND	14	D _{UT}	12.5-12.95	17/150, 16/150, 30/150	47
15.0			Very dense, grayish gravelly clayey SAND	15	D _{UT}	13.5-13.95	23/150, 24/150, 42/150	69
16.0			Very dense, grayish gravelly clayey SAND	16	D _{UT}	14.5-14.95	14/150, 24/150, 39/150	59

LEGEND	
	U4 Undisturbed soil sample
	SPT test location
	SPT disturbed sample

NORPLAN Tanzania Ltd			BOREHOLE LOG SHEET					
CUBIT: TANROADS PROJECT: NEW BAGAMOYO ROAD SITE: TEGETA BRIDGE LOCATION: TEGETA RIVER DATE DRILLED:			BOREHOLE NO. 3 BORING METHOD: Rotary mud circulation CASING USED: III GROUND ELEVATION:					
SGL (m)	LEGEND	GROUNDWATER LEVEL (m)	DESCRIPTION OF STRATA	SOIL SAMPLES		Depth (m)	STANDARD PENETRATION TEST	
				No.	Type		Blows per 100mm	Q-Value
0.0			Top soil with CLRBAGE					
1.0			Loose grayish brown silt SAND	1	D _{un}	1.0-1.45	3/150, 4/150, 5/150	8
2.0			Medium dense, yellowish brown silt SAND	2	D _{un}	2.0-2.45	5/150, 7/150, 10/150	17
3.0		5.7	Medium dense, grayish clayey SAND	3	D _{un}	3.0-3.45	7/150, 7/150, 9/150	16
4.0			Very dense, grayish clayey SAND	4	D _{un}	4.0-4.45	21/150, 25/150, 25/150	54
5.0			Very dense, whitish gray gravelly clayey SAND	5	D _{un}	5.0-5.45	31/150, 15/150, 21/150	36
6.0			Very dense, grayish clayey SAND	6	UD	6.0-6.45	(77 blows)	
7.0			SM, grayish sandy CLAY	7	D _{un}	6.45-6.90	4/150, 5/150, 8/150	13
8.0			Dense, ANHR, WEATHERED CORAL LIMESTONE	8	D _{un}	7.5-7.95	15/150, 16/150, 13/150	29
9.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	9	D _{un}	8.90-9.35	12/150, 22/150, 22/150	40
10.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	10	D _{un}	9.90-9.95	15/150, 29/150, 29/150	58
11.0			Very dense, ANHR, WEATHERED CORAL LIMESTONE	11	D _{un}	11.0-11.45	12/150, 16/150, 26/150	39
12.0			Medium dense, whitish, WEATHERED CORAL LIMESTONE	12	D _{un}	12.0-12.45	9/150, 19/150, 13/150	22
13.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	13	D _{un}	13.0-13.45	12/150, 18/150, 22/150	37
14.0			Very dense, ANHR, WEATHERED CORAL LIMESTONE	14	D _{un}	14.0-14.45	5/150, 15/150, 14/150	30
15.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	15	D _{un}	15.0-15.45	21/150, 18/150, 48/150	67
16.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	16	D _{un}	16.0-16.45	12/150, 19/150, 30/150	49
17.0			Very dense, whitish, WEATHERED CORAL LIMESTONE	17	D _{un}	17.0-17.45	11/150, 25/150, 36/150	55

LEGEND	
	U1 Undisturbed soil sample
	SPT test location
	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 CASSING USED: Nil 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	f ₁ -Value
0.0			Top soil (reddish clayey GRAVEL)					
1.0			Loose brownish fine SAND	1	D _{SPT}	1.0-1.45	2/150, 2/150, 4/150	5
2.0			Medium dense brownish fine SAND	2	D _{SPT}	2.0-2.45	8/150, 6/150, 7/150	13
3.0			Loose, brownish fine to coarse SAND	3	D _{SPT}	3.0-3.45	2/150, 3/150, 6/150	8
4.0			Medium dense, grayish clayey SAND	4	D _{SPT}	4.0-4.45	7/150, 8/150, 12/150	20
5.0		5.0	Dense, grayish clayey SAND	5	D _{SPT}	5.0-6.45	7/150, 14/150, 17/150	31
6.0			Dense, grayish clayey SAND	6	UD	6.0-6.45		
7.0			Dense, grayish clayey SAND	7	D _{SPT}	6.45-6.90	6/150, 13/150, 16/150	29
8.0			Very dense, grayish clayey SAND	8	D _{SPT}	7.50-7.95	18/150, 28/150, 24/150	52
9.0			Stiff, grayish sandy CLAY	9	D _{SPT}	8.50-8.95	7/150, 8/150, 7/150	16
10.0			Stiff, grayish sandy CLAY	10	UD	9.50-9.95		
11.0			Stiff, grayish sandy CLAY	11	D _{SPT}	9.95-10.40	5/150, 4/150, 7/150	11
12.0			Dense, whitish weathered CORAL LIMESTONE	12	D _{SPT}	11.0-11.45	12/150, 11/150, 12/150	23
13.0			Dense, whitish weathered CORAL LIMESTONE	13	D _{SPT}	12.0-12.45	11/150, 9/150, 6/150	12
14.0			Dense, whitish weathered CORAL LIMESTONE	14	D _{SPT}	13.0-13.45	10/150, 14/150, 23/150	37
15.0			Dense, whitish weathered CORAL LIMESTONE	15	D _{SPT}	14.-14.45	9/150, 8/150, 11/150	16
16.0			Dense, whitish weathered CORAL LIMESTONE	16	D _{SPT}	15.0-15.45	10/150, 10/150, 10/150	20
17.0			Dense, whitish weathered CORAL LIMESTONE	17	D _{SPT}	16.0-16.45	7/150, 7/150, 8/150	18
18.0			Dense, whitish weathered CORAL LIMESTONE	18	D _{SPT}	17.0-17.45	19/150, 11/150, 18/150	16
19.0			Very dense, clayey SAND	19	D _{SPT}	18.0-18.45	21/150, 19/150, 35/150	54
20.0			Very dense, clayey SAND	20	D _{SPT}	19.0-19.45	18/150, 23/150, 39/150	62
21.0			Very dense, clayey SAND	21	D _{SPT}	20.45-20.45	19/150, 19/150, 30/150	49
22.0			Very dense, clayey SAND	22	D _{SPT}	21.0-21.45	17/150, 20/150, 26/150	46
23.0			Very dense, clayey SAND	23	D _{SPT}	22.0-22.45	19/150, 29/150, 50/150	79

LEGEND	
	UJ Undisturbed soil sample
	SPT test location
	SPT sample

DETAILED ENGINEERING DESIGN OF WIDENING NEW BAGAMOTOY ROAD																				
TP No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Location	0+700RHS	1+000LHS	1+500LHS	2+100LHS	2+500LHS	3+250LHS	3+750LHS	4+000LHS	4+500LHS	5+250LHS	5+500LHS	5+750LHS	6+000LHS	6+500LHS	7+250LHS	8+000LHS	8+500LHS	8+750LHS	9+000LHS	10+000LHS
Depth (CM) from GL	70 - 150	60 - 82	75 - 100	51 - 100	32 - 100	60 - 100	65 - 100	83 - 113	70 - 100	2 - 100	0 - 60	80 - 100	55 - 100	70 - 110	30 - 120	50 - 100	50 - 80	0 - 40	73 - 100	0 - 30
%PASSING SIEVE																				
AASHTO(mm)																				
50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
38	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
28	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
19	99	92	100	99	100	94	100	100	98	100	100	100	100	99	100	100	100	100	100	100
14	99	91	100	99	100	90	98	98	98	100	98	100	100	99	100	100	100	100	100	100
9.5	97	90	100	97	99	89	97	96	98	100	98	100	100	99	100	100	100	100	100	100
6.3	96	89	100	96	99	87	95	93	97	100	97	100	100	99	100	100	100	100	100	100
4.75	95	88	100	95	99	86	95	92	97	100	97	100	100	99	100	100	100	100	100	100
2.000	93	86	100	94	99	84	93	90	96	99	95	100	98	98	97	99	99	99	98	100
0.600	91	83	97	91	97	81	89	86	95	96	93	97	96	96	95	95	91	90	99	97
0.0425	62	54	64	69	74	57	71	56	78	74	71	78	83	79	59	57	47	47	58	88
0.300	45	39	45	51	50	45	56	40	57	61	58	64	69	68	49	44	33	33	41	69
0.075	19	17	34	37	41	35	45	30	46	49	48	51	57	52	43	37	25	22	28	50
GM	1.5	1.6	1.4	1.4	1.4	1.6	1.3	1.6	1.2	1.1	1.2	1.1	1.1	1.1	1.2	1.3	1.6	1.6	1.5	1.1

ATTERBERG LIMITS																			
LL	20.1	22.2	23.2	26.3	22.2	21.8	25.4	21.8	28.4	31.4	27.6	26.2	25.0	23.8	27.5	23.4	32.4	23.4	43.7
PI	4.7	5.1	4.4	6.7	4.7	5.1	7.2	3.1	9.4	17.5	10.1	11.6	4.4	7.1	8.3	8.3	16.8	5.4	24.9
LS						2.9	3.6	3.6	5.7	9.3	6.4	5.7			3.2		7.9		12.1
Classifi-AAASHTO	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-6(2)	A-2-4(0)	A-2-5(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(1)	A-2-6(1)	A-2-4(0)	A-2-7(6)

CBR@																				
MDD (kg/m ³)	2013	1960	2002	2013	1990	2044	2018	2028	2015	1965	1910	1958	2040	1844	2005	2010	2060	1970	2049	1928
Natural M.C.(%)	5.0	5.0	2.0	6.0	4.0	6.0	10.0	6.0	11.0	15.0	24.0	20.0	12.0	8.0	5.0	11.0	13.0	14.0	8.0	27.0
OMC (%)	8.4	9.2	6.8	9.8	7.0	8.6	8.9	9.5	9.1	9.0	15.2	11.6	8.6	15.6	9.8	10	8.1	11.4	8.8	12.2
Moulding MC	8.2	9	6.8	9.7	7.2	8.5	9.0	9.4	9.2	9.3	15.4	11.7	8.6	15.7	9.9	10.3	8.3	11.7	8.9	12.1
90%MDD	2	12	13	1	3	3	3	3	2	1	4	3	2	2	3	2	6	5	4	2
93%MDD	2	15	17	1	4	6	3	4	3	1	4	4	3	3	3	4	3	8	6	4
95%MDD	3	18	21	2	6	12	4	5	4	1	5	6	3	3	5	3	9	7	5	3
98%MDD	4	22	25	3	16	23	6	10	6	2	7	9	5	4	7	8	11	9	9	5
Classifi-PMDD	S3	S15	S15	S3	S3	S7	S3	S3	S3	S3	S3	S3	S3	S3	S3	S3	S7	S7	S3	S3

TP No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Bunju A	B/PIT
Location	10+500LHS	11+000LHS	11+500LHS	12+000LHS	12+500LHS	13+000LHS	13+500LHS	14+000LHS	14+500LHS	15+000LHS	15+500LHS	16+000LHS	16+500LHS	17+000LHS	Sample 1	Sample 2
Depth (cm) from GL	60 - 100	65 - 100	20 - 100	20 - 70	60 - 100	80 - 100	75 - 100	100 - 100	5 - 100	10 - 100	60 - 80	80 - 100	20 - 100	30 - 100		
%PASSING SIEVE																
AASHTO(mm)																
50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
38	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
28	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
19	100	100	100	99	100	100	100	98	100	100	100	91	100	100	89	86
14	100	100	100	96	100	100	100	98	100	100	99	90	100	99	85	84
9.5	100	100	99	92	100	100	100	98	100	100	98	90	100	97	80	82
6.3	100	100	99	89	100	100	100	97	100	100	96	89	100	96	74	79
4.75	100	100	99	86	100	100	100	96	100	100	94	89	100	94	72	78
2.000	99	100	98	79	100	100	100	93	100	100	91	87	99	91	67	75
1.18	98	99	97	71	98	99	99	90	77	89	88	86	97	89	63	73
0.600	93	90	84	59	47	82	74	84	63	76	81	80	64	82	58	70
0.0425	77	63	71	43	36	63	61	68	54	53	64	74	45	59	55	68
0.300	61	50	57	34	28	42	42	56	48	38	53	68	34	44	52	66
0.015	45	29	35	26	19	25	38	40	42	23	38	55	22	24	48	63
0.075	41	22	30	25	17	23	23	35	40	18	34	49	19	21	47	62
GM	0.8	1.1	1.0	1.5	1.5	1.1	1.2	1.0	1.1	1.3	1.1	0.9	1.4	1.3	1.3	0.9
ATTEBERG LIMITS																
LL	25.5	26.0	30.2	26.2	22.8	20.6	37.6	39.0	40.8	23.0	25.6	27.5	24.0	24.2	31.2	26.6
PI	6.7	8.2	9.4	4.9	4.9	3.5	17.8	14.3	13.3	8.6	10.7	11.3	6.1	6.0	10.0	9.2
LS							9.3	6.9	6.4		5.7	5.0			5.0	4.3
Classifi-AASHTO	A-4(0)	A-2-4(1)	A-2-4(0)	A-2-4(0)	A-2-4(2)	A-2-4(1)	A-2-6(1)	A-2-6(1)	A-6(1)	A-2-4(2)	A-2-4(0)	A-6(0)	A-2-4(1)	A-2-4(1)	A-4(0)	A-4(0)
MDD (kg/m3)	1900	2013	2025	1982	1882	1990	1921	1850	2016	2064	2080	1928	2040	2080	2098	2090
Natural Moisture (%)	21.0	6.0	10.0	5.0	2.0	3.0	9.0	14.0	11.0	4.0	7.0	24.0	12.0	13.0	3.0	3.0
OMC (%)	11.0	10.1	10.4	10.6	13.6	10	15.0	15.2	10.1	10	8.2	13	9.4	8.6	9.8	10
Moulding MC	11.0	10.1	10.1	10.7	13.6	10	15.0	15.3	10.1	10	8.2	12.9	9.3	8.8	10.1	10.3
CBR@																
90%MDD	5	4	3	2	2	4	3	3	3	4	2	3	5	1	17	13
93%MDD	5	4	3	2	3	5	4	4	3	4	3	4	5	2	20	15
95%MDD	5	5	3	2	4	5	5	5	3	5	3	7	6	2	25	20
98%MDD	7	6	4	3	5	8	9	6	4	7	4	10	8	2	38	28
Classifi-FWDM	S3	S3	S3	S3	S3	S3	S3	S3	S3	S3	S3	S7	S3	S3	G25	G15