(4) 地区道路における排水流末の対処方針の確認

JAPAN INTERNATIONAL COOPERATION AGENCY

JICA

JAPAN OVERSEAS COOPERATION VOLUNTEERS
(J O C V)

Eng. CHACHA S. MWITA
~~Mr.HINDABAGOYE~~
City Commissioner for Works
Dar es Salaam City Commission (DCC)
Dar es Salaam
Tanzania

Date : August 21,1996
Ref. : DRDP - 02

Attention
Mr.GAMBA
City Engineer
DCC

Subj. : Request on Appropriate Government Action for Flood prone area within the Five area roads
JICA Basic Design Study for the D.S.M. Road Development Project

Dear Sir,

In conjunction with the on-going above mentioned study of D.S.M Road Development Project, The JICA Study Team would like to submit the result of the identification of the flood prone area within the Five area roads at where installation of proper drainage facilities is definitely necessary from the proposed roadside drainage upto the natural stream as per attached.

At present, most of the flood prone area are blocked by housing without any provision of proper drainage system.

In order to prepare a plan for rehabilitation of local roads in Five area, it is necessary either aquisition of land or any appropriate government action for new installation of proper drainage facilities up to the natural stream prior to the commencement of the project.

JICA Tanzania Office Plot No 1033 Mindu Street Upanga
P. O. Box 9450 DAR ES SALAAM. Tel: 44530/44382 Fax: 44890

30th JOCV

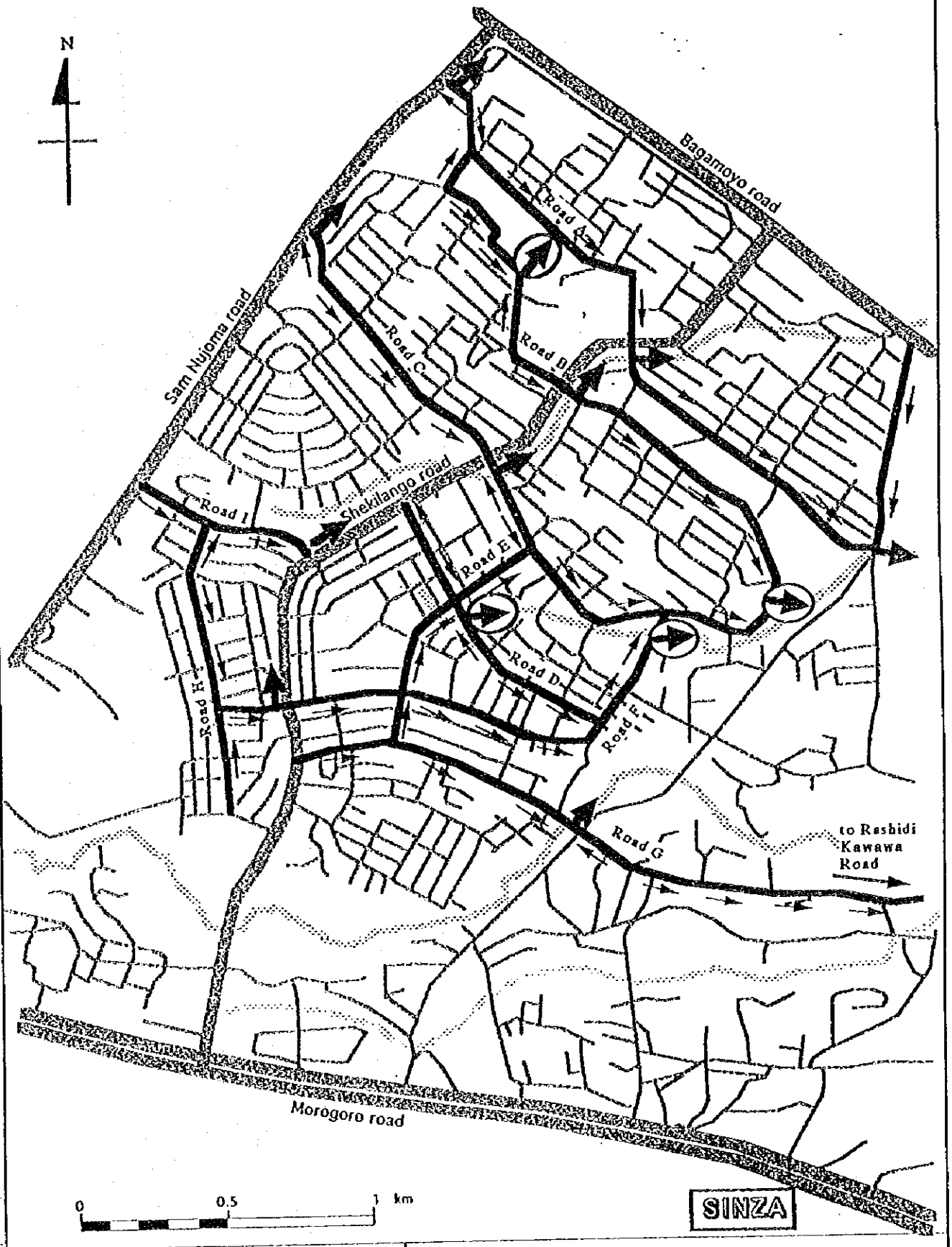
Your quick actions and answer are highly appreciated.

Truly yours,

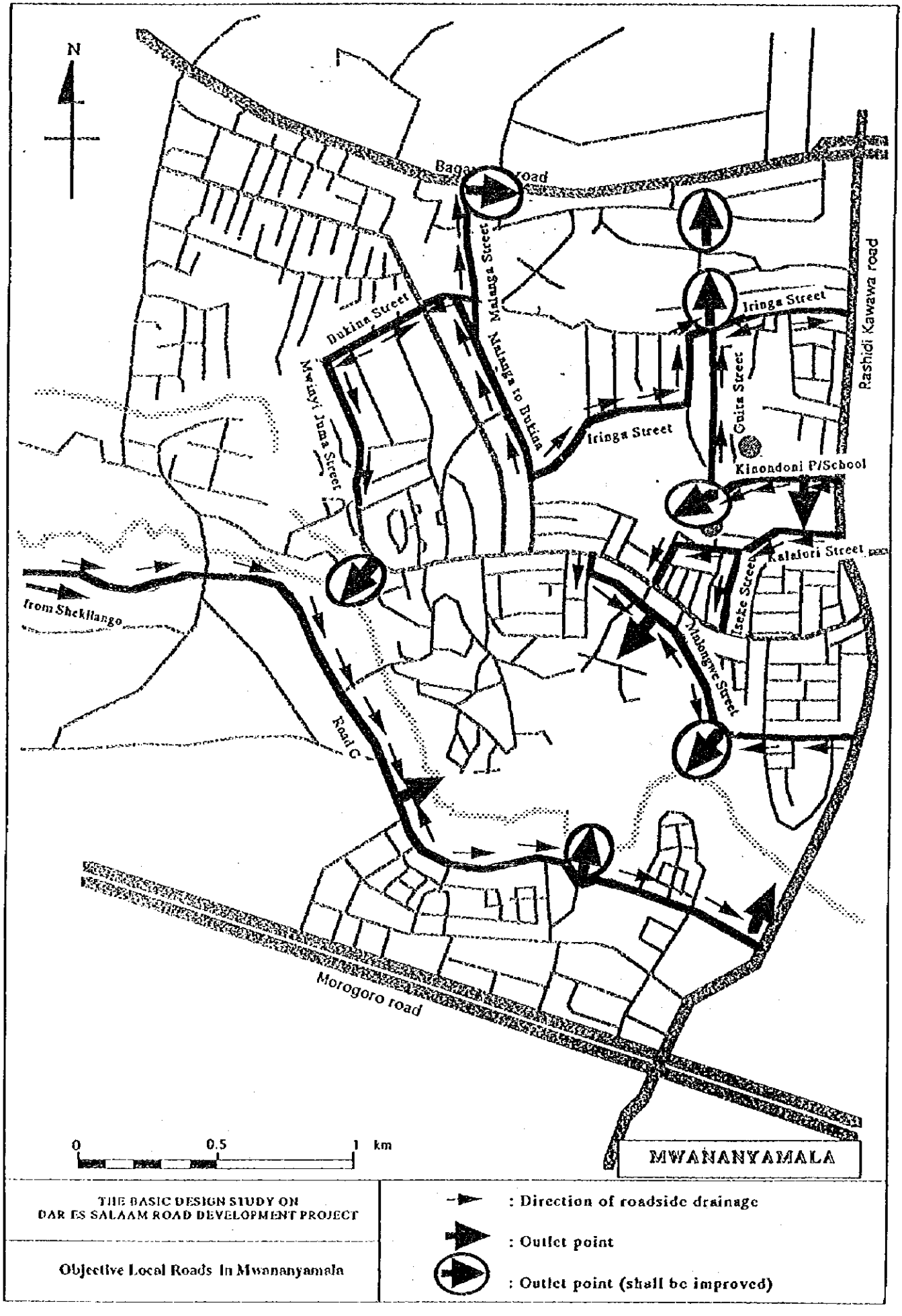
Hisashi Muto
Chief Consultant,
JICA Study Team for
Dar es Salaam Road
Development Project
(DRDP)

C.C. Mr.H.URIO
Director of Roads
Ministry of Works

Mr.M.D.KITILA
Coordinator,Sustainable Dar es Salaam Project
DCC



THE BASIC DESIGN STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PROJECT	: Direction of roadside drainage
Objective Road in Sinza	: Outlet point : Outlet point (shall be improved)



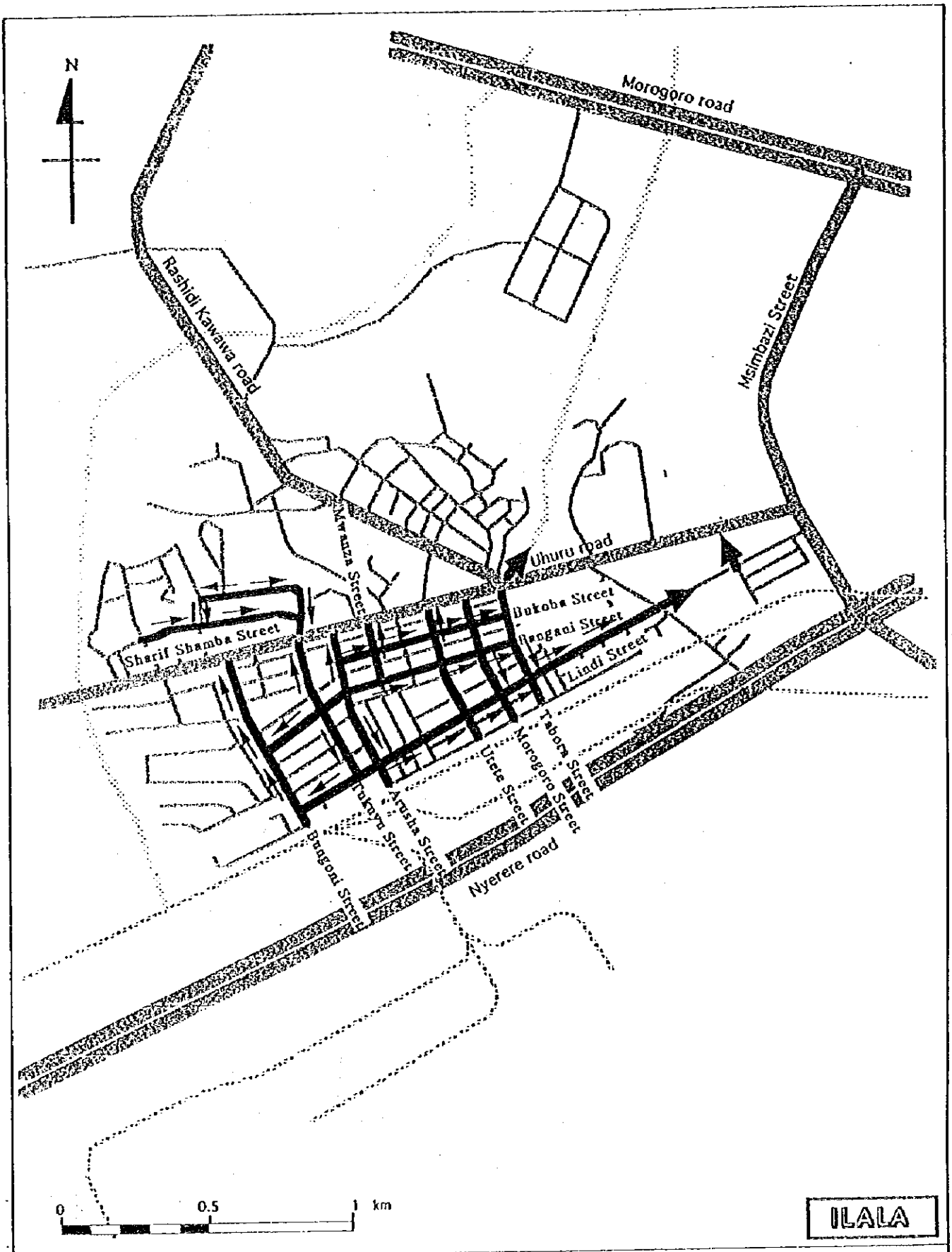
THE BASIC DESIGN STUDY ON
DAR ES SALAAM ROAD DEVELOPMENT PROJECT

Objective Local Roads In Mwananyamala

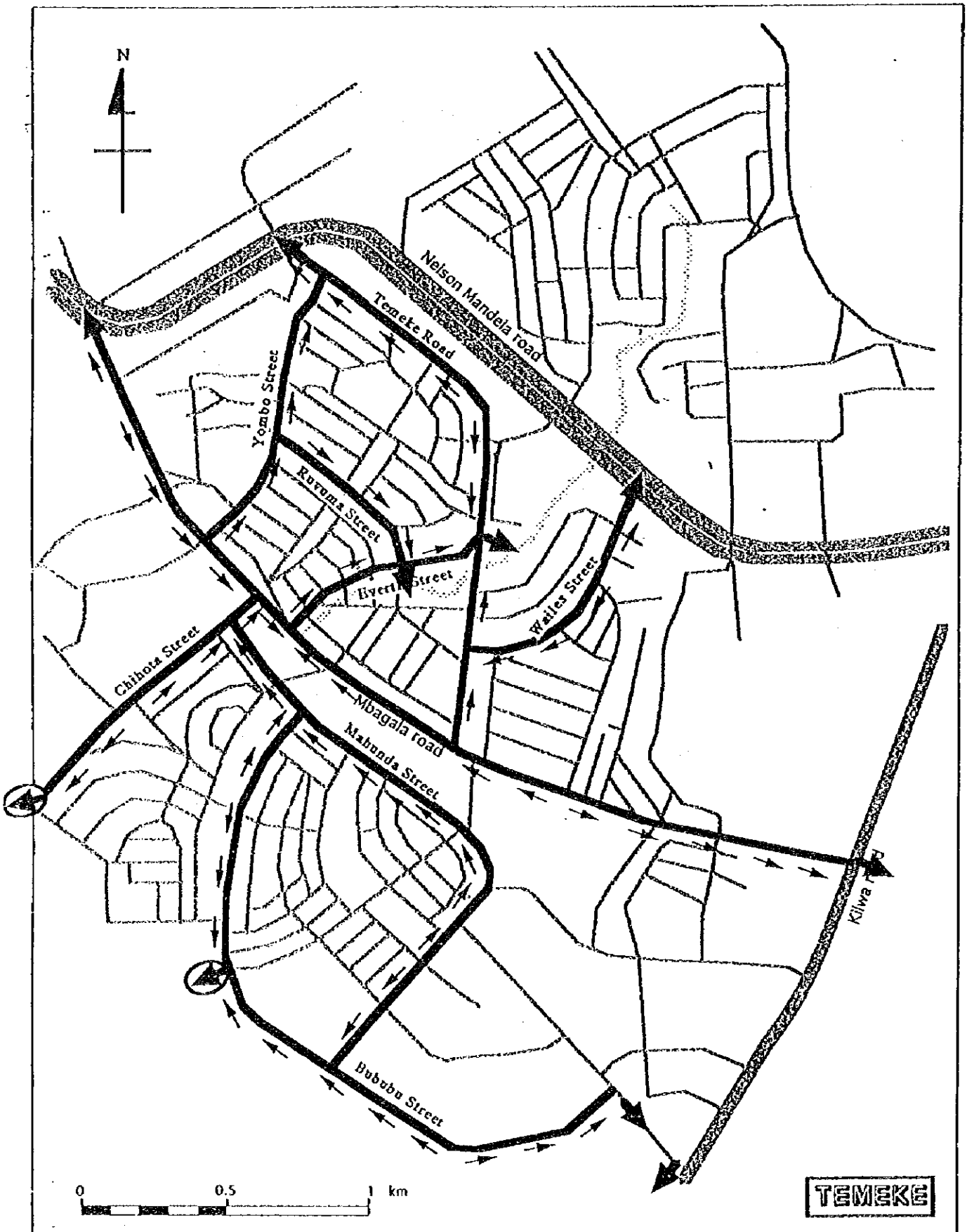
: Direction of roadside drainage

: Outlet point

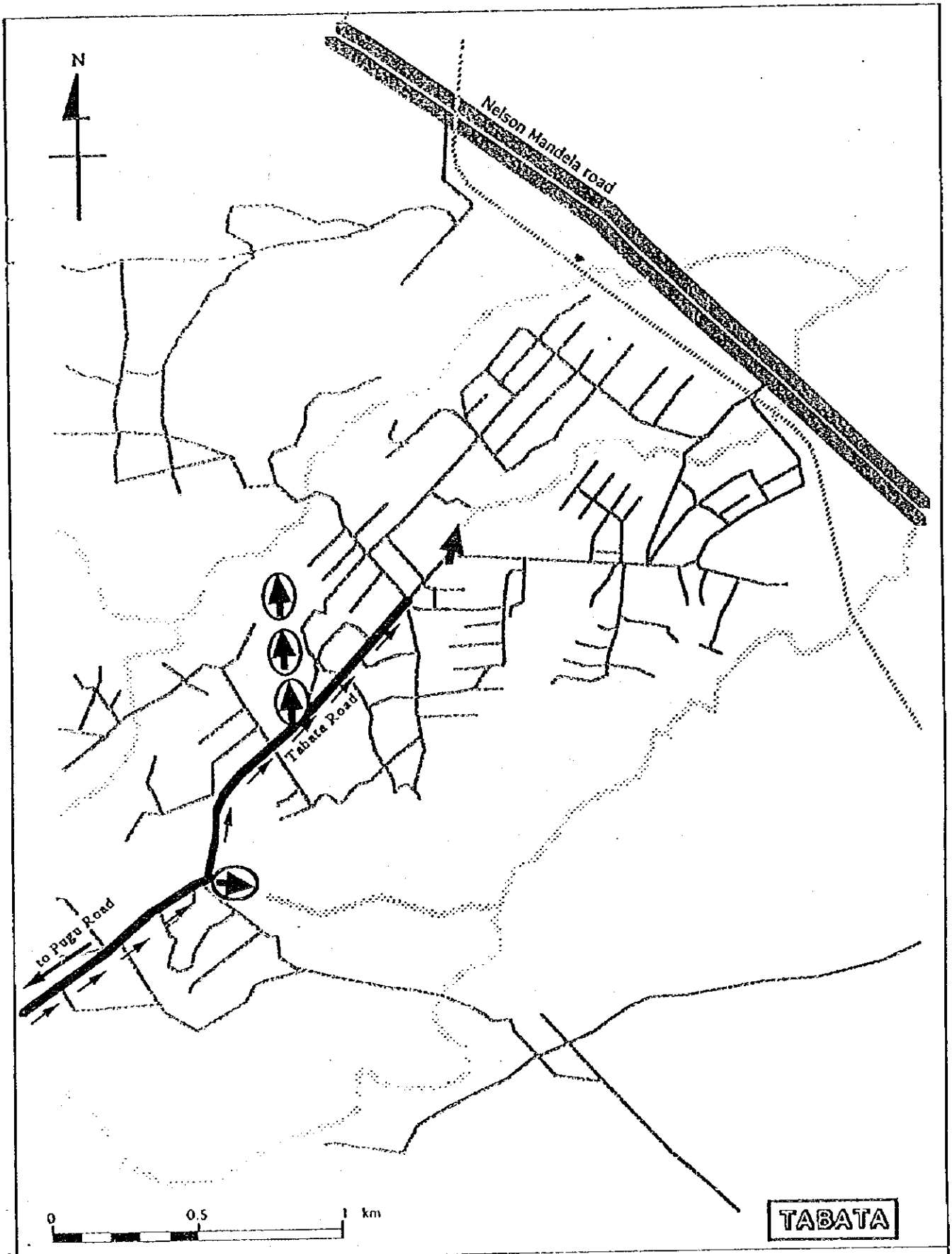
: Outlet point (shall be improved)



THE BASIC DESIGN STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PROJECT	: Direction of roadside drainage : Outlet point : Outlet point (shall be improved)
Objective Road in Ilala	



THE BASIC DESIGN STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PROJECT	: Direction of roadside drainage
Objective Road in Temeke	: Outlet point : Outlet point (shall be improved)



THE BASIC DESIGN STUDY ON
DAR ES SALAAM ROAD DEVELOPMENT PROJECT

Objective Road in Tabata

: Direction of roadside drainage

: Outlet point

: Outlet point (shall be improved)

THE CITY COMMISSION OF DAR ES SALAAM

ALL COMMUNICATIONS TO BE ADDRESED TO THE CHAIRMAN

P. O. BOX 9084
TEL. 23551/5

CITY HALL
DAR ES SALAAM
TANZANIA

REF: NO. DCC/CE/N.30/10/7

3rd September, 1996

Mr. Hisoshi Muto,
Chief Consultant,
JICA Study Team for
Dar es Salaam Road
Development Project (DRDP),
DAR ES SALAAM.

Dear Sir,

SUBJ: REQUEST ON APPROPRIATE GOVERNMENT ACTION FOR FLOOD PRONE AREA WITHIN THE FIVE AREA ROADS

JICA BASIC DESIGN STUDY FOR DAR ES SALAAM ROAD DEVELOPMENT PROJECT

We refer to your letter, ref. DRDP-02, dated 21/8/1996 on the subject under caption and the discussions held on the 03rd September, 1996 in the Commissioner for Works' office on the same matter.

On recognision of the importance of having properly functioning drainage system in the City and particularly so in the five area local roads, the Commission would like to assure you that, it will take all possible measures to avail the land needed for the drainage structures.

You are therefore advised to proceed with the final designs of the referred to project.

The Commission will also Compensate properties which will be affected by the construction of the drainage structures. However, we shall be very grateful to receive the actual information on properties (if any) that shall be demolished to enable us draw a plan for Compensation.

Yours faithfully

(C.S.Mwita)
CHAIRMAN
for. CITY COMMISSION
DAR ES SALAAM

c.c: Principal Secretary,
Ministry of Works,
P.O. Box 9423,
DAR ES SALAAM.

(5) 現地調査結果の確認

JAPAN INTERNATIONAL COOPERATION AGENCY

JICA

JAPAN OVERSEAS COOPERATION VOLUNTEERS
(J O C V)

Mr.H.G.URIO
Director of Roads
Ministry of Works
Dar es Salaam
Tanzania

Date : August 29 , 1996
Ref. : DRDP - 03

Subj. : Results of the Field Survey
JICA Basic Design Study for the D.S.M. Road Development Project

Dear Sir,

Followings are our findings and draft improvement proposal for the Objective Roads.

1. Confirmation of Classification of Roads

After conduction of the field investigation including Road Inventory Survey, Traffic Survey, Road Network Survey, Landuse Survey and Public Facilities Survey, JICA Study Team has prepared and submit our findings on the draft classification of roads and road length for your confirmation.

The road classification has be conducted as shown in Attachment-A based on the analysis of each road functions within the road network, such as origin and destination, type of connecting roads, alighnment, contribution to public transport and accessability to community facilities, land use etc.

2. Draft Road Design Standard for Urban Roads

There is a Draft Road Manual prepared by the Ministry of Communications and Works in 1989 for Rural Roads except Urban Roads.

JICA Tanzania Office Plot No 1033 Mindu Street Upanga
P. O. Box 9450 DAR ES SALAAM. Tel: 44530/44382 Fax: 44890

In order to proceed the Basic Designinig for the Project, JICA Study Team has prepared a draft road design standard for Urban Roads as shown in Attachment-B based on the review of the contents in the Draft Road Manual, JICA Master Plan and Feasibility Study on D.S.M Road Development Plan, Urban Transport Policy Action Plan prepared by the Ministry of Works, Communication and Transport in 1995, Road Safety Programme prepared by MOW in 1996 and the Community Infrastructure Programme in Dar es Salaam supported by the UNDP and World Bank.

The Typical Cross Section and Right of way will change by the installation of power line required possibility 5m with for 11kv line and 3m with for lower than 11kv line, and by the width required for road side ditch installation.

3. Draft Road Improvement Measures

The Objective Road of the Project are classified into four types such as Trunk Road and Primary,Secondary and Tertiary distributors.

Based on the Draft Road Design Standard prepared by JICA Study Team, the Draft Road Improvement Measures for each of the objective roads to be implemented by the Project has been prepared as shown in Attachment-C and covers the following fields for your confirmation, subject to the evaluation to be conducted by JICA and japanese authorities concerned.

A. Road Widening of the Middle Ring Road

- Road Widening for dual carriageway
- Road Widening for pedestrian and bicycle on both side
- Road Widening for Central Strip with consideration of future introduction of Bus Exclusive / Priority Lane or expansion to 6-lane road.
- Rehabilitation of road-side drainage system upto the natural stream
- Provision of Bus stops along side the Middle Ring Road and Bus Stations for changing at important intersections with Radial Trunk Roads
- Construction of Missing Link between Uhuru Road and Pugu Road with realighnment work of the exsiting Railway Truck for level crossing
- Road Safety Measures required including traffic signal, channelization, turning lane, sign and marking

B. Rehabilitation Measures for 5 Area Roads

- Road Pavement Rehabilitation
- Road-side Drainage Rehabilitation including outlet to the natural stream
- Road Shoulder Rehabilitation with consideration of pedestrian pass
- Provision of Bus-stop for Bus Routes
- Road Safety Measures including mini roundabout, hump, sign and marking

Regarding Pavement Rehabilitation Measures concerned, JICA Study Team has prepared a Draft Pavement Rehabilitation Measures as shown in Attachement-D for your confirmation.

The above mentioned measures to be implemented by the Project shall be evaluated and finalized by JICA and japanese authorities concerned during the Basic Design Work in Japan considering Road Classification, Traffic Volume, Road Detorioration, Socio-economic Function, Contribution of Basic Human Needs and Policy.

Your quick actions and answer are highly appreciated.

Truly yours,

Hisashi Muto
Chief Consultant,
JICA Study Team for
Dar es Salaam Road
Development Project
(DRDP)

C.C. 1. JICA Tanzania Office

2. Mr. MARIKI
Chief Engineer Design,MOW

3. Mr.H.NDABAGOYE
City Commisioner for Works,DCC

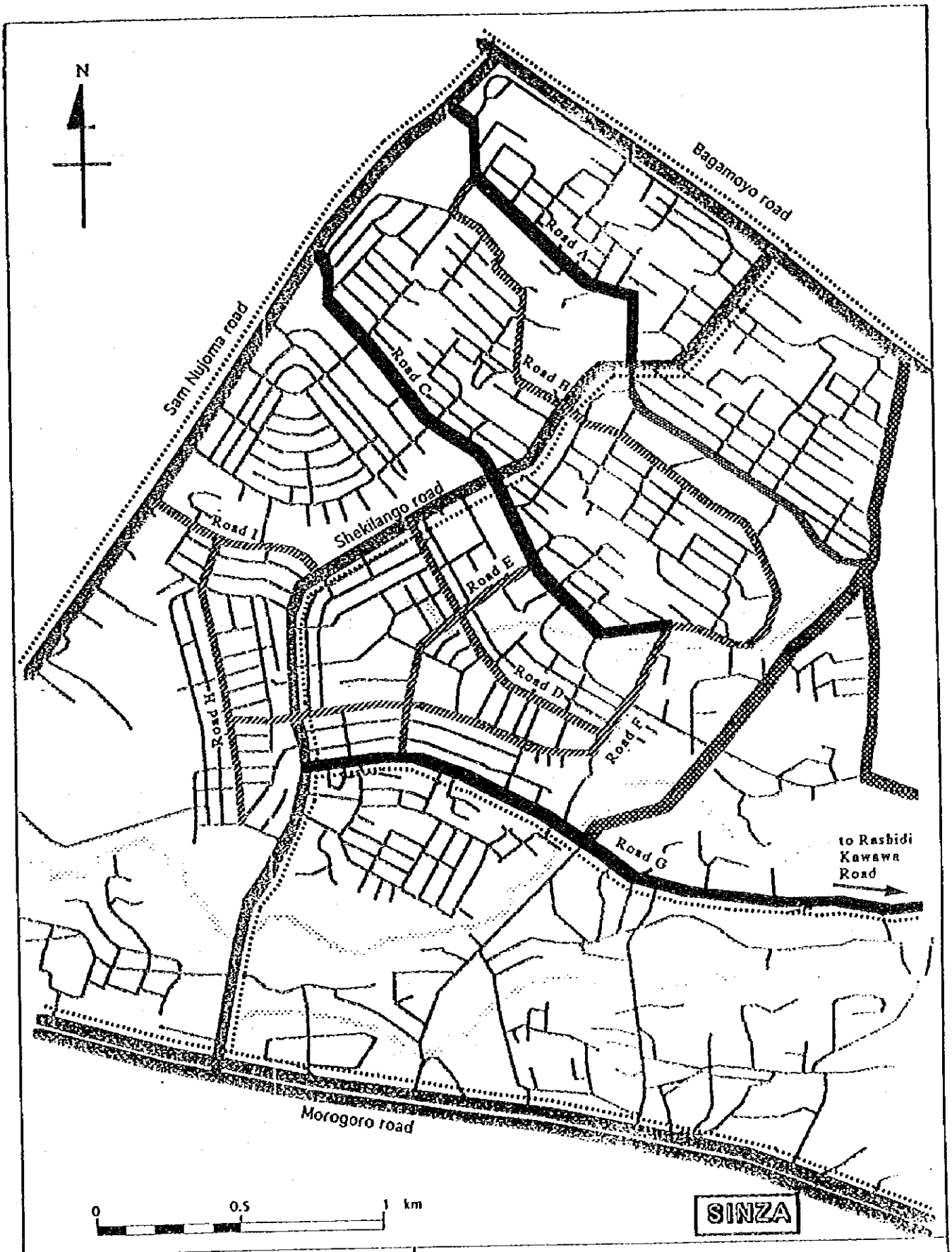
4. Mr.GAMBA
City Enginner,DCC

5. Mr.M.D.KITILA
Coordinator,SDP,DCC

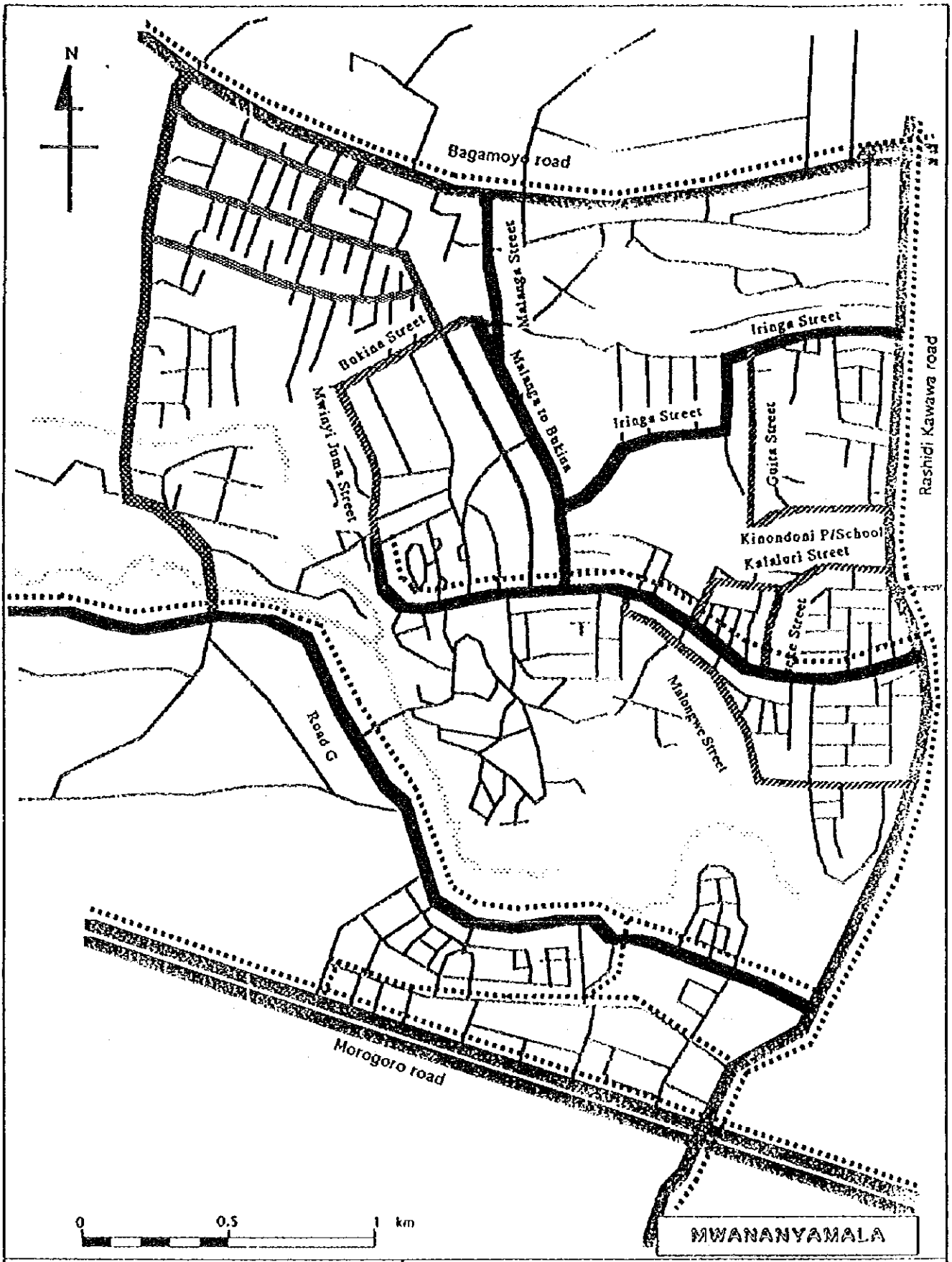
Attachment-A Review of Road Classification

(Unit : km)

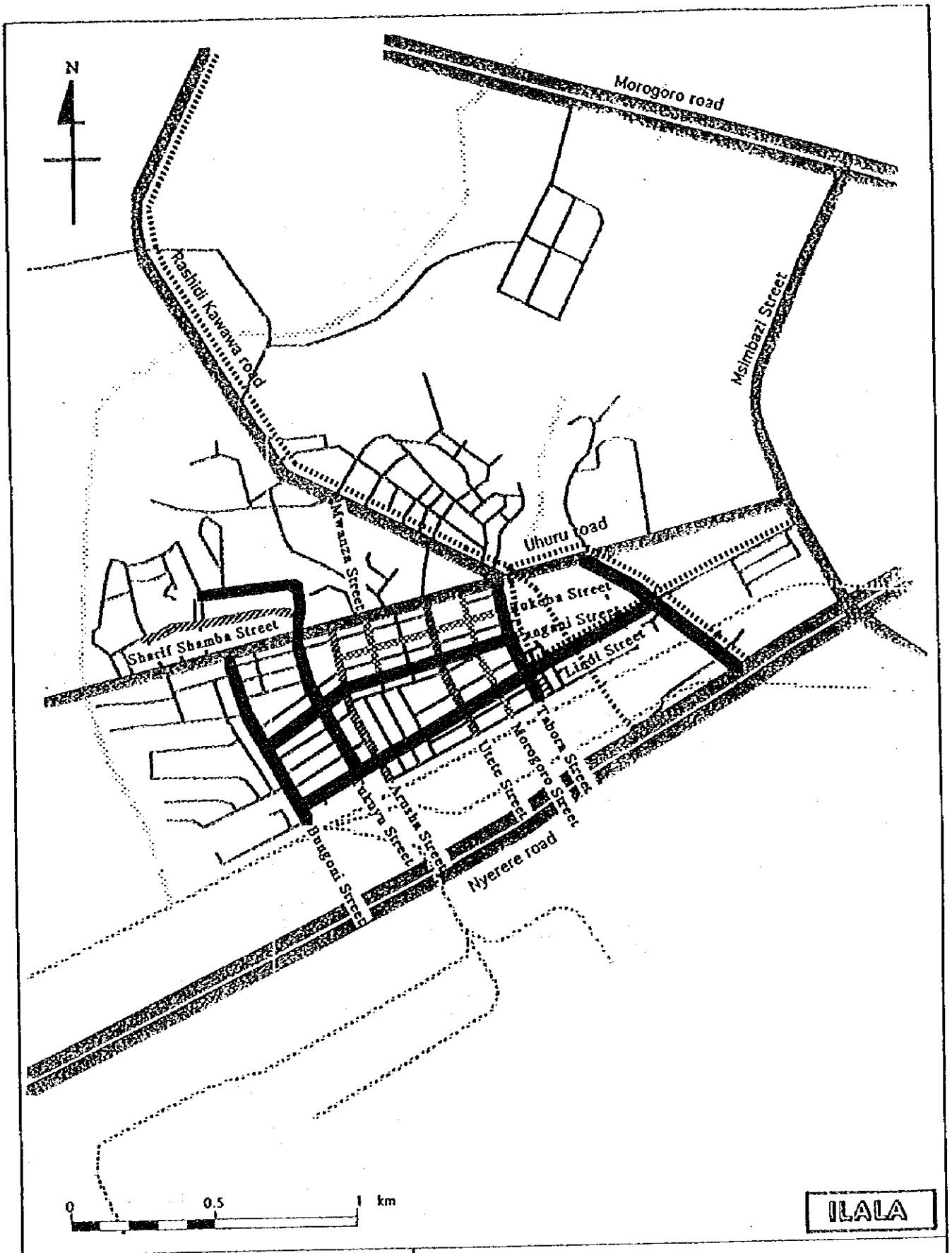
No.	Road Name	Requested by DCC				Measured by the JICA Study Team					(2)-(1)	Bus Route	Access to Hospital / Educational Place / Other Public facility
		Total (1)	Trunk	Primary	Secondary	Total (2)	Trunk	Primary	Secondary	Tertiary			
1. Five Area Roads													
Sinza Area		16.35	0.00	5.21	11.14	15.96	0.00	7.97	7.99	0.00	-0.39		
1	Road A	2.23		2.23		1.10		1.10			-1.13	○	○
2	Road B	2.11			2.11	2.55			2.55		0.44		○
3	Road C	2.24		2.24		1.87		1.87			-0.37		○
4	Road D	0.60			0.60	1.03			1.03		0.43		○
5	Road E	0.74		0.74		0.84			0.84		0.10		○
6	Road F	1.76			1.76	1.76			1.76		0.00		○
7	Road G	5.00			5.00	5.00		5.00			0.00	○	○
8	Road H	0.98			0.98	1.12			1.12		0.14		...
9	Road I	0.69			0.69	0.69			0.69		0.00		...
Mwananyamala Area		7.82	0.00	0.00	7.82	7.56	0.00	2.91	4.65	0.00	-0.26		
10	Bukina Street	0.63			0.63	0.63			0.63		0.00		○
11	Guita Street	0.63			0.63	0.63			0.63		0.00		○
12	Kinondoni P/School	0.48			0.48	0.48			0.48		0.00		○
13	Iseke Street	0.19			0.19	0.19			0.19		0.00		○
14	Malongwe Street	1.30			1.30	1.30			1.30		0.00		○
15	Malanga Street	0.91			0.91	0.65		0.65			-0.26		○
16	Iringa Street	1.56			1.56	1.56		1.56			0.00		○
17	Malanga to Bukina	0.70			0.70	0.70		0.70			0.00		○
18	Karafuu Street	0.85			0.85	0.85			0.85		0.00		○
19	Mwinyi Juma Street	0.57			0.57	0.57			0.57		0.00		○
Hala Area		7.52	0.00	3.89	3.63	7.37	0.00	4.42	1.63	1.32	-0.15		
20	Lindi Street	1.36		1.36		1.36		1.36			0.00	○	○
21	Bungoni Street	0.64		0.64		0.64		0.64			0.00		○
22	Pangani Street	0.75		0.75		0.87		0.87			0.12		○
23	Tabora Street	0.55		0.55		0.45		0.45			-0.10		○
24	Morogoro Street	0.58			0.58	0.48				0.48	-0.10		○
25	Utete Street	0.62			0.62	0.50			0.50		-0.12		○
26	Arusha Street	0.59		0.59		0.59			0.59		0.00		○
27	Tukuyu Street	1.10			1.10	1.10		1.10			0.00		○
28	Sharif Shamba Street	0.54			0.54	0.54			0.54		0.00		○
29	Mwanza Street	0.22			0.22	0.27				0.27	0.05		...
30	Bukoba Street	0.57			0.57	0.57				0.57	0.00		○
Temeke Area		14.29	0.00	6.55	7.74	14.49	0.00	8.08	6.41	0.00	0.20		
31	Evereth Street	0.60			0.60	0.63			0.63		0.03	○	○
32	Yombo Street	1.00		1.00		1.00		1.00			0.00	○	○
33	Temeke Road	2.05		2.05		2.05		2.05			0.00	○	○
34	Mbagala Road	3.50		3.50		3.50		3.50			0.00	○	○
35	Wailes Road	0.78			0.78	0.85			0.85		0.07		○
36	Ruvuma Street	0.62			0.62	0.62			0.62		0.00		
37	Chihota Street	1.00			1.00	1.10		0.33	0.97		0.10	○	○
38	Bububu Street	2.62			2.62	2.62		1.00	1.62		0.00	○	○
39	Mahunda Street	2.12			2.12	2.12		0.40	1.72		0.00	○	○
Tabata Area		9.00	9.00	9.00	0.00	7.10	0.00	1.20	5.90	0.00	-1.90		
40	Tabata Road	9.00		9.00	0.00	7.10		1.20	5.90	0.00	-1.90	○	○
2. Middle Riang Road													
	Total	7.08	7.08	0.00	0.00	7.09	7.09	0.00	0.00	0.00	0.01		
1	Morocco Road	3.58	3.58			3.58	3.58				0.00	○	○
2	New Kigogo Road	2.76	2.76			2.76	2.76				0.00	○	○
3	Missing Link	0.74	0.74			0.75	0.75				0.01	○ (Shaurimoyo st)	○ (Shaurimoyo st)
	TOTAL	62.06	16.08	24.65	30.33	59.57	7.09	24.58	26.58	1.32	-2.49		



THE BASIC DESIGN STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PROJECT	: Primary Road : Secondary Road : Tertiary Road : CIP Project Road (Primary) : CIP Project Road (Secondary) : Public Bus Route
Functional Classification for Area Roads conducted by the JICA Study Team	



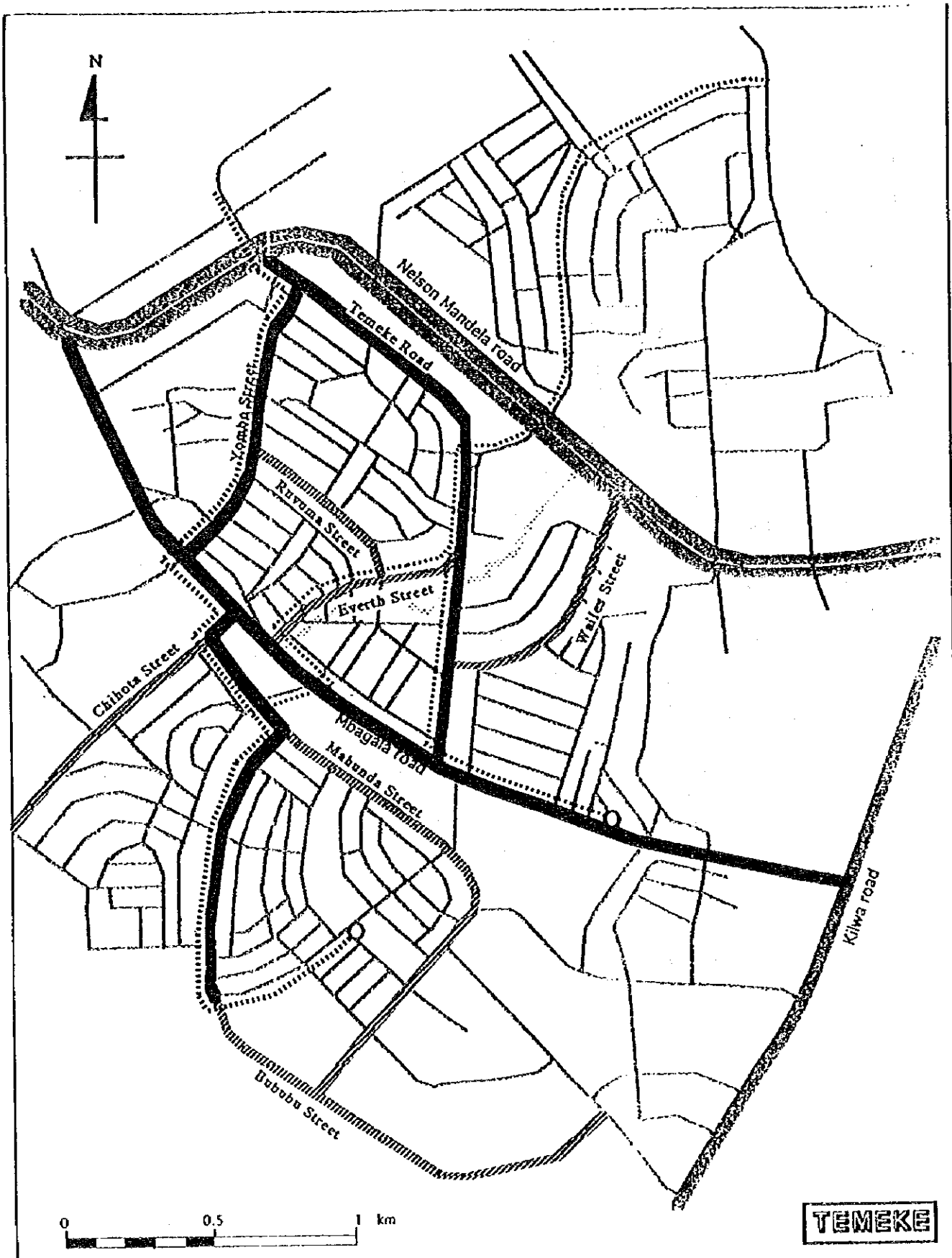
THE BASIC DESIGN STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PROJECT	: Primary Road; : CIP Project Road (Primary)
Functional Classification for Area Roads conducted by the JICA Study Team	: Secondary Road; : CIP Project Road (Secondary); : Tertiary Road; : Public Bus Route



THE BASIC DESIGN STUDY ON
DAR ES SALAAM ROAD DEVELOPMENT PROJECT

Functional Classification for Area Roads
conducted by the JICA Study Team

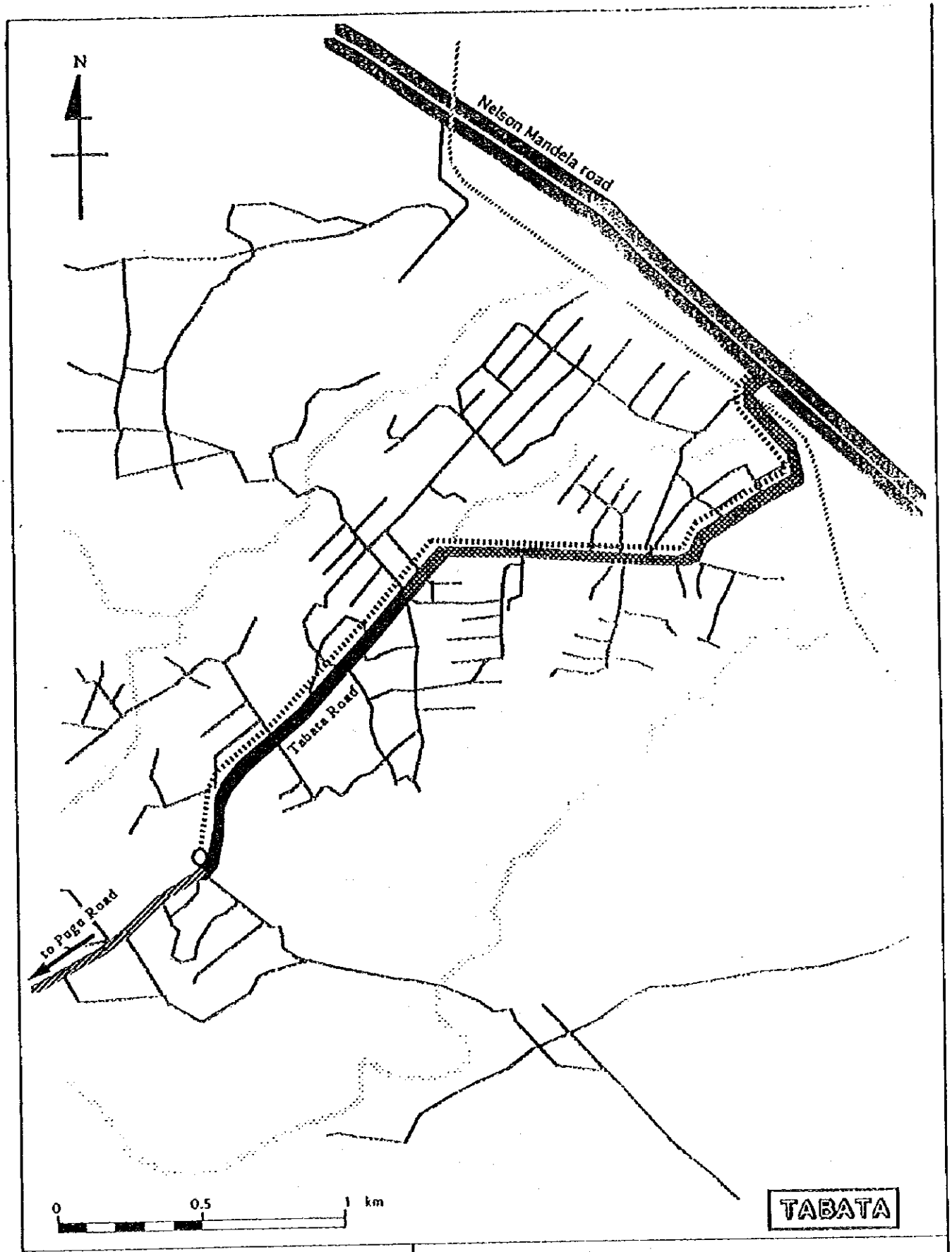
: Primary Road
: Secondary Road
: Tertiary Road
: CIP Project Road (Primary)
: CIP Project Road (Secondary)
: Public Bus Route



THE DASIC DESIGN STUDY ON
DAR ES SALAAM ROAD DEVELOPMENT PROJECT

Functional Classification for Area Roads
conducted by the JICA Study Team

: Primary Road
: Secondary Road
: Tertiary Road
: CIP Project Road (Primary)
: CIP Project Road (Secondary)
: Public Bus Route



THE BASIC DESIGN STUDY ON
DAR ES SALAAM ROAD DEVELOPMENT PROJECT

Functional Classification for Area Roads
conducted by the JICA Study Team

: Primary Road
: Secondary Road
: Tertiary Road
: CIP Project Road (Primary)
: CIP Project Road (Secondary)
: Public Bus Route

Attachment-B Draft Design Standard for Urban Roads

Classification	Design Speed (km/hr)	Design Traffic Volume (pcu/day)	No. of lane	Typical Cross Section									Considerable Pavement Type	
				Recommendable Right of way (m)	Total Road Width (m)	Carriageway (m)	Shoulder (m)	Sidewalk (m)	Planting zone (m)	Center Strip (m)	Dranege System	Utility Space (Recommendable) (m)	Recommendable	Alternative
Trunk Road	60	10,000~	4	45+5	45(Grade separation for future)	3.25 x 4	2.5 x 2	4.0 x 2	4.0 x 2	11.0	L or U-shaped Drain	5		
				35+10	35(Standard)	3.25 x 4	1.5 x 2	4.0 x 2	1.5 x 2	8.0	L or U-shaped Drain	10	A.C.	A.C.
				25	25(Minimum)	3.25 x 4	1.0 x 2	4.0 x 2	-	2.0	L or U-shaped Drain			
Primary Distributer	40~50	4,000~10,000	2	20	20	3.0 x 2	3.0 x 2		-	-	Open Ditch	3	A.C.	A.C./ DBST
Secondary Distributer	40	500~4,000	2	15	15	3.0 x 2	2.0 x 2		-	-	Open Ditch	3	A.C./ DBST	DBST
Tertiary Distributer	20~40	~500	1	12	10	4.0 x 1	1.5 x 2		-	-	Open Ditch	3	Gravel	Gravel

A.C.:Asphaltic concrete
DBST:
Double Bituminous Surface Treatment

Classification	Tanzania Geometric Design Standards								
	Minimum Radius Curve (m)	Superelevation Limits Curve Radious (m)	Maximum Gradient (%)	Minimum Vertical Curve Radius Crest(m)	Minimum Vertical Curve Radius Sag(m)	Minimum Vertical Curve Length (m)	Adequate Camber (%)	Stopping Sight Distance (m)	Passing Sight Distance (m)
Trunk Road	150	1,200	5	14A	16A	-	2.0(A.C.)	75	400
	(150)	(2,000)	(5)	(1,400)	(1,000)	(50)		(75)	(250)
Primary Distributer	100	800	5	10A	12A	-	2.0(A.C.)	55	330
	(100)	(1,300)	(6)	(800)	(700)	(40)	2.5(DBST)	(55)	(200)
Secondary Distributer	75	500	6	6A	8A	-	2.0(A.C.)	40	250
	(60)	(800)	(7)	(450)	(450)	(35)	2.5(DBST)	(40)	(150)
Tertiary Distributer	50	300	6	4A	6A	-	3.0(Gravel)	30	180
	(30)	(500)	(8)	(250)	(250)	(25)		(30)	(100)

Note : ( ) Japanese Road Standard
Minimum Gradient=0.5%
A : algebraic difference in grade(%)

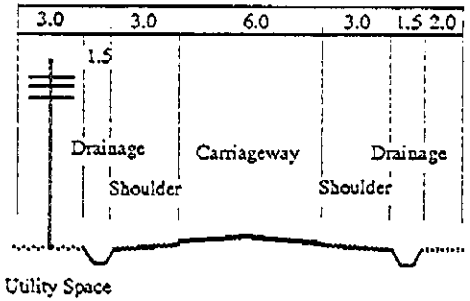
Attachment-B Draft Design Standard for Urban Roads

Classification	Contribution for Public Transport and Non-motorized Traffic		Traffic Safety Measures
	Public Transport	Non-motorized Traffic	
Trunk Road	• Provision of Bus-stops and Bus stations • Reservation for Bus Exclusive / Priority Lane	• Provision of Pedestrian walkway and bicycle way on both side • Pedestrian Crossing with Hump • Pedestrian Crossing with Sign • Pedestrian Crossing with Marking	• Signal Junction with chanelized • Priority Junction with chanelized • Center line marking / Chatter bar • Central strip with turning lane and U-turn lane • Street light at importnat place • Pedestrian and Bicycle way with street trees • Pedestrian crossing with sign,marking • Speed control sign
Primary Distributer	• Bus-stops for Bus Route	• Pedestrian sidewalk space • Pedestrian Crossing with Hump • Pedestrian Crossing with Sign • Pedestrian Crossing with Marking	• Mini Roundabout • Hump,Sign,Lane marking • Bus bay,Sign,Roof,Benti
Secondary Distributer	-	- do -	• Mini Roundabout • Hump,Sign,Lane marking
Tertiary Distiributer	-	- do -	• Hump • Sign • Lane marking

Typical Cross Section

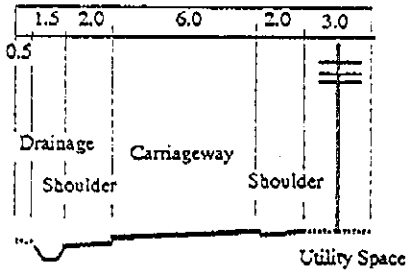
Primary

Right of way Width = 20m



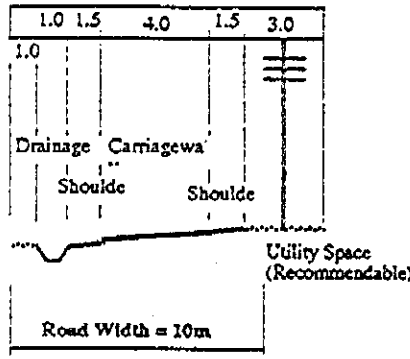
Secondary

Right of way Width = 15m



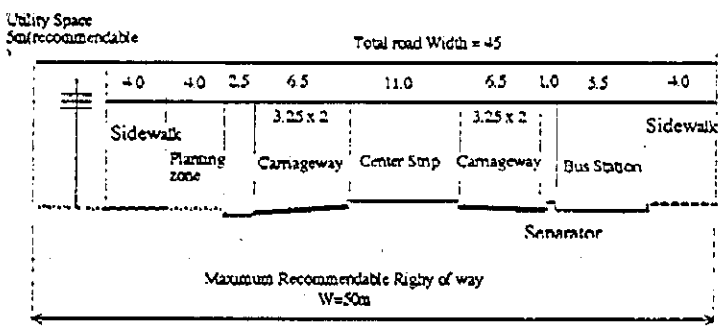
Tertiary

12m (Recommendable Right of way)

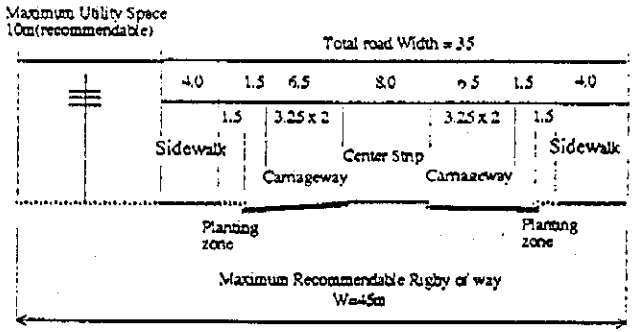


Trunk Road

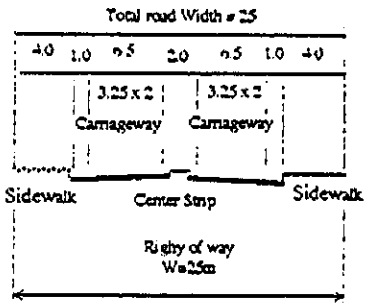
Right of way Width=50m



Right of way Width=45m



Right of way Width =25m



Attachment-C Draft Road Improvement Measures

No.	Road Name	Functional Classification	Road Widening			New Construction	Pavement Rehabilitation	Drainage Rehabilitation	Shoulder Rehabilitation	Provision of Bus-stop	Provision of Bus Station	Realignment work of the existing Railway Truck	Road Safety Measure
			Dual Carriageway	Pedestrian and Bicycle on both side	Center strip with future introduction of Bus Exclusive / Priority lane								
Sinza Area													
1	Road A	Primary					○	○	○	○			○
2	Road B	Secondary					○	○	○				○
3	Road C	Primary					○	○	○				○
4	Road D	Secondary					○	○	○				○
5	Road E	Secondary					○	○	○				○
6	Road F	Secondary					○	○	○				○
7	Road G	Primary					○	○	○	○			○
8	Road H	Secondary					○	○	○				○
9	Road I	Secondary					○	○	○				○
Mwananyamala Area													
10	Bukina Street	Secondary					○	○	○				○
11	Gunta Street	Secondary					○	○	○				○
12	Kinondoni P/School	Secondary					○	○	○				○
13	Iseke Street	Secondary					○	○	○				○
14	Malongwe Street	Secondary					○	○	○				○
15	Malanga Street	Primary					○	○	○				○
16	Inuga Street	Primary					○	○	○				○
17	Malanga to Bukina	Primary					○	○	○				○
18	Karafuu Street	Secondary					○	○	○				○
19	Mwinyi Juma Street	Secondary					○	○	○				
Ilala Area													
20	Lindi Street	Primary					○	○	○	○			○
21	Bungoni Street	Primary					○	○	○				○
22	Pangani Street	Primary					○	○	○				○
23	Tabora Street	Primary					○	○	○				○
24	Morogoro Street	Tertiary					○	○	○				○
25	Utete Street	Secondary					○	○	○				○
26	Arusha Street	Secondary					○	○	○				○
27	Tukuyu Street	Primary					○	○	○				○
28	Shant Shamba Street	Secondary					○	○	○				○
29	Mwanza Street	Tertiary					○	○	○				○
30	Bukoba Street	Tertiary					○	○	○				
Temeke Area													
31	Evereta Street	Secondary					○	○	○	○			○
32	Yombo Street	Primary					○	○	○	○			○
33	Temeke Road	Primary					○	○	○	○			○
34	Mbagala Road	Primary					○	○	○	○			○
35	Waues Road	Secondary					○	○	○				○
36	Ruvuma Street	Secondary					○	○	○				○
37	Chimoa Street	Primary/Secondary					○	○	○	○			○
38	Bububu Street	Primary/Secondary					○	○	○	○			○
39	Mahunda Street	Primary/Secondary					○	○	○	○			
Tabata Area													
40	Tabata Road	Primary/Secondary					○	○	○	○			○
Middle Ring Road													
1	Morocco Road	Trunk	○	○	○		○	○		○	○		○
2	New Kiegoro Road	Trunk	○	○	○		○	○		○		○	○
3	Missing Link	Trunk	○	○		○		○		○		○	○

Attachment-D Draft Pavement Rehabilitation Measures

No.	Road Name	Functional Classification	Existing Daily Heavy Vehicle Traffic	CBR Value (%)	Existing Pavement Type	Existing Pavement Thickness			Result of PSI Survey (Unit : km)					Measures (Unit : km)					
						As(mm)	Base(mm)	Subbase(mm)	1.0~1.3	1.3~2.0	2.0~3.5	3.5~	Total Length	Reconstruction Subgrade~	Reconstruction Base~	Overlay	Maintenance	New Construction	Total Length
Sinza Area									7.93	7.03	1.00	0.00	15.96	7.93	7.03	1.00	0.00	0.00	15.96
1	Road A	Primary	60	6	As/Gravel	20	-	220		0.70	0.40		1.10		0.70	0.40			1.10
2	Road B	Secondary	40		Earth				1.75	0.60	0.20		2.55	1.75	0.60	0.20			2.55
3	Road C	Primary	55	5	Earth	-	-	110	1.27	0.40	0.20		1.87	1.27	0.40	0.20			1.87
4	Road D	Secondary	25		Earth				1.03				1.03	1.03					1.03
5	Road E	Secondary	35		Gravel				0.40	0.44			0.84	0.40	0.44				0.84
6	Road F	Secondary	25		Earth				1.16	0.60			1.76	1.16	0.60				1.76
7	Road G	Primary	55	23,24	Gravel	-	-	-	1.40	3.40	0.20		5.00	1.40	3.40	0.20			5.00
8	Road H	Secondary	25		Earth				0.72	0.40			1.12	0.72	0.40				1.12
9	Road I	Secondary	80	11	Gravel	-	-	100	0.20	0.49			0.69	0.20	0.49				0.69
Mwananyamala Area									4.66	2.30	0.60	0.00	7.56	4.66	2.30	0.60	0.00	0.00	7.56
10	Bukina Street	Secondary	10		Earth				0.63				0.63	0.63					0.63
11	Gutta Street	Secondary	10		Earth				0.63				0.63	0.63					0.63
12	Kinondoni P/School	Secondary	10	7	Earth	-	-	310	0.08	0.40			0.48	0.08	0.40				0.48
13	Iseke Street	Secondary	10		As					0.19			0.19		0.19				0.19
14	Malongwe Street	Secondary	20		As				0.40	0.30	0.60		1.30	0.40	0.30	0.60			1.30
15	Malanga Street	Primary	30		Earth				0.45	0.20			0.65	0.45	0.20				0.65
16	Inga Street	Primary	30	28	As/Earth	-	-	190	1.20	0.36			1.56	1.20	0.36				1.56
17	Malanga to Bukina	Primary	45	14	Earth	-	-	-	0.70				0.70	0.70					0.70
18	Karafuu Street	Secondary	10		As					0.85			0.85		0.85				0.85
19	Mwinyi Juma Street	Secondary	10		Gravel				0.57				0.57	0.57					0.57
Hala Area									2.90	3.47	1.00	0.00	7.37	2.90	3.47	1.00	0.00	0.00	7.37
20	Lindi Street	Primary	15	7	As/Gravel	25	100	275	0.16	0.40	0.80		1.36	0.16	0.40	0.80			1.36
21	Bungoni Street	Primary	25	5	Gravel	-	-	150	0.24	0.40			0.64	0.24	0.40				0.64
22	Pangani Street	Primary	15	15	Gravel	-	-	150	0.40	0.47			0.87	0.40	0.47				0.87
23	Tabora Street	Primary	20		Gravel				0.20	0.25			0.45	0.20	0.25				0.45
24	Morogoro Street	Tertiary	10		Gravel					0.28	0.20		0.48		0.28	0.20			0.48
25	Ctete Street	Secondary	10		Gravel				0.30	0.20			0.50	0.30	0.20				0.50
26	Arusha Street	Secondary	10		Gravel				0.19	0.40			0.59	0.19	0.40				0.59
27	Tukuyu Street	Primary	15		Gravel				1.00	0.10			1.10	1.00	0.10				1.10
28	Sharif Shamba Street	Secondary	10		Gravel				0.34	0.20			0.54	0.34	0.20				0.54
29	Mwanza Street	Tertiary	10		Gravel				0.07	0.20			0.27	0.07	0.20				0.27
30	Bukoba Street	Tertiary	10		Gravel					0.57			0.57		0.57				0.57
Temeke Area									5.42	3.33	2.19	3.55	14.49	5.42	3.33	2.19	3.55	0.00	14.49
31	Evereth Street	Secondary	20	10	Gravel	-	-	300	0.60	0.03			0.63	0.60	0.03				0.63
32	Yombo Street	Primary	20	9	As	50	-	100		0.20	0.80		1.00		0.20	0.80			1.00
33	Temeke Road	Primary	410	13	As	80	-	170				2.05	2.05				2.05		2.05
34	Mbagala Road	Primary	70	8	As/Gravel	-	-	100	1.40	0.20	0.40	1.50	3.50	1.40	0.20	0.40	1.50		3.50
35	Wailes Road	Secondary	20		As					0.60	0.25		0.85		0.60	0.25			0.85
36	Ruvuma Street	Secondary	40		As				0.22	0.20	0.20		0.62	0.22	0.20	0.20			0.62
37	Chinota Street	Primary/Secondary	25	4	Gravel	-	-	100	0.60	0.50			1.10	0.60	0.50				1.10
38	Bububu Street	Primary/Secondary	10	10	Gravel	25	-	250	1.60	0.60	0.42		2.62	1.60	0.60	0.42			2.62
39	Mahunda Street	Primary/Secondary	10	8	As/Gravel	50	-	150	1.00	1.00	0.12		2.12	1.00	1.00	0.12			2.12
Tabata Area									6.10	1.00	0.00	0.00	7.10	6.10	1.00	0.00	0.00	0.00	7.10
40	Tabata Road	Primary/Secondary	40	9	Earth	-	-	55	6.10	1.00			7.10	6.10	1.00				7.10
								Total	27.01	17.13	4.79	3.55	52.48	27.01	17.13	4.79	3.55	0.00	52.48
									51.47%	32.64%	9.13%	6.76%	100.00%	51.47%	32.64%	9.13%	6.76%	0.00%	100.00%
Middle Ring Road																			
1	Morocco Road	Trunk		6,14	As	170 : 130	- : 200	210 : 320				3.58	3.58				3.58		3.58
2	New Kigogo Road	Trunk			As						0.60	2.16	2.76			2.76			2.76
3	Missing Link	Trunk			-								0.00					0.75	0.75
								Total	0.00	0.00	0.60	5.74	6.34	0.00	0.00	2.76	3.58	0.75	7.09
														0.00%	0.00%	38.93%	50.49%	10.58%	100.00%

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF WORKS

Telegrams "UJENZI", D'Salaam.
Telephone 37641/9.
In reply please quote:

P.O.Box 9423,
Dar es Salaam,
TANZANIA

Ref. No. MOW/M.30/459/92

4/9/1996.

Mr. Hisashi Muto,
Chief Consultant,
JICA Study Team for
D'Salaam Road
Development Project
(DRDP).

RE: JICA BASIC DESIGN STUDY FOR THE DSM ROAD DEVELOPMENT PROJECT.

SUB: RESULTS OF FIELD SURVEY

Kindly make reference to your letter of ref. DRDP-03 and dated 29th August, 1996 on the above mentioned subject matter.

We wish to confirm that your draft recommendations on project road length and classification, design standards and improvement measures are generally acceptable to us. However, following comments/observations need to be given further consideration:-

. Functional classification (Attachment A)
It would be more appropriate to classify Morogoro, Mwanza and Bukoba streets in Ilala area as SECONDARY ROADS (and not tertiary roads). These roads were originally paved and the intention here is to keep the roads in their originally designed form (cross section wise).

. Draft design standards (Attachment B)

- Pavement type to be confirmed after analysis of traffic and axle load survey data. In this regard it is strongly requested that a 20 year design life be adopted, but in any case the design life should not be less then 10 years.

- Two columns with heading 'minimum vertical curve radius should be changed to read minimum vertical curve length'. Consequently column with heading 'minimum vertical curve length' should be deleted. After the changes it will be noted that

according to Tanzania design standards the minimum verrtical curve length is expressed as a function of the algebraic difference in grade while according to Japanese standards it is expressed in meters. It would be useful to show how these compare in subsequent stages.

- Minimum camber for gravel roads should be 5% instead of 3% as proposed. This comment is based on our experience on recently constructed gravel roads.

- Passing sight distance according to Japanese standards is low compared to Tanzanian standards. It is therefore recommended to adopt Tanzanian standards in this regard.

- Provision of physical barriers to prevent use of areas reserved for pedestrians and non-motorised traffic by motorised traffic, and concrete posts to protect lighting and traffic light posts from being knocked down by vehicles to be given due consideration during design.

On the other pending issues the Ministry would like to confirm the following:-

. Rail/road level crossing of the proposed missing link of the Middle Ring Road.
It is confirmed that Railway Alternative 2 with reference to your letter DRDP-01 of 21st August, 1996 has been accepted. Further details are as per enclosed letter Ref. No.CE 1/3/2 from the Tanzania Railways Corporation.

. Alignment of the missing link at Karume Memorial Stadium/Cemetery.
Extensive discussions with the responsible institutions are still going on. The final decision will hopefully be communicated to you before end of September, 1996.

Please proceed with the Basic Design on the basis of the foregoing comments/clarification.

Yours Faithfully,

H. G. Urio
For: PRINCIPAL SECRETARY.

(6) 個別建物の算出根拠

THE CITY COMMISSION OF DAR ES SALAAM

ALL COMMUNICATIONS TO BE ADDRESSED TO THE CHAIRMAN

P. O. BOX 9084
TEL. 23551/5

CITY HALL
DAR ES SALAAM
TANZANIA

REF: NO. DCC/VAL/41059/VOL.1[illegible]
72/MMSE

23rd August, 1996

Manager,
DRIMP,
Dar es Salaam.

Dear Sir;

RE: VALUATION OF UNIT RATE PER SQUARE METRE FOR PROPERTIES TO BE COMPENSATED ALONG MORROCO - PUGU ROAD

This has reference to our discussions with you on 20th August, 1996 and your letter with Ref.. No. DRP/15/VOLI/112 dated 22nd August, 1996 over the matter on the reference.

In this, we are pleased to inform you that we have managed to make a random sampling of properties obtained on such a road and thereafter dtermined approximate rates (R.P.S.M) which can be applied in the course of your tentative budget execution.

It should be borne in mind that, the rates declared hereto, are only estmates and could confortably be exceeded for a number of reasons. These rates are those which were prevailing as of 22nd August, 1996.

Should you wish to have any additional information regarding the declared rates, please call at your offices within official working hours.

Attached hereto, please find detailed copies of the stratified properties (termed as Categories A - E) for your next steps.

Yours faithfully,

Mlyambongo M.S.E.
(Valuer)
for:CHAIRMAN, CITY COMMISSION
DAR ES SALAAM

CATEGORY 'A'

TYPE OF PROPERTY:	-	Single storeyed building (with substantial construction specifications).
WALLS:	-	Sand cement blocks, plastered and painted internally tyrolean rendered externally.
ROOF:	-	Gable/monopitched/split-level with corrugated iron sheets covering on timber members purlins and rafters, fascia boards provided.
CEILING:	-	Hard board painted.
FLOOR:	-	Sand cement screeded.
WINDOWS:	-	Hardwood framing fitted with glass panels or louvre.
DOORS:	-	Hardwood framing and shutters fitted with mortice locksets.
FIXTURES AND FITTINGS:	-	Ceramic wall tiles, hand wash basins, water heaters built-in wardrobes, wall mirrors, ceiling fans, kitchen sinks, built-in cupboards etc.
SERVICES:	-	Water, telephone and electricity. Drainage to septic tank/main sewer.
PLOT AND SITEWORKS:	-	Substantial Block wall fence with metallic tages. Concrete pavements etc.
GENERAL REMARKS:	-	Good quality construction, workmanship and availed with easy accessibility.
RATE PER SQUARE METRE:	-	(i) Commercial building Tshs. 80,000/= - 180,000/=.
		(ii) Residential building Tshs. 60,000/= - 140,000/=.

CATEGORY 'B'

TYPE OF PROPERTY:	-	Single storey swahili building (old fashion moderate quality of construction spesfication).
WALLS:	-	Sand cement blocks smoothly plastered, rendered and painted both internally and externally.
ROOF:	-	Double pitched, monopitched or flyover roof covered with corrugated iron sheets on bush pole rafters and purlins.
CEILING:	-	Hard board painted.
FLOOR:	-	Sand cement screed.
DOORS:	-	Hardwood framing and shutters fitted with mortice lock set.
WINDOWS:	-	Provided with burglar proof bars, wiremesh and timber louvred shutters all on a hard wood timber frame.
SERVICES:	-	Water and electricity from public mains while a pit latrine is in an outbuilding.
GENERAL REMARKS:	-	Moderate quality construction workmanship, normaly six roomed with a middle corridor and a small open front verandah and availled with easy accessibility.
RATE PER SQUARE METRE:	-	(i) Commercial building Tshs. 50,000/= - 120,000/= (ii) Residential building Tshs. 45,000/= - 90,000/=.

CATEGORY 'C'

TYPE OF PROPERTY:	-	Single storey building constructed of traditional building materials.
WALLS:	-	Mud and wattle/bush poles or wooden timber members.
ROOF:	-	Gable/Monopitched covered with old corrugated iron sheets or tin remains (debes) on bush poles.
CEILINGS:	-	Not in place.
FLOOR:	-	Compacted earth.
DOORS:	-	Soft wood frames, fitted with tin remains or galvanised corrugated iron sheets shutter.
WINDOWS:	-	Wooden frames, fitted with burglar proof bars.
SERVICES:	-	Water from public mains.
GENERAL REMARKS:	-	Property locally constructed of low quality workmanship, materials and poor finishing.
RATE PER SQUARE METRE:	-	Commercial building Tshs. 20,000/= - 60,000/= Residential building Tshs. 15,000/= - 50,000/=.

CATEGORY 'D'

TYPE OF PROPERTY: - Reinforced concrete flats with high standards of workmanship.

WALLS: - Reinforced concrete columns and beams with concrete block infills. Internally plastered and painted while externally are tyrolean rendered.

ROOF: - Reinforced concrete slab smoothly plastered and painted.

FLOOR: - Concrete slab with terrazzo chips finish.

DOORS: - Hardwood frames with highly polished hard wood shutters. External doors bear metallic grills in addition.

WINDOWS: - Hard wood frames fitted with anti-burglar metal bars, wiremesh and louvred glass.

SERVICES: - Water, telephone and electricity connected to the public mains. Drainage to septic tank/main sewer.

FIXTURES AND FITTINGS: - Ceramic wall tiles, aluminium sinks, hand wash basins, water heaters, built-in wardrobes, wall mirrors, ceiling fans, built-in cupboards western type W/C etc.

GENERAL REMARKS: - Accessible situated in good location and materials of good quality.

RATE PER SQUARE METRE: - Single storey Flat

(i) Commercial Tshs. 150,000/- - 300,000/-

(ii) Residential Tshs. 120,000/- - 250,000/-

Two Floors and above

(i) Commercial Tshs. 180,000/- - 400,000/-

(ii) Residential Tshs. 150,000/- - 340,000/-

CATEGORY 'E'

TYPE OF PROPERTY:	-	Single storeyed framed structure with high standards of workmanship.
WALLS:	-	Reinforced columns and beams with sand cement block infills. Internally plastered and painted; externally plastered and tyrolean rendered.
FLOOR:	-	Sand cement reinforced concrete base finished with sand cement screeding and terrazo chips to some areas.
DOORS:	-	External ones: Metallic grills. Internal ones: Hardwood frames with a mixture of Mninga panels and flush type shutters.
WINDOWS:	-	Hardwood frames, fitted with antiburglar metal bars with glass sash panels or louvre glasses.
SERVICES:	-	Water, telephone and electricity connected from public mains.
GENERAL REMARKS:	-	This comprises massive structures like Factory, Garage, Petrol Stations, workshops, warehouse buildings etc.
RATE PER SQUARE METRE:	-	Tshs. 120,000/= - 300,000/=.

収集資料リスト

地域	東アフリカ	調査団名称	ダルエスサラーム道路開発計画基本設計調査	調査の種類	道路開発基本設計	作成部課	
国名	タンザニア連合共和国			現地調査期間	1996. 7. 31 ～1996. 9. 8	担当者氏名	武藤 寿

番号	資料の名称	版型	ページ数	オリジナル/コピー別	部数	収集先名称又は発行機関
1	The Rolling Plan and Farward Budget for Tanzania For the Period 1994/95-1996/97, Volume 1	A4	138	コピー	1	Ministry of Finance
2	Staff Appraisal Report, TANZANIA, Second Integrated Road project, March 17, 1994	A4	117	コピー	1	Ministry of Works
3	Integrated Road Project (IRP), Monthly Progress Report No.57, February 1996	A4	25	コピー	1	Ministry of Works(Mow)
4	IRP, Road Financing and Disbursement in Tanzania	A4	24	コピー	1	〃
5	Sector Statistics (1990-1994), Ministry of Works, Communication sand transport	A4	33	コピー	1	〃
6	Standard Specifications for Highway Construction, 1974	A4	377	コピー	1	〃
7	Road Note 29, A guide to the structural design of pavementsfor new roads, TRRL	A4	36	コピー	1	〃
8	Road Note 31, A guide to the structural design of bitumen-surfaced roads in tropical and subtropical countries, TRRL,	A4	25	コピー	1	〃
9	Road Safety Programme, Final Report, 22nd July 1996	A4	127	コピー	1	〃
10	Urban Transport Policy Action Plan, Draft Report, November 1995	A4	73	コピー	1	〃
11	Community Infrastructure Programme (CIP) for Dar es Salaam,Preliminary 5 year Programme Proposal, March 1995,	A4	30	コピー	1	City Commuission(DCC)
12	CIP for Dar es Salaam, Appendix 1-Settlement Selection, Feburary 1995	A4	42	コピー	1	DCC
13	CIP for Dar es Salaam, Appendix 3-An Appraisal of Infrastructure Levels	A4	39	コピー	1	〃
14	CIP for Dar es Salaam, Appendix 4-Alternative Strategies for Project Implementation	A4	69	コピー	1	〃
15	CIP for Dar es Salaam, Two Year Programme Proposal, July 1996	A4	87	コピー	1	〃
16	Routes and Bus stops/terminals Survey Report in the City Region of DSM,	A4	55	コピー	1	〃
17	Urban Mobility and Non-motorised Transport Pilot Project, Eastern and Southern Africa , Phase II, Temeke Ward 14 Design Report, Oct, 1996	A4	35	コピー	1	〃
18	Map of Community Facilities	A1	1	コピー	1	〃
19	Progress Report No.4 Phase I, Dar es Salaam-Kibiti Road Project, Feb, 1996	A4	66	コピー	1	Mow
20	Tanzam Highway Feasibility & Pavement Management Study, Draft Final Report, Nov. 1990	A4	327	コピー	1	〃
21	住民意向アンケート調査結果	A4	72	オリジナル	1	DCC
22	地質・路床調査結果	A4	90	オリジナル	1	MOW
23	交通量調査結果	A4	50	オリジナル	1	University of tanzania
24	水道埋設図	A1	6	コピー	1	NUWA
25	電話線埋設図	A1	91	コピー	1	TTCL
26	電気配線図	A1	4	コピー	1	TANESCO
27	現地建設業者見積	A4	17	オリジナル	1	UNICO
28	〃	A4	9	オリジナル	1	MECCO
29	〃	A4	14	オリジナル	1	COSPIAN

資料B　技術資料

B-1　舗装構造及び路床強度調査結果

B-2　地質調査結果

B-3　道路インベントリー調査結果

B-4　交通量調査結果

B-5　中央環状道路幅員の見直し

B-6　舗装設計耐用年数に係わる経済評価

B-7　工事数量の詳細

B--1　舗装構造及び路床強度調査結果

Design CBR's Results.

Calculations for Design CBR will be done according to the subsoil investigation results, using the Manual for Asphalt Pavement (Japan Road Association).

The Section CBR is determined based on CBR values of individual locations within the road section by the formula below.

Section CBR value = Average CBR value of individual locations - (CBRmax - CBRmin) / C

where C is a coefficient for assuming the standard deviation and it depends on the number of available values as follows.

Values of C for Calculating Section CBR Value

Number of values available	2	3	4	5	6	7	8	9	10 or more
C	1.41	1.91	2.24	2.48	2.67	2.83	2.96	3.08	3.18

The design CBR value is obtained from the follwowing table.

Relationship between Section CBR and Design CBR

Design CBR	Section CBR
2	2 or more, but under 3
3	3 or more, but under 4
4	4 or more, but under 6
6	6 or more, but under 8
8	8 or more, but under 12
12	12 or more, but under 20
20	20 or more.

Calculations.

Sinza Area

Road A	CBR= 6 %
Road C	CBR= 5 %
Road G	CBR= 23 % , 24 %
Road I	CBR= 11 %

Section CBR = 13.8 - (24 - 5) / 2.48
= 6.13 % → 6

Mwananyamala Area

Kinondoni P / School	CBR= 7 %
Iringa Street	CBR= 28 %
Malanga to Bukina	CBR= 4 %

Section CBR = 16.67 - (28 - 7) / 1.91
= 5.68 % → 6

Ilala Area

Lindi Street	CBR= 7 %
Bungoni Street	CBR= 5 %
Pangani Street	CBR= 15 %

Section CBR = 9.0 - (15 - 5) / 1.91
= 3.76 % → 4

Temeke Area

Evereth Street	CBR= 10 %
Yombo Street	CBR= 9 %
Temeke Road	CBR= 13 %
Mbagala Road	CBR= 8 %
Chihota Street	CBR= 4 %
Bububu Street	CBR= 10 %
Mahunda Street	CBR= 8 %

Section CBR = 8.86 - (13 - 4) / 2.83
= 5.68 % → **6**

Morocco Road

CBR= 6 % , 14 %

Section CBR = 10.0 - (14 - 6) / 1.41
= 4.3 % → **4**

New Kigogo Road

CBR= 12 % , 8 % , 4 % , 5 % , 10 % , 12 %

Section CBR = 8.5 - (12 - 4) / 2.67
= 5.5 % → **6**

Sinza Area

Road Name		C.B.R Value %		Design C.B.R %
		Tests	Calculations	
1	Road A	6		6
2	Road B		6	6
3	Road C	5		5
4	Road D		6	6
5	Road E		6	6
6	Road F		6	6
7	Road G	23 / 24		20
8	Road H		6	6
9	Road I	11		8

Mwananyamala Area

Road Name		C.B.R Value %		Design C.B.R %
		Tests	Calculations	
10	Bukina Street		6	6
11	Guita Street		6	6
12	Kinondoni P/School	7		6
13	Iseke Street		6	6
14	Malongwe Street		6	6
15	Malanga Street		6	6
16	Iringa Street	28		20
17	Malanga to Bukina	14		12
18	Karafuu Street		6	6
19	Mwinyi Juma Street		6	6

Ilala Area

Road Name		C.B.R Value %		Design C.B.R %
		Tests	Calculations	
20	Lindi Street	7		6
21	Bungoni Street	5		4
22	Pangani Street	15		12
23	Tabora Street		4	4
24	Morogoro Street		4	4
25	Utete Street		4	4
26	Arusuha Street		4	4
27	Tukuyu Street		4	4
28	Sharif Shamba Street		4	4
29	Mwanza Street		4	4
30	Bukoba Street		4	4

Temeke Area

Road Name		C.B.R Value %		Design C.B.R %
		Tests	Calculations	
31	Evereth Street	10		8
32	Yombo Street	9		8
33	Temeke Road	13		12
34	Mbagala Road	8		8
35	Wailes Road		6	6
36	Ruvuma Street		6	6
37	Chihota Street	4		4
38	Bububu Street	10		8
39	Mahunda Street	8		8

Tabata Area

Road Name		C.B.R Value %		Design C.B.R %
		Tests	Calculations	
40	Tabata Street	9		8

Morocco Road

Road Name		C.B.R Value %		Design C.B.R %
		Tests	Calculations	
1	Morocco Road		4	4

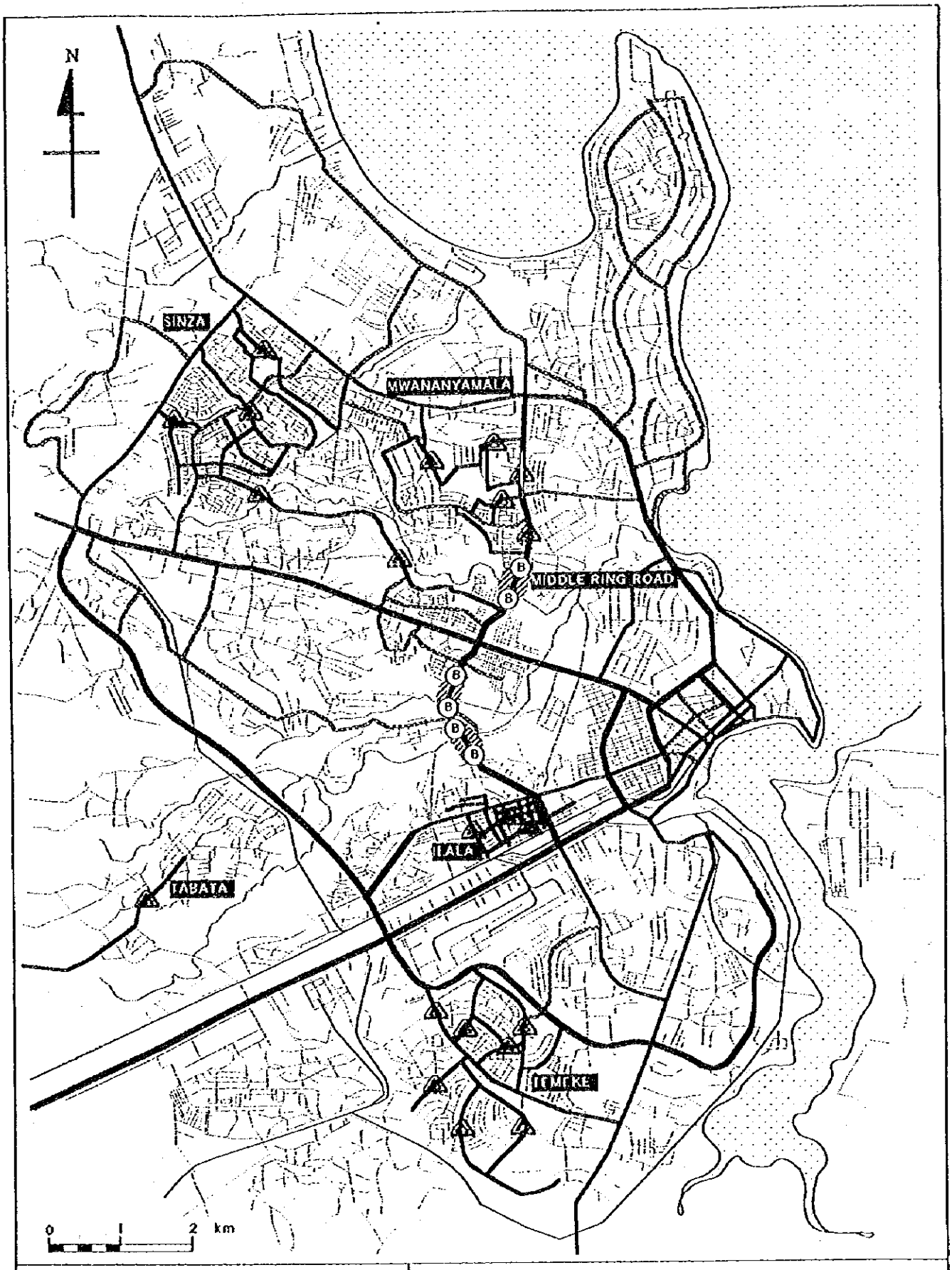
New Kigogo Road

Road Name		C.B.R Value %		Design C.B.R %
		Tests	Calculations	
2	New Kigogo Road		6	6

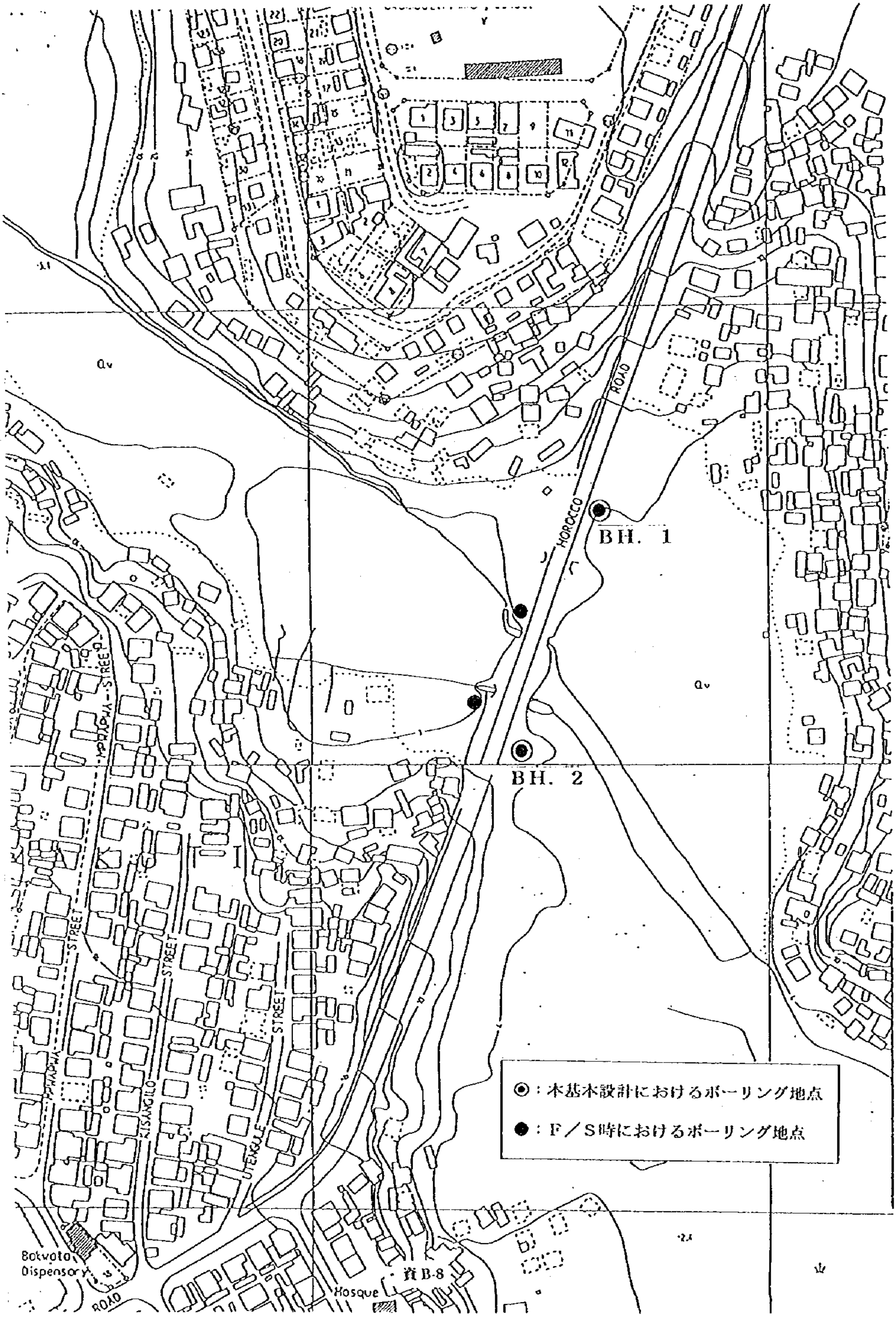
Pavement Rehabilitation Measures

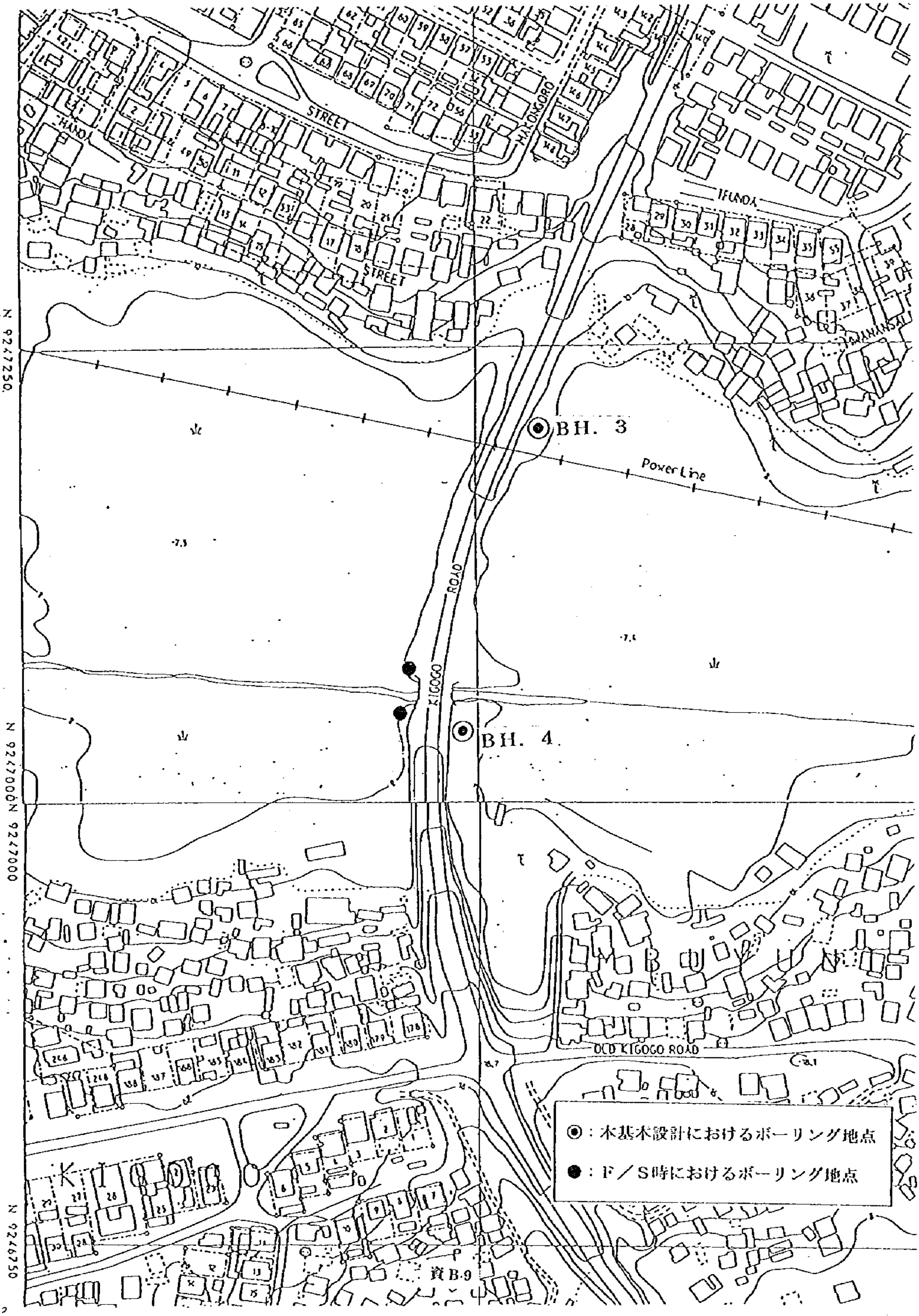
No.	Road Name	Functional Classification	Existing Daily Heavy Vehicle Traffic	CBR Value (%)	Existing Pavement Type	Existing Pavement Thickness			Result of PSI Survey (Unit : km)					Measures (Unit : km)					
						As(mm)	Base(mm)	Subbase(mm	1.0~1.3	1.3~2.0	2.0~3.5	3.5~	Total Length	Reconstruction Subgrade~	Reconstruction Base~	Overlay	Maintenance	New Construction	Total Length
Sinza Area									7.93	7.03	1.00	0.00	15.96	7.93	7.03	1.00	0.00	0.00	15.96
1	Road A	Primary	60	6	As/Gravel	20	-	220		0.70	0.40		1.10		0.70	0.40			1.10
2	Road B	Secondary	40		Earth				1.75	0.60	0.20		2.55	1.75	0.60	0.20			2.55
3	Road C	Primary	55	5	Gravel	-	-	110	1.27	0.40	0.20		1.87	1.27	0.40	0.20			1.87
4	Road D	Secondary	25		Earth				1.03				1.03	1.03					1.03
5	Road E	Secondary	35		Gravel				0.40	0.44			0.84	0.40	0.44				0.84
6	Road F	Secondary	25		Eaarth				1.16	0.60			1.76	1.16	0.60				1.76
7	Road G	Primary	55	23,24	Gravel	-	-	-	1.40	3.40	0.20		5.00	1.40	3.40	0.20			5.00
8	Road H	Secondary	25		Earth				0.72	0.40			1.12	0.72	0.40				1.12
9	Road I	Secondary	80	11	Gravel	-	-	100	0.20	0.49			0.69	0.20	0.49				0.69
Mwananyamala Area									4.66	2.30	0.60	0.00	7.56	4.66	2.30	0.60	0.00	0.00	7.56
10	Bukina Street	Secondary	10		Earth				0.63				0.63	0.63					0.63
11	Guita Street	Secondary	10		Earth				0.63				0.63	0.63					0.63
12	Kinondoni P/School	Secondary	10	7	Earth	-	-	310	0.08	0.40			0.48	0.08	0.40				0.48
13	Iseke Street	Secondary	10		As					0.19			0.19		0.19				0.19
14	Majongwe Street	Secondary	20		As				0.40	0.30	0.60		1.30	0.40	0.30	0.60			1.30
15	Malanga Street	Primary	30		Earth				0.45	0.20			0.65	0.45	0.20				0.65
16	Iringa Street	Primary	30	28	As/Earth	-	-	190	1.20	0.36			1.56	1.20	0.36				1.56
17	Malanga to Bukina	Primary	45	14	Earth	-	-	-	0.70				0.70	0.70					0.70
18	Karafuu Street	Secondary	10		As					0.85			0.85		0.85				0.85
19	Mwinyi Juma Street	Secondary	10		Gravel				0.57				0.57	0.57					0.57
Ilala Area									2.90	3.47	1.00	0.00	7.37	2.90	3.47	1.00	0.00	0.00	7.37
20	Lindi Street	Primary	15	7	As/Gravel	25	100	275	0.16	0.40	0.80		1.36	0.16	0.40	0.80			1.36
21	Bungoni Street	Primary	25	5	Gravel	-	-	150	0.24	0.40			0.64	0.24	0.40				0.64
22	Pangani Street	Primary	15	15	Gravel	-	-	150	0.40	0.47			0.87	0.40	0.47				0.87
23	Tabora Street	Primary	20		Gravel				0.20	0.25			0.45	0.20	0.25				0.45
24	Morogoro Street	Tertiary	10		Gravel					0.28	0.20		0.48		0.28	0.20			0.48
25	Ulete Street	Secondary	10		Gravel				0.30	0.20			0.50	0.30	0.20				0.50
26	Arusha Street	Secondary	10		Gravel				0.19	0.40			0.59	0.19	0.40				0.59
27	Tukuyu Street	Primary	15		Gravel				1.00	0.10			1.10	1.00	0.10				1.10
28	Sharif Shamba Street	Secondary	10		Gravel				0.34	0.20			0.54	0.34	0.20				0.54
29	Mwanza Street	Tertiary	10		Gravel				0.07	0.20			0.27	0.07	0.20				0.27
30	Bukoba Street	Tertiary	10		As/Gravel					0.57			0.57		0.57				0.57
Temeke Area									5.42	3.33	2.19	3.55	14.49	5.42	3.33	2.19	3.55	0.00	14.49
31	Everett Street	Secondary	20	10	Gravel	-	-	300	0.60	0.03			0.63	0.60	0.03				0.63
32	Yombo Street	Primary	20	9	As	50	-	100		0.20	0.80		1.00		0.20	0.80			1.00
33	Temeke Road	Primary	410	13	As	80	-	170				2.05	2.05				2.05		2.05
34	Mbagala Road	Primary	70	8	As/Gravel/Earth	-	-	100	1.40	0.20	0.40	1.50	3.50	1.40	0.20	0.40	1.50		3.50
35	Wailes Road	Secondary	20		As					0.60	0.25		0.85		0.60	0.25			0.85
36	Ruvuma Street	Secondary	40		As				0.22	0.20	0.20		0.62	0.22	0.20	0.20			0.62
37	Chihota Street	Primary/Secondary	25	4	Gravel	-	-	100	0.60	0.50			1.10	0.60	0.50				1.10
38	Bububu Street	Primary/Secondary	10	10	As/Gravel	25	-	250	1.60	0.60	0.42		2.62	1.60	0.60	0.42			2.62
39	Mahunda Street	Primary/Secondary	10	8	As/Gravel	50	-	150	1.00	1.00	0.12		2.12	1.00	1.00	0.12			2.12
Tabata Area									6.10	1.00	0.00	0.00	7.10	6.10	1.00	0.00	0.00	0.00	7.10
40	Tabata Road	Primary/Secondary	40	9	Earth	-	-	55	6.10	1.00			7.10	6.10	1.00				7.10
								Total	27.01	17.13	4.79	3.55	52.48	27.01	17.13	4.79	3.55	0.00	52.48
									51.47%	32.64%	9.13%	6.76%	100.00%	51.47%	32.64%	9.13%	6.76%	0.00%	100.00%
Middle Ring Road																			
1	Morocco Road	Trunk		6.14	As	170 / 130	- / 200	210 / 320				3.58	3.58				3.58		3.58
2	New Kigogo Road	Trunk			As						0.60	2.16	2.76			2.76			2.76
3	Missing Link	Trunk			-								0.00					0.75	0.75
								Total	0.00	0.00	0.60	5.74	6.34	0.00	0.00	2.76	3.58	0.75	7.09
														0.00%	0.00%	38.93%	50.49%	10.58%	100.00%

B-2　地質調査結果

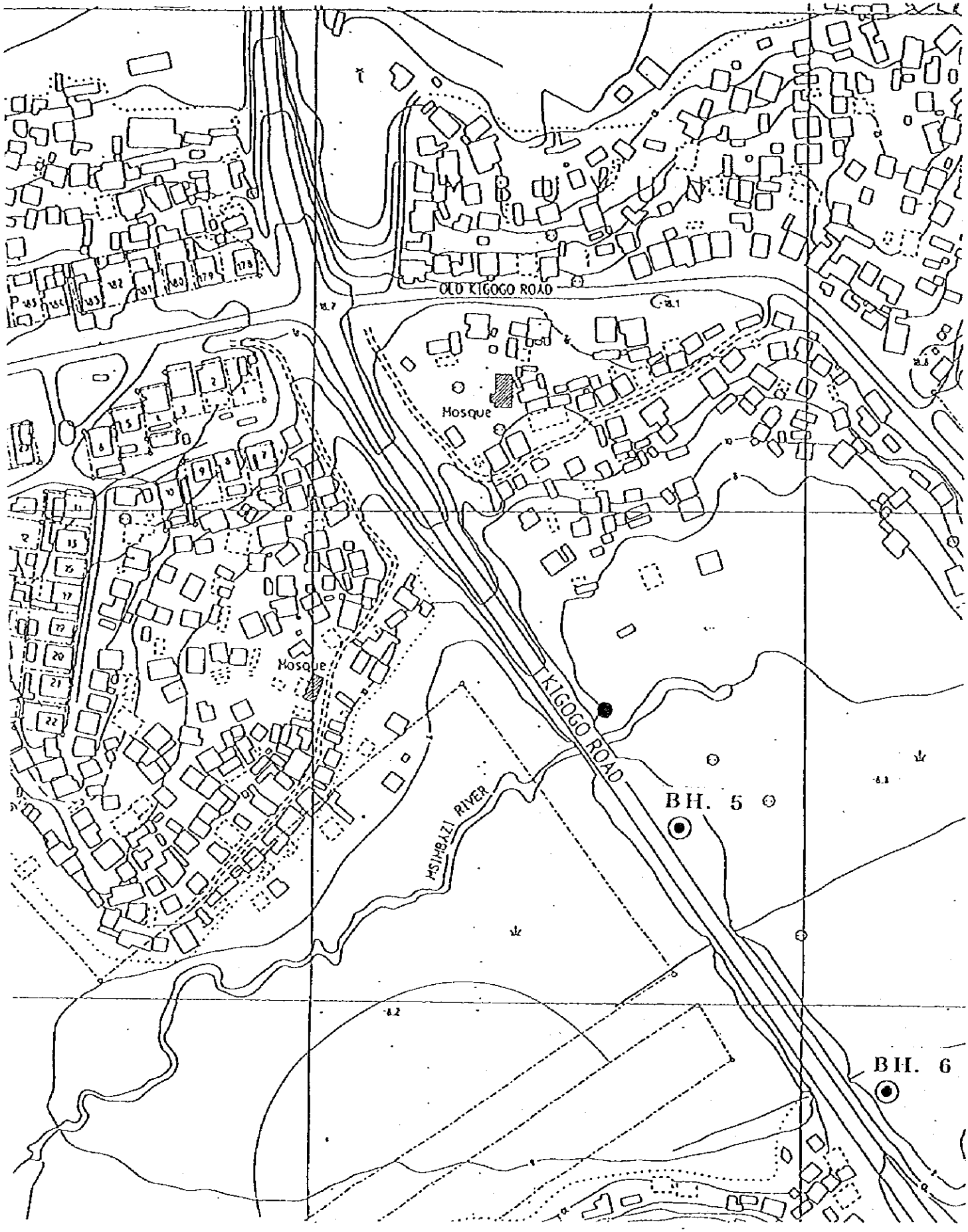


THE BASIC DESIGN STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PROJECT	——— : Objective Road
Location map for Geotechnical Investigation	△ : Sampling point of subgrade (21 points) Ⓑ : Boring point (6 points)


BH. 1
BH. 2
MOROCCO ROAD
STREET
KISANGILO STREET
STREET
Bokvota Dispensory
ROAD
Mosque
◎：本基本設計におけるボーリング地点
●：F／S時におけるボーリング地点



N 9247250
N 9247000
N 9247000
N 9246750
STREET
STREET
BH. 3
BH. 4
Power Line
KIGOGO
ROAD
OLD KIGOGO ROAD
◉：本基本設計におけるボーリング地点
●：F／S時におけるボーリング地点



◉：本基本設計におけるボーリング地点

●：F／S時におけるボーリング地点

Appendix **Detailed Test Results of Borehole Borring**

Location NO.		Morocco Road														
Borehole NO.		B H.1														
Depth (m)		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
Standard Penetration		0	1	2	0	3	4	3	2	2	2	4	7	9	14	17
Natural Moisture Content (%)		50.2	48.6	32.1	33.3	33	21.7	37.8	37.6	41.2	30.9	30.9	38.8	26.2	21.9	8.8
Specific Gravity		2.6	2.66	2.66	2.65.	2.62	2.64	2.62	2.5	2.38	2.24	2.66	2.39	2.56	2.66	2.49
Grain-Size Analysis	76 mm															
	38 mm															
	19 mm															
	9.5 mm															
	4.76 mm			100	100	100	100	100	100	100	100	100	100	100	100	100
	2.36 mm	100	100	99	99	99	98	98	98	98	97	97	99	94	99	99
	1.18 mm	99	99	4	97	98	95	97	96	97	96	96	98	93	97	98
	0.6 mm	96	97	81	88	86	80	90	94	95	94	92	94	88	93	93
	0.425 mm	94	95	70	75	69	62	82	87	89	91	87	88	81	88	88
	0.3 mm	92	94	61	61	53	46	74	84	87	88	80	81	73	80	80
	0.212 mm	91	92	47	43	38	29	64	87	83	84	69	70	59	66	65
	0.15 mm	90	91	37	28	28	18	55	77	79	81	59	59	47	53	52
	0.075 mm	89	90	22	17	18	11	40	74	76	78	45	50	36	42	40
Atterberg Limits	L.L.	65	65	33	25	27	NP	30	30	49	50	47	48	44	46	37
	P.L.	28	31	17	19	20	NP	23	21	26	27	22	19	20	19	18
	P.I.	37	34	16	6	7	NP	7	9	23	23	25	29	24	27	19
Moisture Density (t / m3)		1.788	1.868	1.798	1.864	1.883	1.992	1.742	1.789	1.758	1.702	1.712	1.713	1.902	1.888	1.587
Unconfined Compression																
Triaxial Shear																
Consolidation																
Soil Classification		CH	CH	SC	SM-SC	SM	SW-SM	SM	CL	CL	CL	SC	CL	SC	SC	SC

Appendix **Detailed Test Results of Borehole Borring**

Location NO.		Morocco Road														
Borehole NO.		B H.2														
Depth (m)		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
Standard Penetration		0	3	1	3	6	19	40	27	36	48	35	36	35	33	34
Natural Moisture Content (%)		33.4	30	28.5	27.1	18.1	15.8	16.5	21.2	22.9	13.1	15.2	18.6	14.9	20	15.5
Specific Gravity		2.556	2.556	2.578	2.578	2.578	2.623	2.601	2.601	2.556	2.556	2.56	2.64	2.53	2.62	2.58
Grain-Size Analysis	76 mm															
	38 mm															
	19 mm															
	9.5 mm															
	4.76 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	2.36 mm	99	97	99	85	99	90	90	70	85	89	91	99	99	99	99
	1.18 mm	97	95	95	76	96	86	83	59	72	77	83	96	96	94	90
	0.6 mm	84	87	71	61	79	82	75	52	67	54	77	85	73	75	64
	0.425 mm	69	74	48	50	64	78	70	49	58	42	74	74	54	58	47
	0.3 mm	58	59	28	41	51	76	67	46	54	36	71	63	38	43	36
	0.212 mm	49	43	15	30	41	73	64	44	50	32	69	54	28	37	29
	0.15 mm	39	32	9	24	35	67	67	41	46	29	66	48	21	24	25
	0.075 mm	29	24	7	18	29	50	53	37	41	25	61	40	14	19	22
Atterberg Limits	L.L.	31	26	NP	38	38	31	30	26	23	23	22	25	22	21	24
	P.L.	16	18	NP	20	19	19	16	13	16	14	16	17	16	16	17
	P.I.	15	8	NP	18	19	12	14	13	7	9	6	8	6	5	7
Moisture Density (t / m3)		1.781	1.739	1.855	2.056	2.094	2.182	2.167	2.204	2.231	2.263	2.03	2.162	1.829	1.988	2.066
Unconfined Compression																
Triaxial Shear																
Consolidation																
Soil Classification		SC	SM-SC	SM	SC	SC	SC	CL	SC	SM-SC	SC	ML-CL	SM-SC	SM-SC	SM-SC	SM-SC

Appendix **Detailed Test Results of Borehole Borring**

Location NO.		New Kigogo Road														
Borehole NO.		B H.3														
Depth (m)		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
Standard Penetration		30	4	13	19	24	13	10	10	13	24	30	24	27	30	28
Natural Moisture Content (%)		10	14.9	17	17.7	14.9	17.6	19.6	17.2	18	17	17.7	16.9	18	17.5	17.8
Specific Gravity		2.609	2.625	2.606	2.606	2.65	2.643	2.6	2.623	2.336	2.623	2.623	2.623	2.623	2.623	2.623
Grain-Size Analysis	76 mm															
	38 mm															
	19 mm															
	9.5 mm															
	4.76 mm	100				100	100						100			100
	2.36 mm	99	100	100	100	99	99	100	100	100	100	100	99	100	100	99
	1.18 mm	96	96	96	94	93	96	97	96	94	95	97	95	99	94	96
	0.6 mm	73	72	80	75	72	78	86	78	69	74	82	74	83	69	74
	0.425 mm	53	50	64	58	56	59	72	60	45	53	62	52	61	48	52
	0.3 mm	38	34	52	43	43	42	53	45	29	37	40	34	42	33	38
	0.212 mm	28	24	41	31	33	26	30	32	19	23	24	21	27	25	28
	0.15 mm	21	17	35	24	26	16	15	25	14	15	16	15	19	21	21
	0.075 mm	14	11	29	19	20	8	6	17	9	9	10	10	13	16	15
Atterberg Limits	L.L.	23	NP	36	31	23	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
	P.L.	15	NP	16	15	16	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
	P.I.	8	NP	20	16	7	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Moisture Density (t / m3)		1.983	1.738	1.733	2.222	2.134	2.11	1.751	1.781	2.136	2.136	2.055	2.046	2.045	2.046	2.047
Unconfined Compression				*												
Triaxial Shear				*												
Consolidation				*												
Soil Classification		SM-SC	SM	SC	SC	SM-SC	SW-SM	SW-SM	SM	SW-SM	SW-SM	SW-SM	SW-SM	SM	SM	SM

Appendix **Detailed Test Results of Borehole Borring**

Location NO.		New Kigogo Road														
Borehole NO.		B H.4														
Depth (m)		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
Standard Penetration		3	14	13	18	27	27	25	25	22	18	24	23	26	29	30
Natural Moisture Content (%)		13.3	16.8	39.2	20.5	26.6	16	15.5	19.7	21.3	17.6	20.2	19.5	16.3	17	18.7
Specific Gravity		2.607	2.6	2.623	2.647	2.623	2.623	2.623	2.6	2.625	2.669	2.6	2.623	2.623	2.623	2.623
Grain-Size Analysis	76 mm															
	38 mm															
	19 mm															
	9.5 mm															
	4.76 mm			100	100			100	100	100	100	100	100			100
	2.36 mm	100	100	99	99	100	100	99	99	99	98	99	99	100	100	99
	1.18 mm	98	96	90	96	98	97	97	95	95	93	95	95	97	98	94
	0.6 mm	78	79	64	85	84	85	84	72	78	76	69	78	78	84	70
	0.425 mm	56	64	47	74	65	71	69	55	62	60	46	62	53	66	46
	0.3 mm	41	51	36	63	48	56	58	41	47	45	29	47	39	47	29
	0.212 mm	30	41	29	54	30	40	49	23	33	31	16	36	28	30	16
	0.15 mm	23	35	25	48	19	29	39	12	25	23	9	27	22	19	9
	0.075 mm	15	29	22	40	10	19	29	7	18	17	6	21	14	11	5
Atterberg Limits	L.L.	20	45	40	36	NP	25	16	NP	21	25	NP	26	20	NP	NP
	P.L.	16	18	23	20	NP	17	13	NP	16	17	MP	17	16	NP	NP
	P.I.	4	27	17	16	NP	8	3	NP	5	8	NP	9	4	NP	NP
Moisture Density (t / m3)		1.933	2.101	2.034	2.004	1.928	1.994	1.971	1.95	1.745	1.643	1.685	1.66	1,73	1.75	1.774
Unconfined Compression																
Triaxial Shear																
Consolidation																
Soil Classification		SM-SC	SC	SC	SC	SW-SM	SM-SC	SM	SW-SM	SM-SC	SM-SC	SW-SM	SC	SM-SC	SW-SM	SW-SM

Appendix **Detailed Test Results of Borehole Borring**

Location NO.		New Kigogo Road														
Borehole NO.		B H.5														
Depth (m)		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
Standard Penetration		4	12	6	26	18	4	6	10	18	23	23	22	18	18	21
Natural Moisture Content (%)		19.7	16	26	17.1	18.2	19.6	17.9	17.5	16	15.5	14	13.7	15.2	16.6	12
Specific Gravity		2.623	2.6	2.07	2.623	2.623	2.6	2.623	2.646	2.646	2.623	2.634	2.669	2.534	2.669	2.623
Grain-Size Analysis	76 mm															
	38 mm															
	19 mm															
	9.5 mm															
	4.76 mm	100				100	100		100						100	
	2.36 mm	99	100	100	100	99	99	100	99	100	100	100	100	100	99	100
	1.18 mm	93	99	99	98	94	92	98	91	96	97	95	94	98	96	99
	0.6 mm	75	98	98	94	74	68	92	58	84	87	75	79	88	85	92
	0.425 mm	61	94	91	86	57	49	83	37	72	76	59	65	75	73	82
	0.3 mm	49	89	82	76	43	35	72	26	62	65	47	51	63	60	71
	0.212 mm	38	77	72	58	31	25	60	19	50	49	34	38	51	46	56
	0.15 mm	30	60	64	40	24	19	49	15	40	37	26	29	42	35	44
	0.075 mm	19	35	54	27	18	12	32	10	30	28	19	21	33	27	30
Atterberg Limits	L.L.	24	31	41	28	20	NP	26	21	29	26	20	21	30	26	28
	P.L.	21	16	18	15	13	NP	16	15	15	15	14	15	13	13	13
	P.I.	3	15	23	13	7	NP	10	6	14	11	6	6	17	13	15
Moisture Density (t / m3)		1.681	2.01	1.884	2.083	1.988	1.943	2.005	2.081	2.104	2.133	2.12	2.13	2.055	2.027	2.018
Unconfined Compression					*											
Triaxial Shear		*			*											
Consolidation		*			*											
Soil Classification		SM	SC	SL	SC	SM-SC	SW-SM	SC	SW-SM	SC	SC	SM-SC	SM-SC	SC	SC	SC

Appendix **Detailed Test Results of Borehole Borring**

Location NO.		New Kigogo Road														
Borehole NO.		B H.6														
Depth (m)		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
Standard Penetration		5	20	19	21	12	5	19	14	18	27	35	44	50	35	30
Natural Moisture Content (%)		23.6	15.3	15.8	16.3	17.5	19.5	15	14.6	15.7	15.3	12.8	14.6	15.7	18	20
Specific Gravity		2.623	2.623	2.623	2.647	2.624	2.624	2.623	2.67	2.623	2.623	2.6	2.6	2.534	2.534	2.534
Grain-Size Analysis	76 mm															
	38 mm															
	19 mm															
	9.5 mm															
	4.76 mm		100	100			100		100	100				100	100	100
	2.36 mm	100	98	98	100	100	99	100	97	98	100	100	100	99	99	97
	1.18 mm	99	92	94	99	91	91	98	94	95	97	97	97	97	96	96
	0.6 mm	95	71	83	96	58	68	86	81	83	89	88	86	86	86	94
	0.425 mm	91	54	71	91	38	48	74	69	70	82	78	76	75	78	91
	0.3 mm	86	42	59	81	27	35	61	58	59	73	68	66	65	69	88
	0.212 mm	80	31	46	68	19	24	48	45	48	59	56	55	54	59	84
	0.15 mm	72	26	38	56	16	18	38	34	40	44	45	45	44	53	81
	0.075 mm	56	21	30	43	14	12	26	26	31	28	32	33	33	41	78
Atterberg Limits	L.L.	41	38	31	31	32	21	28	30	38	34	38	35	39	39	60
	P.L.	17	13	15	16	16	14	14	15	18	14	16	13	15	16	22
	P.I.	24	25	16	15	16	7	14	15	20	20	22	22	24	23	38
Moisture Density (t / m3)		1.919	2.118	2.11	2.021	2.03	2.027	2.24	2.218	2.106	2.097	2.108	2.156	2.114	2.075	2.035
Unconfined Compression			*		*											
Triaxial Shear			*		*											
Consolidation			*		*											
Soil Classification		CL	SC	SC	SC	SC	SM-SC	SC	SC	SC	SC	SC	SC	SC	SC	CH

Soft Ground Judgement.

N.value calculations determined using JH calculation standards.

(JH.=Japan Highway public corporation.)

軟弱地盤の区分

地盤区分	土層・土質 区分			記号	wn (%)
泥炭質地盤	高有機質土 (Pt)	ピート (Pt)	繊維質の高有機質土		300以上
		黒泥 (MK)	分解の進んだ高有機質土		300～200
粘土質地盤	粘性土 (F)	有機質土 (O)	塑性図A線の下 有機質		200～100
		火山灰質粘性土 (V)	塑性図A線の下。火山灰質二次たい積粘性土		
		シルト (M)	塑性図A線の下 ダイレクンシー大		100～50
		粘性土 (C)	塑性図A線の上またはその付近。ダイレクンシー小		
砂質地盤	砂質土 (S)	砂質土 (SF)	74μ以下15～50%		50～30
		砂 (S)	74μ以下15%未満		30以下

軟弱地盤の目安

地盤	泥炭質地盤及び粘土質地盤		砂質地盤
層厚	10m未満	10m以上	—
N値	4以下	6以下	10以下
qu (kg/cm²)	0.6以下	1.0以下	—
qc (kg/cm²)	8以下	12以下	40以下

注) ① 表中で「qc」はオランダ式2重管コーン貫入試験におけるコーン指数である。
② 特にN値10以下あるいはqc 40以下の砂地盤では，地震時の流動化が問題となる。

Judgement (From Borehole Borring data)

BH.1 .....From surface	Inorganic cilts	2m	N.value	0～1
	Clayey sands	3m	N.value	0～3
	Silty sands	1m	N.value	4
	Inorganic cilts	5m	N.value	2～4

Above mentioned 11m was judged soft ground.

BH.2 .....From surface	Clayey sands	1m	N.value	0
	Silty sands	2m	N.value	1～3
	Clayey sands	2m	N.value	3～6

Above mentioned 5 m was judged soft ground.

From BH.3 to BH.6 was calculated un-soft ground.

Assumed settling volume is calculated by the below formula.

$$Sc = \Sigma H * Cc / (1 + eo) * \log 10 (Po + \Delta P / Py)$$

$$t = (T * d * d) / C \quad \ldots\ldots$$

Layer Constitution

Layes Name	Thickness	N.value	Wn (%)	Gs	γ t (g / cm3)	WL (%)	qu (kg / cm2)	Cc	Py (Kg / cm2)
1st layer	2m	0	50.2	2.60	1.788	65	0.063	0.502	0.126
2nd layer	3m	0	33.3	2.65	1.864	25	0.208	0.333	0.417
3rd layer	1m	4	21.7	2.64	1.992	NP	0.500	0.217	1.000
4th layer	5m	2	41.2	2.38	1.758	49	0.325	0.412	0.650

Calculation of Yield stress of consolidation (Py) or Initial void ration (eo).

Layes Name	qu (Kg / Cm2)	Pc = 2qu (Kg / cm2)	Wn (%)	Gs	eo = Wn * Gs * 1 / 100
1st layer	0.063	0.126	50.2	2.60	1.305
2nd layer	0.208	0.417	33.3	2.65	0.882
3rd layer	0.500	1.000	21.7	2.64	0.573
4th layer	0.325	0.650	41.2	2.38	0.981

Calculation of Total Deflection.

Layes Name	H	Cc	1+eo	H * (Cc / 1+eo)	Po	∠P	Pc	Po+∠P	(Po+∠P) / Pc	log(Po+∠P) / Pc
1st layer	200	0.502	2.305	43.557	0.179	0.743	0.126	0.922	7.873	0.896
2nd layer	300	0.330	1.882	53.081	0.637	0.743	0.417	1.380	3.309	0.520
3rd layer	100	0.217	1.573	13.795	1.016	0.743	1.000	1.759	1.759	0.245
4th layer	500	0.412	1.981	103.988	1.556	0.743	0.650	2.299	3.537	0.549

Layes Name	Sc (Cm)
1st layer	39
2nd layer	28
3rd layer	3
4th layer	57

Total settlement volume 127 Cm

Consolidation Time calculation.

Infered coefficient of consolidation.

Layer Name	WL (%)	Cv (Cm2 / Sec)
1st layer	65	0.0157
2nd layer	25	0.0157
3rd layer	NP	--
4th layer	49	0.0055

Relation of Degree of consolidation and Time.

U (%)	10	20	30	40	50	60	70	80	90	95	100
T	0.008	0.031	0.071	0.126	0.196	0.287	0.403	0.567	0.848	1.310	∞

Upper section. $t = (250 * 250) / 1,356.5 = 46$ T

Lower section. $t = (250 * 250) / 475.2 = 132$ T

Namber of Days to Reach 90% Degree of consolidation.

Upper section. U90 = 0.846 * 46 =38.9 day

Lower section. U90 = 0.846 * 132 =111.7 day

Appendix Deteiled Test Results of Subgrade Investigation

TEMEKE Area

Name of Road		Temeke Road	Everet Road	Mahunda Road	Bububu Road	Chihota Street	Yombo Street	Mbagala Road
Specific Gravity		2.692	2.597	2.623	2.65	2.632	2.627	2.613
Grain-Size Analysis	76 mm							
	38 mm							
	19 mm							
	9.5 mm							
	4.76 mm							
	2.36 mm	100	100	100	100	100	100	100
	1.18 mm	99	98	99	99	98	99	99
	0.6 mm	74	66	81	69	77	72	89
	0.425 mm	46	39	60	54	56	49	73
	0.3 mm	30	22	41	36	39	31	56
	0.212 mm	19	11	26	21	25	17	37
	0.15 mm	12	6	15	12	15	10	20
	0.075 mm	5	3	6	4	7	4	9
Atterberg Limits	L.L.	NP	NP	NP	NP	NP	NP	NP
	P.L.	NP	NP	NP	NP	NP	NP	NP
	P.I.	NP	NP	NP	NP	NP	NP	NP
Natural Moisture Content (%)		1.3	3.7	3.1	4.3	3.1	3.5	3.9
Compaction	M.D.D. (t/m3)	1.795	1.735	1.77	1.785	1.759	1.712	1.809
	O.M.C. (%)	15.6	12.8	6.5	9.7	16.5	9.2	10.2
CBR	M.D.D. (t/m3)	1.705	1.648	1.682	1.696	1.671	1.626	1.719
	4-days Soaked (%)	13	10	8	10	4	9	8
Soil Classification		A-1-b	A-1-b	A-3	A-3	A-3	A-1-b	A-3

Appendix Deteiled Test Results of Subgrade Investigation

ILALA Area

Name of Road		Bungoni Street	Pangani Street	Lindi Street				
Specific Gravity		2.647	2.591	2.593				
Grain-Size Analysis	76 mm							
	38 mm							
	19 mm							
	9.5 mm							
	4.76 mm							
	2.36 mm	100	100	100				
	1.18 mm	98	99	98				
	0.6 mm	63	71	67				
	0.425 mm	33	41	38				
	0.3 mm	19	27	23				
	0.212 mm	11	16	12				
	0.15 mm	8	9	6				
	0.075 mm	4	4	3				
Atterberg Limits	L.L.	NP	NP	NP				
	P.L.	NP	NP	NP				
	P.I.	NP	NP	NP				
Natural Moisture Content (%)		5.4	4.4	3.9				
Compaction	M.D.D. (t/m3)	1.783	1.773	1.765				
	O.M.C. (%)	12.5	9.3	13.3				
CBR	M.D.D. (t/m3)	1.694	1.684	1.677				
	4-days Soaked (%)	5	15	7				
Soil Classification		A-1-b	A-1-b	A-1-b				

Appendix Deteiled Test Results of Subgrade Investigation

TABATA Area

Name of Road		Tabata Road						
Specific Gravity		2.597						
Grain-Size Analysis	76 mm							
	38 mm							
	19 mm							
	9.5 mm							
	4.76 mm	100						
	2.36 mm	99						
	1.18 mm	96						
	0.6 mm	72						
	0.425 mm	53						
	0.3 mm	38						
	0.212 mm	26						
	0.15 mm	18						
	0.075 mm	10						
Atterberg Limits	L.L.	NP						
	P.L.	NP						
	P.I.	NP						
Natural Moisture Content (%)		7						
Compaction	M.D.D. (t/m3)	1.85						
	O.M.C. (%)	10.2						
CBR	M.D.D. (t/m3)	1.758						
	4-days Soaked (%)	9						
Soil Classification		A-3						

Appendix

Deteiled Test Results of Subgrade Investigation
SINZA Area

Name of Road		Road (A)	Road (C)	Road (G-1)	Road (G-2)	Road (I)		
Specific Gravity		2.507	2.535	2.492	2.536	2.569		
Grain-Size Analysis	76 mm							
	38 mm							
	19 mm							
	9.5 mm							
	4.76 mm							
	2.36 mm	100	100	100	100	100		
	1.18 mm	98	98	98	98	96		
	0.6 mm	83	82	80	87	77		
	0.425 mm	69	68	61	74	61		
	0.3 mm	56	57	46	64	49		
	0.212 mm	45	48	33	53	38		
	0.15 mm	36	43	25	44	31		
	0.075 mm	27	38	17	33	23		
Atterberg Limits	L.L.	29	25	22	29	25		
	P.L.	13	16	15	16	15		
	P.I.	16	9	7	13	10		
Natural Moisture Content (%)		9.7	10.1	9.4	18.4	10		
Compaction	M.D.D. (t / m3)	2.01	1.95	1.95	1.959	2.018		
	O.M.C. (%)	9.4	9.5	10.5	10.5	9.3		
CBR	M.D.D. (t / m3)	1.91	1.853	1.852	1.861	1.917		
	4-days Soaked (%)	6	5	23	24	11		
Soil Classification		A-2-6	A-4	A-2-4	A-2-6	A-2-4		

Appendix

Deteiled Test Results of Subgrade Investigation
MWANANYAMALA Area

Name of Road		Morocco (1)	Morocco (2)	Iringa Street	Malanga to A.H	Kinondoni P / S		
Specific Gravity		2.421	2.5	2.604	2.631	2.468		
Grain-Size Analysis	76 mm							
	38 mm							
	19 mm							
	9.5 mm							
	4.76 mm							
	2.36 mm	100	100	100	100	100		
	1.18 mm	97	96	98	99	98		
	0.6 mm	82	79	81	81	83		
	0.425 mm	66	65	61	58	69		
	0.3 mm	53	55	45	38	56		
	0.212 mm	42	45	31	21	42		
	0.15 mm	34	39	21	12	29		
	0.075 mm	25	32	11	5	20		
Atterberg Limits	L.L.	37	49	NP	NP	29		
	P.L.	20	23	NP	NP	15		
	P.I.	17	26	NP	NP	14		
Natural Moisture Content (%)		17.9	14.2	7.1	2.7	10.3		
Compaction	M.D.D. (t / m3)	1.947	1.937	2.105	1.777	1.993		
	O.M.C. (%)	11.9	10	11.5	14.3	9.5		
CBR	M.D.D. (t / m3)	1.85	1.84	1.999	1.688	1.893		
	4-days Soaked (%)	6	14	28	14	7		
Soil Classification		A-2-6	A-2-7	A-2-4	A-3	A-2-6		

Appendix

Summary of Borrow Pit Test Result

Name of Borrow Pit		Manyema	Kunduchi	Pugu Majae				
Specific Gravity		2.607	2.639	2.59				
Grain-Size Analysis	76 mm							
	38 mm			100				
	19 mm			96				
	9.5 mm			82				
	4.76 mm			69				
	2.36 mm	100	100	61				
	1.18 mm	98	99	50				
	0.6 mm	77	84	45				
	0.425 mm	54	66	41				
	0.3 mm	36	52	38				
	0.212 mm	23	41	34				
	0.15 mm	18	36	31				
	0.075 mm	14	32	27				
Atterberg Limits	L.L.	22	41	39				
	P.L.	19	19	18				
	P.I.	3	22	21				
Natural Moisture Content (%)		5.9	2.6	5.4				
Compaction	M.D.D. (t/m3)	1.899	1.956	2.078				
	O.M.C. (%)	10.6	10.8	9.2				
CBR	M.D.D. (t/m3)	1.804	1.858	1.974				
	4-days Soaked (%)	9	11	7				
Triaxial Shear Test		C=60K/m2 O=29	C=115K/m2 O=13					
Soil Classification		A-2-4	A-2-7	A-2-6				