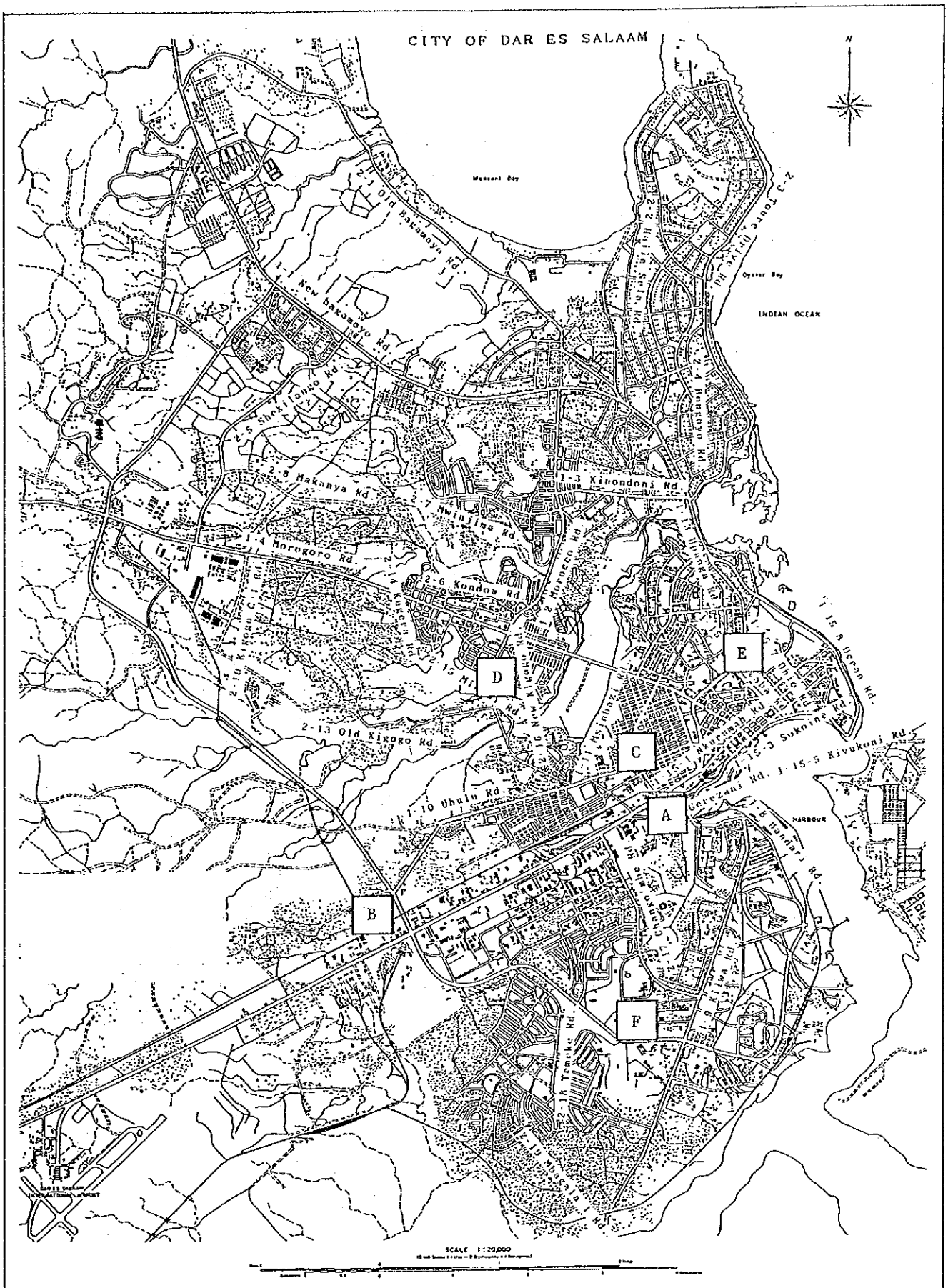
CHAPTER 8: EXISTING ROAD MAINTENANCE AND OPERATION

LIST OF APPENDICES



Appendix 8-1-1:

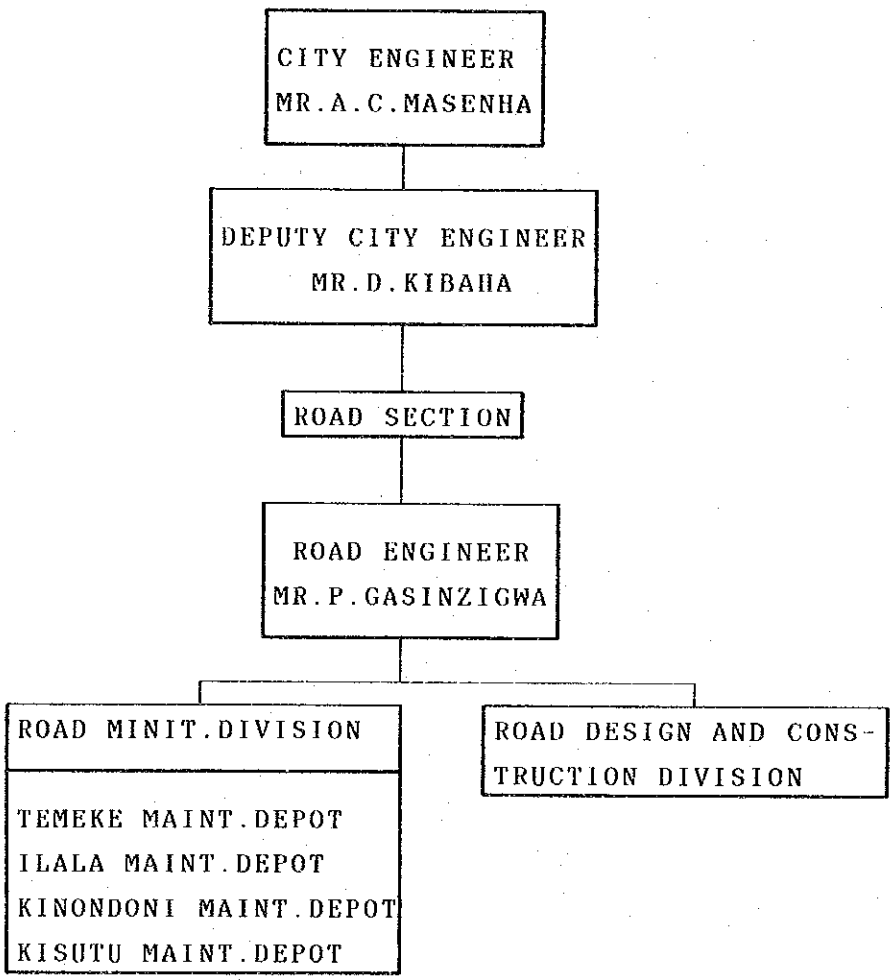
Location Map of Site Depots

A. Pugu Road main depot
B. Port Access depot
C. Ilala garden depot
D. Kigogo Road Depot
E. Kisutu depot
F. Temeke depot

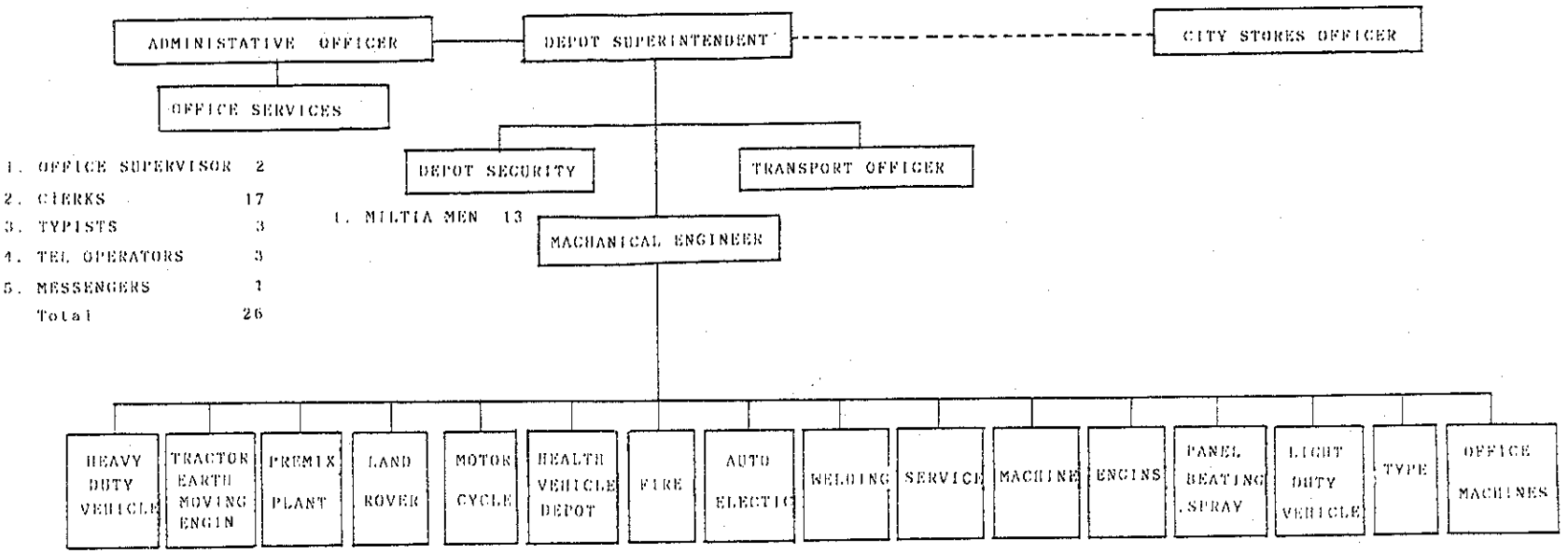
Appendix 8-1-2: Organization Chart of Road Section

DAR ES SALAAM COUNCIL

ORGANIZATION CHART FOR ROAD SECTION



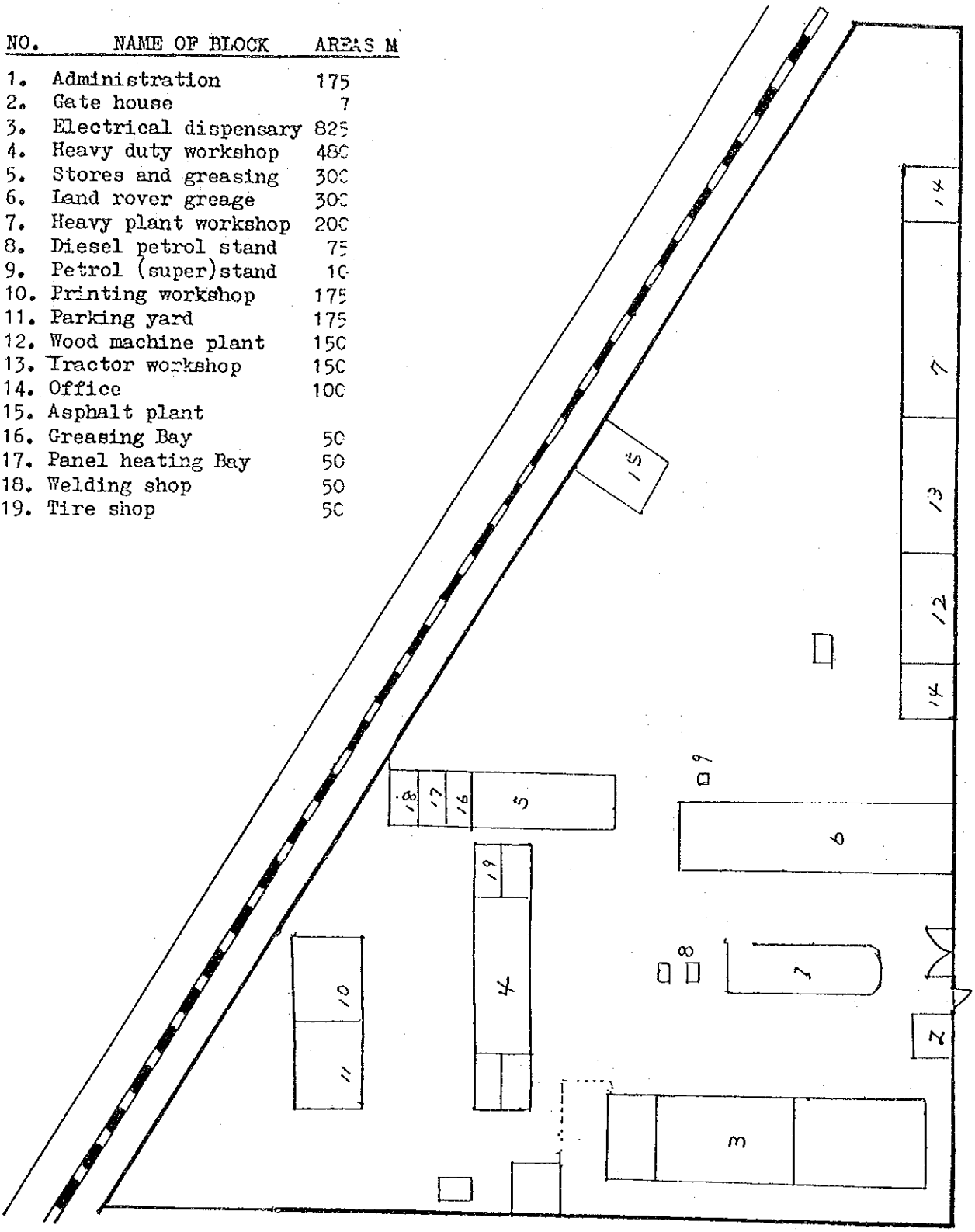
Appendix 8-1-3: Operational Organization Chart and Number of Staff in Main Depot



1. FOR NAN		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 . ASST.FORMAN		1	1	0	1	0	1	0	1	1	0	0	0	0	0	1	0
3. TECHNICANS	i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.	ii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5.	iii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.	iv	0	1	0	0	0	4	1	0	1	0	0	0	0	0	0	0
7.ASS.TECHNICIANS		2	2	3	3	0	2	1	1	3	0	1	1	0	0	0	0
8.TECH.APPRENTICS	i	5	3	0	5	0	0	1	2	2	3	0	0	0	3	1	0
9.	ii	6	7	0	14	1	10	1	2	5	0	0	0	2	5	2	0
10.	iii	6	0	0	1	0	0	0	2	0	0	0	0	0	1	0	0
Total		20	15	4	22	2	17	5	9	13	4	2	2	3	9	5	2

Appendix 8-2-1: Layout of Main Depot

NO.	NAME OF BLOCK	AREAS M
1.	Administration	175
2.	Gate house	7
3.	Electrical dispensary	825
4.	Heavy duty workshop	480
5.	Stores and greasing	300
6.	Land rover greage	300
7.	Heavy plant workshop	200
8.	Diesel petrol stand	75
9.	Petrol (super)stand	10
10.	Printing workshop	175
11.	Parking yard	175
12.	Wood machine plant	150
13.	Tractor workshop	150
14.	Office	100
15.	Asphalt plant	
16.	Greasing Bay	50
17.	Panel heating Bay	50
18.	Welding shop	50
19.	Tire shop	50



Appendix 8-2-2: List and Condition of Road Maintenance Equipment Owned by DCC

NO.	Name of equipment	Name of maker	Capacity	Serial No.	Location	Condition	Remarks
1	Vibrating roller	Sakai	10T	30491	main depot	workable	Need ser
2	Motor grader	Caterpiller	120G	87T 05985	ditto	unworka-ble	Need ove haul
3	Motor grader	Komatsu	600R	14016	ditto	ditto	accident
4	Bull dozer	Caterpiller	D4D	net clear	dumping site	ditto	scrap
5.	Bull dozer	Caterpiller	D4E	ditto	ditto	ditto	ditto
6	Bull dozer	Caterpiller	D4D	ditto	gomvu village	ditto	ditto
7.	Bull dozer	Caterpiller	D4D	ditto	R.E coat	ditto	ditto
8.	Bull dozer	Caterpiller	D3B	ditto	Dumping site	ditto	ditto
9.	Salco maskin A.B	Salco	Not clear	ditto	main depot	ditto	ditto
10.	Salco maskin A.B	Salco	ditto	ditto	Ilala garden	ditto	ditto
11.	Salco maskin A.B	Salco	ditto	ditto	main depot	ditto	ditto
12.	Mixabatch	Good-win	ditto	ditto	Ilala garden	ditto	ditto
13.	Mixabatch	Good-win	ditto	ditto	ditto	ditto	ditto
14.	Wheel loader	J.C.B.	ditto	83.98671J	main depot	ditto	ditto
15.	Wheel loader	Mitsubishi	ditto	WS3-35093	Pugu port	ditto	need ove haul
16.	Steel roller	Bong	ditto	not clear	main depot	ditto	scrap
17.	Steel roller	Not clear	ditto	ditto	ditto	ditto	ditto
18.	Tampactor	Bong	ditto	ditto	ditto	ditto	ditto
19.	Salco maskin A.B	Salco	ditto	ditto	ditto	ditto	ditto
20.	Asphalt plant	P.arker road	ditto	ditto	ditto	ditto	ditto
21.	Asphalt finisher	Blawknox	PF 65B	ditto	ditto	ditto	ditto
22.	Tyre roller	Hyster	250G	ditto	ditto	ditto	ditto
23.	Dozer shovel	International	not clear	ditto	ditto	ditto	ditto
24.	Engine generator	Yanmar	TS130C	ditto	ditto	ditto	ditto

Appendix 8-2-3: List of Tipper Owned by DCC

NO	Register No.	Manufacture Years	Chassis No.	Mailage	Location	Consition	Remarks
1	S.M. 928	Not clear	Not Clear	Not clear	Main depot	Workable	Unworkab need serv
2	S.M. 929	"	"	"	"	"	"
3	930	"	"	"	"	"	"
4	931	"	"	"	"	"	"
5	289	1985	TXA 45 DYTN	"	"	"	"
6	262	1984	TXD55YTN	"	"	"	"
7	149	"	"	"	"	"	"
8	251	1985	TXD55YTN	"	"	"	"
9	252	Not clear	Not clear	"	"	"	"
10	1025	"	"	"	"	"	"
11	1024	"	"	"	"	"	"
12	STG 3369	"	"	"	"	"	"
13	3379	"	"	"	"	"	"
14	2458	"	"	"	"	"	Not unwor
15	S.M. 176	1980	"	"	"	"	"
16	TZ 70337	Not clear	"	"	"	"	"
17	TZ 58209	Not clear	" "	"	"	"	workable service
18	STG1408	"	"	"	"	"	not workal
19	1410	"	"	"	"	"	"
20	STE 5	"	"	"	"	"	"
21	S.M 1028	"	"	"	"	"	workable
22	STG 419	"	"	"	"	"	not workal
23	STA 294	"	"	"	"	"	"
24	ST 9078	"	"	"	"	"	"

Workable tip er are 14units. There are need service before start job
Unworkable tipper are 10units. There are look like scrap.

Appendix 8-2-4: Summary of Hand Tools and Layout of Site Depots

NO	NAME OF DEPOT	ILALA	KISUTU	TEMEKE	KIGOGO
1.	Areas (m^2) Approximately	5200m^2	None	None	748m^2
2.	Building				
	A. Store (m^2)	60	None	16m^2	32m^2
	B. Administration	40	8m^2	16m^2	12m^2
	C. Others				139m^2
3.	Manpower				
	A. Foreman	2		1	1
	B. Assistant foreman	1		1	1
	C. Stores clerks	1		2	1
	D. General clerks	2			2
	E. Headmen	6		5	2
	F. Laboures	21		26	27
	Total	33		35	34
4.	Manual Equipment				
	A. Shoves	4	6	3	5
	B. Hoe	4	4	0	3
	C. Cutter hoe	2	2	0	1
	D. Fork	3	4	3	2
	E. Wheel barrows	4	2	22	3
	F. Rakes	2	1	0	0
	G. Grass slashers	0	6	0	0
	H. Pangas	0	10	0	0
	Remarks	Ilala site is shared with the garden, which also belongs to D.C.C.	The office have been borrowed from drainage section, the area around belongs to malaria control project.	The office have been borrowed from the Nursey School.	The site is shared with C.C.U office.

Appendix 8-2-5: List of Tools in Main Depot

NO.	NAME OF TOOLS	TOTAL	LOCATION	WORKING	NOT WORKING	REMERK
1.	Are welding machine	5	Welding Shop	2	2	need repair
			Heavy duty Workshop	1		need repair
2.	Gas welding equipment	1	Welding Shop	1		good condition
3.	Engine Welding machine	1	Welding Shop	1		need repair
4.	Trolley Tacks	8	Land rover		6	
			Workshop	1		need repair
			Heavy duty Workshop	1		need repair
5.	Hydraulic Tacks	6	Land rover Workshop	1	4	need repair
			Heavy duty Workshop	1		need repair
6.	Manual winch	1	Land rover Workshop	1		need repair
7.	Mechanical Tacks	6	Land rover Workshop	1	4	
			Heavy duty Workshop	1		
8.	Valve facing machine	1	Engine shop		1	need repair
9.	Disk grinder machine	3	Engine shop	3		need repair
10	Manual press	1	Engine shop	1		need repair
11	Hand drilling machine	3	Machine shop	3		need repair
12	Torgue arench	2	Engine shop	1	1	
13	Tool Box Set	12				only one quarter is remaining in each box

CHAPTER 9: IMPROVEMENT OF ROAD MAINTENANCE SYSTEN

LIST OF APPENDICES

Appendix 9-1: Penetration Method for Asphalt Pavement

Aggregate	t=3cm	t=3cm	Remark
Crushed stone (40-30)			
Asphalt			
Crushed stone (30-20)	3.0cu.m	2.4cu.m	Per 100sq.m
Asphalt	220-230l	160-180l (Emul.)	-do-
Crushed stone (20-10)		1.1cu.m	-do-
Asphalt		120-140l (Emul.)	-do-
Crushed stone (10- 5)	1.0cu.m	0.7cu.m	-do-
Asphalt	100-110l	100-120l	-do-
Crushed stone (5under)	0.5cu.m	0.5cu.m	-do-
Asphalt	70-90l	100-120l	-do-
Crushed stone (Seal coat)	0.5cu.m	0.4cu.m	-do-
Total Crushed Stone	5.0cu.m	5.1cu.m	
Total Asphalt	400-420l	520-550l	Per 100sq.m

Appendix 9-2 Requirement for Bitumen Patching

1. Required Equipment

(1) Tipper Trucks 7 ton Capacity

Required quantity of bitumenous mixture is approximately equal to the required quantity of chippings at 1.5 cu.m chipping per 30 sq.m.

Quantity of chippings = 1.5/30 x 30 = 1.5

Therefore total Tipper Trucks required will be 3 Tippers.

(2) LWB Truck

One LWB truck Will be required for transporting workers to and from the camp in addition to various items such as tampers and brooms that may be required at the patching sites.

(3) Road Roller

For the anticipated output of 30 sq.m per unit, each unit will need 1 Roller. Therefore total requirement will be 2 Rollers.

(4) Bitumen Sprayer

Each unit will require 1 hand operated bitumen sprayer. Therefore a total of 2 Sprayers will be required.

(5) Other Equipment

Other minor items required include brooms, hand tampers, rakes and hand shovels.

Summary of Equipment

Description	No.
Tipper Truck (7tons)	3
LWB Truck (7tons)	1
Tandem vib. Roller (2tons)	2
Bitumen Sprayer	2
Supervisory Vehicle (pick-up)	2
Asphalt Cutter	2
Compressor (3.0cu.m)	1
Walk Talky	4
Two-way Radio	2
Motor Cycles	2

2. Required Materials per Annum

(1) Chippings: 1.5 cu.m/30 sq.m/day @200 @2 = 600 cu.m
(2) Bitumen: 150 litters/30 dq.m/day @200 @2 =60,000 litters
(3) Diesel:
Tipper 7t: 9.8 litter/hr @6 @0.7 @200 @2 =18,000 litters
LWB Truck: ditto =18,000
Bitumen Distributor: ditto =18,000
Road Roller:4.6 litter/hr @6 @0.7 @200 @2= 8,400
Heating: 10 @6 @200 @4 = 2,400
Total =64,000
Oil: Each required 480 litter/year @4 @2 @1.1
= 1,000 litters

3. Required Staffs

Category	No.
(1) Inspector	1
(2) Foreman	2
(3) Drivers (Plant Operators)	8
(4) Helpers	8
(5) Labouers	10

Appendix 9-3 Requirement for Routine Maintenance

1. Required Equipment

(1) Motor Grader

Grading is the most expensive routine maintenance activity. Light grading is carried out when the road surface is dry in order to reshape the surface. Preferably, heavy grading will be done after rain. In determining the frequency of grading, in taking into account traffic and surface type, grading will be two times a year.

Road width 5.5m, width of Brade of the Grader is 2.8m
Required 5.5/2.8 = 1.96 times.
Speed of Grader; forward 4 km/hr, backword 6 km/hr,
1/(1.96 @1000/4000 + 1.96 @1000/6000) = 1.22 km per hr
Total working day is 200 days per year and 6 hrs per day.
Annual Capacity per year: 6 @200 @1.22 = 1464 km
Existing road length is 695 km. Therefore, required 1 Grader

(2) Dumper

Estimated sand volume to be hauled out of the paved road:
0.15 cu.m/m x 350,000 m x 0.03 = 1570 cu.m
Daily hauling trips:
6hr/day x 1/(2 + 5km/30km/hr + 5km/60km/hr + 3min/60min)hr
= 2.6 trips
Required Nos. of Dumpers:
1570 x 1/(200 x 1.51 x 2.6) = Approx. 2 Nos.
1.51 is a Loading Capacity per Dumper (2ton).
Therefore, required 2 Dumpers (2ton).

(3) Water Tanker

Assumed thickness of spraying water = 4 mm,
Daily requirement:
0.81km/hr @6 @1000 @5.5 @0.004 = 106.9 cu.m
Capacity of a water tank is 10 cu.m. Average haul distance is assumed 10km. Transport average speed is 40km/hr.
Time required in one cycle:

5km + 5km	= 15 min
Filling 10,000/400	= 25 min
Spray	= 25 min
Total	65 min

Working time is 6 hrs per day, one unit will make 6 @60/65 =4.5 trips/day, therefore required no. of tankers is 106.9/45 =1.95.
Required 2 Water Tankers

(4) Grass Cutting
Assume 0.5 km per day per person.
Output per year = 1/2 @200 = 100 km.
Total length of road network is 1146 km
reqired 1146/100 = Approx. 12 Labourers.

(5) Culvert Cleaning
Total line meter of culverts is 6300 m for 350 km long.
Assume cleaning twice a year, then meters of culverts is 12,600 m.
Assume 20 m per person per day, the annual output is 4,000m.
Required number of workers is:
12,600/4,000 =Approx. 4 Laboures.

Required Equipment

Description	No.
LWB Truck 7 ton	1
Tipper Truck 7 ton	1
Supervisory Vehicles	2
Water Tankers	2
Moter Grader	1
Excavater (0.4 cu.m)	1
Dumper	2
Road Marking Set	1

2.Required Materials per Annum

(1) Diesel:

LWB Truck 7 tons.	9.8 litters/hr@6@0.5@200@1.1=	6,400Litters
Tipper Truck 7 tons	ditto 1.1=	6,400
Road Sweeper	ditto 1.1=	6,400
Water Tanker	ditto @2@1.1=	12,800
Water Grader	0.24 l/hr/HP@150@3@0.6@200@1.1=	14,000
Load Loller	4.6@6@0.7@3@200@1.1 =	12,000
Excavater	0.24 l/hr/HP@100@1@0.6@200@1.1 =	3,000
	Total =	61,000Litters

3.Required Staffs

Category	No.
Inspector	1
Foreman	1
Drivers	5
Operators	4
Helpers	9
Labourers	16

Appendix 9-4: Summary of Main staffs and Materials

Description	Main Depot	Bitumen Patching	Other Routine Maintenance	Total
Resident Engineer	1			1
Deputy Civil Engineer	1			1
Admini. Supervisor	1			1
Supply Officer	1			1
Workshop Chief	1			1
Mechanics	4			4
Auto Electric	2			2
Store Attendant	1			1
Fuel Supply Incharge	1			1
Clerks	2			2
Typist	1			1
Cleaners	2			2
Watchman	8			8
Inspectors		1	1	2
Foremans		2	1	3
Drivers		4	5	9
Operators		4	4	8
Helpers		8	9	17
Laboures		10	16	26
Chippings		600cu.m/yr		600
Bitumen		60,000 l/yr		60,000
Diesel		64,000 l/yr	61,000 l/yr	125,000
Oil		1,000 l/yr	500 l/yr	1,500
Gasoline		20,000 l/yr	20,000 l/yr	40,000
Miscellaneous		Ls	Ls	Ls

Appendix 9-5 Yearly Expenditure for the Road Main Depot

	Q'ty	Unit Rate (Tsh/Month)	Amount (Year)	Remark
Resident Engineer	1	9,040	108,480	Amounts are
Deputy Civil Engineer	1	7,060	84,720	as of November
Admini.Supervisor	1	7,060	84,720	1989
Supply Officer	1	5,205	62,460	
Workshop Chief	1	7,060	84,720	
Mechanics	4	5,205	249,840	
Auto Electric	2	4,385	105,240	
Store Attendant	1	2,075	24,900	
Fuel Supply Incharge	1	4,075	48,900	
Clerk	2	3,655	87,720	
Typist	1	3,065	36,780	
Cleaners	2	2,075	49,800	
Watchman	8	2,075	199,200	
Inspectors	2	4,385	105,240	
Foremans	7	4,385	368,340	Incl. 4 of
Drivers	9	3,335	360,180	Sub Depot
Operators	8	4,475	429,600	
Helpers	17	3,335	680,340	
Laboures	26	2,075	647,400	
Sub Total			3,818,580	

Yearly Main Material Expenditure

	Qty	Unit Rate	Amount
Chippng	600cu.m	7,000	4,200,000
Bitumen	60,000 litter	46.3	2,778,000
Diesel	130,000	39.15	4,893,000
Oil	2,000	350	525,000
Gasoline	40,000	92.15	3,686,000
Miscellaneous			1,608,000
Sub Total			17,690,000

Office Expenditure 1,400,000

Appendix 9-6: Equipment for Road Maintenance

1. ROUTINE MAINTENANCE (4 Sub Depots)

7 ton Tipper Trucks	8
LWB Lorries with Crane	4
Motor Graders	4
Tractor & Drags	4
Monitoring Vehicles (Pick Ups)	4
Bitumen Sprayers (200 lts)	4
2 tons Hand Rollers	4
2 ton Dumpers	4
Excavator (0.4 cum)	4
Road Sweeper (7-9 ton)	4
Motor Cycles	4
Hand Rammers	16
Asphalt Cutters	4
Wheel Burrows	8
Hand Shivels	20
Rakes	20
Watering Cans	8
Picks	20
Cutlasses	40
Masons Tools	4 sets
Road Marking Set	4

2. PERIODIC AND URGENT MAINTENANCE

Tipper Trucks (7 tons) 8(G)&5(0) =	13
Steel Wheeled Roller (8-10 ton)	2
Pneumatic Tyred Roller (8-10 ton)	2
Motor Grader	1
Bulldozer (D7 with ripper)	1
Shovel Loader (2 cum)	2
Water Bowzer	2
LWB (with Crane)	1
Paver (Asphalt) (3.6 m)	1
Gully Trap Emptier	1

Compressor (3.5 cum)	1
Supervisory Vehicles (Pick Up)	4
Double Cabin Pick-up (3.5 ton)	2
Motor Cycles	4

EQUIPMENT FOR WORKSHOP

Welding Machine 1(P)&2(W) =	3
Lathe (10 inch)	2
Generator (8 KVA) 1(P)&1(W) =	3
Compressor	1
Round Saw	2
Chain Block 1(R)&1(P)&1(W) =	3
Fuel Pump (Petrol(1)&Dissel(1)) =	2
Mobile Service Truck (with Tools)	1
Tool Box (for Mechanics) 1(P)&4(W) =	5

Appendix 9-7: Equipment for Road Main Depot

Equipment/Machine	Unit Price (U.S.$)	Short Term (Pa)	(R)	(W)	(T)	Cost (P)+(R)	(W)
7 ton Tipper Trucks	48,000	3	1	1	5	192,000	48,000
LWB Lorries with Crane	50,000	1	1		2	100,000	
Motor Grader	79,000		1		1	79,000	
Vehicles (Pick Up)	19,000	2	2		4	76,000	
Bitumen Sprayers	3,000	2			2	6,000	
2 tons vib.Rollers	17,000	2			2	34,000	
2 tons Dumpers	18,000		2		2	36,000	
Excavater(0.4 cum)	85,000		1		1	85,000	
Motor Cycles	3,000	2		2	4	6,000	6,000
Asphalt Cutters	20,000	2			2	40,000	
Road Marking Sets	13,000		1		1	13,000	
Steel Wheeled Roller(8-10t)	50,000						
Pneumatic Tyred Roller(8-10t)	50,000						
Bullzoser(7 ton with Ripper)							
Shovel Loader(2 cm)	65,000						
Watter Tanker	32,000		2		2	64,000	
Compressor (3.5 cum)	24,000	1		1	2	24,000	24,000
Double Cabin Pick-up(3.5ton)	33,000			1	1		33,000
Welding Machines	2,000			1	1		2,000
Overhead Crane	62,000			1	1		62,000
Generators (8 kVA)	7,000			2	2		14,000
Chain Blocks	1,000			3	3		3,000
Fuel Pumps	1,000			3	3		3,000
Tool Boxes	2,000			5	5		10,000
Work Talkies	1,000	4			4	4,000	
Two Way Radio	3,000	2			2	6,000	
Fuel Tank (20kl)	36,000			1	1		36,000
Fuel Dispenser	24,000			1	1		24,000
Other Tool	32,000			1	1		32,000
Crushing Plant (50 t/hr)							
Dump Trucks (10 ton)							
Bulldozer (D8 Equivalent)							
Excavater (2.5 cum)							
						765,000	297,000
						@144	
						(Tsh110.mil,	43.mil)

Abbreviation: Pa=Patching Maintenance Work
R=Routine Maintenance Work
W=Workshop
T=Total Nomber

Appendix 9-8: Equipment for Road Main Depot

Equipment/Machine	Unit Price (U.S.$)	Medium/Long Term (R)	(P)	(W)	(T)	Total Cost (R)+(P)	(W)
7 ton Tipper Trucks	48,000	2	3		5	240,000	
LWB Lorries with Crane	50,000	2			2	100,000	
Motor Grader	79,000		3		3	237,000	
Vehicles(Pick up)	19,000	2	2	1	5	76,000	19,000
Bitumen Sprayers	3,000	2			2	6,000	
2 tons Vib.Rollers	17,000	2			2	34,000	
2 tons Dumpers	18,000	2			2	36,000	
Excavator(0.4 cum)	85,000	1			1	85,000	
Road Sweepers	28,000	2			2	56,000	
Motor Cycles	3,000		2	2	4	6,000	6,000
Asphalt Cutters	20,000		2		2	40,000	
Road Marking Sets	13,000		2		2	26,000	
Steel Wheeled Roller(8-10t)	50,000			1	1		50,000
Pneumatic Tired Roller(8-10t)	50,000			1	1		50,000
Bulldozer (D7 with Ripper)	215,000			1	1		215,000
Compressor (3.5 cu.m)	24,000	1		1	2	24,000	24,000
Welding Machines	2,000			1	1		2,000
Walk Talkies	1,000	2			2	2,000	
Dump Trucks (10 ton)	70,000			5	5		350,000
Excavator (2.5 cu.m)	150,000			1	1		150,000
As. Finishor (3.6m)	75,000			1	1		75,000
						955,000	930,000
						@144	
						(Tsh 137.mil	134.mil)

Abbreviation: R=Routine Maintenance Work
P=Periodic Maintenance Work
W=Workshop
T=Total Number

CHAPTER 10: IDENTIFICATION OF NECESSARY IMPROVEMENT

LIST OF APPENDICES

Appendix 10-3: Work Quantity and Preliminary Cost Estimate

Appendix 10-3-1: Unit Quantity of Improvement Measures

Appendix 10-3-2: Estimated Unit Quantity of Pot-holes

Appendix 10-3-3: Unit Rates for Major Work Items

Appendix 10-3-4: Unit Cost of Each Improvement Measures

Appendix 10-3-5: Preliminary Cost of Improvement Measures for Each Road

Appendix 10-1: Result of PSI Survey (1/4)

Link No.	Name of Roads	Length (km)	PSI Rate in Each Unit (500)																			Average	Maintenance	Overlay	Reconstruction
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
Group 1: Arterial Roads																									
			Maintenance								Overlay		Maintenance		Overlay		Reconstruction		Maintenace						
1-1	Bagamoyo Road	35.0	3.8	3.9	2.8	2.9	2.5	2.6	2.6	1.9	1.3	2.2	2.7	2.7	2.7	2.3	1.1	1.5	2.7	1.7	1.5	1.4				
			Reconstruction								Overlay							Maintenance		Reconstruction						
			1.2	1.6	1.8	1.9	1.7	1.9	1.8	1.8	1.6	2.0	1.7	2.7	2.3	2.5	2.2	2.8	2.9	2.8	1.8	0.2				
			Reconstruction				Wazo Hill				Overlay					Reconstruction					Overlay					
			0.0	0.6	0.2	0.0	1.7	1.8	1.9	1.9	1.9	2.8	2.1	0.9	0.0	0.1	0.8	0.6	0.9	2.2	1.5	2.0				
			Overlay				Reconstruction							From DSM - Wazo Hill : 22.0km								1.97	8.0	9.0	5.0
														Wazo Hill - Mnjii River: 13.0km								1.27	-	6.5	6.5
			2.5	1.9	1.6	1.0	0.8	1.2	0.9	0.0	0.0	0.0											1.70	8.0	15.5	11.5
			Overlay																						
1-2	Morocco Road	3.5	2.3	2.1	2.1	2.0	1.7	2.0	2.0														2.03	-	3.5	-
			Overlay		Maintenance																					
1-3	Kinondoni Road	1.7	1.6	2.9	2.8																		2.43	1.2	0.5	-
			Overlay		Maintenance								Overlay					Reconstruction Port Access							
1-4	Morogoro Road	33.0	2.5	1.8	4.0	4.0	4.0	4.0	4.0	3.0	2.6	2.9	1.8	2.8	1.3	2.5	2.3	1.6	1.4	1.3	1.6	2.0				
			4 lanes (3.5km)								Overlay				2 lanes (5.5km)											
			2.2	2.5	2.7	2.1	2.2	2.4	2.7	2.2	2.3	2.3	2.6	2.1	1.8	2.3	2.2	2.3	1.9	1.9	1.9	2.4				
			7CH 2.5km Overlay																							
			1.4	1.9	2.0	1.7	2.0	1.5	1.7	2.2	2.0	1.9	1.8	2.3	2.5	2.3	2.4	2.6	2.2	2.6	2.3	2.6				
			Overlay											Other Sections : 23.5km								2.38	4.0	18.0	1.5
														Section Proposed by DCC: 9.5km								2.19	-	9.5	-
			2.7	2.6	2.4	2.4	2.5	2.6															2.35	4.0	27.5	1.5
			Maintenance																						
1-5	United Nation Road	2.0	3.0	3.0	2.4	3.0																	2.85	2.0	-	-
			Maintenance																						
1-6	UWT Road	1.9	3.5	3.3	3.4	2.8																	3.25	1.9	-	-
			Maintenance																						
1-7	Port Access	15.6	3.9	3.9	3.9	3.9	4.0	3.9	4.0	3.9	4.0	3.9	2.7	3.8	4.0	4.0	4.0	4.0	3.8	4.0	4.0	3.9				
			Maintenance																						
			3.7	3.0	3.4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0										3.85	15.6	-	-
			Maintenace Reconstruction																						
1-8	Bandari Road	2.2	2.4	2.6	1.3	1.2																	2.07	1.0	-	1.2

Appendix 10-1: Result of PSI Survey (2/4)

Link No.	Name of Roads	Length (km)	PSI Rate in Each Unit (500) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average	Maintenance	Overlay	Reconstruction
			Maintenance		Overlay			Maintenance			Overlay			Reconstruction			Overlay		Maintenance							
1-9	Kilwa Road	15.7	2.6	2.3	2.4	2.3	1.6	2.7	2.8	2.4	1.7	2.4	1.4	2.1	1.6	1.1	2.4	2.7	2.7	2.8	2.7	2.9				
			Maintenance					Overlay																		
																							Section Proposed by DCC: 8.6km			
																							Other Sections : 7.1km			
			2.6	2.7	2.8	2.2	1.7	2.0	2.5	2.8	1.4	1.7	1.7										2.19	2.1	6.0	0.5
																							2.32	3.4	3.7	-
																							2.25	5.5	9.7	0.5
					Overlay						Maintenance															
1-10	Uhuru Road	5.0	2.4	2.1	1.8	2.1	2.0	2.1	2.3	2.1	3.5	3.7											2.41	1.0	4.0	-
			Maintenance		Overlay																					
1-11	Msimbazi Road	1.6	2.8	1.7	1.8																		2.10	0.5	1.1	-
					Overlay																					
1-12	Mpakani Road	3.9	2.4	2.0	1.8	2.1	1.8	2.0	2.2	2.2													2.06	-	3.9	-
					Maintenance																					
1-13	Upanga Road	1.8	2.5	2.8	2.9	3.0																	2.80	1.8	-	-
1-14	Pugu Road	17.4	3.7	3.8	3.8	3.8	3.8	3.9	3.9	3.9	3.8	3.8	3.9	3.9	3.8	3.8	3.8	3.9	3.8	3.8	3.8	3.8	3.64	10.0		-
			2.5	2.3	2.0	2.0	2.0	2.6	1.6	2.1	2.5	1.9	2.8	2.5	2.7	2.7	3.4						2.37	10.0	7.4	-
1-15	Central Area Streets																									
1-15-1	Nkurumah Street	0.3	1.8																				1.80	-	0.3	-
1-15-2	Samora Avenue	0.8	2.1	2.3																			2.20	-	0.8	-
1-15-3	Sokoine Drive	0.8	2.4	2.5																			2.45	-	0.8	-
1-15-4	Gerezani Street	1.2	1.8	1.7	2.5																		2.00	-	1.2	-
1-15-5	Kivukoni Front	1.0	2.1	2.5	2.0																		2.20	-	1.0	-
1-15-6	Maktaba & Azikiwe	0.9	2.1	1.9																			2.00	-	0.9	-
1-15-7	Ohio Street	1.0	2.0	2.7																			2.34	-	1.0	-
1-15-8	Ocean Road	3.2	2.8	2.5	2.5	1.9	2.4	2.4	2.7														2.36	-	3.2	-

Appendix 10-1: Result of PSI Survey (3/4)

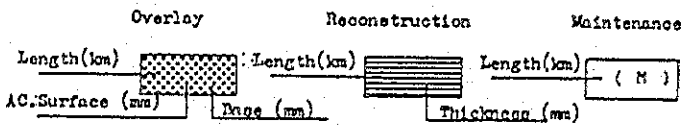
Link No.	Name of Roads	Length (km)	PSI Rate in Each Unit (500)																			Average	Maintenance	Overlay	Reconstruction
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
Group 2: Collector Roads			Overlay											Reconstruction												
2-1	Old Bagamoyo Road	8.2	1.8	2.0	1.8	2.0	1.3	0.9	0.8	0.9	1.3	1.2	0.9	0	0	1.0	1.5	1.6					1.19	-	2.2	6.0
			Overlay						Reconstruction (Gravel Pav.)																	
2-2	Haile Sellasie	5.0	2.4	2.2	2.4	2.4	2.7	2.9	0.0	0.0	0.0	0.0											1.50	-	3.0	2.0
			Overlay																							
2-3	Toure Drive	5.6	2.5	2.3	2.2	2.3	2.3	2.1	2.9	2.1	2.0	2.1	2.1										2.26	-	5.6	-
			Overlay																							
2-4	Bongoyo Street	0.8	2.1	2.7																			2.40	-	0.8	-
			Reconstruction			Overlay			Reconstruction																	
2-5	Shekilango Road	3.8	1.2	2.0	1.6	2.2	2.8	0.1	0.6														1.50	-	1.8	2.0
			Overlay																							
2-6	Kondoa Street	1.2	2.6	2.6	1.4	2.6																	2.20	-	1.2	-
			Reconstruction																							
2-7	Mwinjuma Road	2.4	0.9	2.1	1.1	0.5	1.1																1.14	-	-	2.4
			Overlay			Reconstruction (Gravel Pav.)																				
2-8	Makanya Road	5.0	1.9	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0											0.57	-	1.5	3.5
			Overlay																							
2-9	University Road	3.8	1.6	2.1	2.0	2.2	1.9	2.4	2.0	2.1													2.07	-	3.8	-
			Maintenance																							
2-10	Kigogo C-1(to be named)	1.3	2.7	2.2	2.5																		2.47	1.3	-	-
			Reconstruction (Gravel Pav.)																							
2-11	Kigogo C-2(to be named)	1.8	0.0	0.0	0.0	0.0																	0.0	-	-	1.8
			Reconstruction (Gravel Pav.)																							
2-12	Kigogo C-3(to be named)	1.9	0.0	0.0	0.0	0.0																	0.0	-	-	1.9
			Overlay				Reconstruction (Gravel Pav.)																			
2-13	Old Kigogo Road	6.8	2.7	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								0.38	-	1.0	5.8
			Maintenance			Reconstruction																				
2-14	Kagera Street	2.0	2.6	1.9	1.5																		1.60	1.0	-	0.2
			Reconstruction																							
2-15	Mikumi Street	1.1	0.9	1.6																			1.25	-	-	1.1

Appendix 10-1: Result of PSI Survey (4/4)

Link No.	Name of Roads	Length (km)	PSI Rate in Each Unit (500)																				Average	Maintenance	Overlay	Reconstruction
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
			Maintenance				Reconstruction																			
2-16	New Kigogo Road	2.7	2.8	2.8	2.7	1.3	1.2																2.16	1.6	-	1.1
			Maintenance			Overlay			Maintenance													Overlay					
2-17	Chang'ombe Road	4.6	3.7	2.3	2.4	2.9	2.6	2.9	2.6	2.8	2.2												2.68	3.2	1.4	-
					Maintenance																					
2-18	Temeke Street	1.9	2.6	2.3	3.0	2.7																	2.65	1.9	-	-
			Reconstruction			Maintenance																				
2-19	Mbagala I. Road	1.4	0.0	0.5	2.7																		1.07	0.4	-	1.0
			Reconstruction			Maintenance																				
2-20	Mbagala II Road	2.2	1.4	2.8	2.4	2.8																	2.35	1.7	-	0.5
			Mainteance			Reconstruction																				
2-21	Mahunda Street	2.0	2.9	0.3	0.2	0.4																	1.3	0.5	-	1.5
Group 3: Area Roads																										
A	Oyster Bay	8.1																					1.5-2.5		8.1	
B	Mwunijuma	(-)																					0.0-1.0			2.4
C	Magomeni	(-)																					0.0-3.0	1.0	2.0	0.2
D	Central Area	10.3																					1.5-2.5		10.3	
E	Kariakoo	30.0																					0.0-1.0			30.0
F	Chang'ombe	14.6																					0.0-1.0			14.6
G	Temeke	13.9																					1.5-2.5		13.9	
H	Ilala	10.3																					0.0-1.0			10.3
I	Other Local Rds.	4.0																					0.0-1.0	-	-	4.0
	Total	305.2																						64.1	135.9	105.2

PSI survey was not conducted for these area roads because of the difficulty in identifing pavement condition for each short road. PSI values were determined by visual observation on the basis of accumulated experience of the Study Team through the PSI survey.

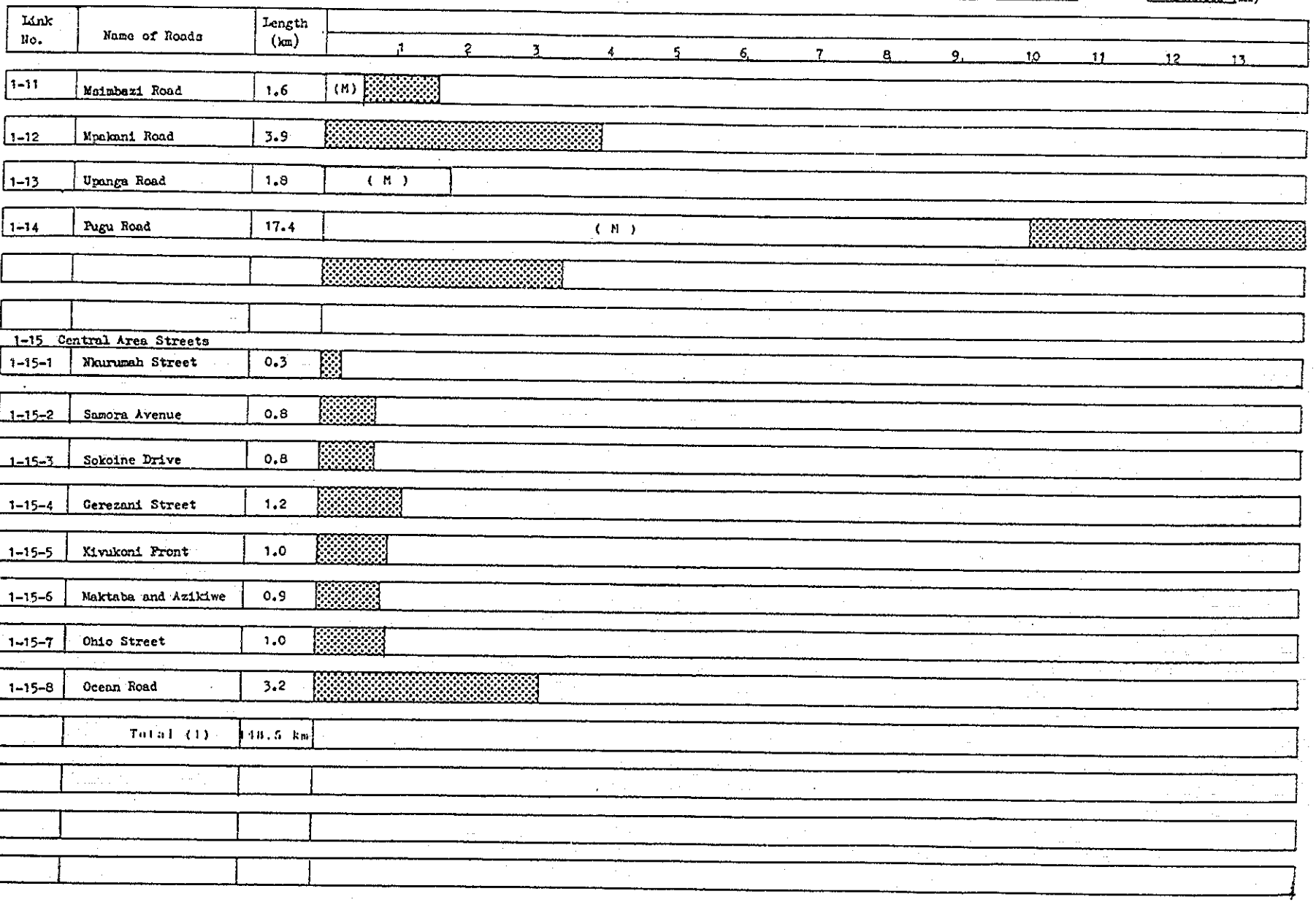
Road Section by Countermeasures (1/4)



Link No.	Name of Roads	Length (km)	1	2	3	4	5	6	7	8	9	10	11	12	13
Group 1: Arterial Roads															
1-1	Bagamoyo Road	35.0	(M)					(M)			(M)				
						(M)									
1-2	Morocco Road	3.5													
1-3	Kinondoni Road	1.7		(M)											
1-4	Morogoro Road	33.0			(M)										
1-5	United Nation Road	2.0	(M)												
1-6	U.W.T Road	1.9	(M)												
1-7	Port Access	15.6													
			(M)												
1-8	Bandari Road	2.2	(M)												
1-9	Kilwa Road	15.7	(M)				(M)						(M)		
1-10	Ubalo Road	5.0							(M)						

Road Section by Countermeasures (2/4)

Overlay — Length(km) : AC Surface (mm) / Base (mm)
Reconstruction — Length(km) : Thickness (mm)
Maintenance — Length(km) : (M)



Link No.	Name of Roads	Length (km)	
1-11	Maimbazi Road	1.6	(M)
1-12	Mpakani Road	3.9	
1-13	Upanga Road	1.8	(M)
1-14	Pugu Road	17.4	(M)
1-15	Central Area Streets		
1-15-1	Nkurumah Street	0.3	
1-15-2	Samora Avenue	0.8	
1-15-3	Sokoine Drive	0.8	
1-15-4	Gerezani Street	1.2	
1-15-5	Kivukoni Front	1.0	
1-15-6	Maktaba and Azikiwe	0.9	
1-15-7	Ohio Street	1.0	
1-15-8	Ocean Road	3.2	
	Total (1)	48.5 km	

Road Section by Countermeasures (3/4)

Overlay — Length(km) — AC.Surface (mm) — Base (mm)
Reconstruction — Length(km) — Thickness (mm)
Maintenance — Length(km) — (M)

Link No.	Name of Roads	Length (km)	1 2 3 4 5 6 7 8 9 10 11 12 13
2-18	Temeke Street	1.9	(M)
2-19	Mbagala I Road	1.4	(M)
2-20	Mbagala II Road	2.2	(M)
2-21	Mkunda Street	2.0	(M)
	Total	65.5 km	
Group 3: Local Roads (Area Roads Proposed by DCC)			
A	Oyster Bay	8.1	
B	Mwunjumo	(-)	
C	Magomeni	(-)	
D	Central Area	10.3	
E	Kariakoo	31.6	
F	Chang'ombe	14.6	
G	Temeke	13.9	
H	Ilala	10.3	
I	Other Important Rds.	4.0	
	Total 91.2 km		

Study Roads	Total (km)	Overlay (km)	Reconstruction (km)	Maintenance (km)
Arterial Roads	148.5	81.3	14.7	52.5
Collector Roads	65.5	22.3	31.6	11.6
Local Roads	91.2	32.3	58.9	0.0
Total	305.2 km	135.9km	105.2km	64.1km

Road Section by Countermeasures (4/4)

Overlay — Length(km) — AC.Surface (mm)
Reconstruction — Length(km) — Base (mm) — Thickness (mm)
Maintenance — Length(km) — (M)

Link No.	Name of Roads	Length (km)
Group 2: Collector Roads		
2-1	Old Bagamoyo Road	8.2
2-2	Haile Sellasie	5.0
2-3	Toure Drive	5.6
2-4	Bongoyo Street	0.8
2-5	Shekilango Road	3.8
2-6	Kondoa Street	1.2
2-7	Mwinjuma Road	2.4
2-8	Makanya Road	5.0
2-9	University Road	3.8
2-10	Kigogo C-1 (to be name	1.3
2-11	Kigogo C-2 to be named	1.8
2-12	Kigogo C-2 to be named	1.9
2-13	Old Kigogo Road	6.8
2-14	Kagera Street	2.0
2-15	Mikumi Street	1.1
2-16	New Kigogo Road	2.7
2-17	Chang'ombe Road	1.6

Appendix 10-2: Pavement Overlay Design

Appendix 10-2-1: Summary of Initial Daily Traffic (IDT)

Name of Roads	ADT in 1989 Year				Traffic Growth Rate Per Annual		IDT in 1994 Year			
	Medium Goods	Heavy Goods	Bus	Total	Medium/ Heavy Goods	Bus	Medium Goods	Heavy Goods	Bus	Total
	①	②	③	①+②+③	④	⑤	⑥=①*(1.02)^5	⑦=②*(1.02)^5	⑧=③*(1.10)^5	⑥+⑦+⑧
1. Arterial Roads										
1-1 New bagamoyo										
-Up to Mpakani J.	972	118	140	1230	2	10	1073	130	226	1429
-Beyond Mpakani J.	436	55	38	592	2	10	481	61	61	603
1-2 Morocco	514	72	29	615	2	10	568	79	47	694
1-3 Kinondoni	16	0	99	115	2	10	18	0	160	178
1-4 Morogoro										
-Up to Port Ac. J.	1535	234	242	2011	2	10	1695	258	389	2342
-Beyond Port Ac. J.	296	90	30	416	2	10	327	99	48	474
1-8 Bandari	944	197	55	1196	2	10	1042	218	89	1349
1-9 Kilwa										
-Up to 8. 6	962	128	133	1223	2	10	1062	141	215	1418
1-10 Uhulu	540	119	179	838	2	10	596	131	289	1016
1-11 Msinbazi	645	155	367	1167	2	10	712	171	591	1474
1-13 Upanga	803	106	232	1141	2	10	887	117	374	1378
1-15-1 Nkurumah	0	0	0	0	2	10	0	0	0	0
1-15-3 Sokoine	155	19	531	705	2	10	171	21	855	1047
1-15-4 Gerezani	900	179	78	1157	2	10	994	198	126	1318
1-15-5 Kivukoni	142	16	78	236	2	10	157	18	126	301
1-15-6 Maktaba	184	23	0	207	2	10	203	25	0	228
1-15-7 Ohio	31	1	0	32	2	10	34	1	0	35
1-15-8 Ocean	0	0	0	0	2	10	0	0	0	0
2. Collector Roads										
2-1 Old Bagamoyo	197	18	38	460	2	10	218	20	62	300
2-2 Haile Sela.	424	40	16	480	2	10	468	44	26	538
2-3 Toure Drive	0	0	16	16	2	10	0	0	26	26
2-4 Bongoyo	0	0	16	16	2	10	0	0	26	26
2-5 Shekilango	242	18	7	267	2	10	267	20	12	299
2-6 Kondoa	0	0	0	0	2	10	0	0	0	0
2-7 Mwinjima	315	34	77	426	2	10	348	38	124	510
2-8 Makanya	16	0	0	16	2	10	18	0	0	18
2-10 KigogoC-1	75	9	0	84	2	10	83	10	0	93
2-13 Old Kigogo	87	11	89	187	2	10	96	12	144	252
2-14 Kagera	40	42	0	82	2	10	44	46	0	90
2-15 Mikumi	24	1	0	25	2	10	26	1	0	27
2-16 New Kigogo	132	37	57	226	2	10	146	41	91	278
2-17 Chango' mbe	1095	54	84	1233	2	10	1209	60	136	1405
2-18 Temeke	161	36	143	340	2	10	178	40	231	449
2-19 Mbagala 1	77	8	98	183	2	10	85	9	158	252
3. Local Roads (Area Roads Proposed by DCC)										
A. Oyster Bay Area	0	0	16	16	2	10	0	0	26	26
D. Central Area	31	1	0	32	2	10	34	1	0	35
E. Kariakoo Area	40	42	0	82	2	10	44	46	0	90
F. Chango' mbe Area	77	8	98	183	2	10	85	9	158	252
G. Temeke Area	77	8	98	183	2	10	85	9	158	252
H. Ilala Area	24	1	0	25	2	10	26	1	0	27
I. Other Important Rd										
-Mwinjima	0	0	0	0	2	10	0	0	0	0

Appendix 10-2-2: Average Gross Mass of Heavy Vehicle

Heavy Vehicle is the Main target vehicles for the pavement design.

The Classification of type of vehicle in the traffic survey conducted are divided into five types such as :

a, Car,taxi
b, Light goods vehicle
c, Medium goods vehicle
d, Heavy goods vehicle
e, Buses

Light vehicle such as car,taxi,light goods vehicle, and small bus aren't considerable factor and remaing Hevey Vehicles such as Medium goods vehicle ,Hevey goods vehicle and standerdsize bus are the target vehicle for the pavement design.

Due to shortage of actual date an vehicle loading in DAR ES SALAAM ,Average Groods Mass of these Heavy vehicle are establish in accordance with the Japanese survey results as fallows.

(1) Average Gross Mass of Medium goods.

Reffering to the result of the Traffic survey conducted oridinary type of Medium goods vehicle is represented on equivalent as ISUZU-FSS12EA truck with about 10 ton of average gross mass of Medium goods vehicle listed in the year book of Motor vehicle Enginearing Association.

(2) Average Gross Mass of Standerd size bus.

Reffering to the result of the traffic survey conducted, Standerd size bus is represented an equivalent as ISUZU-P-LT312J with about 10 ton of average gross mass of standerd size bus listed in the year book.

(3) Average Gross Mass of Heavy Goods Vehicles

In order to analyze the distribution of heavy goods vehicles, traffic counting survey for only heavy goods vehicles with more than 3 axles was conducted on Morogoro road and Port Access road on may, 1989 as follows;

Based on the result of this survey, almost of heavy goods vehicles were 3 axles vehicle and furthermore loading weight per one axle of heavy goods vehicle with 3 axle will be a most influence factor for the pavement design.

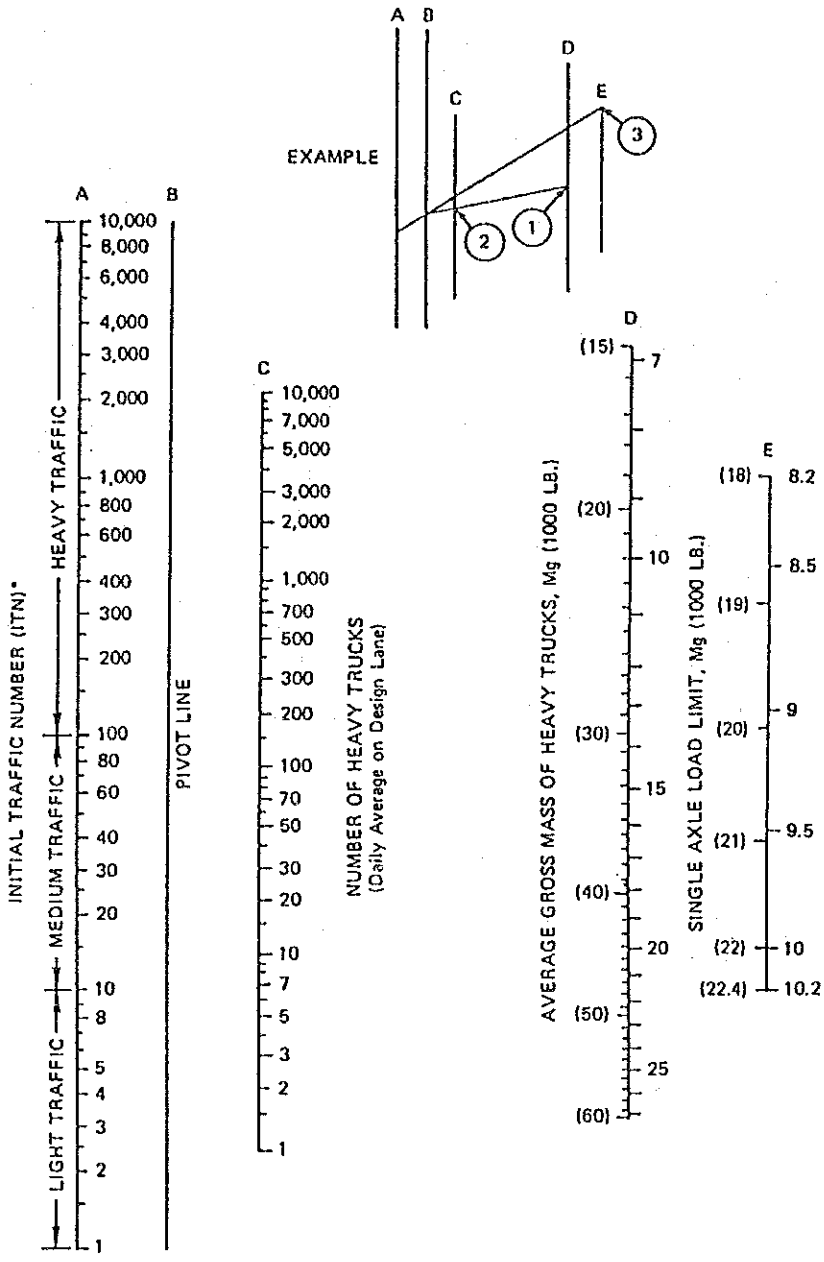
therefore representative type of heavy goods vehicle is applied an equivalent as HINO-HWF146 of heavy goods vehicle of 3axle with abut 18 ton of average gross mass in the year book.

Heavey goods vehicle survey

1989.5.18.(Thu) 10:00AM 3:00PM

		3axles	4axles	5axles	6axles	more tham 7axles	Total
Port Access	(up)	46	10	19	16	0	91
	(down)	42	11	22	12	1	88
	(both)	88	21	41	28	1	178
	component(%)	49.2	11.7	22.9	15.6	0.6	100.0
Morogoro road	(up)	16	3	10	10	0	39
	(down)	24	6	14	16	0	60
	(both)	40	9	24	26	0	99
	component(%)	40.0	9.1	24.2	26.3	0.0	100.0
Total	(both)	128	30	65	54	1	278
	component(%)	46.0	10.8	23.4	19.4	0.4	100.0

Appendix 10-2-3: Analysis Chart of Initial Traffic Number



Appendix 10-2-4: Ajustment Factor for Design Period

Design Period, Years (n)	Annual Growth Rate, percent (r)					
	0	2	4	6	8	10
1	0.05	0.05	0.05	0.05	0.05	0.05
2	0.10	0.10	0.10	0.10	0.10	0.10
4	0.20	0.21	0.21	0.22	0.22	0.23
6	0.30	0.32	0.33	0.35	0.37	0.39
8	0.40	0.43	0.46	0.50	0.53	0.57
10	0.50	0.55	0.60	0.66	0.72	0.80
12	0.60	0.67	0.75	0.84	0.95	1.07
14	0.70	0.80	0.92	1.05	1.21	1.40
16	0.80	0.93	1.09	1.28	1.52	1.80
18	0.90	1.07	1.28	1.55	1.87	2.28
20	1.00	1.21	1.49	1.84	2.29	2.86
25	1.25	1.60	2.08	2.74	3.66	4.92
30	1.50	2.03	2.80	3.95	5.66	8.22
35	1.75	2.50	3.68	5.57	8.62	13.55

$$\text{Factor} = \frac{(1 + r)^n - 1}{20r}$$

where r = annual growth rate
n = design period, years

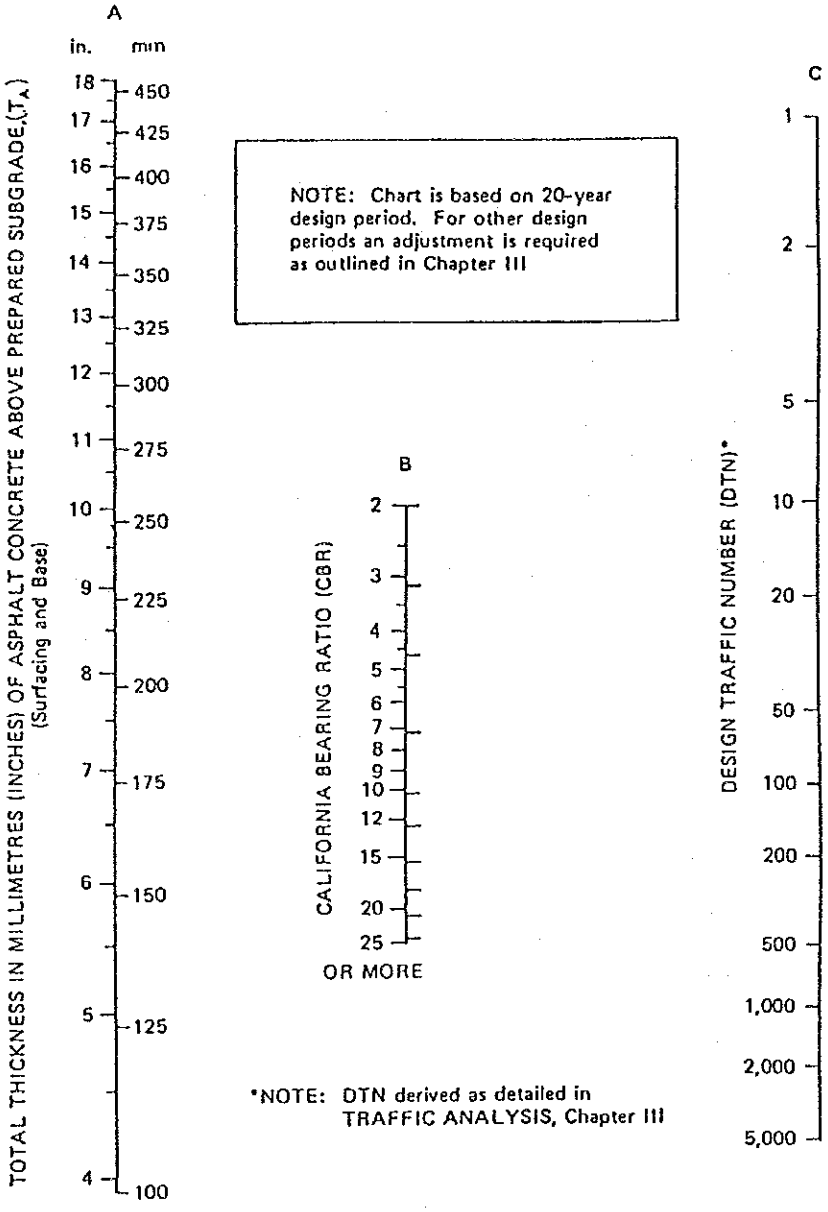
Appendix 10-2-5: Summary of Design Traffic Number (DTN)

Continued

Name of Roads	IDT in 1994Yeac				Initial Traffic Number in Terms of Heavy Vehicle			Adjustment Factor				DTN in 2004Year				DTN in 2014Year			
	Medium Goods	Heavy Goods	Bus	Total	Medium Goods	Heavy Goods	Bus	2004 Year Traffic Growth Rate Medium/Heavy Goods 2%	Bus 10%	2014 Year Traffic Growth Rate Medium/Heavy Goods 2%	Bus 10%	Medium Goods	Heavy Goods	Bus	Total	Medium Goods	Heavy Goods	Bus	Total
					①	②	③	④	⑤	⑥	⑦	①×④	②×④	③×⑤		①×⑥	②×⑥	③×⑦	
1. Arterial Roads																			
1-1 New bagamoyo																			
-Up to Mpakani J.	1073	130	226	1429	322	91	68	0.55	0.80	1.21	2.86	178	51	55	284	390	111	195	696
-Beyond Mpakani J.	481	61	61	603	145	43	18	0.55	0.80	1.21	2.86	80	24	14	112	176	52	51	279
1-2 Morocco	568	79	47	694	171	56	15	0.55	0.80	1.21	2.86	95	31	12	138	207	68	43	318
1-3 Kinondoni	18	0	160	178	6	0	48	0.55	0.80	1.21	2.86	4	0	39	43	8	0	138	146
1-4 Morogoro																			
-Up to Port Ac. J.	1695	258	389	2342	509	181	167	0.55	0.80	1.21	2.86	280	100	134	514	616	220	478	1314
-Beyond Port Ac. J.	327	99	48	471	98	69	14	0.55	0.80	1.21	2.86	54	38	11	103	119	83	40	242
1-8 Bandari	1042	218	89	1349	313	153	27	0.55	0.80	1.21	2.86	173	85	22	280	379	186	78	643
1-9 Kilwa																			
-Up to 8.6	1062	141	215	1418	319	99	65	0.55	0.80	1.21	2.86	176	55	52	283	386	120	186	692
1-10 Uhulu	596	131	289	1016	179	92	87	0.55	0.80	1.21	2.86	99	51	70	220	217	112	249	578
1-11 Msinbazi	712	171	591	1474	214	120	178	0.55	0.80	1.21	2.86	118	66	143	327	259	146	510	915
1-13 Upanga	887	117	374	1378	267	82	113	0.55	0.80	1.21	2.86	147	46	91	284	324	100	324	748
1-15-1 Nkurumah	0	0	0	0	0	0	0	0.55	0.80	1.21	2.86	0	0	0		0	0	0	
1-15-3 Sokoine	171	21	855	1047	52	15	257	0.55	0.80	1.21	2.86	29	9	214	206	63	19	736	818
1-15-4 Gerezani	994	198	126	1318	299	139	38	0.55	0.80	1.21	2.86	165	77	31	273	362	169	109	640
1-15-5 Kivukoni	157	18	126	301	48	13	38	0.55	0.80	1.21	2.86	27	8	31	66	59	16	109	184
1-15-6 Maktaba	203	25	0	228	61	18	0	0.55	0.80	1.21	2.86	34	10	0	44	74	22	0	96
1-15-7 Ohio	34	1	0	35	11	1	0	0.55	0.80	1.21	2.86	7	1	0	8	14	2	0	16
1-15-8 Ocean	0	0	0	0	0	0	0	0.55	0.80	1.21	2.86	0	0	0	0	0	0	0	0

Name of Roads	IDT in 1994Yeae				Initial Traffic Number in Terms of Heavy Vehicle			Adjustment Factor				DTN in 2004Year				DTN in 2014Year			
	Medium Goods	Heavy Bus Goods		Total	Medium Goods	Heavy Goods	Bus	2004 Year Traffic Growth Rate Medium✓ Heavy Goods 2%	Bus 10%	2014 Year Medium✓ Heavy Goods 2%	Bus 10%	Medium Goods	Heavy Bus Goods		Total	Medium Goods	Heavy Bus Goods		Total
					①	②	③	④	⑤	⑥	⑦	①*④	②*④	③*⑤		①*⑥	②*⑥	③*⑦	
2. Collector Roads																			
2-1 Old Bagamoyo	218	20	62	300	66	14	19	0.55	0.80	1.21	2.86	37	8	16	61	80	17	55	152
2-2 Haile Scla.	468	44	26	538	141	31	8	0.55	0.80	1.21	2.86	78	18	7	103	171	38	23	232
2-3 Toure Drive	0	0	26	26	0	0	8	0.55	0.80	1.21	2.86	0	0	7	7	0	0	23	23
2-4 Bongoyo	0	0	26	26	0	0	8	0.55	0.80	1.21	2.86	0	0	7	7	0	0	23	23
2-5 Shekilango	267	20	12	299	81	14	4	0.55	0.80	1.21	2.86	45	8	4	57	99	17	12	128
2-6 Kondoa	0	0	0	0	0	0	0	0.55	0.80	1.21	2.86	0	0	0	0	0	0	0	0
2-7 Mwinjima	348	38	124	510	105	27	38	0.55	0.80	1.21	2.86	58	15	31	104	128	33	109	270
2-8 Makanya	18	0	0	18	6	0	0	0.55	0.80	1.21	2.86	4	0	0	4	8	0	0	8
2-10 KigogoC-1	83	10	0	93	25	7	0	0.55	0.80	1.21	2.86	14	4	0	18	31	9	0	40
2-13 Old Kigogo	96	12	144	252	29	9	44	0.55	0.80	1.21	2.86	16	5	36	57	36	11	126	173
2-14 Kagera	44	46	0	90	14	33	0	0.55	0.80	1.21	2.86	8	19	0	27	17	40	0	57
2-15 Mikumi	26	1	0	27	8	1	0	0.55	0.80	1.21	2.86	5	1	0	6	10	2	0	12
2-16 New Kigogo	146	41	91	278	44	29	28	0.55	0.80	1.21	2.86	25	16	23	64	54	36	81	171
2-17 Chango' mbe	1209	60	136	1405	363	42	41	0.55	0.80	1.21	2.86	200	24	33	257	440	51	118	609
2-18 Temeke	178	40	231	449	54	28	70	0.55	0.80	1.21	2.86	30	16	56	102	66	34	201	301
2-19 Mbagala 1	85	9	158	252	26	7	48	0.55	0.80	1.21	2.86	15	4	39	58	32	9	138	179
3. Local Roads (Area Roads Proposed by DCC)																			
A. Oyster Bay Area	0	0	26	26	0	0	8	0.55	0.80	1.21	2.86	0	0	7	7	0	0	23	23
D. Central Area	34	1	0	35	11	1	0	0.55	0.80	1.21	2.86	7	1	0	8	14	2	0	16
E. Kariakoo Area	44	46	0	90	14	33	0	0.55	0.80	1.21	2.86	8	19	0	27	17	40	0	57
F. Chango' mbe Area	85	9	158	252	26	7	48	0.55	0.80	1.21	2.86	15	4	39	58	32	9	138	179
G. Temeke Area	85	9	158	252	26	7	48	0.55	0.80	1.21	2.86	15	4	39	58	32	9	138	179
H. Ilala Area	26	1	0	27	8	1	0	0.55	0.80	1.21	2.86	5	1	0	6	10	2	0	12
I. Other Important Rd.																			
-Mwinjima	0	0	0	0	0	0	0	0.55	0.80	1.21	2.86	0	0	0	0	0	0	0	0

Appendix 10-2-6: Thickness Design Chart



Appendix 10-2-7: Conversion Factors for Converting Thickness of Existing Pavement to Effective Thickness

Pavement Structural components of the existing roads are evaluated so as to obtain the representative effective thickness (Te) on each proposed road. To determine (Te) ,each layer such as surface course and base course of the existing pavement components must be converted to be equivalent thickness of asphalt concrete using the Conversion Factor authorized by the Asphalt Institute of U.S.A

(1) Calculation of Convertion Factor of surface course

Based on the result of PSI Survey and Road Structural Survey, Conversion Factor of surface course can be classified into three levels by the surface condition representing as the PSI Value. And Each road conditions are analyzed and applied the following classification Number of Material and conversion factors as bellow in accordance with the takle of Classification of Material, Description of Material and Conversion Factors of the Asphalt Institute as shown bellow.

Convertion Factor for surface course

PSI Value and Road Condition	clasification of Material	Convertion factor
PSI > 2.5 (Mentenace level)		0.9-1.0
2.5> PSI > 1.5 (overlay level)		0.7-0.9
1.5> PSI (Reconstruction level)		0.5-0.7

(2) Calculation Factor of Base course

Based on the result of the Road Structural Survey Conversion Factor of Base course can be identified as type of the Classification of Material with the level of 0.3 to 0.5 of conversion factor shown bellow.

(3) Selection of Conversion Factor by Pavement components

Conversion Factor by Pavement components are established as middle value of the conversion Factor calculated and shown as bellow.

Conversion Factor applied by Pavement components use for overlay calculation

PSI value	Comversion Factor by Pavement components. Surface	Base
PSI > 2.5	0.95	0.4
2.5 >PSI >1.5	0.8	0.4
1.5 >PSI	0.6	0.4

Classification of Material	Description of Material	Conversion Factors*
I	Native Subgrade in all cases	0.0
II	(a) Improved Subgrade—Predominantly granular materials—may contain some silt and clay but have P.I. of 10 or less (Improved Subgrade = any course or courses of improved material between the native subgrade soil and the pavement structure.)	0.0 – 0.2
	(b) Lime modified subgrade constructed from high plasticity soils—P.I. greater than 10. (Lime modified subgrade = A prepared and mechanically compacted unhardened or semihardened intimate mixture of lime, water and soil below the pavement system.)	
III	(a) Granular Subbase or Base—Reasonably well-graded, hard aggregates with some plastic fines and CBR not less than 20. Use upper part of range if P.I. is 6 or less; lower part of range if P.I. is more than 6.	
	(b) Cement modified subbases and bases constructed from low plasticity soils—P.I. of 10 or less. (Cement modified subbase = An unhardened or semihardened intimate mixture of pulverized soil, portland cement and water, used as a layer in a pavement system between the subgrade and the base course. Cement modified base = An unhardened or semihardened intimate mixture of pulverized soil, portland cement and water, used as a layer in the pavement system to reinforce and protect the subgrade or subbase.) #	0.2 – 0.3

Classification of Material	Description of Material	Conversion Factors*
IV	(a) Granular Base—Nonplastic granular material complying with established standards for high quality aggregate base. Use upper part of range.	
	(b) Asphalt surface mixtures having large well defined crack patterns, spalling along the cracks, exhibit appreciable deformation in the wheel paths showing some evidence of instability.	
	(c) Portland cement concrete pavement that has been broken into small pieces, two feet or less in maximum dimension, prior to overlay construction. Use upper part of range when subbase is present; lower part of range when slab is on subgrade.	0.3 – 0.5
	(d) Soil-cement bases that have developed extensive pattern cracking, as shown by reflected surface cracks, may exhibit pumping, and pavement shows minor evidence of instability. (Soil-cement base = A hardened material formed by curing a mechanically compacted intimate mixture of pulverized soil, portland cement and water, used as a layer in a pavement system to reinforce and protect the subgrade or subbase.) #	
V	(a) Asphalt surfaces and underlying asphalt bases** that exhibit appreciable cracking and crack patterns, but little or no spalling along the cracks, and while exhibiting some wheel path deformation, remain essentially stable.	

* Values and ranges of Conversion Factors are multiplying factors for conversion of thickness of existing structural layers to equivalent thickness of asphalt concrete.

\# "Definition of Terms Relating to Soil-Portland Cement Stabilization," *Highway Research Abstracts*, Vol. 29, No. 6, June 1959, Highway Research Board (now Transportation Research Board), Washington, D. C.

**Asphalt concrete base, asphalt macadam base, plant-mix base, asphalt mixed-in-place base.

Classification of Material	Description of Material	Conversion Factors*
	(b) Appreciably cracked and faulted portland cement concrete pavement that cannot be effectively undersealed. Slab fragments, ranging in size from approximately one to four square yards, are well seated on the subgrade by heavy pneumatic rolling.	0.5 – 0.7
	(c) Soil-cement bases that exhibit little cracking, as shown by reflected surface crack patterns, and that are under stable surfaces. (See definition of soil-cement base under IV d.)	
VI	(a) Asphalt concrete surfaces that exhibit some fine cracking, small intermittent cracking patterns and slight deformation in the wheel paths but remain stable.	
	(b) Liquid asphalt mixtures that are stable, generally uncracked, show no bleeding, and exhibit little deformation in the wheel paths.	0.7 – 0.9
	(c) Asphalt treated base, other than asphalt concrete.**	
	(d) Portland Cement concrete pavement that is stable and undersealed has some cracking but contains no pieces smaller than about one square yard.	
VII	(a) Asphalt concrete, including asphalt concrete base generally uncracked, and with little deformation in the wheel paths.	
	(b) Portland cement concrete pavement that is stable, undersealed and generally uncracked.	0.9 – 1.0
	(c) Portland cement concrete base, under asphalt surface that is stable, non-pumping and exhibits little reflected surface cracking.	

* Values and ranges of Conversion Factors are multiplying factors for conversion of thickness of existing structural layers to equivalent thickness of asphalt concrete.

**Asphalt macadam base, plant-mix base, asphalt mixed-in-place base.

Appendix 10-2-8: Effective Thickness of Existing Pavement

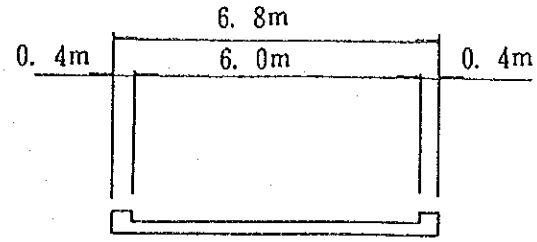
Name of Roads	Overlay Length	Existing Pavemant Thickness		Conversion Factor		Effective Thickness (Te)
		Surface	Base	Surface	Base	
	(km)	(mm) ①	(mm) ②	(mm) ③	(mm) ④	(mm) ①×③+②×④
1. Arterial Roads						
1-1 New bagamoyo						
-Up to Mpakani J.	2. 0	70	110	0. 8	0. 4	100
-Beyond Mpakani J.	8. 0	70	110	0. 8	0. 4	100
1-2 Morocco	3. 5	50	140	0. 8	0. 4	100
1-3 Kinondoni	—	—	—	—	—	—
1-4 Morogoro						
-Up to Port Ac. J.	—	—	—	—	—	—
-Beyond Port Ac. J.	4. 7	80	180	0. 8	0. 4	120
1-8 Bandari	—	—	—	—	—	—
1-9 Kilwa						
-Up to 8. 6km	5. 5	60	110	0. 8	0. 4	100
1-10 Uhulu	1. 9	40	150	0. 8	0. 4	100
1-11 Msinbazi	1. 0	90	160	0. 8	0. 4	140
1-13 Upanga	—	—	—	—	—	—
1-15-1 Nkurumah	0. 3	50	250	0. 8	0. 4	140
1-15-3 Sokoine	—	—	—	—	—	—
1-15-4 Gerezani	1. 2	90	160	0. 8	0. 4	140
1-15-5 Kivukoni	1. 0	50	250	0. 8	0. 4	140
1-15-6 Maktaba	0. 9	50	250	0. 8	0. 4	140
1-15-7 Ohio	1. 0	50	250	0. 8	0. 4	140
1-15-8 Ocean	3. 2	50	250	0. 8	0. 4	140
sub-total	34. 2km					
2. Collector Roads						
2-1 Old Bagamoyo	2. 0	60	200	0. 8	0. 4	130
2-2 Haile Sela.	3. 0	30	150	0. 8	0. 4	90
2-3 Toure Drive	5. 6	70	120	0. 8	0. 4	110
2-4 Bongoyo	0. 8	70	120	0. 8	0. 4	110
2-5 Shekilango	2. 0	20	160	0. 8	0. 4	80
2-6 Kondoa	1. 2	20	160	0. 8	0. 4	80
2-7 Mwinjima	—	—	—	—	—	—
2-8 Makanya	—	—	—	—	—	—
1-15-4 Gerezani	1. 2	90	160	0. 8	0. 4	140
2-13 Old Kigogo	1. 0	70	110	0. 8	0. 4	110
2-14 Kagera	—	—	—	—	—	—
2-15 Mikumi	—	—	—	—	—	—
2-16 New Kigogo	—	—	—	—	—	—
2-17 Chango' mbe	1. 6	60	200	0. 8	0. 4	120
2-18 Temeke	—	—	—	—	—	—
2-19 Mbagala 1	—	—	—	—	—	—
sub-total	18. 7km					
3. Local Roads (Area Roads Proposed by DCC)						
A. Oyster Bay Area	—	—	—	—	—	—
D. Central Area	—	—	—	—	—	—
E. Kariakoo Area	—	—	—	—	—	—
F. Chango' mbe Area	—	—	—	—	—	—
G. Temeke Area	—	—	—	—	—	—
H. Ilala Area	—	—	—	—	—	—
I. Other Important Rd.						
-Mwinjima	—	—	—	—	—	—
sub-total	—	—	—	—	—	—
Total	52. 9km					

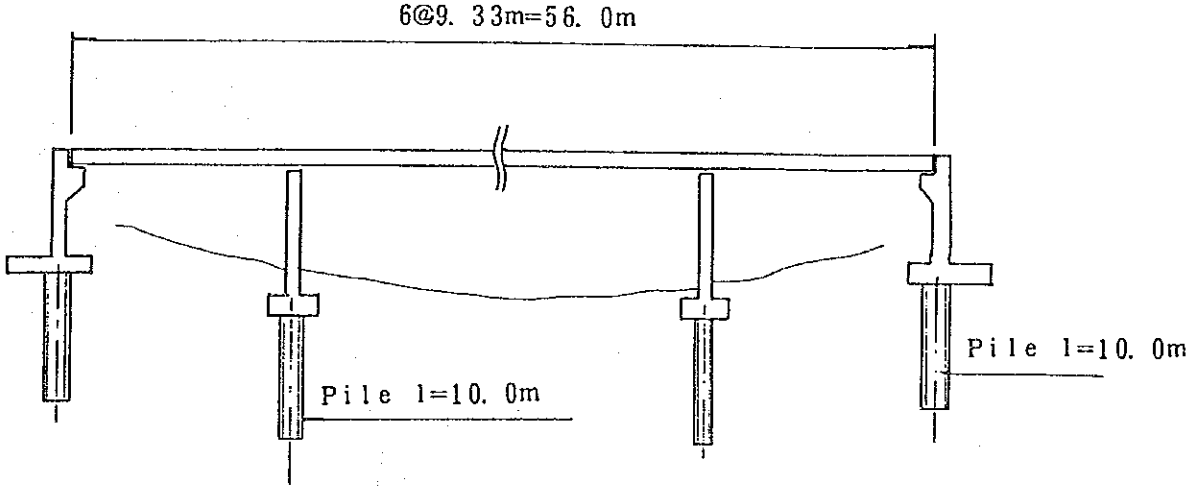
Appendix 10-2-9: Thickness of Overlay

Name of Roads	Overlay Length (km) ①	CBR Val. (%) ②	DTN in 2004 Year ③	Full-depth Thick:. (Ta) in 2004 (mm) ④	Effective Thickness (Te) (mm) ⑤	Overlay Thickness (mm) ⑥=④-⑤
1. Arterial Roads						
1-1 New bagamoyo						
-Up to Mpakani J.	2. 0	8	284	200	100	100
-Beyond Mpakani J.	8. 0	8	112	180	100	80
1-2 Morocco	3. 5	8	138	180	100	80
1-3 Kinondoni	–	8	43	160	–	–
1-4 Morogoro						
-Up to Port Ac. J.	–	–	–	–	–	–
-Beyond Port Ac. J.	4. 7	8	103	200	120	80
1-8 Bandari	–	10	280	180	–	–
1-9 Kilwa						
-Up to 8. 6km	5. 5	10	283	180	100	80
1-10 Uhulu	1. 9	10	148	170	100	70
1-11 Msinbazi	1. 0	10	327	180	140	40
1-13 Upanga	–	10	284	180	–	–
1-15-1 Nkurumah	0. 3	10	0	100	140	25
1-15-3 Sokoine	–	10	244	180	–	–
1-15-4 Gerezani	1. 2	10	273	180	140	40
1-15-5 Kivukoni	1. 0	10	66	160	140	40
1-15-6 Maktaba	0. 9	10	44	160	140	40
1-15-7 Ohio	1. 0	10	8	100	140	25
1-15-8 Ocean	3. 2	10	0	100	140	25
sub-total	34. 2km					
2. Collector Roads						
2-1 Old Bagamoyo	2. 0	8	61	180	130	50
2-2 Haile Sela.	3. 0	12	103	150	90	60
2-3 Toure Drive	5. 6	12	7	100	110	25
2-4 Bongoyo	0. 8	12	7	100	110	25
2-5 Shekilango	2. 0	8	57	170	80	90
2-6 Kondoa	1. 2	8	0	100	80	20
2-7 Mwinjima	–	8	104	180	–	–
2-8 Makanya	1. 5	8	4	100	80	25
2-10 KigogoC-1	–	8	18	160	–	–
2-13 Old Kigogo	1. 0	8	57	180	110	70
2-14 Kagera	–	8	27	160	–	–
2-15 Mikumi	–	8	6	100	–	–
2-16 New Kigogo	–	8	64	180	–	–
2-17 Chango' mbe	1. 6	10	257	160	120	40
2-18 Temeke	–	10	102	160	–	–
2-19 Mbagala 1	–	10	58	160	–	–
sub-total	18. 7km					
3. Local Roads (Area Roads Proposed by DCC)						
A. Oyster Bay Area	–	12	7	100	–	–
D. Central Area	–	8	8	100	–	–
E. Kariakoo Area	–	8	27	160	–	–
F. Chango' mbe Area	–	10	58	160	–	–
G. Temeke Area	–	10	58	160	–	–
H. Ilala Area	–	10	6	100	–	–
I. Other Important Rd.						
-Mwinjima	–	8	0	100	–	–
sub-total	–					
Total	52. 9km					

Appendix 10-2-10: Preliminary Bridge Design

RC Bridge





・Superstructure of Work (RC Bridge)

Area =6. 00*56. 00=336. 00m²

Rate of Work

Unit Rate=60, 000Tsh. /m²

Rate of Work=60, 000Tsh. /m² *336m² =20, 160, 000Tsh.

・Substructure of Work

Abutment

High=5. 0m

Width=6. 8m

Unit Rate=500, 000Tsh. /m

Rate of Work=500, 000Tsh. /m*6. 8*2=6, 800, 000Tsh.

Pierment

High=7. 0m

Width=6. 8m

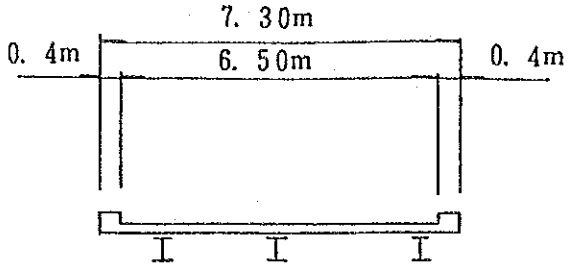
Unit Rate=450, 000Tsh. /m

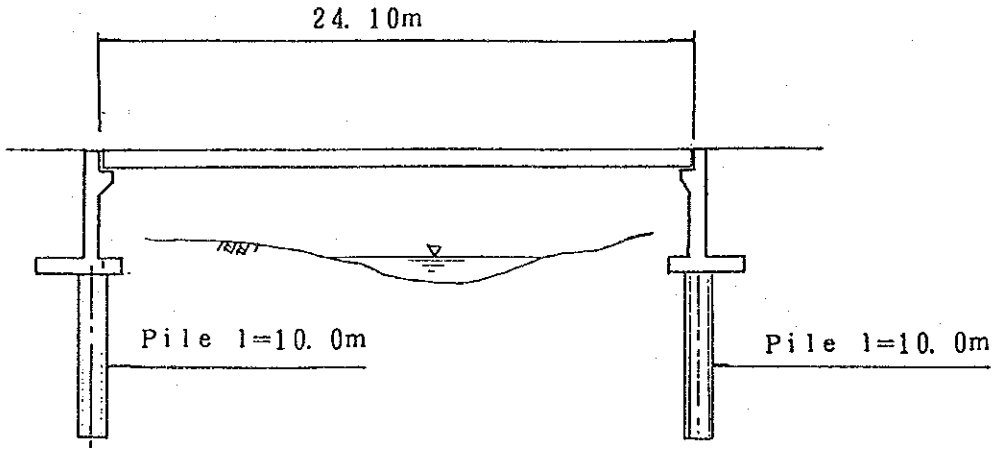
Rate of Work=450, 000Tsh. /m*6. 8*5=15, 300, 000Tsh.

・Total

42, 260, 000Tsh.

Steel Girder Bridge





・Superstructure of Work (Steel Girder Bridge)

Unit Weight=220t/m²

Area =6. 50*24. 10=156. 65m²

Weight =0. 22*156. 65=34. 5t

Rate of Work

Unit Rate=630, 000Tsh. /t

Rate of Work=630, 000Tsh. /t*34. 5t=21, 735, 000Tsh.

・Substructure of Work

High=5. 0m

Width=6. 8+0. 4*2=7. 30m

Unit Rate=500, 000Tsh. /m

Rate of Work=500, 000Tsh. /m*7. 3*2=7, 300, 000Tsh.

・Total

21, 735, 000Tsh. +7, 300, 000Tsh. =29, 035, 000Tsh.

Appendix 10-3: Work Quantity and Preliminary Cost Estimate

Appendix 10-3-1: Unit Quantity of Improvement Measures

Continued

Major Work Items	Unit	A-1 Overlay Quantity (t)	A-2 Reconstruction of Pavement Type-A Quantity (sq. m)	Type-B Quantity (sq. m)	Type-C Quantity (sq. m)
Exc. & Filling, comon -5 km<H Dist. <10km	cu. m				
Asphalt concrete	ton	t*w*2. 3t/m³	0. 05m*2. 3t/m³ =0. 115	0. 05m*2. 3t/m³ =0. 115	0. 03m*2. 3t/m³ =0. 115
Prim coat	sq. m		t*w*1. 01/m³	t*w*1. 01/m³	t*w*1. 01/m³
Tuck coat	sq. m	t*w*1. 01/m²			
Subbase, Crusher run	cu. m		t*w*0. 30m	t*w*0. 35m	t*w*0. 20m
Base, Selected Material	cu. m		t*w*0. 15m	t*w*0. 25m	
Conorete, Drainage45*60	Lin. m				
Pipe Culvert Dia. =100	Lin. m				

w:width t:thickness

Major Work Items	Unit	A-3 Widening Type-A Quantity (m)	Type-B Quantity (m)	A-4 Drainage System Quantity (m)
Exc. & Filling, comon -5 km<H Dist. <10km	cu. m	10. 0m³	8. 0m³	
Asphalt concrete	ton	0. 05*7. 5m*2*2. 3t/m³ =1. 73	0. 05*7. 0m*2*2. 3t/m³ =1. 61	
Prim coat	sq. m	1. 0m*7. 5m*2=15. 0	1. 0m*7. 0m*2=14. 0	
Tuck coat	sq. m			
Subbase, Crusher run	cu. m	0. 35*7. 5m*2=5. 25	0. 35*7. 0m*2=4. 9	
Base, Selected Material	cu. m	0. 25*7. 5m*2=3. 75	0. 25*7. 0m*2=3. 5	
Side Worke	sq. m	3. 5m*1=3. 5	3. 5m*1=3. 5	
Conorete, Drainage45*60	Lin. m	1. 0m*2nos. =2. 0	1. 0m*2nos. =2. 0	
Pipe Culvert Dia. =100	Lin. m	27. 0m/100m=0. 27	24. 0m/100m=0. 24	w+ (2*5. 0m)
Miscellanious work		1	1	

Major Work Items	Unit	A-5 Bus Bay Pavement:Type-A Type-A Quantity Rates (nos.)	A-5 Bus Bay Pavement:Type-A Type-B Quantity Rates (nos.)	A-6 Intersection Pavement:Type-A Type-A Quantity Rates (nos.)	A-6 Intersection Pavement:Type-A Type-B Quantity Rates (nos.)
		A= (40.0+70.0)/2*3.0 =165m²	A= (20.0+50.0)/2*3.0 =105m²	A= (70.0+103.0)/2*2*3.0 =1200m²	A= (50.0+90.0)/2*2*3.0 =840 m²
Exc. & Filling, comon -5 km<H Dist. <10km	cu. m				
Asphalt concrete	ton	165.0*0.05*2.3t/m³ =18.98	105.0*0.05*2.3t/m³ =12.08	1200*0.05*2.3t/m² =138	840*0.05*2.3t/m³ =96.6
Prim coat	sq. m	165.0*1.0=165	105.0*1.0=105	1200*1.0=1200	840*1.0=840
Tuck coat	sq. m				
Subbase, Crusher run	cu. m	165.0*0.3m=49.5	105.0*0.3m=31.5	1200 *0.3m=360	840*0.3m=252
Base, Selected Material	cu. m	165.0*0.15m=24.75	105.0*0.15m=15.75	1200 *0.15m=180	840*0.15m=126
Side Worke	sq. m				
Conorete, Drainage45*60	Lin. m				
Pipe Culvert Dia. =100					

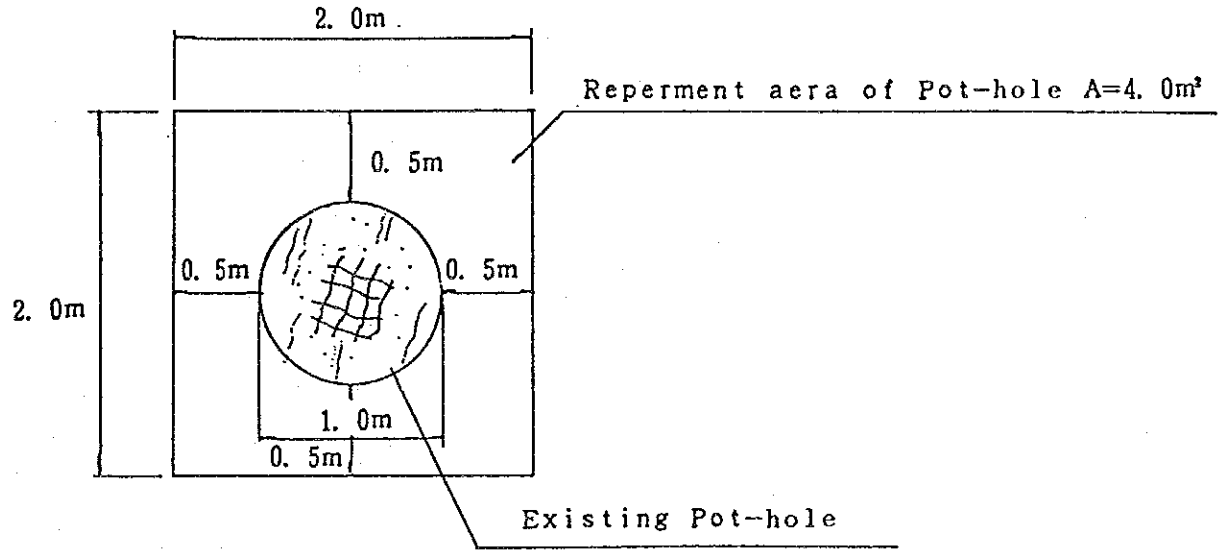
Major Work Items	Unit	Unit Rate (Tsh.)	B-1 Urgent Repair of Pot-halls Quantity (sq. m)
			A=4.0m²
Exc. & Filling, comon -5 km<H Dist. <10km	cu. m	2.060	
Asphalt concrete	ton	11.100	4.0*0.05m*2.3t/m³ =0.46
Prim coat	sq. m	210	4.0
Tuck coat	sq. m	100	
Subbase, Crusher run	cu. m	7.690	
Base, Selected Material	cu. m	8.120	4.0*0.2m=0.8
Side Worke	sq. m	1.010	
Conorete, Drainage45*60	Lin. m	7.920	
Pipe Culvert Dia. =100	Lin. m	66.570	

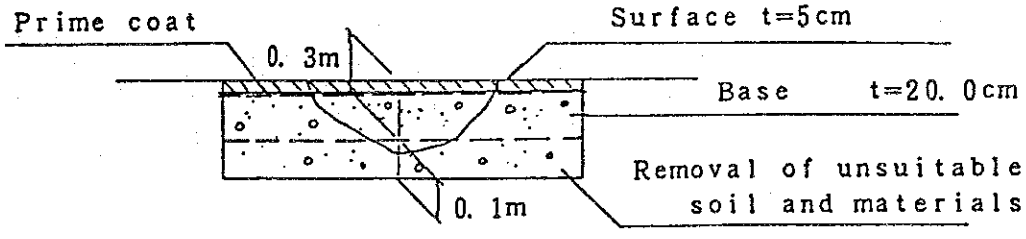
Appendix 10-3-2: Estimated Unit Quantity of Pot-Holes

As the Result of the PSI Survey ,Number of Pot-hall distribution are analized as bellow following the road condition represented by PSI value

PSI value	Pot-hole ratio
PSI > 2.5	1 nos./100m
2.5 > PSI > 1.5	5 nos./100m
1.5 > PSI	10 nos./100m

Considering the actual size of Pot-holes being observed various size and patern on the existing roads,the following Figures are established as the average size of Pot-hole and the ordinary repair method of Pot-hole for the Calculation of the Urgent repair of Pot-holes.





Appendix 10-3-3: Unit Rates for Major Work Items

Continued

Major Work Items	Unit	Unit Rate	A-1 Overlay		A-2 Reconstruction of Pavement					
					Type-A		Type-B		Type-C	
			Quantity	Rates	Quantity	Rates	Quantity	Rates	Quantity	Rates
		(Tsh.)	(t)	(Tsh.)	(sq. m)	(Tsh.)	(sq. m)	(Tsh.)	(sq. m)	(Tsh.)
Exc. & Filling, comon										
-5 km<H. Dist. <10km	cu. m	2. 060								
Asphalt concrete	ton	11. 100	1. 0	11. 100	0. 115	1. 280	0. 115	1. 280	0. 069	770
Prim coat	sq. m	210			1. 0	210	1. 0	210	1. 0	210
Tuck coat	sq. m	100	1. 0/sq. m	100						
Subbase, Crusher run	cu. m	7. 690			0. 30	2. 300	0. 35	2. 690	0. 20	1. 540
Base, Selected Material	cu. m	8. 120			0. 15	1. 120	0. 25	2. 030		
Conorete, Drainage45*60	Lin. m	7. 920								
Pipe Culvert Dia. =100	Lin. m	66. 570								
Total				11. 100		4. 910		6. 210		2. 520

Major Work Items	Unit	Unit Rate	A-3 Widening				A-4 Drainage System	
			Type-A		Type-B			
			Quantity	Rates	Quantity	Rates	Quantity	Rates
		(Tsh.)	(m)	(Tsh.)	(m)	(Tsh.)	(m)	(Tsh.)
Exc. & Filling, comon								
-5 km<H. Dist. <10km	cu. m	2. 060	10. 0	20. 600	8. 0	16. 480		
Asphalt concrete	ton	11. 100	1. 73	19. 200	1. 61	17. 870		
Prim coat	sq. m	210	15. 0	3. 150	14. 0	2. 940		
Tuck coat	sq. m	100						
Subbase, Crusher run	cu. m	7. 690	5. 25	40. 370	4. 90	37. 680		
Base, Selected Material	cu. m	8. 120	3. 75	30. 450	3. 5	28. 420		
Side Worke	sq. m	1. 010	3. 5	3. 530	3. 5	3. 530		
Conorete, Drainage45*60	Lin. m	7. 920	2. 0	15. 840	2. 0	15. 840		
Pipe Culvert Dia. =100	Lin. m	66. 570	0. 27	17. 970	0. 24	15. 980	1. 0	66. 570
Miscellanious work	sub total*10%		1	15. 110	1	13. 870		
Total				166. 220		152. 610		66. 570

Major Work Items	Unit	Unit Rate	A-5 Bus Bay				A-6 Intersection			
			Pavement:Type-A2				Pavement:Type-A2			
			Type-A		Type-B		Type-A		Type-B	
			Quantity	Rates	Quantity	Rates	Quantity	Rates	Quantity	Rates
		(Tsh.)	(nos.)	(Tsh.)	(nos.)	(Tsh.)	(nos.)	(Tsh.)	(nos.)	(Tsh.)
Exc. & Filling, comon -5 km<H Dist. <10km	cu. m	2. 060								
Asphalt concrete	ton	11. 100	18. 98	210. 680	12. 08	134. 090	138. 0	1531. 800	96. 6	1072. 260
Prim coat	sq. m	210	165. 0	34. 650	105. 0	22. 050	1200. 0	252. 000	840. 0	176. 400
Tuck coat	sq. m	100								
Subbase, Crusher run	cu. m	7. 690	49. 5	380. 660	31. 5	242. 240	360. 0	2768. 400	252. 0	1937. 880
Base, Selected Material	cu. m	8. 120	24. 75	200. 970	15. 75	127. 890	180. 0	1461. 600	126. 0	1023. 120
Side Worke	sq. m	1. 010								
Conorete, Drainage45*60	Lin. m	7. 920								
Pipe Culvert Dia. =100	Lin. m	66. 570								
Total				826. 960		526. 270		5013. 800		4209. 660

Major Work Items	Unit	Unit Rate	B-1 Urgent Repair of Pot-holes	
			Quantity	Rates
		(Tsh.)	(sq. m)	(Tsh.)
Exc. & Filling, comon -5 km<H Dist. <10km	cu. m	2. 060		
Asphalt concrete	ton	11. 100	0. 46	5. 100
Prim coat	sq. m	210	4. 0	840
Tuck coat	sq. m	100		
Subbase, Crusher run	cu. m	7. 690		
Base, Selected Material	cu. m	8. 120	0. 80	6. 500
Side Worke	sq. m	1. 010		
Conorete, Drainage45*60	Lin. m	7. 920		
Pipe Culvert Dia. =100	Lin. m	66. 570		
Total				12. 440

Appendix 10-3-4: Unit Cost of Each Improvement Measures

Continued

Name of Roads	Overlay Width ① (m)	Length (km)	Thickness ② (mm)	①*1.0*②*2.3t/m³*11,100Tsh/t +①*1.0*100Tsh/m²
1. Arterial Roads				
1-1 New bagamoyo				
-Up to Mpakani J.	7.0	2.0	100	7.0*0.1*1.0*2.3*11,100+7.0*1.0*100 =18,570 Tsh/m
-Beyond Mpakani J.	7.0	8.0	80	7.0*0.08*1.0*2.3*11,100+7.0*1.0*100 =15,000 Tsh/m
1-2 Morocco	7.5	3.5	80	7.5*0.08*1.0*2.3*11,100+7.5*1.0*100 =16,070 Tsh/m
1-3 Kinondoni	7.5	–	–	
1-4 Morogoro				
-Up to Port Ac. J.	6.0	–	–	
-Beyond Port Ac. J.	6.0	4.7	80	6.0*0.08*1.0*2.3*11,100+6.0*1.0*100 =12,850 Tsh/m
1-8 Bandari	7.0	–	–	
1-9 Kilwa				
-Up to 8.6km	7.0	5.5	80	7.0*0.08*1.0*2.3*11,100+7.0*1.0*100 =15,000 Tsh/m
1-10 Uhulu	12.8	1.9	70	12.8*0.07*1.0*2.3*11,100+12.8*1.0*100=24,150 Tsh/m
1-11 Msinbazi	12.8	1.0	40	12.8*0.04*1.0*2.3*11,100+12.8*1.0*100=14,350 Tsh/m
1-13 Upanga	10.5	–	–	
1-15-1 Nkurumah	9.5	0.3	25	9.5*0.025*1.0*2.3*11,100+9.5*1.0*100= 7,100 Tsh/m
1-15-3 Sokoine	9.5	–	–	
1-15-4 Gerezani	10.0	1.2	40	10.0*0.04*1.0*2.3*11,100+10.0*1.0*100=11,210 Tsh/m
1-15-5 Kivukoni	5.0	1.0	40	5.0*0.04*1.0*2.3*11,100+5.0*1.0*100 = 5,610 Tsh/m
1-15-6 Maktaba	12.0	0.9	40	12.0*0.04*1.0*2.3*11,100+12.0*1.0*100=13,450 Tsh/m
1-15-7 Ohio	9.0	1.0	25	9.0*0.025*1.0*2.3*11,100+9.0*1.0*100= 6,640 Tsh/m
1-15-8 Ocean	7.0	3.2	25	7.0*0.025*1.0*2.3*11,100+7.0*1.0*100= 5,170 Tsh/m
sub total		34.2km		
2. Collector Roads				
2-1 Old Bagamoyo	6.5	2.0	50	6.5*0.05*1.0*2.3*11,100+6.5*1.0*100 = 8,950 Tsh/m
2-2 Haile Sela	6.5	3.0	60	6.5*0.06*1.0*2.3*11,100+6.5*1.0*100 =10,610 Tsh/m
2-3 Toure Drive	6.5	5.6	25	6.5*0.025*1.0*2.3*11,100+6.5*1.0*100= 4,800 Tsh/m
2-4 Bongoyo	6.5	0.8	25	6.5*0.025*1.0*2.3*11,100+6.5*1.0*100= 4,800 Tsh/m
2-5 Shekilango	6.5	2.0	90	6.5*0.09*1.0*2.3*11,100+6.5*1.0*100 =15,590 Tsh/m
2-6 Kondoa	7.5	1.2	25	7.5*0.025*1.0*2.3*11,100+7.5*1.0*100= 5,540 Tsh/m
2-7 Mwinjima	7.0	–	–	
2-8 Makanya	6.5	1.5	25	6.5*0.025*1.0*2.3*11,100+6.5*1.0*100= 4,800 Tsh/m
2-10 KigogoC-1	6.5	–	–	
2-13 Old Kigogo	6.5	1.0	70	6.5*0.07*1.0*2.3*11,100+6.5*1.0*100 =12,270 Tsh/m
2-14 Kagera	7.5	–	–	
2-15 Mikumi	7.5	–	–	
2-16 New Kigogo	7.0	–	–	
2-17 Chango' mbe	7.0	1.6	40	7.0*0.04*1.0*2.3*11,100+7.0*1.0*100 = 7,850 Tsh/m
2-18 Temeke	6.0	–	–	
2-19 Mbagala 1	6.0	–	–	
sub-total		18.7km		
3. Local Roads (Area Roads sed by DCC)				
A. Oyster Bay Area	5.0	–	–	
D. Central Area	7.0	–	–	
E. Kariakoo Area	6.0	–	–	
F. Chango' mbe Area	7.0	–	–	
G. Temeke Area	7.0	–	–	
H. Ilala Area	6.5	–	–	
I. Other Important Rd.				
-Mwinjima	7.0	–	–	
sub-total		–		
Total		52.9km		

Unit Cost of Each Improvement Measures

Name of Roads	Reconctrction Width ① (m)	Length (km)	Type	①m*1.0m*Unit Rates Tsh./M²
1. Arterial Roads				
1-1 New bagamoyo				
-Up to Mpakani J.	7.0	1.0	B	7.0*1.0*6,210=43,470Tsh./m
-Beyond Mpakani J.	7.0	4.0	B	7.0*1.0*6,210=43,470Tsh./m
1-2 Morocco	7.5	–	–	
1-3 Kinondoni	7.5	0.5	A	7.5*1.0*4,910=36,825Tsh./m
1-4 Morogoro				
-Up to Port Ac. J.	6.0	–	–	
-Beyond Port Ac. J.	6.0	–	–	
1-8 Bandari	7.0	1.2	B	7.0*1.0*6,210=43,470Tsh./m
1-9 Kilwa				
-Up to 8.6km	7.0	0.5	B	7.0*1.0*6,210=43,470Tsh./m
1-10 Uhulu	12.8	–	–	
1-11 Msinbazi	12.6	–	–	
1-13 Upanga	10.5	–	–	
1-15-1 Nkurumah	9.5	–	–	
1-15-3 Sokoine	9.5	–	–	
1-15-4 Gerezani	10.0	–	–	
1-15-5 Kivukoni	5.0	–	–	
1-15-6 Maktaba	12.0	–	–	
1-15-7 Ohio	9.0	–	–	
1-15-8 Ocean	7.0	–	–	
sub-total		7.2km		
2. Collector Roads				
2-1 Old Bagamoyo	6.5	6.2	B	6.5*1.0*6,210=40,365Tsh./m
2-2 Haile Sela.	6.5	2.0	A	6.5*1.0*4,910=31,915Tsh./m
2-3 Toure Drive	6.5	–	–	
2-4 Bongoyo	6.5	–	–	
2-5 Shekilango	6.5	1.8	B	6.5*1.0*6,210=40,365Tsh./m
2-6 Kondoa	7.5	–	–	
2-7 Mwinjima	7.0	2.4	B	7.0*1.0*6,210=43,470Tsh./m
2-8 Makanya	6.5	3.5	C	6.5*1.0*2,520=16,380Tsh./m
2-10 KigogoC-1	6.5	1.0	A	6.5*1.0*4,910=31,915Tsh./m
2-13 Old Kigogo	6.5	5.8	B	6.5*1.0*6,210=40,365Tsh./m
2-14 Kagera	7.5	1.0	A	7.5*1.0*4,910=36,825Tsh./m
2-15 Mikumi	7.5	1.1	A	7.5*1.0*4,910=36,825Tsh./m
2-16 New Kigogo	7.0	1.2	B	7.0*1.0*6,210=43,470Tsh./m
2-17 Chango' mbe	7.0	–	–	
2-18 Temeke	6.0	–	–	
2-19 Mbagala 1	6.0	1.0	A	6.0*1.0*4,910=29,460Tsh./m
sub-total		27.0km		
3. Local Roads (Area Roads Proposed by DCC)				
A. Oyster Bay Area	5.0	8.1	C	5.0*1.0*2,520=12,600Tsh./m
D. Central Area	7.0	10.3	C	7.0*1.0*2,520=17,640Tsh./m
E. Kariakoo Area	6.0	30.0	A	6.0*1.0*4,910=29,460Tsh./m
F. Chango' mbe Area	7.0	14.6	A	7.0*1.0*4,910=34,370Tsh./m
G. Temeke Area	7.0	13.9	A	7.0*1.0*4,910=34,370Tsh./m
H. Ilala Area	6.5	10.3	C	6.5*1.0*2,520=16,380Tsh./m
I. Other Important Rd.				
-Mwinjima	7.0	1.5	C	7.0*1.0*2,520=17,640Tsh./m
sub-total		88.7km		
Total		122.9km		

Unit Cost of Each Improvement Measures

Name of Roads	Urgent Repair of Pot-hole					
	Width (m)	Total Length (km)	Ment. level ① (km)	Overlay ② (km)	Recon. ③ (km)	①*10*1nos. /100m+②*10*5nos. /100m ③*10*10nos. /100m
1. Arterial Roads						
1-1 New bagamoyo						
-Up to Mpakani J.	7.0	8.0	5.0	2.0	1.0	(50*1+20*5+10*10) =250nos.
-Beyond Mpakani J.	7.0	15.0	3.0	8.0	4.0	(30*1+80*5+40*10) =830nos.
1-2 Morocco	7.5	3.5	—	3.5	—	(0*1+35*5+ 0*10) =175nos.
1-3 Kinondoni	7.5	0.7	0.2	—	0.5	(2*1+ 0*5+ 5*10) =52nos.
1-4 Morogoro						
-Up to Port Ac. J.	6.0	4.8	4.8	—	—	(48*1+ 0*5+ 0*10) =48nos.
-Beyond Port Ac. J.	6.0	4.7	4.7	—	—	(47*1+ 0*5+ 0*10) =47nos.
1-8 Bandari	7.0	2.2	1.0	—	1.2	(10*1+ 0*5+12*10) =130nos.
1-9 Kilwa						
-Up to 8.6km	7.0	8.6	2.6	5.5	0.5	(26*1+55*5+ 5*10) =351nos.
1-10 Uhulu	12.8	2.8	—	2.8	—	(0*1+28*5+ 0*10) =140nos.
1-11 Msinbazi	12.6	1.6	0.6	1.0	—	(6*1+10*5+ 0*10) =56nos.
1-13 Upanga	10.5	1.8	1.8	—	—	(18*1+ 0*5+ 0*10) =18nos.
1-15-1 Nkurumah	9.5	0.3	—	0.3	—	(0*1+ 3*5+ 0*10) =15nos.
1-15-3 Sokoine	9.5	0.8	0.8	—	—	(8*1+ 0*5+ 0*10) =8nos.
1-15-4 Gerezani	10.0	1.2	—	1.2	—	(0*1+12*5+ 0*10) =60nos.
1-15-5 Kivukoni	5.0	1.0	—	1.0	—	(0*1+10*5+ 0*10) =50nos.
1-15-6 Maktaba	12.0	0.9	—	0.9	—	(0*1+ 9*5+ 0*10) =45nos.
1-15-7 Ohio	9.0	1.0	—	1.0	—	(0*1+10*5+ 0*10) =50nos.
1-15-8 Ocean	7.0	3.2	—	3.2	—	(0*1+32*5+ 0*10) =160nos.
sub-total		62.1km				
2. Collector Roads						
2-1 Old Bagamoyo	6.5	8.2	—	2.0	6.2	(0*1+20*5+62*10) =720nos.
2-2 Haile Sela.	6.5	5.0	—	3.0	2.0	(0*1+30*5+20*10) =350nos.
2-3 Toure Drive	6.5	5.6	—	5.6	—	(0*1+56*5+ 0*10) =280nos.
2-4 Bongoyo	6.5	0.8	—	0.8	—	(0*1+ 8*5+ 0*10) =40nos.
2-5 Shekilango	6.5	3.8	—	2.0	1.8	(0*1+20*5+18*10) =280nos.
2-6 Kondoa	7.5	1.2	—	1.2	—	(0*1+12*5+ 0*10) =60nos.
2-7 Mwinjima	7.0	2.4	—	—	2.4	(0*1+ 0*5+24*10) =240nos.
2-8 Makanya	6.5	5.0	—	1.5	3.5	(0*1+15*5+35*10) =425nos.
2-10 KigogoC-1	6.5	2.0	1.0	—	1.0	(10*1+ 0*5+10*10) =110nos.
2-13 Old Kigogo	6.5	6.8	—	1.0	5.8	(0*1+10*5+58*10) =630nos.
2-14 Kagera	7.5	2.0	1.0	—	1.0	(10*1+ 0*5+10*10) =110nos.
2-15 Mikumi	7.5	1.1	—	—	1.1	(0*1+ 0*5+11*10) =110nos.
2-16 New Kigogo	7.0	2.7	1.5	—	1.2	(15*1+ 0*5+12*10) =135nos.
2-17 Chango' mbe	7.0	4.6	3.0	1.6	—	(30*1+16*5+ 0*10) =110nos.
2-18 Temeke	6.0	1.9	1.9	—	—	(19*1+ 0*5+ 0*10) =19nos.
2-19 Mbagala 1	6.0	1.4	0.4	—	1.0	(4*1+ 0*5+10*10) =104nos.
sub-total		54.5km				
3. Local Roads (Area Roads Proposed by DCC)						
A. Oyster Bay Area	5.0	8.1	—	—	8.1	(0*1+ 0*5+81*10) =810nos.
D. Central Area	7.0	10.3	—	—	10.3	(0*1+ 0*5+103*10) =1030nos.
E. Kariakoo Area	6.0	30.0	—	—	30.0	(0*1+ 0*5+300*10) =3000nos.
F. Chango' mbe Area	7.0	14.6	—	—	14.6	(0*1+ 0*5+146*10) =1460nos.
G. Temeke Area	7.0	13.9	—	—	13.9	(0*1+ 0*5+136*10) =1360nos.
H. Ilala Area	6.5	10.3	—	—	10.3	(0*1+ 0*5+103*10) =1030nos.
I. Other Important Rd.						
-Mwinjima	7.0	1.5	—	—	1.5	(0*1+ 0*5+15*10) =150nos.
sub-total		88.7km				
Total		205.3km				

Appendix 10-3-5: Preliminary Cost of Improvement Measures for Each Road

Continued

Name of Roads	Roads Length	Categories A							Categories B
		A-1 Overlay	A-2 Reconstruc. of Pavemant	A-3 Widening	A-4 Drainage System	A-5 Bus bay	A-6 Intersec-tion	Total	B-1 Urgent Repair of Pot-holes
	(km)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)
1. Arterial Roads									
1-1 New bagamoyo									
-Up to Mpakani J.	8.0	37.140	43.470	498.660	14.940	13.560	-	607.770	3.110
-Beyond Mpakani J.	15.0	120.000	173.880	-	-	-	-	293.880	10.330
1-2 Morocco	3.5	56.250	-	-	-	8.270	-	64.520	2.180
1-3 Kinondoni	0.7	-	18.410	-	-	-	-	18.410	650
1-4 Morogoro									
-Up to Port Ac. J.	4.8	-	-	797.860	-	11.240	-	809.100	600
-Beyond Port Ac. J.	4.7	60.400	-	-	-	-	-	60.400	580
1-8 Bandari	2.2	-	52.160	-	3.740	-	-	55.900	1.620
1-9 Kilwa									
-Up to 8.6km	8.6	82.500	21.740	-	12.450	-	-	116.690	4.370
1-10 Uhulu	2.8	45.890	-	137.350	-	7.610	-	190.850	1.740
-Widening	(2.8)	-	-	(427.310)	-	-	-	(427.310)	(1.740)
1-11 Msinbazi	1.6	14.350	-	-	-	-	-	14.350	700
1-13 Upanga	1.8	-	-	274.700	4.540	-	-	279.240	220
1-15-1 Nkurumah	0.3	2.130	-	-	-	-	6.610	8.740	190
1-15-3 Sokoine	0.8	-	-	122.090	-	-	-	122.090	100
1-15-4 Gerezani	1.2	13.450	-	-	-	-	-	13.450	750
1-15-5 Kivukoni	1.0	5.610	-	-	-	-	-	5.610	620
1-15-6 Maktaba	0.9	12.110	-	-	-	-	13.890	26.000	560
1-15-7 Ohio	1.0	6.640	-	-	5.570	-	-	12.210	620
1-15-8 Ocean	3.2	16.540	-	-	-	-	-	16.540	1.990
sub-total	62.1km	473.010	309.660	1.830.660	41.240	40.680	27.110	2.715.750	30.930
				(2.120.620)					

Name of Roads	Roads Length	Categories A							Categories B
		A-1 Overlay	A-2 Reconstruc. of Pavemant	A-3 Widening	A-4 Drainage System	A-5 Bus bay	A-6 Intersec-tion	Total	B-1 Urgent Repair of Pot-holes
	(km)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)	(Tsh. *1000)
2. Collector Roads									
2-1 Old Bagamoyo	8. 2	17. 900	250. 260	—	64. 010	—	—	332. 170	8. 960
2-2 Haile Sela.	5. 0	31. 830	63. 920	—	—	—	—	95. 750	4. 350
2-3 Toure Drive	5. 6	26. 880	—	—	—	—	—	26. 880	3. 480
2-4 Bongoyo	0. 8	3. 840	—	—	—	—	—	3. 840	500
2-5 Shekilango	3. 8	31. 180	72. 660	—	22. 960	—	—	126. 800	3. 480
2-6 Kondoa	1. 2	6. 650	—	—	—	—	—	6. 650	750
2-7 Mwinjima	2. 4	—	104. 330	—	29. 880	—	—	134. 210	2. 990
2-8 Makanya	5. 0	7. 200	57. 330	—	14. 500	—	—	79. 030	5. 290
2-10 KigogoC-1	2. 0	—	31. 920	—	—	—	—	31. 920	1. 370
2-13 Old Kigogo	6. 8	12. 270	234. 120	—	41. 120	—	—	287. 510	7. 840
2-14 Kagera	2. 0	—	36. 830	—	—	—	—	36. 830	1. 370
2-15 Mikumi	1. 1	—	40. 510	—	—	—	—	40. 510	1. 370
2-16 New Kigogo	2. 7	—	52. 160	—	—	—	—	52. 160	1. 680
2-17 Chango' mbe	4. 6	12. 560	—	—	—	—	—	12. 560	1. 370
2-18 Temeke	1. 9	—	—	—	—	—	—	—	240
2-19 Mbagala 1	1. 4	—	29. 460	—	—	—	—	29. 460	1. 290
sub-total	54. 5km	150. 310	973. 500	—	172. 470	—	—	1. 296. 280	46. 330
3. Local Roads (Area Roads Proposed by DCC)									
A. Oyster Bay Area	8. 1	—	102. 060	—	—	—	—	102. 060	10. 080
D. Central Area	10. 3	—	181. 690	—	—	—	—	181. 690	12. 810
E. Kariakoo Area	30. 0	—	883. 800	—	—	—	—	883. 800	37. 320
F. Chango' mbe Area	14. 6	—	501. 800	—	—	—	—	501. 800	18. 160
G. Temeke Area	13. 9	—	477. 740	—	—	—	—	477. 740	16. 920
H. Ilala Area	10. 3	—	168. 710	—	—	—	—	168. 710	12. 810
I. Other Important Rd.									
—Mwinjima	1. 5	—	26. 460	—	—	—	—	26. 460	1. 870
sub-total	88. 7	—	2. 342. 260	—	—	—	—	2. 342. 260	109. 970
Total	205. 3km	623. 320	3. 625. 420	1. 830. 660	213. 710	40. 680	20. 500	6. 354. 290	187. 230
				(2. 120. 620)					

CHAPTER 11: EVALUATION OF PROJECT ROADS AND FORMULATION OF IMPLEMENTATION PROGRAMME

LIST OF APPENDICES

Appendix 11-1: Criteria of Priority Order for Each Road in terms of Socio- Economy

1. Land-use Pattern

1.1 Ranking of land-use pattern

Ranking of land-use pattern is given 10 points score and is classified into three items which are Industrial/ commercial area, Residential area and Agriculture/less developed area. These three areas are given each score as follows taking into consideration importance of generated and attracted traffic of each land-use area.

Land-use pattern	Score
Industrial/commercial area	10
Residential area	5
Agricurture/less developed area	0

1.2 Classification methodology of Land-use pattern

Method of a classification of existing land-use pattern for each areas will be considered following two methods based on the study results on the socio-economic situations of the study area in the progress report prepared by the study team.

- Visual classification of existing land-use pattern
- Numerical classification of existing land-use pattern

The visual classification of existing land-use pattern will be applied visualy to each areas by reffering the existing land-use map shown in the Fig. 2.1 "Existing land-use map in 1989" in the progress report of the study. While the numerical classification will be applied numerically to each traffic zones by the analysis of the existing figure of population and employment shown in the table 4.5 "Summary of Framework by traffic zone" in the progress report.

In the execution of the actual classification of each areas, degree of each land-use pattern or mixed degree of each land-use condition will be necessary to diside certain land-use pattern in case of mixed land-use area. Therefore the numerical classification is applied in this study.

Following classification of land-use pattern is identified based on the correlation analysis of distribution pattern of existing land-use map and with degree of population and employment density by each traffic zone.

Land-use pattern	degree of land-use
Industrial area	: Existing density of industrial employment is over 20 persons per hectare.
Commercial area	: Existing density of commercial employment is over 50 persons per hectare.
Agriculture/less development area	: Existing population density is under 20 people per hectare.

Each classification of land-use pattern are shown in table 1.1 and illustrated in fig. 1.1 and following traffic zones are identified as each land-use pattern.

Land-use pattern	identified traffic zone No.	Allocated score
Industrial area	: 1, 2, 5, 7, 9	10
Commercial area	: 1, 2, 5	10
Agriculture/less development area	: 20, 21, 25, 28, 29, 30, 31, 32, 33, 34	0
Residential area	: Other traffic zones except above	5

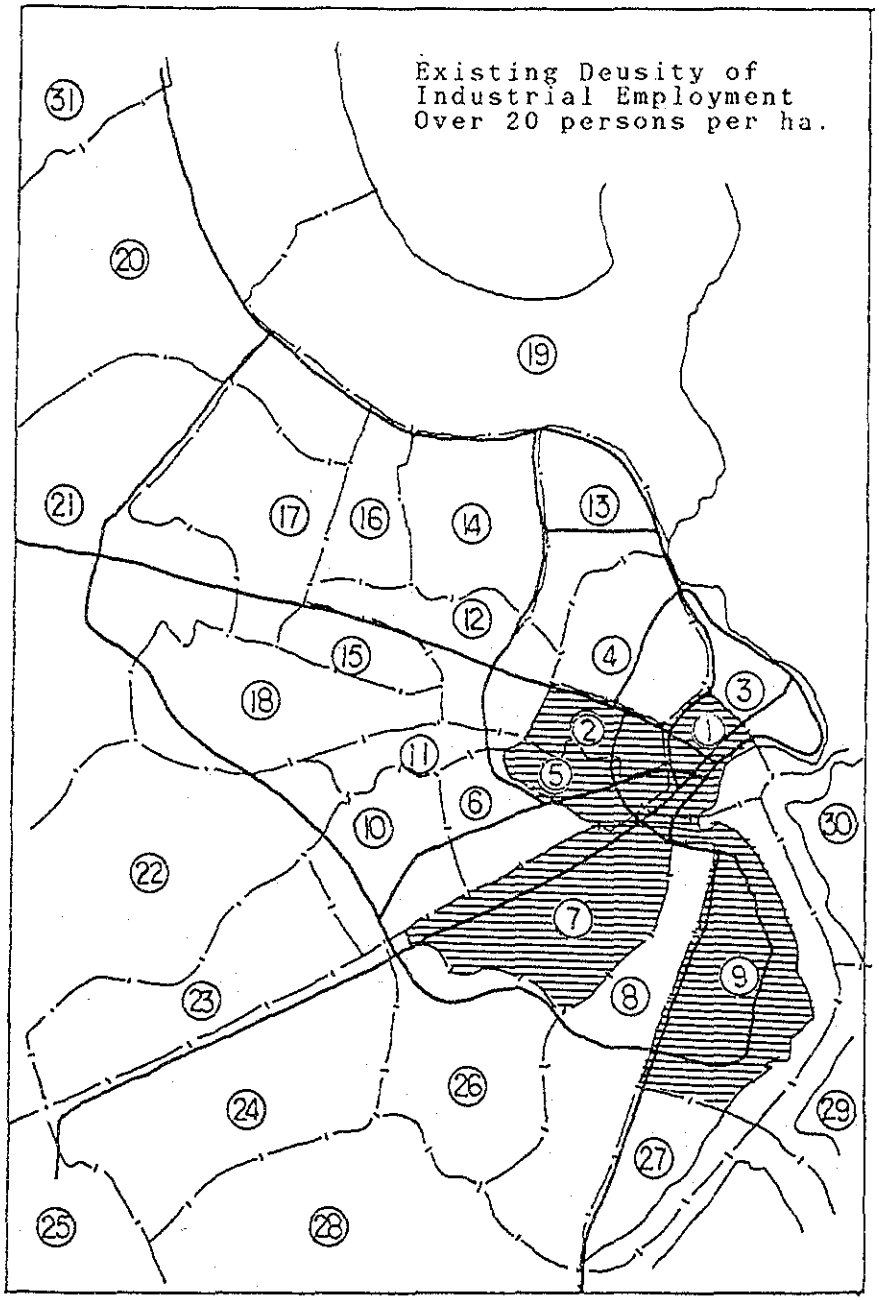
1.3 Evaluation of Proposed Roads by land-use pattern

Evaluation method of proposed roads by land-use pattern is applied by the established scores of each land-use pattern for the area where the proposed road directory access. Table 1.2 shows the evaluation results of each proposed roads adopted above mentioned classification and scoreing method.

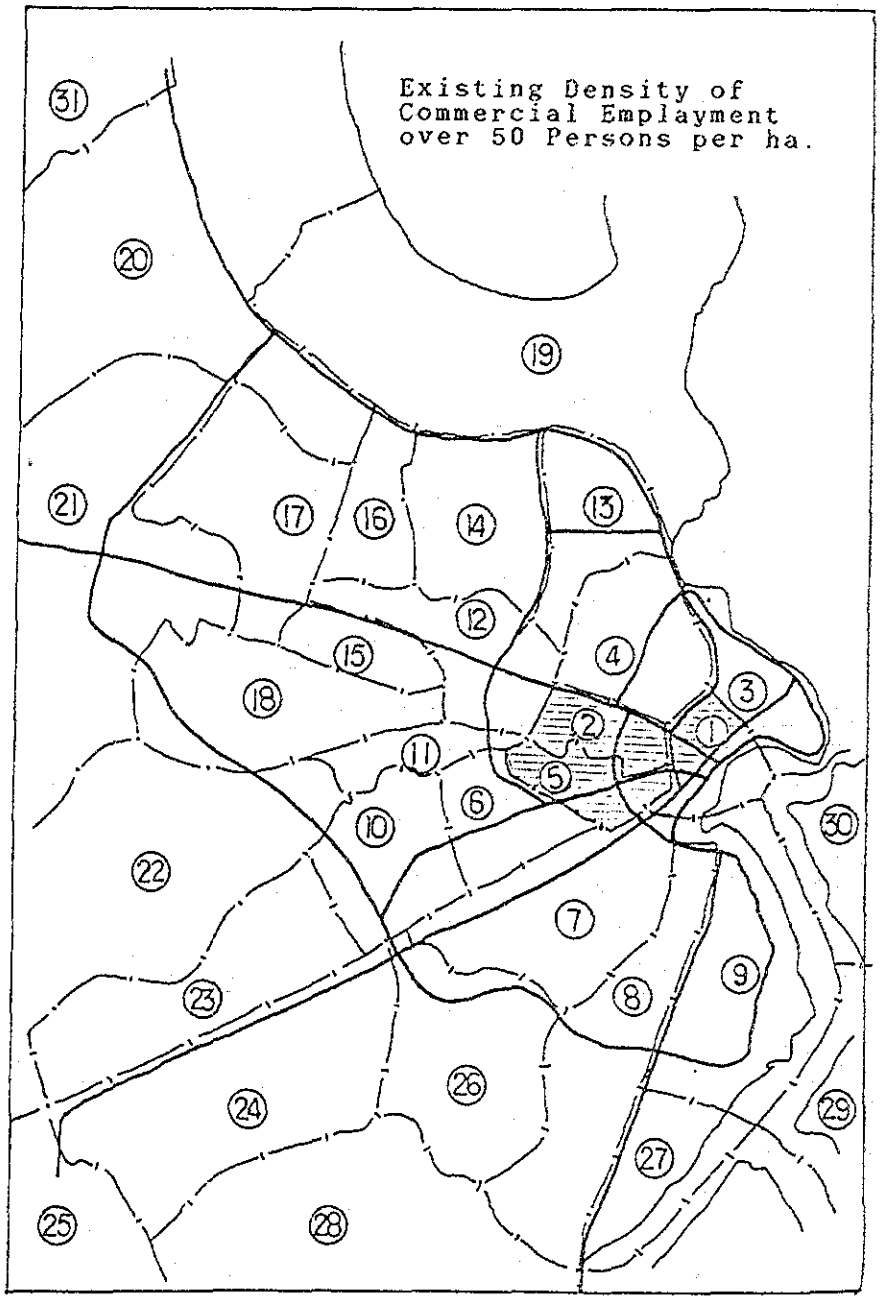
Table 1.1 Population and Enployment Density by Traffic Zone

Zone No	Zone name	Area (km)	Density in 1988(person/ha)		
			Population	Employment	
				Industry	Commercial
1.	City Centre	1.2	141	63	162
2.	Kariakoo	1.8	155	50	118
3.	Kivukoni	2.5	21	4	23
4.	Upanga	3.9	53	4	9
5.	Gerezani	1.9	119	32	58
6.	Ilala	2.2	159	15	36
7.	Keko	6.1	70	21	7
8.	Miburani	6.7	109	33	11
9.	Kurasini	5.7	47	4	5
10.	Buguluni	3.6	134	1	24
11.	Kigogo	3.6	59	8	4
12.	Magomeni	3.8	194	1	23
13.	Kinondoni	3.7	115	1	4
14.	Mwananya-mala	4.1	177	2	5
15.	Mburahati	1.7	317	2	11
16.	Tandele	2.5	234	1	4
17.	Manzese	5.4	101	5	4
18.	Mabibo	5.8	79	1	4
19.	Msasani	24.0	21	-	1
20.	Kawe	46.0	10	-	-
21.	Ubungo	38.0	12	1	-
22.	Tabata	9.1	20	1	1
23.	Vingunguti	5.2	65	-	-
24.	kipawa	10.4	35	4	3
25.	Ukonga	56.2	8	-	1
26.	Temeke	5.9	154	9	2
27.	Mtoni	2.1	188	4	16
28.	Mobagala	115.6	7	-	-
29.	Vijimkweni	69.2	2	-	-
30.	Kigamboni	35.2	7	-	-
31.	Kunduchi	217.2	2	-	-
32.	Kibanba	174.1	1	-	-
33.	Pugu	148.2	2	-	-
34.	Kisarawe	444.2	-	-	-

Fig. 1.1 Landuse Pattern(Industrial area)



(Commercial area)



(Agriculture/Less developed area)
Existing Population Density
under 20 persons per ha.
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Table 1.2 Evaluation Result of Priority Order for Each Roads in terms of Socio-economy

Link No.	Name of Roads	Road Length (km)	Direct Access Zone	Priority Order: Land-use Pattern	Priority Order: Development Potensial	Remark
1.	Arterial Roads					
1-1	New Bagamoyo	(23.0)				
-	Up to Mpakani J.	(8.0)	13,14,16,19	5	10	
-	Up to Wazo Hill	(15.0)	19,20,31	5	10	
1-2	Morocco	3.5	12,13,16	5	0	
1-3	Kinondoni	0.7	13	5	0	
1-4	Morogoro	9.5				
-	Up to Ring Rd.	5.0	12,15,17,21	10	10	
-	Up to TRM 4.5km	4.5	21	5	10	
1-8	Bandari	2.2	9	10	10	
1-9	Kilwa					
-	Up to 8.6km	8.6	8,9,27,28	5	10	
1-10	Uhulu	2.8	2,5,6,10	10	0	
1-11	Msimbazi	1.6	2,5	10	0	
1-13	Upanga	(1.8)	3,4	10	10	*1
1-15-1	Nkurumah	0.3	1	10	0	
1-15-3	Sokoine	0.8	1	10	0	
1-15-4	Gerezani	1.2	1,8,9	10	10	
1-15-5	Kivukoni	1.0	3	5	0	
1-15-6	Maktaba	0.9	1	10	0	
1-15-7	Ohio	1.0	1	10	0	
1-15-8	Ocean	3.2	3	5	0	
	Sub-total (1)	37.3km				
2.	Collector Roads					
2-1	Old Bagamoyo	8.2	19,20	5	10	
2-2	Haile Sela.	5.0	19	5	10	
2-3	Toure Drive	5.6	19	5	10	
2-4	Bongoyo	0.8	19	5	10	
2-5	Shekilango	3.8	17,20,21	5	10	
2-6	Kondoa	1.2	12	5	10	
2-7	Mwinjuma	2.4	14	5	0	
2-8	Makanya	5.0	12,16,17	5	10	
2-10	Kigogo C-1	2.0	21	10	10	*2
2-13	Old Kigogo	6.8	11,18,21	5	10	
2-14	Kagera	2.0	15	5	0	
2-15	Mikumi	1.1	12	5	10	
2-16	New Kigogo	2.7	6,11,12	5	0	
2-17	Chango'mbe	4.6	7,8	10	10	
2-18	Temeke	1.9	7,8	5	10	
2-19	Mbagala I	1.4	26	5	10	
	Sub-total (2)	54.5km				
3.	Local Roads (Area Roads Proposed by DCC)					
A.	Oyster Bay Area	8.1	19	5	10	
D.	Central Area	10.3	1	10	10	
E.	Kariakoo Area	30.0	2,5	10	10	
F.	Chango'mbe Area	14.6	7	10	10	
G.	Temeke Area	13.9	8,26	5	0	
H.	Ilala Area	10.3	6	5	0	
I.	Mwinjuma L-1	1.5	14	5	0	
	Sub-total (3)	88.7km				
	Total	180.5km				

*1: Foreign Embassy located.
*2: Textile factory located.

2. Development Potential

2.1 Ranking of Development potential

Ranking of Development potential is given 10 points score and classified into three items which are Industrial/ commercial development potential area, Residential development potential area and Less development potential area with following scores taking into consideration importance of each development potential.

Development potential	score
Industrial/commercial development potential area	10
Residential development potential area	5
Less development potential area	0

2.2 Classification method of Development Potential

Following the classification method applied in case of land-use pattern described as before, the numerical classification of development potential is applied to each traffic zones by using the proposed future increase of population and employment established in the progress report and shown in table 2.1. The development potential of each area on each land-use pattern will be a relative potential in the total development potential and there is no certain level of authorized development potential.

Therefore some assumption are established that a development potential area will be classified by it's future population or employment growth rate which is greater than total average growth rate of future population or employment in Dar es Salaam.

Potential area of development	Degree of development potential
Potential area of industrial development	greater than total average growth rate of industrial employment
Potential area of commercial development	greater than total average growth rate of commercial employment
Potential area of residential development	greater than total average growth rate of population

Calculation results of development potential by zone are shown in table 1.1 and illustrated in fig.2.1 and following traffic zones are identified as each potential area of development.

Potential area	identified traffic zone No.	score
Industrial development	4, 7, 9, 10, 21, 22, 23, 24, 25, 28, 30, 31, 33	10
Commertial development	17, 19, 20, 21, 22, 23, 24, 25, 28, 30, 31, 32, 33	10
Residential development	17, 19, 20, 21, 22, 23, 24, 25, 28, 30, 31, 32, 33, 34	5

2.3 Evaluation of Proposed Roads by development potential

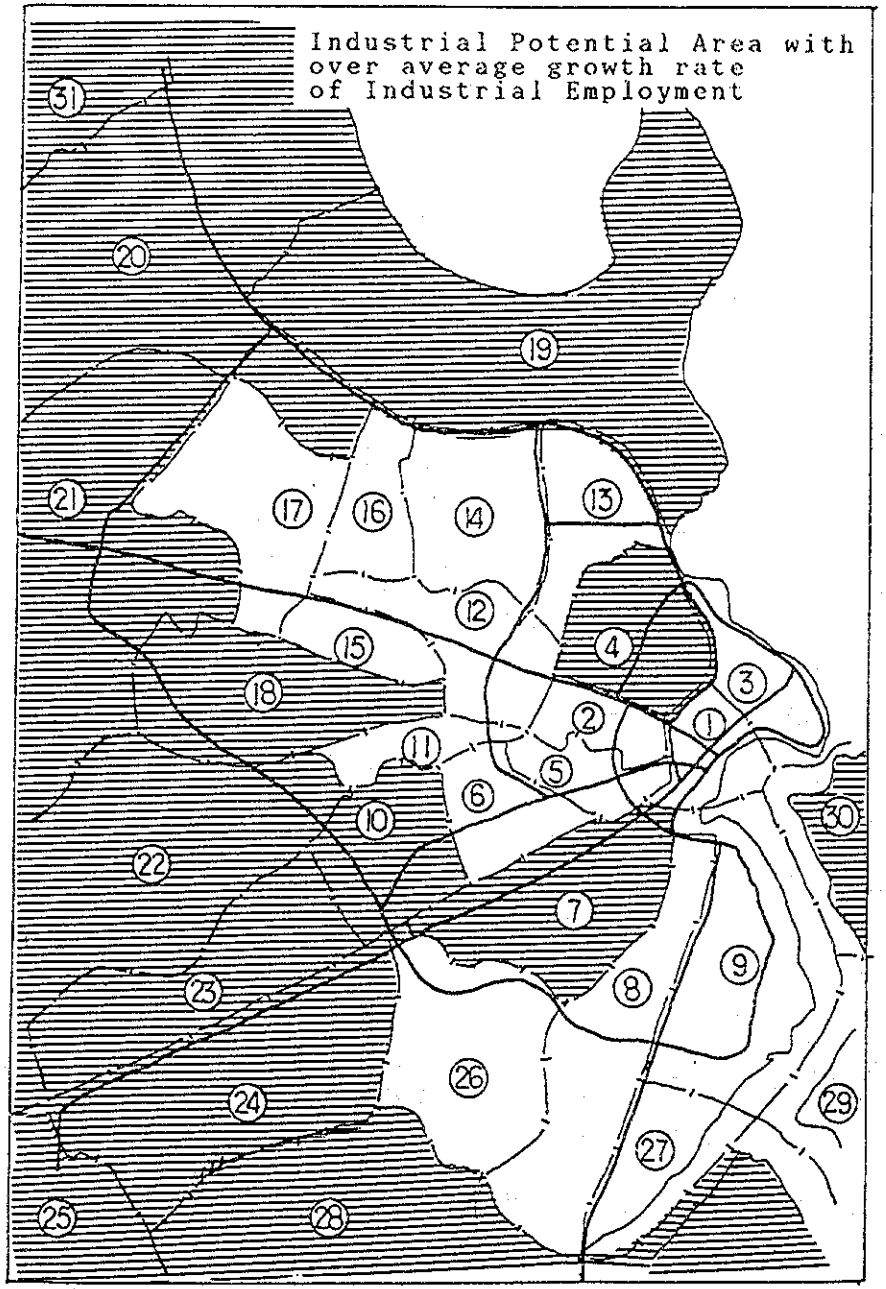
Evaluation method of proposed roads by development potential is applied using the established scores of each development potential for the traffic zone where the proposed road directly access. Table 1.2 shows the evaluation results of each proposed roads adopted above mentioned classification and scoreing method.

Table 2.1 Growth Rate of Population and Employment by Traffic Zone

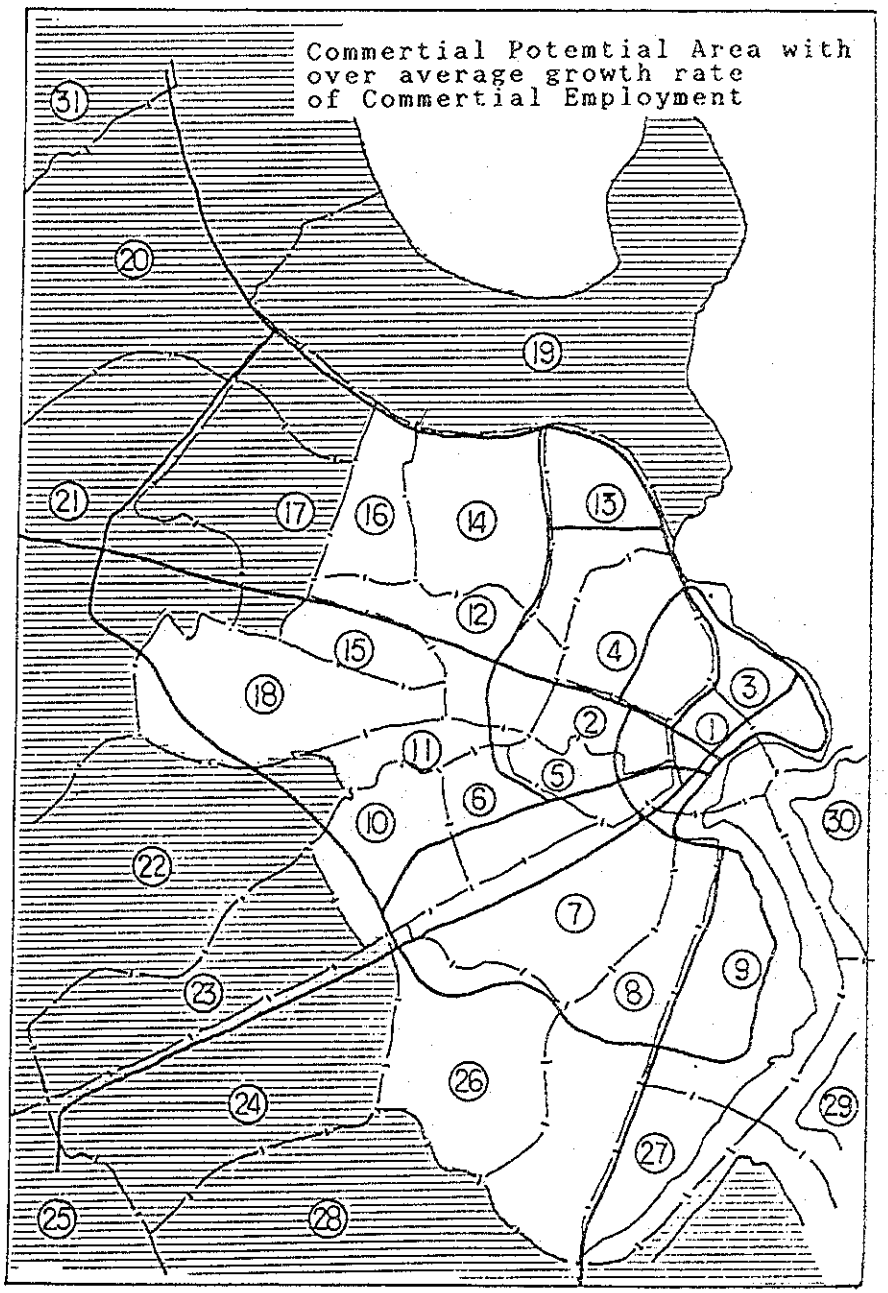
Zone No.	zone name	Population 1988	Population 2000	Growth Rate	Industrial Employment 1988	Industrial Employment 2000	Growth Rate	Commercial Employment 1988	Commercial Employment 2000	Growth Rate
1.	City Centre	16,904	16,000	0.94	7,600	9,800	1.29	19,400	26,200	1.35
2.	Kariakoo	27,889	29,000	1.04	9,000	11,600	1.29	21,300	28,600	1.34
3.	Kivukoni	5,372	5,000	0.93	900	1,200	1.33	5,800	7,800	1.34
4.	Upanga	20,827	23,000	1.10	1,600	4,000	2.5	3,500	2,900	0.83
5.	Gerezani	22,527	23,000	1.02	6,100	9,800	1.61	11,000	14,800	1.35
6.	Ilala	5,048	39,000	1.11	3,200	5,100	1.59	7,900	10,700	1.35
7.	Keko	42,868	50,000	1.16	12,900	7,900	2.94	4,400	4,100	0.93
8.	Miburani	72,892	82,000	1.12	2,600	3,300	1.27	7,200	6,000	0.83
9.	Kurasini	26,776	45,000	1.68	8,800	26,100	2.97	3,100	3,900	1.26
10.	Buguluni	48,247	72,000	1.49	1,600	5,000	3.12	8,500	9,500	1.12
11.	Kigogo	21,222	28,000	1.32	500	600	1.2	1,500	1,500	1.0
12.	Magomeni	73,665	83,000	1.13	3,200	4,100	1.28	8,700	11,700	1.34
13.	Kinondoni	42,387	63,000	1.49	200	300	1.5	1,400	1,600	1.14
14.	Mwananyamala	72,508	103,000	1.42	800	1,000	1.25	1,900	2,000	1.05
15.	Mburahati	3,911	51,000	0.95	200	300	1.5	1,900	2,500	1.35
16.	Tandele	58,413	63,000	1.08	200	300	1.5	1,100	1,500	1.36
17.	Manzese	54,499	113,000	2.07	2,500	3,200	1.28	2,300	12,800	5.56
18.	Mabibo	45,963	75,000	1.63	700	4,700	6.71	2,400	2,900	1.21
19.	Msasani	51,293	106,000	2.07	900	4,100	4.55	2,100	3,200	1.52
20.	Kawe	44,085	114,000	2.59	400	3,400	8.5	700	1,300	1.86
21.	Ubungo	46,980	122,000	2.60	2,000	1,200	5.6	1,800	3,200	1.78
22.	Tabata	18,465	153,000	8.28	700	4,700	6.71	1,300	3,500	2.69
23.	Vingunguti	33,690	63,000	1.87		3,900			2,800	
24.	kipawa	36,910	104,000	2.81	3,700	19,300	5.21	3,300	6,300	1.91
25	Ukonga	45,203	117,000	2.59	1,100	4,300	3.91	4,200	7,700	1.83
26	Temeke	91,144	111,000	1.22	5,600	11,000	1.96	14,500	13,200	0.91
27	Mtoni	39,417	48,000	1.22	800	1,000	1.25	3,400	3,100	0.91
28	Mbagala	78,350	238,000	3.04	600	2,700	4.50	4,300	9,700	2.26
29	Vijimkweni	12,212	20,000	1.64	-	-	-	-	-	-
30	Kigamboni	26,078	39,000	1.49	500	1,600	3.20	1,700	1,900	1.12
31	Kunduchi	34,879	69,000	1.98	100	3,000	20.00	200	300	1.50
32	Kibanba	21,504	51,000	2.37	300	400	1.33	600	1,000	1.66
33	Pugu	22,625	105,000	4.64	-	1,000	-	300	1,000	3.33
34	Kisarawe	16,016	38,000	2.37	-	-	-	-	-	-
	Total	1,360,850	2,461,000	1.81	89,200	198,300	2.22	157,500	214,400	1.36

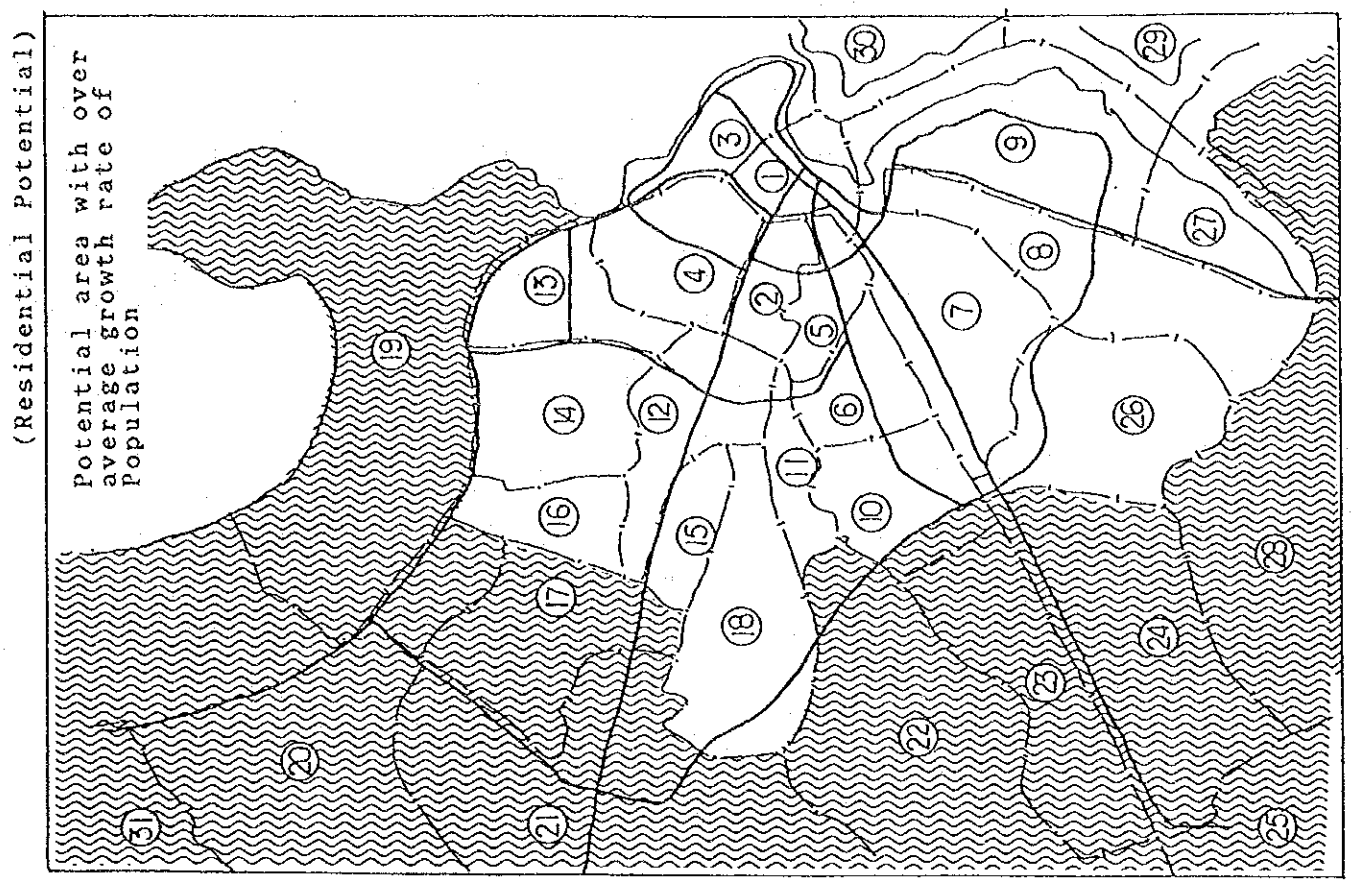
Fig. 2.1 Development Potential

(Industrial Potential)



(Commercial Potential)




(Residential Potential)
Potential area with over average growth rate of Population
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A－5－11

CITY COUNCIL OF DAR ES SALAAM

ALL COMMUNICATIONS TO BE ADDRESSED TO THE CITY DIRECTOR

P. O. Box 9084
TEL. 23551/5

CITY HALL,
DAR ES SALAAM.
TANZANIA

REFERENCE: RE/P.2/182/32

18/5/1989

Mr. Hiroki SHINKAI,
Deputy Team Leader,
JICA study Team

Dear Sir,

RE: YOUR REQUEST OF INFORMATION ON ON-GOING PROJECTS: FEASIBILITY STUDY ON IMPROVEMENT AND MAINTENANCE OF DAR ES SALAAM CITY ROADS.

We refer to your letter with Ref. No. ST - 12 dated April 28th 1989.

In response to the said letter we have the following information on the mentioned proposed road projects in the Masterplan of 1979.

1. Upanga Road:

   The project has not been implemented but it is proposed to be implemented in the nearest future through cooperation with Italian Government.

2. Tabata East Roads:

   The project has not been implemented and there are no near future plans.

3. Gerezani, Bandari and Kilwa Road:

   Not yet implemented and no near future plans.

4. Kurasini Bridge:

   Not yet implemented. It was requested by DCC that the bridge is included in the study.

Bagamoyo Road:

Improvements on New Bagamoyo Road have been proposed and are shedulled to be implemented in the nearest future. The proposed improvements are as follows:-

i- Selander Bridge to Mpakani Road junction (7.8km)
- Reconstruction to four - lane dual carriageway, with pedestrian walkways and cycle ways. This will include improvement of stormwater drains.

ii- Mpakani Road Junction to Wazo hill junction (12.7km);
- Widening to three lanes (Single carriageway) each of 3.25m width, 1.5m wide shoulders and improvement of storm water drainage.

In the said letter you requested for the required information on the proposed Improvement project for New Bagamoyo Road to be financed through cooperation with Italian Government. We have the following clarifications:-

i Project length:-
The proposed improvement will include the following road sections:-
- Tanganyika motors to Mpakani Road juction (9.20km)
- Mpakani Road Junction to Wazo Hill Junction (12.70km)
- Mpakani Road (3.8km)
- Road links to Wazo Hill cement factory and the beach hotels (Total: 10:90km)

ii. Rehabilitation measures to be taken:

(a) Tanganyika motors to Mpakani road Junction (9.2km):
- Re construction to four lane dual carriageway with 3.25m wide lanes and 3.5m wide sideways with pedestrian ways and cycleways, including improvement of drainage structures.

(b) -Mpakani Road (3.8km):
-Rehabilitation measures as in (a)

(c) Mpakani Road Junction to Wazo Hill junction (12.7km):
- Reconstruction to three lane, single carriageway with 3.25m width of each lane, provision of 1.5m wide shoulders and improvement of drainage structures.

(d) - Road link to Wazo Hill cement factory and the beach hotels (total:10.9km):
- Re construction to two - lane single carriageway with 3.25 wide lanes and 1.5m wide shoulders

iii. Contract period:
The proposed project period is 30 (thirty) months .

iv. Construction cost;

The construction cost is as follows:-

- Cost for maintenance works
- Local currency.....Tshs. 18,024,048.00
- Foreign currency.....ECU. 451,546.00

- Cost of the main Improvement project:
- Local currency.....Tshs. 443,329,096.20
- Foreign currency.....ECU. 18,906,846.39

We hope the above elaborations will meet your requirements.

Faithfully yours,

(A.C.Masenha)
for: CITY DIRECTOR
DAR ES SALAAM
For CITY DIRECTOR
DAR ES SALAAM

CC 1. Mr. I.N.Kimambo, Commissioner for construction and maintenance, MOCW.

2. Mr. S. Mwegunisa, Counterpart Engineer, MOCW,

3. JICA Dar es salaam Office.

CHAPTER 12 PRELIMINARY ENGINEERING DESIGN FOR THE HIGH PRIORITY PROJECTS

LIST OF APPENDICES

Appendix A-12-1: Area Road Traffic Count

AREA ROAD TRAFFIC COUNT

Date	21,11,1989							upper : up direction			
Road Name	Aggrey (City Centre)							middle : down direction			
Direction								lower : both direction			
Name of Surveyors											
Time	-8:00	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	Total
Type of Vehicle											
	47	57	100	99	125	142	67	79	67	129	912
1. Car Taxi	12	38	23	41	48	68	26	38	49	43	208
	59	95	123	140	173	210	93	117	116	172	1120
	19	30	43	59	60	46	31	34	53	50	425
2. Light Goods	5	17	20	23	23	30	19	17	29	25	208
	24	47	63	82	83	76	50	51	82	75	633
	3	6	6	6	9	9	4	5	9	11	68
3. Medium Goods	3	4	3	2	7	6	5	11	7	5	53
	6	10	9	8	16	15	9	16	16	16	121
	-	-	-	-	-	1	-	-	-	-	1
4. Heavy Goods	-	-	-	-	-	2	-	-	-	-	2
	-	-	-	-	-	3	-	-	-	-	3
	8	1	5	6	8	5	5	1	3	5	47
5. Bus	4	-	-	1	4	5	2	2	3	2	23
	12	1	5	7	12	10	7	3	6	7	70
	77	94	154	170	202	203	107	119	132	195	1453
Total	24	59	46	67	82	111	52	68	88	75	672
	101	153	200	237	284	314	159	187	220	270	2125

AREA ROAD TRAFFIC COUNT

Date	21,11,1989							upper : up direction			
Road Name	Zanaki Street (City Centre)							middle : down direction			
Direction								lower : both direction			
Name of Surveyors											
Time	-8:00	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	Total
Type of Vehicle											
	91	165	196	168	205	180	84	206	203	145	1643
1. Car Taxi	59	108	176	188	190	255	116	160	191	211	1654
	150	273	372	356	395	435	200	366	394	356	3297
	41	49	65	59	66	61	33	73	84	83	614
2. Light Goods	40	48	68	70	93	88	42	62	79	75	665
	81	97	133	129	159	149	75	135	163	158	1279
	1	11	10	8	8	5	6	8	5	7	69
3. Medium Goods	7	9	7	11	15	6	4	6	5	7	77
	8	19	17	18	23	11	10	14	10	14	146
	0	0	-	-	-	-	-	-	-	-	
4. Heavy Goods	0	0	-	-	-	-	-	-	-	-	
	0	0	-	-	-	-	-	-	-	0	
	11	5	13	16	11	12	8	7	6	10	99
5. Bus	8	5	5	2	6	8	5	4	1	9	53
	19	10	18	18	17	20	13	11	7	19	152
	144	230	284	251	290	258	131	294	298	245	2425
Total	114	170	256	271	304	357	167	232	276	302	2449
	258	400	540	522	594	615	298	526	574	547	4874

AREA ROAD TRAFFIC COUNT

Date	21,11,1989										upper: up direction
Road Name	Libya Street (City Centre)										middle: down direction
Direction											lower : both direction
Name of Surveyors											
Time	-8:00	8-9	9-10	10-11	11-12	12- 1	1- 2	2-3	3-4	4-5	Total
Type of Vehicle											
	92	138	166	152	177	178	94	155	179	176	1507
1. Car Taxi	49	71	113	114	133	138	90	92	129	149	1078
	141	209	279	266	310	316	184	247	308	325	2585
	45	60	50	68	83	58	54	67	94	54	633
2. Light Goods	38	41	50	54	52	68	34	40	54	45	476
	93	101	100	122	135	126	88	107	148	99	1109
	05	09	09	05	04	14	07	07	12	06	78
3. Medium Goods	02	09	8	7	4	6	9	3	5	7	59
	7	18	17	13	8	20	16	10	17	13	137
	01	01	02	-	01	0	02	0	0	0	7
4. Heavy Goods	01	0	1	2	0	0	2	0	0	0	5
	2	1	3	2	1	0	4	0	0	0	12
	11	06	07	08	11	04	10	08	03	14	82
5. Bus	06	05	7	4	3	5	5	2	5	10	52
	17	11	14	12	14	9	15	10	8	24	134
	154	214	234	233	276	254	167	237	288	250	2307
Total	96	126	179	181	192	217	140	137	193	211	1672
	250	340	413	414	468	471	307	374	481	461	3979

AREA ROAD TRAFFIC COUNT

Date	21,11,1989										upper : up direction
Road Name	Kongo Street										middle : down direction
Direction											lower : both direction
Name of Surveyors											
Time	-8:00	8-9	9-10	10-11	11-12	12- 1	1- 2	2-3	3-4	4-5	Total
Type of Vehicle											
	15	13	11	12	12	20	23	22	24	30	182
1. Car Taxi	11	5	19	16	17	25	20	19	17	15	164
	26	18	30	28	29	45	43	41	41	45	346
	6	5	6	5	7	15	11	8	14	15	92
2. Light Goods	18	7	14	11	8	9	12	9	10	14	112
	24	12	20	16	15	24	23	17	24	29	204
	1	0	0	1	6	5	2	3	0	2	20
3. Medium Goods	2	3	1	0	3	4	4	0	2	2	21
	3	3	1	1	9	9	6	3	2	4	41
	0	0	0	0	0	0	0	1	4	0	5
4. Heavy Goods	0	0	0	0	1	0	0	0	3	0	4
	0	0	0	0	1	0	0	1	7	0	9
	1	1	2	1	6	1	1	2	2	5	22
5. Bus	1	1	1	2	2	6	0	6	1	1	21
	2	2	3	3	8	7	1	8	3	6	43
	23	19	19	19	31	41	37	36	44	52	321
Total	32	16	35	29	31	44	36	34	33	32	322
	55	35	54	48	62	85	73	70	77	84	643

AREA ROAD TRAFFIC COUNT

Date	22,11,1989										upper : up direction
Road Name	Mkunguni										middle : down direction
Direction											lower : both direction
Name of Surveyors											
Time	-8:00	8-9	9-10	10-11	11-12	12- 1	1- 2	2-3	3-4	4-5	Total
Type of Vehicle											
1. Car Taxi	48	71	96	105	104	102	74	83	96	90	869
	37	95	110	128	151	137	81	100	110	113	1062
	85	166	206	233	255	234	155	183	206	203	1931
2. Light Goods	27	50	54	47	58	33	34	50	48	35	436
	37	58	62	66	69	48	41	42	51	59	528
	64	108	116	113	127	81	75	92	99	94	964
3. Medium Goods	6	11	10	7	9	8	3	6	5	5	70
	8	13	10	11	10	13	10	13	10	6	104
	14	24	20	18	19	21	13	19	15	11	174
4. Heavy Goods	-	-	-	-	-	-	-	-	-	-	-
	-	2	-	-	-	-	-	-	-	-	2
	-	2	-	-	-	-	-	-	-	-	2
5. Bus	2	7	6	5	4	5	7	12	7	9	64
	6	12	10	5	7	8	1	5	10	11	75
	8	19	16	10	11	13	8	17	17	20	139
Total	83	139	166	164	175	148	118	151	156	139	1439
	88	175	192	210	237	206	133	160	181	189	1771
	171	314	358	374	412	354	251	311	337	328	3210

AREA ROAD TRAFFIC COUNT

Date	22,11,1989										upper : up direction
Road Name	Sikukuu Street (Kariakoo Area)										middle : down direction
Direction											lower : both direction
Name of Surveyors											
Time	-8:00	8-9	9-10	10-11	11-12	12- 1	1- 2	2-3	3-4	4-5	Total
Type of Vehicle											
1. Car Taxi	8	09	12	18	18	15	14	10	17	14	135
	08	09	14	15	12	17	18	13	13	14	133
	16	18	26	33	30	32	32	23	30	28	368
2. Light Goods	05	06	13	12	16	08	10	13	07	16	106
	03	10	05	05	08	13	06	11	16	12	91
	8	16	18	17	24	21	18	24	23	28	197
3. Medium Goods	07	03	04	07	02	04	03	05	01	01	37
	01	01	06	01	04	03	03	04	02	02	27
	8	4	10	8	6	7	6	9	3	3	64
4. Heavy Goods	-	-	-	-	-	-	-	-	01	01	02
	-	-	-	-	01	01	-	-	-	-	02
	-	-	-	-	1	1	-	-	1	1	4
5. Bus	04	01	01	02	03	-	02	05	02	02	22
	03	02	03	02	01	01	02	06	02	03	25
	7	3	4	4	4	1	4	11	4	5	47
Total	24	1	30	39	39	27	29	33	28	34	302
	1	22	28	23	26	35	31	34	33	31	278
	30	23	58	62	65	62	60	67	61	65	580

AREA ROAD TRAFFIC COUNT

Date	22,11,1989							upper : up direction			
Road Name	Mbozi Road (Chang'ombe Industrial Area)							middle : down direction			
Direction								lower : both direction			
Name of Surveyors											
Time	-8:00	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	Total
Type-of-Vehicle											
1. Car Taxi	33	61	102	100	103	90	56	79	79	71	774
	77	87	99	79	94	89	53	97	71	33	779
	110	148	201	179	197	179	109	176	150	104	1553
2. Light Goods	10	34	69	80	76	69	53	73	62	44	570
	38	61	75	55	74	50	52	63	52	34	554
	48	95	144	135	150	119	105	136	114	78	1124
3. Medium Goods	9	32	28	34	35	35	28	38	35	16	290
	5	27	36	29	46	36	28	34	30	11	282
	14	59	64	63	81	71	56	74	137	27	572
4. Heavy Goods	0	07	03	07	11	07	02	07	05	07	56
	0	03	04	07	10	08	02	06	04	02	46
	0	10	7	14	21	15	4	13	9	9	102
5. Bus	9	02	06	04	09	03	05	07	08	04	56
	9	03	11	04	03	04	05	06	04	04	53
	18	5	16	8	11	7	10	13	12	8	109
Total	61	136	208	225	233	204	144	204	189	142	1746
	129	181	225	174	227	187	140	206	161	84	1714
	190	317	433	399	460	391	284	410	350	226	3460

AREA ROAD TRAFFIC COUNT

Date	22,11,1989							upper : up direction			
Road Name	Changa Road (Chang'ombe Residensial Area)							middle : down direction			
Direction								lower : both direction			
Name of Surveyors											
Time	-8:00	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	Total
Type of Vehicle											
1. Car Taxi	46	39	50	43	30	37	27	41	45	28	386
	21	27	35	58	39	43	27	39	42	36	367
	67	66	85	101	69	80	54	80	87	64	753
2. Light Goods	07	23	24	22	20	18	26	33	30	15	218
	18	13	15	16	26	18	19	29	31	20	205
	25	61	39	38	46	36	45	62	61	35	423
3. Medium Goods	02	00	14	05	06	04	07	05	12	09	64
	02	04	05	08	06	06	08	05	14	04	62
	4	4	19	13	12	10	15	10	26	13	126
4. Heavy Goods	01	04	02	01	03	00	05	01	03	01	21
	01	04	01	00	00	01	01	04	00	00	12
	2	8	3	1	3	1	6	5	3	1	33
5. Bus	04	02	02	01	00	03	03	05	02	01	23
	03	02	01	00	00	03	02	04	02	01	18
	7	4	3	1	0	6	5	9	4	2	41
Total	60	68	92	72	59	62	68	85	92	54	712
	45	50	57	82	71	71	57	81	89	61	664
	105	118	149	154	130	133	125	166	181	115	1376

AREA ROAD TRAFFIC COUNT

Date	5.12.1989							upper : up direction			
Road Name	MAKATYA ROAD							middle : down direction			
Direction								lower : both direction			
Name of Surveyors											
Time	7.00 -8:00	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	Total
Type of Vehicle											
1. Car Taxi	7	2	4	2	5	5	4	5	9	9	52
	7	2	3	2	3	5	5	3	12	11	53
	14	4	7	4	8	10	9	8	21	20	105
2. Light Goods	7	7	2	1	3	2	4	3	3	6	38
	4	7	2	5	4	4	4	3	5	6	44
	11	14	4	6	7	6	8	6	8	12	82
3. Medium Goods	2	2	0	3	2	1	0	2	3	4	19
	3	0	0	2	6	2	1	2	3	5	24
	5	2	0	5	8	3	1	4	6	9	43
4. Heavy Goods	1	1	0	0	0	0	0	0	1	0	3
	0	0	1	2	0	0	0	0	0	0	3
	1	1	1	2	0	0	0	0	1	0	6
5. Bus	0	0	0	0	0	0	0	0	1	1	2
	0	0	0	0	0	0	0	1	2	0	3
	0	0	0	0	0	0	0	1	3	1	5
Total	17	12	6	6	10	8	8	10	17	20	114
	14	9	6	11	13	11	10	9	22	22	127
	31	21	12	17	23	19	18	19	39	42	241

Appendix A-12-2: Intersection Traffic Counting

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		UVT											
INTERSECTION NAME		MAKTABA STREET INTERSECTION											
DATE / PEAK HOUR		17,11,1989 AM											
DIRECTION		7:00 - 8:00						8:00 - 9:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Maktaba	UVT	149	52	1	0	15	217	168	51	4	2	13	238
Maktaba	Upanga Roundabout	118	45	2	0	7	172	124	37	0	0	8	169
	TOTAL	267	97	3	0	22	389	292	88	4	2	21	407
Upanga Roundabout	UVT	340	167	14	5	22	548	480	173	21	3	23	700
Upanga Roundabout	Maktaba	94	26	3	0	4	127	57	27	9	1	4	98
	TOTAL	434	193	17	5	26	675	537	200	30	4	27	798
UVT	Upanga Roundabout	385	162	36	1	35	619	429	159	18	4	17	627
UVT	Maktaba Street	273	121	10	0	46	450	319	97	15	2	61	494
	TOTAL	658	283	46	1	81	1069	748	256	33	6	78	1121
	TOTAL												
GRAND TOTAL		1359	573	66	6	129	2133	1577	544	67	12	126	2326

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		UVT											
INTERSECTION NAME		MAKTABA INTERSECTION											
DATE / PEAK HOUR		17,11,1989 PM											
DIRECTION		3:00 - 4:00						4:00 - 5:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Upanga	UVT	421	153	22	5	37	638	343	148	22	4	26	543
Upanga	Maktaba	46	12	1	0	2	61	230	24	5	0	4	263
	TOTAL	467	165	23	5	39	699	573	172	27	4	30	806
Maktaba	Roundabout	187	49	1	0	16	253	248	73	4	0	24	349
Maktaba	UVT	148	76	12	0	17	253	153	61	11	2	16	245
	TOTAL	335	125	13	0	33	506	403	134	15	2	40	594
UVT	Maktaba	240	98	16	1	30	385	211	68	9	2	32	322
UVT	Upanga Roundabout	331	138	27	5	20	521	412	165	25	1	32	635
	TOTAL	571	236	43	6	50	906	623	233	34	3	64	957
	TOTAL												
GRAND TOTAL		1373	526	79	11	122	2111	1599	539	76	9	134	2357

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		NEW BAGAMOYO ROAD											
INTERSECTION NAME		MOROCCO ROAD INTERSECTION											
DATE / PEAK HOUR		13,11,1989 PM											
DIRECTION		3 :00 - 4:00						4:00 - 5:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Morocco	Mwenge	50	32	12	2	34	130	76	52	19	2	39	188
Morocco	City Centre	41	23	6	1	7	78	74	34	14	1	10	133
	TOTAL	91	55	18	3	41	208	150	86	33	3	49	321
Bagamoyo	Morocco	46	32	9	2	33	122	204	109	34	1	20	368
Bagamoyo	City Centre	183	81	30	7	15	316	60	29	17	1	42	154
	TOTAL	229	113	39	9	48	438	269	138	51	2	62	522
City Centre	Bagamoyo	189	89	27	3	14	322	295	145	28	5	13	486
City Centre	Morocco	94	62	12	4	6	178	79	35	10	6	12	142
	TOTAL	283	151	39	7	20	500	374	180	38	11	25	628
	TOTAL												
GRAND TOTAL		503	319	96	19	109	1146	793	304	122	16	136	1471

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		NEW BAGAMOYO											
INTERSECTION NAME		OLD BAGAMOYO INTERSECTION											
DATE / PEAK HOUR		14,11,1989 AM.											
DIRECTION		7 :00 - 8:00						8:00 - 9:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
New Bagamoyo	Old Bagamoyo	25	19	-	-	1	45	50	38	-	-	2	90
New Bagamoyo	City Centre	288	150	28	4	8	478	576	300	56	8	16	956
	TOTAL	313	169	28	4	9	523	626	338	56	8	18	1046
Old Bagamoyo	New Bagamoyo	74	42	4	-	4	124	35	26	10	1	3	75
Old Bagamoyo	City Centre	312	42	4	-	8	366	164	50	9	1	2	226
	TOTAL	386	84	8	-	12	490	199	76	19	2	5	301
City Centre	Old Bagamoyo	140	78	2	2	2	224	85	44	10	1	5	145
City Centre	New Bagamoyo	320	150	40	6	26	542	260	107	44	6	14	431
	TOTAL	460	228	42	8	28	766	345	151	54	7	19	576
	TOTAL												
GRAND TOTAL		1159	481	78	12	49	1779	1170	565	129	17	42	1923

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		NEW B.GAMOYO ROAD											
INTERSECTION NAME		OLD BAGAMOYO ROAD INTERSECTION											
DATE / PEAK HOUR		14,11,1989 AM.											
DIRECTION		3 :00 - 4:00						4:00 - 5:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Old Bagamoyo	City Centre	140	69	12	4	7	234	162	56	7	1	2	228
Old Bagamoyo	New Bagamoyo	46	27	8	1	2	84	72	24	8	1	2	107
	TOTAL	186	96	20	5	11	318	234	80	15	2	4	335
New Bagamoyo	City Centre	266	102	30	6	16	420	175	105	26	3	3	312
New Bagamoyo	Old Bagamoyo	38	23	4	-	4	69	36	21	4	1	4	66
	TOTAL	304	125	34	6	20	489	211	126	30	4	7	378
City Centre	Old Bagamoyo	218	75	14	-	11	318	235	97	5	-	8	345
City Centre	New Bagamoyo	364	169	43	4	2	582	410	168	39	1	25	643
	TOTAL	532	244	57	4	13	900	645	265	44	1	33	988
	TOTAL												
GRAND TOTAL		1072	465	111	15	44	1707	1090	471	89	7	44	1701

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		BAGAMOYO ROAD											
INTERSECTION NAME		HAILE SELASSIE INTERSECTION											
DATE / PEAK HOUR		14,11,1989 AM.											
DIRECTION		7:00 - 8:00						8:00 - 9:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
City Centre	Bagamoyo	250	134	22	8	18	432	238	113	30	4	14	389
City Centre	Haile Selassie	62	24	6	2	4	98	71	29	5	2	3	110
	TOTAL	312	158	28	10	22	530	309	142	25	6	17	499
Bagamoyo	City Centre	476	178	20	2	24	700	410	190	32	6	20	658
Bagamoyo	Haile Selassie	168	74	6	0	8	256	99	50	9	2	5	165
	TOTAL	644	252	26	2	32	956	509	240	41	8	25	823
Haile Selassie	Bagamoyo	112	32	14	0	4	162	77	20	8	2	0	107
Haile Selassie	City Centre	62	26	4	0	4	96	73	41	10	0	2	126
	TOTAL	174	58	18	0	8	258	150	61	18	2	2	233
	TOTAL												
GRAND TOTAL		1130	468	72	12	62	1744	968	443	84	16	44	1565

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		NEW BAGAMOYO ROAD											
INTERSECTION NAME		HAILE SELASSIE INTERSECTION											
DATE / PEAK HOUR		14,11,1989 PM.											
DIRECTION		3:00 - 4:00						4:00 - 5:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
City Centre	New Bagamoyo	448	196	36	5	22	707	444	208	18	0	37	707
City Centre	Haile Selassie	85	20	7	0	2	114	78	43	5	1	6	133
	TOTAL	533	216	43	5	24	821	522	251	23	1	43	840
Haile Selassie	City	89	28	9	0	4	130	87	25	8	0	2	122
Haile Selassie	Bagamoyo	91	50	11	0	3	155	112	26	11	0	1	150
	TOTAL	130	78	20	0	7	235	199	51	19	0	3	272
Bagamoyo	City Centre	360	164	31	6	31	592	271	136	24	3	35	469
Bagamoyo	Haile Selassie	87	26	11	4	4	132	81	36	10	0	3	130
	TOTAL	447	190	42	10	35	724	352	172	34	3	38	599
	TOTAL												
GRAND TOTAL		1160	484	105	15	65	1830	1073	474	76	4	84	1711

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		BAGAMOYO ROAD											
INTERSECTION NAME		KINONDONI ROAD INTERSECTION											
DATE / PEAK HOUR		16,11,1989 AM											
DIRECTION		7:00 - 8:00						8:00 - 9:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Bagamoyo	City Center	702	300	28	-	18	1048	641	244	28	2	28	943
Bagamoyo	Kinondoni	-	-	-	-	-	-	7	1	0	-	-	8
Bagamoyo	Kenyatta	2	1	-	-	-	3	2	1	-	-	-	3
	TOTAL	704	301	28	-	18	1051	650	246	28	2	28	954
Kenyatta Drive	City Center	579	141	8	-	2	730	244	69	6	-	7	326
Kenyatta Drive	Bagamoyo	-	1	-	-	-	1	2	2	-	-	-	4
Kenyatta Drive	Kinondoni Road	9	3	-	-	-	12	9	-	-	-	-	9
	TOTAL	588	145	8	-	2	743	255	71	6	-	7	339
From Kinondoni	Bagamoyo	12	1	1	-	-	14	13	4	2	-	-	19
From Kinondoni	City Center	477	173	23	1	49	723	238	93	15	-	20	366
From Kinondoni	Kenyatta Drive	11	1	-	-	-	12	5	2	-	-	2	9
	TOTAL	500	175	24	1	49	749	256	99	17	-	22	394
City Center	Kinondoni	166	57	9	-	58	290	123	45	7	-	27	202
City Center	Bagamoyo	388	172	46	1	46	653	300	157	42	3	19	521
City Center	Kenyatta Drive	117	27	5	-	6	155	63	27	7	-	4	101
	TOTAL	671	256	60	1	110	1098	486	229	56	3	50	824
GRAND TOTAL		2463	877	120	2	179	3641	1647	645	107	5	107	2511

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		BAGAMOYO ROAD											
INTERSECTION NAME		KINONDONI ROAD INTERSECTION											
DATE / PEAK HOUR		16 , 11 , 1989 PM											
DIRECTION		3:00 - 4:00						4:00 - 5:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Kinondoni	Bagamoyo Road	7	3	2	-	1	13	7	2	1	-	-	10
Kinondoni	City Center	161	37	9	1	16	224	146	42	8	-	38	234
Kinondoni	Kenyatta Drive	16	2	-	-	-	18	12	4	-	-	-	16
	TOTAL	184	42	11	1	17	255	165	48	9	-	38	260
Kenyatta	City Center	134	31	3	-	7	175	116	28	7	-	5	156
Kenyatta	Bagamoyo	2	-	-	-	-	2	2	-	-	-	-	2
Kenyatta	Kinondoni	8	1	-	-	-	9	6	3	-	-	-	9
	TOTAL	144	32	3	-	7	186	124	31	7	-	5	167
City Center	Kinondoni	263	79	13	-	53	408	238	98	9	1	54	400
City Center	Bagamoyo	678	227	49	2	46	1002	609	208	37	3	44	901
City Center	Kenyatta Drive	262	33	9	1	7	312	232	62	7	1	2	304
	TOTAL	1203	339	71	3	106	1722	1079	368	53	5	100	1605
Bagamoyo	City Center	452	199	40	1	23	715	390	166	36	2	25	619
Bagamoyo	Kenyatta Drive	2	-	-	-	-	2	27	10	4	-	-	41
Bagamoyo	Kinondoni Road	22	9	3	-	-	34	9	5	-	-	-	14
	TOTAL	476	208	43	1	23	751	426	181	40	2	25	674
GRAND TOTAL		2007	621	128	5	153	1914	1794	628	109	7	169	2706

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		UPANGA ROAD											
INTERSECTION NAME		UN ROAD INTERSECTION											
DATE / PEAK HOUR		16,11,1989 AM											
DIRECTION		7:00 - 8:00						8:00 - 9:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
UN	Bagamoyo	234	112	21	2	18	387	166	94	17	4	15	296
UN	Upanga Road	228	47	1	0	9	285	132	43	2	0	8	185
	TOTAL	462	159	22	2	27	672	298	137	19	4	23	481
City Centre	Bagamoyo	420	156	27	1	57	661	336	170	37	4	37	584
City Centre	UN	76	32	5	0	5	118	92	31	2	1	5	131
	TOTAL	496	187	33	1	62	779	428	201	39	5	42	715
Bagamoyo	City Centre	1157	367	33	1	84	1642	238	156	16	1	13	424
Bagamoyo	UN	404	254	24	1	52	735	855	303	19	2	54	1233
	TOTAL	1561	621	57	2	136	2377	1093	459	35	3	67	1657
	TOTAL												
GRAND TOTAL		2519	967	112	5	225	3828	1819	797	93	12	132	2853

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		UPANGA ROAD											
INTERSECTION NAME		UN ROAD INTERSECTION											
DATE / PEAK HOUR		16,11,1989 AM.											
DIRECTION		3:00 - 4:00						4:00 - 5:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
UN Road	City Center	285	136	24	5	24	474	300	127	20	3	27	596
UN Road	Bagamoyo	96	15	2	2	7	122	75	14	10	2	0	101
	TOTAL	381	151	26	7	31	596	375	141	30	5	27	578
Upanga	Bagamoyo	722	272	36	9	68	1107	723	280	40	4	60	1117
Upanga	UN Road	69	26	5	0	4	104	66	40	8	1	3	118
	TOTAL	791	298	41	9	72	1211	789	330	48	5	63	1235
Bagamoyo	Upanga	584	187	18	2	40	831	476	143	22	1	62	704
Bagamoyo	UN Road	195	71	7	1	14	289	207	94	9	1	13	324
	TOTAL	780	258	25	3	54	1120	683	237	31	2	75	1028
	TOTAL												
GRAND TOTAL		1952	707	92	19	157	2927	1847	703	109	12	165	2841

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		UPANGA ROAD											
INTERSECTION NAME		OCEAN ROAD INTERSECTION											
DATE / PEAK HOUR		16,11,1989 AM											
DIRECTION		7:00 - 8:00						8:00 - 9:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
City Center	Bagamoyo	349	133	31	1	54	568	316	121	33	3	28	504
City Center	Ocean	34	13	1	0	2	50	23	10	1	0	2	36
	TOTAL	383	146	32	1	56	618	339	134	34	3	30	540
Bagamoyo	City Centre	575	203	22	2	54	856	475	172	16	2	29	694
Bagamoyo	Ocean	886	202	16	0	47	1151	548	184	7	0	35	774
	TOTAL	1461	405	38	2	101	2007	1023	356	23	2	64	1468
Ocean	Bagamoyo	192	52	2	-	8	254	202	80	9	0	12	303
Ocean	City Centre	23	9	0	0	1	33	21	4	0	0	0	25
	TOTAL	215	61	2	0	9	287	223	84	9	0	12	328
	TOTAL												
GRAND TOTAL		2059	612	72	3	166	2912	1585	574	66	5	104	2334

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		UPANGA ROAD											
INTERSECTION NAME		OCEAN ROAD INTERSECTION											
DATE / PEAK HOUR		16,11,1989 PM.											
DIRECTION		3:00 - 4:00						4:00 - 5:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Upanga	Bagamoyo	555	176	33	1	51	816	562	213	29	3	57	864
Upanga	Ocean Road	16	4	1	0	1	22	15	5	0	0	1	21
	TOTAL	571	180	34	1	52	838	577	218	29	3	58	885
Bagamoyo	Upanga	210	61	4	0	10	285	337	119	19	2	50	527
Bagamoyo	Ocean	418	155	22	1	42	638	188	51	6	0	12	257
	TOTAL	628	216	26	1	52	923	525	170	25	2	62	784
Ocean	Bagamoyo	381	95	11	2	20	509	358	79	12	0	10	459
Ocean	City Centre	20	6	1	0	3	30	25	6	1	0	1	33
	TOTAL	401	101	12	2	23	539	383	85	13	0	11	492
	TOTAL												
GRAND TOTAL		1600	497	72	4	127	2300	1485	473	67	5	131	2161

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		UPANGA											
INTERSECTION NAME		TANGANYIKA MOTORS ROUNDABOUT INTERSECTION											
DATE / PEAK HOUR		17,11,1989 AM.											
DIRECTION		7:00 -8:00						8:00 - 9:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Ohio	Upanga	80	37	5	2	7	131	84	24	8	2	15	133
Ohio	City Center	21	2	2	-	1	26	28	3	-	-	1	32
Ohio	UWT	125	37	6	3	6	177	209	74	12	-	17	312
	TOTAL	226	76	13	5	14	334	321	101	20	2	33	477
City Center	Bagamoyo Road	150	40	6	1	15	212	153	38	9	-	14	214
City Center	UWT Street	44	16	1	1	1	63	49	11	-	-	1	61
City Center	Ohio Street	10	1	-	-	-	11	9	4	2	-	-	15
	TOTAL	204	57	7	2	16	286	211	53	11	-	15	290
UWT	City Center	110	43	4	1	7	165	132	46	5	1	7	191
UWT	Ohio	166	62	13	1	14	256	148	46	14	1	7	216
UWT	Upanga	102	54	10	1	14	181	178	70	4	2	6	260
	TOTAL	378	159	27	3	35	602	458	162	23	4	20	667
Upanga	Ohio	137	63	9	-	19	228	177	62	11	-	15	265
Upanga	City Center	383	135	7	-	28	553	238	84	14	2	23	361
Upanga	UWT	160	79	12	-	4	255	275	71	10	-	13	369
	TOTAL	680	277	28	-	51	1036	690	217	35	2	51	995
GRAND TOTAL		1483	569	75	10	116	2258	1630	533	89	8	119	2429

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		UNT											
INTERSECTION NAME		TANGANYIKA MOTORS ROUNDABOUT INTERSECTION											
DATE / PEAK HOUR		17,11,1939 PM.											
DIRECTION		3:00 - 4:00						4 :00 - 5 :00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
UNT	City Center	78	22	2	-	3	105	76	31	1	-	2	110
UNT	Ohio	64	28	6	4	5	107	95	28	7	2	15	147
UNT	Upanga	258	86	21	1	25	391	200	77	10	1	28	316
	TOTAL	400	136	29	5	33	603	371	136	18	3	45	573
Upanga	Ohio	102	37	4	-	3	146	88	22	1	-	3	114
Upanga	City Center	185	77	20	-	17	299	150	53	11	1	36	251
Upanga	UNT	221	60	13	-	14	308	148	76	18	1	8	251
	TOTAL	508	174	37	-	34	753	386	151	30	2	47	616
Ohio	City Center	16	4	-	-	1	21	16	2	-	1	2	21
Ohio	UNT	150	50	11	1	15	227	114	46	5	-	14	179
Ohio	Uparga	183	73	6	2	34	298	171	75	6	-	32	284
	TOTAL	349	127	17	3	50	546	301	123	11	1	48	484
City Center	Upanga	319	99	18	1	21	458	375	115	5	2	18	515
City Center	UNT	6	3	0	0	0	9	4	2	0	0	0	6
City Center	Ohio	3	1	0	0	0	4	4	1	0	0	0	5
	TOTAL	328	103	18	1	21	471	383	118	5	2	18	526
GRAND TOTAL		1585	540	101	9	133	2373	1441	528	64	8	158	2199

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		MOROGORO ROAD											
INTERSECTION NAME		PORT ACCES INTERSECTION											
DATE / PEAK HOUR		15,11,1939 AM											
DIRECTION		7:00 - 8:00						8 :00 - 9 :00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Port Access	Morogoro	45	20	15	12	18	110	22	24	11	5	11	73
Port Access	Mwenge	75	38	20	17	8	158	36	15	21	7	7	86
Port Access	City Center	66	42	17	8	11	144	30	22	23	5	6	86
	TOTAL	186	100	52	37	37	412	88	61	55	17	24	245
Mwenge	Port Acces	172	89	25	2	19	307	63	39	32	6	3	143
Mwenge	Morogoro	38	21	9	-	10	78	18	9	6	3	12	48
Mwenge	City Center	25	36	7	1	4	73	49	24	2	2	1	78
	TOTAL	235	146	41	3	33	458	130	72	40	11	16	269
Morogoro	Port Access	116	70	10	10	18	224	40	27	7	15	13	102
Morogoro	City Center	59	33	26	-	49	167	49	36	12	1	38	136
Morogoro	Mwenge	12	11	8	-	8	39	11	5	3	1	7	27
	TOTAL	187	114	44	10	75	430	100	68	22	17	58	265
City Center	Port Acces	40	40	13	1	12	106	55	47	32	4	8	146
City Center	Morogoro	159	82	41	11	40	333	51	33	21	7	46	158
City Center	Mwenge	73	28	17	2	30	150	25	31	9	0	2	67
	TOTAL	272	150	71	14	82	589	131	111	62	11	56	371
GRAND TOTAL		880	510	288	64	227	1889	449	312	179	56	154	1150

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		MOROGORO ROAD											
INTERSECTION NAME		PORT ACCESS ROAD INTERSECTION											
DATE / PEAK HOUR		15,11,1989 PM.											
DIRECTION		3 :00 - 4:00						4:00 - 5:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Morogoro	Port Access	20	11	15	5	16	67	35	24	18	6	14	97
Morogoro	City Centre	61	38	16	2	63	180	51	30	21	-	49	151
Morogoro	Mwenge	27	11	8	2	15	63	21	17	7	-	10	55
	TOTAL	108	60	39	9	94	310	107	71	46	6	73	303
Mwenge	Port Access	49	35	43	6	7	140	45	28	31	8	2	114
Mwenge	Morogoro	30	11	4	1	6	52	27	21	7	1	14	70
Mwenge	City Centre	33	19	7	2	9	70	42	22	12	-	13	89
	TOTAL	112	65	54	9	22	262	114	71	50	9	29	273
City Centre	Mwenge	37	24	10	3	5	79	82	40	30	9	21	182
City Centre	Morogoro	51	54	20	5	71	201	47	39	19	5	52	162
City Centre	Port Access	48	47	34	14	20	163	33	28	8	5	4	78
	TOTAL	136	125	64	22	96	443	162	107	57	19	77	422
Port Access	City Centre	58	48	39	7	19	171	63	42	26	6	14	151
Port Access	Mwenge	35	47	30	5	9	124	45	34	15	6	5	105
Port Access	Morogoro	36	38	18	5	21	120	35	29	21	9	14	108
	TOTAL	129	133	87	17	49	415	143	105	62	21	33	364
GRAND TOTAL		485	383	244	57	261	1430	526	354	215	55	212	1362

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		MOROGORO ROAD											
INTERSECTION NAME		SHEKILANGO ROAD INTERSECTION											
DATE / PEAK HOUR		20,11,1989 PM											
DIRECTION		3 :00 - 4 :00						4:00 - 5 :00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Shekilango	City Center	56	43	10	5	25	139	70	34	10	3	32	149
Shekilango	Morogoro	49	29	11	-	12	101	30	16	11	1	12	70
	TOTAL	105	72	21	5	37	240	100	50	21	4	44	219
Morogoro	City Center	105	93	36	8	70	312	120	110	41	5	62	338
Morogoro	Shekilango	39	30	13	4	10	96	45	38	18	1	8	110
	TOTAL	144	123	49	12	80	408	165	148	59	6	70	448
City Center	Morogoro	140	108	48	7	69	372	107	100	47	11	73	338
City Center	Shekilango	71	37	11	3	32	154	77	43	14	2	31	167
	TOTAL	211	145	59	10	101	526	184	143	61	13	104	505
	TOTAL												
GRAND TOTAL		460	340	129	27	218	1174	449	341	141	23	218	1172

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		MOROGORO ROAD											
INTERSECTION NAME		NEW KIGOGO INTERSECTION											
DATE / PEAK HOUR		15,11,1989 AM											
DIRECTION		7 :00 - 8:00						8:00 - 9:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
City Centre	Morogoro	176	136	27	4	131	474	195	95	9	0	121	420
City Centre	Morocco	65	51	3	4	75	198	60	33	3	1	70	167
City Centre	Kigogo	29	15	0	0	5	49	31	14	1	0	5	51
	TOTAL	270	202	30	8	211	721	286	142	13	1	196	638
Morogoro	Morocco	23	9	4	0	7	43	37	19	5	1	6	68
Morogoro	City Centre	359	153	64	11	203	790	296	155	28	7	130	616
Morogoro	New Kigogo	11	4	3	1	4	23	16	1	1	2	2	22
	TOTAL	393	166	71	12	214	856	349	175	34	10	138	706
Kigogo	Morocco	37	16	7	0	3	63	20	13	11	0	3	47
Kigogo	City Centre	25	24	4	0	9	62	18	11	3	0	2	34
Kigogo	Morogoro	9	9	8	1	3	30	7	2	2	1	3	15
	TOTAL	71	49	19	1	15	155	45	26	16	1	8	96
Morocco	City Centre	108	37	7	4	91	247	74	48	18	3	76	219
Morocco	Kigogo	52	31	17	4	5	109	30	28	14	5	5	82
Morocco	Morogoro	28	12	5	0	8	58	28	12	6	3	3	52
	TOTAL	188	80	29	8	104	409	132	88	38	11	84	353
GRAND TOTAL		922	497	149	20	544	2131	812	431	101	23	426	1793

INTERSECTION TRAFFIC COUNTING

MAIN ROAD		MOROGORO ROAD											
INTERSECTION NAME		NEW KIGOGO ROAD INTERSECTION											
DATE / PEAK HOUR		15,11,1989 PM											
DIRECTION		3:00 - 4:00						4 :00 - 5:00					
FROM	TO	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL	CAR TAXI	LIGHT GOODS	MEDIUM GOODS	HEAVY GOODS	BUS	TOTAL
Morocco	City Centre	78	38	8	1	73	198	75	40	15	0	73	203
Morocco	Kigogo	46	29	3	0	9	87	27	17	8	3	9	64
Morocco	Morogoro	35	20	12	0	13	80	31	21	6	1	7	66
	TOTAL	159	87	23	1	95	365	133	78	29	4	89	333
Kigogo	City Centre	19	18	0	0	8	45	20	18	2	2	9	51
Kigogo	Morocco	30	25	13	1	8	77	43	28	7	4	20	102
Kigogo	Ubungo	11	4	2	0	1	18	5	7	2	1	4	19
	TOTAL	60	47	15	1	17	140	68	53	11	7	33	172
Morogoro	City Centre	220	91	26	4	114	455	217	110	28	6	127	488
Morogoro	Kigogo	7	3	4	0	5	19	38	30	10	2	15	95
Morogoro	Morocco	41	15	11	1	9	77	6	8	3	0	3	20
	TOTAL	268	109	41	5	128	551	261	148	41	8	145	603
City Centre	Morogoro	257	136	18	3	111	525	280	136	25	8	146	595
City Centre	Morocco	95	41	8	0	60	204	118	64	12	2	92	288
City Centre	Kigogo	26	12	4	0	5	47	24	19	7	3	8	61
	TOTAL	378	189	30	3	176	776	422	219	44	13	246	944
GRAND TOTAL		865	432	109	10	416	1832	834	498	125	32	513	2052

Appendix A-12-3: Introduction of Grade Separation

Considering the establishment of the future trunk road network in Dar es Salaam, an introduction of Grade Separeted intersection (Grade Separation) will be considerd on an intesedtion crossing between dual carriagway road of which the traffic volume is over the capasity of signal controlled intersection.

Following the capasity calculation formula of signal controlled intersection between dual carriagway:

$$C_S = (C_A + C_B)/2 \times 0.9 \times 1/P \times K$$

Where, C_S : Traffic Capasity of signal controlled intersection (vehicle/day)
C_A : Saturation Flow Rate of enterance A road
C_B : Saturation Flow Rate of enterance B road
P : Peak hour traffic rate (10%)
K : Congestion Rate (1.5)

and each enterance road are having following Saturation Flow Rate:

lane	Ideal Saturetion Rate	Adjustment factor heavy vehicle (15%)	Right turn vehicle	Left turn vehicle	Saturation Flow Rate
Through	2000	0.91	1.00	1.00	1820
Through	2000	0.91	1.00	1.00	1820
Right turn	1800	0.91	1.00	1.00	500
Left turn	1800	0,91	1.00	0.80	1310
					5450

Therefore,

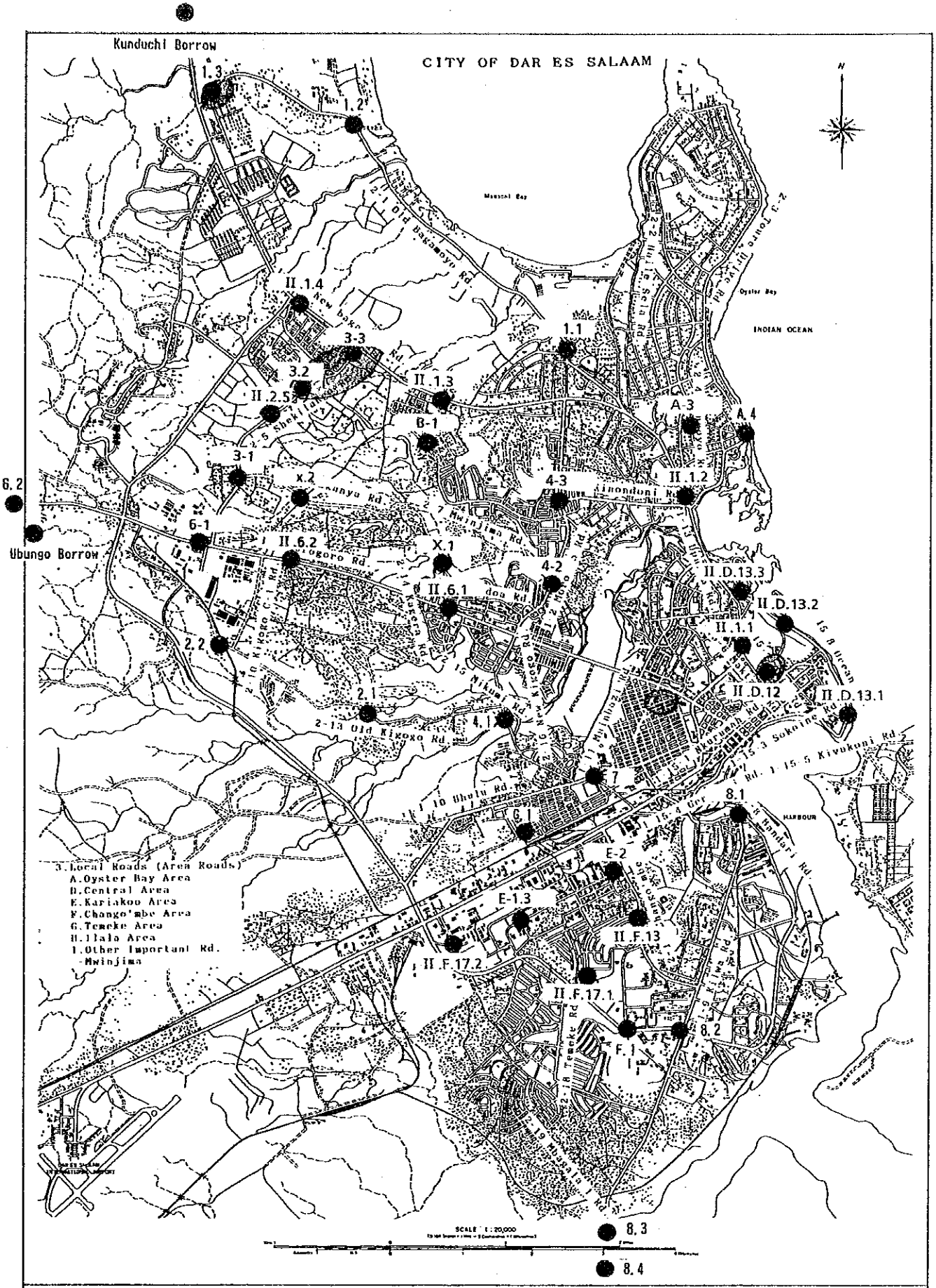
$$C_S = (5450+5450)/2 \times 0.9 \times 1/10\% \times 1.5 = 73,575$$

say 75,000(veh/day)

Reffering the result of the future traffic volume on the future trunk road network shown in Appendix 5-8, following important intersections have been calculated more traffic volume than the capacity of signal controlled intersection.

Therefore, introduction of Grade Separation to the following intersections will be recommendable in long term plan.

1. Intersection between Pugu and Port Access road
2. Intersection between Pugu and New Midle Ring road
3. Intersection between Pugu and Msinbazi road
4. Intersection between New Midle Ring road and Morogoro road
5. Intersection between New Midle Ring road and Uhuru road



Appendix 12.4 Location of Sub-soil Samplings

- NOV. 89 SURVEY POINTS (Phase II)
- APR. 89 SURVEY POINTS (Phase I)
- Low CBR Volue Area

Appendix 12.5(1) Sub-soil Test Results (Phase 2)

Route	Old Bagamoy Road			Old Kigogo		Shekilango Road			Morocco Road		
Sampling No.	1.1	1.2	1.3	2.1	2.2	3.1	112.5	3.2	3.3	4.1	4.2	4.3
Composition												
Fine Gravel	1	4	2	2	3	1	1	1	2	37	77	2
Sand	73	81	69	61	78	95	73	65	73	35	15	64
Silt and Clay	26	15	29	37	19	4	26	34	25	28	8	34
Atterberg Limit Test												
Liquid Limit	41	NP	35	25	27	NP	32	37	39	33	NP	NP
Plastic Limit	14	NP	10	17	23	NP	11	12	13	12	NP	NP
Plastic Index	27	NP	25	8	4	NP	21	25	26	21	NP	NP
Copmaction Test												
Max. Dry Density	2060	2068	2060	2199	2165	1818	1890	2033	2090	2173	2213	2263
Opt. Water Content	11.2	9.8	10.5	6.4	8.1	13.8	8.6	10.2	10.8	8.8	7.0	7.0
Nat. Water Content	12.7	13.3	18.5	17.7	13.5	0.5	24.2	13.9	14.2	6.1	7.2	15.9
Labo. CBR Test												
Swell	Nil	Nil	3.5	NIL	NIL	NIL	NIL	NIL	0.2	NIL	0.2	0.2
CBR Value	8	24	1	7	14	19	8	2	4	21	72	72
Classification												
AASHTO 17-149	A-2-7	A-1-b	A-2-6	A-4	A-2-4	A 3	A-2-7	A-2 6	A-2-6	A-2-6	A-1-a	A-3
Unified	GC	GP-GC	GC	SC	GM GC	GP-GC	GC	GC	GC	GC	GP-GC	GC
Topo. Condition	F	F	H	F	H	H	F	F	F	E	E	F

Route	Morogoro Road				Uhule Gerezani/Bandari				Kilwa	Oyster Bay		M-jima
Sampling No.	6.1	116.1	116.2	6.2	7	8.1	8.2	8.3	8.4	A.3	A.4	B.1
Composition												
Fine Gravel	2	1	1	4	1	1	1	2	1	69	66	8
Sand	76	89	73	71	96	90	83	78	89	12	14	91
Silt and Clay	22	10	29	25	3	26	34	25	28	8	34	11
Atterberg Limit Test												
Liquid Limit	33	NP	35	38	NP	NP	NP	NP	NP	44	38	NP
Plastic Limit	13	NP	10	16	NP	NP	NP	NP	NP	22	15	NP
Plastic Index	20	NP	25	22	NP	NP	NP	NP	NP	22	23	NP
Copmaction Test												
Max. Dry Density	2122	1810	1920	2112	1798	1859	2133	2290	1990	1982	2100	1980
Opt. Water Content	9.2	11.0	8.0	11.3	16.2	11.0	8.5	8.0	6.5	11.6	8.8	9.0
Nat. Water Content	18.2	-	-	14.0	3.3	3.0	6.4	12.7	6.5	12.4	10.8	11.0
Labo. CBR Test												
Swell	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	2.3	NIL	NIL
CBR Value	17	8	2	7	14	16	15	10	21	42	96	23
Classification												
AASHTO 17-149	A-2-6	A-3	A-2-4	A-2-7	A-1-b	A-1 b	A-1 b	A-2-6	A 1-b	A-1-a	A-1-a	A-1-b
Unified	GC	GP-GC		GC	GP GC	GP-GC	GP GC	GC	GP-GC	GC	GC	GP-GC
Topo. Condition	H	F	F	F	F	F	F	H	H	F	F	F

Route	Makanya Road			Kariakoo Area				Chang'ombe Area Roas				
Sampling No.	X.1	X.2	X.Y	D9.11	U.F. 46.1	U.F. 46.2	U.F. 46.3	E.2	E.15	U.F. 13	U.F. 17.1	U.F. 17.2
Composition												
Fine Gravel	2	1	2	1	1	1	1	1	1	1	1	1
Sand	79	62	76	77	94	93	64	94	91	96	95	95
Silt and Clay	19	37	22	22	5	64	35	5	8	7	4	4
Atterberg Limit Test												
Liquid Limit	31	33	26	NP	NP	NP	32	NP	NP	NP	NP	NP
Plastic Limit	14	16	14	NP	NP	NP	11	NP	NP	NP	NP	NP
Plastic Index	17	17	12	NP	NP	NP	21	NP	NP	NP	NP	NP
Copmaction Test												
Max. Dry Density	2100	1934	2100	1812	1800	1676	1881	1888	1892	1786	1671	1690
Opt. Water Content	8.3	11.1	9.0	8.8	10.5	13.0	10.0	10.0	8.4	8.0	7.5	12.5
Nat. Water Content	10.2	13.6	18.1	1.5	2.2	5.0	13.6	3.9	10.1	7.3	3.5	2.2
Labo. CBR Test												
Swell	0.1	1.3	NIL	NIL	NIL	0.1	NIL	NIL	NIL	NIL	NIL	NIL
CBR Value	19	29	21	10	13	7	2	22	20	7	5	8
Classification												
AASHTO 17-149	A-2-6	A-2-6	A-2-6	A-3	A-3	A 3	A 3	A 1 b	A-3	A-3	A-3	A 3
Unified	GC	GC	GC	GP GC	GP-GC	GP GC	GP-GC	GP GC	GP-GC	GP-GC	GP-GC	GP-GC
Topo. Condition	H	H	F	F	F	F	F	F	F	F	F	F

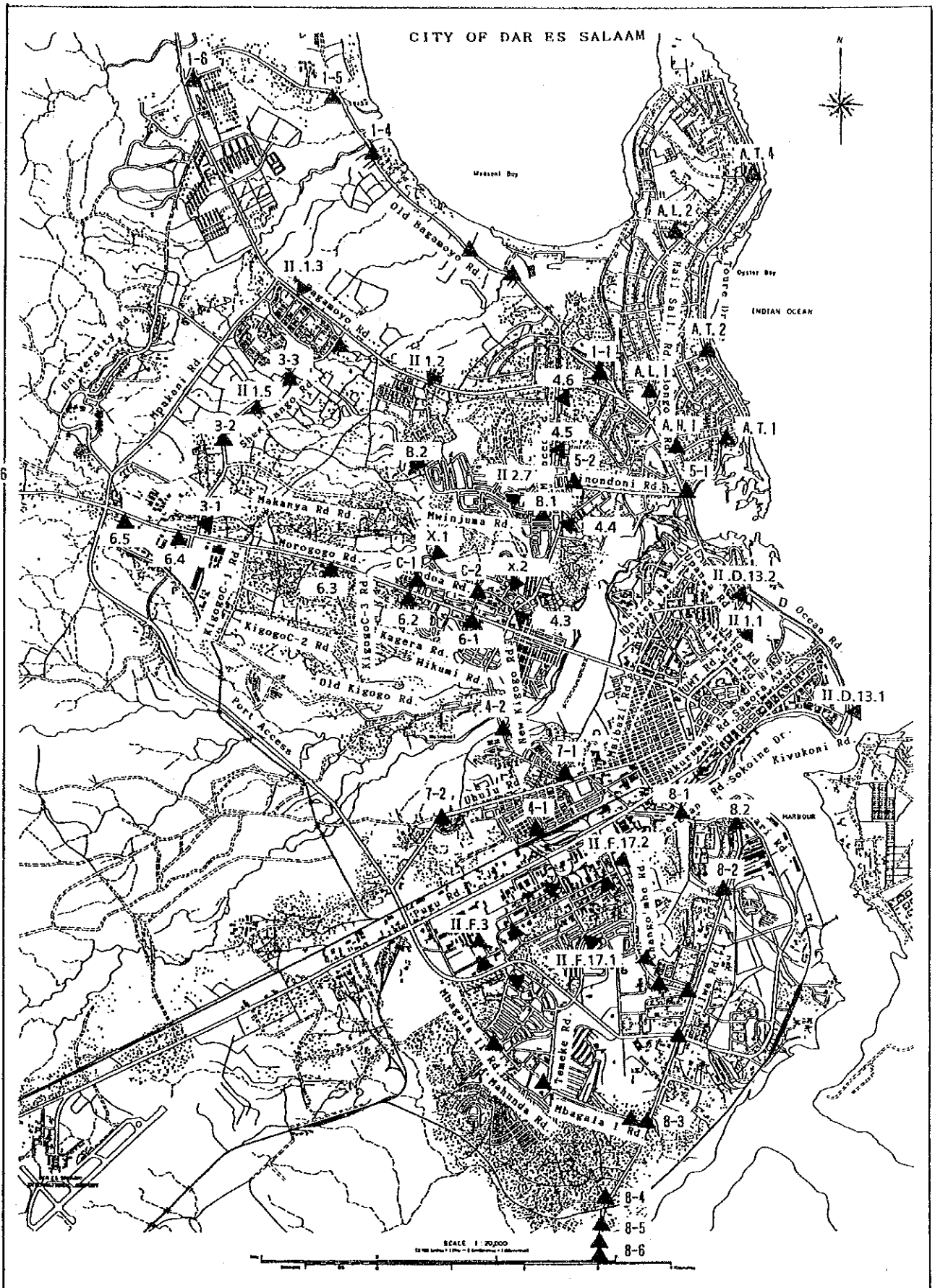
Note H: Hilly, F: Flat,

Appendix 12.5(2) Sub-soil Test Results (Phase 2)

Route	Hala Area	Temeke Area	Central Area							
Sampling No.	G.1	F.1	H D.12	H D.19	H D.23	H D.24	H D.26	H D.13.1	H D.13.2	H D.13.2
Composition										
Fine Gravel	1	1	1	1	1	1	1	0	0	1
Sand	95	97	55	74	75	71	91	97	98	90
Silt and Clay	4	2	44	25	24	28	8	3	2	9
Atterberg Limit Test										
Liquid Limit	NP	NP	29	NP	NP	22	NP	NP	NP	22
Plastic Limit	NP	NP	14	NP	NP	15	NP	NP	NP	12
Plastic Index	NP	NP	15	NP	NP	7	NP	NP	NP	10
Copmaction Test										
Max. Dry Density	1827	1987	1962	1850	1775	1960	1784	1543	1547	1859
Opt. Water Content	15.1	12.3	11.0	10.0	11.8	11.2	12.5	7.0	13.4	11.0
Nat. Water Content	1.8	1.8	3.8	4.6	5.1	4.8	-	-	-	3.0
Labo. CBR Test										
Swell	NIL	NIL	0.1	NIL	NIL	0.1	NIL	NIL	0.1	NIL
CBR Value	13	21	2	7	8	12	5	4	6	17
Classification										
AASHTO 17-149	A-1-b	A-1-b	A-4	A-1-b	A-1-b	A-2-4	A-3	A-3	A-3	A-2-4
Unified	GP-GC	GP-GC	CL	GP-GC	GP-GC	GP-GC	GP-GC	GP-GC	GP-GC	GP-GC
Topo. Condition	F	F	F	F	F	F	F	F	F	F

Route	New Bagamoyo Road				Borrow Area		
Sampling No.	H 1.1	H 1.2	H 1.3	H 1.4	Kunduchi Area	Ubanga Area (1)	Ubanga Area (2)
Composition							
Fine Gravel	1	1	0	0	39	4	4
Sand	72	90	65	78	37	78	66
Silt and Clay	22	9	35	21	24	18	29
Atterberg Limit Test							
Liquid Limit	24	35	34	32	22	46	32
Plastic Limit	17	10	18	11	16	20	21
Plastic Index	7	25	16	21	6	26	11
Copmaction Test							
Max. Dry Density	1981	1834	1701	1890	2007	1843	1960
Opt. Water Content	15.1	12.3	11.0	10.0	8.2	10.2	10.6
Nat. Water Content	5.3	8.6	14.9	21.2	-	-	4.0
Labo. CBR Test							
Swell	NIL	2.2	9.0	NIL	NIL	NIL	3
CBR Value	10	4	5	8	11	13	27
Classification							
AASHTO 17-149	A-2-4	A-3	A-2-b	A-2-b	A-1-b	A-2-7	A-2-4
Unified	GP-GC	GP-GC	GC	GC	GP-GC	S C	GM-GC
Topo. Condition	F	F	F	F	h	H	H

F: Flat Area, H: Hilly Area, E: Embankment Area



Appendix 12.6 Location of Pavement Structural Survey

▲ Nov. 1989 SURVEY POINTS (Phase II)

▲ PREVIOUS SURVEY POINTS (Phase I)

Appendix 12.7 Structural Component of Proposed Existing Roads

Unit: mm

Project Road	Length (km)		Survey Rusults 1	2	3	4	5	Average Thickness
New Bagamoyo Road	9.2	1*	II.1.1	II.1.2	II.1.3	-	-	
		2*	N	N	N	-	-	
		3*	30	30	40	-	-	30
		4*	140	110	130	-	-	120
Morogoro Road	5.6	1	6.1	6.2	6.3	6.4	6.5	
		2	G	N	P	N	N	
		3	100	20	85	70	70	70
		4	250	250	165	230	120	165
Morocco Road	3.5	1	4.3	II.1.2	4.4	4.5	4.6	
		2	N	P	N	G	G	
		3	35	15	20	45	65	35
		4	195	165	180	75	105	130
Shekilango Road	3.8	1	3.1	3.2	II.1.5	3.3.	3.4	
		2	P	N	P	V.P	V.P	
		3	20	10	10	0	20	10
		4	120	105	110	115	160	115
Mwinjima Road	2.0	1	B.1	II.2.7	B.2	-	-	
		2	P	P	P	-	-	
		3	90	15	15	-	-	20
		4	120	105	95	-	-	100
Makanya Road	4.6	1	X.1	X.2	-	-	-	
		2	G	P	-	-	-	
		3	50	40	-	-	-	50
		4	95	120	-	-	-	100
Ocean Road	3.2	1	D.13.1	II.D.13.2	II.D.13.2	-	-	
		2	G	G	G	-	-	
		3	20	80	70	-	-	50
		4	300	150	120	-	-	180
Gerezani/Bandari Roads		1	8.1	8.2	-	-	-	
1.2/2.2		2	G	P	-	-	-	
		3	85	45	-	-	-	60
		4	155	75	-	-	-	120
Central Area Roads (1)		1	D.1	D.2	D.3	D.4	D.5	
	20.9	2	P	P	P	P	P	
		3	50	30	0	50	25	
		4	250	330	310	185	235	
Central Area Roads (2)		1	II.D.16	II.D.17	II.D.24	II.D.50	-	
		2	P	P	N	N	-	
		3	20	30	20	15	-	25
		4	100	90	170	160	-	250
Msimbazi Street	1.6	1	II.46.1	II.46.2	II.46.3	-	-	
		2	N	P	P	-	-	
		3	20	90	25	-	-	35
		4	250	150	290	-	-	250
Kariakoo Area Road	31.6	1	E.1	E.2	E.3	E.4	E.5	
		2	P	P	P	P	P	
		3	40	20	10	30	0	20
		4	210	100	340	220	90	150
Chang'ombe Road	4.6	1	II.F.13	II.F.13	II.F.13	-	-	
		2	N	N	P	-	-	
		3	90	15	15	-	-	50
		4	210	210	175	-	-	200
Chang'ombe Area Road		1	1	2	3	4	5	
	19.2	2	G	G	N	N	G	
		3	25	25	55	55	15	25
		4	200	200	215	190	260	220

Note *: 1; Survey Point, 2; Pavement Condition,(G; Good, N; Normal, P; Poor, V.P; Very Poor)
3; Surface Thickness(mm), 4; Base Thickness(mm)

Appnedix 12-8(1) Project Length By Improvement Measures

Summary Of Project Length

Name of Roads	Total Length (km)	Maint-nance (km)	Overlay (km)	Reconst-ruction (km)	Widening (km)
P-1 Morogoro road	5. 72	–	–	–	5. 72
–Up to Morocco J	5. 72	–	–	–	5. 72
P-2 New bagamoyo road	9. 79	2. 25	2. 30	1. 38	3. 86
Upanga road	1. 86	–	0. 30	0. 23	1. 33
New bagamoyo road	7. 93	2. 25	2. 00	1. 15	2. 53
–Up to Morocco J.	3. 53	1. 00	–	–	2. 53
–Beyond Morocco J.	4. 40	1. 25	2. 00	1. 15	–
P-5 Mwinjima Area Group	16. 73	0. 35	7. 03	9. 35	–
Mwinjima area roads	2. 15	–	0. 75	1. 40	–
Mwinjima L-1	1. 50	–	–	1. 50	–
Morocco road	3. 58	–	2. 78	0. 80	–
Kinondoni road	0. 70	0. 35	–	0. 35	–
Shekilango road	3. 80	–	2. 00	1. 80	–
Makanya road	5. 00	–	1. 50	3. 50	–
P-7 Central Area Group	20. 98	0. 20	17. 08	3. 70	–
Central Area roads	9. 80	–	6. 1	3. 7	–
Bandari road	2. 20	0. 20	2. 0	–	–
Nkurumah road	0. 36	–	0. 36	–	–
Sokoine road	0. 82	–	0. 82	–	–
Gerezani road	1. 39	–	1. 39	–	–
Kivukoni road	1. 22	–	1. 22	–	–
Maktaba road	0. 93	–	0. 93	–	–
Ohio road	0. 96	–	0. 96	–	–
Ocean road	3. 30	–	3. 30	–	–
P-8 Kariakoo Area Group	31. 68	3. 30	3. 70	24. 68	–
Kariakoo Area roads	30. 00	3. 30	2. 02	24. 68	–
Msinbazi road	1. 68	–	1. 68	–	–
P-9 Chango' mbe Area Group	19. 20	5. 38	4. 78	9. 04	–
Chango' mbe Area roads	14. 60	2. 55	3. 01	9. 04	–
Chango' mbe road	4. 60	2. 83	1. 77	–	–
Total	104. 10	11. 48	34. 89	48. 15	9. 58

Appnedix 12-8(2) Project Length By Improvement Measures

	Name of Roads	Total Length (km)	Maintenance (km)	Overlay (km)	Reconstruction (km)	Widening (km)
D·Central Area Roads						
D-1	Lindi street	0. 20 (0. 2)	–	–	0. 20	–
D-2	Uhuru street	0. 26 (0. 2)	–	–	0. 26	–
D-3	Aggery street	0. 38 (0. 4)	–	0. 06	0. 32	–
D-4	Kitumbini street	0. 24 (0. 3)	–	–	0. 24	–
D-5	Band street	0. 17 (0. 2)	–	–	0. 17	–
D-6	Mosque street	0. 44 (0. 4)	–	0. 19	0. 25	–
D-7	Morogoro street	0. 90 (0. 9)	–	0. 90	–	–
D-8	Zanaki street	0. 70 (0. 9)	–	0. 62	0. 08	–
D-9	Mrina street	0. 15 (0. 3)	–	–	0. 15	–
D-10	Mkwepu street	0. 41 (0. 4)	–	0. 41	–	–
*D-11	Maktaba street	*0. 93 (0. 9)	–	0. 93	–	–
*D-12	Ohio street	*0. 96 (1. 0)	–	0. 96	–	–
*D-13	Ocean road	*3. 30 (3. 2)	–	3. 30	–	–
*D-14	Nkrumah street	*0. 36 (0. 3)	–	0. 36	–	–
D-15	Africa street	0. 30 (0. 3)	–	–	0. 30	–
D-16	Kisutu street	0. 53 (0. 5)	–	0. 43	0. 10	–
D-17	Libya street	0. 50 (0. 5)	–	0. 50	–	–
D-18	Mtendeni street	0. 36 (0. 3)	–	–	0. 36	–
D-19	Jamhuri street	1. 10 (1. 1)	–	0. 72	0. 38	–
D-20	Mshihili street	0. 23 (0. 3)	–	–	0. 23	–
D-21	Market-Makunganya street	1. 10 (1. 0)	–	0. 87	0. 23	–
D-22	India street	0. 69 (0. 6)	–	0. 60	0. 09	–
D-23	Indep· (Samora) Avenue	0. 80 (0. 8)	–	0. 80	–	–
D-24	Mansfield street	0. 34 (0. 5)	–	–	0. 34	–
*D-25	Sokoine drive	*0. 82 (0. 8)	–	–	–	–
*D-26	Kivukoni road	*0. 22 (1. 0)	–	–	–	–
	Total	9. 80 (10. 1)	0. 00	6. 10	3. 70	0. 00

Appnedix 12-8(3) Project Length By Improvement Measures

	Name of Roads	Total Length (km)	Maintenance (km)	Overlay (km)	Reconstruction (km)	Widening (km)
E·Kareakoo Arer Road						
E-1	Matumbi (A) street	0.44 (0.1)	0.30	—	0.14	—
E-2	Matumbi (B) street	0.24 (0.3)	—	—	0.24	—
E-3	Nyati street	0.36 (0.4)	0.11	—	0.25	—
E-4	Faru street	0.38 (0.4)	—	—	0.38	—
E-5	Twiga street	0.50 (0.4)	—	—	0.50	—
E-6	Nduvu street	0.40 (0.4)	—	—	0.40	—
E-7	Rufiji street	0.39 (0.4)	—	—	0.39	—
E-8	Muhoro street	0.70 (0.7)	0.40	—	0.30	—
E-9	Ungoni street	0.30 (0.3)	—	—	0.30	—
E-10	Amani street	0.60 (0.7)	—	—	0.60	—
E-11	Udowe street	0.40 (0.4)	—	—	0.40	—
E-12	Kariakoo street	0.88 (0.8)	—	—	0.88	—
E-13	Kibambawe street	0.27 (0.3)	—	—	0.27	—
E-14	Mafia street	0.83 (0.8)	—	—	0.83	—
E-15	Mkunguni street	0.89 (0.9)	—	—	0.89	—
E-16	Pemba street	0.30 (0.4)	—	—	0.30	—
E-17	Tandamti street	1.06 (1.0)	—	—	1.06	—
E-18	Narung'ombe Sstreet	1.06 (1.0)	—	—	1.06	—
E-19	Mahiwa street	0.23 (0.2)	—	—	0.23	—
E-20	Mhonda street	0.55 (0.5)	—	—	0.55	—
E-21	Magila street	0.32 (0.3)	—	—	0.32	—
E-22	Mchikichi street	0.73 (0.7)	—	—	0.73	—
E-23	Aggrey street	1.07 (1.1)	—	—	1.07	—
E-24	Masasi street	0.32 (0.3)	—	—	0.32	—
E-25	Uhuru street	1.20 (1.2)	0.50	0.70	—	—
E-26	Kipata street	0.69 (0.6)	—	—	0.69	—
E-27	Lindi street	0.65 (0.7)	—	—	0.65	—
E-28	Somali street	0.60 (0.5)	—	—	0.60	—
E-29	Kiungani street	0.70 (0.6)	—	—	0.70	—
Sub total		17.06 (16.7)	1.31	0.70	15.05	0.00

Appnedix 12-8(4) Project Length By Improvement Measures

Name of Roads	Total Length (km)	Maintenance (km)	Overlay (km)	Reconstruction (km)	Widening (km)
E-30 Mbaruku street	0.39 (0.4)	—	—	0.39	—
E-31 Kisarawe street	0.66 (0.6)	0.29	—	0.37	—
E-32 Viwanda street	0.58 (0.5)	0.50	—	0.08	—
E-33 Lumumba street	1.20 (1.2)	1.20	—	—	—
E-34 Nyasa street	0.16 (0.2)	—	—	0.16	—
E-35 Ukami street	0.15 (0.2)	—	—	0.15	—
E-36 Kipande street	0.16 (0.2)	—	—	0.16	—
E-37 Livingstone street	1.32 (1.3)	—	1.32	—	—
E-38 Mvita street	0.14 (0.2)	—	—	0.14	—
E-39 Hivao street	0.10 (0.1)	—	—	0.10	—
E-40 Chura street	0.17 (0.2)	—	—	0.17	—
E-41 Sikukuu street	1.46 (1.5)	—	—	1.46	—
E-42 Sukuma street	0.18 (0.2)	—	—	0.18	—
E-43 Gogo street	0.10 (0.1)	—	—	0.10	—
E-44-1 Swahili street	0.72 (1.6)	—	—	0.72	—
E-44-2 Swahili street	0.75	—	—	0.75	—
E-45-1 Wanyawezi street	0.76 (1.6)	—	—	0.76	—
E-45-2 Wanyawezi street	0.58	—	—	0.58	—
*E-46 Msimbazi street	*1.68 (1.6)	—	1.68	—	—
E-47-1 Kongo street	0.63 (1.1)	—	—	0.63	—
E-47-2 Kongo street	0.36	—	—	0.36	—
E-47-3 Kongo street	0.28	—	—	0.28	—
E-48 Jangwani street	0.59 (0.5)	—	—	0.59	—
E-49-1 Likama street	0.20 (0.6)	—	—	0.20	—
E-49-2 Likama street	0.11	—	—	0.11	—
E-49-3 Likama street	0.32	—	—	0.32	—
E-50 Mzizima street	0.20 (0.6)	—	—	0.20	—
E-50' Mdanda street	0.32	—	—	0.32	—
E-51 Muheza street	0.35 (0.4)	—	—	0.35	—
Sub total	12.94 (13.3)	1.99	1.32	9.63	0.00
Total	30.00 (30.0)	3.30	2.02	24.68	0.00

Appnedix 12-8(5) Project Length By Improvement Measures

	Name of Roads	Total Length (km)	Maintenance (km)	Overlay (km)	Reconstruction (km)	Widening (km)
F·Chango' mbe area road						
F-1	Soza road	1. 56 (1. 5)	—	0. 75	0. 81	—
F-2	Migeyo road	0. 20 (0. 7)	—	—	0. 20	—
F-3	Mdozi road	2. 20 (2. 0)	—	0. 60	1. 60	—
F-4	Dakawa street	0. 82 (0. 8)	—	—	0. 82	—
F-5	Upper vorita	0. 49 (0. 5)	—	—	0. 49	—
F-6	Chuma road	0. 54 (0. 6)	—	—	0. 54	—
F-7	Rwanda road	0. 20 (0. 2)	—	—	0. 20	—
F-8	Uruwira road	0. 40 (0. 5)	—	—	0. 40	—
F-9	Wasambara road	1. 20 (1. 3)	0. 85	—	0. 35	—
F-10	Basuraa street	0. 61 (0. 5)	—	0. 61	—	—
F-11	Msikiti street	0. 25 (0. 3)	—	—	0. 25	—
F-12	Ismailia street	0. 21 (0. 2)	—	—	0. 21	—
F-13	Saranda street	0. 30 (0. 5)	—	—	0. 30	—
F-14	Kimathi street	0. 14 (0. 2)	—	—	0. 14	—
F-15	Tagore street	0. 28 (0. 2)	—	—	0. 28	—
F-16	Ivory coast	0. 38 (0. 2)	—	—	0. 38	—
F-17	Chamwenyewe street	0. 78 (0. 2)	—	0. 78	—	—
F-18	Mzore road	0. 40 (0. 4)	0. 40	—	—	—
F-19	Ubena street	0. 61 (1. 0)	—	—	0. 61	—
F-20	Uiwani street	0. 66 (0. 7)	—	—	0. 66	—
F-21	Mataka street	0. 27 (0. 2)	—	0. 27	—	—
F-22	Mapinduzi street	0. 80 (0. 8)	—	—	0. 80	—
F-23	Monrovia road	1. 30 (1. 3)	1. 30	0. 27	—	—
	Total	14. 60 (14. 6)	2. 55	3. 01	9. 04	0. 00

Appendix 12. 9. 1 Initial Daily Traffic (IDT)

Name of Roads	ADT in 1989 Year				Traffic Growth Rate Per Annual		IDT in 1994 Year			
	Medium Goods	Heavy Goods	Bus	Total	Medium/ Heavy Goods	Bus	Medium Goods	Heavy Goods	Bus	Total
	①	②	③	①+②+③	%	%	④=①*(1.0²)^5	⑤=②*(1.0²)^5	⑥=③*(1.10)^5	④+⑤+⑥
P-1 Morogoro road										
-Up to Port Ac. J.	1535	234	242	2011	2	10	1695	258	389	2342
P-2 New bagamoyo road										
Upanga road	803	106	232	1141	2	10	887	117	374	1378
-Central aera road	31	1	0	32	2	10	34	1	0	35
New bagamoyo road										
-Up to Morocco J.	972	118	140	1230	2	10	1073	130	226	1429
-Beyond Morocco J.	436	55	38	592	2	10	481	61	61	603
P-5 Mwinjima Area Group										
Mwinjima road	315	34	77	426	2	10	348	38	124	510
Mwinjima L-1 road	30	1	0	31	2	10	33	1	0	34
Morocco road	514	72	29	615	2	10	568	79	47	694
Kinondoni road	16	0	99	115	2	10	18	0	160	178
Shekilango road	242	18	7	267	2	10	267	20	12	299
Makanya road	16	0	0	16	2	10	18	0	0	18
P-7 Central Area Group										
Central Area roads	31	1	0	32	2	10	34	1	0	35
Bandari road	944	197	55	1196	2	10	1042	218	89	1349
Nkurumah road	30	1	0	31	2	10	33	1	0	34
Sokoine road	155	19	531	705	2	10	171	21	855	1047
Gerezani road	900	179	78	1157	2	10	994	198	126	1318
Kivukoni road	142	16	78	236	2	10	157	18	126	301
Maktaba road	184	23	0	207	2	10	203	25	0	228
Ohio road	31	1	0	32	2	10	34	1	0	35
Ocean road	30	1	0	31	2	10	33	1	0	34
P-8 Kariakoo Area Group										
Kariakoo Area roads	40	42	0	82	2	10	44	46	0	90
Msinbazi road	645	155	367	1167	2	10	712	171	591	1474
P-9 Chango' mbe Area Group										
Chango' mbe Area roads										
-Factory area roads	77	8	98	183	2	10	85	9	158	252
-Residence area roads	30	1	0	31	2	10	33	1	0	34
Chango' mbe road	1095	54	84	1233	2	10	1209	60	136	1405