

CHAPTER 6 FORMULATION OF URBAN TRANSPORTATION STRATEGIES

6.1 Urban Development Strategies

(1) Projection of Future Socio-economy

(a) Population Projection

Population growth in Dar es Salaam has almost remained linear since 1967. The urban population by the year 2000 has thus been estimated to be around 2.0 million assuming a linear incremental growth rate of about 62,000 persons/year obtained from 1988 census figure of 1.26 million.

The urban population by the year 2010 has been estimated at 2.8 million with an assumed linear growth rate of about 82,000 persons/year obtained from 1988 census figure, and also estimated population of 2.0 million for the year 2000.

The rural population in the year 2000 and the year 2010 are also estimated to be 140,000 persons and 180,000 persons, applying the same linear growth rate trend for Tanzania to be assumed at 2.4% per annum.

Results of projection for the future total regional population of Dar es Salaam is estimated to be 2.14 million for the year 2000 and 3.00 million for the year 2010. The future population share of Dar es Salaam in Tanzania will grow 7.0% for the year 2000 and 7.8% for the year 2010 compared to the existing share of 5.9% (refer to Table 6.1).

Table 6.1 Future Population Projection

		Actual/Provisional				Future		
		1967	1978	1988	1992 *1	2000	2002 *1	2010
Population ('000)	Dar es Salaam	356.3 (2.9)	843.1 (4.8)	1,360.90 (6.9)	1,631.00 (6.5) *1	2,140 (7.0)		3,000 (7.8)
	Urban		763.1 (4.4)	1,255.90 (5.4)	1,515.00 (6.0) *1	2,000 (6.5) *2	2,000 (6.2) *2	2,820 (7.3)
	Rural		80.00 (0.5)	105.00 (0.5)	116.00 (0.5)	140 (0.5)	147 (0.5)	180 (0.5)
	Tanzania	12,313 (100.0)	17,512 (100.0)	23,174 (100.0)	25,100 (100.0)	30,460 (100.0)	31,800 (100.0)	38,600 (100.0)

Source : Population census, 1967, 1978, 1988 and provisional figure of Planning Commission.

*1 : Estimated by "Urban Sector Engineering Project" (December 1992).

*2 : Estimated by "Dar es Salaam Urban Passenger Transport Study" (July 1991).

Others : Estimated by the Study Term.

(b) Sectored Employment

Based on the projected population for the Dar es Salaam Region, the future volume of employment has been estimated and divided into 3 industrial sectors as shown in Table 6.2.

Table 6.2 Employment in Dar es Salaam Region

Unit: '000

Employment	1988	1992	Projection	
	(Actual)	(Provisional)	2000	2010
Urban	473	574	760	1,078
Rural	67	73	89	112
Region Total	540	647	849	1,190
of which:				
Primary Sector	132	138	149	167
Secondary Sector	76	95	130	190
Tertiary Sector	332	414	570	833

(c) Income Level

Table 6.3 shows the Gross Domestic Products (GDP) of Tanzania Mainland projected towards the year 2010, together with the Gross Regional Products (GRP) projected for the Dar es Salaam Region.

Based on the projected GDP and GRP, Per Capita production was calculated for the Tanzania Mainland and Dar es Salaam Region as shown in Table 6.4.

Table 6.3 GDP and DSM-GRP

Unit: Million Tshs.

Description	1992 (Base Figure)	Projection	
		2000	2010
GDP at 1985 Prices	142,175	194,576	288,020
GDP at 1993 Prices *)	949,729	1,299,768	1,923,974
Dar es Salaam Region			
GRP at 1985 Prices	22,890	31,327	46,371
GRP at 1993 Prices *)	152,905	209,264	309,758

Remark: *): Multiple Factor = 6.68 (Price escalation during 1985-1993)

Table 6.4 Per Capita Production

Unit: Tshs.

Area	1992	2000	2010
Tanzania Mainland	5,664	6,119	7,462
DSM-Region	14,034	14,639	15,457

Remarks: (1): At 1985 Prices.

(2): Results of division of actual/projected production by actual/projected population corresponding in the area.

(3): DSM-Region magnification ratio over the Mainland: 1992 - 2.48, 2000 - 2.39, 2010 - 2.07.

(2) Urban Development Strategies

(a) Basic Philosophy

The basic development philosophy is to reduce the city's overall densities and improve the level of services available to future residents in Dar es Salaam. The density of new residential development outside of the existing urban area will be reduced to less than 100 person per ha. via the incremental increase in the number of appropriate size of plots provided. Future residential development based on a reduction in density and, more importantly, on improvement of services within the proposed development areas should include community facilities and services for a desirable urban environment.

In conjunction with these areas, the nature of existing and on-going planning schemes on the periphery of and within the existing urban areas must be considered as the potential area for urban development, servicing requirement and the economics of servicing distant to development areas.

(b) Community Concept and Planning District

Community Concept

Basic community facilities such as schools, clinics and markets, provided within an acceptable walking distance of the residents they serve, will form an integral part of the urban structure of the new residential area.

Each community accommodates a population of approximately 40,000 people and will be self-contained with respect to the basic day to day needs of its residents.

Planning District

Planning districts will accommodate populations ranging from 200,000 to 300,000 people consisting of five to seven communities which will require overall planning and coordination to ensure that the provision of facilities and servicing parallels the staging of residential and industrial development.

As a focal point, each planning district will have a major center that will provide services and facilities complementary to the city center as well as office and commercial space.

(3) Future Urban Trends and Land-Use Prospects

(a) Development Schemes and Urban Trend

Ongoing and proposed regional development schemes consist mainly of new large scale residential developments, new industrial developments and urban area redevelopment plans.

Some of these new development schemes have already been begun in addition to continued unplanned growth which are summarized in the proposed five growth axis. (See Fig. 6.1)

(b) Land-use Prospects

Based on the above urban trends and the population projection for Dar es Salaam, future urban land-use prospects have been prepared for the year 2010, embodying the basic development philosophy of the Dar es Salaam Master Plan and analysis of potential areas for future urban development (see Fig. 6.2).

(c) Dispersion of the Function of CBD

Considering the limited space of the existing CBD, it is difficult to accommodate all demands within the existing CBD land area. At present in this area, located are the massive retail and wholesale outlets, almost all branches of government banks and government offices most of which are more suited to be located outside the CBD.

With respect to daily needs of residents, it is recommendable that some of these functions be relocated to existing sub-cores in urban areas. Proposed sub-centers in planning districts and/or applying the concept of future expansion of the CBD to the Kigamboni area should be considered.

Furthermore, considering existing substandard buildings and the chronic shortage of parking spaces with auto parking infringing on road traffic and pedestrian ways, it will be necessary to introduce new parking management techniques on functional roads and new building codes for the preservation of individual properties, especially in the CBD.

Fig.6.1 Future Urban Trend

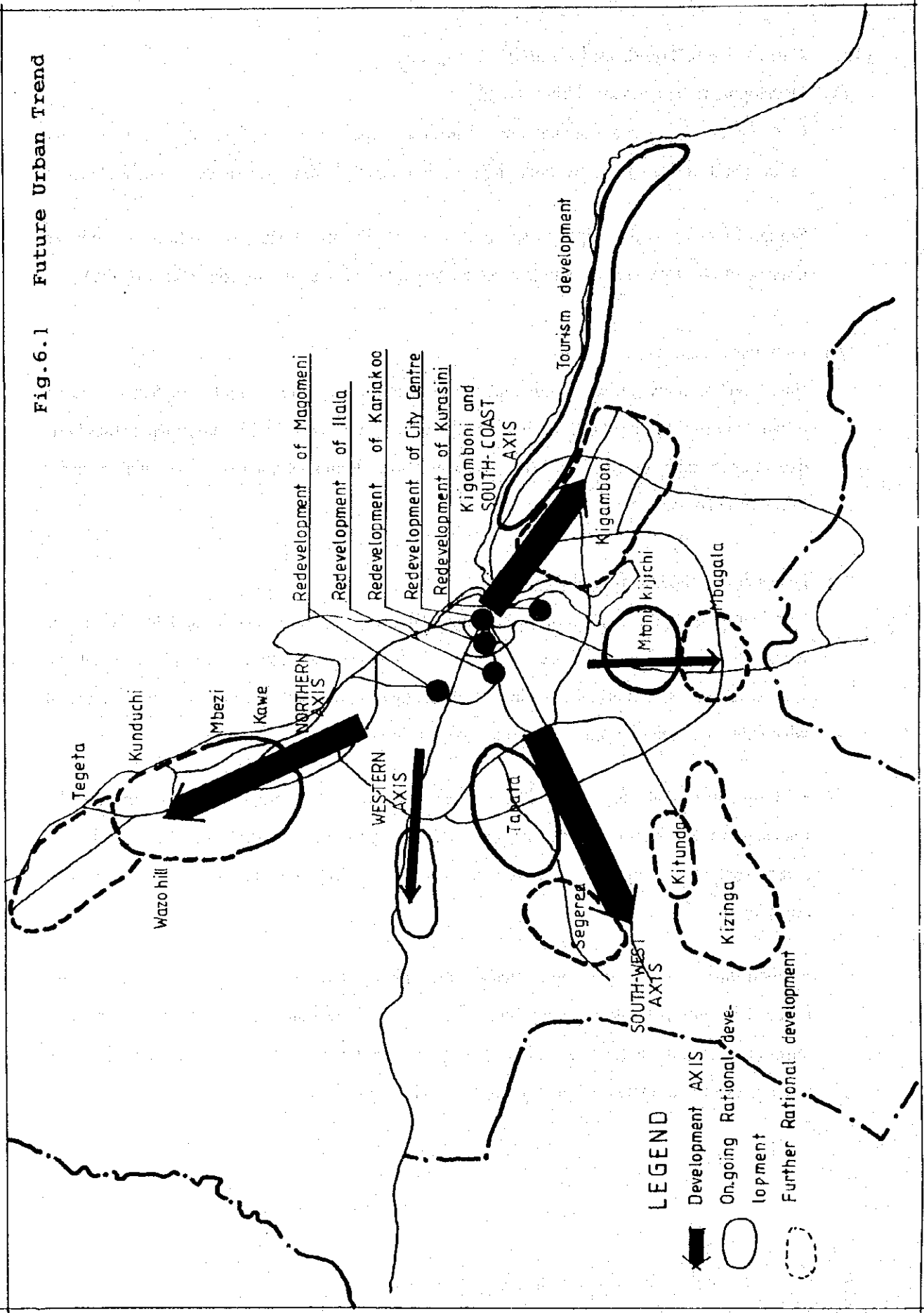
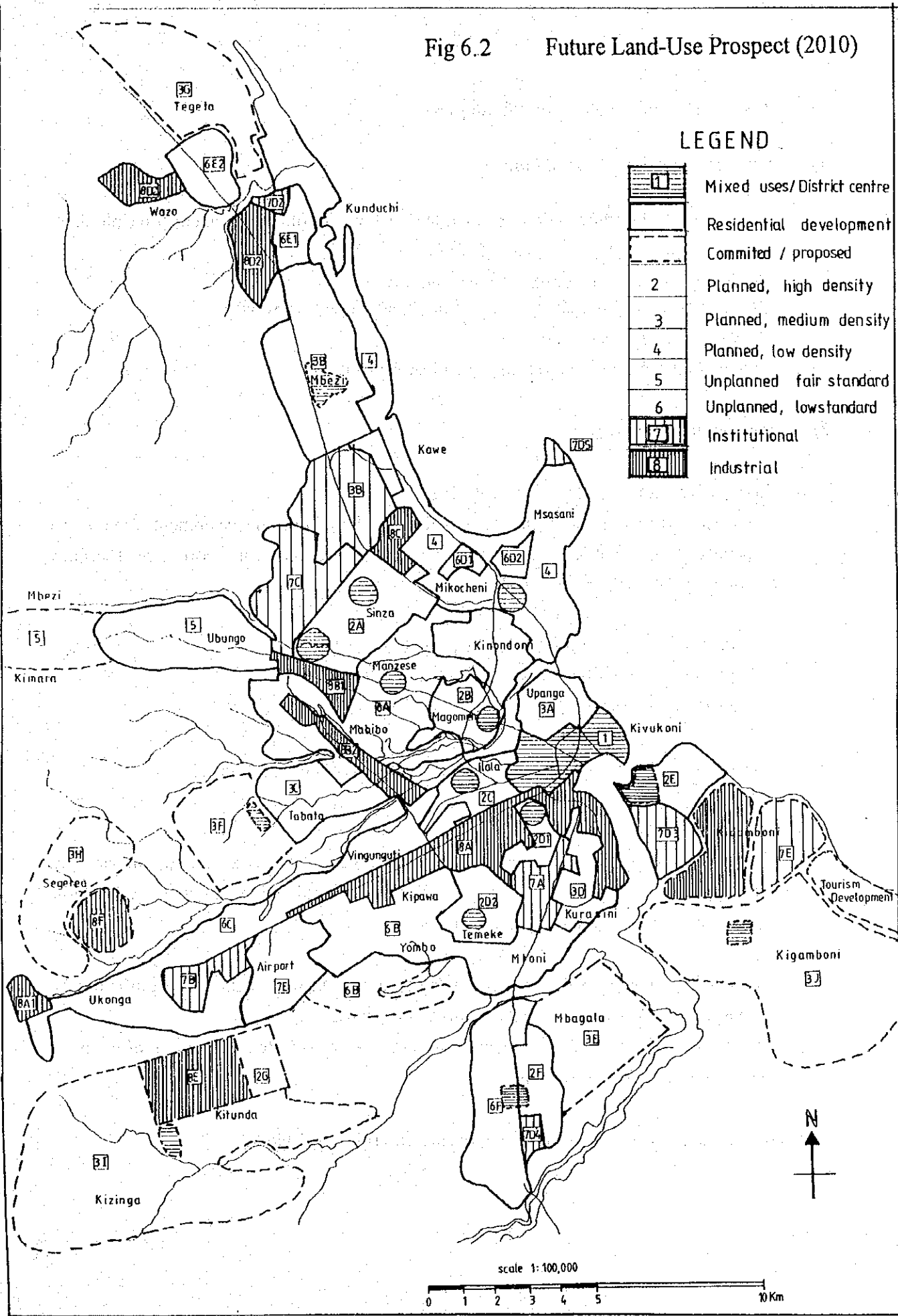


Fig 6.2 Future Land-Use Prospect (2010)

LEGEND

1	Mixed uses/ District centre
2	Residential development Committed / proposed
3	Planned, high density
4	Planned, medium density
5	Planned, low density
6	Unplanned fair standard
7	Unplanned, low standard
8	Institutional
9	Industrial



6.2 Transportation Development Strategies

(1) Principles for Future Development

In the context of traffic issues articulated in Chapter 4, traffic development principles in Dar es Salaam have been established as follows:

- Reduction of Inflow of Traffic in the Central Area
- Road Network Improvement focussed on Public Transport Services
- Streamlining of Urban Traffic
- Traffic Management Plan to Enhance Urban Amenity

(2) Development Strategies

(a) Strategy for Short-term Development Plan

The basic attitude toward the formulation of Short-term Development Plan is to streamline urban traffic. With this recognition, targets for short-term transport development plans have been established as follows:

- Reduction of concentration of traffic in central areas,
- Improvement of bottleneck points in urban traffic, and
- Efficient use of road spaces.

Concrete measures to realize the above targets are described in Table 6.5.

(b) Strategy for Long-term Development Plan

It is inevitable to improve present service level of transportation infrastructure in harmony with growing demand for traffic in future. With this consideration, targets for Long-term Development have been introduced as below.

- Road and road network development in harmony with growing demand for traffic trends
- Transport development to strengthen urban functions
- Dispersion of urban functions in a wider area for greater realization of a more homogeneous urban development.

Concrete measures to attain the above targets are described in Table 6.6.

Table 6.5 Strategies for Urban Transport Development (Short-term)

Target for Development	Regional Planning / Land-use policy	Traffic Management		Public Transport Development	Road Development
		Legal/Administrative/ Institutional Measures	Physical Measures		
Short-term plan	* Reduction of concentration of traffic in central areas	* Control of roadside parking by charging parking fee	* Construction of public parking spaces	* Integration of bus terminals	* Improvement/construction of missing links of middle ring road
	* Improvement of bottleneck points in urban traffic	* Regulation of heavy vehicles passage in city center	* Improvement of intersection facilities	* Relocation of long-distance bus terminal to suburban area	* Improvement of bottleneck points or roads (intersections, bridges, pavement, drainage)
	* Efficient use of road spaces	* Control of illegal activities on road spaces	* Streamlining of pedestrian through the pedestrian signal, marking of crossing points	* Designation of the places of bus stop	* Introduction of roads in potential area of development
	* Attachment of parking code to the building code	* Enforcement of traffic education		* Provision of bus service routes in the area of growing demand.	* Strengthening of ferry function
	* Land readjustment in congested urban areas and slums	* Enforcement of one-way regulation		* Introduction of Ride & Ride system	* Improvement of feeder roads (residential/commercial area)
	* Preparation of substituting land in suburban area			* Review of public transport fee	
				* Route regulation of heavy buses	* Improvement of accident-prone road sections
				* Introduction of itinerant bus system/shuttle bus	

Table 6.6 Strategies for Urban Transport Development (Long-term)

	Target for Development	Regional Planning / Land-use policy	Traffic Management		Public Transport Development	Road Development
			Legal/Administrative/ Institutional Measures	Physical Measures		
Long-term plan	* Road and network development in harmony with growing traffic demand and its pattern	* Creation of urban subcores	* Thorough observation of traffic laws	* Construction of grade-separated Intersection/rail way crossing /pedestrian crossing	* Complete enforcement of Ride and Ride system	* Development of collector road system
	* Transport development to strengthen urban function	* Development of Kiyamboni area	* Establishment of traffic engineering institute		* Passenger services by railway	* Construction of road linkage between city center and Kigamboni.
	* Dispersion of urban function in wider area and realization of homogeneous urban development.	* Land readjustment in city center				* Road network development in Kigamboni. * Road development in potential urban are along Pugu corridor. * Construction of outer ring road for prevention of disordered urban development.

CHAPTER 7 TRAFFIC DEMAND FORECAST

7.1 Methodology

Future traffic demand has been forecasted through original Four (4)-Step Measure as shown in Fig. 7.1. Details of the forecasting measures are explained below.

7.1.2 Future Trip Ends

Future trip ends by vehicle type, which are equivalent to southeast corner of future OD tables has been estimated based on the number of registered vehicles in future, where 6.7% and 6.3% of annual increasing rates for passenger cars and trucks are applied respectively as shown in Table 7.1.

7.1.3 Traffic Generation/Attraction by Traffic Zone

Future zone-wise traffic generation/attraction has been estimated reflecting future zone-wise population and number of employment during the daytime which were obtained in Chapter 6.

7.1.4 Future Traffic Distribution (Future OD Tables)

Future traffic distribution or components of future OD tables have been obtained through combination of the following two measures:

- Traffic distribution among non-developed zones
Present pattern method has been adopted to estimate these traffic distribution.
- Traffic distribution relating to developed zones
Traffic distribution of developed zones, which are defined as the zones where intensive future development is aimed at, has been estimated applying Gravity Model where future trip ends and travel time have been given as explanatory variables.

In addition, Intra-zonal Traffic Movement Decision Model has been adopted to explain anticipated, enhanced traffic movement within the newly developed areas. In this model, future population density is used as one of the explanatory variables.

7.1.5 Traffic Diversion from Other Modes of Transport

With the improvement of public transport system, it is expected that some of the trips being made by walk and by bicycle will divert to improved public transport system. Traffic diversion model which is explained by difference of travel time between these means of transport and bus has been introduced for this purpose.

7.1.6 Traffic Assignment

Traffic Assignment has been done by adopting K-V method. Future OD traffic were assigned on road network reflecting the relation between congestion level and traffic volume on certain road section.

7.2 Some Results of Future Traffic Demand Forecast

(1) Future Number of Trip-end by Vehicle Users

It is expected that future trip-ends by vehicle users will become 1.57 times and 3.0 times of present one for the year 2000 and 2010 respectively as shown below.

	Unit: Vehicles/day	
1993	178,294	
2000	280,009	(1.57)
2010	533,833	(3.00)

(2) Future Generated/Attracted Traffic Volume by Traffic Zone

Traffic generation/Attraction in the suburban areas tend to show high increasing rates as shown in Fig. 7.2.

(3) Future Traffic Distribution

Concentration to the city center seems to continue even in 2000 and 2010. However, the degree of concentration will be released relatively in future as shown in Fig. 7.3. In addition, strong traffic linkages among the newly developed areas could be found in the future distribution pattern.

(4) Assigned Traffic

Because of the improved road network in future, road links with high congestion rates are apt to decrease. Traffic volume on major sections of roads are:

Unit: pcu/day

Kigamboni – Mainland	:	About 100,000
UWT Road	:	40,000 ~ 70,000
Morogoro Road	:	50,000 ~ 60,000
Pugu Road	:	50,000 ~ 80,000
Bagamoyo Road	:	50,000 ~ 80,000
Kilwa Road	:	40,000 ~ 70,000

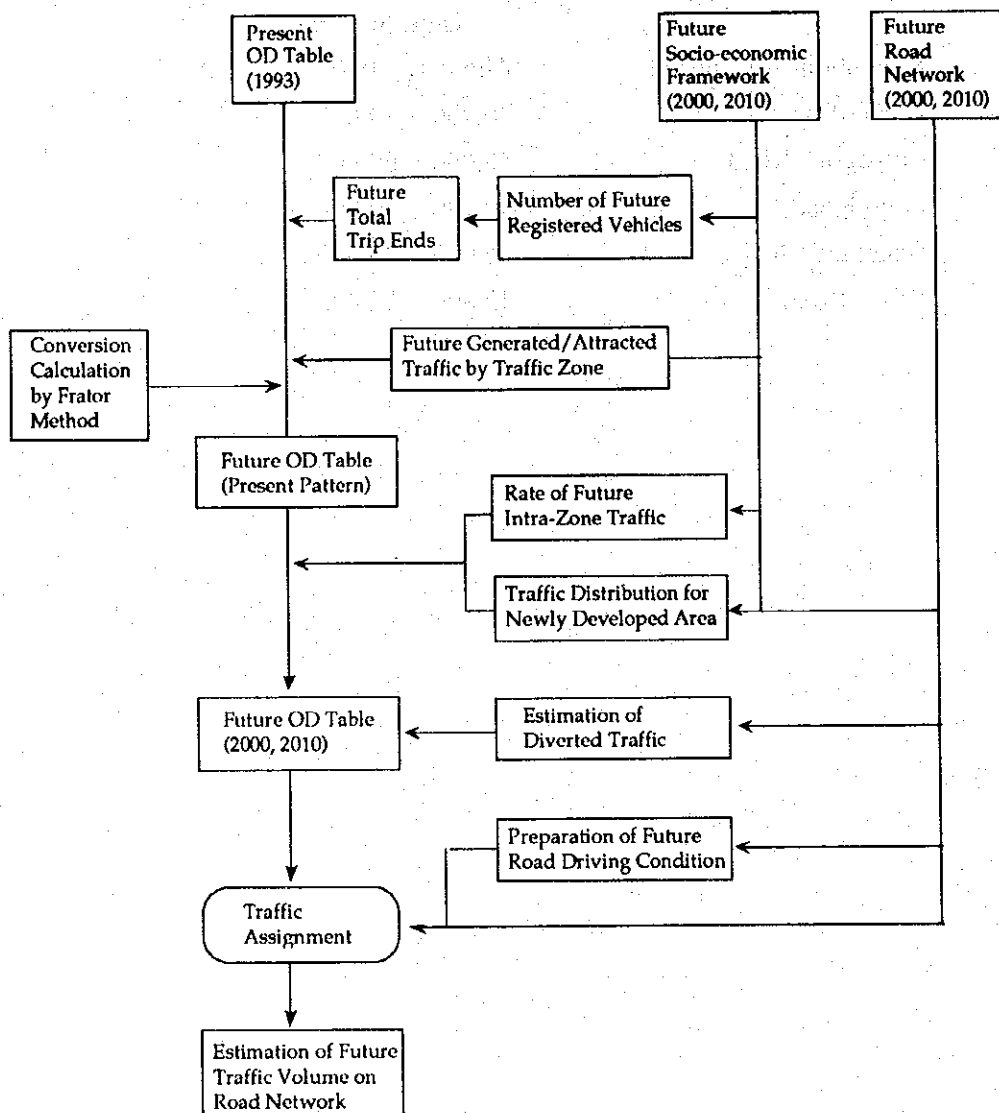
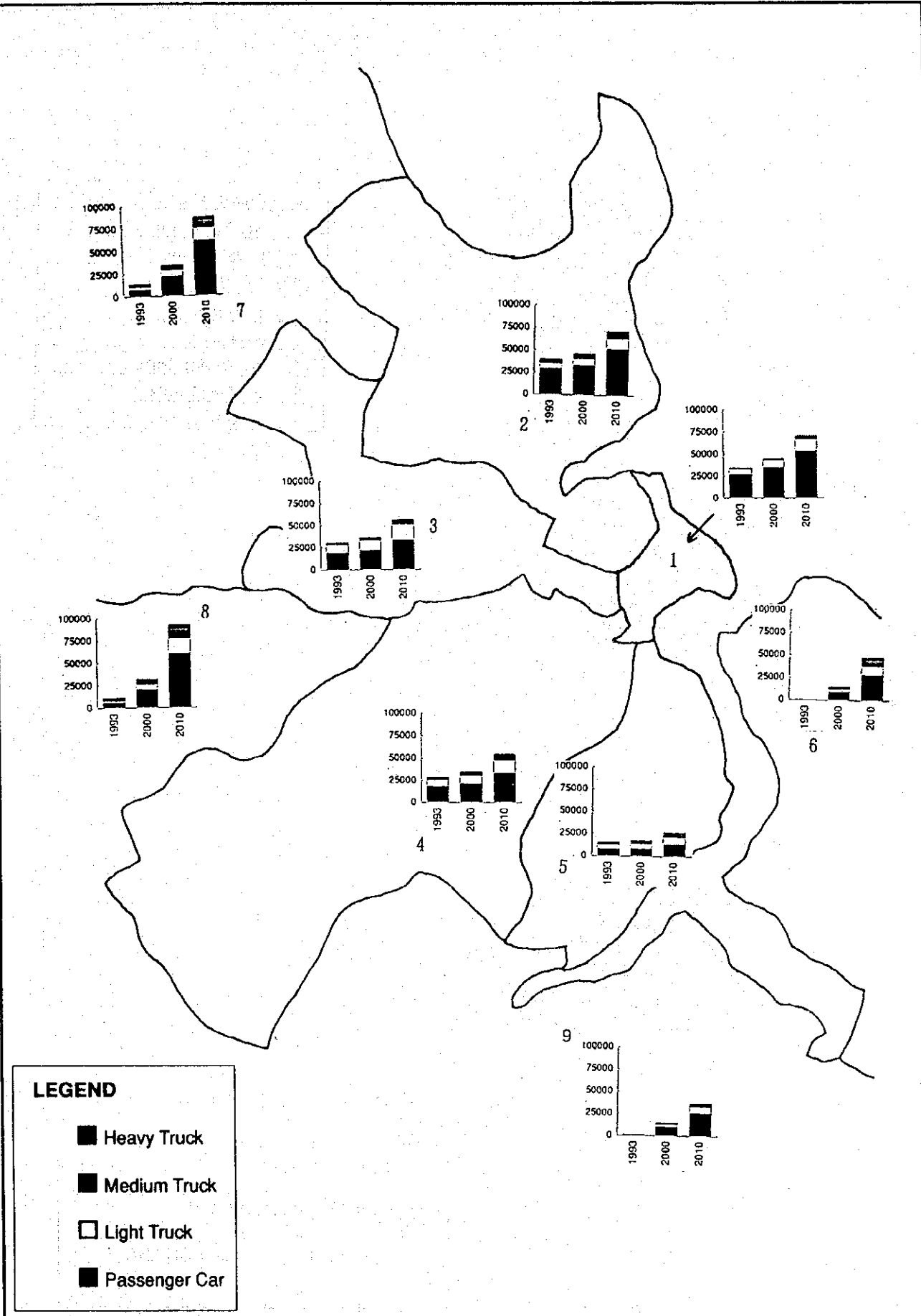


Fig. 7.1 Procedure for Future Traffic Demand Forecast

Table 7.1 Estimated Registered Vehicles in Dar es Salaam (1989 – 1993)

	DES Income Share	Cars	Buses	Truck	M.C.	Others	Total
1989 *	16.6	14,820	1,854	13,386	8,359	1,199	39,618
1992	16.1	18,137	2,276	16,238	9,779	1,356	47,786
1993	16.1	19,236	2,464	17,293	10,272	1,385	50,650
Annual Increasing Rate		6.7%	7.4%	6.6%	5.3%	3.7%	6.3%

* Year of traffic survey for DRIMP Study by JICA.



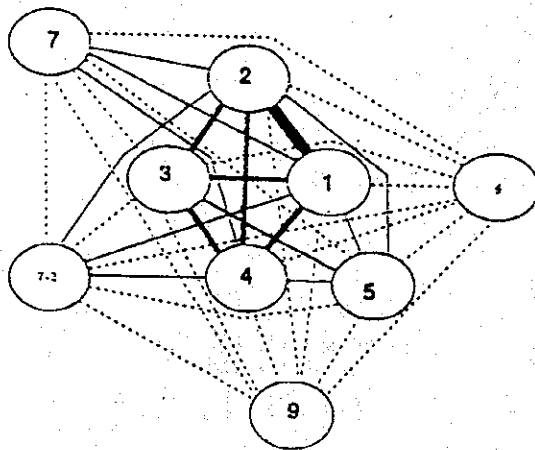
LEGEND

- Heavy Truck
- Medium Truck
- Light Truck
- Passenger Car

THE STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PLAN

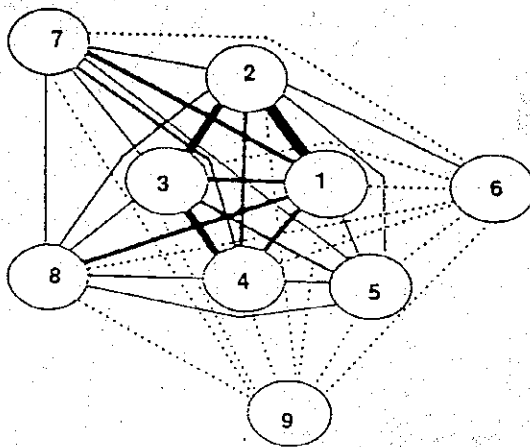
Fig. 7.2 Generated/Attracted Traffic by Consolidated Traffic Zone:ADT

1993

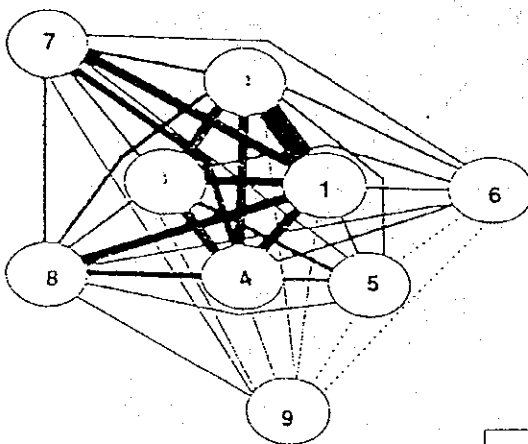


1	Central DSM
2	NE. DSM (Urban)
3	E. DSM (Urban)
4	SE. DSM (Urban)
5	S. DSM (Urban)
6	Kigamboni
7	NE. DSM (Suburban)
8	E. DSM (Suburban)
9	DSM (Suburban)

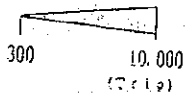
2000



2010

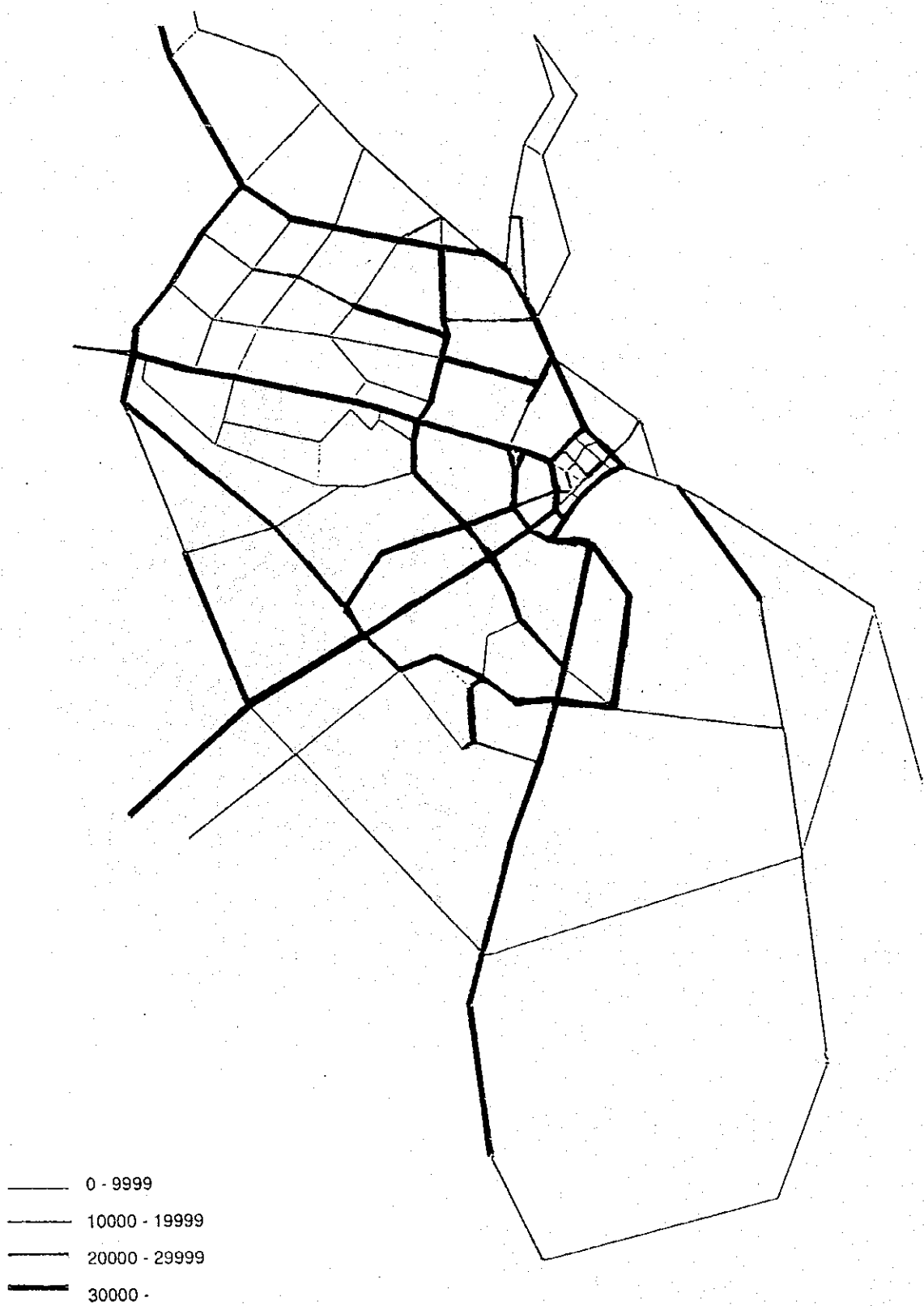


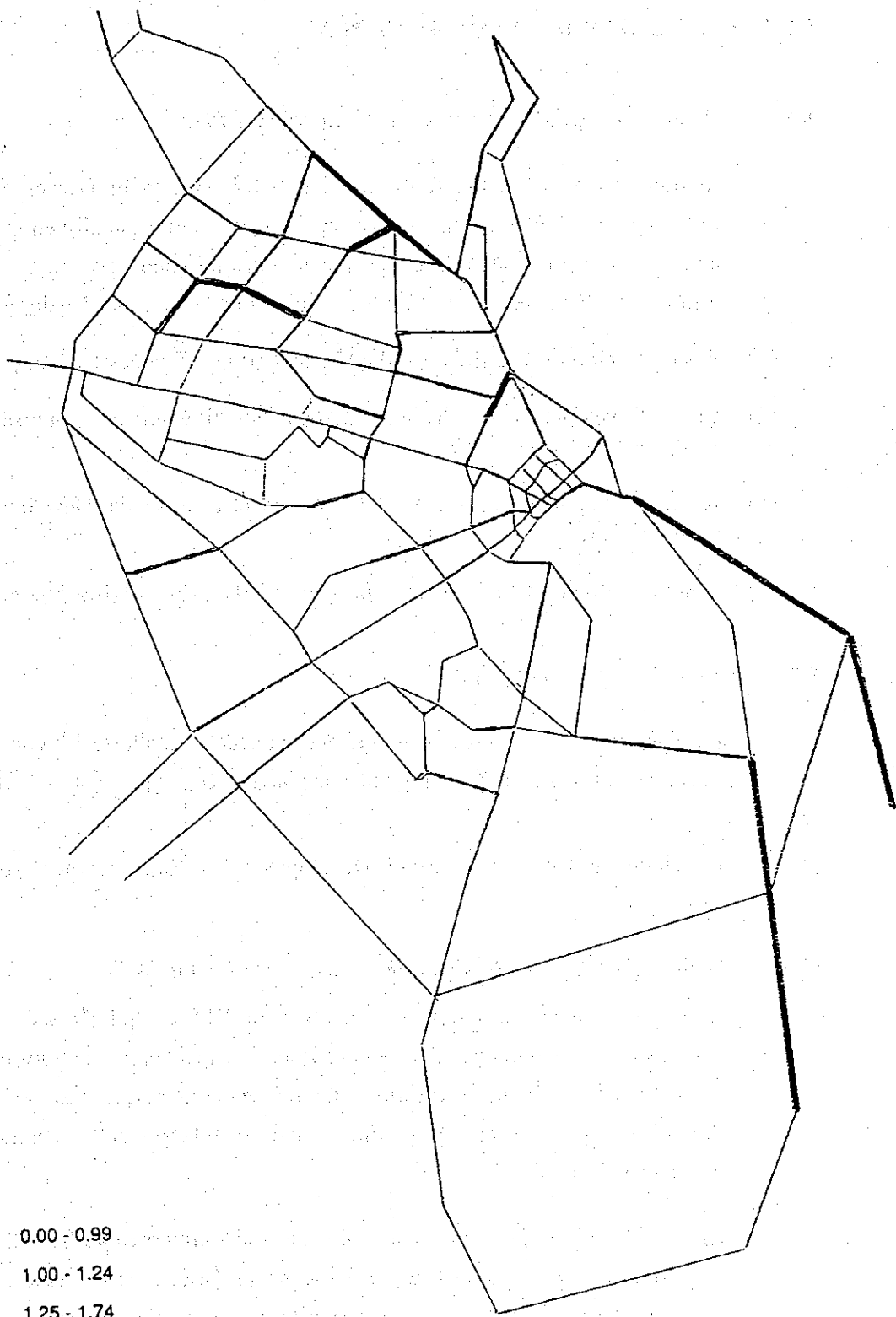
LEGEND	
	50,000 PCU / DAY
	Less than 2,000 PCU / DAY



THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

Fig. 7.4 Traffic Desire Line(2010) - DSM Urban Area
- Total Vehicle -





- 0.00 - 0.99
- 1.00 - 1.24
- 1.25 - 1.74
- 1.75 -

CHAPTER 8 ROAD DEVELOPMENT PLAN

8.1 Basic Concept of Road Development Master Plan

In order to establish the future road network system in Dar es Salaam, the following road development concepts have been established taking into consideration problems and issues on the existing road network as well as the future traffic demand forecast on the basis of future land-use development plan:

- (1) Road Development to Enhance the Urban Traffic Efficiency (See Fig. 8.1)
- (2) Road Development to Promote Urban Function in the Intensified Urban Development (See Fig. 8.2)
- (3) Road Development to Induce the Development of Potential Development Areas (See Fig. 8.3)
- (4) Road Development to Prevent Haphazard Urban Sprawl (See Fig. 8.4)

8.2 Road Development Plan

In line with the road development concept established, concrete road development plans and planning elements have been proposed as shown below.

- (1) Development Concept 1; Road Development to Enhance the Urban Traffic Efficiency
- (1-1) Widening of Arterial Roads in the City Center (See Fig. 8.5)

In order to maintain the urban function of Dar es Salaam as a center of administration, economy and social activities in Tanzania for the future as well as to facilitate the anticipated future traffic demand concentrating to the city center, the following measures are recommended to enlarge traffic capacity of the arterial roads in the city center:

- (i) Widening of Ohio, Sokoine, Gerezani and Bandari Road from 2 to 4 lanes road including reconstruction of Gerezani Bridge with 4 lanes, relocation of city bus terminal along Sokoine Drive, provision of seaside promenade with car parking lots and improvement of roundabout to the intersection with signal control.

- (ii) Construction of short-cut between UWT Road and Gerezani Road at DSM Railway Station in the long-term plan. (4 lanes, L = 0.24 km)

(1-2) Widening of Middle Ring Road with the Construction of Missing Link

The Middle Ring Road is consisting of Morocco, New Kigogo and Chang'ombe Roads. Proposed measures are presented in Fig. 8.6 and summarized below.

- (i) Widening of the Middle Ring Road from 2 to 4 lanes road with sidewalks being built on both sides and local bus station (8 places) for changing at every important intersection of radial trunk road.
- (ii) Construction of Missing Link between New Kigogo and Chang'ombe Road (4 lanes, L= 750 m)

(1-3) Widening of Trunk Roads from 2 Lanes to 4 Lanes

To build-up the basic frame of urban road network system in DSM as well as to cope up with the anticipated traffic demand in future, widening is recommended for the following trunk roads as shown in Fig. 8.7:

- (i) New Bagamoyo Road from Morocco Road Junction up to Wazo Hill
- (ii) Mpakani Road from Ubungo Junction up to New Bagamoyo Road
- (iii) Morogoro Road from Ubungo Junction up to 7.5 km point of Morogoro Road
- (iv) Uhuru Road from Msimbazi Road up to existing 4 lane section of Uhuru Road
- (v) United Nation Road
- (vi) United Nation-Morocco Road
- (vii) Kilwa Road from Gerezani Road up to Outer Ring Road

(1-4) Construction of Grade-separated Intersection at Major Trunk Roads

The grade separation are recommended for the major intersections (8 places) as shown in Fig. 8.8 to cope up with the anticipated future traffic demand on the major trunk and radial roads in the city.

(2) Development Concept 2; Road Development to Promote Urban Function in the Intensified Urban Development

(2-1) Construction and Improvement of Collector Roads

Road density in the areas between Mandela Road and Middle Ring Road is extremely low due to lack of collector roads. In order to facilitate anticipated traffic demands as well as to improve accessibility to the public bus services in the areas, strengthening of collector road network system inside Mandela Road is recommended as shown in Fig. 8.9.

(2-2) Rehabilitation of Pavement Condition on Local Roads (See Fig. 8.10)

The rehabilitation of local roads in the central area, Chang'ombe area and Kariakoo area are implemented under the program of Japanese Grant Aid (Dar es Salaam Road Improvement and Maintenance Project-DRIMP), which is expected to be completed by the end of 1995. In addition, the local roads for the following areas are recommended to be rehabilitated:

Temeke area, Ilala area, Tabata area, Sinza area and Mwinjuma area

(2-3) Reconstruction of Bridges on Trunk Roads (See Fig. 8.11)

The following bridges are recommended to be rehabilitated or replaced from the viewpoint of traffic safety:

- | | |
|----------------------------------|-----------------|
| (i) Bridges to be rehabilitated | 1 No. or 38 m |
| (ii) Bridges to be reconstructed | 9 Nos. or 306 m |

(3) Development Concept 3; Road Development to Induce the Development of Potential Development Areas

(3-1) Strengthening of Road Network in Kigamboni area including Construction of Bridge crossing Harbor (See Fig. 8.12)

The Tanzania Government has placed the high priority to the development of Kigamboni area for residential and industrial areas with a population of 265,000 by the year 2000 as well as for tourist facilities to about 30 km further south. In order to stimulate the development of Kigamboni area, the following development plans are recommended:

- (i) Construction of Harbor Bridge at the northern tip of Kigamboni Peninsula (L= 2.80 km including a 1400 m long bridge with 2 lanes)

- (ii) Construction of Kurasini Bridge at Kurasini creek
(L = 5.30 km including a 600 m long bridge with 3 lanes)
- (iii) Improvement of following regional roads to 2-lane roads with pavement;
(DRR 22, DRR 23, DRR 14)
- (iv) Rehabilitation of following regional roads to 1-lane roads with gravel surface; (DRR 2, DRR 3, DRR 8, DRR 12, DRR 22, DRR 30)

(3-2) Strengthening of Road Network along Pugu Road (See Fig. 8.13)

It is proposed to strengthen the road network along Pugu Road by construction of ladder step roads in order to promote orderly development in the frontage as well as to provide efficient transportation network in the newly developed areas.

- Construction of South Pugu Road, Improvement of North Pugu Road(DTR- 17) and Construction of North-South Access

(4) Development Concept 4: Road Development to Prevent Haphazard Urban Sprawl

(4-1) Construction of Outer Ring Road (See Fig. 8.13)

In order to enhance urban development as well as to prevent disordered land-use situations, the Outer Ring Road is planned outside Mandela Road (Port Access).

- Construction of Outer Ring Road (2 lanes, L= 23.0 km)

(4-2) Improvement of Trunk and District Roads in Rural Areas (See Fig. 8.14)

Improvement of road surface from graveled/earthen surface to asphalt pavement with minor improvement of drainage and alignment are recommended to all regional roads located in the Dar es Salaam Region.

- All regional roads in Dar es Salaam Region from DRR No.1 to DRR No.30

(5) Strengthening of Maintenance Capability

In addition to the road development plans, the strengthening of maintenance capability is recommended. Strengthening of road maintenance depots at Ilala Garden and 3 site-depots at Kisitu, Kigogo and Temeke has been implemented

by provision of maintenance equipment under the road maintenance program of DRIMP with the financial and technical assistance of Japanese Government.

However, road maintenance situation is the same as it was due to financial constraints and inappropriate policies regarding road maintenance operation. It is recommended for MWCT and DCC to take the following measures:

- (i) To strengthen the function of maintenance unit of DRIMP at Ilala Garden in terms of funds, man-power, equipment and materials
- (ii) To prepare firm daily and routine maintenance program and fulfill these program proper daily/routine maintenance including bush cleaning, ditch cleaning, dragging, gravel patching, pot-hole patching, grading and road furniture installation.

8.3 Number of Traffic Lanes and Typical Cross-section

Required number of traffic lanes for each road development plan was studied and determined for the year 2010 taking into consideration the following factors:

- (i) Functional requirement to meet the road classification expected in each road development plan,
- (ii) Future traffic demand,
- (iii) Land-use development plan, and
- (iv) Environmental conditions including land acquisition situation.

Typical cross-sections were developed for the year 2010 in line with the traffic lane number determined above as well as surrounding local conditions including land-use pattern along the proposed road.

8.4 Preliminary Cost Estimate of Proposed Road Development

Preliminary cost estimate was conducted for analyzing financial and economic viabilities of the proposed road development plan. The result of evaluation was reflected to the implementation program in the Short-term and Long-term plans.

8.5 Road Network Master Plan in 2010

On the basis of various road development plans proposed in the previous Section, the road development master plan in Dar es Salaam for the year 2010 was set up with the following targets and presented in Fig. 8.15:

- (i) To harmonize with growing traffic demand and its pattern,
- (ii) To strengthen urban function, and
- (iii) To disperse urban function in wider area for realization of homogeneous urban development.

Road network system by type of roads in the year 2010 was presented in Table 8.1.

To examine traffic condition of the proposed road network system, traffic assignment has been made on the proposed network for the year 2010. Fig. 8.16 shows the result of congestion analysis conducted on the basis of the road capacity and traffic volume. The congestion level on the arterial roads is moderate, ranging from 1.0 to 1.75, and no serious congestion would be expected on the major roads in Dar es Salaam in the year 2010 with the exception of some urban roads in and around the city center. This result shows the future road network proposed in this Study is totally proper.

To examine the situation of the road network system in 2000, tentative road network system was established assuming that all radial trunk roads are widened from 2 to 4 lane by the year 2000 and traffic assignment has been made on this network. Congestion ratio on the major roads is presented in Fig. 8.17 which shows no serious congestion would be expected on the road network in case that the widening of above roads are implemented by the year 2000.

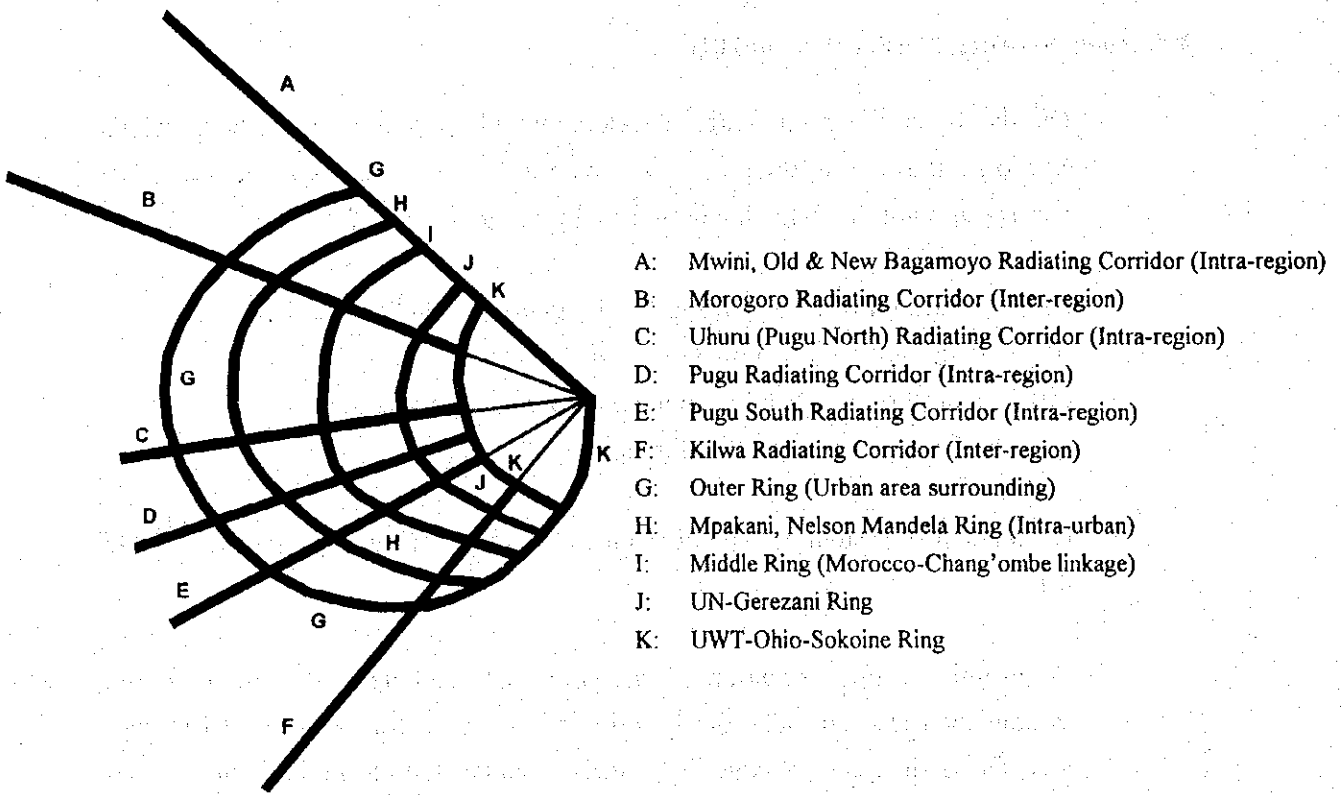


Fig. 8.1 Concept of Road Development to Enhance Urban Traffic Efficiency

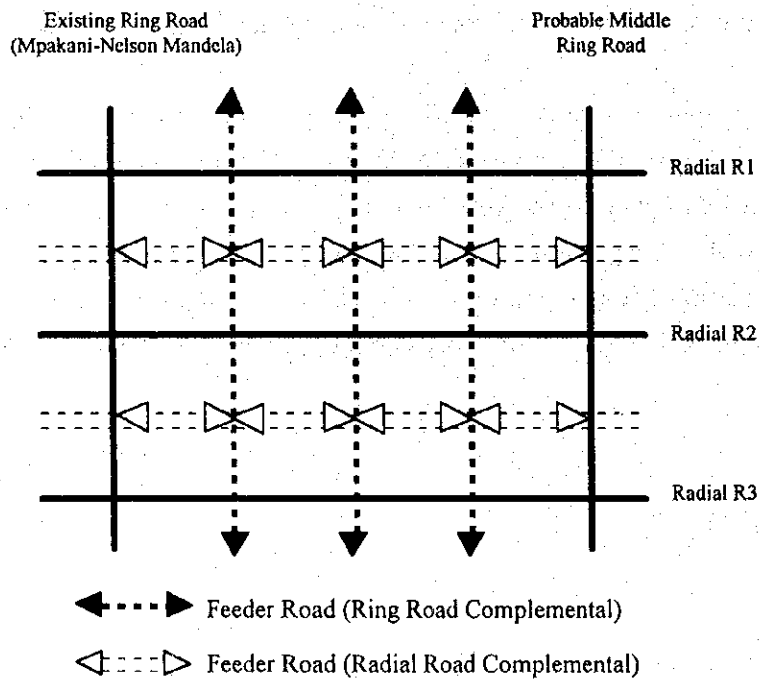


Fig. 8.2 Concept of Road Development to Promote Urban Development

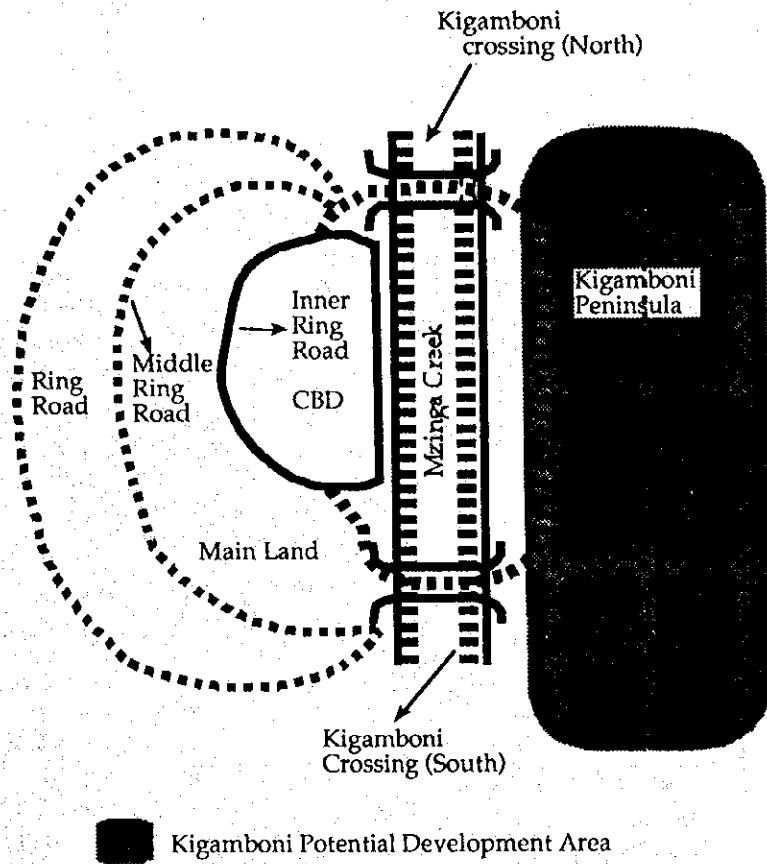


Fig. 8.3 Road Development to Induce the Development of Potential Development Area

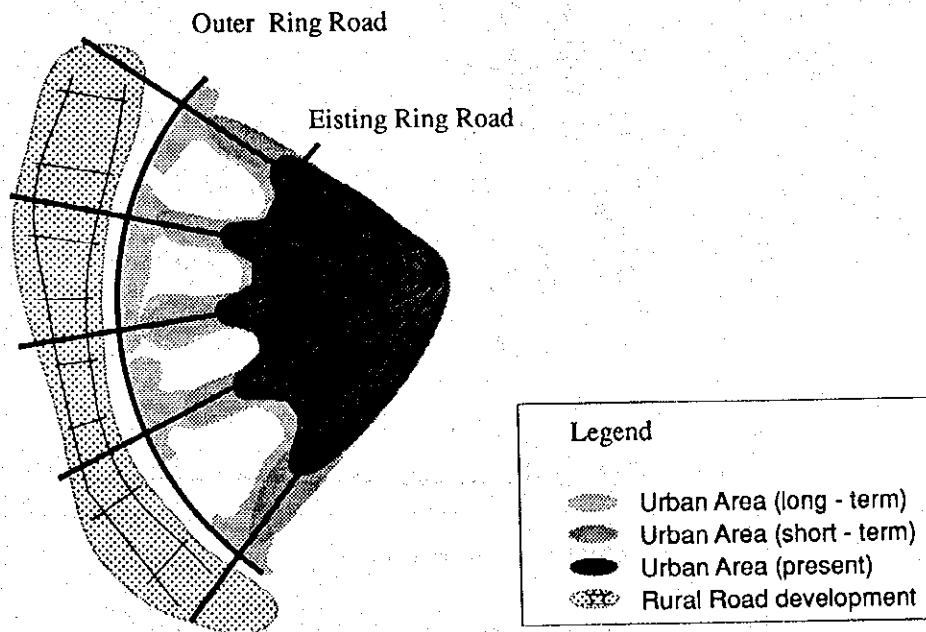
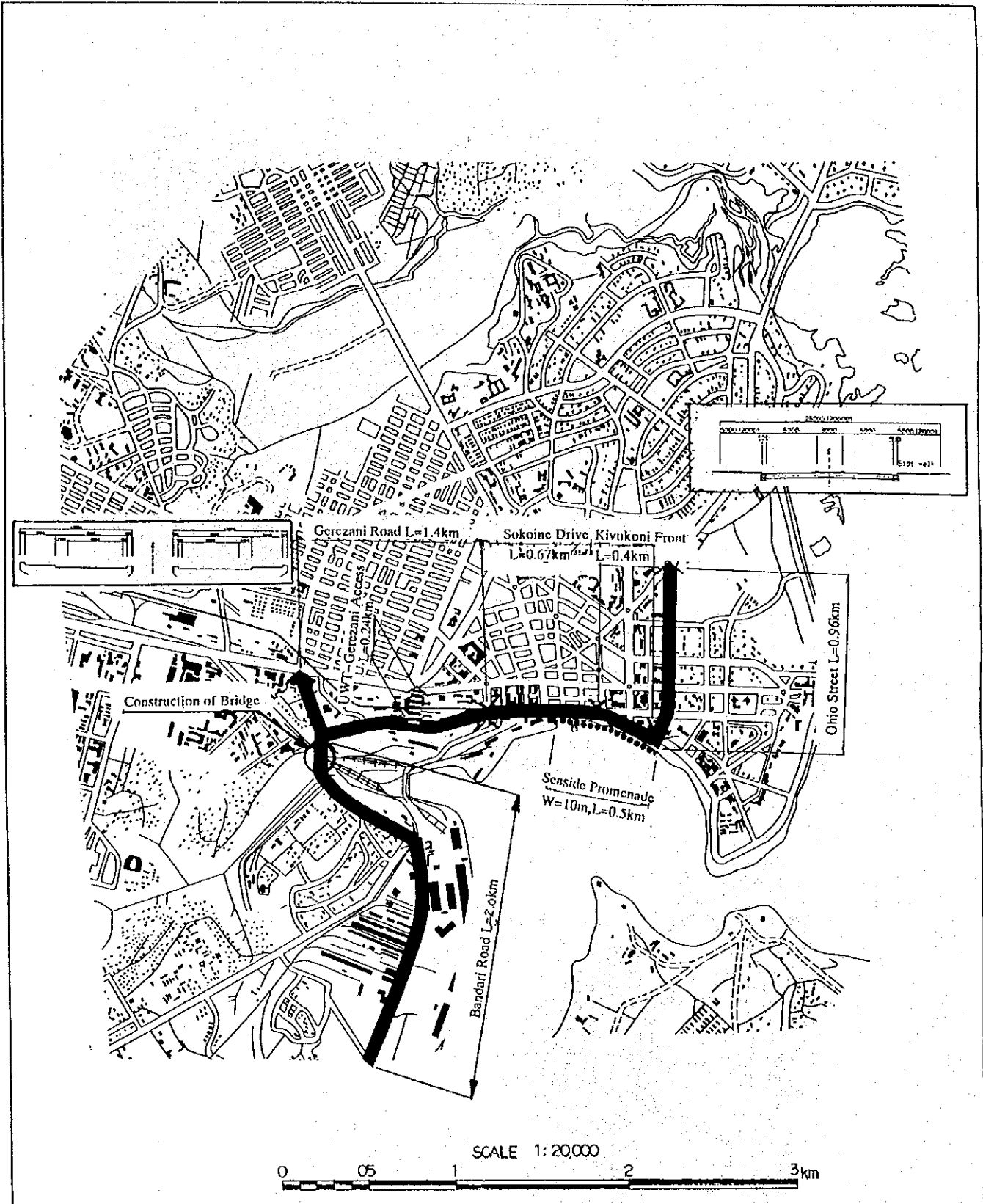





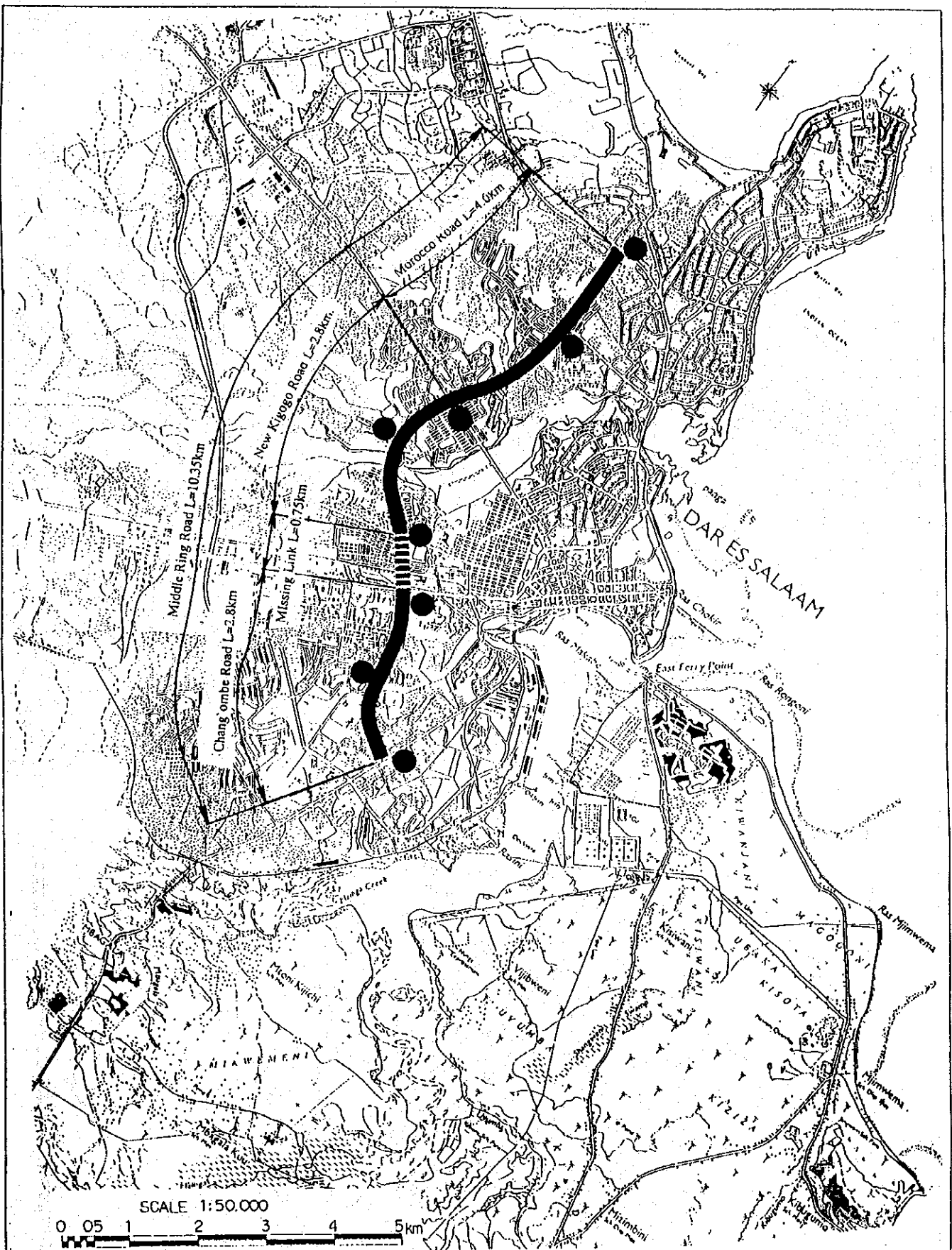
Fig. 8.4 Concept of Road Development to Conduct Orderly Urban Expansion



THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN




Fig.8.5
Proposed Widening of Arterial Roads in City Center

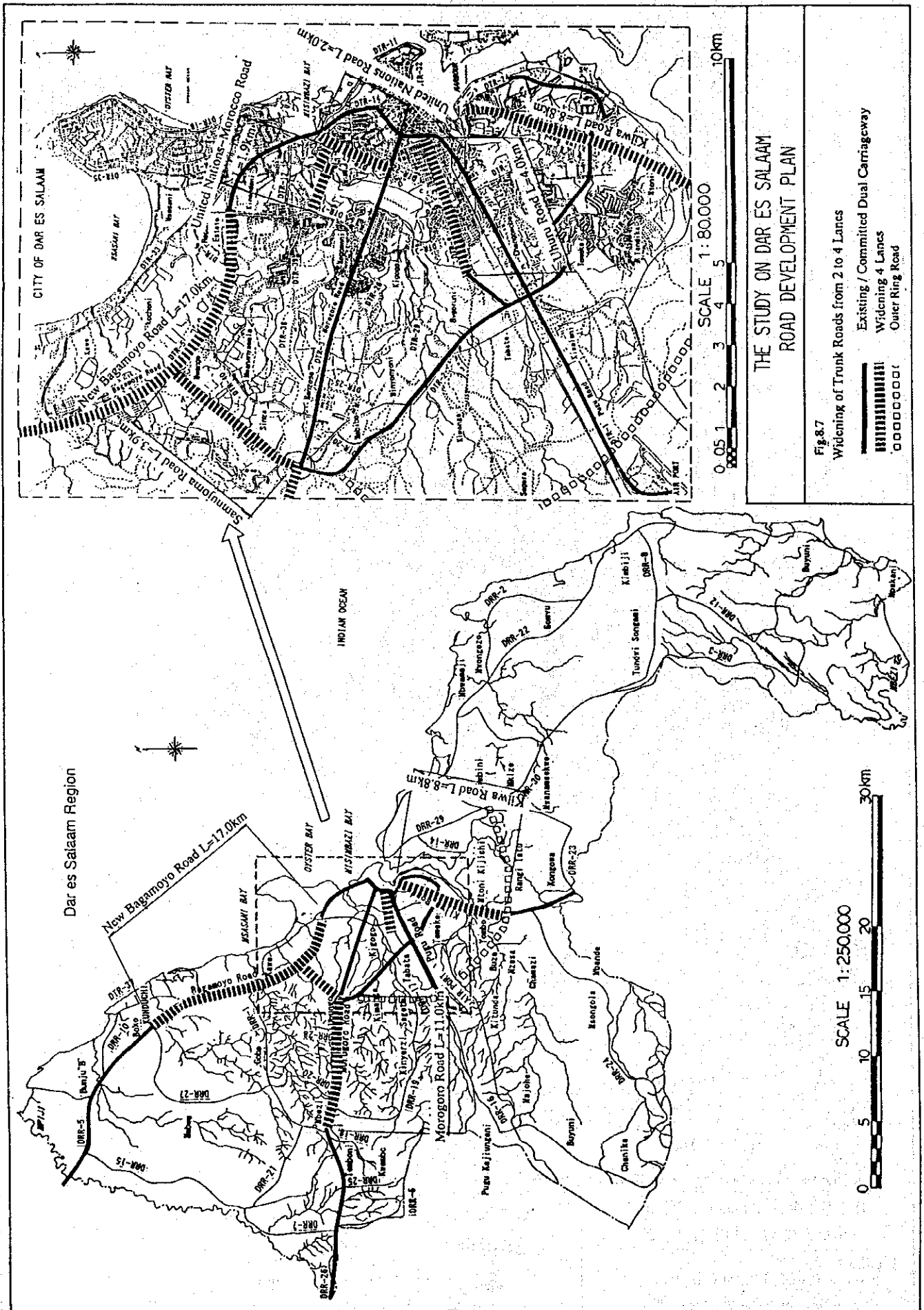
-  Widening 4 Lanes
-  New Construction Section UWT-Gerezani Access
-  Seaside Promenade

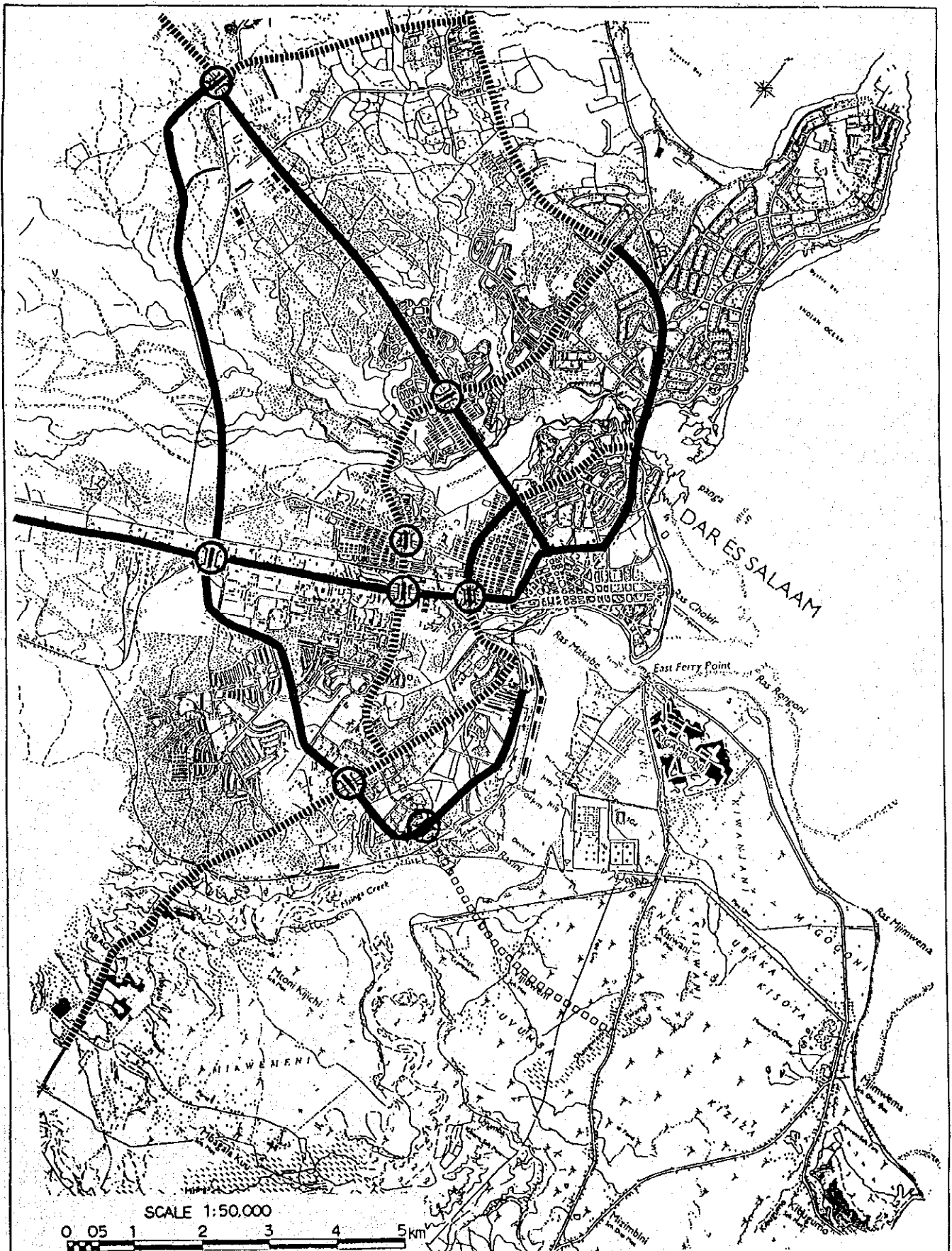


**THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN**

Fig.8.6
Proposed Widening of Middle Ring Road
with Construction of Missing Link

-  Widening of Middle Ring Road
-  Construction of Missing Link
-  Construction of Bus Station



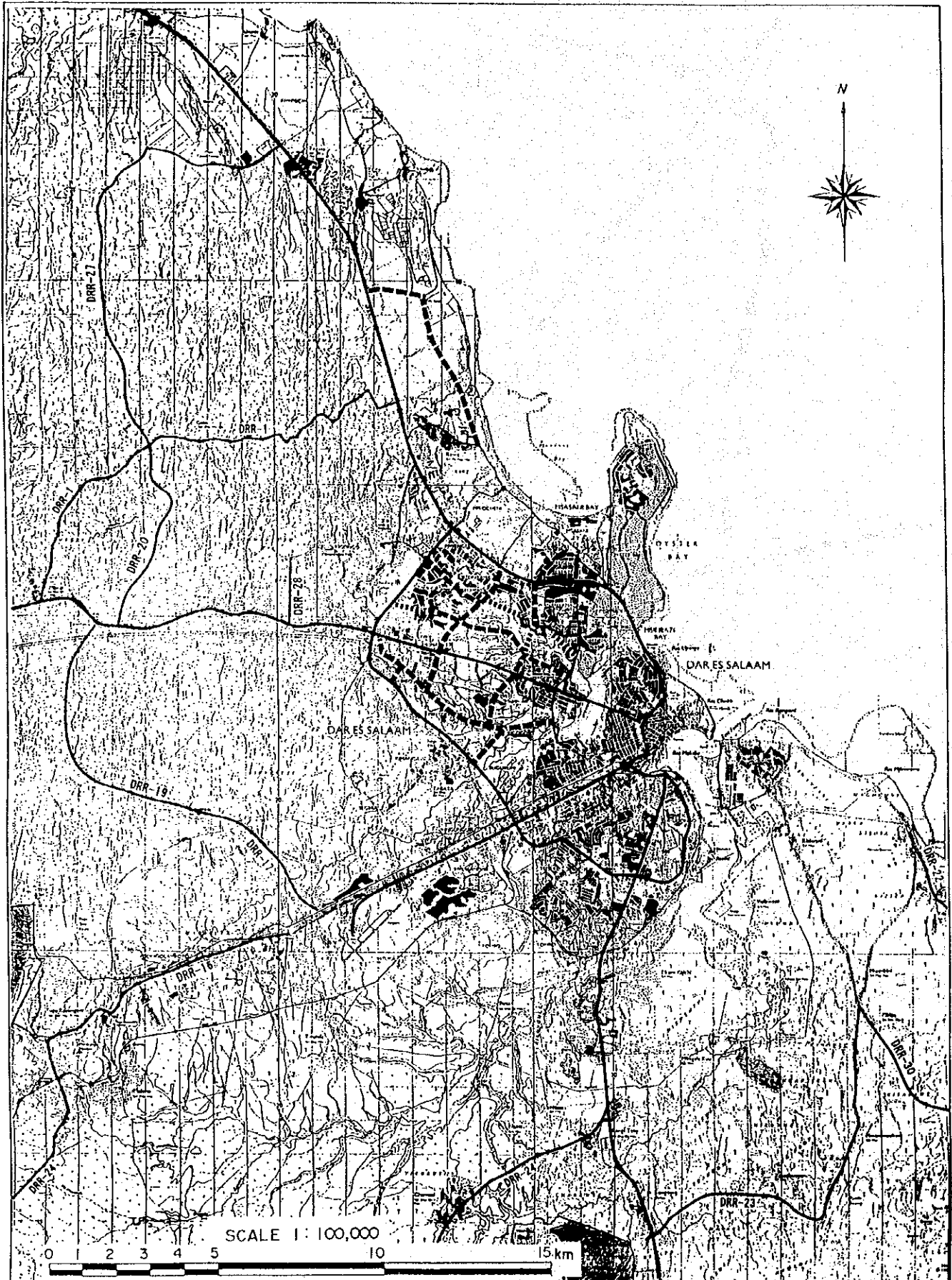


THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

Fig.8.8 Location of Proposed Grade Separation

- Grade Separation

 Kurasini Bridge and Access Road
- Existing / Committed Dual Carriageway
- Proposed Widening / Construction to be Dual Carriageway



**THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN**




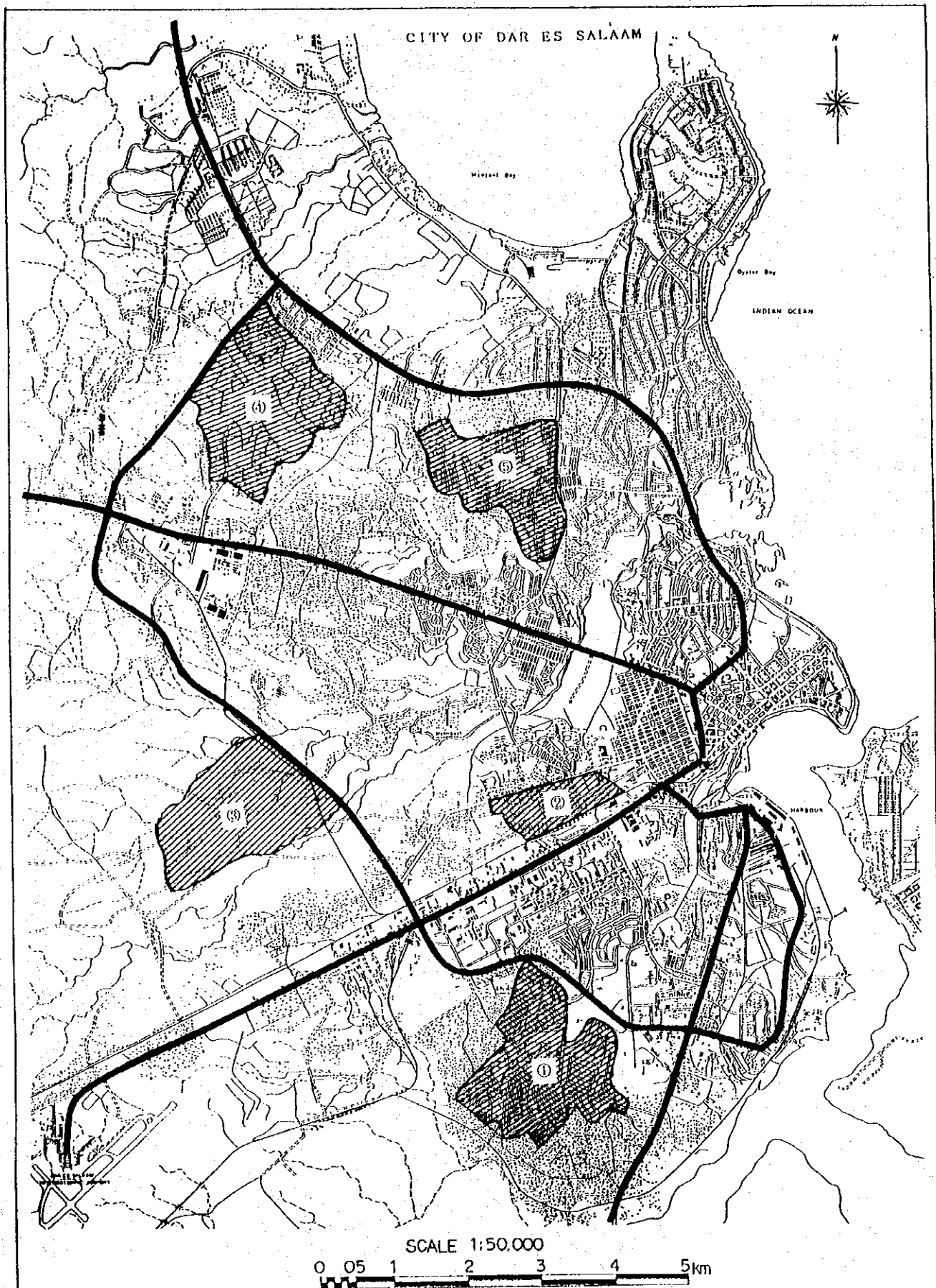
-  Improvement of Collector Roads
-  New Construction of Collector Roads
-  Existing Collector Road

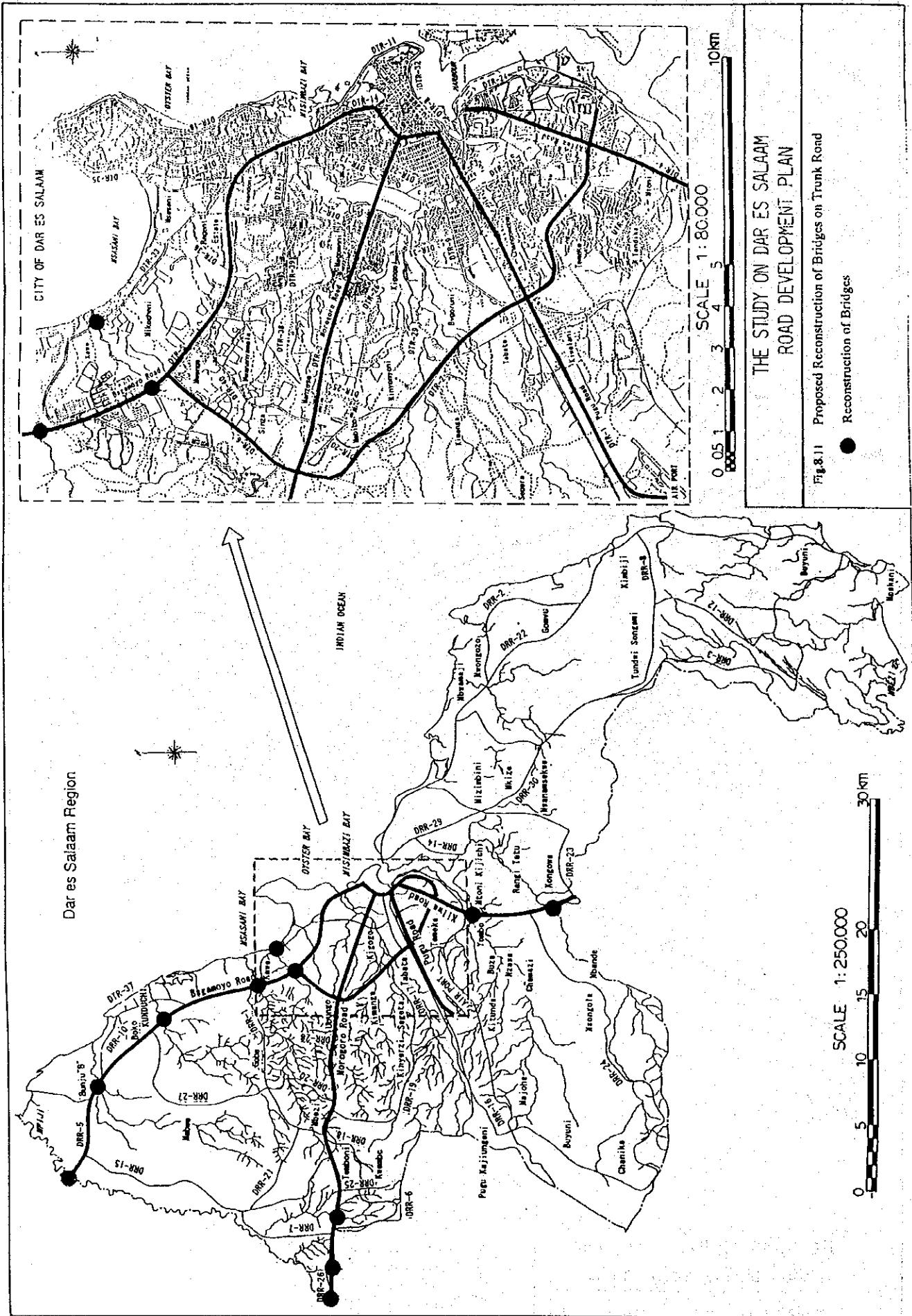
Fig.8.9 Proposed Road Development to disperse Urban function in Wider Area



THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

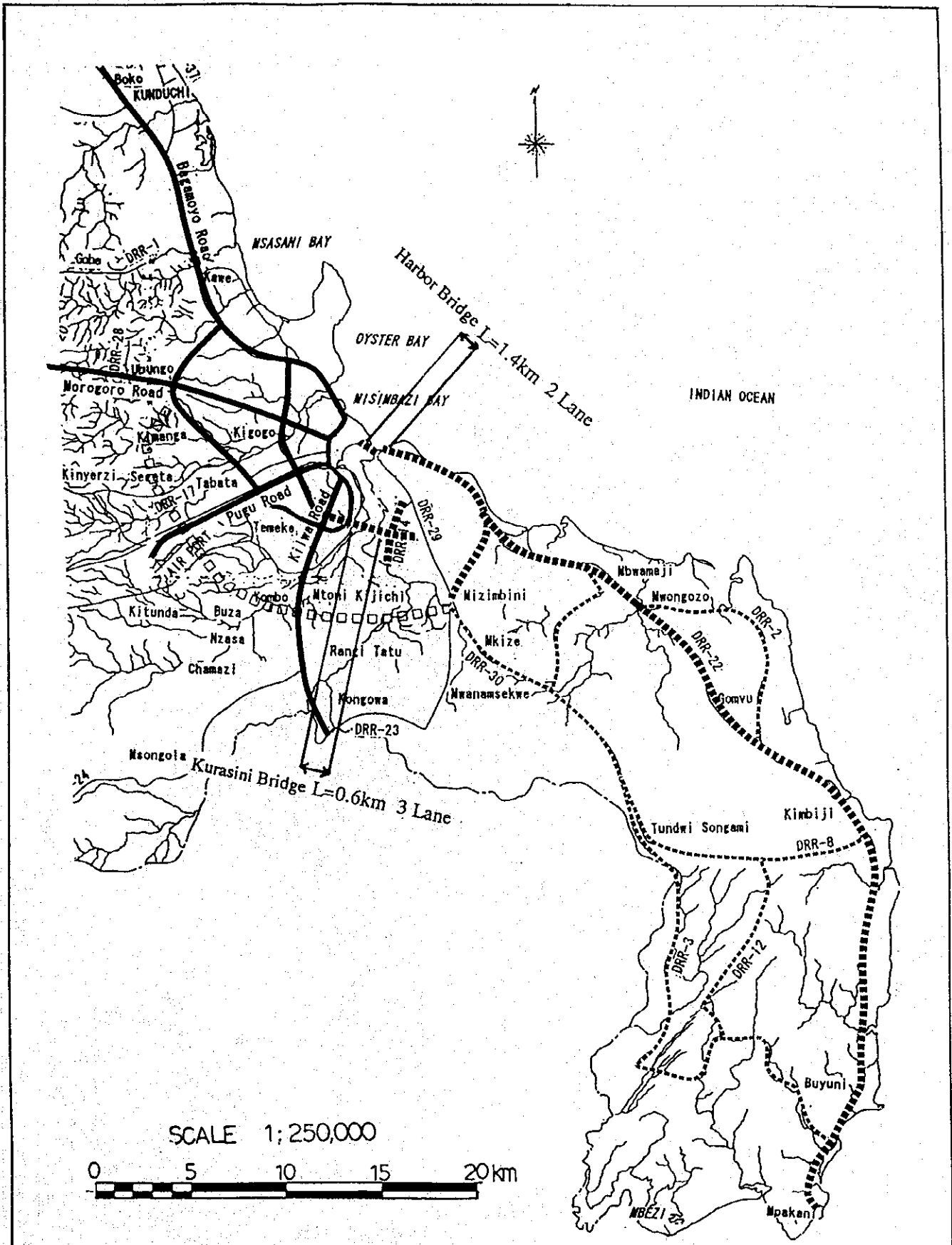
Fig.8.10 Local Roads to be Rehabilitated

- ① Temeke Area Roads (L=13.9km)
- ② Ilala Area Roads(L=10.3km)
- ③ Tabata Area Roads(L=9.2km)
- ④ Sinza Area Roads(L=9.2km)
- ⑤ Mwinjijuma Area Roads(L=17.2km)



THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

Fig 8.11 Proposed Reconstruction of Bridges on Trunk Road
● Reconstruction of Bridges



THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

Fig.8.12 Proposed Road Development Plan
-Strengthening of Road Network
in Kigamboni Area

- Improvement of Regional Roads to 2 lane road with pavement
- - - - - Rehabilitation of Regional Road with gravel surface
- Outer Ring Road

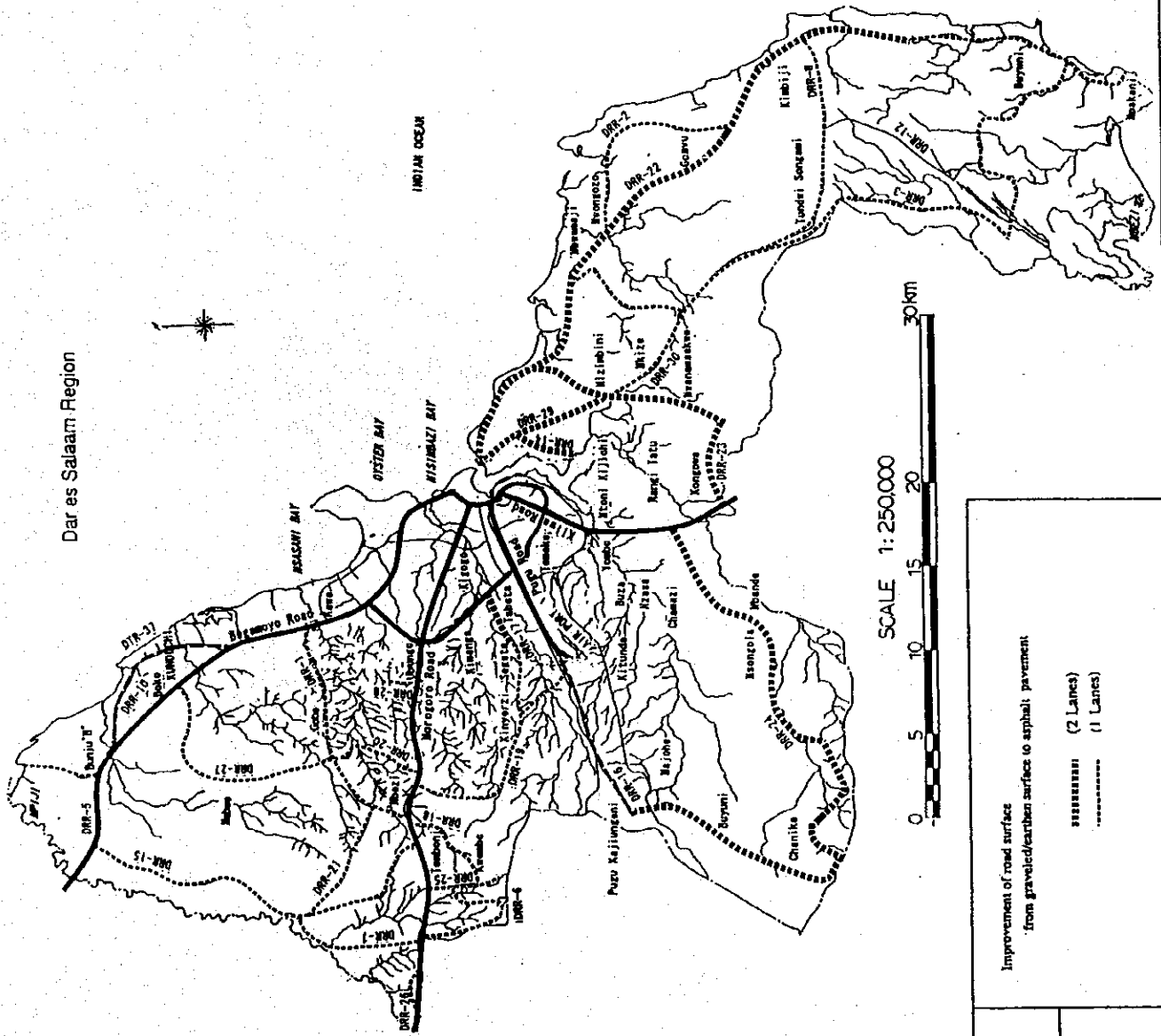


THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

Fig.8.13 Proposed Road Development to disperse
Urban function in Wider Area

Construction of Outer Ring Road
Strengthening of Road Network along Pugu Road

Dar es Salaam Region



SCALE 1:250,000



Improvement of road surface
from gravelled/earthen surface to asphalt pavement

————— (2 Lanes)
..... (1 Lane)

THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

Fig. 8.14
Improvement of Important Roads in Rural Areas

THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

Fig. 8.15
Road Network Master Plan in 2010

- Widening 4 Lanes
- New Construction (4 Lanes)
- New Construction (2 Lanes)
- Improvement
- Rehabilitation
- Overlay
- Reconstruction
- Construction of Grade Separated Intersection

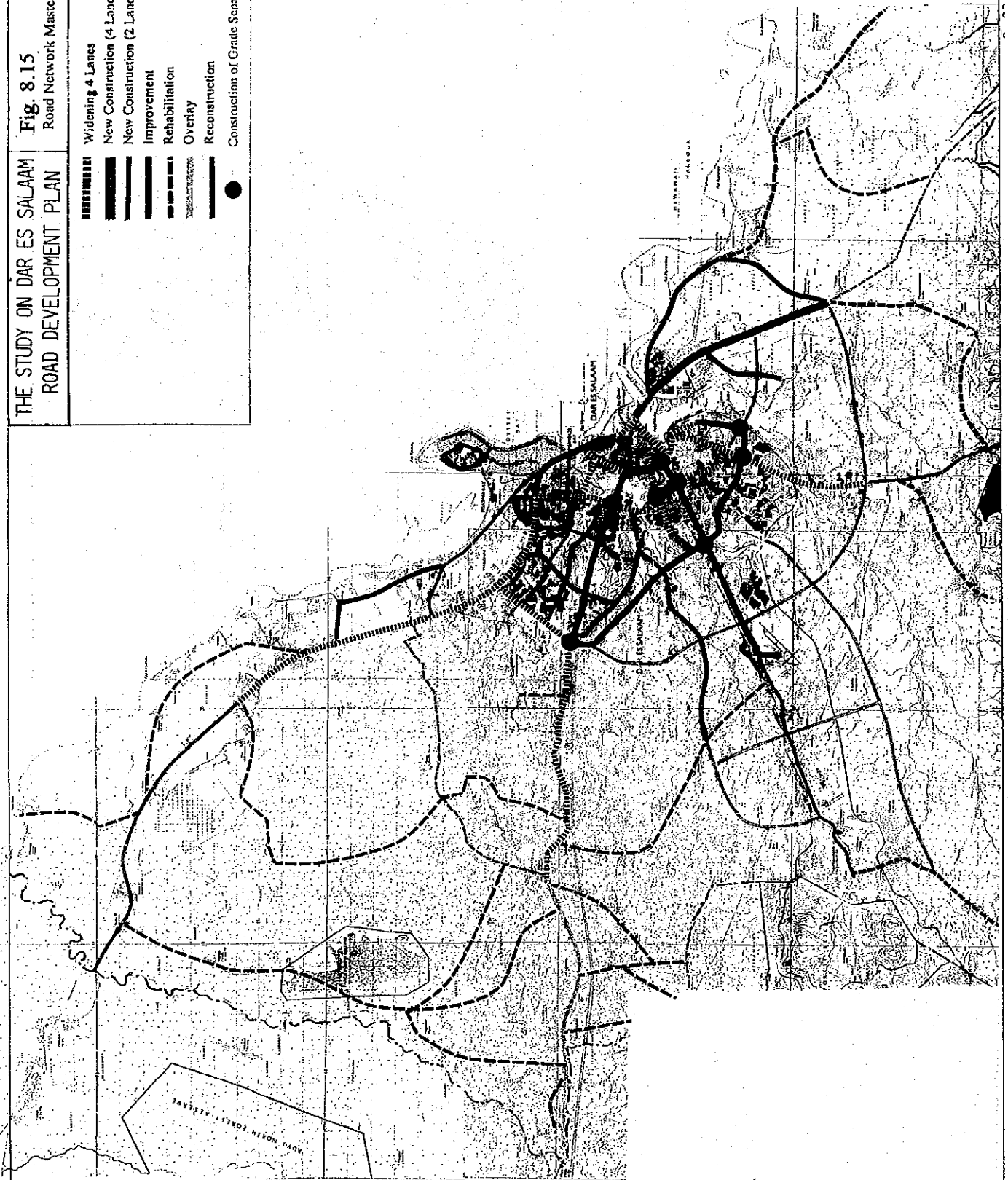
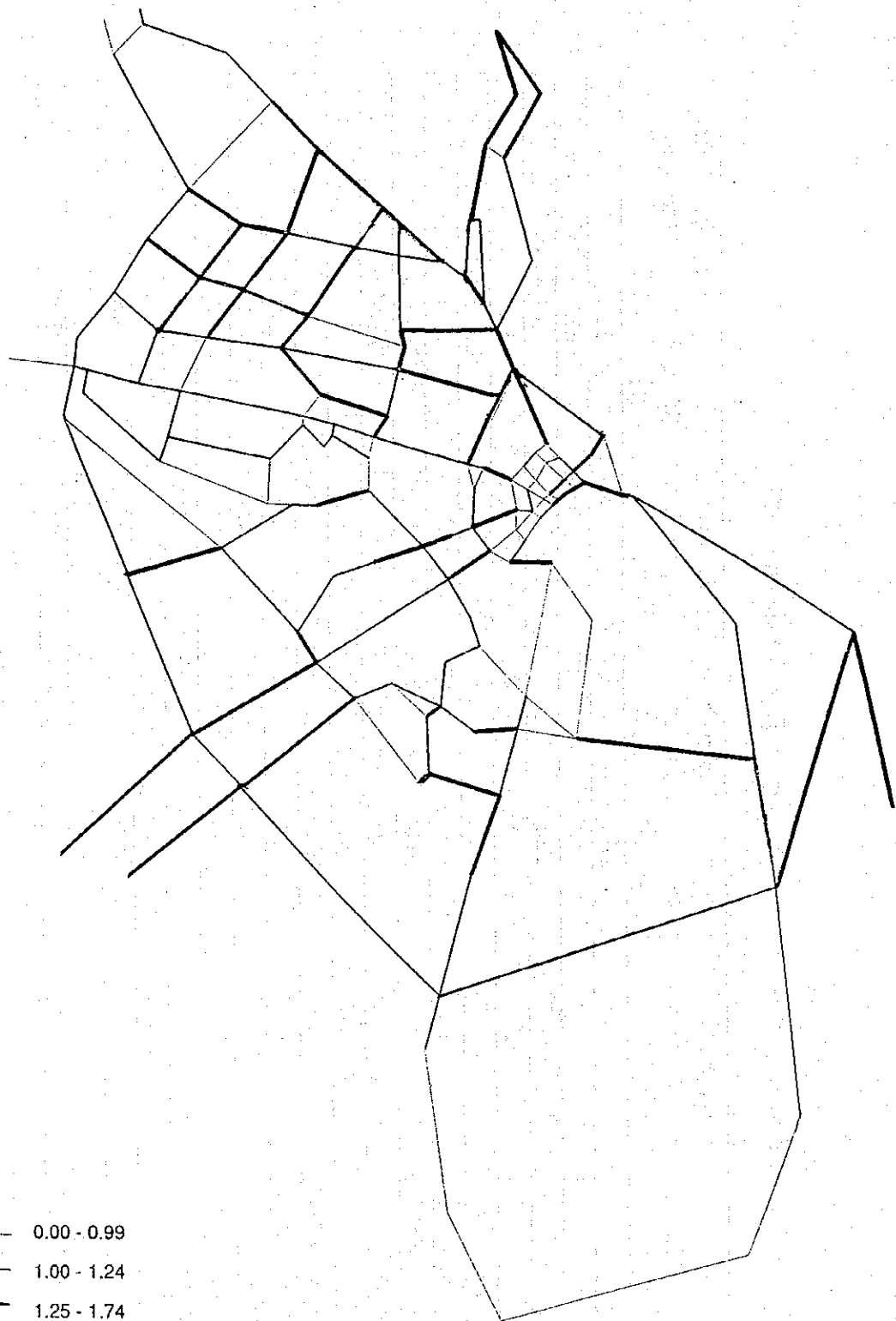


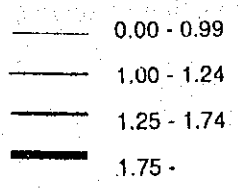
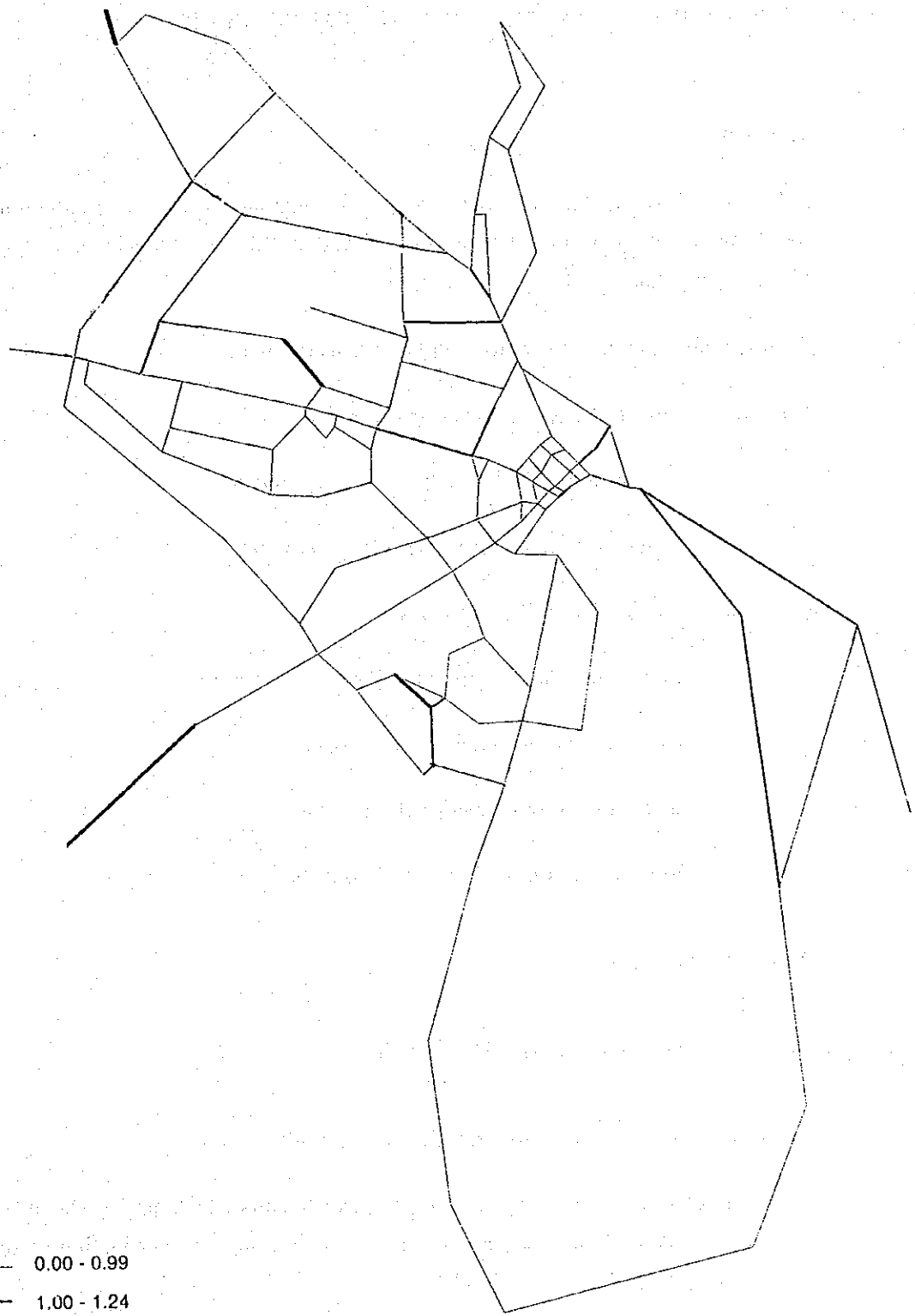
Table 8.1 Road Network System in Dar es Salaam in 2010

Road Classification	Present Road Network in 1994 (km)*	New Const. Road (km)	Improvement Road (km)	Total Road Network in 2010 (km)	Difference (km)	Improvement Measures
Trunk Road	144.5	22.0	0.0	166.5	22.0	
4 lane roads (paved)	39.8	0.0	62.7	102.5	62.7	A-1,A-2,A-3
2 lane roads (paved)	104.7	22.0	-62.7	64.0	-40.7	A-10
Regional Road	314.0	0.0	61.2	375.2	61.2	
2 lane roads (paved)	60.7	0.0	205.0	265.7	205.0	A-5,A-8,A-11
2 lane roads (unpaved)	143.8	0.0	-143.8	0.0	-143.8	
1 lane roads (paved-SBST)	0.0	0.0	109.5	109.5	109.5	A-8,A-11
1 lane roads (unpaved)	109.5	0.0	-109.5	0.0	-109.5	
District Road	213.1	0.0	0.0	213.1	0.0	
1 lane roads (paved-SBST)	0.0	0.0	0.0	0.0	0.0	
1 lane roads (unpaved)	213.1	0.0	0.0	213.1	0.0	
Major Feeder Road	251.0	0.0	0.0	251.0	0.0	
2 lane roads (paved)	151.0	0.0	59.8	210.8	59.8	A-6
2 lane roads (unpaved)	100.0	0.0	-59.8	40.2	-59.8	
Minor Feeder Road	227.4	0.0	0.0	227.4	0.0	
1 lane (paved)	0.0	0.0	0.0	0.0	0.0	
1 lane (unpaved)	227.4	0.0	0.0	227.4	0.0	
Total Length	1,150.0	22.0	61.2	1,233.2	83.2	

Note: /* Refer to Table 4.14 "Summary of Road Network System Identified by the Study Team"



- 0.00 - 0.99
- 1.00 - 1.24
- 1.25 - 1.74
- 1.75 -



CHAPTER 9 PUBLIC TRANSPORT DEVELOPMENT PLAN

9.1 General

Public transport development plan has been formulated basically in conjunction with road development plans proposed in Chapter 8 and traffic management plans which will be explained in Chapter 10.

Components of public transport planning are as follows:

- (a) **Improvement of Long-distance Bus Services**
 - Integration of Long-distance Bus Terminals
 - Relocation of Long-distance Bus Terminals
- (a) **Improvement of City Bus Services**
 - Functional Classification of Bus Service Routes
 - Construction of Local Bus Stations
 - Strengthening of Junctional Function
 - Reorganization of City Bus Terminals

9.2 Description of Plan

9.2.1 Improvement of Long-distance Bus Service

(1) Integration of Long-distance Bus Terminals

For the well ordered services of long-distance bus which are beneficial both for bus users and bus operators, integration of bus terminal by destination of services has been proposed as shown in Fig. 9.1

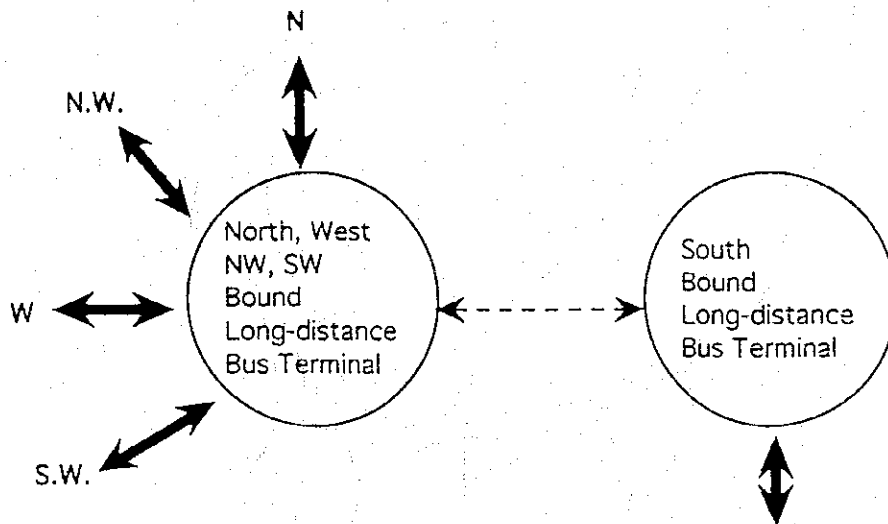
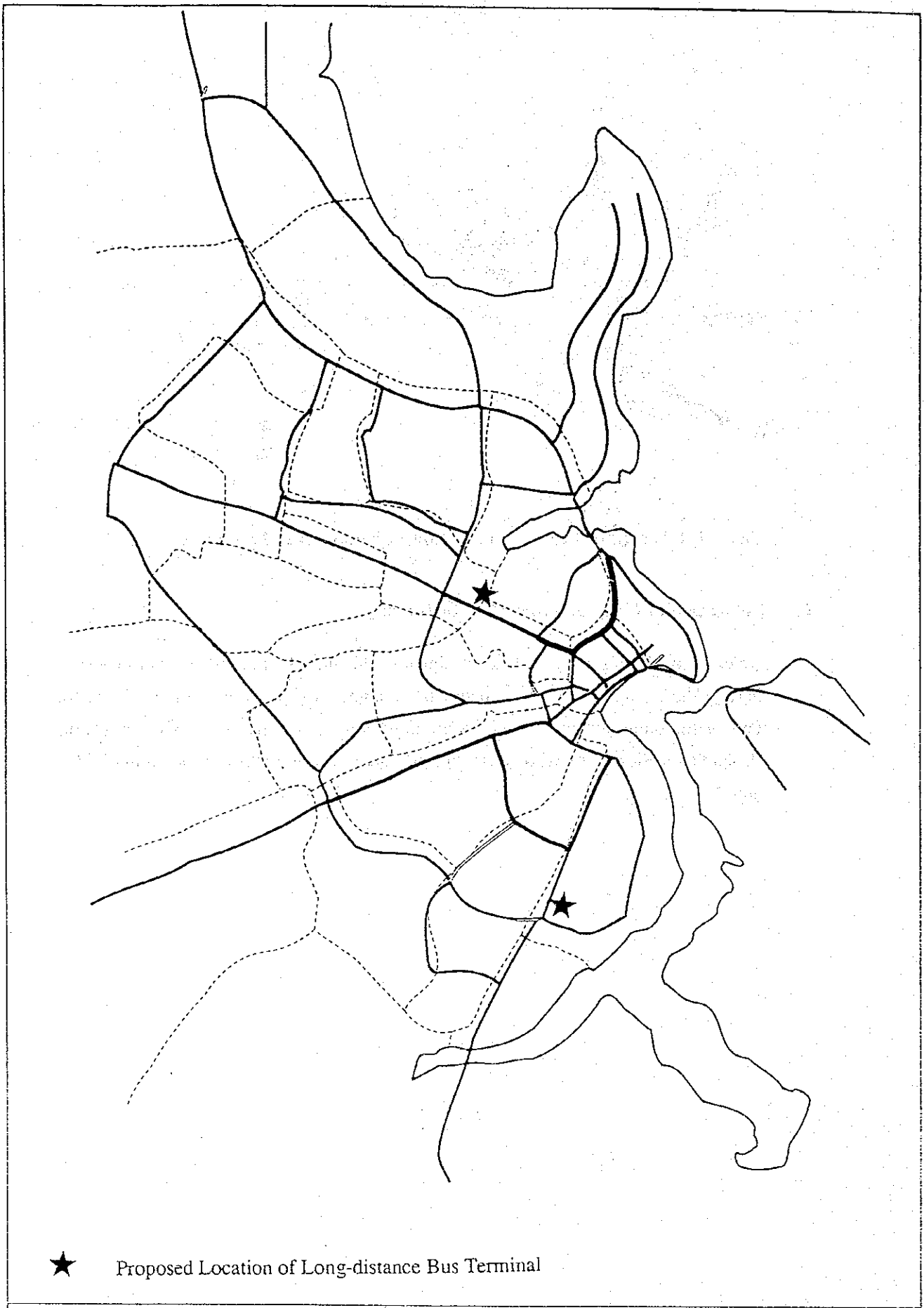


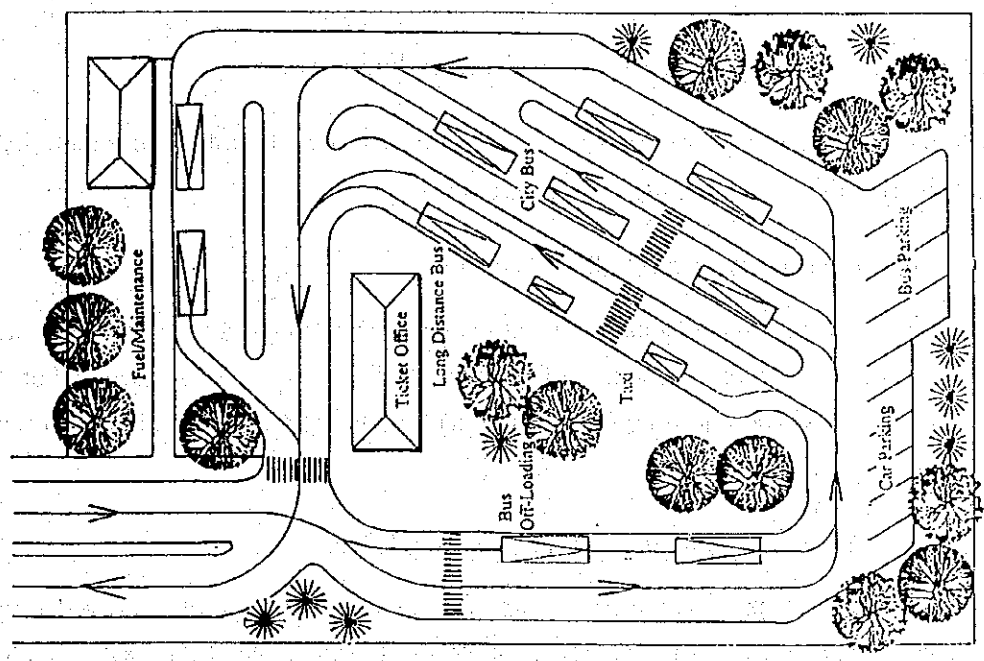
Fig. 9.1 Concept of Integration of Long-distance Bus Terminals

(2) Relocation of Long-distance Bus Terminals

Relocation of long-distance bus terminals to the suburban area has been proposed here. The exodus of bus terminals from congested urban area would release the congestion on urban streets and would contribute to the streaming of urban traffic. Probable location of new bus terminals and their ground plans are shown in Fig. 9.2 and 9.3

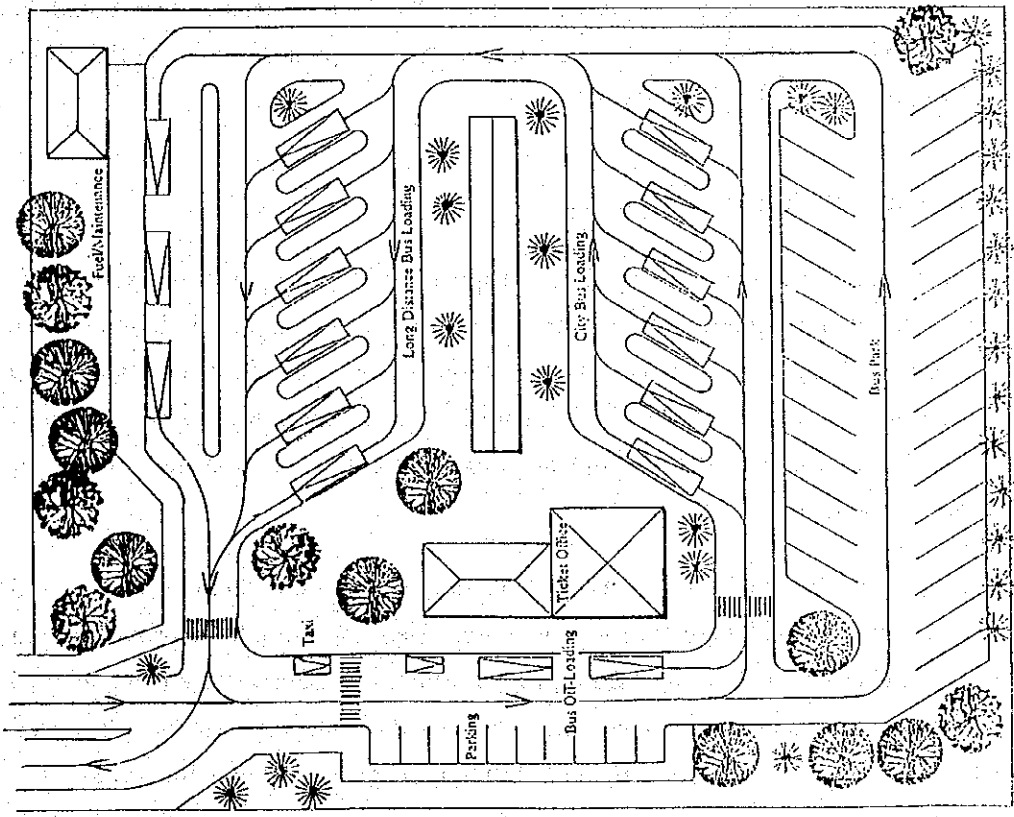


★ Proposed Location of Long-distance Bus Terminal



Scale 0 10m 20m 30m

South Bound Bus Terminal



Scale 0 10m 20m 30m

West Bound Bus Terminal

Fig. 9.3 Layout Plan of Long Distance Bus Terminal

9.2.2 Improvement of City Bus Services

(1) Functional Classification Bus Service Routes (Fig. 9.4)

In order to conduct well ordered bus services in the city, the following functional classification of bus service has been proposed:

- Trunk Road Services on Radial Roads

This is the medium distance bus services between suburban residential areas and the city center on such radial roads as Bagamoyo, Morogoro, Uhuru, Pugu, and Kilwa, and functions as line-haul public transport service within the city.

- Itinerating Trunk Road bus Services on Ring Roads

This is a concept to enhance bus services taking advantage of improved ring shape road network such as Mpakani/Nelson Mandela (Port Access), Middle Ring Road, UN/Msimbazi, UWT/Ohio/Sokoine.

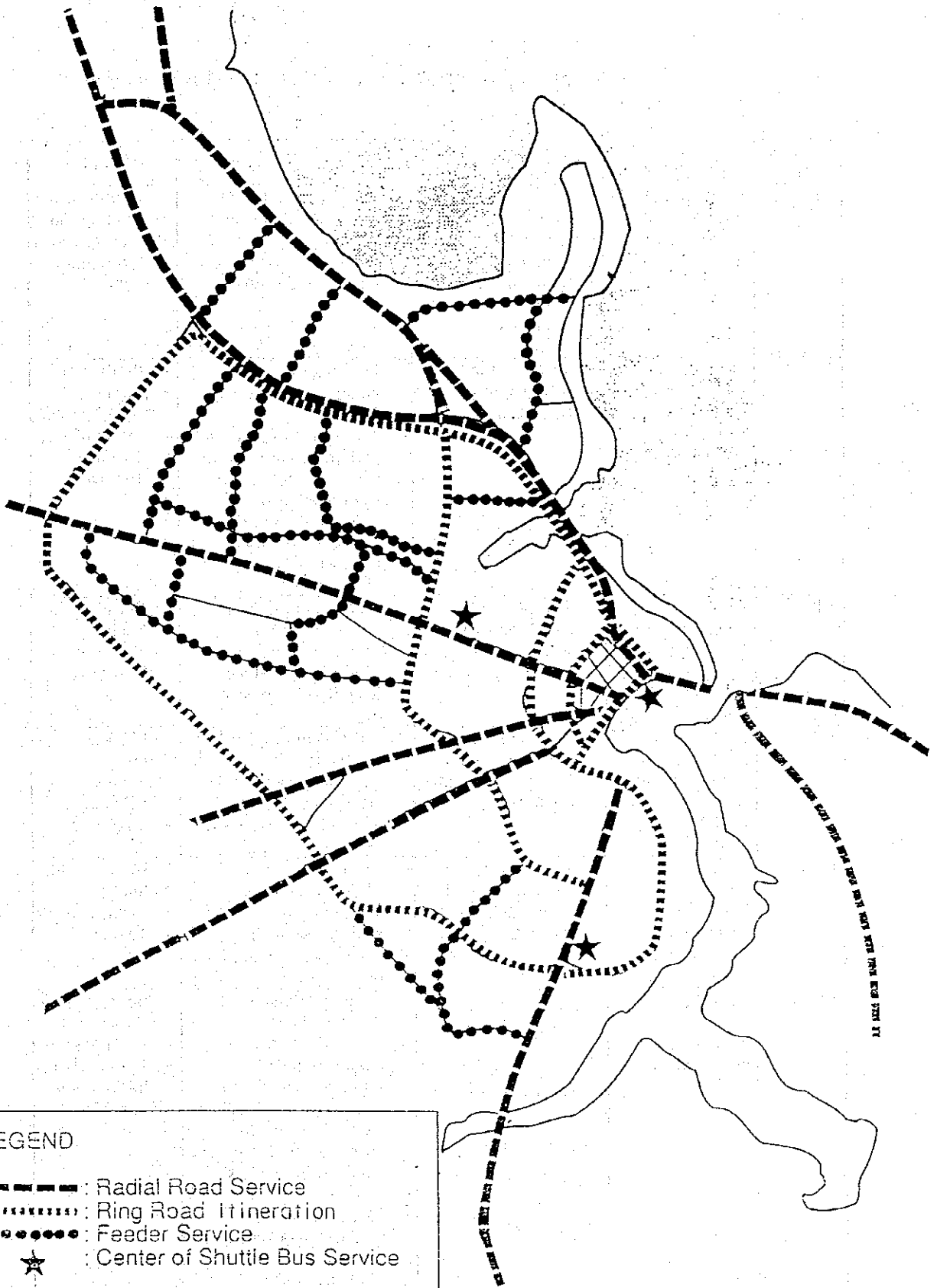
- Feeder Road Bus Services by Private Companies

Bus services on feeder roads should be intensified supplementarily to above-mentioned two kinds of bus services on the trunk roads. This could be realized by providing incentives to private bus companies under the guidelines worked out by UDA or MWCT.

(2) Construction of Local Bus Stations

For the integrated function of the above proposed different types of bus services, it is inevitable to introduce a new bus operation system which will be based on the concept of Ride & Ride system or bus transition system. Junctional points in urban public transport service have to be improved so as to smooth transit to this new system. In this context, it is recommended to construct bus stations near the major junctional points in the city.

These stations would function as the centers of city bus services and would encourage systematic bus operation in the city. Also, they should be provided with certain number of bus bays, according to the volume of transit passengers, as well as minimum of facilities for passenger services and bus operations. Proposed location and function of each of the bus station is shown in Fig. 9.5 and Table 9.1.

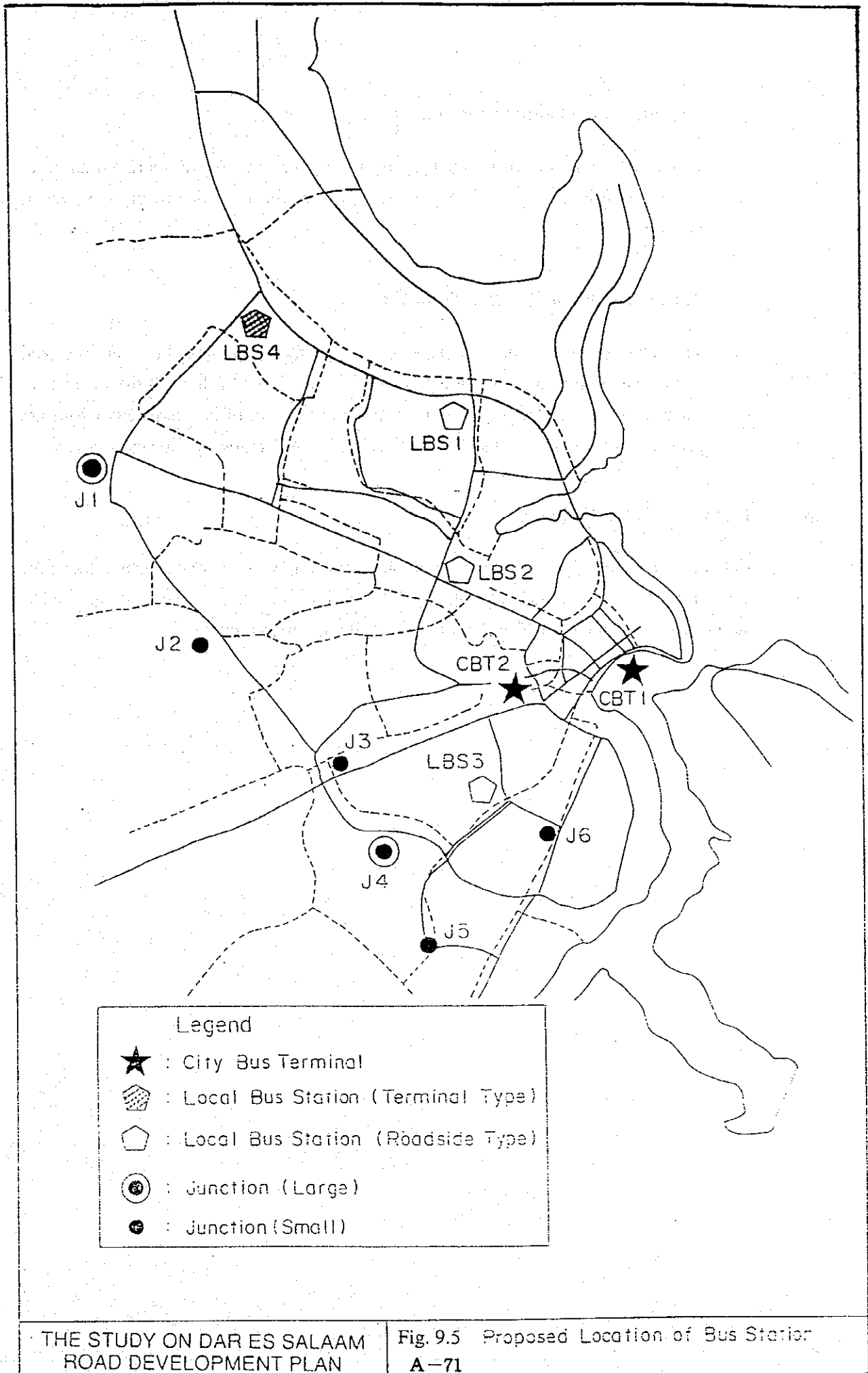


LEGEND

- — — — — : Radial Road Service
- : Ring Road Itineration
- : Feeder Service
- ★ : Center of Shuttle Bus Service

Table 9.1 Dimension of Proposed City Bus Terminals, Local Bus Stations, and Junctions

Location No.	Location	Pattern of Transfer	Background	Facilities
CBT1	In front of old post office along the Sokoine drive	<ul style="list-style-type: none"> Central City Bus Terminal One of the ends of Shuttle bus services between long-distance bus terminals 	<ul style="list-style-type: none"> Taking advantage of widened Sokoine drive, bus berths would be constructed in the area parallel to the street 	<ul style="list-style-type: none"> Berths (40 ~) Waiting room Ticket office, Information Taxi bays
CBT2	Near the intersection of Gerezani and Uhuru street (Kariakoo area)	<ul style="list-style-type: none"> Terminal for private buses (Daladala) 	<ul style="list-style-type: none"> Promotion of transit among private buses (Daladala) Absorption of roadside parking of buses along Gerezani street Coordination with the city government is necessary as the land belongs to the city government. 	<ul style="list-style-type: none"> Berths (60 ~) Garage Waiting room Ticket office, Information Taxi bays
LBS1	At the intersection of New Bagamoyo and Morocco (Middle Ring) roads	<ul style="list-style-type: none"> Transit place of radial trunk road service and circular trunk road service 	<ul style="list-style-type: none"> Junction of proposed Middle Ring Road, short-cut service to the areas along the Inner Ring Road is expected of. 	<ul style="list-style-type: none"> Berths (~ 30) Shelter Ticket office Taxi bays
LBS2	At the intersection of Morogoro and Morocco (Middle Ring) roads	<ul style="list-style-type: none"> Transit place of radial trunk road service and circular trunk road service 	<ul style="list-style-type: none"> Junction of proposed Middle Ring Road, short-cut service to the areas along the Inner Ring Road is expected of. 	<ul style="list-style-type: none"> Berths (50 ~ 60) Shelter ticket office Taxi bays
LBS3	Near the intersection of Pugu and Changombe (Middle Ring) roads	<ul style="list-style-type: none"> Transit place of radial trunk road service and circular trunk road service 	<ul style="list-style-type: none"> Junction of proposed Middle Ring Road, short-cut service to the areas along the Inner Ring Road is expected of. 	<ul style="list-style-type: none"> Berths (~ 30) Shelter Ticket office Taxi bays
LBS4	Near the intersection of New Bagamoyo and Mpakani roads	<ul style="list-style-type: none"> Trunk Road Service (Radial) ⊕ Trunk Road Service (Circular) ⊕ Feeder Road Service 	<ul style="list-style-type: none"> Existing private bus depot would be modernized in conjunction with improvement of New Bagamoyo and Mpakani roads. This would encourage transit system among different bus services. Extension of Mpakani road to Mikocheni area would enlarge the area of feeder bus services. 	<ul style="list-style-type: none"> Berths (30 ~) Garage Waiting room Ticket office, Information Taxi bays



(3) Strengthening of Junctional Function

Junctional points in urban public transport service have to be improved so as to smooth transit to this new system. Location of the junctions to be improved is given in Fig. 9.5.

(4) Reorganization of City Bus Terminals

The plan proposed here aims at improvement of private bus services and concurrently aims at restoration of essential road function through the removal of roadside parking. The plans propose the construction of bus terminals which are provided with enough number of berths and related facilities in the nearby areas.

9.3 Preliminary Cost Estimate

The costs required for the implementation of the above-mentioned public transport development plan have been estimated as shown in Table 9.2. Total cost required is about Tsh. 1,500 million which is equivalent to about 340 million yen.

Table 9.2 Estimation of Cost for Public Transport Development

Unit: Million Tsh.

Plan	Project	Estimated Cost
1. Improvement of Long-distance Bus Services	(1) Construction of West-Bound Long-distance Bus Terminal	800
	(2) Construction of South-bound Long-distance Bus Terminal	450
	(3) Shuttle Bus Operation (West Bound Long-distance Bus Terminal)	60
	(4) Shuttle Bus Operation (South Bound Long-distance Bus Terminal)	30
	Subtotal	1,340
2. Improvement of City Bus Service	(1) Construction of City Bus Terminals (Sokoine drive and Kariakoo)	60
	(2) Construction of Local Bus Stations (Terminal Type)	30
	(3) Construction of Local Bus Stations (Roadside Type)	75
	(4) Strengthening of Junction Function (Major)	40
	(5) Strengthening of Junctional Function (Small)	30
	Subtotal	235
Grand Total		1,575

CHAPTER 10 TRAFFIC MANAGEMENT PLAN

10.1 Basic Concept

Present traffic issues requiring measures of traffic management in Dar es Salaam are related mainly to the chronic traffic congestion in the city center and to emergence of bottleneck points in urban traffic along the trunk roads. With this consideration, the following traffic management plans have been proposed:

- (a) **Traffic Management Plan to Reduce Roadside Parking**
- (b) **Enhancement of Road Capacity through the Adoption of Proper Traffic Regulation Measures**
 - One-way Traffic Regulation
 - Restriction of Heavy Buses
 - Restriction on Heavy Trucks
 - Introduction of Non-through-traffic Route
- (c) **Streamlining of Pedestrian Flow**
 - Introduction of Pedestrian Mall
 - Provision of Pedestrian Crossing Bridges
 - Improvement of Roadside Pedestrian Way

10.2 Description of Plan

10.2.1 Traffic Management Plan to Reduce Roadside Parking

Construction of multi-story parking garages are effective for the intensive absorption of roadside parking. Probable location of the garages and their dimension are presented in Fig. 10.1.

Table 10.1 Dimension of Probable Multi-story Public Parking Garages

Location No.	Place	Location	Area	Probable Influential Area
PG1	Kisumu Long-distance Bus Terminals	Morogoro Road ⊕ Libya Street	2,000 sq.m	Area near the junction of Morogoro and UWT, inside UWT road. (within radius of 1 km)
PG2*	Next plot of Extelcoms Building	Samora Avenue ⊕ Morogoro Road	840 sq.m	Area near the junction of Morogoro and Samora avenue. (within radius of 1 km)
PG3	In front of Tankot Building	Samora Avenue ⊕ Pamba Street	2,000 sq.m	Area near the junction of Morogoro and Samora (East). (within radius of 1 km)
PG4	West corner of Maktaba and Jumhuri Junction (Opposite of YWCA)	Maktaba Street ⊕ Jamhuri Street	2,000 sq.m	Area near the junction of Maktaba and Jamhuri street. (within radius of 1 km)

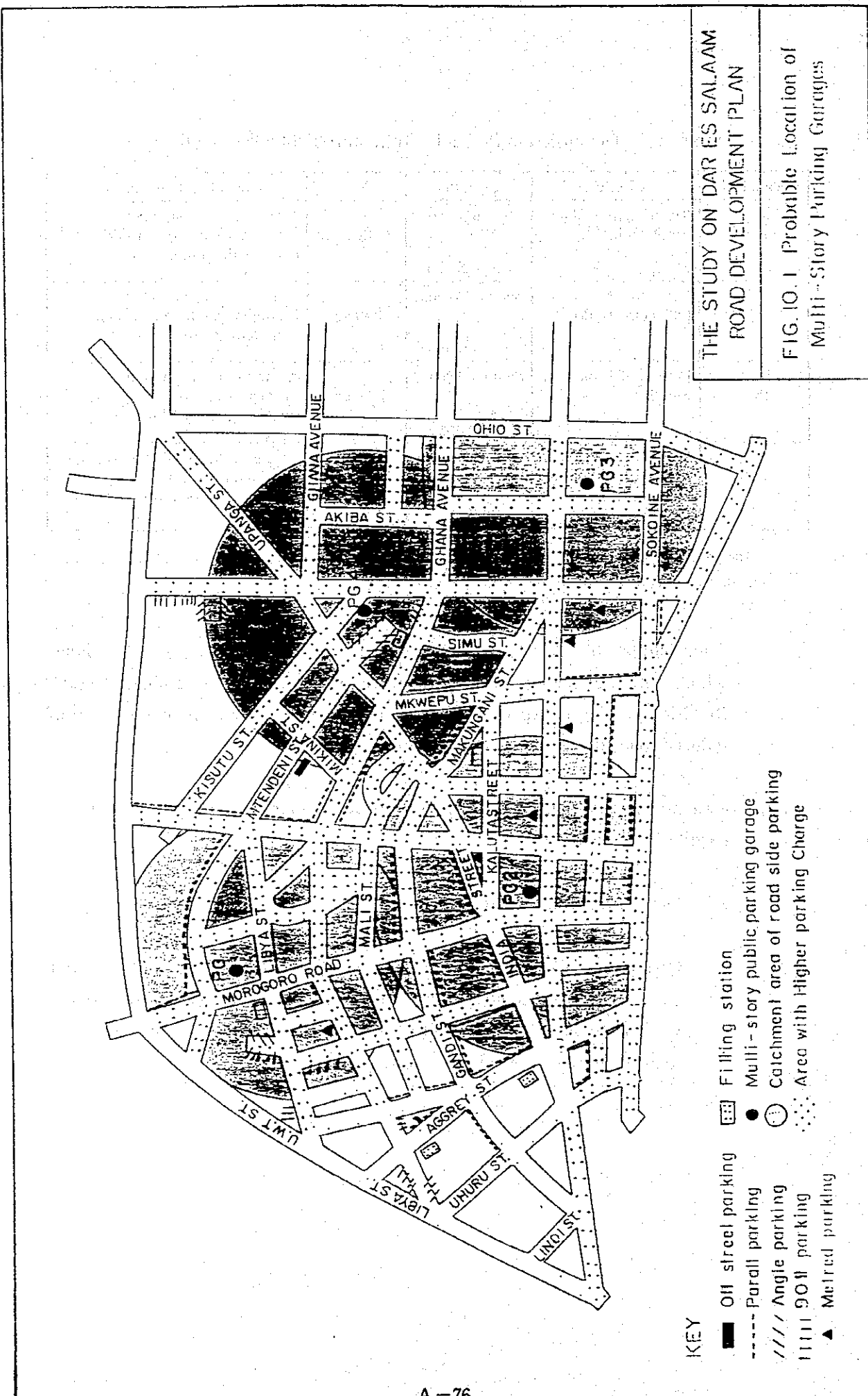
* The parking garage construction is being proposed by the National Housing Corporation, Tanzania in its plan of construction of International House.

Total number of parking lots estimate is 672 and total number of vehicles which will use these parking garage per day is estimated at about 16,000. Roadside parking is expected to decrease drastically. The estimated number of reduced roadside parked vehicle is about 15,000.

10.2.2 Enhancement of Road Capacity through the Adoption of Proper Traffic Regulation Measures

A. One-way traffic regulation

One-way traffic regulation is recommended to be introduced in major streets in the city center not only in horizontal direction (East-West) but in vertical direction (North-South). Traffic flow control in conjunction with road development plan is as follows:



THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

FIG. 10.1 Probable Location of
Multi-Story Parking Garages

KEY

- Off street parking
- - - Parallel parking
- /// Angle parking
- |||| 90° parking
- ▲ Metered parking
- ▤ Filling station
- Multi-story public parking garage
- Catchment area of road side parking
- ⋯ Area with Higher parking Charge

East-West Corridor

In this direction the following one-way traffic regulation will be proposed:

- One-way traffic regulation in Samora Avenue

One-way traffic regulation which bans east to west traffic will reduce traffic congestion on this road. Potential west bound traffic on this road will be diverted to the improved Sokoine Drive.

- One-way traffic regulation in Jamhuri Street

One-way traffic regulation which allows only west to east traffic: reverse way of one-way regulation of Samora Avenue will streamline the traffic flow along east-west corridor of the city center.

North-South Corridor

Regarding north-south direction, the following one-way traffic regulation will be proposed:

- One-way traffic regulation on Maktaba Street
- One-way traffic regulation on Zanaki Street and on Morogoro Road
- One-way traffic regulation on Uhuru Road

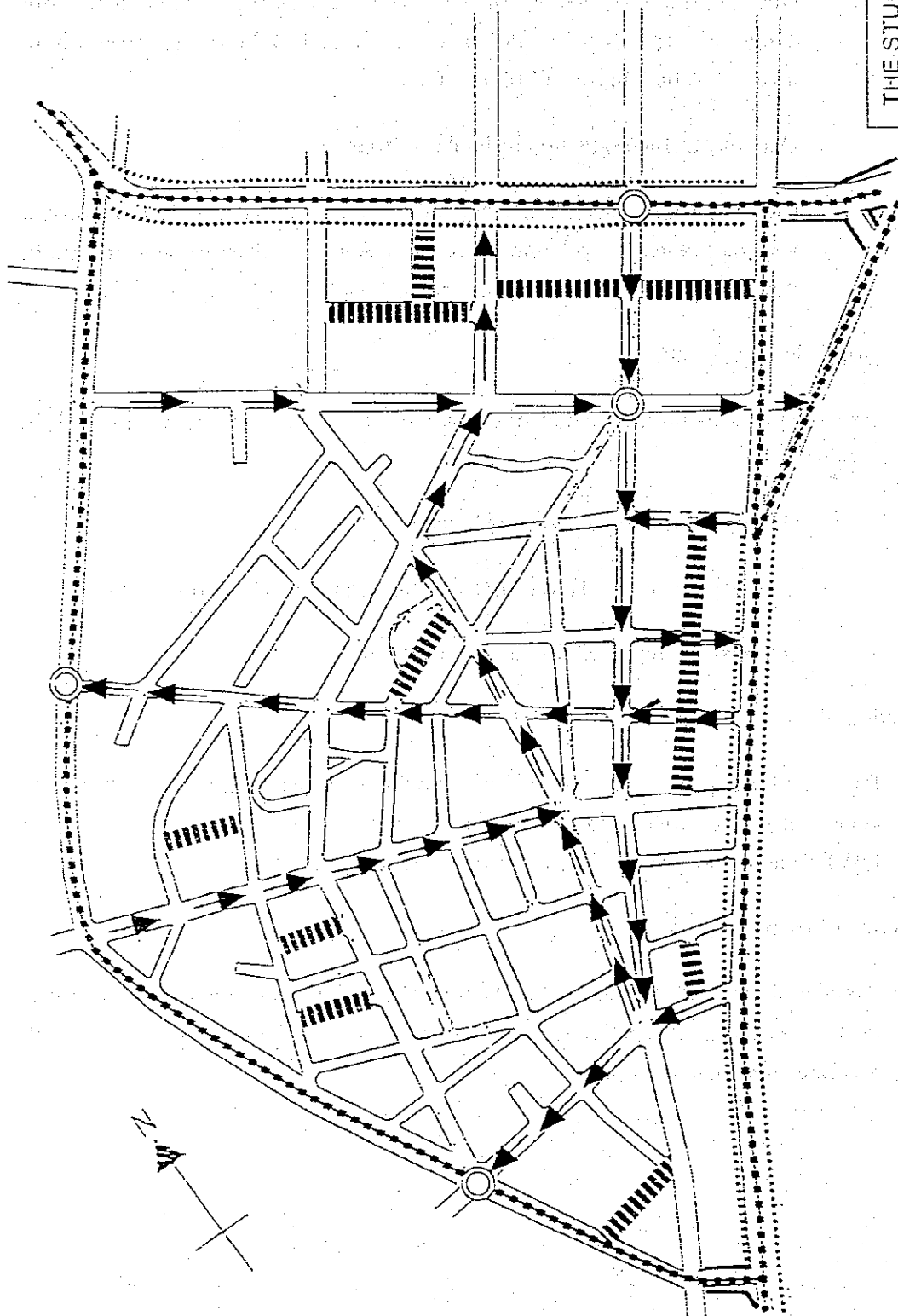
B. Restriction of Heavy Buses

Passage of heavy buses in the city center should be banned on the streets in the city center except for Inner Ring Road which will be formed by the combination of UWT Road, improved Sokoine Drive and widened Ohio Street.

C. Restriction of Heavy Trucks

Passage of heavy trucks during the daytime should be totally banned in the streets in the city center except for circumferential road which consists of UWT Road, Sokoine Drive and Ohio Street.

- Intersection to be improved.
- ⋯⋯⋯ New Construction
- ▬ Widening
- ▬ Non-restriction route for Heavy Vehicle
- ▬ One-way Traffic Regulation
- ▬ Non-through-traffic Route



THE STUDY ON THE DAR ES SALAAM
ROAD DEVELOPMENT PLAN

Fig. 10.2 Traffic Regulation Plan in
City Center

D. Introduction of Non-through-traffic Routes

The measure proposed here is to totally ban the passage of traffic through certain urban streets in the city center. This measure would function well if applied in the combined manner with the measures proposed above including one-way traffic regulation.

These concepts of traffic management is illustrated in Fig. 10.2.

10.2.3 Streamlining of Pedestrian Flow

A. Introduction of Pedestrian Mall

Construction of walking promenade along the Sokoine Drive taking advantage of beautiful ocean view and the introduction of shopping mall along Samora Avenue would enhance the comforts and safety of the pedestrians.

B. Provision of Pedestrian Crossing Bridges

This is a plan aimed to prevent the intrusion of pedestrians into the carriageway at the places where a great number of road crossings are observed. Candidate locations of these pedestrian bridges are shown in Fig. 10.3

C. Improvement of Roadside Pedestrian Way

This is a plan to provide roadside pedestrian walkways along the major roads within the city. Furthermore, it is recommended that all the newly proposed roads, such as the Missing Link of the Middle Ring Road and the Outer Ring Road proposed in Ch. 8, should be provided with the well-devised sidewalks.

10.2.4 Improvement of Bottleneck Points in Urban Traffic

Bottleneck points hampering smooth urban traffic should be improved so as to streamline the city-wide traffic flow. Bottleneck points, consisting mainly of intersections, were identified based on the road inventory survey and traffic survey. The improvement measures are proposed as shown in Table 10.2.

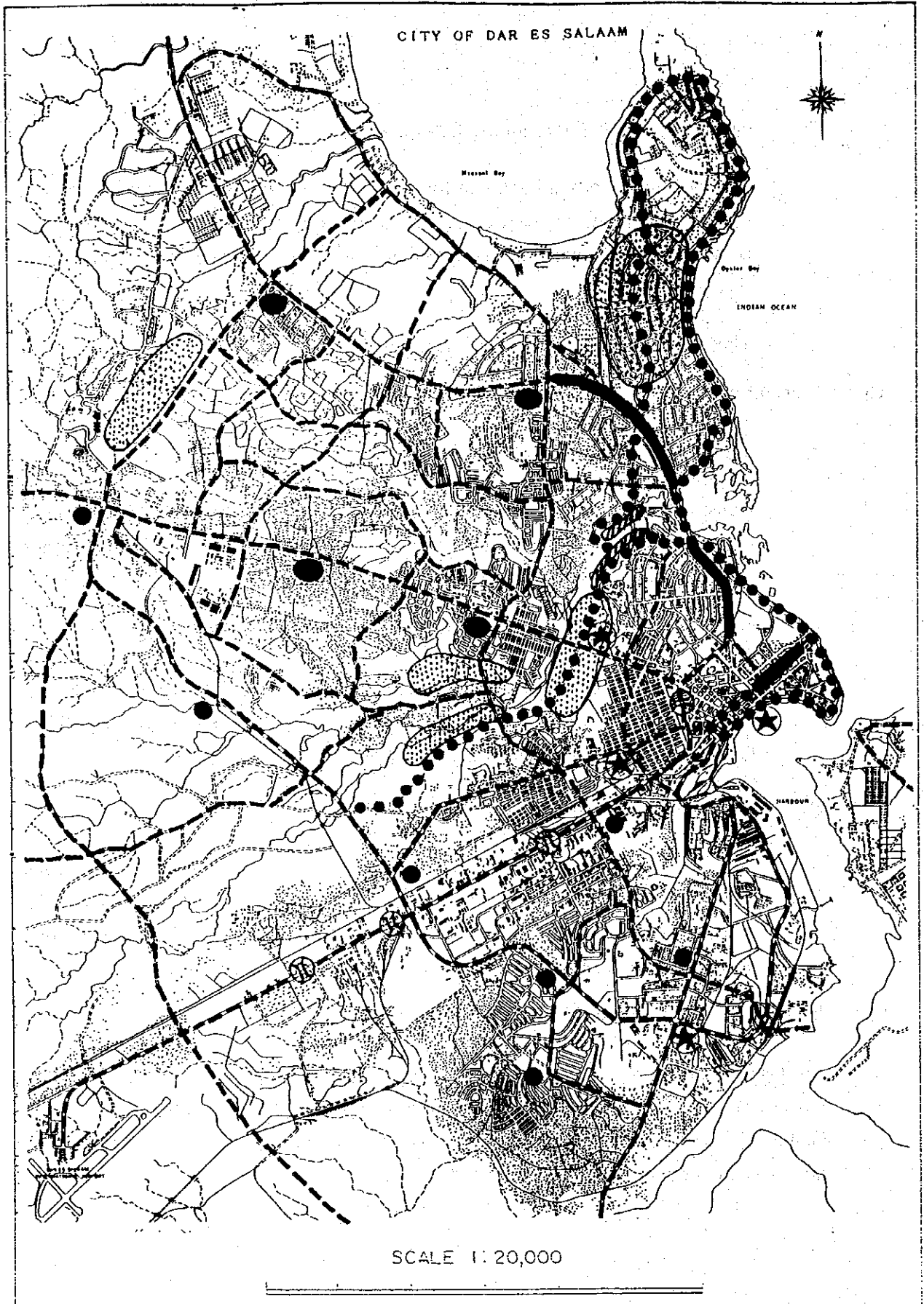









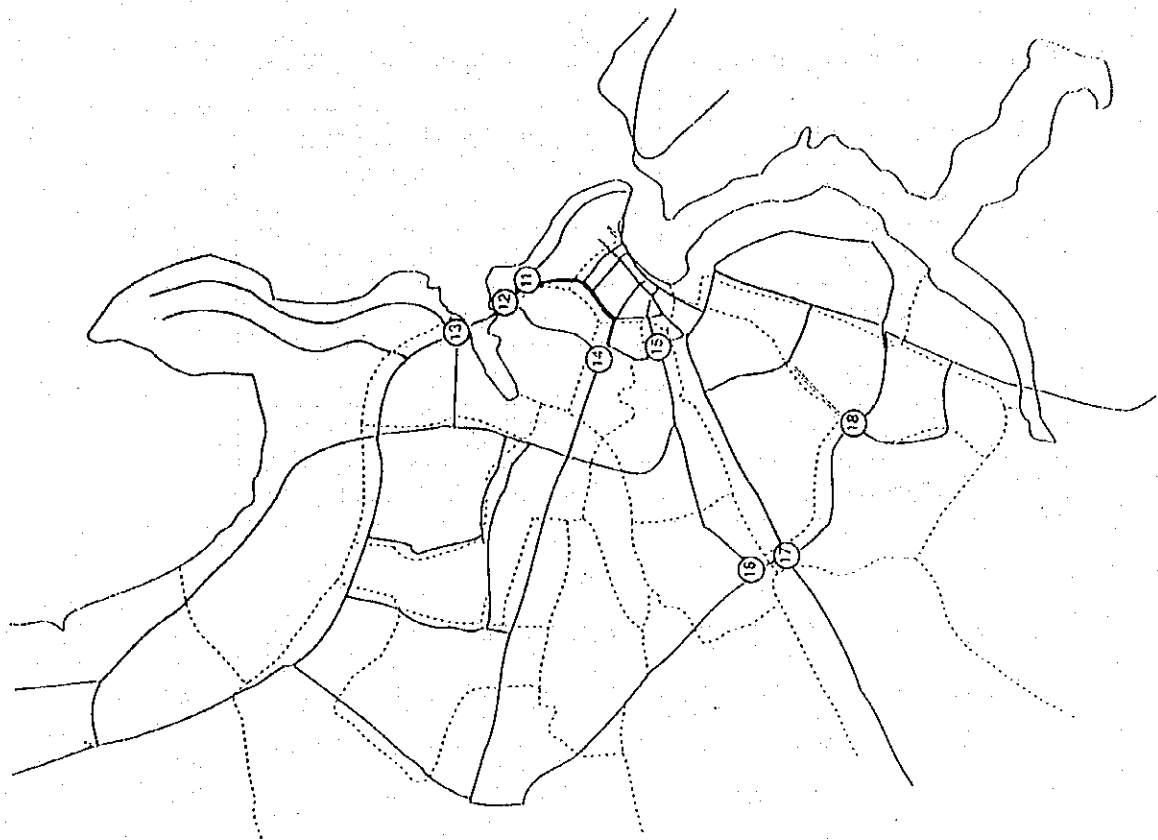
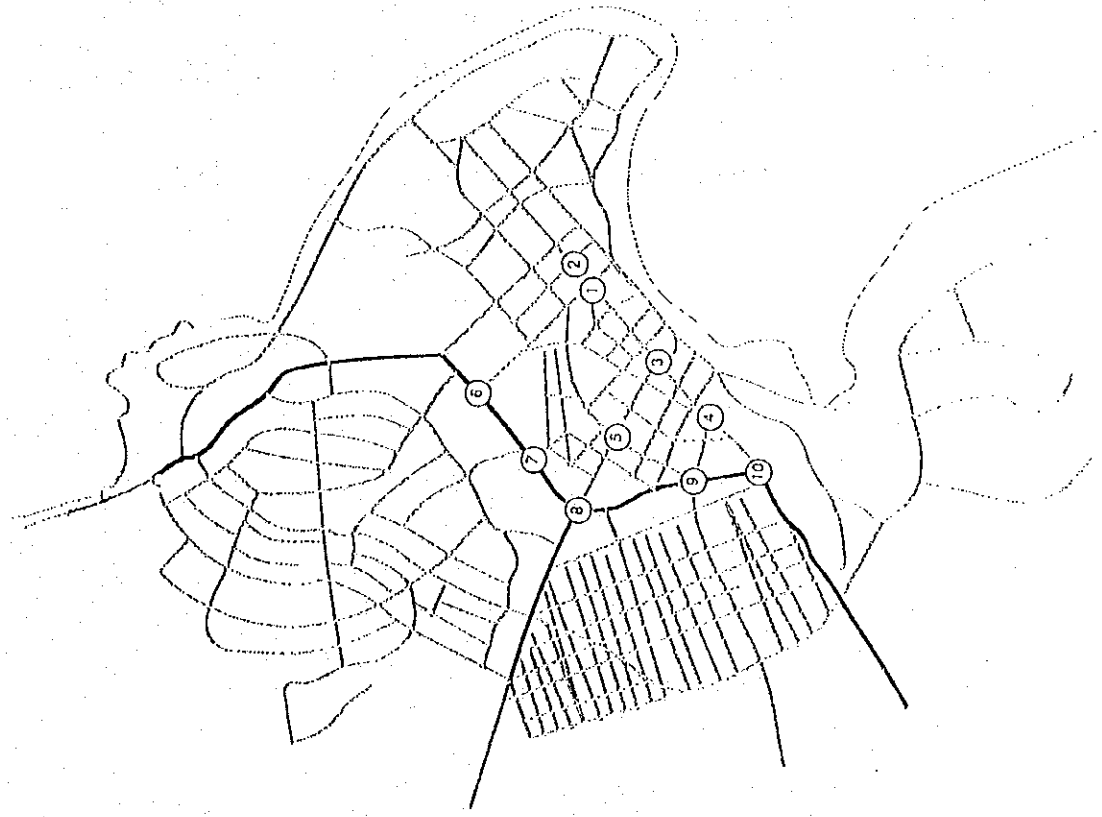


Fig. 10.3 Concept of Pedestrian Management

- | | | | |
|---|---------------------------------|---|----------------------------|
|  | Mangrove Areas |  | Bus Terminal |
|  | Roadside Trees |  | Bus Station |
|  | Residence Trees and Green Space |  | Bus Junction |
|  | Pedestrian/Bicycle Way |  | Pedestrian Crossing Bridge |
|  | Road with Sidewalk | | |



Urban Area



City Center

Fig. 10. 4 Location of Bottleneck Points

Table 10.2 Bottleneck Points by Category of Improvement Work

Type of Improvement Work	Present Bottleneck Point
Category A	7
Category B	3, 5, 9, 15, 16, 17, 18
Category C	4
Category D-1	1, 10
Category D-2	2, 6, 7, 8, 9, 11, 12, 13, 14
Category E	7, 8, 9, 10, 11, 14, 15, 17, 18

Category A: Installation of new traffic signal

Category B: Improvement of existing traffic signal

Category C: Restructuring of rotary intersection to grade crossing intersection

Category D: Improvement of structure of grade crossing intersection.
This is further classified into following two categories:

Category D-1: Restructuring of present intersection

Category D-2: Minor improvement works such as placing of traffic signs and markings

Category E: Installation of pedestrian crossing (pelican crossing)

10.3 Preliminary Cost Estimate

The cost required for the implementation of the above proposed traffic management plans is estimated at about Tsh. 17,200 million or about 3,900 million yen as shown below.

Implementation Cost Estimate

Unit: Million Tsh.

• Reduction of Roadside Parking	:	12,000
• Traffic Regulation in City Center	:	-
• Streamling of Pedestrian Flow		
(1) Introduction of Pedestrian Mall	:	88
(2) Pedestrian Crossing Bridges	:	350
(3) Improvement of Pedestrian Way		
- Promenade	:	610
- Side walk improvement	:	3,940
• Improvement of Bottleneck Points		
(1) Traffic Signal	:	6
(2) Pedestrian Signal	:	6
(3) Improvement of Rotary Intersection	:	20
(4) Restructuring of Intersection	:	189
(5) Installation of Traffic Markings/Signs	:	6
<hr/>		
Total	:	17,215