

6.2 Transportation Development Strategies

6.2.1 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:

a) Reduction of Inflow of Traffic in the Central Area

This is a principle to reduce urban traffic congestion in the CBD of Dar es Salaam. This is a principle which entails a variety of policies to be undertaken. They might be decentralization of urban land-use and facilities, introduction of road network which discourage through-traffic in the area, parking regulation and so on.

b) Road Network Improvement focused on Public Transport Operation

This principle has two aspects in it as below:

- * Public transport development to reduce private vehicles in CBD area.
- * Public transport development to strengthen interdependence among major cores within the city.

Regarding the first point, public transport system would be improved in CBD area in such a manner as to reduce private vehicles in the context of first Principle. Introduction of circular bus transportation, hopefully by minibus, on major streets in CBD area and promotion of Ride & Ride system, which discourages passage of heavy buses in densely crowded area in the city center, might be probable idea for this principle.

On the other hand, the second point envisages public transport network development in wider area of the city in the prospect of expanding urban area and need of strong linkage among urban cores in terms of network development.

c) Streamlining of Urban Traffic

This principle relates both quantitative and qualitative nature of urban traffic. This policy aims at improvement of urban traffic through the improvement of bottleneck points and through the promotion of functional classification among roads.

d) Traffic Management Plan to Improve Urban Amenity

This principle mostly relates pedestrian management which aims at segregation of pedestrian from vehicles, including readjustment of roadside facilities such as shops and repair works as well as improvement walkways and pedestrian crossings. This principle also aims at enhancement of traffic safety and improvement of roadside environment.

6.2.2 Analyses of Plans

(1) Road Development Plan

The road development plan for Dar es Salaam can be classified into three categories:

a) Road Development Plan in the City Center

As the city center is already saturated with urban facilities and existing roads, the major concern is to how to utilize existing road efficiently. Minor improvement of the road surfaces, intersections, sidewalks and drainage will become a major concern. Some of the works discussed above would directly relate to traffic management plans to be undertaken there.

b) Road Development Plan in the Area between the City Center and Suburban Areas

These areas are most rapidly developing area in the city. Traffic problems here are most serious and there are many potential road development plans.

However, these plans would be classified into two groups; One is the plans relating to road network development. Although in this are skeleton of road network have been already formed, there are many missing links of road which might be constructed or improved in terms of totality of road network. The other is the plans relating to the physical structure of individual road.

There are many unpaved roads, roads with deteriorated surface condition with poor drainage system and sidewalks. These roads must be improved or rehabilitated as soon as possible.

c) Road Development Plan in the Suburban Area

The road development plan here should be made so as to induce future land development or in a consistent manner with future regional development. This area is the most potential area for industrial development and residential development in the city.

(2) Public Transportation Plan

Public transport service by bus would remain as sole measure of service as the near future is concerned. This could be planned in two ways, say public transport services on urban streets and those on trunk roads outside the urban area.

Regarding the public transport planning on urban streets, following principles would be introduced:

- Strengthening of public transport so as to encourage diversion from other modes of transport,
- Reduction of operation of heavy bus on narrow urban streets, and
- Intensive feeder road services.

While public transport service on trunk roads outside the urban area should be planned focused on the following points:

- To be strengthen in conjunction with trunk/regional road development.
- Reduction of operation of long-distance buses on trunk roads in urban area.

Strengthening of junction function, between public transport services on urban streets and those on trunk roads outside the urban areas, is inevitable.

Construction of new long-distance bus terminal in the suburban area, with the integration of existing small long-distance bus terminals in the city center, is practical idea. This new terminal would function as a hub for both of the public transport services.

In either cases, public transport service in Dar es Salaam should be enhanced in the growing demand for services which involves the improvement of operation method, management system, reorganization of bus-operation bodies as well as that of physical ones.

(3) Traffic Management Plan

The traffic management plan will be formulated focusing on the central area of Dar es Salaam, where urban transport is extremely chaotic.

Most of the issues relative to traffic management in the area come from the fact that excessive concentration of traffic into the area. These could be found in roadside parking due to shortage of parking spaces and severe congestion at intersections and most of the streets in the area.

In this context, basic stance for traffic management have been introduced as below:

- Reduction for traffic in the city center,
- Improvement of bottleneck points in urban traffic and streamlining of urban traffic,

- Conduction of traffic management measures so as to realize efficient use of road spaces,
- Separation of mixture of traffic

The measure of traffic management entails many aspect in it, which might be physical measure such as improvement of traffic facilities, or legal measure to prohibit certain traffic behaviors such as one-way regulation, or sometimes might be institutional measure such as charging of parking fee.

6.2.3 Development Strategies

(1) Strategy for Short-term Development Plan

The basic attitude toward the formulation of short-term development plan is to streamline urban traffic. This would be done by two ways:

One is to control the traffic flow itself and the other is to enhance the service level of transport facilities. The former will be done mainly by applying traffic management measures, improvement of public transport measures so as to encourage diversion from other mode of transport, and relocation of critical places of traffic generation/attraction to the less congested areas. While the latter will be done through the improvement works of existing transport related facilities without conducting of large scale construction works of infrastructure.

With this recognition, targets for short-term transport development plans have been established as follow:

- 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 6.9.

(2) 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. This would be attained through the application of comprehensive transportation planning method, in which transport development would be done in combined manner with regional

development plan and land-use plans so as to avert urban bias in certain areas and/or certain components of society. 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 function
- Dispersion of urban function in a wider area for greater realization of a more homogeneous urban development.

Concrete measures to attain the above targets are described in Table 6.10

Table 6.9 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	<ul style="list-style-type: none"> * Reduction of concentration of traffic in central areas * Improvement of bottleneck points in urban traffic * Efficient use of road spaces 	<ul style="list-style-type: none"> * Strong enforcement of zoning code and penalty system in case of violation * Encouragement of urban subcore development * Attachment of parking code to the building code * Land readjustment in congested urban areas and slums * Preparation of substituting land in suburban area 	<ul style="list-style-type: none"> * Control of roadside parking by charging parking fee * Regulation of heavy vehicles passage in city center * Control of illegal activities on road spaces * Enforcement of traffic education * Enforcement of one-way regulation 	<ul style="list-style-type: none"> * Construction of public parking spaces * Improvement of intersection facilities * Streamlining of pedestrian through the pedestrian signal, marking of crossing points 	<ul style="list-style-type: none"> * Integration of bus terminals * Relocation of long-distance bus terminal to suburban area * Designation of the places of bus stop * Provision of bus service routes in the area of growing demand. * Introduction of Ride & Ride system * Review of public transport fee * Route regulation of heavy buses * Introduction of itinerating bus system/shuttle bus 	<ul style="list-style-type: none"> * Improvement/construction of missing links of middle ring road * Improvement of bottleneck points or roads (intersections, bridges, pavement, drainage) * Introduction of roads in potential area of development * Strengthening of ferry function * Improvement of feeder roads (residential/commercial area) * Improvement of accident-prone road sections

Table 6.10 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 Kigamboni 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.

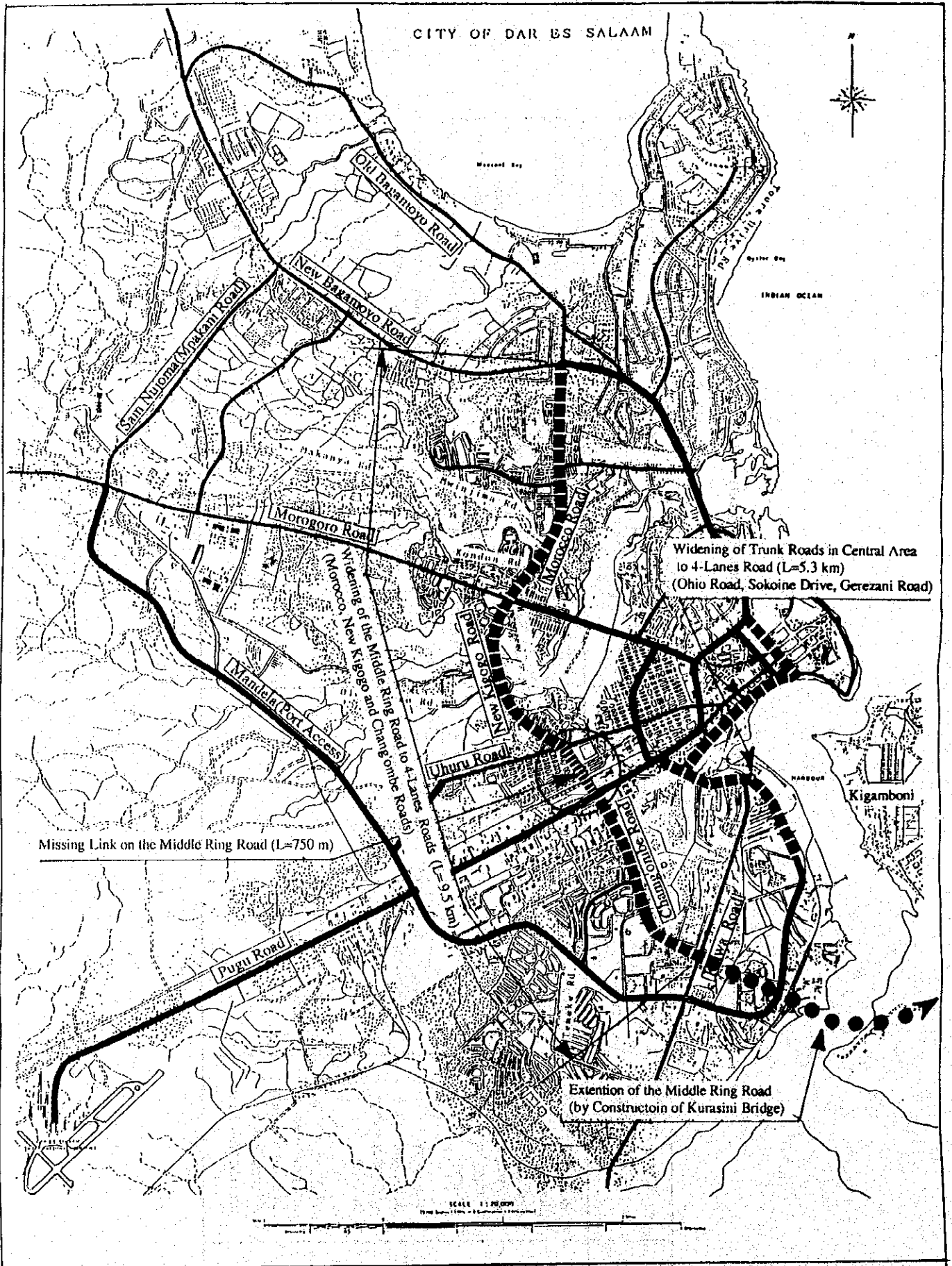


Fig. 6.5 Priority Possible Projects

- (1) Improvement and Construction of the Missing Link of Middle Ring Road
- (2) Widening of Trunk Roads in Central Area to 4-Lanes Road

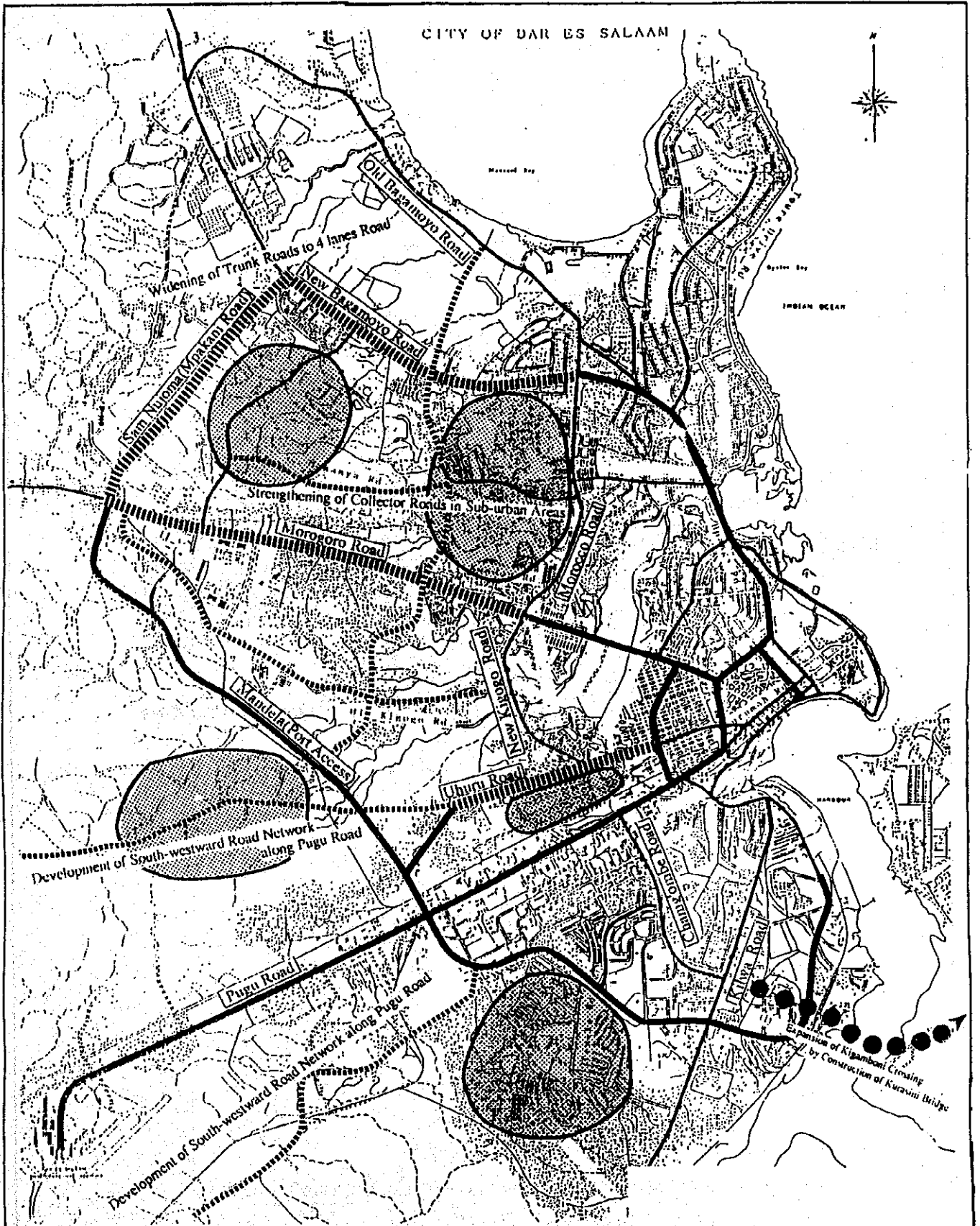
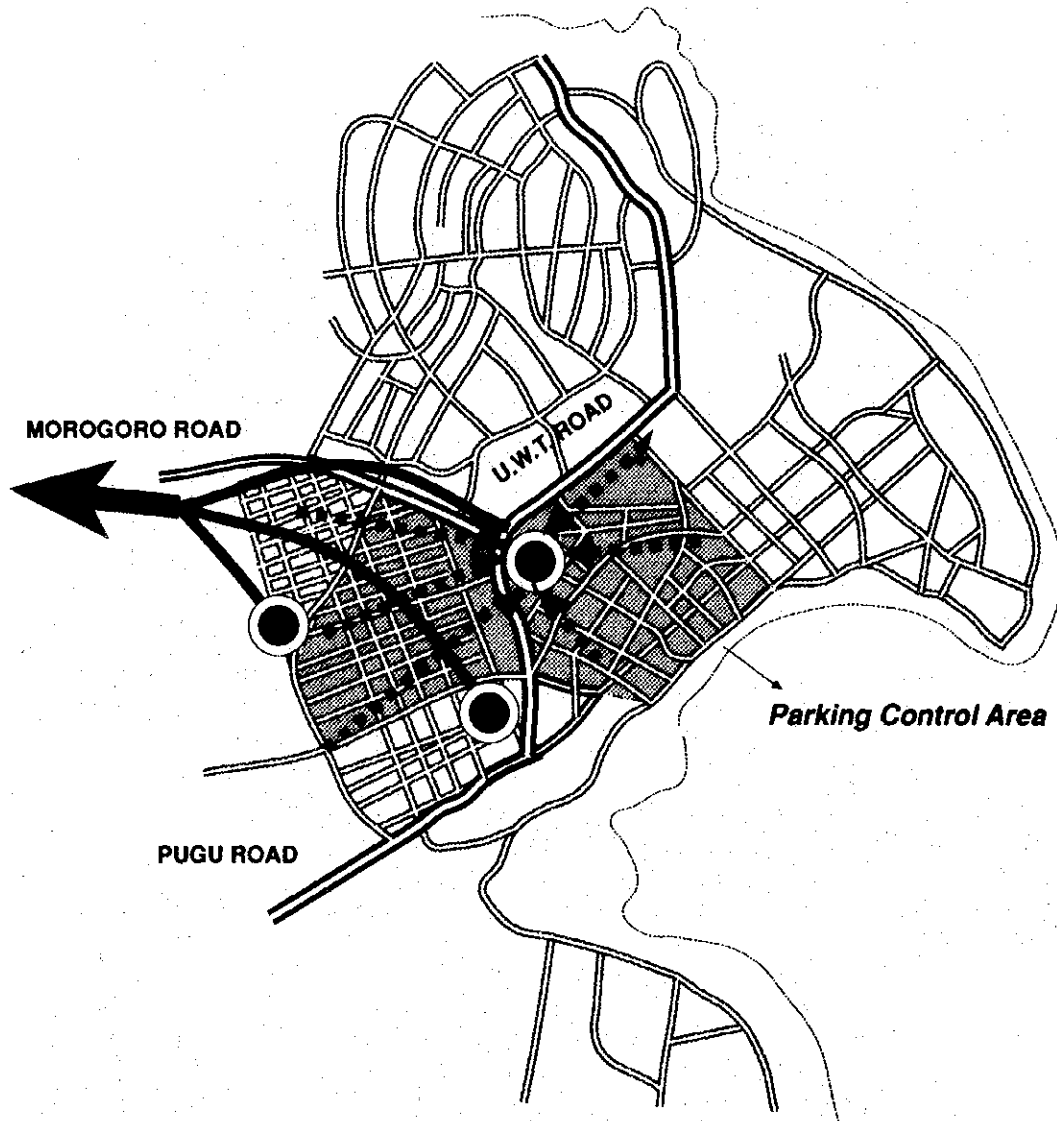


Fig. 6.6 Other Possible Projects

- (1) Expansion of Kigamboni Crossing by Construction of Kurasini Crossing
- (2) Strengthening of Collector Roads in Sub-urban Areas
- (3) Development of South-westward Road Network along Pugu Road
- (4) Widening of Trunk Roads to 4 lanes Road
- (5) Reconstruction of Damaged and Narrow Bridges
- (6) Improvement of Pavement for Local Roads
- (7) Improvement of Maintenance Capability for Drainage



LGEND	
	Absorption of Roadside Parking
	Integration & Relocation of Long-Distance Bus Terminal
	Existing Long Distance Bus Terminal
	Parking Control Area

CHAPTER 7 TRAFFIC DEMAND FORECAST



CHAPTER 7 TRAFFIC DEMAND FORECAST

7.1 General

In order to evaluate road development plans proposed in the master plan and to provide basic data for economic evaluation of the plan, future traffic demand has been forecasted.

Major work items for traffic demand forecast are as follows:

- Estimation of future registered vehicles
- Estimation of future traffic generation/attraction by traffic zones
- Estimation of future traffic distribution
- Estimation of traffic diversion from other modes of transport
- Estimation of future traffic volume on road networks

The process of traffic demand forecast is shown in Fig. 7.1.

7.2 Estimation of Future Total Trip End

7.2.1 Prospect of Future Registered Vehicles

As there is no reliable data of number of registered vehicles in Dar es Salaam and in Tanzania as a whole, time series data for vehicles in Dar es Salaam have been estimated by the Study Team utilizing available data, which include Trade Statistics (Annual number of imported vehicles) by the Customs Office, Traffic Accident Data by the Traffic Police, and Income Data by Bureau of Statistics.

Number of registered vehicles in whole of Tanzania during 1978 - 1993 were estimated by vehicle type as shown in Table 3.1 where annual increase rate of 7% during this period was obtained.

Number of registered vehicles in Dar es Salaam was estimated on the basis of this Tanzania total applying income data of Tanzania, where the 16.6% and 16.1% of shares of incomes of Dar es Salaam in 1989 and 1993 were assumed respectively. As the result, 6.3% of annual increasing rates of registered vehicles during the period for total vehicle has been obtained as shown in Table 3.2.

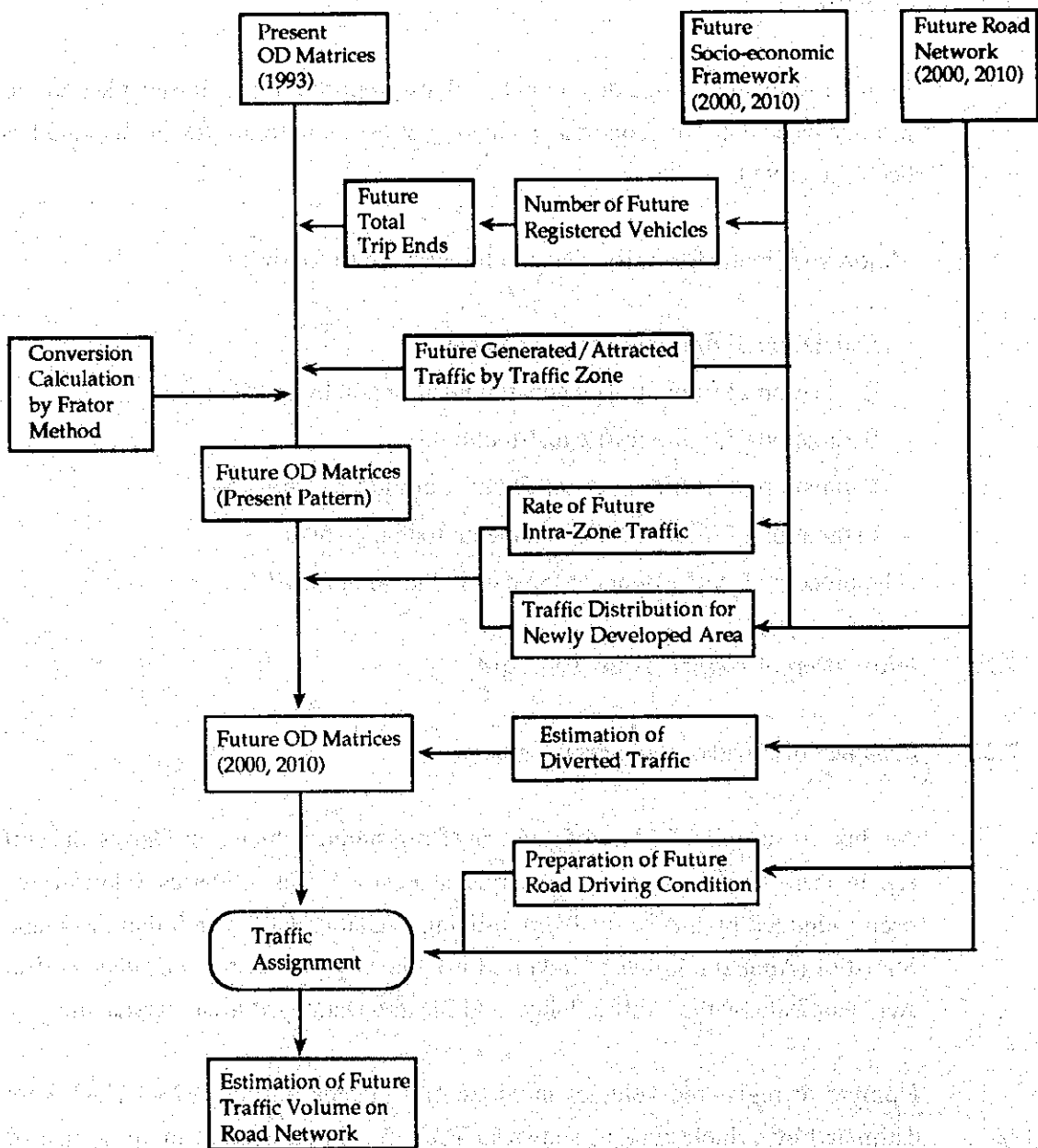


Fig. 7.1 Procedure of Future Traffic Demand Forecast

Table 7.1 Estimated Number of Registered Vehicles in Tanzania (1978 - 1993)

	Cars	Buses	Truck	Motorcycles	Others	Total
1978	41,931	4,286	38,420	33,553	5,032	123,222
1979	47,387	5,021	42,578	33,992	5,130	134,108
1980	51,154	5,512	44,206	35,693	5,265	141,830
1981	54,641	5,761	45,982	36,766	5,431	148,581
1982	57,891	6,254	47,624	36,856	5,828	154,453
1983	60,727	6,734	49,133	38,557	6,032	161,183
1984	62,563	7,192	52,060	39,830	6,075	167,720
1985	64,898	8,132	56,599	41,326	6,443	177,398
1986	68,086	8,721	61,772	43,001	6,377	187,957
1987	72,667	9,409	66,491	44,520	6,702	199,789
1988	83,238	10,409	75,658	50,130	7,199	226,634
1989	89,278	11,167	80,637	50,353	7,224	238,659
1990	98,412	12,843	91,345	54,391	8,010	265,001
1991	106,199	13,049	94,688	57,823	8,241	280,000
1992	112,651	14,134	100,855	60,741	8,420	296,801
1993	119,481	15,307	107,411	63,799	8,601	314,599
Annual Increasing Rate	7%	9%	7%	4%	4%	7%

Table 7.2 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%

* The year of traffic survey for DRIMP Study by JICA.

Assuming that the share of economic activities of Dar es Salaam would remain at the present level, the number of future registered vehicles has been estimated via extrapolation of the past trend.

Table 7.3 Estimated Registered Vehicles in Dar es Salaam

	Cars	Buses	Truck	Motorcycles	Others	Total
1993	19,236	2,464	17,293	10,272	1,385	50,650
2000 (2000/1993)	30,200 (1.57)	4,070 (1.65)	26,980 (1.56)	14,790 (1.44)	1,550 (1.29)	77,590 (1.54)
2000 (2010/1993)	57,900 (3.01)	8,300 (3.37)	51,190 (2.96)	24,800 (2.41)	2,220 (1.85)	144,410 (2.85)

7.2.2 Future Total Trip Ends

Future total trip ends, which are the figures of the south east corners of future OD matrices, have been estimated applying same increasing rates of registered vehicles by vehicle type.

7.3 Estimation of Traffic Zone-wise Generated/Attracted Traffic

Future generated/attracted traffic by traffic zone has been estimated via decomposition of above explained total trip ends in prorata with the size of zone-wise population and employment. This decomposition has been made by trip purpose for each vehicle type, adopting different index as decomposers as given in Table 3.4. Present purpose composition by vehicle type, which is another information necessary for the application of the above procedure, is given in Table 3.5.

Table 7.4 Index Used for the Estimation of Traffic Zone-wise Trip Generation/Attraction

Trip Purpose	Index for Traffic Zone-wise Trip Generation	Index for Traffic Zone-wise Trip Attraction
Go to Office	Population	Daytime Employment
Go to School	Population	Daytime Employment
Business	Daytime Employment	Daytime Employment
Shopping	Population	Daytime Employment
Back to Home	Daytime Employment	Population
Others	Population	Population

Table 7.5 Trip Purpose Composition by Vehicle Type*

Vehicle Type		Go to Office	Go to School	Business	Shopping	Back to Home	Others	Total
Passenger Car	No. of Trip	84,247	11,770	43,920	12,595	123,483	52,076	328,091
	%	25.7	3.6	13.4	3.8	37.6	15.9	100.0
L-Goods Truck	No. of Trip	12,383	1,987	10,482	3,711	25,167	11,395	65,125
	%	19.0	34.1	16.1	5.7	38.6	17.5	100.0
M-Goods Truck	No. of Trip	1,573	375	1,282	1,229	4,247	1,157	9,863
	%	15.9	3.8	13.0	12.5	43.1	11.7	100.0
H-Goods Truck	No. of Trip	487	0	242	0	370	177	1,216
	%	40.1	0.0	19.9	0.0	30.4	9.6	100.0

* Result of Person Trip Survey conducted by the Study Team in 1993.

7.4 Estimation of Future Traffic Distribution (Future OD Matrices)

7.4.1 Traffic Distribution for Zones with No Intended Development Plan

Traffic distribution for the zones, which are deemed non-developed zones with no intended development plans, was estimated by Present Pattern Method, in which components of present OD matrices were given as the initial values in the conversion calculation by the Frator Method, where the future traffic zone-wise generation and attraction were given as the control variables.

7.4.2 Traffic Distribution for Zones with Intended Development Plan

Traffic distribution for the zones with intended development plans, such as Kigamboni zone, was estimated applying the Gravity Model. Future travel time, which will be realized through the improvement of transport system, and magnitude of estimated future generated and attracted trips were given for the estimation.

Gravity Model applied here has the following structure:

$$T_{ij} = K \cdot \frac{G_i^a \cdot A_j^b}{D_{ij}^c}$$

Where,

T_{ij} : Traffic Flow between Zone i and Zone j (Total Vehicle)

G_i : Generated Traffic in Zone i

A_j : Attracted Traffic in Zone j

D_{ij} : Travel Time in Minutes

K, a, b, c; Parameters as estimated below:

k	a	b	c	Correlation Coefficient
0.0259	0.6409	0.6234	0.4779	0.841

Vehicle decomposition into vehicle type has been carried out considering vehicle composition of similar traffic zones in terms of land-use pattern, and level and density of economic activities.

7.4.3 Estimation of Share of Intra-zonal Traffic

With the expansion of urban activities to the suburban areas, intra-regional traffic in suburban areas is expected to increase. Intra-zonal traffic share decision model was introduced to explain this facts.

The model developed here has following structure:

$$R = a + b \cdot X + c \cdot Y$$

R : Share of Intra-zonal Traffic

X : Area Size (Sq. km)

Y : Population Density per Sq. km

a, b, c; Parameters as estimated below:

a	b	c	Correlation Coefficient
0.0724	0.0016	0.0004	0.539

7.5 Estimation of Traffic Diversion from Other Modes of Transport

With the improvement of road network, it is expected that some of the traffic will divert from other modes of transport. Especially, improvement of bus services on improved road network would induced traffic diversion from such modes of transport as walk and bicycle. In order to reflect this fact, traffic diversion model which explains the diversion traffic to bus has been introduced as explained below:

$$P_{ij} = 1/(1 + 2.333 \times \text{EXP}(-0.185 \times X_{ij}))$$

where,

P_{ij} : Share of buses in the trip between Zone i and j .

X_{ij} : Difference in travel times between those by walking and by bus in the trip between Zone i and Zone j .

Total number of trips by bus and by walking/bicycling by zone pair in the future OD matrices have been decomposed into travel mode applying estimated values of P_{ij} calculated from the above formula.

It was assumed that no diversion to private cars from other modes of transport would occur in this context. It should be noted that mode selection among different types of vehicle is being decided via prospect of future registered vehicles, irrelevant of innovation of individual transport mode.

7.6 Traffic Assignment on Road Network

Traffic assignment has been made applying K-V formula in which the relation between driving speed and congestion level were given for each road to simulate vehicle movement in the proposed road networks. Details of work flow of traffic assignment are shown in Fig. 7.2

K-V formula was prepared on the basis of the result of the Vehicle Running Speed Survey carried out in this Study and road capacities. The relation between vehicle speed and congestion level has been set up considering road condition, which is expressed by PSI (present serviceability index) for each road section. The details of K-V formula and its application method is explained below:

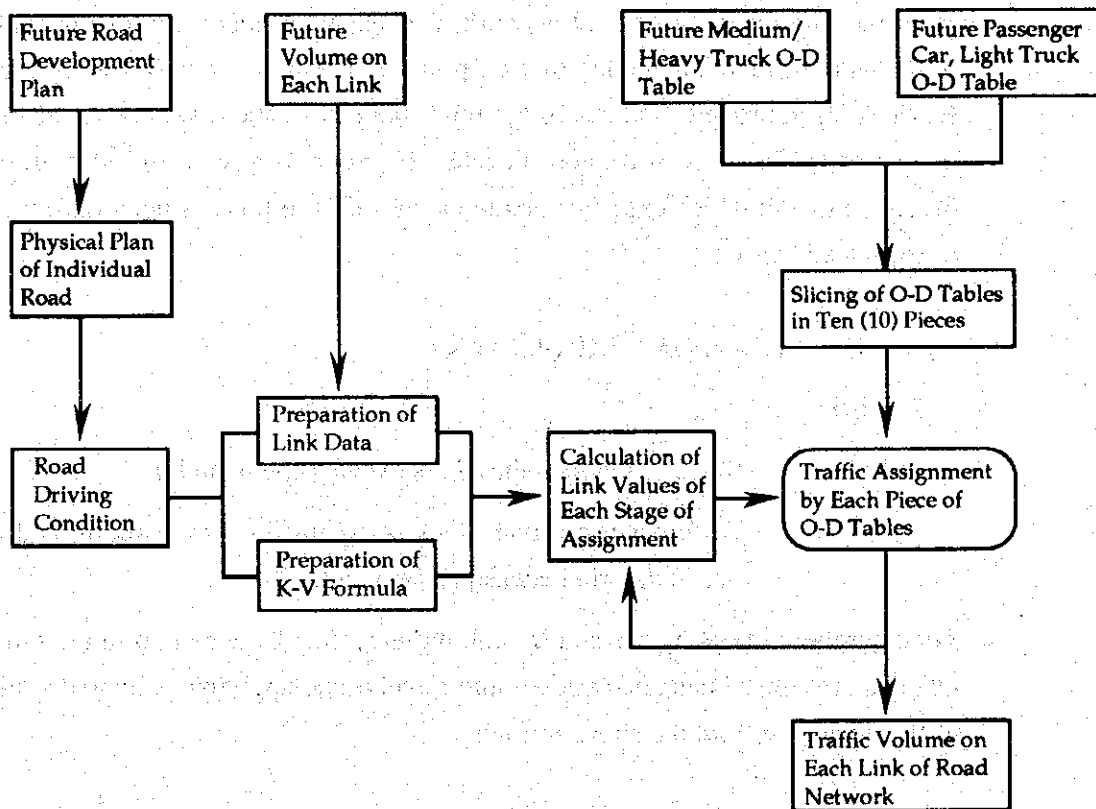
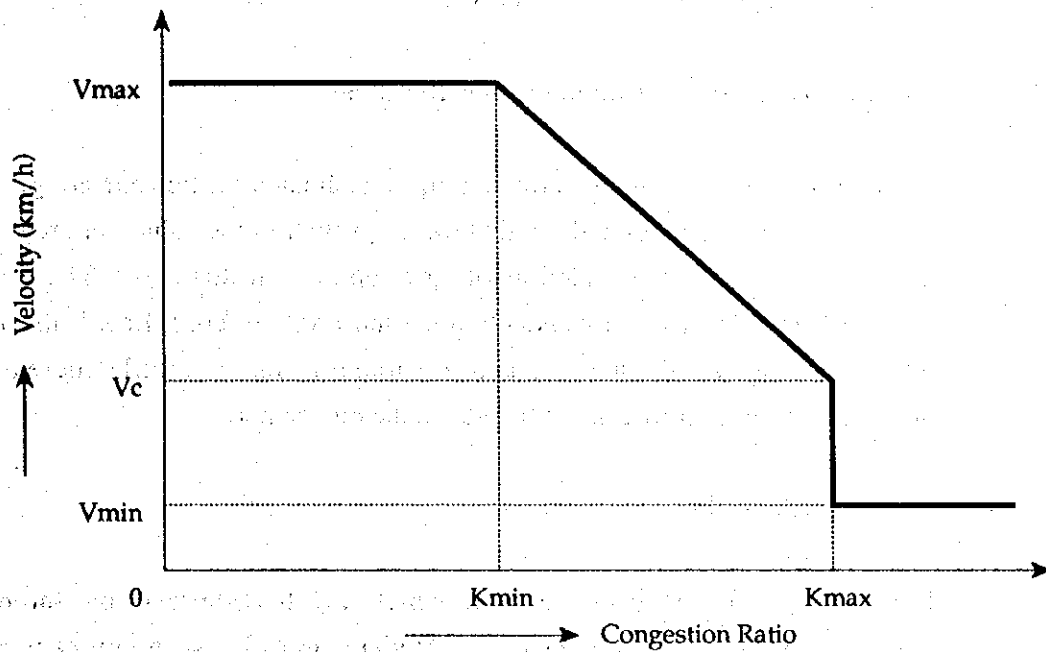


Fig. 7.2 Detailed Procedure of Traffic Assignment



Code	Vmax	Vc	Vmin	Kmin	Kmax
1	30	20	5	0.5	1.0
2	40	20	5	0.5	1.0
3	50	20	5	0.5	1.0
4	80	30	5	0.5	1.0
5	10	10	10	0.5	1.0

Access Link

< K-V Code applied >

Area	Collector Road			Arterial Road (2 lanes)			4 lanes
	bad	poor	good	bad	poor	good	
in CBD	1	2	3	1	2	3	3
out of CBD	1	2	3	1	2	3	4

- * bad road condition : $PS1 < 1.5$
- * poor road condition : $1.5 \leq PS1 < 2.5$
- * good road condition : $2.5 < PS1$

7.7 Results of Traffic Demand Forecast

7.7.1 Traffic Generation/Attraction by Traffic Zone

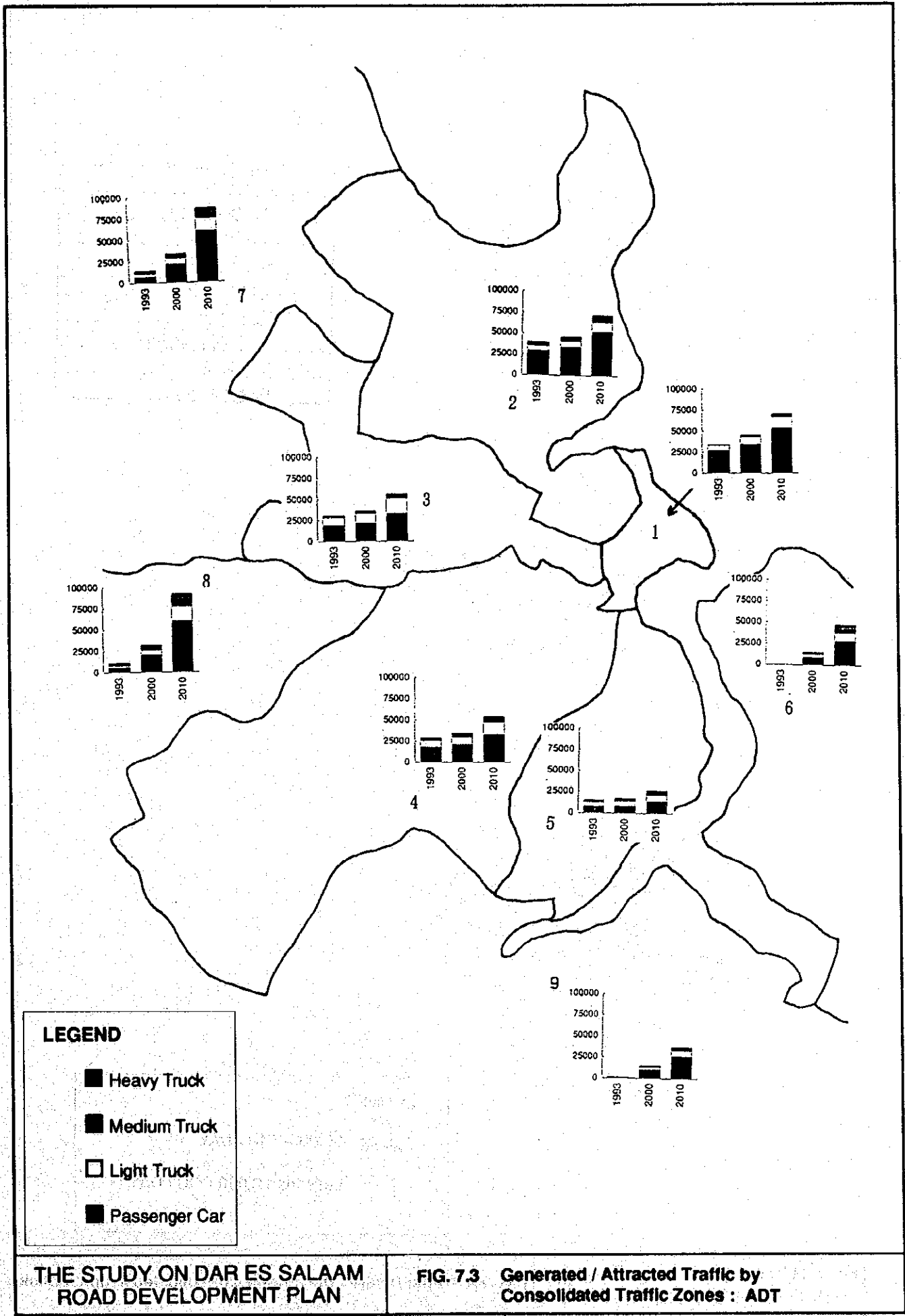
Future traffic generation and attraction by consolidated traffic zone are given in Fig. 7.3. It could be pointed out that traffic growth in the suburban area is the greatest of all due to intended urban development in this area. These areas include Kawe, Mbezi and Kunduch along the northern coast line, Tabata and Segerea along the Pugu road, and Kigamboni area. A little increase of generated/attracted traffic could be seen in the city center.

7.7.2 Traffic Distribution

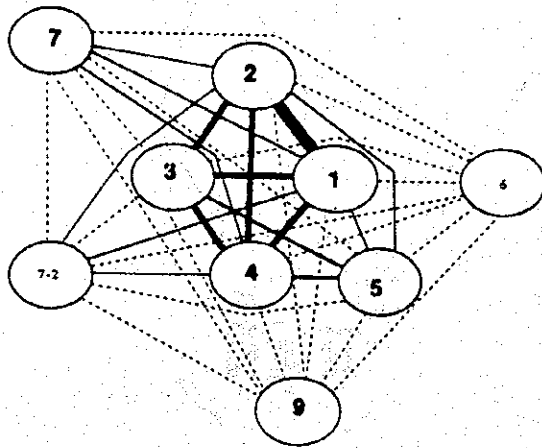
Reflecting future land-use pattern which is characterized by intensive development in suburban areas or intermediate areas between city center and suburban area, strong linkage among these newly developed regions could be identified. In spite of relatively low increasing rate of traffic in the city center compared with other areas, city center would remain as the gravity of urban traffic.

Traffic which crosses Mzinga creek, or traffic between Kigamboni area and mainland, is estimated at about 11,000 ADT and 55,000 ADT for the year 2000 and 2010 respectively.

Traffic desire lines are shown in Figs. 7.5-7.9.

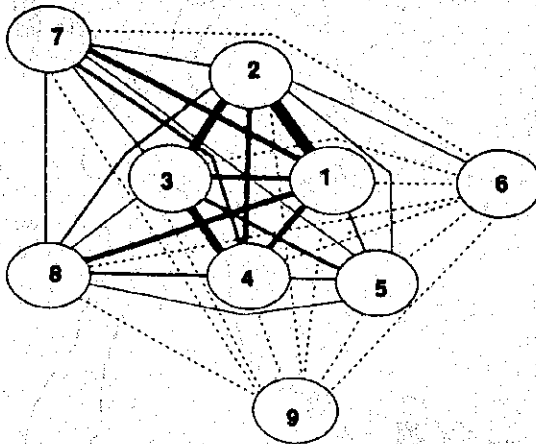


1993

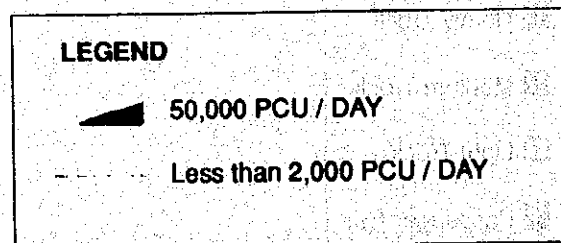
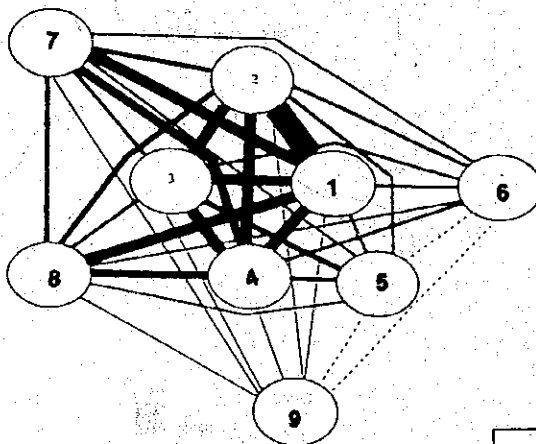


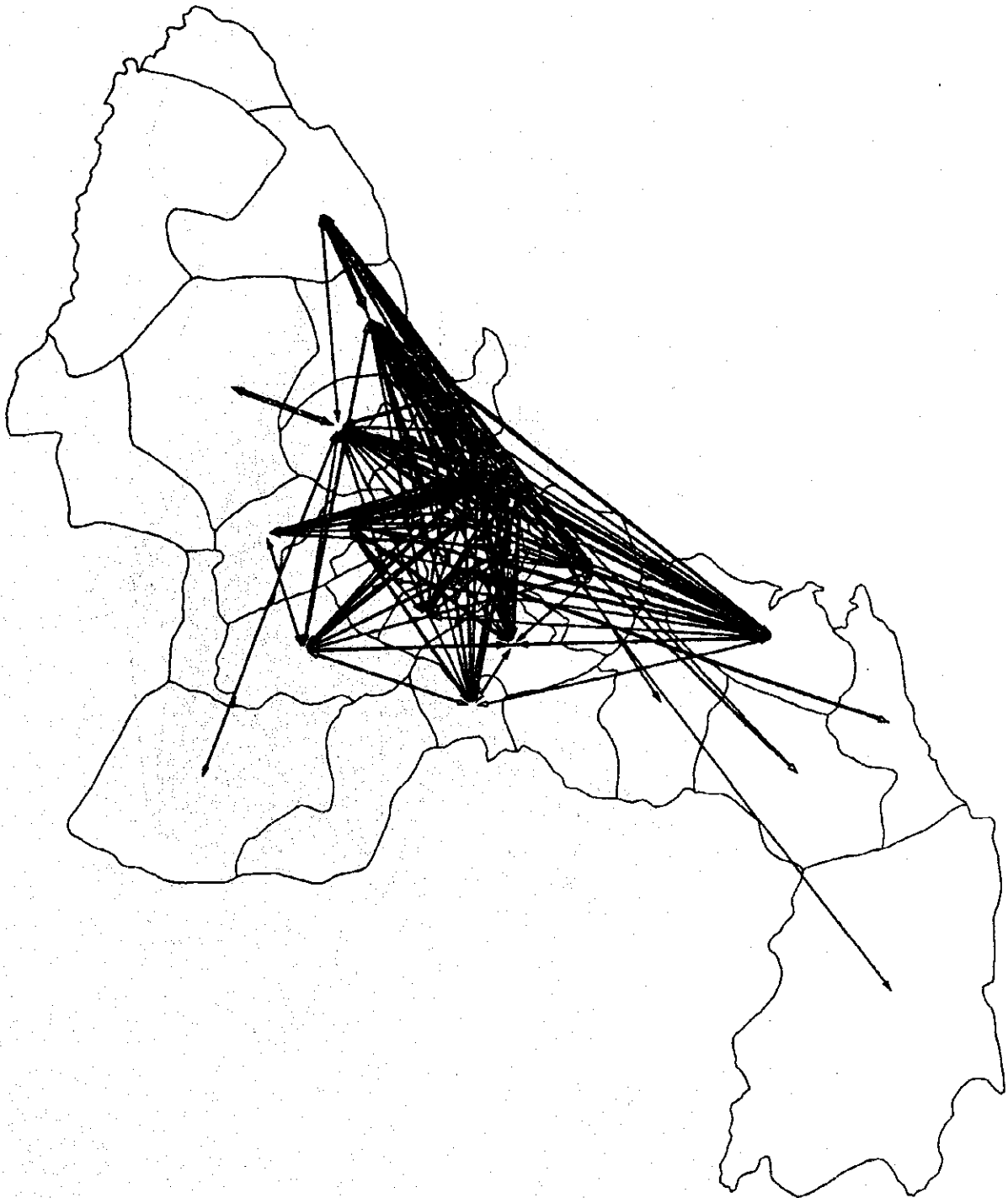
1	Central DSM
2	NE. DSM (Urban)
3	E. DSM (Urban)
4	SE. DSM (Urban)
5	S. DSM (Urban)
6	Kigamboni
7	NE. DSM (Suburban)
8	E. DSM (Suburban)
9	DSM (Suburban)

2000



2010

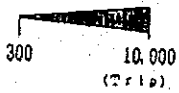




300 10,000
(Trips)

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

**FIG. 7.5 Traffic Desire Line(2000) - DSM Regional Areas
- Total Vehicle -**



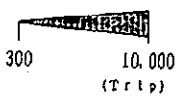
THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

FIG. 7.6 Traffic Desire Line(2000) - DSM Urban Area
- Total Vehicle -



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

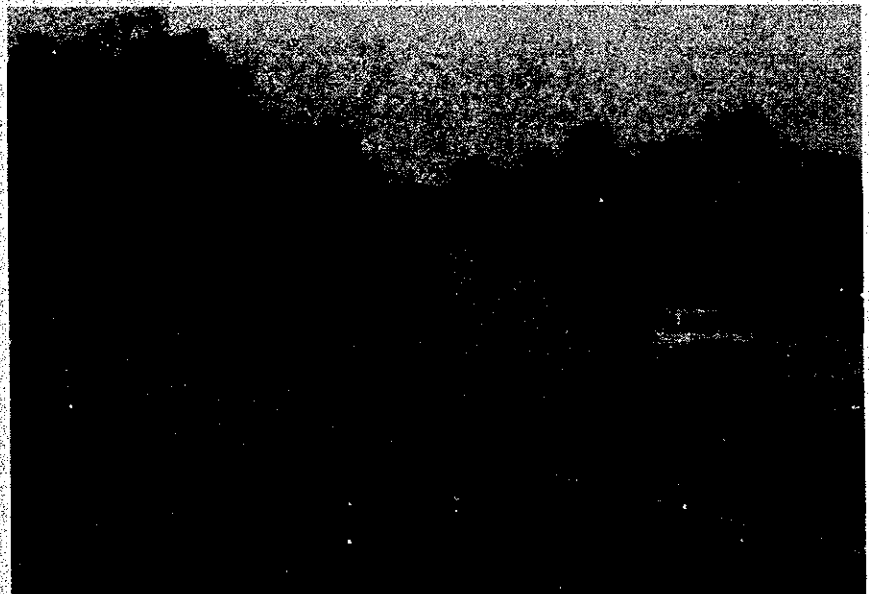
**FIG. 7.7 Traffic Desire Line(2010) - DSM Reginal Area
- Total Vehicle -**



THE STUDY ON DAR ES SALAAM
ROAD DEVELOPMENT PLAN

FIG. 7.8 Traffic Desire Line(2010) - DSM Urban Area
- Total Vehicle -

CHAPTER 8 ROAD DEVELOPMENT PLAN



CHAPTER 8 ROAD DEVELOPMENT PLAN

8.1 Basic Concept of Road Development Master Plan

8.1.1 Introduction

As discussed in Chapter 4, urbanization of Dar es Salaam would continue at fairly high speed. Urban area in 2010 is expected to grow up to about 1.8 times as large as present, while both population and daytime employment are expected to grow to 1.8 times of present ones. However, these urbanization would not follow trend of past that is characterized by strong concentration of business function in the city center and disorderly expansion of residential area in the suburban.

The city center has already highly developed and there are no enough spaces to be developed except for development in vertical dimension such as construction of sky scrapers and high buildings. Alternative places of urban development have to be sought out and future development have to take place centered around these places so as to accommodate further development of the city.

As far as the foreseeable future is concerned, the role of economic activities of Dar es Salaam in the nation would not be weakened but it would rather be emphasized. For this reason, road development plan as well as urban development plan should enhance the urban activities avert economic inefficiency brought about by urban biases.

Table 8.1 Prospects of Urban Development

	Present (1992)	2000	2010
Urban Area (Ha)	19,730	23,530	36,440
Population ('000)	1,631	2,140	3,000
Employment ('000)	647	849	1,190
Number of Vehicles Registered	47,786	77,590	132,090

8.1.2 Road Development Concept

In the context of road development strategies proposed in Chap. 6 and pattern of future traffic demand forecast on the basis of land-use development plan proposed in Chapter 4, the following road development concept have been proposed:

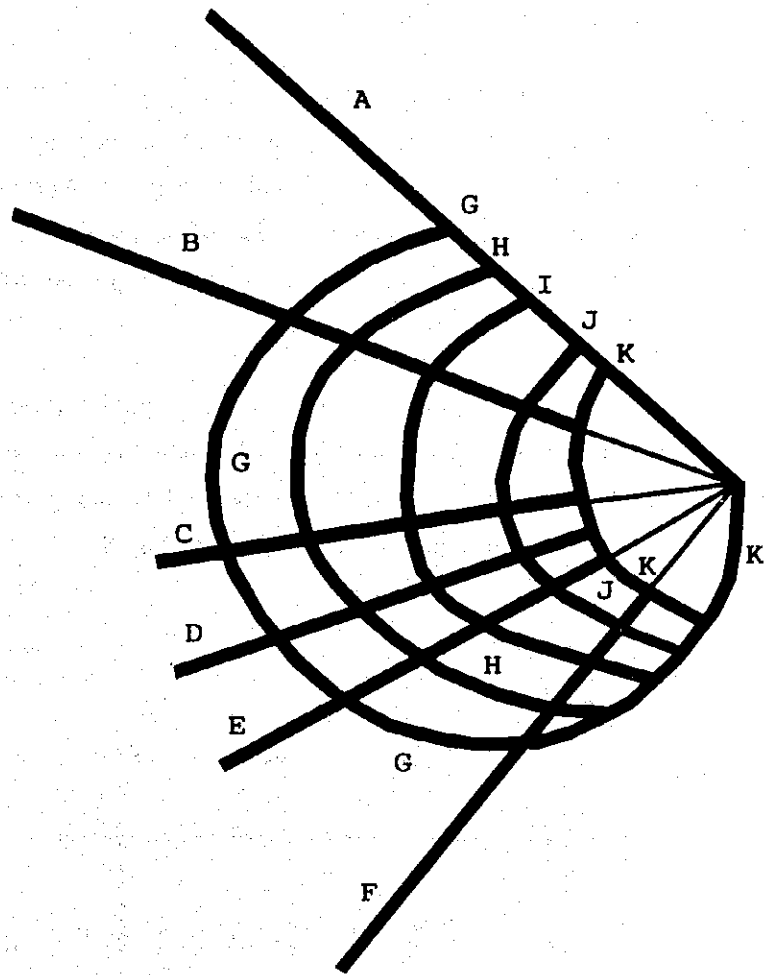
- (1) Road Development to Enhance the Urban Traffic Efficiency.
- (2) Road Development to Promote Urban Function in the Intensified Urban Development.
- (3) Road Development to Induce the Development of Potential Development Areas.
- (4) Road Development to Conduct Ordered Urban Expansion.

Each of the above concepts is detailed below:

- (1) Road Development to Enhance the Traffic Efficiency.

Low density of road network and lack of road section at critical parts of urban traffic would lead to saturated urban traffic flow in near future. At present road network in Dar es Salaam is characterized by roads radiating from the city center and imperfectly functioning circular roads. This fact is forcing passage of unnecessary vehicles in the urban area and resultant inefficient traffic flow there.

Perfect combinations of road function among radial roads and ring shaped road and enhancement of capacity of individual road have to be attained first of all to provide skeleton of road network in the city. This concept of road development plan is illustrated in Fig. 8.1.



- A: Mwini, Old & New Bagamoyo Radiating Corridor (Intra-region)
- B: Morogoro Radiating Corridor (Inter-region)
- C: Uhuru (Pugu North) Radiating Corridor (Intra-region)
- D: Pugu Radiating Corridor (Intra-region)
- E: Pugu South Radiating Corridor (Intra-region)
- F: Kilwa Radiating Corridor (Inter-region)
- G: Outer Ring (Urban area surrounding)
- H: Mpakani, Nelson Mandela Ring (Intra-urban)
- I: Middle Ring (Morocco-Chang'ombe linkage)
- J: UN-Gerezani Ring
- K: UWT-Ohio-Sokoine Ring

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

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

Heterogeneous distribution of feeder roads is hampering homogenous distribution of urban area. This could be seen mostly in the middle area surrounded by existing Mpakani-Nelson Mandela and Morocco-Changombe Ring. It is expected that this area will be highly developed as both residential and business cores in the expected urban growth of Dar es Salaam.

Feeder roads which service these middle areas are effective to accommodate further locations of urban facilities and to realize smooth traffic flow within the area. These feeder roads are preferable if they are strengthened in grid pattern as shown in Fig. 8.2.

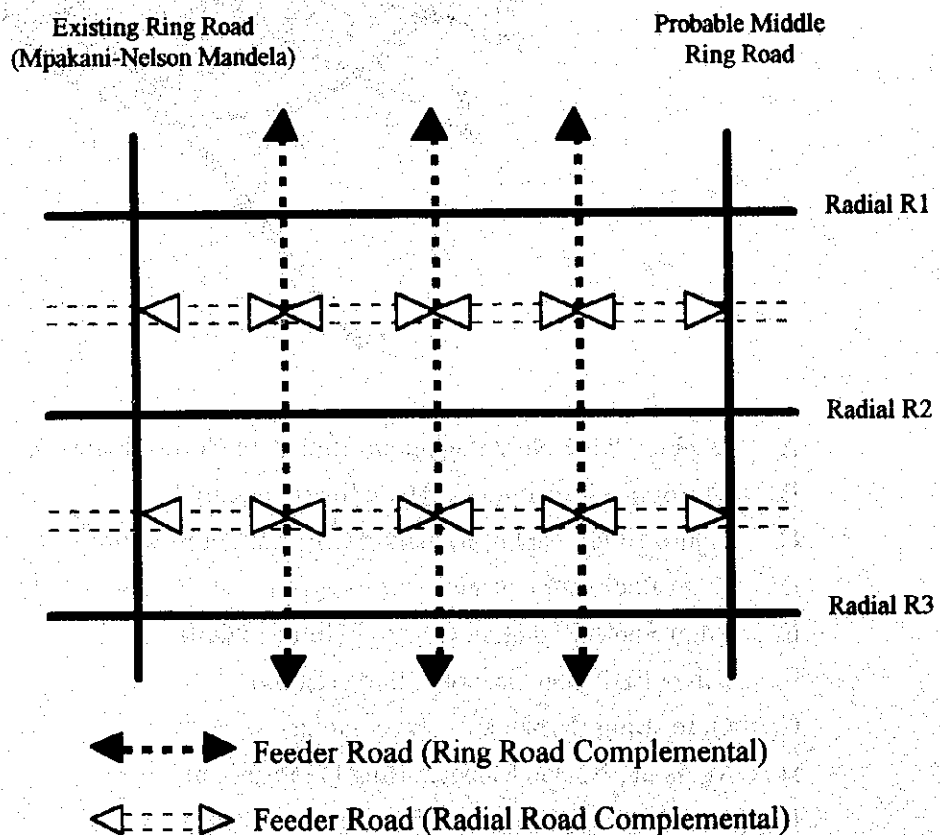


Fig. 8.2 Concept of Road Development to Promote Urban Development

(3) Road Development to Induce the Development of Potential Development Area

Poor transport system sometimes keep potential development area untapped. Typical example could be seen in Kigamboni area which is separated from mainland by Mzinga creek over which there is no bridges to cross at present. Kigamboni is a sole untapped areas in Dar es Salaam with vast size and good accessibility to the city center. Good access to this area would induce the relocation and new location of urban facilities into this area, and would contribute to the integrated urban development with the present city center.

In addition, present difficulty of road development on the seaside of the mainland, which is the preferable road sections of inner ring road, would be solved if road section of this ring shaped road is constructed on the side of the Kigamboni with the introduction of two bridges connecting the mainland and the peninsular in a long-term. This concept is illustrated in Fig. 8.3. Similar concept is applicable to the area along the Pugu road and the Nelson Mandela road where the development potential is great.

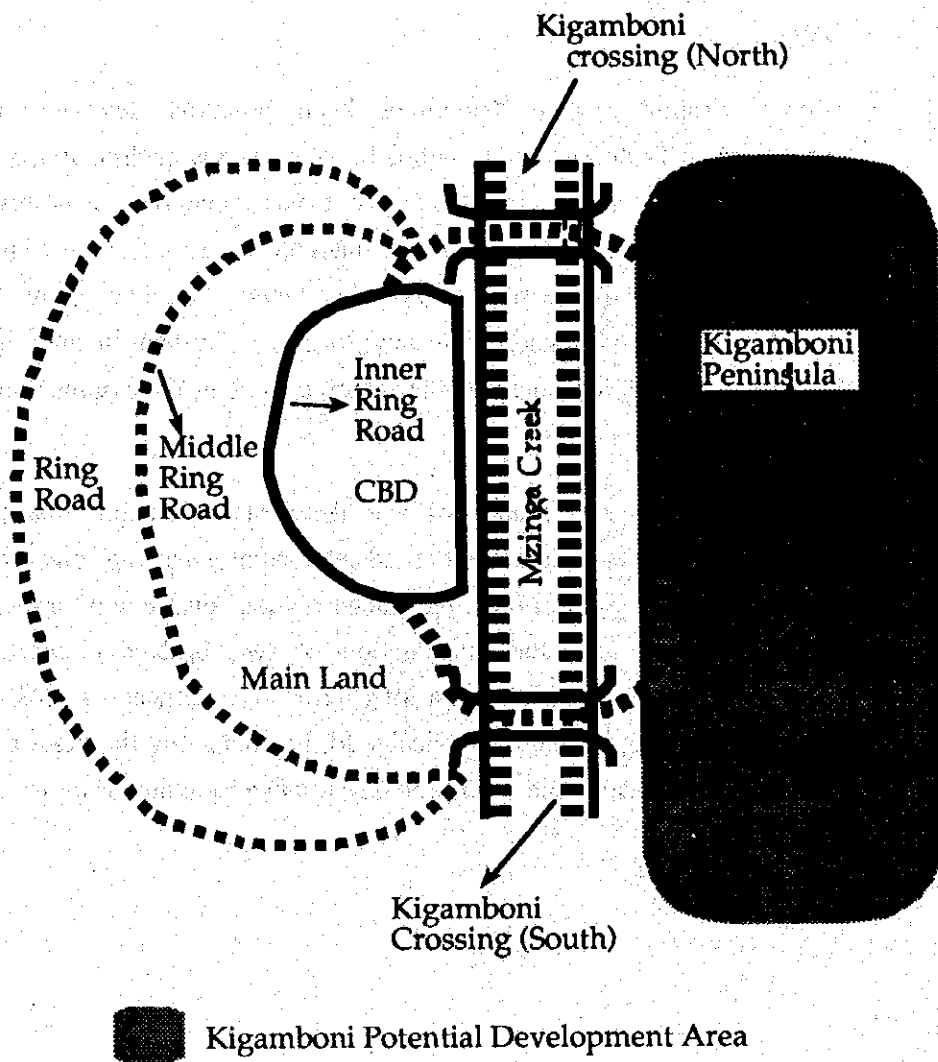


Fig. 8.3 Road Development to Induce the Development of Potential Development Area

(4) Road Development to Prevent Haphazard Urban Sprawl

Existing trend of urban sprawl along the radial roads should be checked and future expansion should be conducted so as to avert disordered urban development. Outer ring road would function for this purpose along with the well planned rural road development in the areas outside of this road. Fig. 8.4 explains this concept.

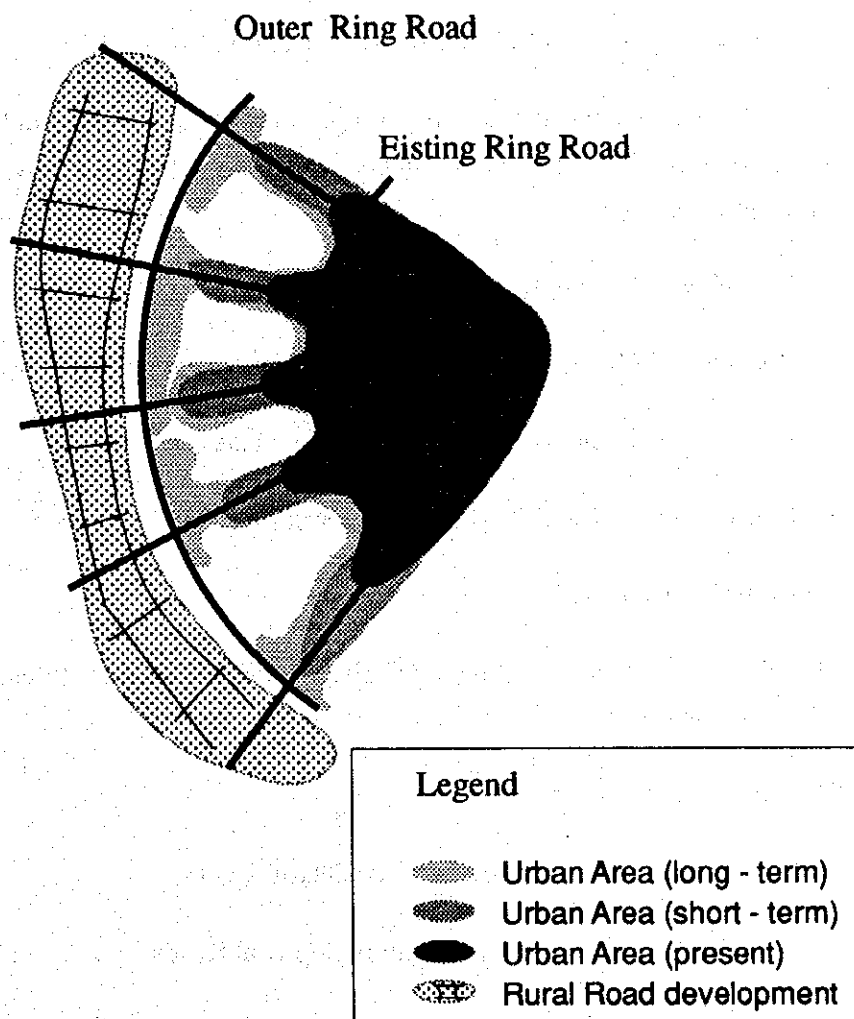


Fig. 8.4 Concept of Road Development to Conduct Orderly Urban Expansion