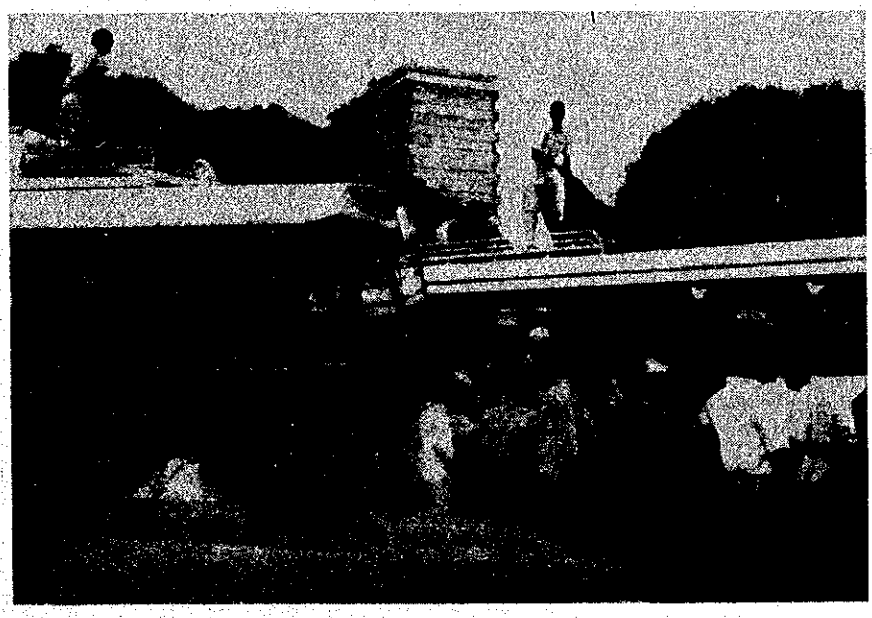
CHAPTER 9 PUBLIC TRANSPORT DEVELOPMENT PLAN



CHAPTER 9 PUBLIC TRANSPORT DEVELOPMENT PLAN

9.1 Basic Concept

Public transport in Dar es Salaam is inefficient. Streamlining the system is one of the most urgent issues facing the city's urban transport development. The frequency of bus service is quite low compared with growing demand resulting in over crowding and left over of passengers. Bus network at present is such that it does not cover densely populated areas of the city and do not adequately cover newly developed areas of the city.

Regarding existing patterns for bus service, most service is concentrated along radial roads with little service on roads which connect these radial roads to each other. This pattern is hindering the homogeneous development of the city and encouraging excessive concentration in the city center. This is not only true for public transport services but also for the existing road network and landuse policy. It is urgent that a public transport development plan in conjunction with road development be formulated. Consideration for the formulation of such a plan are given in this chapter.

Public transport service by bus will remain the primary mode of public transport in the city, as it does not require as great a capital investment as for the introduction of services by other modes. It is expected that the city's population will reach more than 2 million inhabitants at the beginning of the next century. Because of this trend the need to create an urban transport service system which will cater to 2 million inhabitants of the Dar es Salaam metropolitan area is essential.

9.2 Proposed Measures of Development Plan

9.2.1 Improvement of Long-distance Bus Service

- Background

  Dar es Salaam is the origin of long-distance bus service to other major towns in Tanzania. These buses are serviced at four (4) bus terminals located in the densely populated city centers. Most of these terminals are poorly facilitated and provide poor service to users where departure

terminals differ by destination and operation schedule are not well established.

The number of long-distance buses departing from and arriving at these bus terminals in 1993 was 115 per day in total and it is estimated that more than 4,000 passengers are using these disorderly functioning terminals. Most of long-distance bus terminals are located along the narrow streets in the city center and Kariakoo where the streets are crowded with pedestrians, hawkers and cars parked on the roadside. It is urgent to foster urban traffic system focused on improvement of the terminal function of buses in the city as detailed below:

(1) Integration of Long-distance Bus Terminals

At present there exist four (4) long-distance bus terminals in the city and taking care of services rather independently by destination of services as shown in Fig. 9.1.

It is proposed that these terminals are integrated into two primary terminals under the coordinated operation system. Considering two different directions of long-distance bus serviced: One is the services which are bound for North, West, North-west, South-west, and the other is the services, for South, it might be efficient if two of the new terminals are introduced in the city as shown in Fig. 9.2.

Coordinated management of bus service would bring about "economy of scale" in terms of reducing the operation cost of vehicles, maintenance cost, and crew cost for bus operations. Users of long-distance buses would receive the benefit from this renovation.

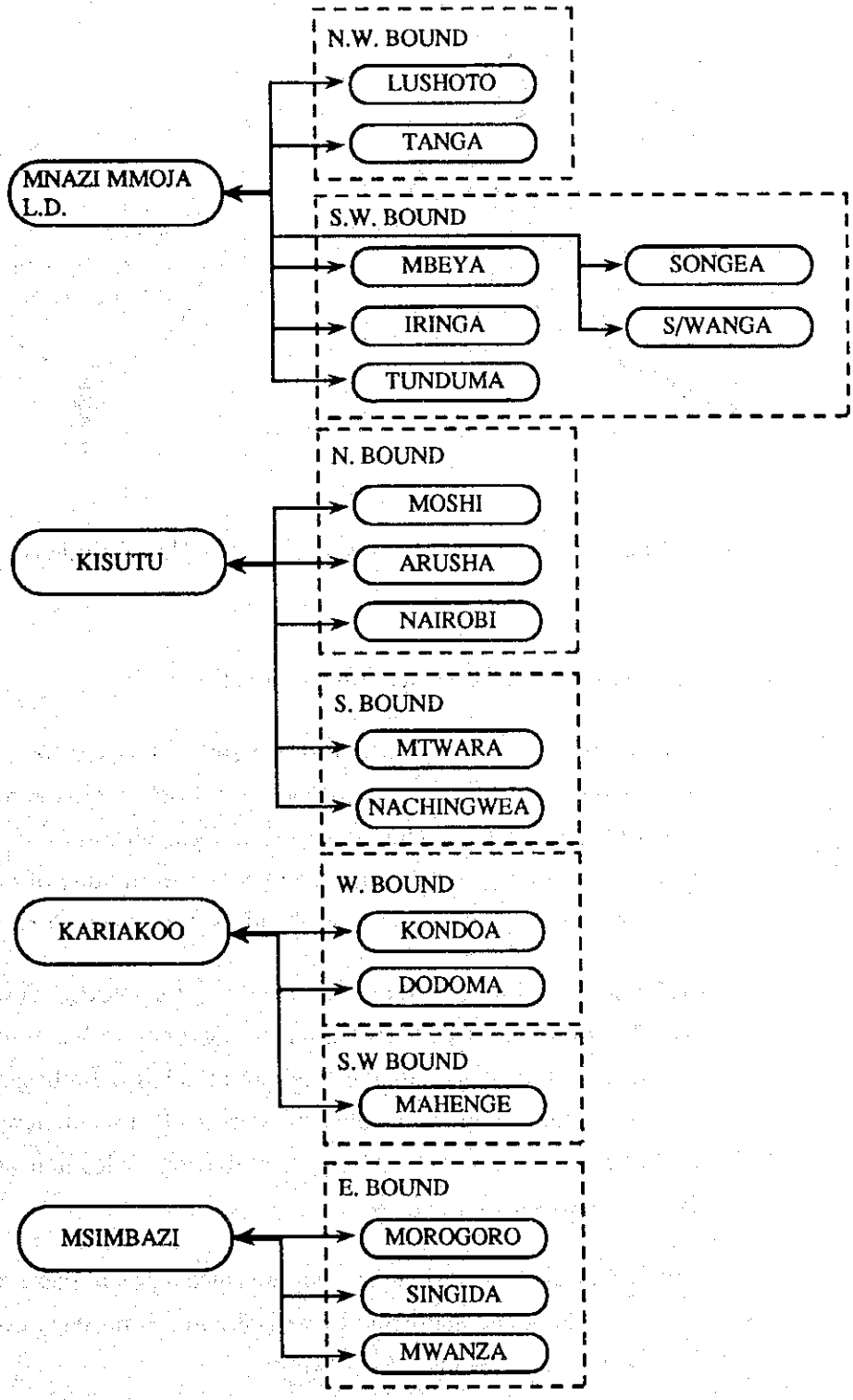


Fig. 9. 1 Present Long-distance Bus Service by Bus Terminal and Destination

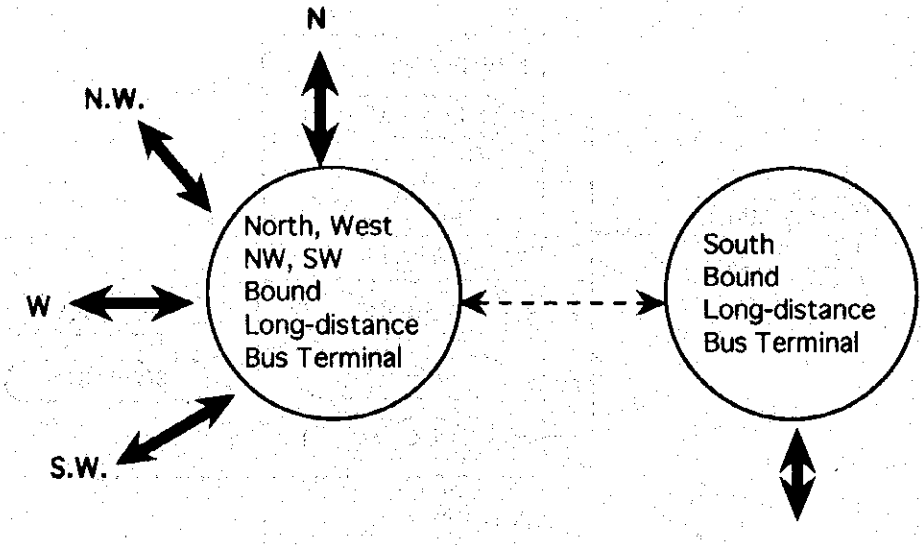


Fig. 9.2 Concept of Integration of Long-distance Bus Terminals

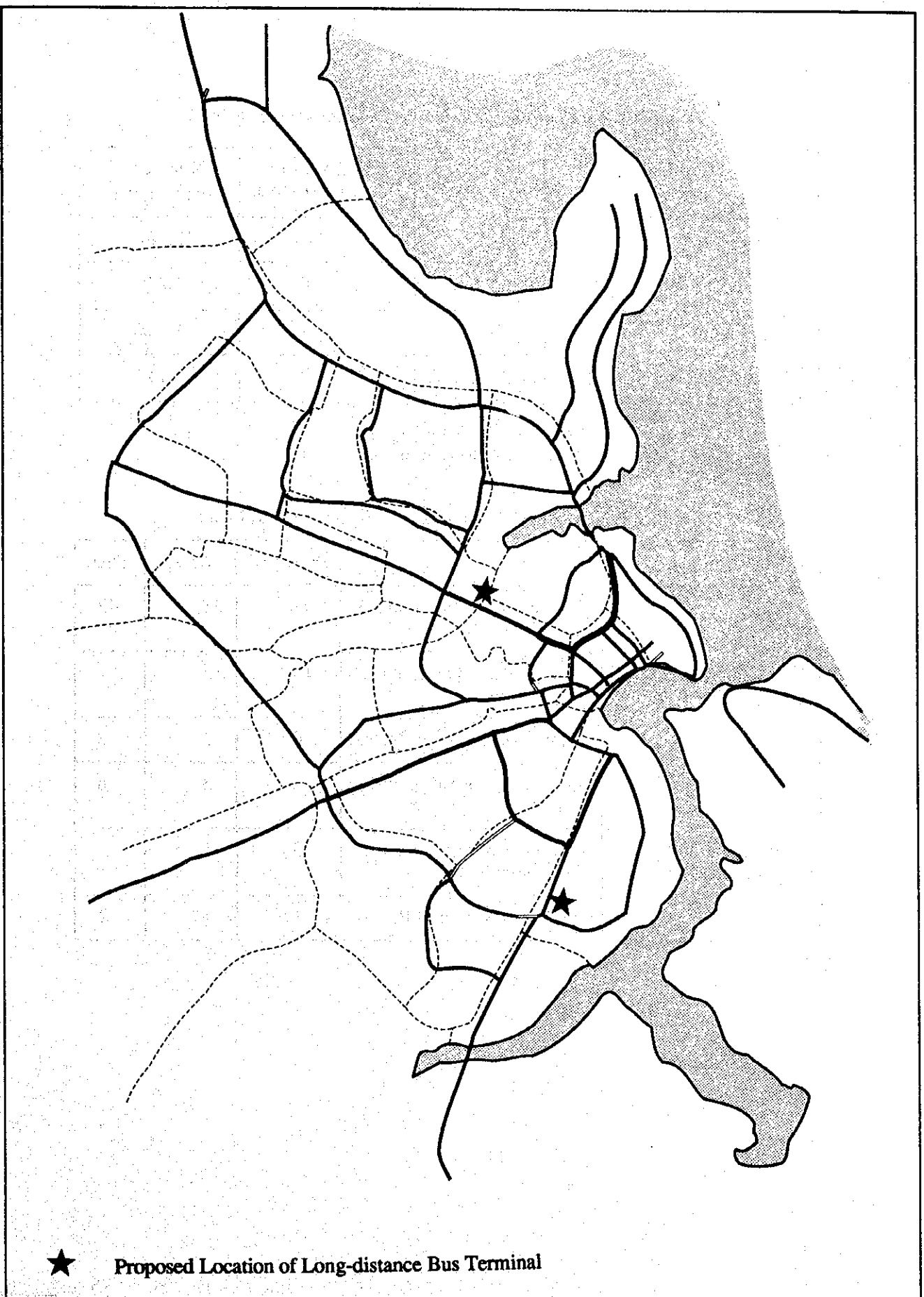
(2) Relocation of Long-distance Bus Terminal

Passage of heavy buses, which are mainly used for long-distance service, on urban streets is one of the most serious problem in the city center of the Dar es Salaam. To relocate these terminals to suburban area would mitigate congestion and the degree of mixture of traffic and would promote the functional classification of the roads in urban area.

Probable location of new bus terminal for North/West/North-West/South-West buses (hereinafter as West bound bus terminal) is preferable if it located along the Morogoro road as these buses use this road within the city of Dar es Salaam. On the other hand, new location of South bound bus terminal is preferable to be located along the Kilwa road as shown in Fig. 9.3.

Daily departures and arrivals of long-distance buses at these terminals in the year 2000 are estimated to be 208 and 27 for West bound bus terminal and South bound respectively.

Planning elements of these terminals have been estimated as shown in Table 9.1-3.



★ Proposed Location of Long-distance Bus Terminal

THE STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PLAN	Fig. 9.3 Proposed Location of Long-distance Bus Terminal

Table 9.1 Number of Bus Operation and Passengers (2000)

Terminal		Number of Departure/Arrival	Number of Passenger 1)
West Bound Long-distance Bus Terminal	Daily	416	12,462
	Peak Hour 2)	42	1,246
South Bound Long-distance Bus Terminal	Daily	54	1,568
	Peak Hour 2)	6	157

1) 30 persons/vehicle is assumed.
2) 10% of peak hour ratio is assumed.

Table 9.2 Number of Berth for Long-distance Buses (Total)

Terminal		Departure	Arrival	Total
West Bound Long-distance Bus Terminal	Number of Operation during Peak Hour	21	21	42
	Average Berth Occupancy Time (Minutes)	15	15	–
	Number of Required Berths	6	2	8
South Bound Long-distance Bus Terminal	Number of Operation during Peak Hour	3	3	6
	Average Berth Occupancy Time (Minutes)	15	5	–
	Number of Required Berth	1	1	2

Table 9.3 Number of Berth for Long-distance Buses by Terminal

(1) West Bound Long-distance Bus Terminal

	Shuttle Bus		Taxi		Private Car
	On-board	Off-board	On-board	Off-board	On/Off board
Number of Passengers (Peak Hour)	1,246 (Refer Table 9.1)				
Share of Access Mode [1]	30%		5%		5%
Number of Passengers by Mode (Peak Hour)	187	187	32	32	63
Average Number of Passengers (per Vehicle [2])	20			1.74	1.74
Number of Vehicles (Peak Hour)	10	10	19	19	37
Average Berth Occupancy (Minutes)	5	15	2	2	2
Number of Berth Required	1	3	1	1	2

1) Base on the observation by the Study Team
2) Based on Traffic Survey carried out by the Study Team.

(2) South Bound Long-distance Bus Terminal

	Shuttle Bus		Taxi		Private Car
	On-board	Off-board	On-board	Off-board	On/Off board
Number of Passengers (Peak Hour)	157 (Refer Table 9.2)				
Share of Access Mode [1]	30%		5%		5%
Number of Passengers by Mode (Peak Hour)	24	24	4	4	8
Average Number of Passengers (per Vehicle [2])	20		1.74		1.74
Number of Vehicles (Peak Hour)	1.5 [3]	1.5 [3]	3	3	5
Average Berth Occupancy (Minutes)	5	15	2	2	2
Number of Berth Required					

1) Base on the observation by the Study Team.
2) Based on Traffic Survey carried out by the Study Team.
3) Corresponding 3 times of departure/arrival during the peak hour.

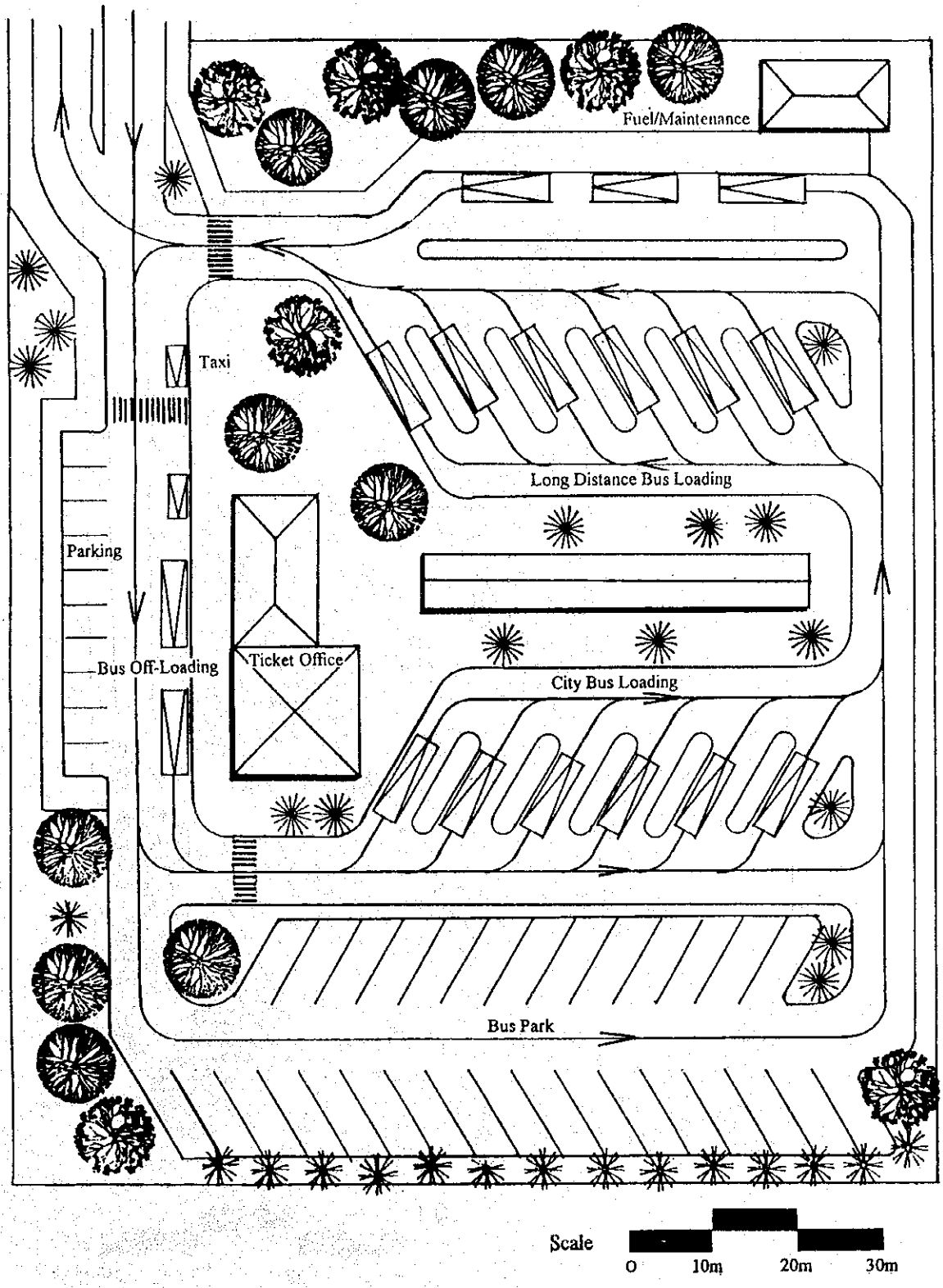
On the basis of the estimation carried out in Table 9.1 - 9.3, required number of parking spaces has been estimated as shown in Table 9.4.

Table 9.4 Number of Required Parking Spaces

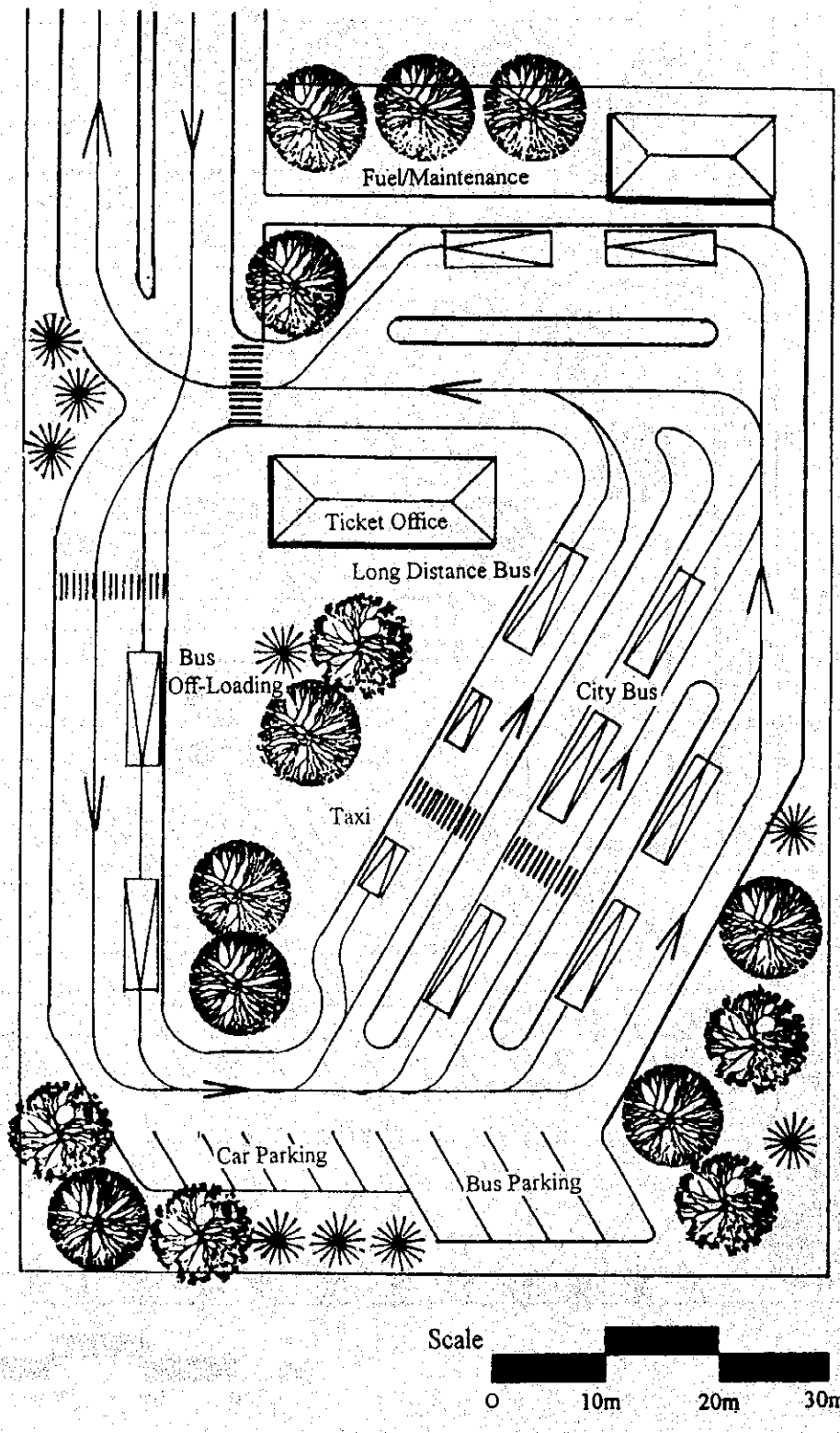
Terminal	Long-distance Bus	Shuttle Bus	Taxi	Passenger Car
West Bound Long-distance Bus Terminal	21	5	1	24
South Bound Long-distance Bus Terminal	3	2	–	–

Layout of terminals has been proposed as shown in Fig. 9.4 and 9.5 based on the above estimation.

Regarding the access service at the new terminals shuttle bus service between the down town core (old post office along Sokoine drive) is proposed in conjunction with improvement plan of city bus services.



THE STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PLAN	Fig. 9.4 Layout Plan of West Bound Long-distance Bus Terminal



THE STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PLAN	Fig. 9.5 Layout Plan of South Bound Long-distance Bus Terminal

9.2.2 Improvement of City Bus Service

(a) Background

As far as foreseeable future is concerned, bus will remain as the main means of public transport. Existing bus transport system in the city, in the wave of urbanization have to undergo drastic reform so as to cope with growing demand for urban travel and to provide better services for the users. Furthermore, future bus service network should be provided taking advantage of improved road network proposed in Chapter 8. In this context, following improvement plans would be proposed:

- Functional Classification of Bus Service Routes
- Construction of Local Bus Stations
- Strengthening of Junctional Function
- Reorganization of City Bus Terminals

(b) Functional Classification of Bus Service Route

- 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 function 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 Drives.

- Feeder road Bus Services by Private Companies

  Bus services on feeder roads should be intensified supplementary to the above mentioned two kinds of bus services on trunk roads. This could be realized by introducing incentives to private bus companies under guideline worked out by UDA or MWCT. Services on feeder roads would be classified into following two (2) groups:

  • Feeder Road Service in Newly Developed Areas

    This service consists of commuter services between newly developed areas to nearby trunk roads. These areas include,

Mikocheni, Mwananyamala, Kigogo, Tabata and Temeke areas.

- Feeder Road Service in Existing Urban and Residential Cores.

  This is a service which aims at intra-urban service to facilitate interdependence of urban activities. These areas include city center (Mchafukoge), Upanga, Kariakoo and Changombe areas.

- Shuttle Bus Services between Long-distance Bus Terminal and City Center

  Shuttle bus services which transport long-distance bus passengers could be provided to/from bus terminals as proposed in the previous section. This concept will also be applied to the services between new railway station and city center under the condition that existing Dar es Salaam railway station could be removed from the present location in a long term.

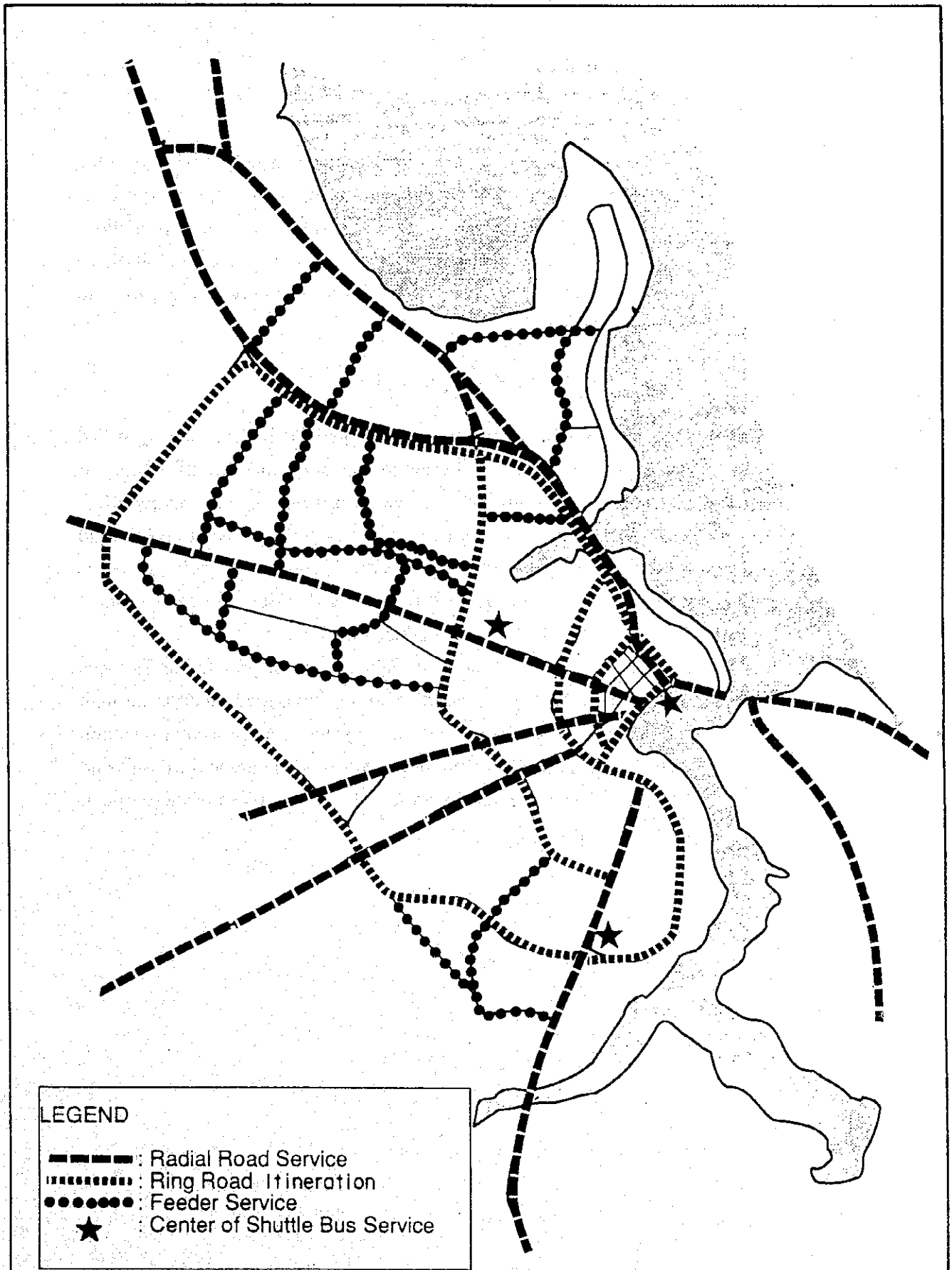
  The above concept is illustrated in Fig. 9.6.

(c) Construction of Local bus Stations

For the integrated function of the above proposed different types of bus services, new bus operation system, which will be based on the concept of Ride & Ride system or bus transition system, is inevitable to be introduced. Junctional points in urban public transport services 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 a certain number of bus bays, according to the volume of transit passengers, and provided with minimum of facilities for passenger services and bus operations. These include shelters, ticket offices, kiosks, and facilities for bus operation. Proposed location and function of each of the bus station is shown in Fig. 9.7 and Table 9.5, while Fig. 9.8 shows proposed typical ground plans of the stations.

Broadly speaking, the type of bus stations could be classified into 2 types; one is terminal type and another is roadside type. These would be determined taking account of the availability of land, future operation system, and expected number of transit passengers.



THE STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PLAN	FIG. 9.6 Functional Classification of Bus Service Route

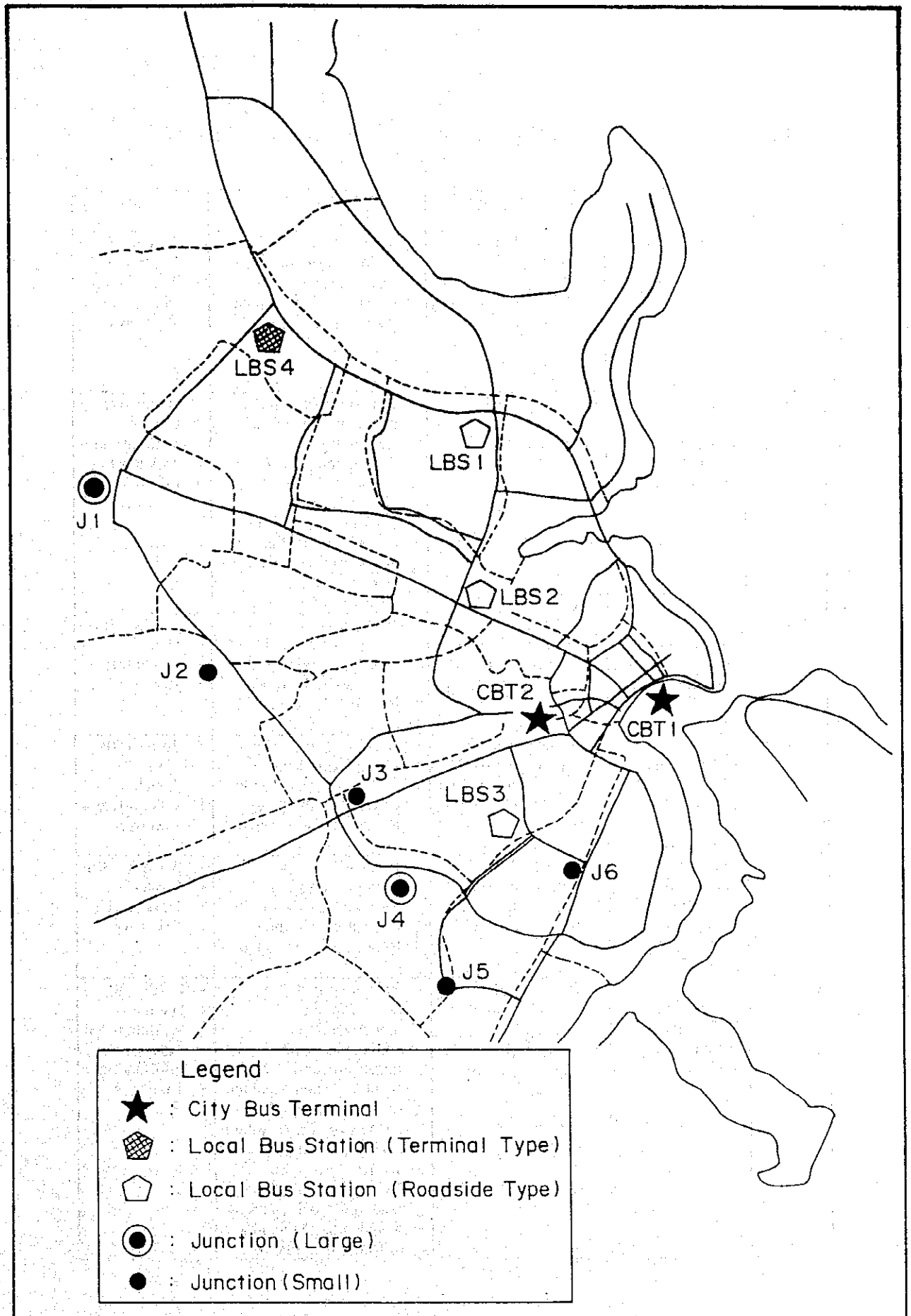
(d) Strengthening of Junctional Function

Introduction of different types of bus services, which consists of trunk road service, ring road itineration, and feeder road service, require the strengthening of junctional function. Least level of bus stop facilities and access with pedestrian signals should be provided at these junctions. Location of probably junctions to be improved is shown in Fig. 9.7 and Table 9.6.

(e) Reorganization of City Bus Terminals

Disordered operation of city buses at present is deteriorating urban traffic situation in Dar es Salaam to a great extent. On/off loading of passengers and parkings of numbers of private buses in narrow urban streets are causing inconvenience to users and nuisance to other road users. Especially, disordered bus services and concentration of buses in the city center and Kariakoo area are deteriorating the transport efficiency of streets as well as urban amenity.

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 parkings. The plans propose the construction of bus terminals which are provided with enough number of berths and related facilities in the nearby areas. The ground plans of the terminal are shown in Fig. 9.9.

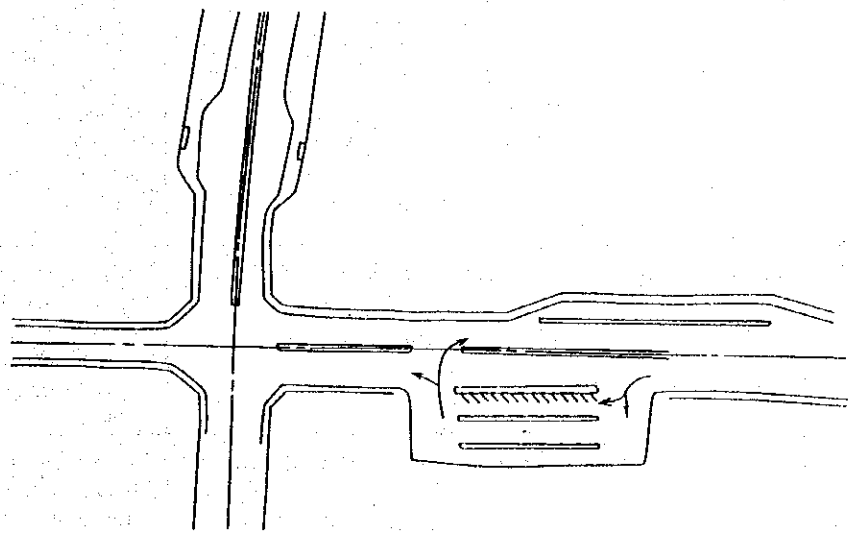


THE STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PLAN

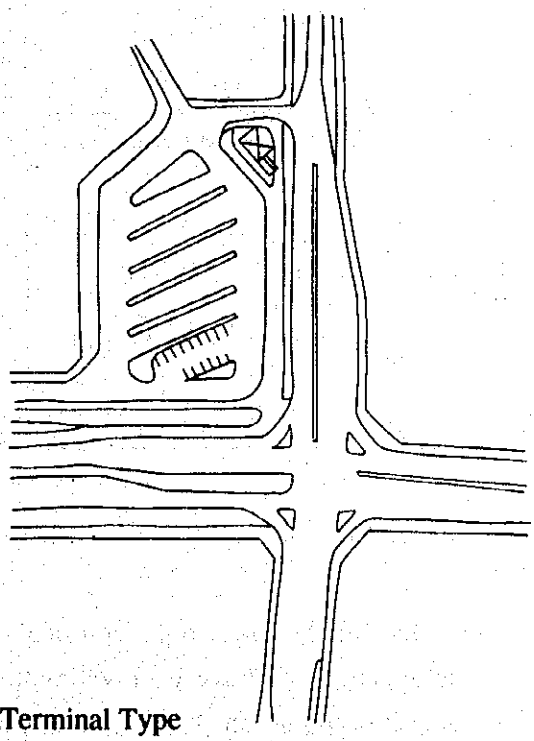
Fig.9.7 Proposed Location of Bus Station

Table 9.5 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	• Central City Bus Terminal • One of the ends of Shuttle bus services between long-distance bus terminals	• Taking advantage of widened Sokoine drive, bus berths would be constructed in the area parallel to the street	• Berths (40 ~) • Waiting room • Ticket office, Information • Taxi bays
CBT2	Near the intersection of Gerezani and Uhuru street (Kariakoo area)	• Terminal for private buses (Daladala)	• 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.	• Berths (60 ~) • Garage • Waiting room • Ticket office, Information • Taxi bays
LBS1	At the intersection of New Bagamoyo and Morocco (Middle Ring) roads	• Transit place of radial trunk road service and circular trunk road service	• Junction of proposed Middle Ring Road, short-cut service to the areas along the Inner Ring Road is expected of.	• Berths 30) • Shelter • Ticket office • Taxi bays
LBS2	At the intersection of Morogoro and Morocco (Middle Ring) roads	• Transit place of radial trunk road service and circular trunk road service	• Junction of proposed Middle Ring Road, short-cut service to the areas along the Inner Ring Road is expected of.	• Berths (50 ~ 60) • Shelter • ticket office • Taxi bays
LBS3	Near the intersection of Pugu and Changombe (Middle Ring) roads	• Transit place of radial trunk road service and circular trunk road service	• Junction of proposed Middle Ring Road, short-cut service to the areas along the Inner Ring Road is expected of.	• Berths (~ 30) • Shelter • Ticket office • Taxi bays
LBS4	Near the intersection of New Bagamoyo and Mpakani roads	• Trunk Road Service (Radial) ⊕ Trunk Road Service (Circular) ⊕ Feeder Road Service	• 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.	• Berths (30 ~) • Garage • Waiting room • Ticket office, Information • Taxi bays



A. Roadside Type



B. Terminal Type

Fig. 9.8 Prototype of Bus Station

Table 9.6 Strengthening of Junctions

J1	Junction of Morogoro and Nelson Mandela	• Trunk Road Service (Radial) ⊕ Trunk Road Service (Circular) and • Trunk Road Service ⊕ Feeder Road Service	To function as major junction of middle distance bus serviced to Kimara, Mbezi and Temboni. Transfer to SE part of the city via Nelson Mandela is encouraged. Also function as the center of feeder bus service in Manzese and Mburahati areas.
J2	Junction of Kimanga-Kigogo and Nelson Mandela	• Trunk Road Service (Circular) ⊕ Feeder Road Service	With the opening of Kimanga-Kigogo road, this terminal function as the major feeder bus terminal which services in Tabata, Kigogo an Ilala (south) areas.
J3	Junction of Pugu and Nelson Mandela	• Trunk Road Service (Circular) ⊕ Trunk Road Service and • Trunk Road Service ⊕ Feeder Road Service	As the major junction among Nelson Mandela, Pugu, and Uhuru, this terminal takes care of both transfer of trunk line passengers and area service in Tabata, Kiwalani, Ilala areas.
J4	Junction of Nelson Mandela and Second Pugu	• Trunk Road Service (Circular) ⊕ Feeder Road Service	With the opening of proposed Second Pugu road, this terminal would function as the center of feeder road services in Temeke, Changombe and Kiwalani areas.
J5	Near the junction of Temeke street and Mbagala road in Temeke area	• Center of Feeder Road Service	This junction would function as a core of feeder road bus service in Temeke area.
J6	Junction of Kilwa and Changombe (Middle Ring) roads	• Trunk Road Service (Radial) ⊕ Trunk Road Service (Circular)	• To function as the transit core in the south-eastern part of the city. • To be located within walking distance of proposed long-distance bus terminal.

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 9.6. Total cost required is about Tsh. 1,575 million which is equivalent to about 350 million yen.

Table 9.7 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

9.4 Public Transport Development Master Plan

It is recommended that those projects proposed here would be implemented as soon as possible. However, some of the projects proposed here are recommended to be implement with the completion of long-term road development plan so as to bring about larger benefit to urban public transport in Dar es Salaam. With this consideration, implementation plan of public transport development plan has been proposed as below:

- Short-term Plan
  - Construction of West Bond Long-distance Bus Terminal
  - Shuttle Bus Operation (To/From West Bound Long-distance Bus Terminal)
  - Construction of Two (2) City Bus Terminals (One in Sokoine drive and the other in Kariakoo)
  - Construction of Local Bus Stations (Large)
  - Strengthening of Junctional Function

- Long-term Plan
  - Construction of South Bound Long-distance Bus Terminal
  - Shuttle Bus Operation (South Bound Long-distance Bus Terminal)
  - Strengthening of Junctional Function (Small)

Costs required for each of the planning terms are Tsh. 1,095 million for short-term plan and Tsh. 490 million for long-term plan or about 250 million yen and 110 million yen respectively.

CHAPTER 10 TRAFFIC MANAGEMENT PLAN

CHAPTER 10 TRAFFIC MANAGEMENT PLAN

10.1 Basic Concept

Traffic management is interpreted as the measure to be undertaken to streamline urban traffic without conducting large scale infrastructure development. The measures for traffic management could be classified into two categories: One is legislative/administrative/legal measure and the other is physical measures. These two types of measure should be adopted in combined manner so as to bring about early solution to the problem.

Present traffic issues which require the 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.

10.1.1 Traffic Management Plan in the City Center

Concentration of excessive traffic in the city center has resulted in severe traffic chaos there. Urban roads in this area are chronically overcrowded with roadside parking which are narrowing the road capacity extremely. Traffic management measures ever introduced there are ineffectively functioning and has not bring about great achievement so far.

Improper usage of road spaces by illegal roadside parking and intrusion of hawkers and roadside stalls on carriageways are forcing urban traffic in the city center to very inefficient and disordered one. Roadside parking is the most serious issue among them as they reduce the capacities of road greatly.

All the possible management measures to enhance road transport efficiency: reducing the traffic inflow, enhancing the function of individual road, and enlarge the capacity of roads as a total have to be urgently introduced in the city center. In concrete form following measures are deemed effective:

- Reduction of roadside parking,
- Enhancement of road capacity by adopting, one-way traffic policies,
- Restriction of traffic inflow by legal measures, and
- Streamlining of pedestrian flow.

10.1.2 Traffic Management Plan in Urban Area

Major concern of traffic management in urban area, which is defined as outside area of UWT road, is obsolate traffic facilities which sometimes bring about bottlenecks in urban traffic.

Outdated traffic signals which are prone to malfunction even in the peak hours of traffic lead to inefficient urban traffic flow. Lack of proper installation of traffic sings including markings of lanes and pedestrian crossings is major cause of traffic accidents as well as disordered traffic flow.

Bottleneck points on urban trunk roads are lowering travel speed and forcing the pattern of urban traffic to very inefficient one. In this context, traffic management plan in urban area is focused on improvement of "Bottleneck Points" which include:

- Improvement of traffic signals,
- Improvement of road structure at bottlenecks, and
- Efficient control of traffic flow by applying traffic safety facilities such as marking of lanes.

10.2 Proposed Measures of Development Plan

10.2.1 Reduction of Roadside Parking

(1) Background

The city center of Dar es Salaam at present has severe parking problems. This could be seen in such facts as vehicles parked on side walks, islands of rotary intersections, and sometimes even just in front of signs of "No Parking". It is commonly seen that one of the lanes of urban roads is exclusively used for parking purposes. According to the parking survey carried away in this Study, potential demand for parking in this area is estimated at about 30,000 a day, while the number of authorized parking lots in the area is as small as 2,000 including authorize parking lots on the roadside.

Shortage of parking spaces are bringing about following unfavorable traffic condition on the roads in the area:

- Parked vehicles on a stretch of road reduce its effective width and consequently its capacity,
- Vehicles circulating for available parking space increase unnecessary traffic congestion,
- Poor driving condition brought about by lowered road capacities require more vehicle operation cost and travel time, and
- Parked vehicles is major cause of traffic accident.

Roadside parking at present is under the control of traffic police and DSC is in charge of this management. However, no great achievement has been attained so far and the situation is getting worse in the increasing traffic demand.

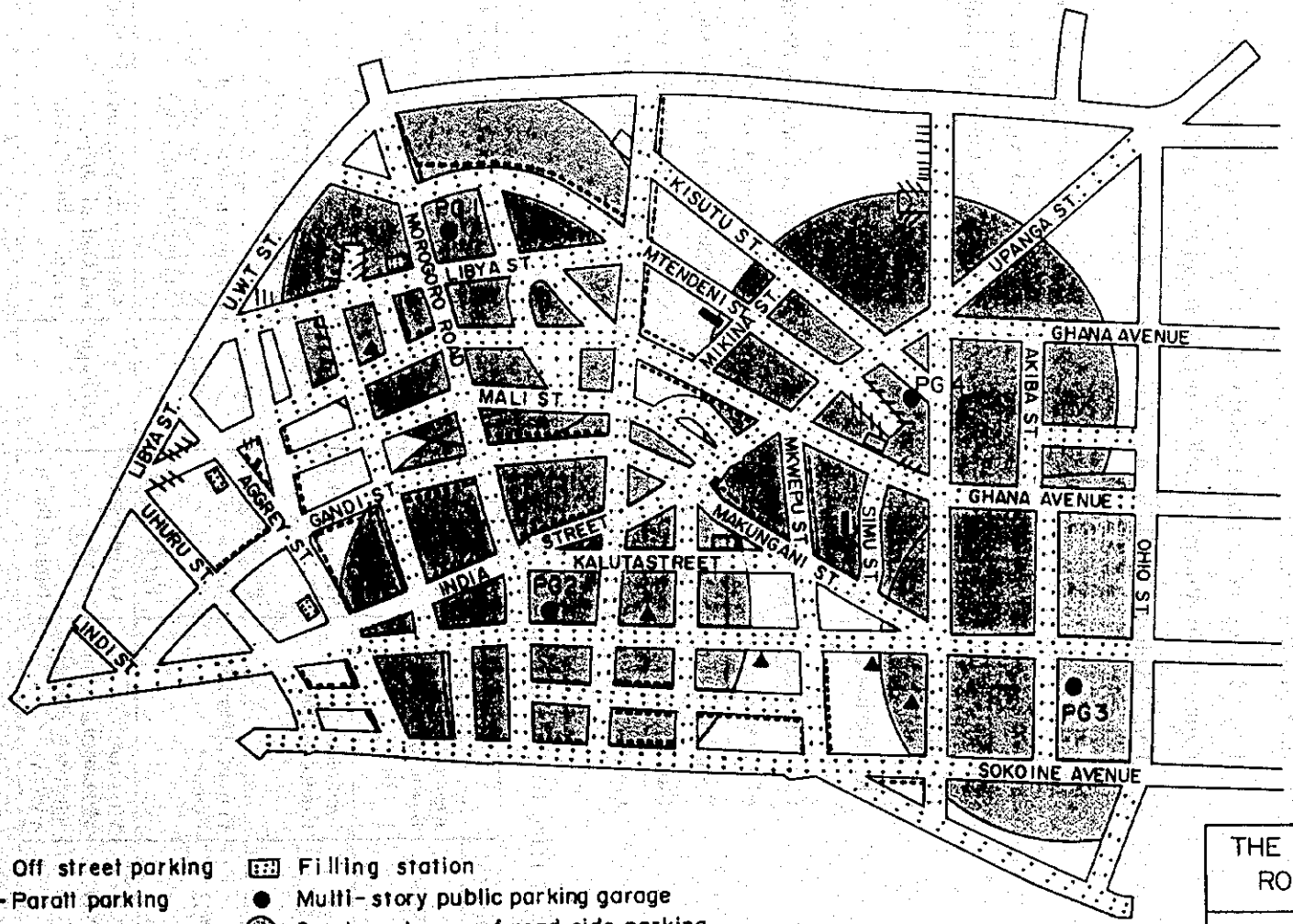
(2) Description of Plan

Construction of public parking spaces which take care of parking demand of certain area is most effective measure for the prompt solution of the issues. Construction of multi-story parking garages are more effective for the intensive absorption of roadside parking. Probable location for the garages and their dimension are presented in Fig. 10.1 and Table 10.1.

Table 10.1 Dimension of Probable Multi-story Public Parking Garages

Location No.	Place	Location	Area	Probable Influential Area
PG1	Kisutu 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, Tazania in its plan of construction of International House.



THE STUDY ON DAR ES SALAAM ROAD DEVELOPMENT PLAN

FIG. 10.1 Probable Location of Multi-Story Parking Garages

Prototype of parking garage is illustrated in Fig. 10.2 and Fig. 10.3. Total number of parking spaces is estimate 672 and total number of vehicles which will use these parking garage per day is estimated at about 16,000 assuming 30 minutes of parking time during daytime (7:00 A.M. - 7:00 P.M.). These parking garages would function more effectively if higher parking fee is charged on roadside parking nearby areas as shown in Fig. 10.1.

Roadside parking is expected to decrease drastically. The estimated number of reduced roadside parked vehicle is about 15,000 as shown in Table 10.2.

Table 10.2 Capacity of Public Parking Garages

Location No.	Place	1) Plottage (sq.m)	No. of Floors	No. of Parking Spaces	No. of Vehicles to be Accommodated per day	Expected No. of Potential Vehicles to be Absorbed from Roadside Parking *
PG1	Kisutu Long-distance Bus Terminals	1,400	6	224	5,376	5,000
PG2	Next plot of Extelcoms Building	1,200	3	210	5,040	4,700
PG3	In front of Tankot Building	1,400	6	224	5,376	5,000
PG4	Opposite to YWCA Building	1,400	6	224	5,376	5,000
Total				882	21,168	19,700

1) 70% of building-to-land ratio is assumed.

* 93% of roadside parking is assumed based on the parking survey conducted by the Study Team.

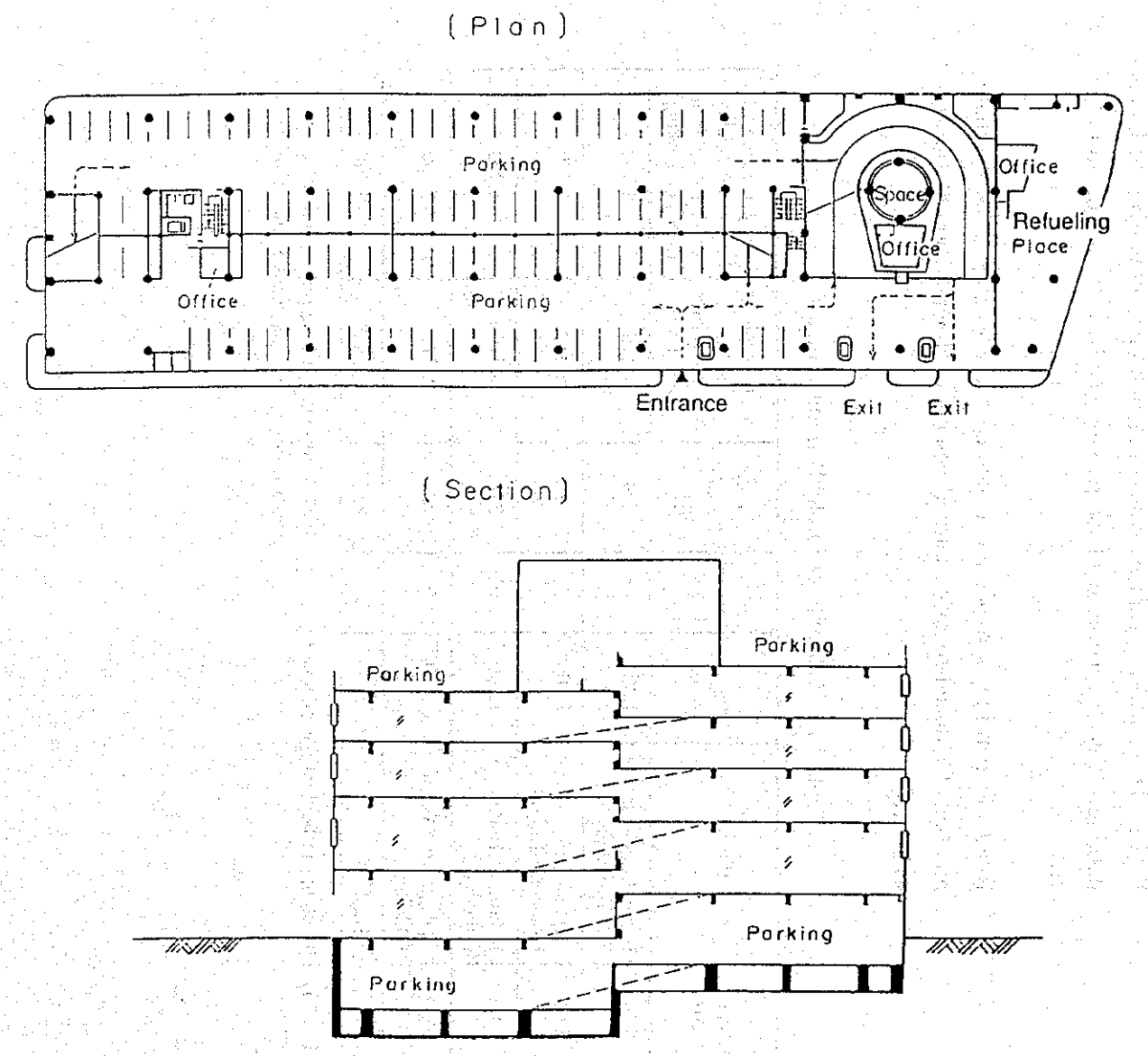


Fig. 10.2 Prototype of Parking Garage (Location PG1, PG3 and PG4)

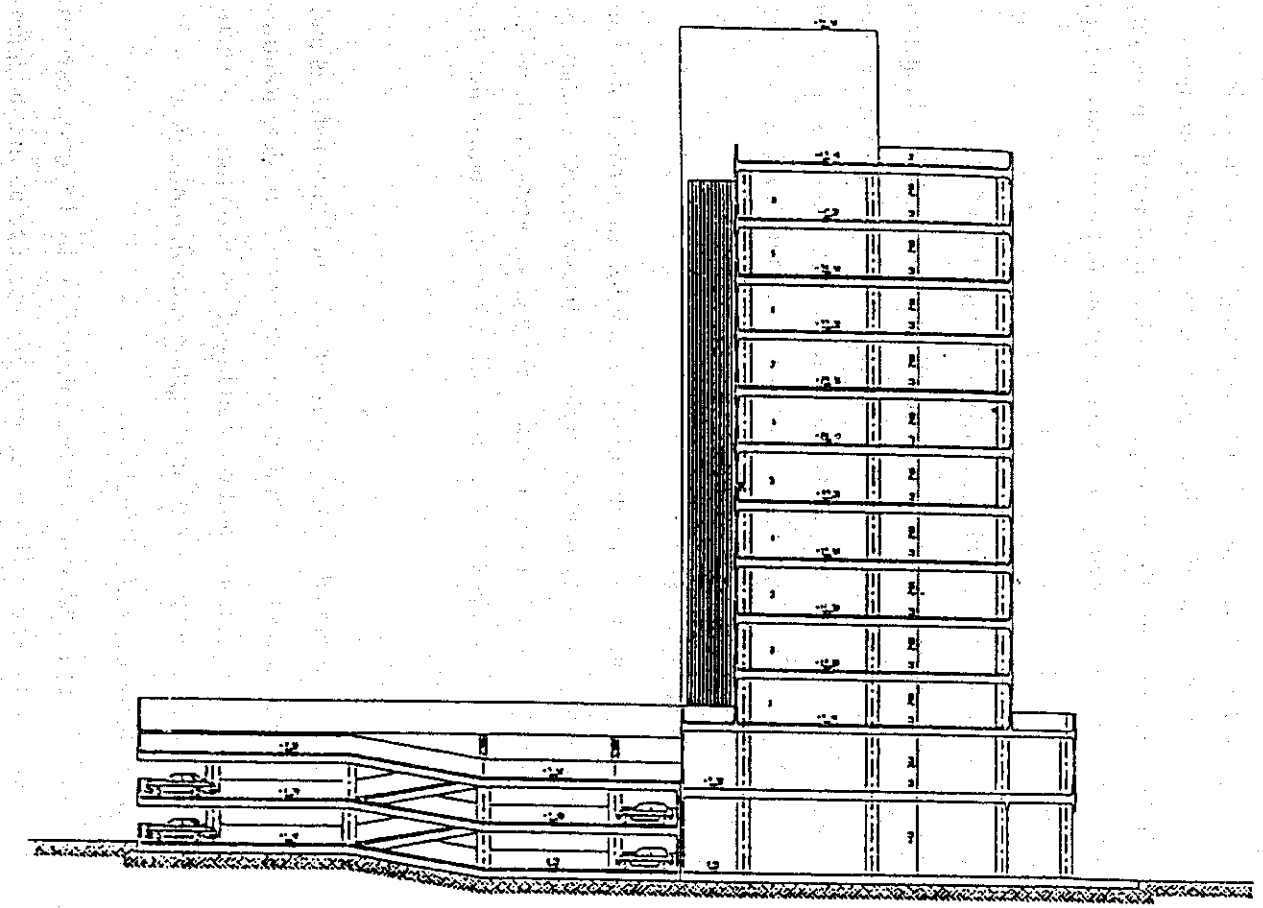


Fig. 10.2 Proposed Parking Garage (Location PG2)

10.2.2 Enhancement of Road Capacity by Adopting Proper Traffic Regulation Measures

(1) Background

Traffic flow in the city center of Dar es Salaam is inefficient. Congestion, traffic queuing and traffic accidents are daily events on urban roads. Poor circulation is caused by poor traffic facilities and lack of proper measures of traffic regulation. In other way, poor circulation of traffic in the city center is attributed to following facts which require improved measures of traffic management:

- Lack of Functional Hierarchy among Road in the City Center

  Apart from capacity of individual road, the road network is primarily a grid pattern and well provided within the area. However, the functional classification among roads in the city center is not well established. This fact has resulted in chronic and area wide overcrowding of roads in city center.

- Passage of Heavy Trucks

  Heavy trucks constitute a substantial proportion of urban traffic on certain roads in the city center. Inflow of heavy trucks to the city center through Pugu road, Gerezani street and Bandari street, which function as access roads to port and railway yard, is worsening the urban traffic flow.

- Passage of Heavy Buses

  Location of bus terminals along the densely crowded urban streets and passage of buses on trunk roads in the city center are deteriorating urban traffic situation. In addition, parking of buses on the lane where there is no off-street bus bay are interrupting smooth traffic flow.

- Improper One-way Traffic Regulation

  One-way traffic regulation is being undertaken by DCC on certain streets in the city center. However, most of these regulation is adopted on the east-west corridor of the city center, and no one-way regulation is given along the north-south corridors on such roads as Ohio street, Maktaba street, Morogoro road and Uhuru road. Lack of traffic regulation has incurred inflow of traffic from UWT road in haphazard manner.

With this consideration, it is urgent to formulate more systematic traffic management plan in the city center, reflecting actual traffic pattern of the area.

(2) Description of Plan

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.

East – West corridor

As studied in Ch. 8 existing 2-lane road would be widened to 4-lane with new access link to UWT road near present Dar es Salaam railway station. With this improvement works, combination of road network which consists of UWT road, Sokoine drive, and Ohio street will form circumferential road in the city center and will contribute to the reduction of through traffic along north-south corridors. With this background, 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

- One-way traffic regulation in Maktaba street

  In order to reduce traffic near the Askari Monument which is located in the junction of this road and Samora avenue, one-way traffic regulation which allows only north to south traffic will be proposed.

- One-way traffic regulation in Zanaki street and on Morogoro road

  Over capacity of present Morogoro road will be alleviated by combined one-way traffic regulation in these streets. North to south one-way system on Zanaki street will take care of outflow of traffic from Morogoro road in the city center. This system accompanies the improvement work of UWT–Zanaki intersection on the side of UWT road, which at present does not allow left-turn from Zanaki street. Morogoro road in the section in the city center will solely take care of inflow of traffic.

- One-way traffic regulation on Uhuru road

  Prohibition of inflow of traffic from outside of the city center on this road will promote detoured traffic on UWT road and Sokoine drive. Uhuru-UWT intersection, which also intersects with Jamhuri street, is to be improved in parallel.

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 formed by the combination of UWT road, improved Sokoine drive and widened Ohio street.

C. Restriction of Heavy Trucks

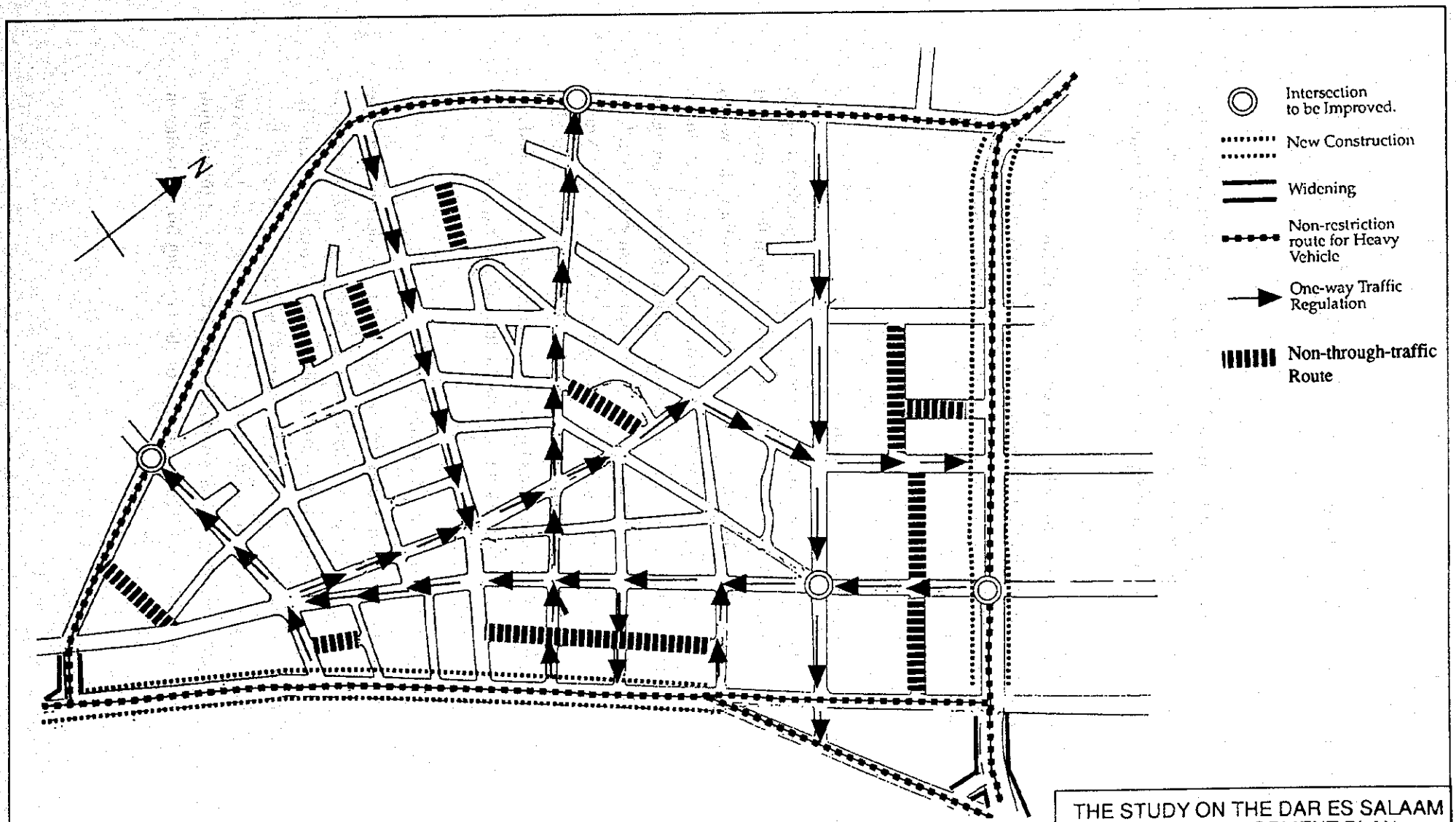
Passage of heavy trucks during the daytime should be totally banned in the streets in the city center except for circumferential road, which consists of UWT road, Sokoine drive and Ohio street. Truck terminal for distribution purpose and reloading to smaller truck is recommended to be constructed in a long term somewhere in suburban area.

D. Introduction of Non-through-traffic Routes

Concentration of traffic in the city center sometimes force the vehicles to pass through small isles in the area. Through traffic in urban communities is not only deteriorating living condition but also hindering urban activities there.

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 it is applied in combined manner with the above proposed measures including one-way traffic regulation. The candidate routes for this measure are shown in Fig. 10.3.

The above concept is illustrated in Fig. 10.3.



THE STUDY ON THE DAR ES SALAAM ROAD DEVELOPMENT PLAN

Fig. 10.3 Traffic Regulation Plan in City Center

10.2.3 Streamlining of Pedestrian Flow

(1) Background

Recent traffic increase on urban roads has invited deterioration of urban traffic condition for pedestrians and bicycle users and has brought about such negative impacts as deterioration of environment of surrounding areas.

Traffic management plans, which focuses on the improvement of traffic condition for pedestrians and non-motorized vehicles should be compiled in parallel. With this background, following development plans have been proposed in this section.

(2) Description of Plan

A. Introduction of Pedestrian Mall

Widening of Sokoine drive and one-way traffic regulation in urban streets would improve the pedestrian flow through the provision of pedestrian ways along these roadsides. These pedestrian ways would promote separation of movement of pedestrians from that of vehicles on the carriage ways. Construction of walking promenade along the Sokoine driving taking advantage of beautiful ocean view from there, and introduction of shopping mall along Samora avenue would enhance the comfortability and safety of the pedestrians. This kind of pedestrian management plan should be extended to ocean road and to seaside road in Msasani Peninsula in a long term. The above concept is illustrated in Fig. 10.4.

B. Provision of Pedestrian Crossing Bridges

This is a plan aimed at prevention of intrusion of pedestrians into the carriageway at the place where there exist a great number of road crossings. Although there exist many places of crossing in the city, however, the road section to be crossed by this measure must have more than four (4) lanes for technical reasons. Candidate location of this pedestrian bridge is shown in Fig. 10.4 with related information given in Table 10.3. The prototype of the crossing bridge is shown in Fig. 10.5.

Table 10.3 Proposed Location of Pedestrian Crossing Bridges

Location No.	Location	Road to be Crossed	Estimated No. of Traffic Crossing (day)	Expect Effect on Urban Development
PCB1	In front of Mnazi Mmoja	UWT Road	30,000	Strengthening of linkage between City Center and Kariakoo area
PCB2	1 km west of Pugu-Changombe intersection	Pugu Road	7,000	Integrated development of Buguruni and Changombe areas
PCB3	Western corner of Nelson Mandela - Pugu intersection	Pugu Road	10,000	Core development around Nelson Mandela - Pugu intersection areas
PCB4	2 km west of Nelson Mandela - Pugu intersection (Kiwalani area)	Pugu Road	20,000	Integrated development of Vingunguti and Kiwalani areas

C. Improvement of Roadside Pedestrian Way

This is a plan to provide roadside pedestrian walks along the major roads within the city. Provision of sidewalks would contribute to the reduction of traffic accidents which involve pedestrians as well as to the improvement of vehicle driving condition. 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 have well designed sidewalks in this context. These sidewalks would also provide easy access to the transit passengers at the places of bus transition proposed in Ch. 9. Proposed measures for pedestrian management in this section are shown in Fig. 10.4.

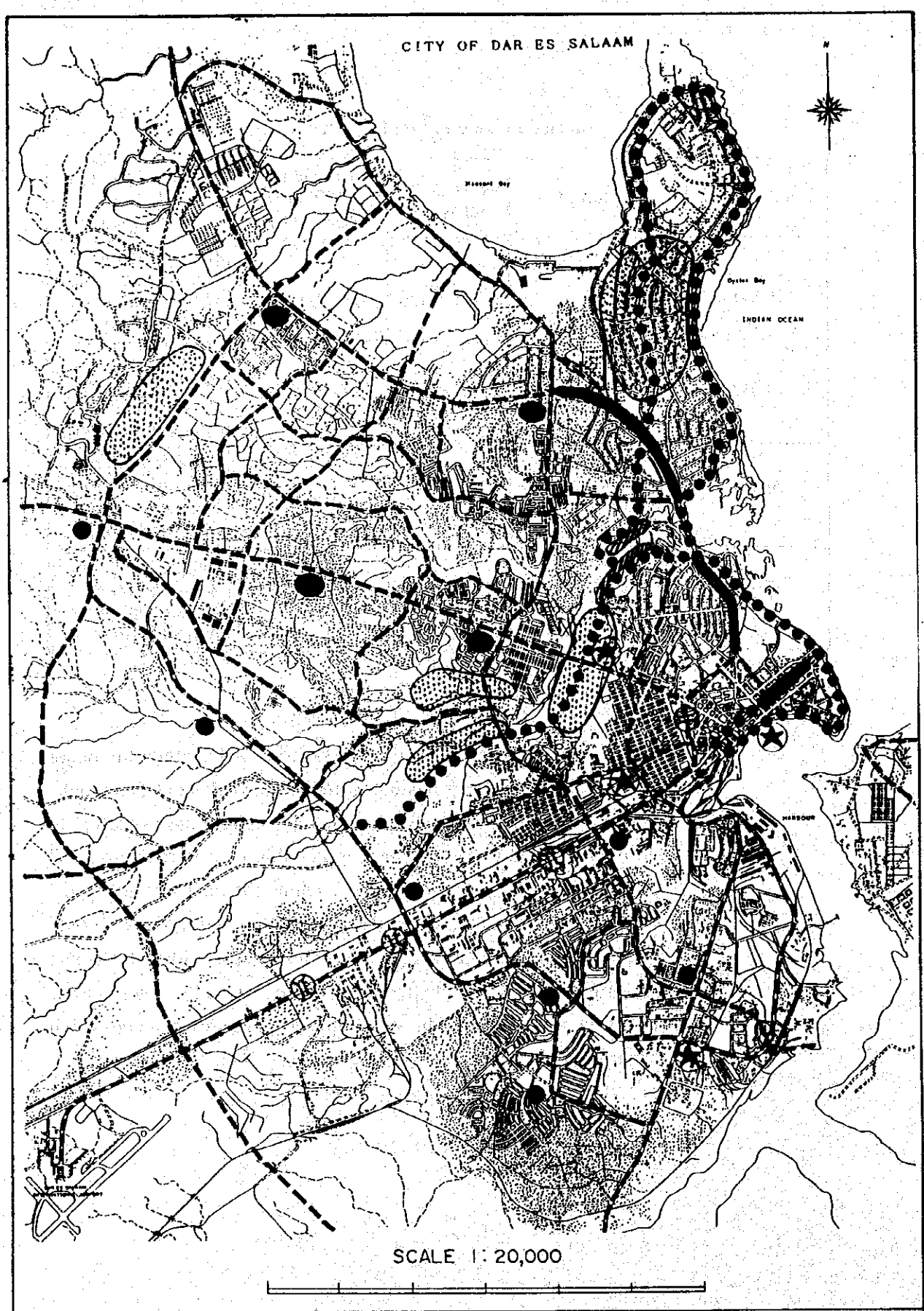


Fig.10.4 Concept of Pedestrian Management

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

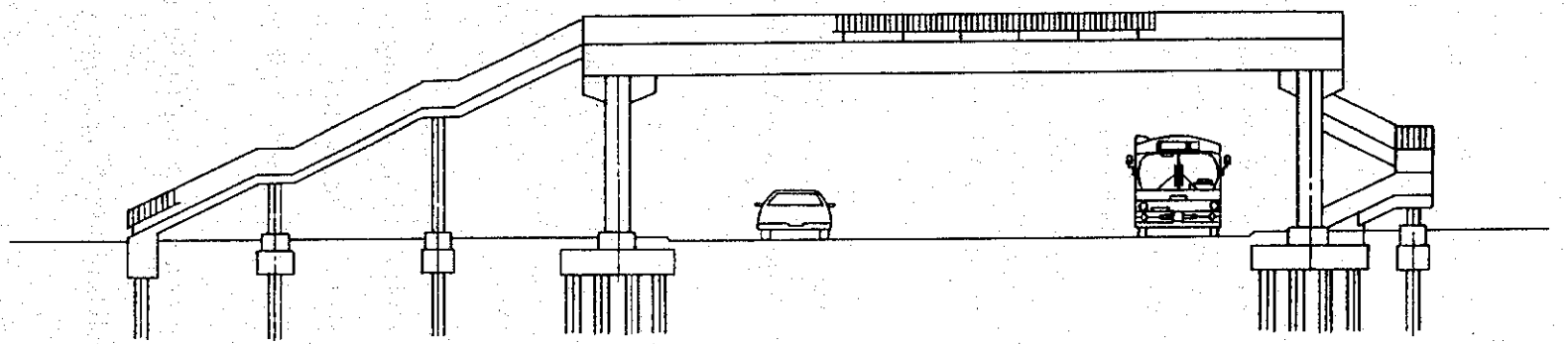


Fig. 10.5 Prototype of Pedestrian Crossing Bridge

10.2.4 Improvement of Bottleneck Points in Urban Traffic

(1) Background

Sharp concentration of traffic in the city center has in creationed bottleneck points in the city. These bottleneck points could be seen mostly at intersections of trunk roads.

Intersections in Dar es Salaam, except for newly improved ones by DRIMP and related projects, are poorly facilitated and traffic control there is inefficiently managed. There are some intersections which have no traffic signal where daily traffic is as large as 20,000. Most of the traffic signals are prone to malfunction and apt to stop during the power failure of the city as there in no special power supply system for these signals. Structure of intersections itself is poor with no markings of turning lanes and short storage length. Pedestrian crossing lanes are not clearly marked.

(2) Description of Plan

Based on the result of inventory survey of bottleneck points shown in Table 10.4, following classification of improvement works has been proposed:

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)

Classification of bottleneck points by the above category is given in Table 10.5.

Table 10.4 (1/2) Inventory of Bottleneck Points

ID No. *	Name	Function			Degree of Saturation	Traffic Congestion	Traffic Accident	Others	Remarks
		Signal	No. of Lanes	Type of Intersection					
1	Samora + Maktaba	Not provided	2 x 2	• Roundabout • Type A	0.72	○	○	• N.P.	• Parking
2	Samora + Pamba	Not provided	2 x 2	• Grade crossing • Type A		○	○	• N.P.	Small capacity
3	Samora + Morogoro	Outdated	2 x 2	• Grade crossing • Type A		○	○	• N.P.	• Parking
4	Nkurumah (Samora) + Uhuru	Not provided	2 x 2	• Roundabout • Type A		○	○	• N.P.	• Improvement (Urgent) • parking
5	Jamhuri + Morogoro	Outdated	2 x 2	• Grade crossing • Type A		○			
6	UWT + Maktaba	Provided	4 x 2	• Grade crossing • Type B		○			
7	UWT + Zanaki	Not provided	4 x 2	• Grade crossing • Type B				• N.P.	• Newly created bottleneck due to closure of Upanga road
8	UWT + Morogoro	Provided	4 x 4 (CBD side 4 x 2)	• Grade crossing • Type A		○	○	• N.P.	• Right turn from UWT road is not allowed
9	UWT + Uhuru	Outdated	4 x 2	• Grade crossing • Type A		○	○	• N.P.	• Newly improved
10	UWT + Lumumba	Outdated	4 x 2	• Grade crossing • Type C	0.80			• N.P. • Channelization	• Poor structure
11	Ocean + Mwinyi	Provided	2 x 4	• Grade crossing • Type B		○	○	• N.P.	• Newly installed by DRIMP

* Location of bottleneck points is given in Fig. 10.6.

Table 10.4 (2/2) Inventory of Bottleneck Points

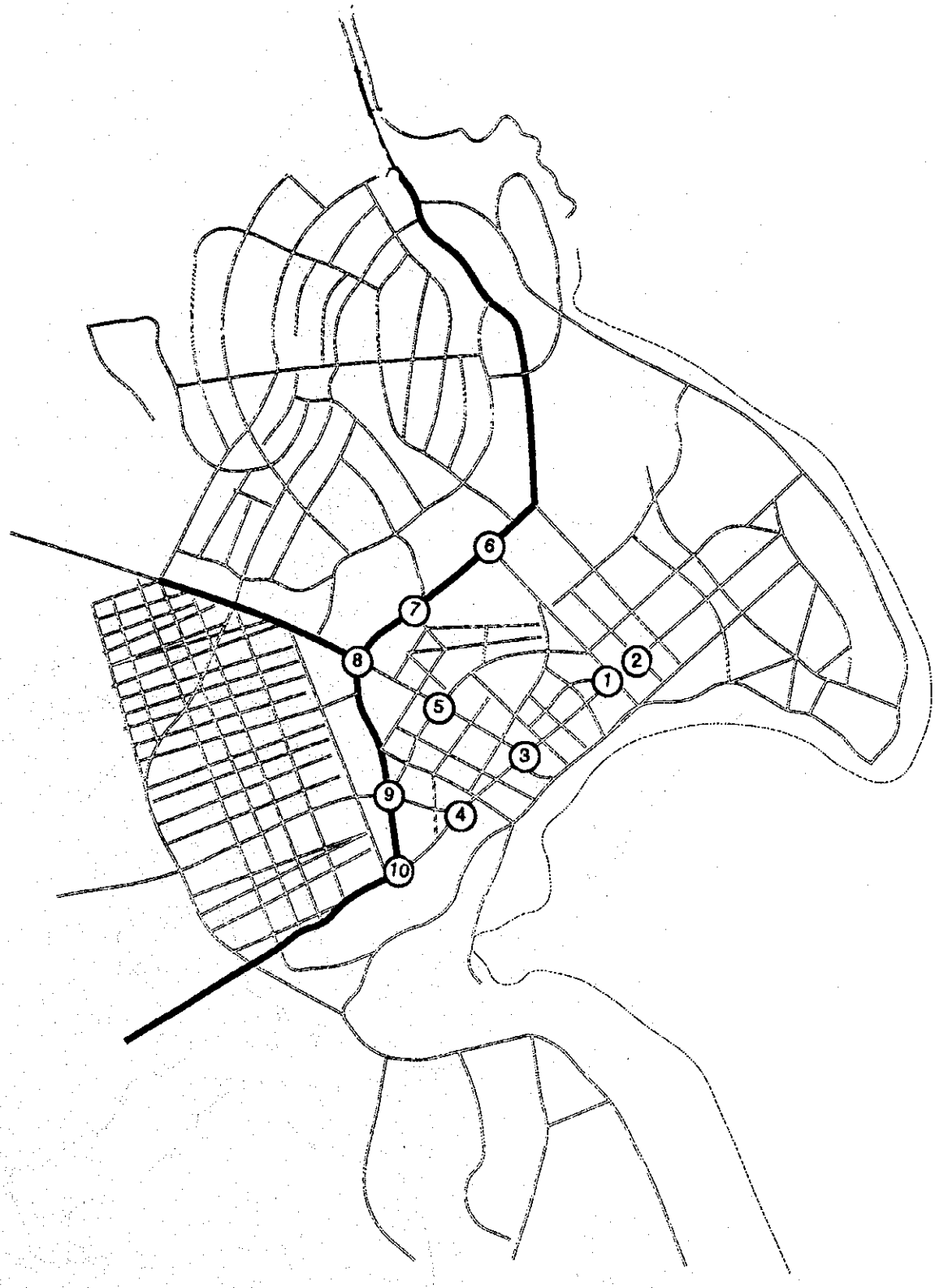
ID No. *	Name	Function			Degree of Saturation	Traffic Congestion	Traffic Accident	Others	Remarks
		Signal	No. of Lanes	Type of Intersection					
12	United Nation + Mwinyi	Provided	2 x 4	• Grade crossing • Type B		○			• Newly installed by DRIMP
13	Mwinyi + Kinondoni Kenyatta	Provided	4 x 2	• Grade crossing • Type A		○		• N.P.	• Newly installed by DRIMP
14	United Nation + Morogoro	Provided	2 x 4	Grade crossing • Type A		○	○	• N.P.	• Newly improved
15	Msimbazi + Uhuru	Outdated	2 x 2	Grade crossing • Type A		○			
16	Uhuru + Nelson Mandela	Outdated	2 x 4	Grade crossing • Type B		○	○	• N.P.	Old signal
17	Pugu + Nelson Mandela	Provided (prone to stop)	4 x 4	Grade crossing • Type A	0.77	○	○	• N.P. • Channelization	Poor structure (Urgent)
18	Changombe + Nelson Mandela	Outdated	2 x 4	Grade crossing • Type B				• N.P.	

Type A : 

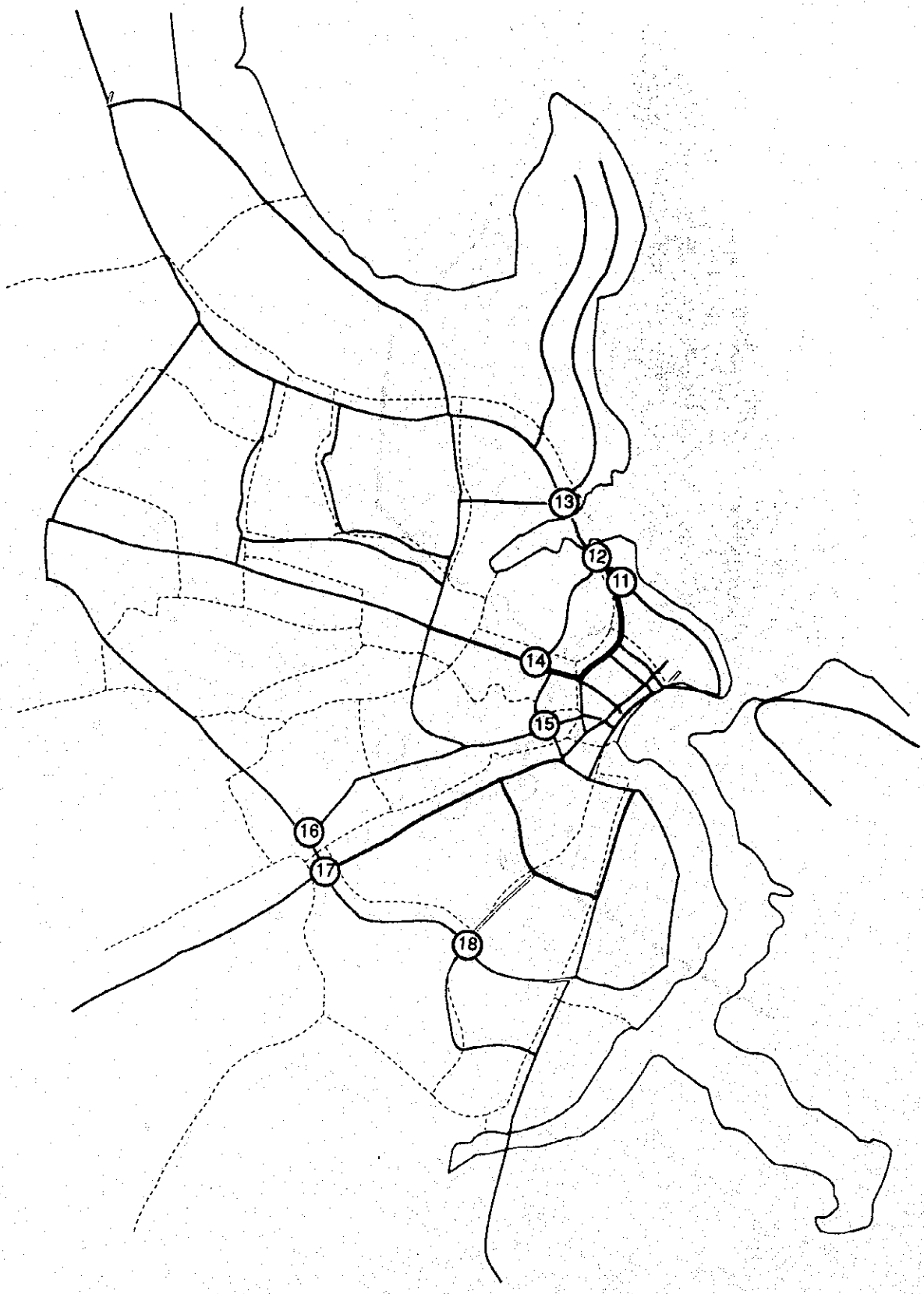
Type B : 

Type C : Others

N.P.: No pedestrian crossing



THE STUDY ON THE DAR ES SALAAM ROAD DEVELOPMENT PLAN	Fig. 10.6 Location of Bottleneck Points – City Center and Its Nearby Area –



THE STUDY ON THE DAR ES SALAAM ROAD DEVELOPMENT PLAN

Fig. 10.6 Location of Bottleneck Points (Cont'd)
– Urban Area –

Table 10.5 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

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 the City Center	:	-
• Streamlining 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
Total		17,215

10.4 Formulation of Traffic Management Master Plan

Traffic management plans proposed in this Chapter will work more efficiently with the simultaneous implementation of institutional/legislative measures of traffic management along with the road and public transport development plans proposed in Ch. 8 and 9. It is recommended that all the improvement projects of present bottleneck points are implemented in the short-term plan as the issues are urgent.

Regarding public parking garage construction projects, construction at site 1: Existing Kisutu Long-distance Bus Terminal, should be implemented in the short term as the model case of this project. As to pedestrian management plan pedestrian mall in Sokoine Drive and two of the pedestrian bridges, one is over the UWT road (PCB1) and the other over the Uhuru road near Kiwalani area (PCB4), are recommended to be implemented in the short-term plan. Therefore, the project costs by term of planning are estimated as below:

Unit: Million Tsh.

		Short-term	Long-term
• Reduction of Roadside Parking	:	3,000	9,000
• Traffic Regulation in the City Center	:	-	-
• Streamlining of Pedestrian Flow	:	263	4,725
• Improvement of Bottleneck Points	:	227	-
Total	:	3,490	13,725

CHAPTER 11 SHORT-TERM DEVELOPMENT PLAN AND IMPLEMENTATION SCHEDULE

CHAPTER 11 SHORT-TERM DEVELOPMENT PLAN AND IMPLEMENTATION SCHEDULE

11.1 Short-term Development Plan

The Master Plan Study for the year 2010 was categorized into three parts, namely the road development plan, public transport plan and traffic management plan The results of the study are presented in Chapters 8, 9 and 10.

On the basis of the Master Plan Study, a short-term development plan was established. The basic outlook for formulating the short-term development plan was to consider a minimum level of improvement of the transportation infrastructure and traffic management measures so as to extract maximum services from the existing facilities as stated in Chapter 6 of this report. In addition, when formulating the short-term development plan consideration was given to improve transport services for the public and traffic safety. As a result, the following major criteria were introduced for a confirmation of urgency of proposed projects in the short-term development plan:

(1) Improvement of bottlenecks on urban roads
(2) Improvement of the transportation poor

11.1.1 Short-term Road Development Plan

The Study Team formulated the short-term road development plan (for the period 1995 - 1999) on the basis of the road master plan established in Chapter 8.

The recommended road network to be implemented in the short-term is shown in Fig. 11.1, with the concept of road development in the short-term plan described below:

(1) Widening of Arterial Roads in the City Center for the Formation of Inner Ring Road

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 for the year 2000 focusing into the city center, it will be necessary to enlarge the traffic capacity of the arterial roads in the city center in conjunction with the measures for strengthening the public transport facilities and traffic management. In this regard, it is recommended to widen Ohio Street, Kivukoni Front Road, Sokoine Drive and Gerezani Street from 2 to 4-lanes road.

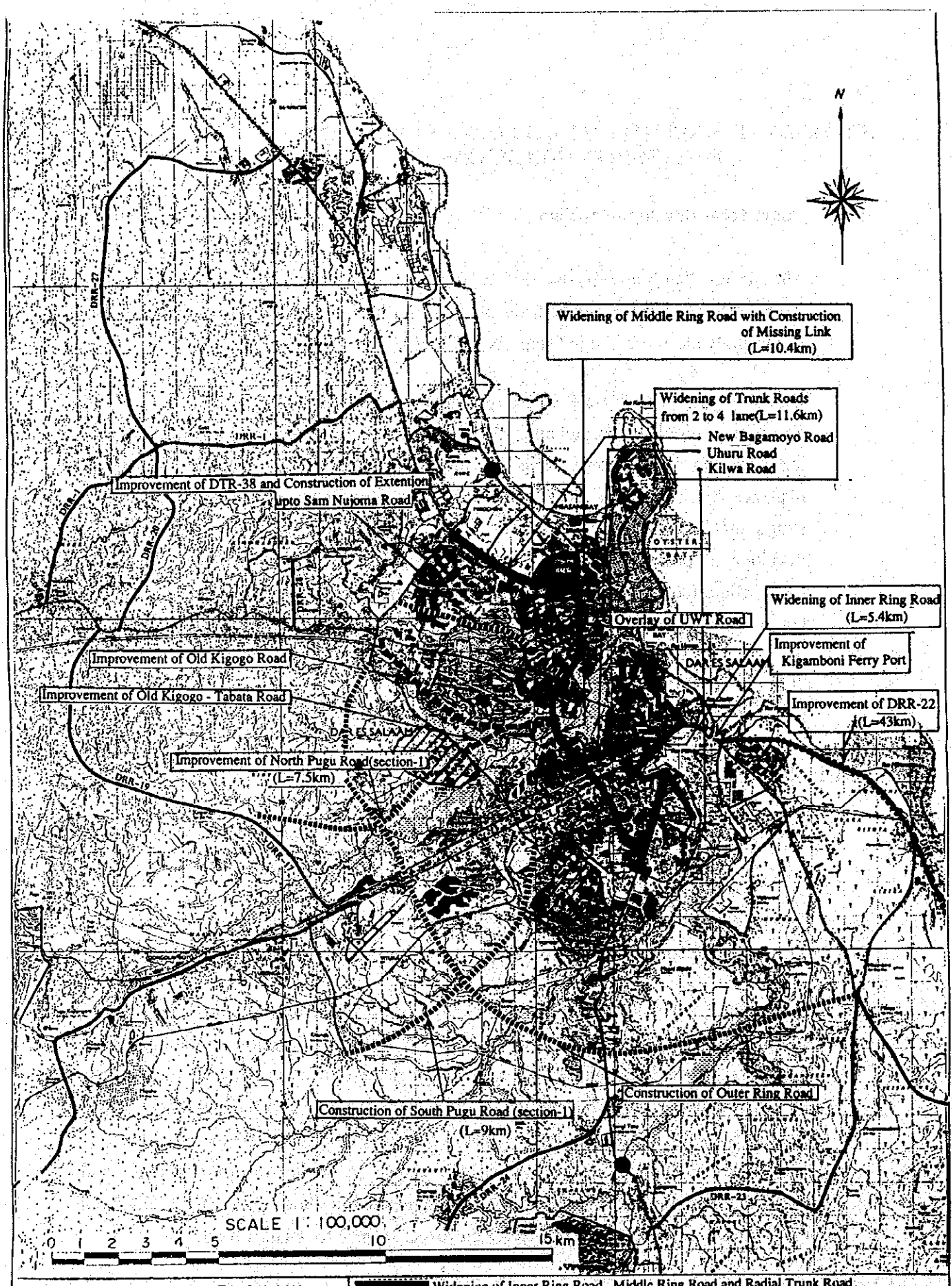


Fig.11.1 Short Term Road Development Projects

The 4-lane Inner Ring Road that will surround the city center by connection with UWT road and Pugu road as shown in Fig. 11.1.

Proposed measures to be taken for the Inner Ring Road with some access road (total length: 5.43 km) in short-term are summarized below:

- Widening of Ohio Street from 2 to 4 lanes (L = 0.96 km)
- Widening of Sokoine Drive from 2 to 4 lane (L = 0.67 km)
- Widening of Gerezani Road from 2 to 4 lane (L = 1.40 km)
- Widening of Bandari Road from 2 to 4 lane (L = 2.00 km)
- Widening of Kivukoni Front Road from 2 to 4 lane (L = 0.40 km)
- Reconstruction of City Bus Terminal located in front of Central Post Office
- Construction of a 4-lane bridge for replacement of the deteriorated 2-lane bridge on Bandari road which passes over the railway line

(total length of widening section: 5.43 km)

(2) Widening of Middle Ring Road including Construction of Missing Link

The Middle Ring Road including construction of Missing Link, forming the major trunk road network in the city, will play an important role to streamline urban traffic by reducing the concentration of traffic in the central area as well as to establish a public transport network by connecting the proposed bus stations in each sub-center that will be built at all important intersections with radial trunk roads.

According to the result of the traffic demand forecast, the anticipated traffic volume on the Middle Ring Road is estimated to be more than 30,000 ADT by the year 2000 and this will exceed the existing traffic capacity of the existing 2-lane roads.

The proposed start-term measures to be taken for the Middle Ring Road (total length: 10.35 km) are shown in Fig. 11.1 and summarized below:

- Widening of Morocco Road from 2 to 4 lanes (L = 4.00 km)
- Widening of New Kigogo Road from 2 to 4 lanes (L = 2.80 km)
- Widening of Chang'ombe Road from 2 to 4 lanes (L = 2.80 km)
- Construction of Missing Link between New Kigogo and Chang'ombe Road with 4 lanes (L = 0.75 km)
- Construction of bus stations at all important intersections with the radial trunk roads

(total length of dual carriage way: 10.35 km)

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

In order to establish the basic frame of the urban road network in DSM as well as to cope up with the anticipated traffic demand in the year 2000, it is recommended to widen major trunk roads from 2 to 4 lanes within the short-term.

The proposed sections for widening (total length: 11.6 km) are presented in Fig. 11.1 and summarized below:

- Widening of New Bagamoyo Road from Morocco Road junction to Sam Nujoma Road junction (L = 4.40 km)
- Widening of Uhuru Road from Msimbazi Road up to the 4-lane section of Uhuru Road (L = 4.00 km)
- Widening of Kilwa Road from Gerezani road to Nelson Mandela Road (L = 3.20 km)

(Total length of widening: 11.6 km)

(4) Strengthening of Road Network in Kigamboni

Kigamboni is a viable alternative for the development of residential, industrial and commercial facilities in Dar es Salaam from the viewpoint of its geographical proximity to the city center for the long term target. In order to stimulate development of the Kigamboni area, construction of a permanent crossing facility across the harbor is an essential measure for long-term development. However, for the short-term plan the following measures are recommended to enhance the Kigamboni area as well as for the planned tourist facilities located about 30 km to the south:

- Improvement of Kigamboni Ferry Port
- Improvement and Rehabilitation of DRR-22 from Kigamboni to Mjimwema (L=43.0 km)

(5) Construction of Outer Rig Road

In Dar es Salaam, urbanization is rapidly proceeding in the western are a along Pugu Road and in the southern parts of the urban fringe. To enhance urban development and also to prevent disordered urban sprawl, the Outer Ring Road is to function as a major distributor by connecting with radial road network as well as a road for stimulation of the Tabata, Yumbo and Kigamboni suburbs in the short-term plan.

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

(6) Strengthening of Road Network along Pugu Road

A tendency of urban expansion is and will proceed along Pugu Road following the regional development plan proposed in the future Land-use Plan of this report. To promote well-ordered regional development as well as to provide an efficient public transportation network to the newly developed area, it is recommended to strengthen the road network along Pugu Road by construction of ladder step roads (total length 16.5 km) as shown below:

- Improvement of North Pugu Road (DTR-17) from Nelson Mandela Road up to DRR-19 Road (2-lane, L = 7.5 km)
- Construction of South Pugu Road from Nelson Mandela Road up to 9 km in length (2-lane, L = 9.0 km)

Total length = 16.5 km

(7) Construction and Improvement of Road Network inside Nelson Mandela Road

Road density in the existing urban area between Nelson Mandela Road and Middle Ring Road is extremely low due to a lack of collector roads. To facilitate an anticipated traffic demand and to improve the existing accessibility for public transport services into the area, it is recommended to strengthen the following collector and trunk roads to provide a road network system for the area in the short-term:

- Overlay of UWT Road (4 -lane, L = 2.0 km)
- Overlay of Existing 4-lane Section of Uhuru Road (4-lane, L = 1.2 km)
- Improvement of Old Kigogo Road (2-lane, L = 6.5 km)
- Improvement of Old Kigogo - Tabata Road (2-lane, L = 1.5 km)
- Improvement of DTR-38 and Construction of Extension to Sam Nujoma Road (2-lane, L = 6.1 km)

(Total length = 17.3 km)

(8) Rehabilitation of Pavement for Local Roads

Local roads are still remained as they are seriously damaged and deteriorated. Since local roads have directly effected on the daily life of people, improvement of these roads are essential. The following local roads should be rehabilitated as a part of the short-term development plan:

(2 lanes, Total L = 59.8 km)

- Local Roads in Temeke Area (13.9 km)
- Local Roads in Ilala Area (10.3 km)
- Local Roads in Tabata Area (9.2 km)
- Local Roads in Sinza Area (9.2 km)
- Local roads in Mwinjuma areas (17.2 km)

(9) Reconstruction of Bridges on Trunk Roads

Existing bridges on trunk roads are generally narrow and outdated which could require either rehabilitation or reconstruction. From the view point of traffic safety, existing bridges on trunk roads are recommended to be rehabilitated or replaced in the short-term, except the bridges which are located within the sections proposed for widening. Improvement of these bridges should be implemented within the projects of proposed widening.

- Bridges to be reconstructed on Trunk Roads (7 Nos. to talling 185 m)

(10) Improvement of Trunk and District Roads in Rural Areas

Most roads in rural areas are narrow and have a poor surface condition consisting of gravel and earth.

Improvement of these roads by asphalt sealing, additionally drainage and better alignment is recommended for the following regional road in short-term:

Improvement and Rehabilitation of New Bagamoyo Road (DTR-5) beyond Wazo Hill (2 lane, L = 20.5 km)

11.1.2 Short-term Public Transport Development Plan

Regarding the short-term development plan for public transport, the following plans as identified in Chapter 9 should be implemented for an early solution of existing public transport:

a) Construction of West-bound Long-distance Bus Terminal
b) Shuttle Bus Operation (West Bound Long-distance Bus Terminal)
c) Strengthening of Junctional Function (Major and Small Bus Terminal)
d) Construction of two (2) City Bus Terminals (Sokoine Drive and Kariakoo)
e) Construction of Local Bus Stations (Roadside Type and Terminal Type)

11.1.3 Short-term Traffic Management Development Plan

Regarding the proposed traffic management plan, most of it is recommended to be implemented in the short-term for the realization of streamlined urban traffic, the reduction of traffic congestion and accidents. The proposed plans to be implemented in the short-term are as follows:

a) Construction of Public Parking Building (1 No.)
b) Traffic Regulations for the City Center
c) Streamlining of Pedestrian Flow
   - Introduction of Pedestrian Mall
   - Construction of Two Pedestrian Bridges
d) Improvement of Bottleneck Points
   - Traffic Signals
   - Pedestrian Signals
   - Improvement of Rotary Intersections
   - Major Improvement of At-grade Intersections
   - Minor Improvement of At-grade Intersections

11.2 Implementation Schedule

A implementation schedule has been prepared on the basis of the short-term and long-term development strategies proposed in the previous section. The schedule has been prepared in line with the transport development strategy established in Chapter 6 as summarized in Table 11.1 and illustrated in Fig. 11.1 and Fig. 11.2.

11.2.1 Implementation Schedule for Short-term Development Plan

The implementation schedule for the short-term development plan was prepared by the Study Team taking into account the following factors:

1) Time requirement for subsequent services including feasibility study and detailed design required for implementation of the project.

2) Necessary arrangement for land/house acquisition and compensation to be performed by the Government of Tanzania.

3) Balance of the disbursement schedule of funds required for implementation of the projects.

The period for the short-term development plan is proposed starting from 1995 up to 1999 for the purpose of the implementation schedule.

A summary of the short-term implementation schedule for the development of roads, public transport and traffic management is presented in Table 11.2 as an investment program.