

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
MINISTRY OF WORKS, TRANSPORT AND COMMUNICATIONS  
THE REPUBLIC OF UGANDA

**THE FEASIBILITY STUDY  
OF  
IMPROVEMENT OF TRUNK ROAD  
AT  
KAMPALA URBAN INTERFACE SECTIONS**

**FINAL REPORT**

SUMMARY

NOVEMBER 1997

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## PREFACE

In response to a request from the Government of the Republic of Uganda, the Government of Japan decided to conduct a Feasibility Study of Improvement of Trunk Road at Kampala Urban Interface Sections and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Uganda a study team headed by Mr. K. Matsuda, Nippon Koei Co., Ltd., three times between January 1997 and October 1997.

The team held discussions with the officials concerned of the Government of Uganda , and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincerely appreciation to the officials concerned of the Government of the Republic of Uganda for their close cooperation extended to the team.

November, 1997



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Kimio Fujita  
President  
Japan International Cooperation Agency



1140881 [2]

November, 1997

Mr. Kimio Fujita  
President  
Japan International Cooperation Agency  
Tokyo, Japan

Letter of Transmittal

Dear Sir,

We are pleased to submit to you the report on the Feasibility Study of Improvement of Trunk Road at Kampala Urban Interface Sections. The report contains the advice and suggestions of the authorities concerned of the Government of Japan and your agency as well as the comments made by the authorities concerned in the Republic of Uganda. The report consists of a main report, an executive summary and a drawing volume.

The report contains a Master Plan and a Feasibility Study parts. The master plan proposes the road development strategies towards 2015 and high priority road developments projects to be implemented by 2015. The subsequent feasibility study on high priority road development projects concludes that the proposed projects will be technical and economically feasible and will be acceptable from the environmental aspects, and will contribute to the improvement of urban traffic situation in the city of Kampala.

We wish to take this opportunity to express our sincere gratitude to your agency, the Ministry of Foreign Affairs, the Ministry of Construction and the Japan Highway Public Corporation. We also wish to express our deep gratitude to the Government agencies concerned in the Republic of Uganda for the close cooperation and assistance extended to us during our study. We hope this report will contribute to the development of the Republic of Uganda.

Very truly yours,

*K. Matsuda*

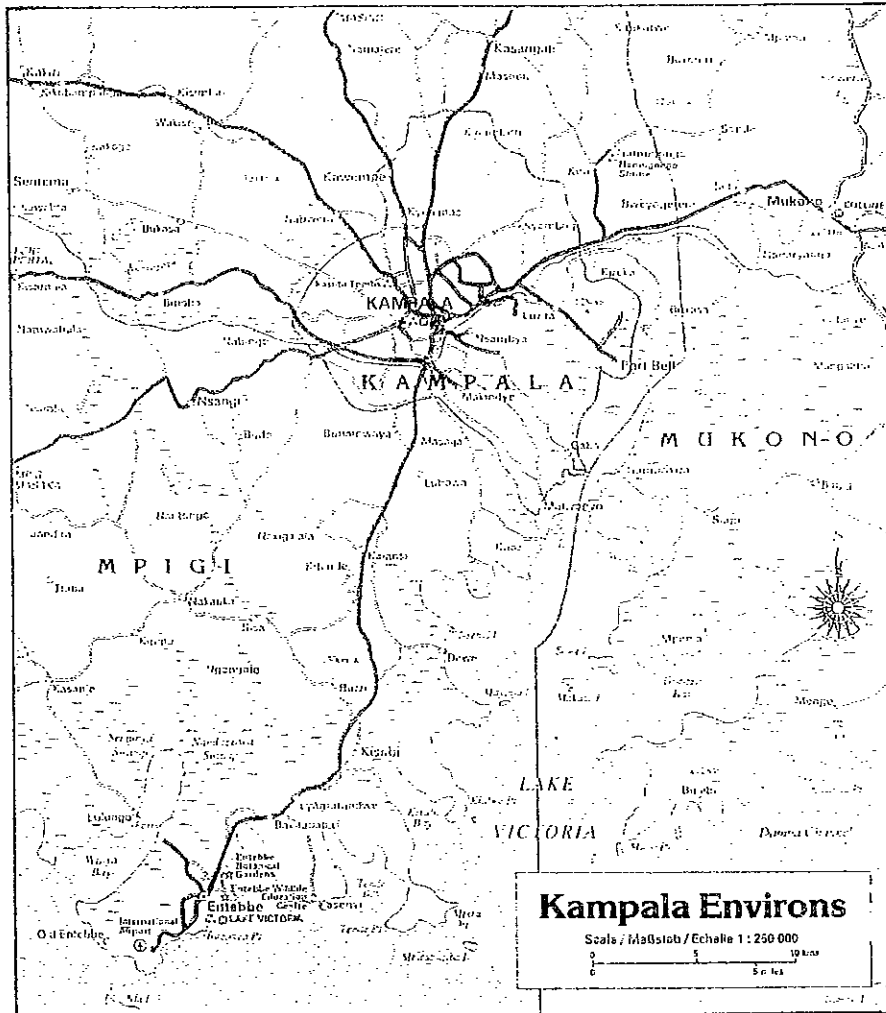
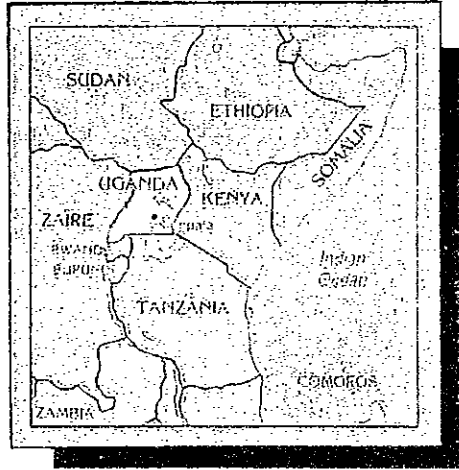
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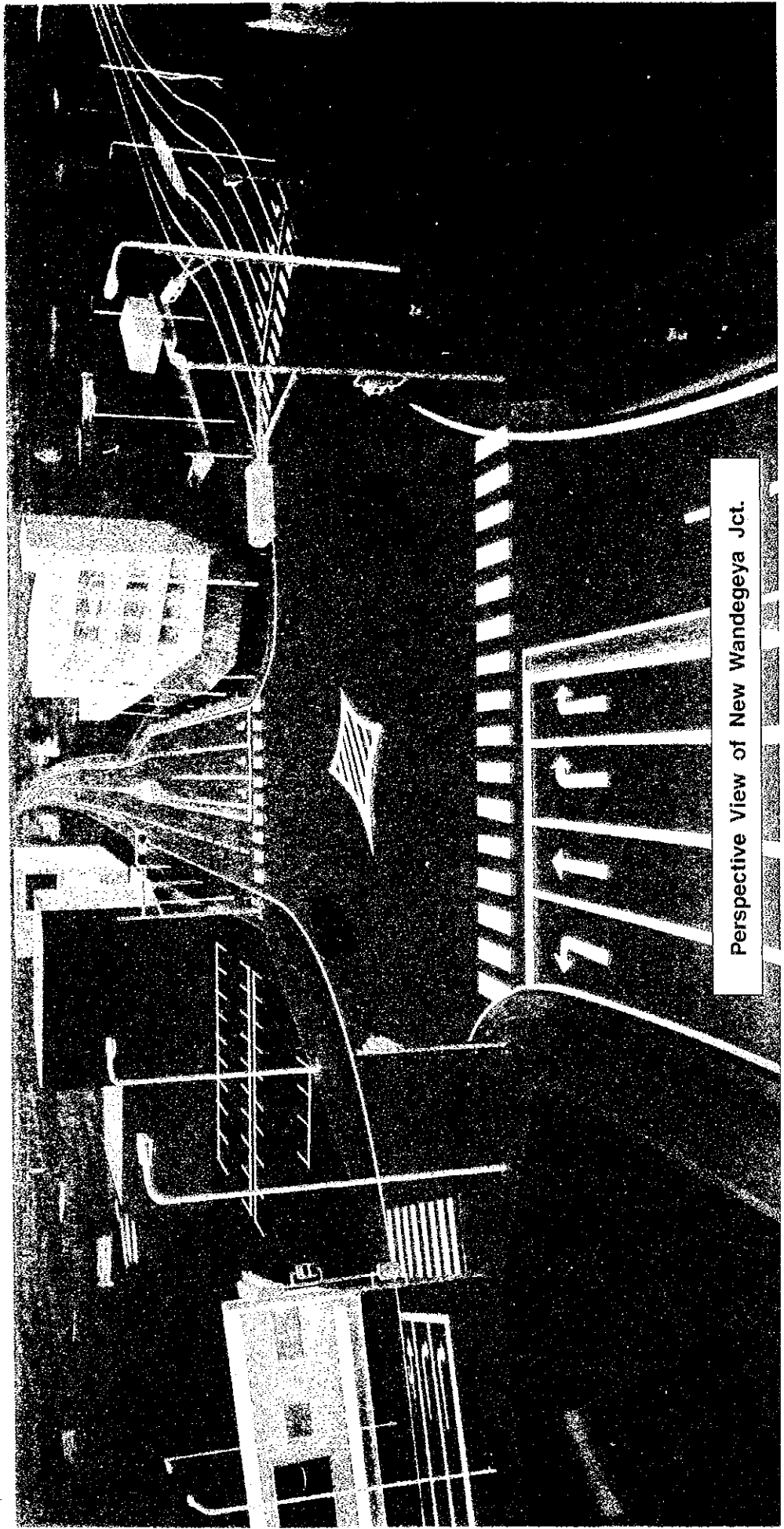
Katsuyoshi Matsuda  
Team Leader  
The Feasibility Study of Improvement  
of Trunk Road at Kampala Urban  
Interface Sections



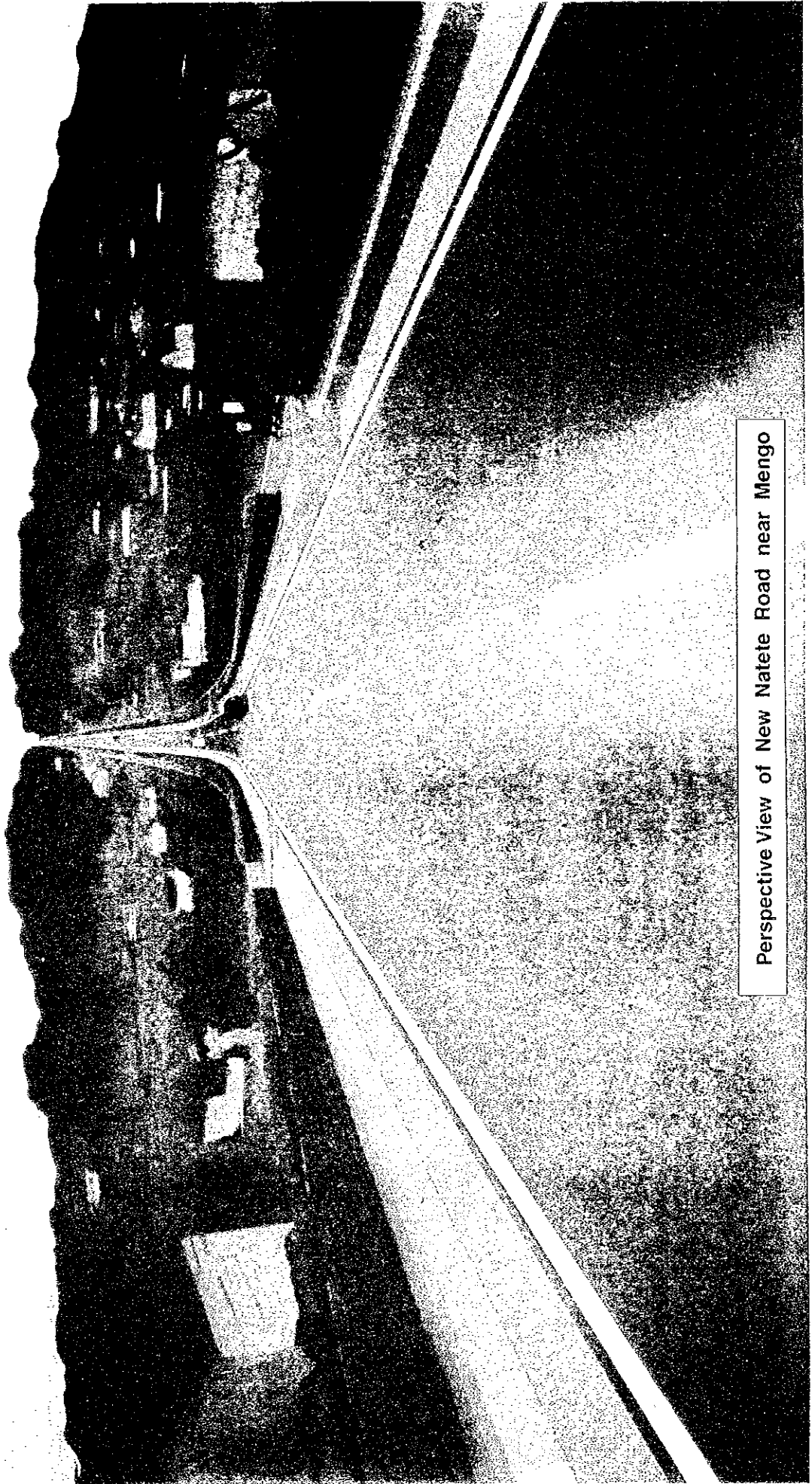


# LOCATION MAP





Perspective View of New Wandegeya Jct.



Perspective View of New Natete Road near Mengo



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## **CONCLUSION AND RECOMMENDATION**

The following are the conclusion and recommendations made by the Study Team on the basis of the results of the Master Plan Study and the Feasibility Study for the Improvement of Trunk Road at Kampala Urban Interface Sections.

### **PART A: MASTER PLAN STUDY**

#### **A-1 Road Development Master Plan**

The Study Team concluded that the Road Development Master Plan as shown in Fig. A.1 should be completed by the year 2015 from the viewpoint of urban development, socio-economy and policy of the Ugandan Government.

The Road Development Master Plan has been established taking into consideration the following Road Development Concepts and Road Development Strategies shown in Table A. 1:

##### Development Concept 1: Road Development to Enhance the Urban Traffic Efficiency

- Eradication of bottleneck points in urban traffic
- Enhancement of road function of major roads via widening and rehabilitation
- Introduction of road links to divert traffic concentration in the city centre

##### Development Concept 2: Road Development to Enhance Road Amenity

- Enhancement of road safety level
- Improvement of roadside environment

#### **A-2 Short Term Development Plan**

The Study Team concluded that some of the high priority projects which constitute the Master Plan should be implemented by the year 2005. The basic concept behind the selection of the high priority projects was that of "cost efficiency."

#### **A-3 High Priority Projects as the Object of Feasibility Study**

The Study Team selected the high priority projects shown in Fig.A. 2 as the object of the Feasibility Study. The criteria introduced for the selection of the projects are as the follow:

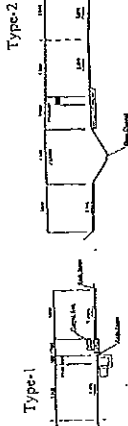
- (1) Engineering View Point

Table A.1 Road Development Strategies

Planning Horizon	Target of Development	Management Measure			Physical/Infrastructural Measure
		Legal/Administrative Measure	Institutional Measure	Facility Improvement	
Short Term	- Improvement of Bottleneck Points	- Strict enforcement of traffic law	- Enhancement of road maintenance capacity	- Installation of traffic signals	- Improvement of intersection geometry
	- Enhancement of Road Safety Level	- Control on roadside parking	- Enforcement of traffic education	- Provision of signs, markings, guardrails	- Improvement of sidewalks
	- Protection of Roadside Environment	- Introduction of one way traffic regulation	- Introduction of car inspection system	- Designation of pedestrian crossing points	- Improvement of drainage system
	- Upgrade of Linehaul			- Installation of bus bays	- Raising of carriage ways
Long Term	- Upgrade of Linehaul	- Route regulation for heavy vehicles	- Establishment of self-sustaining road management system	- Introduction of cycling routes	- Rehabilitation/reconstruction of urban corridor (north-south, east-west)
	- Improvement of Road Facilities	- Strict enforcement of zoning system	- Functional specification of roads	- Introduction of coordinated signals	- Rehabilitation/reconstruction of urban artery (radial roads)
	- Diversion of Traffic from City Centre				- Introduction of bypass roads



Typical Cross Section



**THE FEASIBILITY STUDY OF IMPROVEMENT OF TRUNK ROAD AT KAMPALA URBAN INTERFACE SECTION**

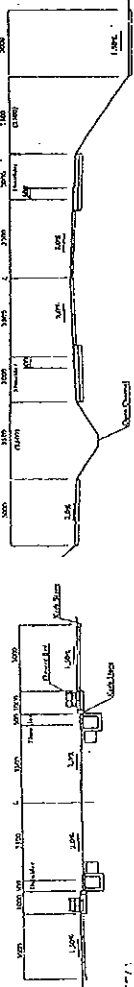
**Fig. A.1 Road Development Master Plan**

LEGEND	
	Reconstruction Type 1
	Reconstruction Type 2
	Overlay Type 1
	Overlay Type 2
	Proposed bypass
	Inner Circular Rd
	Toll-free rbt
	Bottomless Flood

# Typical Cross Section Unit: m.

Type-2

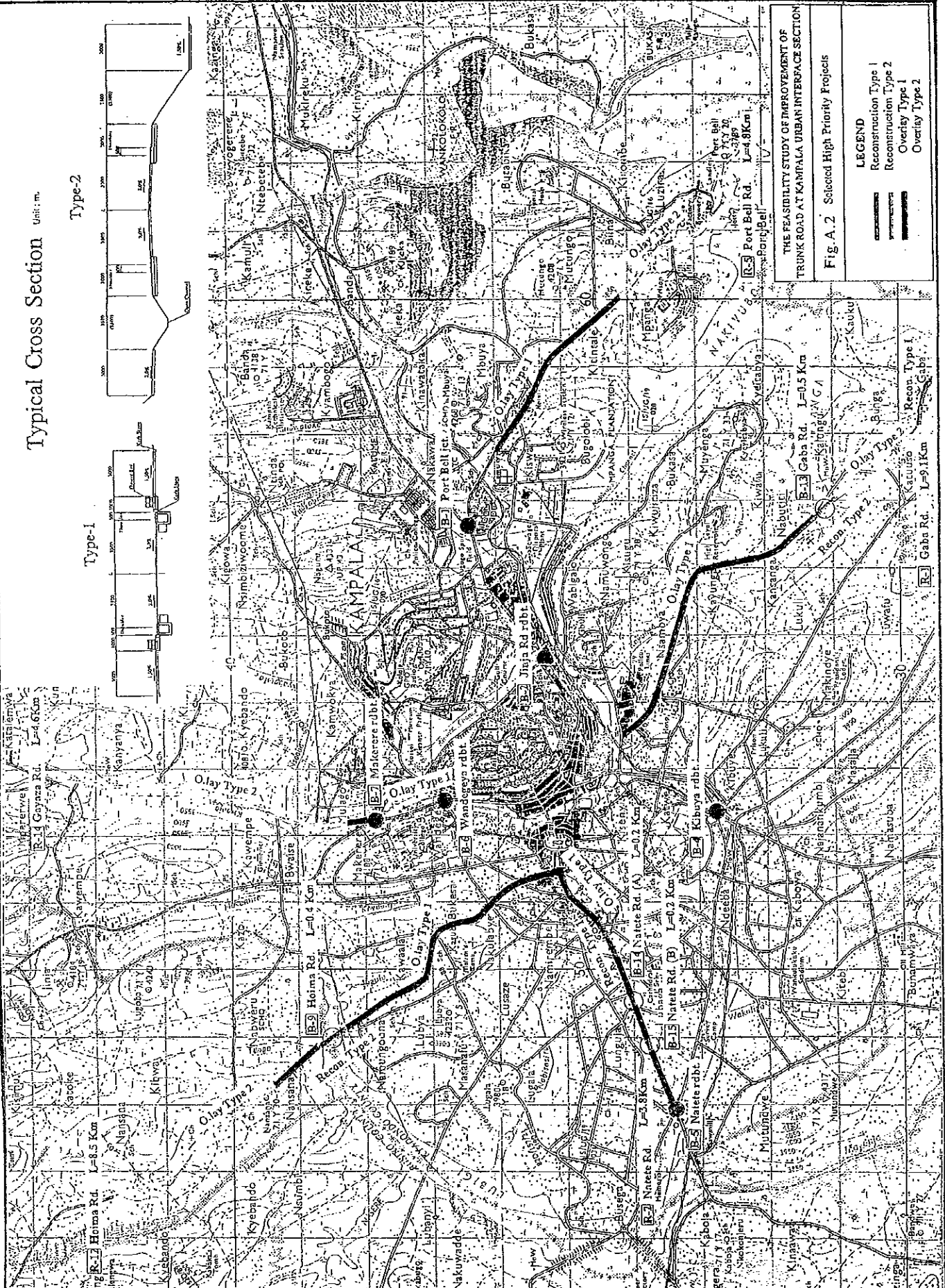
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**THE FEASIBILITY STUDY OF IMPROVEMENT OF TRUNK ROAD AT KAMPALA URBAN INTERFACE SECTION**

**Fig. A. 2 Selected High Priority Projects**

LEGEND	
	Reconstruction Type 1
	Reconstruction Type 2
	Overlay Type 1
	Overlay Type 2



- Deterioration Level of Pavement
- Future Traffic Volume
- Deterioration Level of Drainage

(2) Socio-economic View Points

- Function of Road
- Land Use Pattern

(3) Satisfaction of Basic Human Need

(4) Development Policy of Uganda

**A-4 Required Costs and Investment Schedule**

The total costs required for the implementation of the projects proposed in the Master Plan was estimated to be Ushs.1,709 million which is equivalent to 12.5 billion Japanese Yen. The investment schedules for the short term and long term plans are shown in Table A.2 and A.3 respectively.

**PART B: FEASIBILITY STUDY**

The Study Team concluded that the projects shown in Table B.1 should be implemented by the year 2005 from the view points of engineering, economic and environment and the policy of the Ugandan Government.

**B-1 The Results of Environmental Assessment**

The implementation of the high priority projects is expected to bring about beneficial changes for the society, economy and environment as described below:

(1) Prevention of Air Pollution

The level of air pollution which has been caused by the congestion of traffic at the critical section of roads and intersection will be reduced greatly due to streamlined traffic flow realized by the Projects.

(2) Elimination of Flood Hazard

Overflow of water on the roads has been observed in many places in Kampala due to damaged road surface and insufficient drainage conditions. This flooding will be eliminated by improvement of the road pavement and roadside drainage in the course of the project implementation.

Table A.2 Proposed Cost Disbursement Schedule (Short-term)

Unit: Ushs. million  
(Unit: Yen, million)

Package	Project Component	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year
		1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005
Package I	(a) Port Bell/Jinja Road Junction							
	(b) Kibuye Junction							
	(c) Natete Junction	5,132.8 (594.9)						
	(d) Wandegaya Junction							
	(e) Makerere Junction							
Package II	(f) Natete Road		14,952.5 (1,733.0)					
	(g) Gaba Road							
Package III	(h) Port Bell Road				5,522.1 (640.0)			
Package IV	(i) Gayaza Road					5,361.0 (644.5)		
Package V	(j) Hoima Road						11,540.7 (1,337.6)	
	(k) Jinja Junction							

Table A.3 Proposed Investment Schedule by Road Development (Long-term)

Unit: Ushs. million

Proposed Projects to be Implemented in the Long-term Plan	2005 - 2009		2010 - 2015	
	Investment Schedule			
	Pro. Cost	Land Acq.	Pro. Cost	Land Acq.
<b>[Improvement of Bottleneck]</b>				
Junction	Clock Tower Roundabout	1,107.1		
Flood Area:	Sentema Road Carriageway Raising	(1,141.9)		
	Bomba Road Carriageway Raising	(464.6)		
	Jinja Road (A) Carriageway Raising	(468.9)		
	Jinja Road (B) Carriageway Raising	(433.3)		
<b>[Reinforcement of Linehaul]</b>				
Regional	Sentema Road	4,927.8	(10.0)	
Artery:	Kira Road	10,462.8	(10.0)	
	Jinja-Kampala -Bomba Road	1,878.0		
	Butikiro-Kisenyi Road	1,476.1		
	Musaja-Alumbwa Road	370.1		
	Muwanga Road	444.1		
	Mengo-Kisenyi Road	518.1		
<b>[Reinforcement of Linehaul]</b>				
Inter-regional				
Artery:	Masaka Road	11,502.9		
	Bomba Road	6,637.3		
	Jinja Road	8,085.5		
	Entebbe Road	4,214.8		
<b>[Strengthening of Road Network]</b>				
Circular:	Inner Ring Road	9,111.1	(15.0)	
	Katwe Lubiri Ring Road		2,948.2	(23.0)
	Middle Ring Road (Kampala Bypass)		* -	-
Access:	Katwe Road		803.1	
	Motebi Road		296.1	
	Lubiri Ring-Queens way		222.0	
	Lubiri Ring-Masaka Road		148.0	
	Subtotal	60,735.7	(35.0)	4,417.4 (23.0)
<b>Total</b>		<b>Project Cost 65,153.2</b>		<b>Land Acq. Cost (58.0)</b>

\* Committed by EU

Table B.1 Project Description

Package	Project Components	Present Issues	Content of Improvement Work	Traffic (1997) (A.M. Peak Hour)	Area of the Project Site (sq. m)
I	Natete Junction	- Queuing - Intrusion of pedestrians	- Signalized junction - Turning lanes - Pedestrian crossing	3,902 (A.M. Peak Hour)	9,000 sq. m
	Makerere Junction	- Queuing - Traffic accident	- Signalized junction - Turning lanes - Pedestrian crossing	5,565 (A.M. Peak Hour)	6,300 sq. m
	Kibuye Junction	- Queuing - Pavement deterioration	- Improvement of geometry - Safety facilities	5,618 (A.M. Peak Hour)	8,200 sq. m
	Port Bell/ Jinja Road Junction	- Queuing - Traffic accident	- Improvement of geometry - Safety facilities - Pedestrian crossing	7,793 (A.M. Peak Hour)	5,800 sq. m
	Wandegeya Junction	- Queuing - Traffic accident - Instruction of pedestrian	- Signalized junction - Turning lanes - Safety facilities - Pedestrian crossing	8,679 (A.M. Peak Hour)	13,000 sq. m
II	Natete Road	- Narrow carriageway - Pavement deterioration - Poor drainage system - Lack of sidewalk	- Improvement of pavement - Widening of carriageway - Raising of carriageway (2 points) - Installation of sidewalks	8,500 ADT	3.8 km
	Gaba Road	- Narrow carriageway - Pavement deterioration - Poor drainage system	- Improvement of pavement - Widening of carriageway - Raising of carriageway (1 point) - Installation of sidewalks	11,600 ADT	9.1 km
III	Port Bell Road	- Pavement deterioration - Poor drainage system - Lack of sidewalk	- Improvement of pavement - Widening of carriageway - Installation of sidewalks	7,800 ADT	4.8 km
IV	Gayaza Road	- Narrow carriageway - Pavement deterioration - Poor drainage system - Lack of sidewalk	- Improvement of pavement - Widening of carriageway - Installation of sidewalks	15,700 ADT	4.6 km
V	Hoima Road	- Narrow carriageway - Pavement deterioration - Poor drainage system - Lack of sidewalk	- Improvement of pavement - Widening of carriageway - Raising of carriageway (1 point) - Installation of sidewalks	9,900 ADT	8.5 km
	Jinja Junction	- Queuing - Pavement deterioration - Traffic accident	- Improvement of geometry - Turning lanes - Safety facilities	9,802 (A.M. Peak Hour)	10,000 sq. m

### (3) Enhancement of Road Amenity and Traffic Safety Level

It is concluded that the roadside environment will be improved by the provision of trees, lighting and other ancillary facilities with the implementation of the Project. Furthermore, traffic accidents will be reduced by the provision of pedestrian way and road crossing facilities.

### (4) Minimization of Additional Land Acquisition and Relocation

The Project involves no additional land acquisition and relocation of resident as the project is being designed within the available right-of-ways. This will expedite the smooth implementation of the Project .

## **B-2 Results of Economic Evaluation**

It is concluded that each package of high priority projects would be technically and economically feasible with high values of evaluating indicators as shown below:

Table B.2 Summary of Economic Evaluation Results

Evaluation Indicator	Package-I	Package-II	Package-III	Package-IV	Package-V	Whole Project
1. B/C	1.50	1.20	1.02	1.24	1.35	1.26
2. NPV (Million Ushs.)	1,936	1,819	52	633	1,675	6,116
3. IRR (%)	19.6	15.1	12.3	15.8	17.0	16.1

Remarks: B/C and NPV have been calculated at a discount rate of 12%.

Furthermore, it is expected that the Project will produce following effects in and around Kampala urban economy:

- Stimulation of regional industries
- Inducement of organized urban development
- Promotion of accessibility to public services
- Improvement of social environment

## **B-3 Recommendations**

In order to materialize the Project, the Study Team recommends the Ugandan Government to take the following actions:

(1) Allocation of a Local Budget for Project Preparation

The Project does not involve procedures such as the acquisition of additional land, demolition of building and resettlement of residents, however, it is necessary for MOWTC to prepare local funds for the relocation of electric and telephone poles in limited areas.

(2) Strengthening of the Maintenance Capability of MOWTC

For the utilization of materialized traffic facilities by the Project, maintenance works have to be provided in organized manner with strengthening of the MOWTC maintenance unit.

(3) Reinforcement of Traffic Legislation, Institutional Build-up and traffic Education

It is recommended that in parallel with the physical development of transport infrastructure, support is given to the development of institutions, legislation and education related to traffic affairs.

(4) Coordination with related Ongoing/Proposed Development Schemes

The Project should be coordinated with the ongoing/proposed development schemes of the city. These include the First Urban Project by Kampala City Council and Nakivubo Channel Development Project proposed by EU.

(5) Establishment of Comprehensive Legislation for Environment Protection

It is recommended that the surveillance system for environment protection be strengthened with periodic motor vehicle inspections and the provision of a penalty code in case of the violation of environmental regulation.

(6) Improvement of Public Transport Services

It is expected that the matatu will remain the major means of road transport in the city for the foreseeable future. At present this public transport is operated in a disorderly manner and the service level is substandard. It can be predicted that the improved roads will be used chaotically for this public transport, should strict regulation on these vehicles and/or improvement measures of services not be undertaken.

(7) Establishment of Construction Yard



A construction yard for the purpose of project execution should be established at a suitable location considering all the project sites. Furthermore, the yard is requested to have good access to potential borrow pits and quarries.

(8) Implementation of the Project under Sub-construction Method

For the purpose of reducing the project cost, it is recommended that the Project should be implemented under sub-contractor method, utilizing the machinery and equipment held by the Ugandan contractors as much as possible. The sub-contractor is to be selected on the basis of their capability in terms of earth work, pavement works, drainage work, and so on.

## **SUMMARY OF THE STUDY**

### **PART A: MASTER PLAN STUDY**

## **1. INTRODUCTION**

### **1.1 Background of the Study**

With the initiation of the Economic Recovery Programme (ERP), the Government of Uganda has placed the highest emphasis on rehabilitation and maintenance of the dilapidated road infrastructure. However, the road standard in Uganda at present is still low and further investment work is required for the build-up of the national economy.

The city of Kampala has a road network of 212 km in total of which 126 km or about 60% of the total road length is paved road. However, most of the roads are substandard with insufficient road facilities, with dilapidated road surface condition, narrow sidewalks, and a poorly maintained roadside drainage system.

The road traffic condition in the city is getting worse due to the recent increase in vehicles and sharp concentration of people in the city centre. Traffic congestion on the major trunk roads near the city centre occurs daily and traffic accidents which involve pedestrians are sharply on the increase.

With this background, the Government of Uganda is in urgent necessity of improving the road traffic situation of the city of Kampala and requested the assistance of the Japanese Government of carry out a feasibility study of improvements to the trunk road in the city of Kampala.

### **1.2 Objectives of the Study**

The major objectives of the Study are:

- 1) To formulate a road development plan for the trunk roads in the city of Kampala up to the year 2015, aiming at a reduction of traffic congestion and enhancement of traffic safety levels,
- 2) To select high priority road sections to be improved, and carry out feasibility a study of them in which road designing is to be carried out, along with an environmental impact assessment and economic evaluation of them, and
- 3) To promote technical transfer of knowledge and technology, which is necessary for the formulation and implementation of the road development plan, to Ugandan counterparts.

### **1.3 Study Area**

The Study Area covers the entire area of the city of Kampala and its adjacent area.

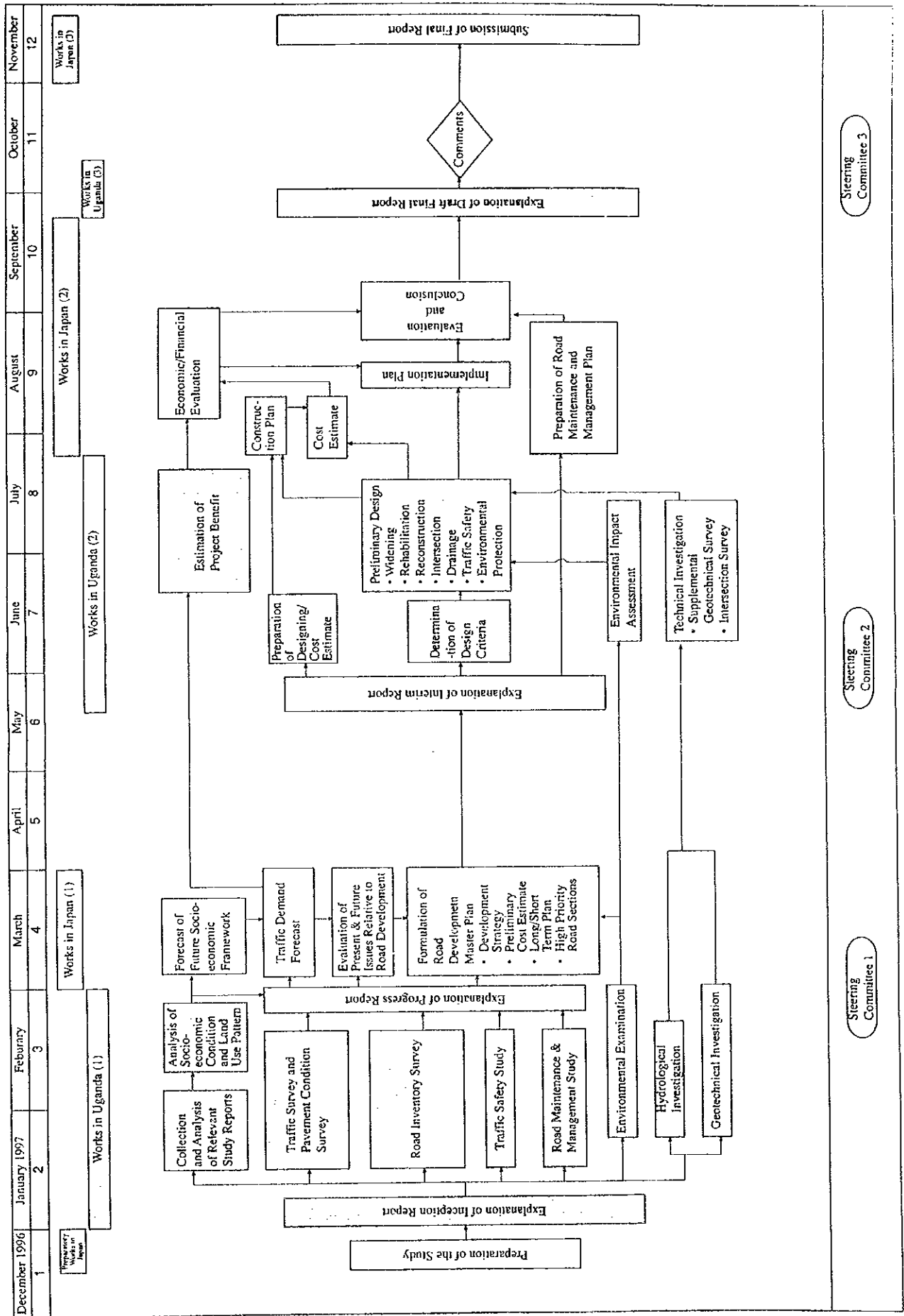
### **1.4 Work Schedule of the Study**

The Study started at the end of December 1996 and will come to end in October 1997. An overall work flow illustrating the inter-relationship of all activities in the Study is presented in Figure 1.1.

### **1.5 Organization and Assignment of Study Team**

The organization chart and assignment schedule of the Study Team are presented in Figure 1.2 respectively.

Figure 1.1 Work Schedule of the Study



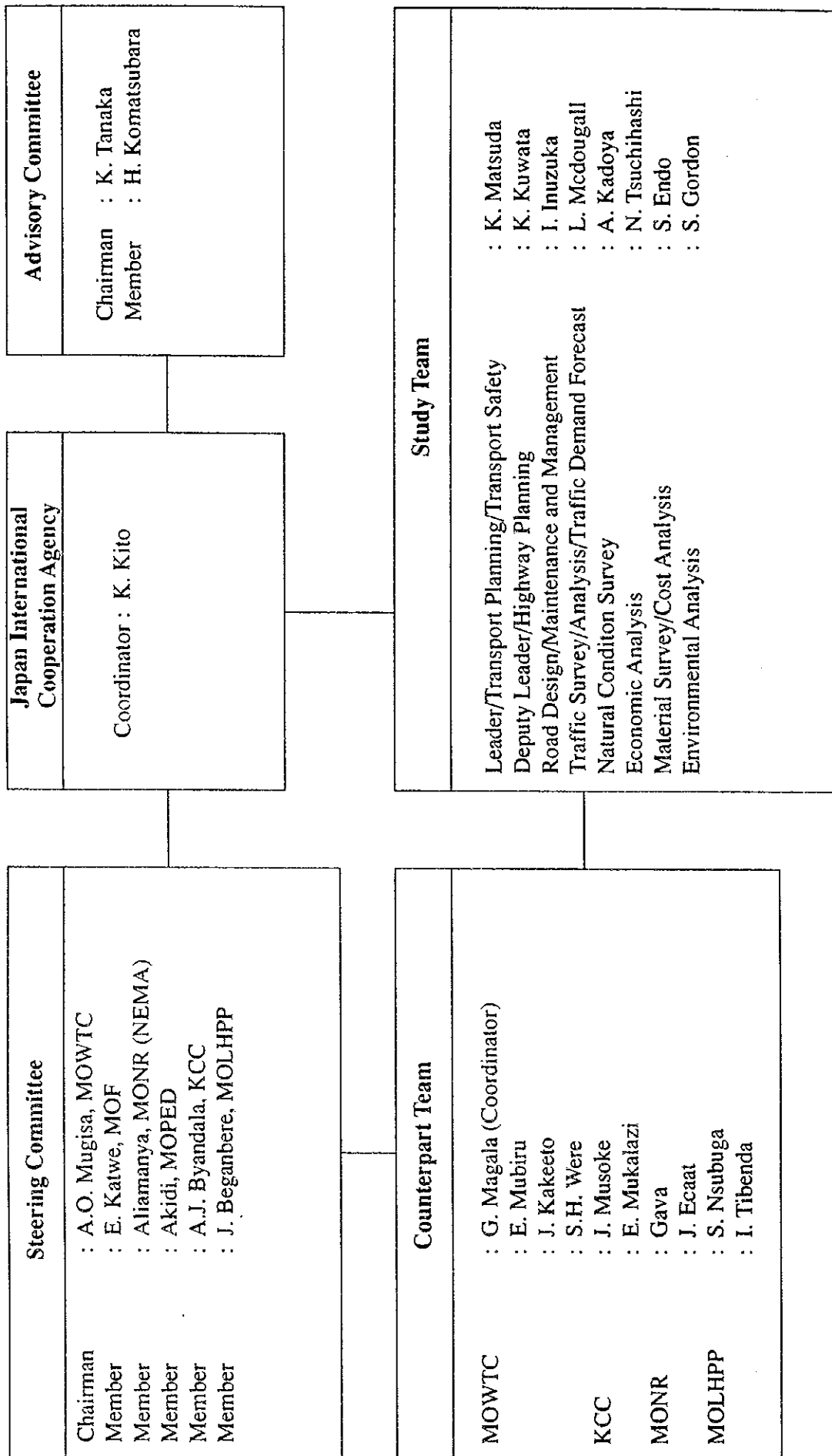


Figure 1.2 Organization Chart

## 2 SOCIO-ECONOMIC CONDITION

### 2.1 Socio-economic Background

Uganda, located at the equator, has a total area of 241,139 km<sup>2</sup> of which 18% (43,405 km<sup>2</sup>) is water, swamp and marsh, 12% (28,937 km<sup>2</sup>) is forest and game reserves while the remainder 70% (16,897 km<sup>2</sup>) is fertile ground potentially available for crop and livestock production.

In the period immediately following Independence, the Ugandan economy recorded growth rates around 5% per annum, while inflation was contained within single digit figures.

An Economic Recovery Programme (ERP) was launched in 1987 with the following principal objectives:

- promote economic rehabilitation and growth;
- restore internal financial stability and achieve low inflation;
- reduce imbalances in the external accounts particularly through increases in the volume and diversity of exports.

### 2.2 Population

The total population in Uganda was approximately 17 million, according to the latest 1991 Census. Ninety percent(90%) of the population live in rural areas. The table below shows population figures in 1969, 1980 and 1991 and the growth rates between the respective years.

#### Uganda

Year	Population	Annual Average Growth (%)
1969	9,535,051	
1980	12,636,179	2.6
1991	16,671,705	2.5

Kampala City, covering the whole administrative division of Kampala District, had a population of more than 774,000 in 1991. The 1991 Census likewise gives the following figures:

### **Kampala City**

Year	Population	Annual Average Growth (%)
1969	330,700	
1980	458,503	3.0
1991	774,241	4.9

### **2.3 Economic Activity**

Kampala City is a major commercial and industrial centre of Uganda, accommodating important economic, social and political institutions. The economy of Kampala City is strongly influenced by the national economy. Regional production figures are not available, but the factors attracting manufactures and traders are identified as follows:

- Kampala city is the largest market in the country, with relatively better income than elsewhere, in terms of consumer goods.
- Kampala city has a role of hub of the country's transportation network: roads, rail, air, and water transport on Lake Victoria.
- Financial institutions such as banks and insurance companies are concentrated in the Central Business District.
- Kampala city is the centralized location of government ministries, parastatals (together with Entebbe) and various corporations in the private sector.

### **2.4 Land Use in Kampala City**

#### **(1) Existing Land Use Pattern**

Kampala City, the only District being designated as an urban municipality, encompasses a land area of approximately 176 km<sup>2</sup>. Historically, settlement or township formation began from the western hills such as Old Kampala and Mengo. The major religious/social institutions were located on hilltops, surrounded by upper-class housing. Middle-class residents settled further down the hill, and lower-income groups were left to occupy the valleys. Commercial centers have developed in two forms - either nodes or corridors of the road network. The present land use pattern in the city of Kampala is shown in Fig. 2.1



(2) Land Use Plan

Figure 2.2 shows the structure plan for the Kampala District and the extended area, formulated under the “Kampala Urban Study” in 1994. The target year of this structure plan is 2004. Basically, it stipulates the intensification of the existing land use pattern and the expansion of residential areas to the north, south and the east. Potential industrial areas are also indicated on some outlying spots. The fundamental structure in Kampala City in terms of land use will not change drastically.



Legend

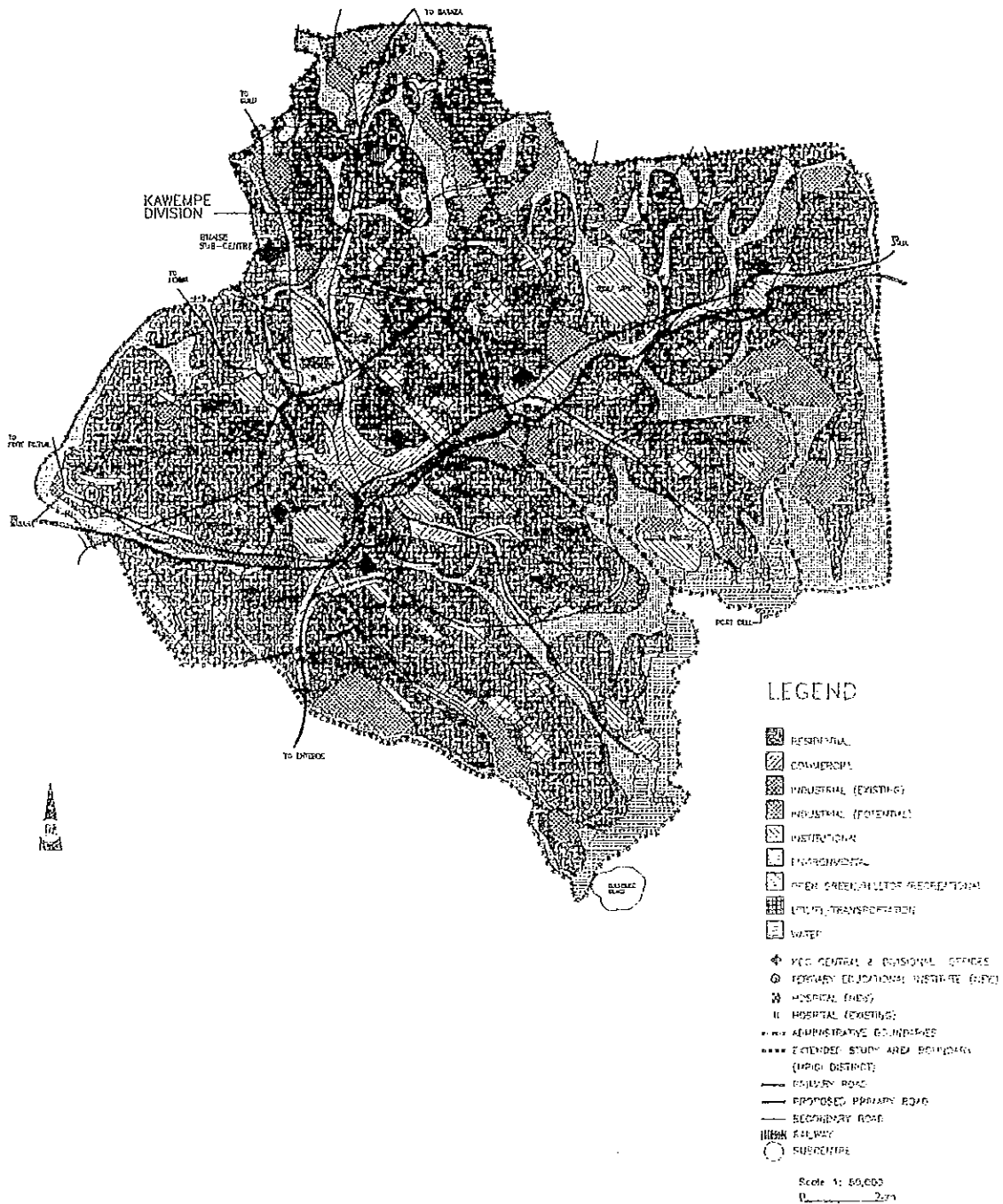
- Residential
- Commercial
- Major Industrial
- Small Scale Industrial
- Institutional
- Open Green Space
- Transportation
- Utilities
- Undeveloped/Agricultural
- Forest
- Wetlands

5 km

THE FEASIBILITY STUDY OF  
IMPROVEMENT OF TRUNK ROAD  
AT KAMPALA URBAN INTERFACE

Fig. 2.1

**Present Land Use in Kampala District  
and the Extended Area**



THE FEASIBILITY STUDY OF  
 IMPROVEMENT OF TRUNK ROAD  
 AT KAMPALA URBAN INTERFACE

Fig. 2.2 Structure Plan; 1994-2004,  
 Kampala District and  
 the Extended Area



### **3. PRESENT TRANSPORT SYSTEM**

#### **3.1 Outline of the Transport**

Transportation in the nation consists of roads, railways, airports and waterways as shown in Fig. 3.1. Road is the largest sector of transport. The total road length in the nation is about 60,000 km and carries over 90% of passengers and freight in the nation. Transportation in Kampala City is mostly made by road. There are no regular railway services between urban areas of the city.

#### **3.2 Road Network in the Study Area**

The total road length in the Study Area is 212 km and these roads are classified into three main groups; trunk road, urban road and community road. The road network in the city consists of eight (8) radial roads extending from the central area of the city as shown in Fig. 3.2.

The road network in the city does not have circular roads and/or bypasses which would divert concentrated traffic from the above roads. This fact has resulted in unnecessary congestion of road sections in the central area. Most of the important junctions in the city are roundabouts with few signalized ones. These low capacity junctions on the road network are impeding smooth urban traffic flow and are bottlenecks to road traffic.

#### **3.3 Road Traffic Condition**

Public transport services in the city are being provided by mini-buses. Most of them are operated by small and medium-sized private companies. Public transport services by mini-buses are provided in a rather disordered manner with no indication of service routes and places of on/off loading. Most of the mini-buses are overcrowded due to infrequent service time and shortage of absolute fleet number, and their service level is far below the satisfactory level.

The mixture of traffic is another factor of impedance to smooth urban traffic flow. The intrusion of pedestrians onto the road space, due mainly to the lack of distinct sidewalks along most of the urban roads, is a major cause of the reduction to vehicle speeds and of the increase in traffic accidents. The accident prone area is shown in Fig. 3.3.

Despite the above negative aspects, the urban transport service level in the Study Area is well maintained due mainly to recent road improvement works. However, it is anticipated that the traffic situation will become worse in the near future, should the

current high rate of traffic increase, more than 10% annually, continue on the existing road infrastructure in the city of Kampala.

### **3.4 Present Road Maintenance Systems**

The maintenance of the roads in the city is the responsibility of MOWTC and KCC. MOWTC is carrying out the maintenance of 587 km of trunk roads while KCC maintain the remaining of 598 km of road network in the city section.

The excessive damage of city roads is due to the following factors:

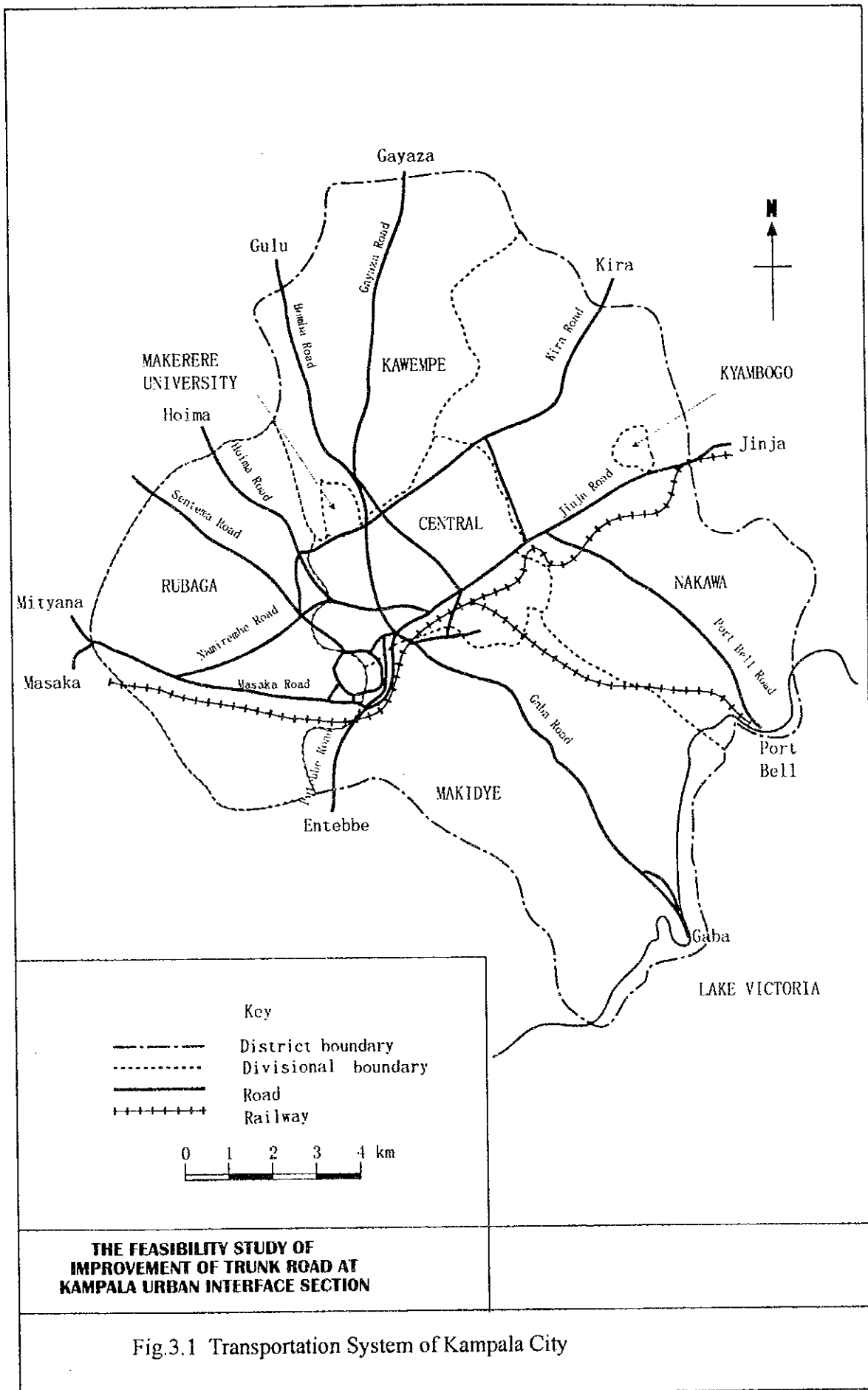
- 1) Inadequacy of funds available each year for road maintenance, rehabilitation and reconstruction.
- 2) Lack of equipment and plant for road maintenance.
- 3) Higher rate of city growth in all aspects as compared to the ability of the City Authority to provide the required infrastructure.

In the city centre sites, it may be said that trunk roads are in generally fair condition; this is a result of the last City Roads Phase II Project, funded by the EU.

On roads surrounding the city there are fair conditions in road maintenance with side drains protected by concrete plates or masonry walls, but pavement edges are damaged in many places which is due to a lack of kerb stone or pavement stopper.

### **3.5 Ongoing Road Development Projects**

Regarding road development in Kampala City, several bi-lateral and multi-lateral international agencies have been assisting in the rehabilitation and development. Fig. 3.4 shows past and on-going road development projects financed by international agencies.











## **4. PRESENT ROAD TRAFFIC SITUATION**

### **4.1 Traffic Survey**

In order to understand the characteristics of present traffic movements in Kampala and to prepare basic data for future traffic demand forecasts, the following traffic surveys were carried out in February 1997:

(a) Roadside OD Survey

- 8 cordon stations
- 2 internal stations

(b) Traffic Flow Survey

- Weekly count
- 24 hour counts
- 12 hour counts
- Peak period counts

(c) Axle Load Survey

(d) Pavement Condition Survey

The location of traffic survey points is shown in Fig. 4.1.

### **4.2 Major Results of Traffic Survey**

(1) Traffic Counts

Results of traffic counts at major points of roads are shown in Fig. 4.2 and Table 4.1.

(2) Results of Roadside OD Survey

The results of roadside OD surveys were converted into AADT (Annual Average Daily Traffic) applying expansion factor and weekly fluctuation factor, and were expressed in the form of OD matrices and in desire line. The desire lines by vehicle type are shown in Fig. 4.3.

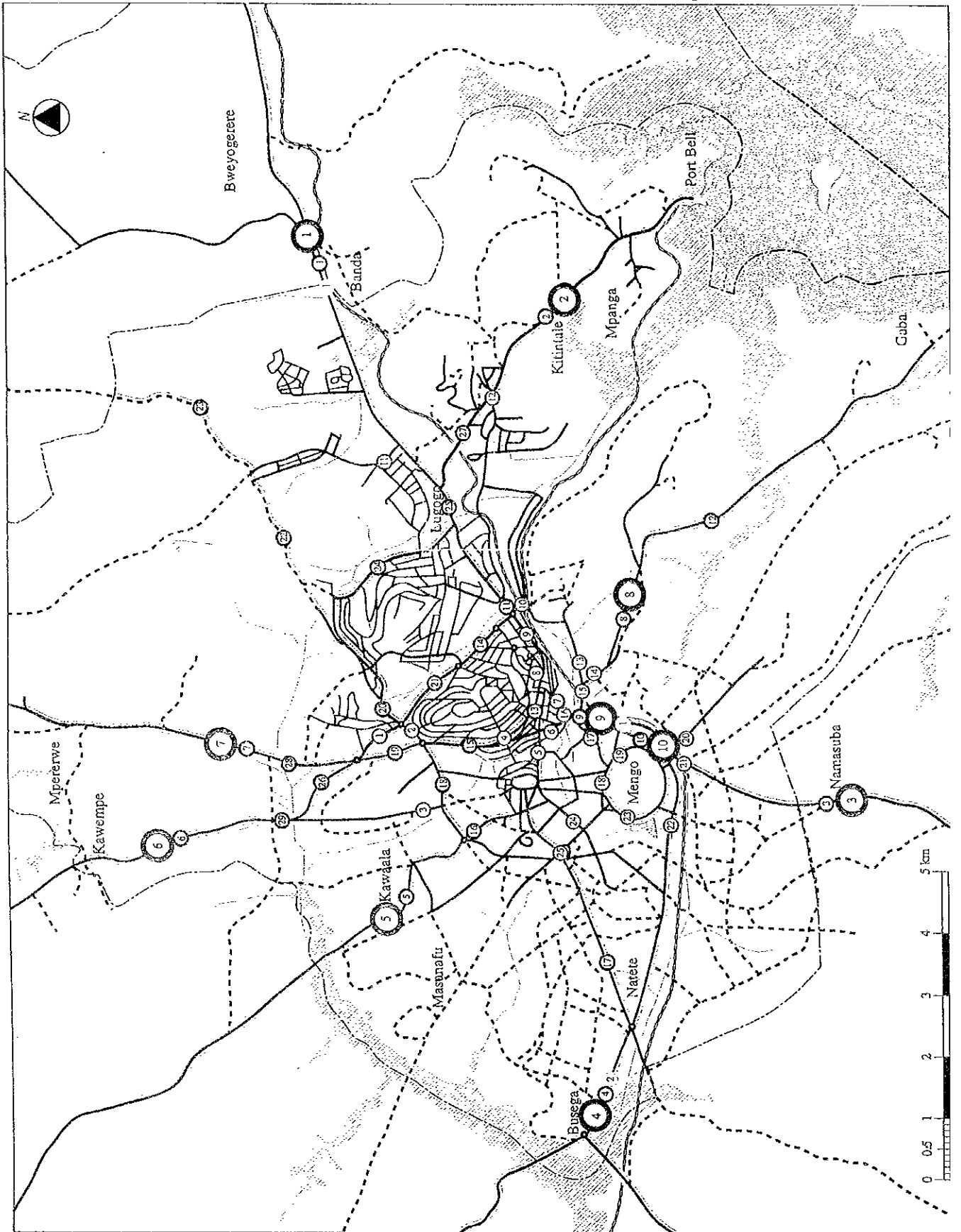


Table 4.1 Factored Estimated 12-hour Flows and Pcus/hr

Point	Direction	Private	Heavy	Public	Alt	Pcus/hr
		Vehicles	Vehicles	Transport		
		Pcu Factor	Pcu Factor	Pcu Factor		
		1.1	2	1.3		
C1	1	5086	607	3153	8846	909
	2	5126	650	3242	9018	929
C2	1	1687	136	1136	2959	300
	2	1787	88	1222	3096	311
C3	1	2594	283	1385	4262	435
	2	2499	330	1344	4173	430
C4	1	2204	352	1419	3975	414
	2	2042	372	1455	3869	407
C5	1	772	89	1100	1960	205
	2	709	80	911	1700	177
C6	1	1858	276	1577	3711	387
	2	1486	275	1552	3313	350
C7	1	2272	204	1304	3780	384
	2	1993	196	1206	3395	346
C8	1	3063	163	1440	4666	464
	2	2867	154	1350	4372	435
C9	1	6052	479	1864	8395	837
	2	5119	507	3579	9205	941
C10	1	3472	438	4515	8426	880
	2	2684	404	2151	5239	546
C11	1	9002	919	4917	14838	1511
	2	12995	975	5642	19612	1965
C12	1	3083	136	1277	4496	444
	2	2800	76	1196	4072	399
C13	1	6165	284	2178	8627	848
	2	11695	179	2463	14337	1369
C14	1	9016	375	509	9900	944
	2	8711	397	383	9491	906
C15	1	6544	160	4899	11602	1157
	2	5969	218	5315	11502	1159
C16	1	1596	105	2182	3884	400
	2	1472	85	2271	3828	395
C17	1	1623	97	1578	3299	336
	2	1627	129	1575	3331	341
C18	1	4064	148	700	4912	473
	2	4191	117	633	4941	472
C19	1	2485	272	3369	6126	638
	2	3044	187	2893	6123	624
C20	1	5163	144	1475	6782	657
	2	3934	107	1545	5587	546
C21	1	6595	338	348	7281	699
	2	5663	299	294	6255	601
C22	1	2620	94	10	2724	257
	2	2235	88	753	3076	301
C23	1	64	0	5	69	6
	2	64	0	1	65	6
C24	1	1289	87	50	1425	138
	2	1632	116	86	1834	178
C25	1	7793	801	3831	12425	1263
	2	7126	815	3759	11700	1196
C26	1	3055	191	1946	5193	523
	2	2957	196	1876	5030	507
C27	1	2216	91	366	2673	258
	2	1587	87	305	1979	193
C28	1	2506	192	1334	4032	406
	2	3104	215	1637	4956	498
C29	1	4090	259	2928	7277	735
	2	3496	734	2751	6982	741

Direction (1) To Kampala  
 Direction (2) From Kampala



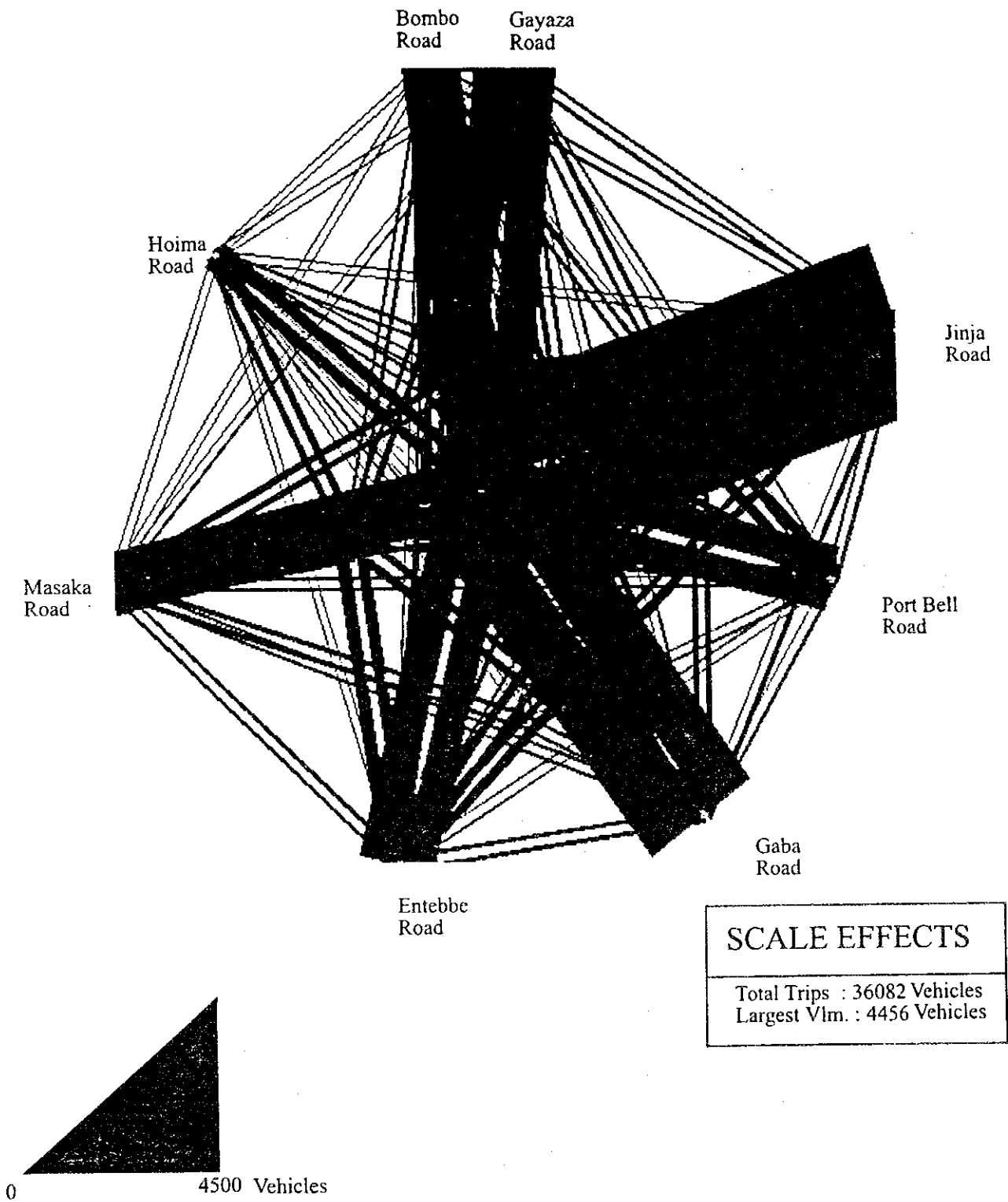


Fig. 4.3 (1) Traffic Desire Line at the Cordon, 1997 - Private Vehicle -

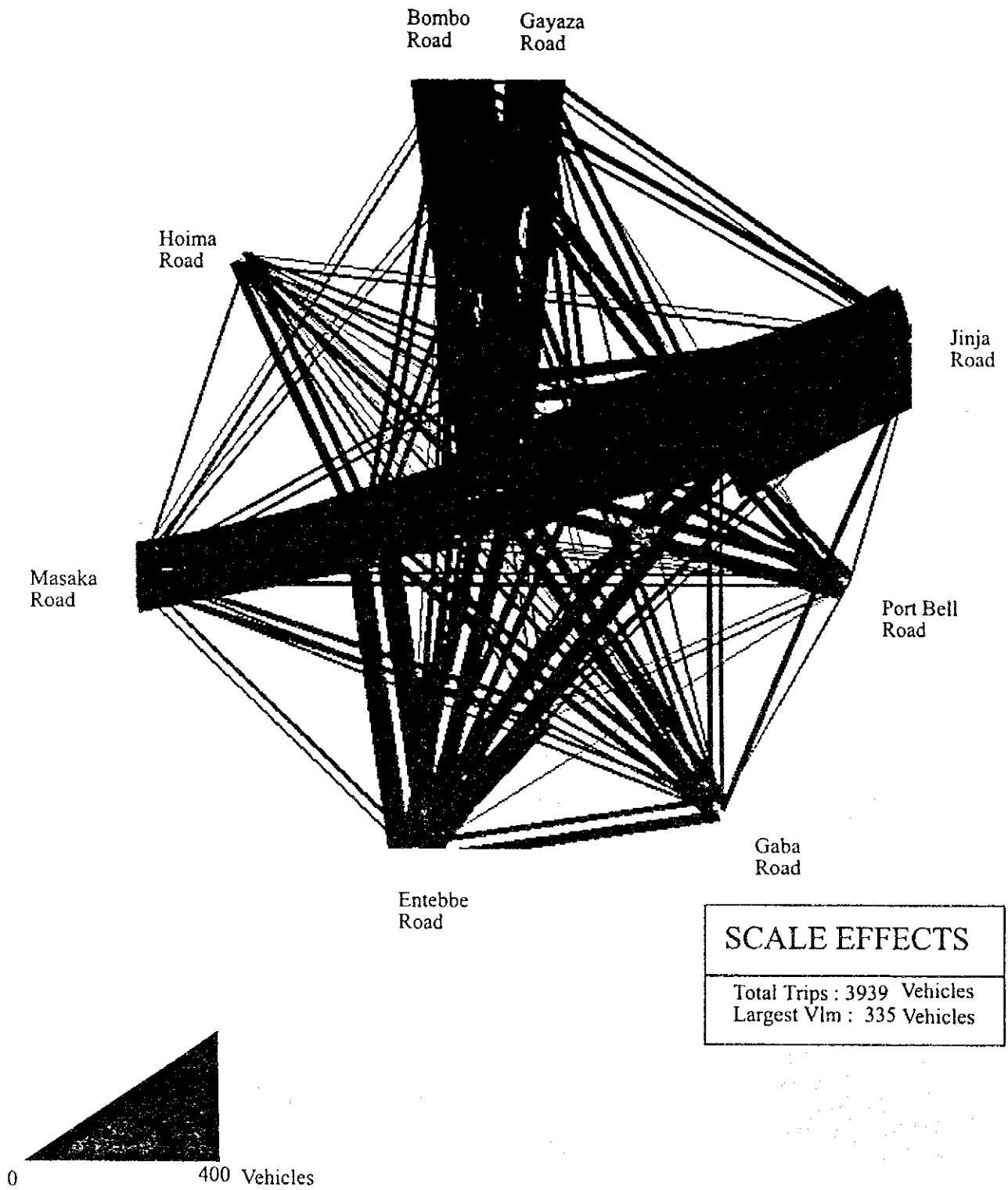


Fig. 4.3 (2) Traffic Desire Line at the Cordon, 1997 - Heavy Vehicle -



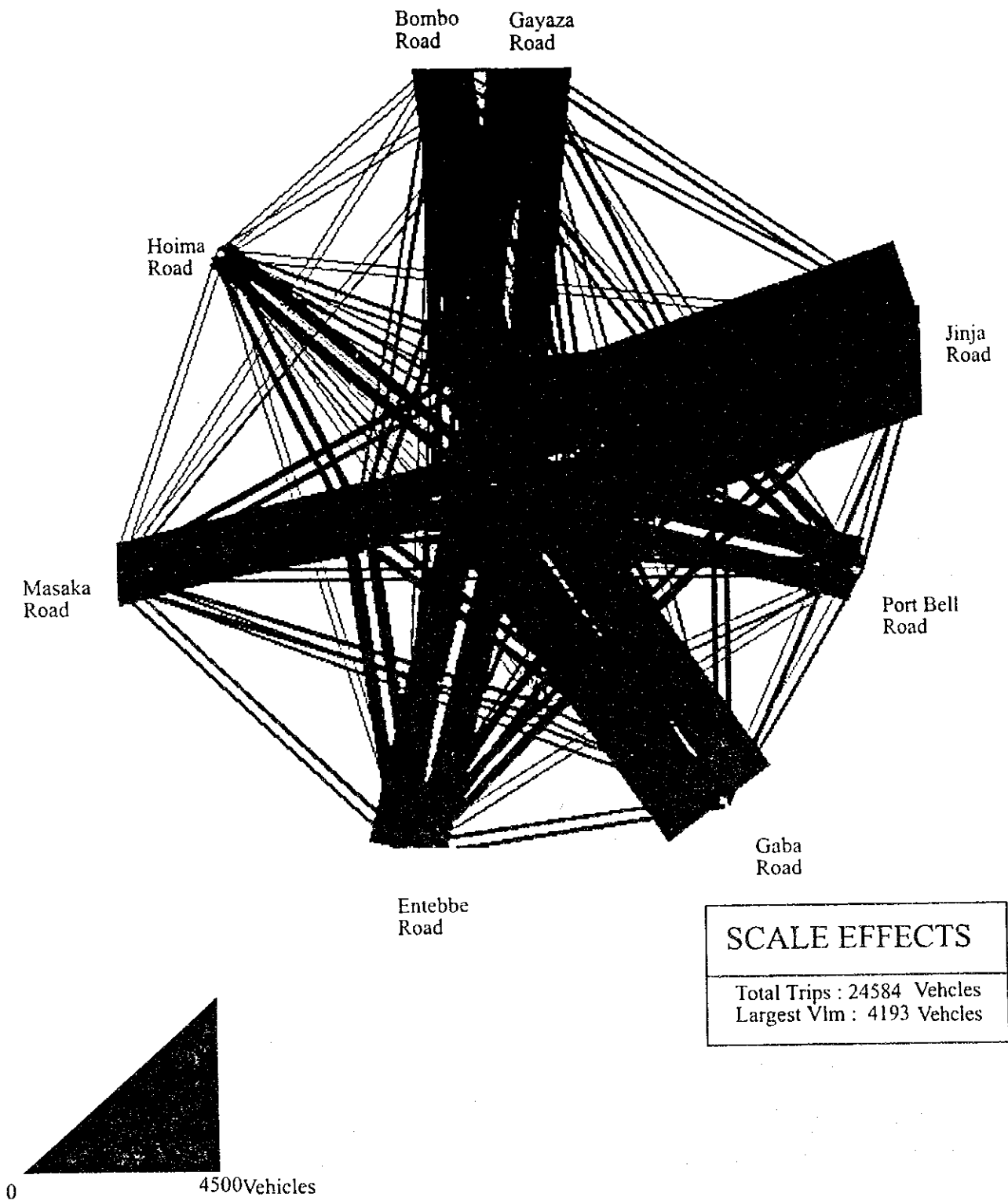


Fig. 4.3 (3) Traffic Desire Line at the Cordon, 1997 - Public Vehicle -

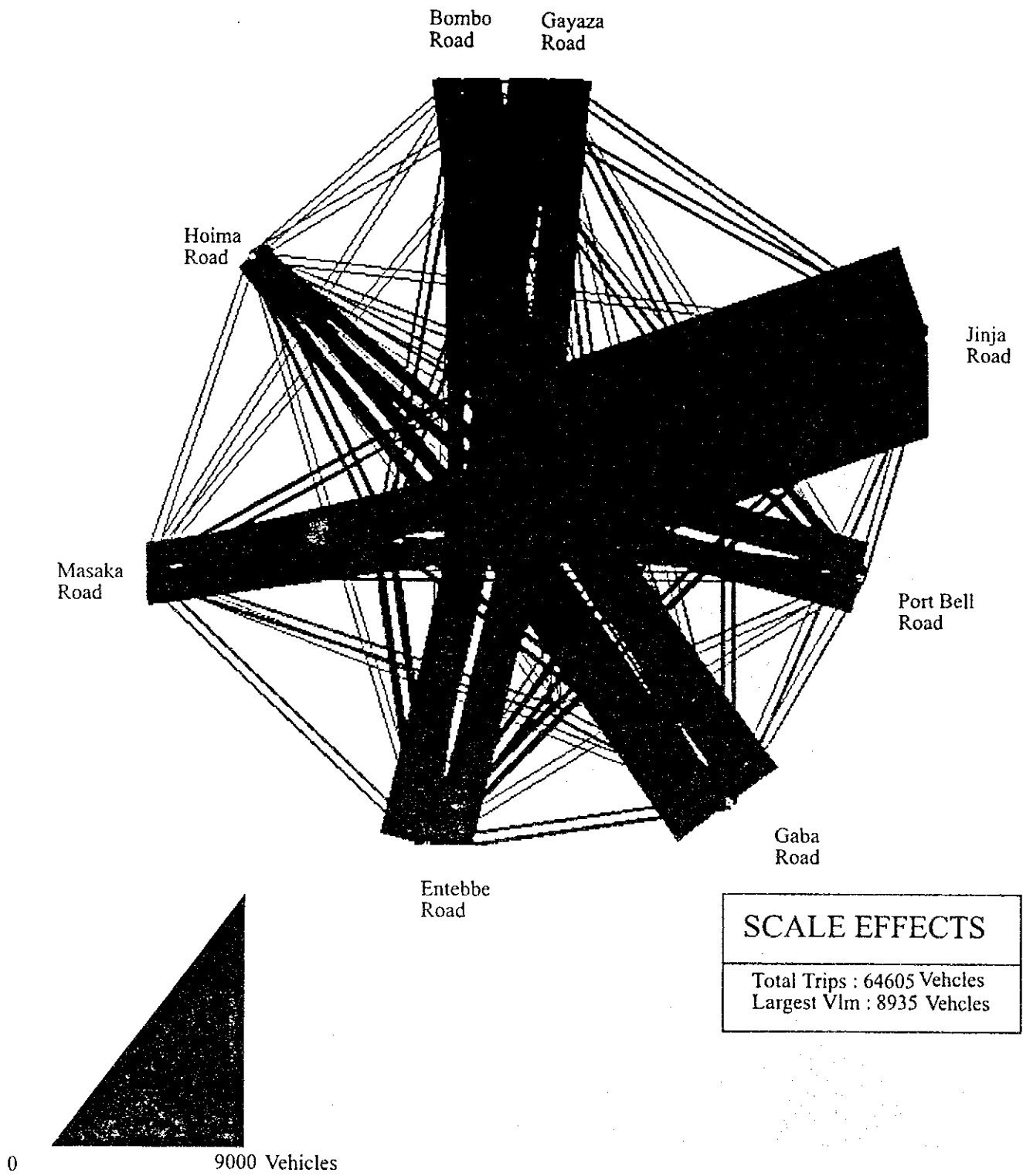


Fig. 4.3 (4) Traffic Desire Line at the Cordon, 1997 - All Vehicle -

## **5 FUTURE TRAFFIC DEMAND FORECAST**

### **5.1 Future Socio-economic Framework**

In the population projection, the applied rates of increase were as follows:

- Uganda : 2.5% per annum up to the year 2015
- Kampala City : 4.6% per annum up to the year 2005  
4.5% per annum during 2005 - 2015

The future population by traffic zone was estimated decomposing the above regional totals into the zone.

With regards to the future GDP, the applied rates were as follows:

- Uganda : 3.6% per annum up to the year 2005  
2.5% per annum during 2005 - 2015

### **5.2 Forecast of Future Traffic Volume**

Future traffic volume was forecast considering the projection of future population and GDP.

Private Vehicles	:	5.5% (1997 - 2005) 3.0% (2005 - 2015)
Heavy Vehicles	:	3.6% (1997 - 2005) 2.5% (2005 - 2015)
Public Transport	:	3.6% (1997 - 2005) 2.5% (2005 - 2015)

The future generated/attracted traffic by traffic zone was estimated decomposing the total traffic in prorate with the sizes of population by traffic zone.

### **5.3 Forecast of Future OD (Origin-Destination) Matrices**

Future OD matrices were forecast applying present pattern method. The future OD matrices in terms of PCU (Passenger Car Unit) are shown in Fig. 5.1.

## 5.4 Results of Future Traffic Forecast

### (1) Future Vehicle Volume

Future traffic volume in 2005 and 2015 were expected to become 1.69 times and 3.12 times of the present traffic volume respectively as described bellow:

1997	:	64,605
2005	:	108,866 (1.69)
2005	:	201,888 (3.12)

\* Figures in brackets indicate the ratio to the traffic volume in 1997

### (2) Characteristics of Generated/Attracted Traffic by Traffic Zone

It can be pointed out that the suburban areas of Kampala city tend to show higher increasing rate of traffic than the central areas of the city due to intensive urban development in the periphery of the city.

### (3) Regional Traffic Distribution Pattern

A traffic concentration to the city centre is expected to continue until 2015. The traffic volume along the east-west corridor of the city shows a greater magnitude than that in north-south corridor.

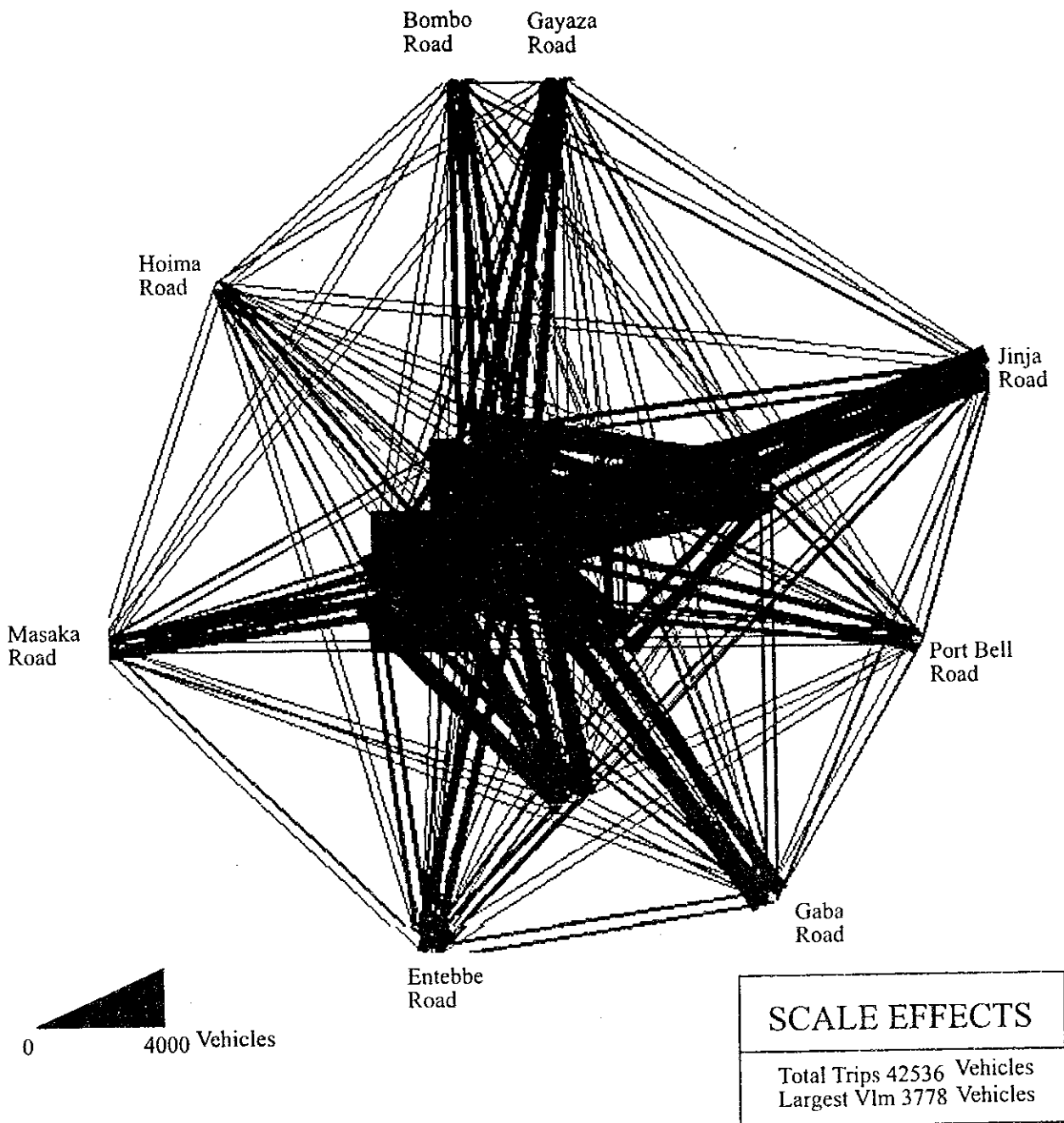


Fig. 5.1 (1) Pcus/hr 2005 Sector Matrix

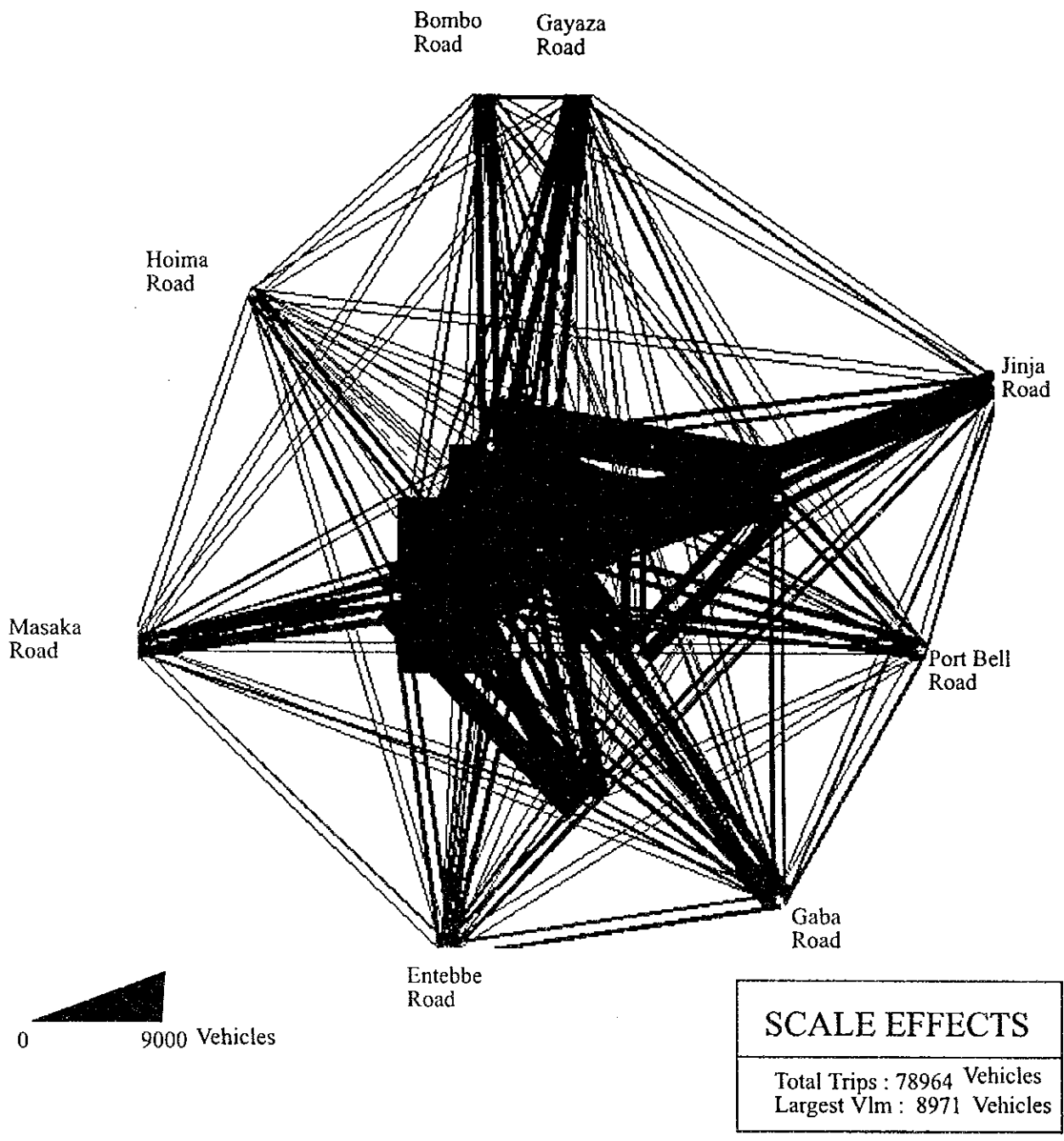


Fig. 5.1 (2) Pcus/hr 2015 Sector Matrix

## **6. FORMULATION OF ROAD DEVELOPMENT CONCEPT**

### **6.1 Present Road Traffic Issues**

The nature of the traffic in the Study Area is such that the existing transport infrastructure cannot provide sufficient services to road users and communities situated near roads. This has resulted in inefficiency in urban transport and deterioration of urban amenities. It is noted that the road network in the study area is not well organized. The road network is mainly composed of a number of radial roads which converge in the city centre. There is no circular road or by-pass to reduce the concentration of traffic in one area of the city. Most of the junctions in the study area are roundabouts with low capacity. Traffic congestion at these junctions is chronic and is causing a “bottleneck” in urban traffic flow. Enhancement of junction capacity is one of the most urgent issues to streamline urban traffic flow in the area.

The present road issues identified by the Study Team are described Fig. 6.1 and Table 6.1.

### **6.2 Prospect of Future Road Development**

#### **(1) Basic Stance**

The emphasis of future road development planning was placed more on the aspect of improvement of existing infrastructure than on new construction, in which cost effective road development proposals are being sought, taking account of such negative effects usually brought about by “big plans” as burdens on the environment and human life, and the financial condition of the Ugandan government.

The target of future road development in this study were set out as follows:

- Road development aiming at enhancement of road user benefit
- Road development aiming at enhancement of road amenity

#### **(2) Road Development Aiming at Enhancement of Road User Benefit.**

The above target will be attained by adopting the following measures;

- Improvement of existing bottleneck points in urban traffic flow.
- Enhancement of road capacity through rehabilitation, construction and widening of the existing roads.

- Introduction of new road network to divert traffic from certain congested road sections

(3) Road Development aiming at Enhancement of Road Amenity

The above target will be attained adopting some supplemental works of installation of traffic furniture and facilities on critical road sections.

The development concept in this context consists of the following two subjects:

- Enhancement of road safety level
- Protection of roadside environment

The road development scenario to attain the above mentioned targets is illustrated in Fig. 6.2.





Table 6.1 Present Road Traffic Issues

Present Traffic Issues	Factor behind Present Road Traffic Issues	Probable Measures to be Undertaken
<ul style="list-style-type: none"> <li>- Inefficiency in Road Transport</li> </ul>	<p>A. Factors related to Road Infrastructure</p> <p>1. Physical Factors</p> <ol style="list-style-type: none"> <li>(1) Concentration of radial roads into city centre</li> <li>(2) Lack of ring shaped arterial road surrounding downtown core.</li> <li>(3) Lack of bypass road for through traffic (East-West, North-South corridors)</li> <li>(4) Under - capacity of intersections</li> <li>(5) Insufficient road linkage</li> <li>(6) Defective road infrastructure</li> <li>(7) Low geometric design</li> <li>(8) Poor provision of road facilities (drainage, sidewalks, road furniture)</li> <li>(9) Unbalanced road network as against the pattern of traffic demands</li> </ol>	<ul style="list-style-type: none"> <li>- Upgrade of bottleneck intersection, signalization, grade-separation, improvement of geometry</li> <li>- Improvement of linkage roads</li> <li>- Improvement of carriageways (rehabilitation, reconstruction, partial repair)</li> <li>- Improvement of road facilities/ furniture</li> <li>- Widening of road/ increasing number of lanes</li> <li>- Introduction of circular roads/ bypasses</li> </ul>
<ul style="list-style-type: none"> <li>- Disregard of Traffic Safety</li> </ul>	<p>2. Management /Public Transport related Factors</p> <ol style="list-style-type: none"> <li>(1) Intrusion of pedestrians onto carriage way</li> <li>(2) Passage of heavy vehicles in the city centre and residential areas</li> <li>(3) Increase in roadside parking</li> <li>(4) No control on roadside loading and unloading</li> <li>(5) Concentration of public transport (mini buses) in the city centre.</li> <li>(6) Substandard service level of public transport.</li> </ol>	<ul style="list-style-type: none"> <li>- Designation of crossing points</li> <li>- Installation of pelican crossing</li> <li>- Regulation of heavy vehicle passage</li> <li>- Installation of parking places</li> <li>- Designation of on/off loading places</li> <li>- Construction of bus bays</li> <li>- Reorganization of private bus companies</li> </ul>
<ul style="list-style-type: none"> <li>- Degradation of Roadside Environment</li> </ul>	<p>B. Factors related to traffic demand</p> <ol style="list-style-type: none"> <li>(1) Extension of urban land use</li> <li>(2) Heterogeneous population increase</li> <li>(3) Sharp increase in vehicle ownership</li> <li>(4) Concentration of urban facilities in one area of the city</li> </ol> <p>C. Administrative/Legislative/Institutional Factors</p> <ol style="list-style-type: none"> <li>(1) Partial enforcement of traffic regulation (through traffic, one-way, vehicle loading, vehicle inspection, environmental protection)</li> <li>(2) Poor traffic behaviour (driver, pedestrian, activities in nearby communities).</li> </ol>	<ul style="list-style-type: none"> <li>- Road development consistent with land use plan.</li> <li>- Introduction of functional hierarchy of roads</li> <li>- Decentralization of urban facilities</li> </ul>
		<ul style="list-style-type: none"> <li>- Strict enforcement of traffic regulation and control</li> <li>- Revision of traffic related laws</li> <li>- Introduction of legal measures to protect the environment</li> </ul>

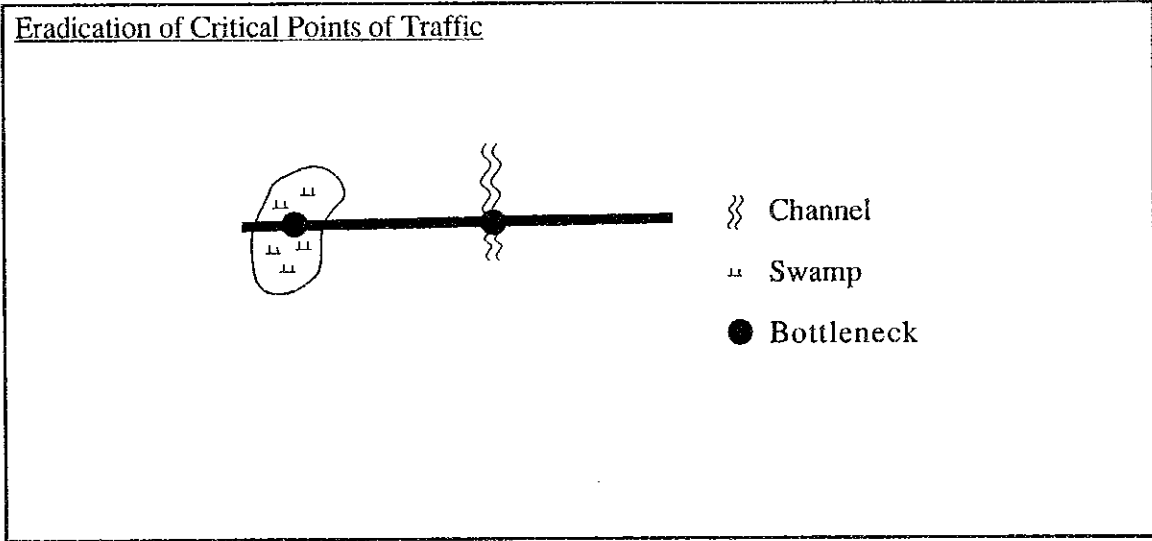
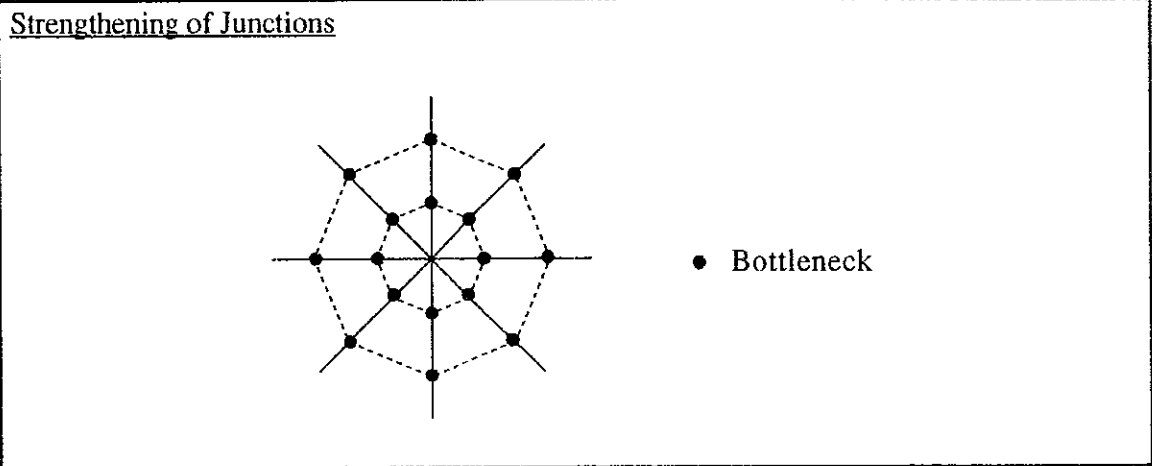
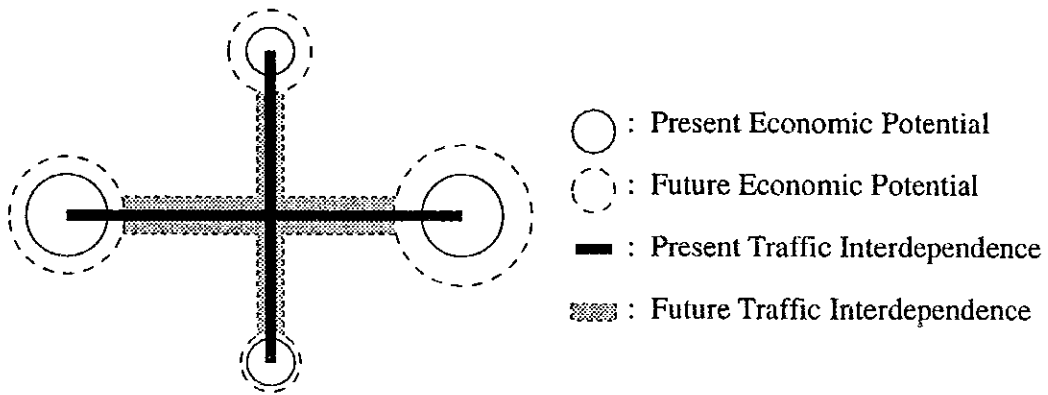


Figure 6.2 (1) Road Development Concept  
 - Improvement of Existing Bottleneck Points -

**Strengthening of Urban Corridors (A)**



**Strengthening of Urban Corridors (B)**

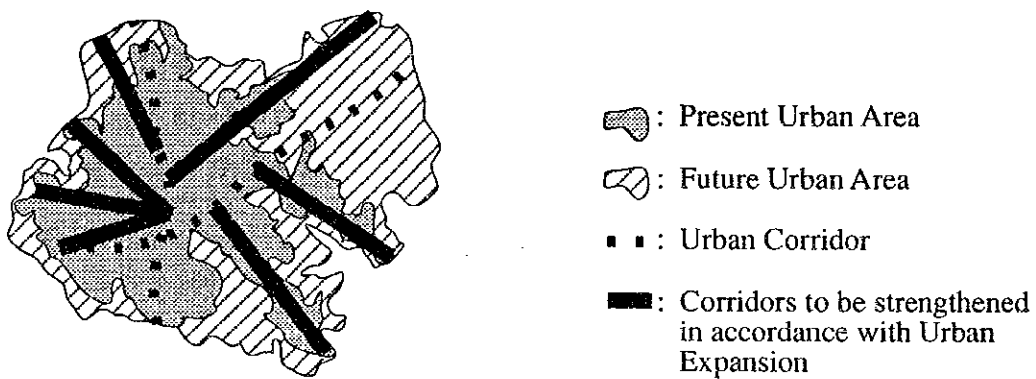
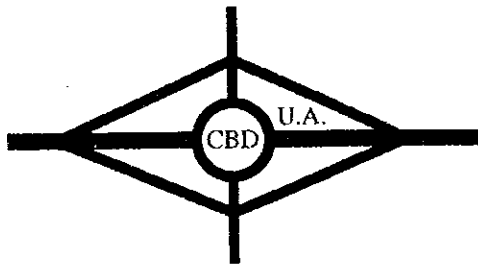


Figure 6.2 (2) Road Development Concept  
- Enhancement of Linehaul Capacities -

Diversion of Traffic Concentration



CBD: Central Business District

U.A.: Urban Area

Figure 6.2 (3) Road Development Concept  
- Diversion of Traffic Concentration -



## **7. FORMULATION OF ROAD DEVELOPMENT MASTER PLAN**

### **7.1 Proposal for Future Road Development Plan**

The future road development plan has been formulated taking into consideration such factors as the future traffic pattern, present road condition, future urban land use plan, and the expected improvement to be brought about with the introduction of each development scheme. The basic road development objectives set up for the master plan are as follows:

#### To Enhance Road User Benefit

- improvement of bottleneck points in urban traffic
- enhancement of capacities of linehaul
- diversion of traffic from the city centre

#### To Enhance Road Amenity

- enhancement of road safety
- protection of roadside environment

The road development concept with the above targets has been prepared as shown in Table 7.1, where probable measures to attain the targets are being proposed.

The road development master plan prepared in this context is presented in Fig. 7.1.

### **7.2 Future Traffic on Proposed Road Network**

The result of traffic assignment on the proposed road network in 2015 is shown in Fig. 7.2 and Table 7.2, from which the following could be pointed out:

Both the figure and the table demonstrate that the flows are in harmony with the proposed capacity. The proposed ring road is well used but only over a short section (Access Road just south of Jinja Road) is the flow in excess of capacity. Traffic on Jinja Road to the west of the start of the by-pass is of a similar level to that in the base year. Flows forecast for the main east west route, Jinja Road - Entebba Road - Queens way - Masaka Road are generally within capacity, although the portion of Jinja Road between Port Bell Road and Kitante Road will require more capacity. Inside the proposed ring road, the roads showing large increases over the base year flows are either in the vicinity of the reconstructed Katwe Lubiri circular road or are feeders to the ring road.

### 7.3 Selection of High Priority Projects

#### (1) Methodology

Determination of priority projects were done applying a scoring method. The criteria introduced for the determination are as the follow\*:

	Items of Evaluation	Score
1.	Engineering View Point	(60)
1.1	Deterioration Level of Pavement	(15)
	- Totally Destroyed	15
	- Very Bad	15
	- Bad	15
	- Good	10
	- Fair	5
1.2	Traffic Volume	(30)
	- ADT > 20,000	30
	- 20,000 > ADT > 10,000	25
	- 10,000 > ADT > 5,000	20
	- 5,000 > ADT > 1,000	15
	- 1,000 > ADT > 100	10
	- ADT < 100	5
1.3	Deterioration Level of Drainage	(15)
	- Flood area	15
	- Area without drainage	15
	- Area with partially malfunctioning drainage/Area with poor drainage	10
	- Other than the above	5
2.	Socio-economic View Points	(20)
2.1	Function of Road	(10)
	- Inter Regional Arterial	10
	- Regional Arterial Road	5
	- City/town Road	5
	- Feeder/Access Road	0
2.2	Land Use Pattern	(10)
	- Commercial/industry/densely populated Area	10
	- Residential Area	5
	- Less Developed Area	0



3.	Satisfaction of Basic Human Need	(10)
	- Large impact on low income group	10
	- Medium impact on low income group	5
	- Less impact on low income group	0
4.	Development Policy of MOWTC	(10)
	- Highest priority	10
	- High priority	5
	- Others	0
	Total	100

\* The criteria of the scoring method introduced here are not universal ones and are subject to change with the type and content of projects to be evaluated.

## (2) Selected High Priority Projects

High priority projects were selected on the basis of the sizes of the scores obtained. these projects include:

### Improvement of Bottlenecks

- Junction
  - Port Bell Junction
  - Jinja Rd. Roundabout
  - Kibuya Roundabout
  - Natete Roundabout
  - Wandegeya Roundabout
  - Makerere Roundabout
  
- Flood Area
  - Hoima Road (0.4 km: Lubigi Channel Crossing Part)
  - Natete Road (A) (0.2 km: Lubaga Area)
  - Natete Road (B) (0.2 km: Lunguja Area)
  - Gaba Road (0.5 km: Kalungu Channel Crossing Part)

### Reinforcement of Linehaul

- Gaba Road (4.1 km)
- Natete Road (3.8 km)
- Port Bell Road (4.8 km)
- Hoima Road (8.5 km)

- Gayaza Road (4.6 km)

Selected high-priority projects are shown in Fig. 7.2.

Table 7.1 Road Development Proposal

Planning Horizon	Target of Development	Management Measure			Physical/Infrastructural Measure
		Legal/Administrative Measure	Institutional Measure	Facility Improvement	
Short Term	- Improvement of Bottleneck Points	- Strict enforcement of traffic law	- Enhancement of road maintenance capacity	- Installation of traffic signals	- Improvement of intersection geometry
	- Enhancement of Road Safety Level	- Control on roadside parking	- Enforcement of traffic education	- Provision of signs, markings, guardrails	- Improvement of sidewalks
	- Protection of Roadside Environment	- Introduction of one way traffic regulation	- Introduction of car inspection system	- Designation of pedestrian crossing points	- Improvement of drainage system
	- Upgrade of Linehaul			- Installation of bus bays	- Raising of carriage ways
Long Term	- Upgrade of Linehaul	- Route regulation for heavy vehicles	- Establishment of self-sustaining road management system	- Introduction of cycling routes	- Rehabilitation/reconstruction of urban corridor (north-south, east-west)
	- Improvement of Road Facilities	- Strict enforcement of zoning system	- Functional specification of roads	- Introduction of coordinated signals	- Rehabilitation/reconstruction of urban artery (radial roads)
	- Diversion of Traffic from City Centre			- Planting of trees along road sides	- Introduction of bypass
					- Introduction of circular roads



Table 7.2 Results of the 2015 Traffic Assignment

Site Reference	Site Description	Assigned Flow in 1997 (Pcus/hr)	Assigned Flow in 2015 (Pcus/hr)	Percentage increase	Nominal capacity (Pcus/hr)	Flow to capacity ratio
<b>Ring road</b>						
	Press House Road	1520	4751	213%	5600	0.85
P10	Access Road	2768	6146	122%	5600	1.10
	Kitante Road	2634	5188	97%	5600	0.93
C14	Kitante Road	2000	4750	138%	5600	0.85
C21	Kitante Road	1388	4258	207%	5600	0.76
P2	Mulago Hill Road	2327	5318	129%	5600	0.95
	Makerere Hill Road	2188	5878	169%	5600	1.05
C18	Makerere Hill Road	1112	3120	181%	5600	0.56
	Makerere Hill Road	1204	5300	340%	5600	0.95
	Balintuma Road	502	4205	738%	5600	0.75
	Balintuma Road	338	3672	986%	5600	0.66
	North of Natate Road		3477		5600	0.62
	South of Natate Road		3554		5600	0.63
	Nabunya Road	467	3298	606%	5600	0.59
	Nabunya Road		2454		2500	0.98
	Masaka Road to Entebbe Road		1439		2500	0.58
	Entebbe Road to Makindye Road		1439		2500	0.58
	Makindye Road to Gaba Road		1146		2500	0.46
	Gaba Road to Press House Road		2041		2500	0.82
<b>Jinja Road - Entebbe Road - Queensway - Masaka Road</b>						
C1	Jinja Road	1822	1668	-8%	3000	0.56
C25	Jinja Road	2687	4498	67%	3700	1.22
C11	Jinja Road	3374	4608	37%	3700	1.25
P9	Jinja Road	2350	2510	7%	3700	0.68
P7	Entebbe Road	1997	2604	30%	2800	0.93
P16	Entebbe Road	3865	4714	22%	4000	1.18
C9	Queensway	2065	2365	15%	3000	0.79
P22	Masaka Road	1007	1704	69%	3000	0.57
C4	Masaka Road	810	1350	67%	3000	0.45
<b>Inside the Ring Road</b>						
C10	Katwe Road	1454	3456	138%	3500	0.99
C13	Kampala Road	3292	3557	8%	4000	0.89
C15	Bombo Road	2484	3348	35%	4000	0.84
C16	Hoima Road	839	2054	145%	2500	0.82
P5	Namirembe Road	1723	1498	-13%	2000	0.75
P6	South Street	1868	2111	13%	2000	1.06
P13	Kibuli Road	1192	1467	23%	2500	0.59
P14	Nsambya Road	1672	2421	45%	2500	0.97
P15	Kibuli Road	1621	2020	25%	2000	1.01
P17	Mengo Hill Road	1478	2617	77%	2800	0.93
P18	Katwe Lubiri Ring Road	221	830	276%	2800	0.30
P19	Katwe Lubiri Ring Road	149	961	545%	2800	0.34
P20	Makindye Road	816	2148	163%	2800	0.77
P21	Entebbe Road	1923	3094	61%	3000	1.03
P23	Katwe Lubiri Ring Road	6	96	1500%	2800	0.03
P24	Rubaga Road	673	1516	125%	1280	1.18
P25	Natete Road	1265	1865	47%	1600	1.17

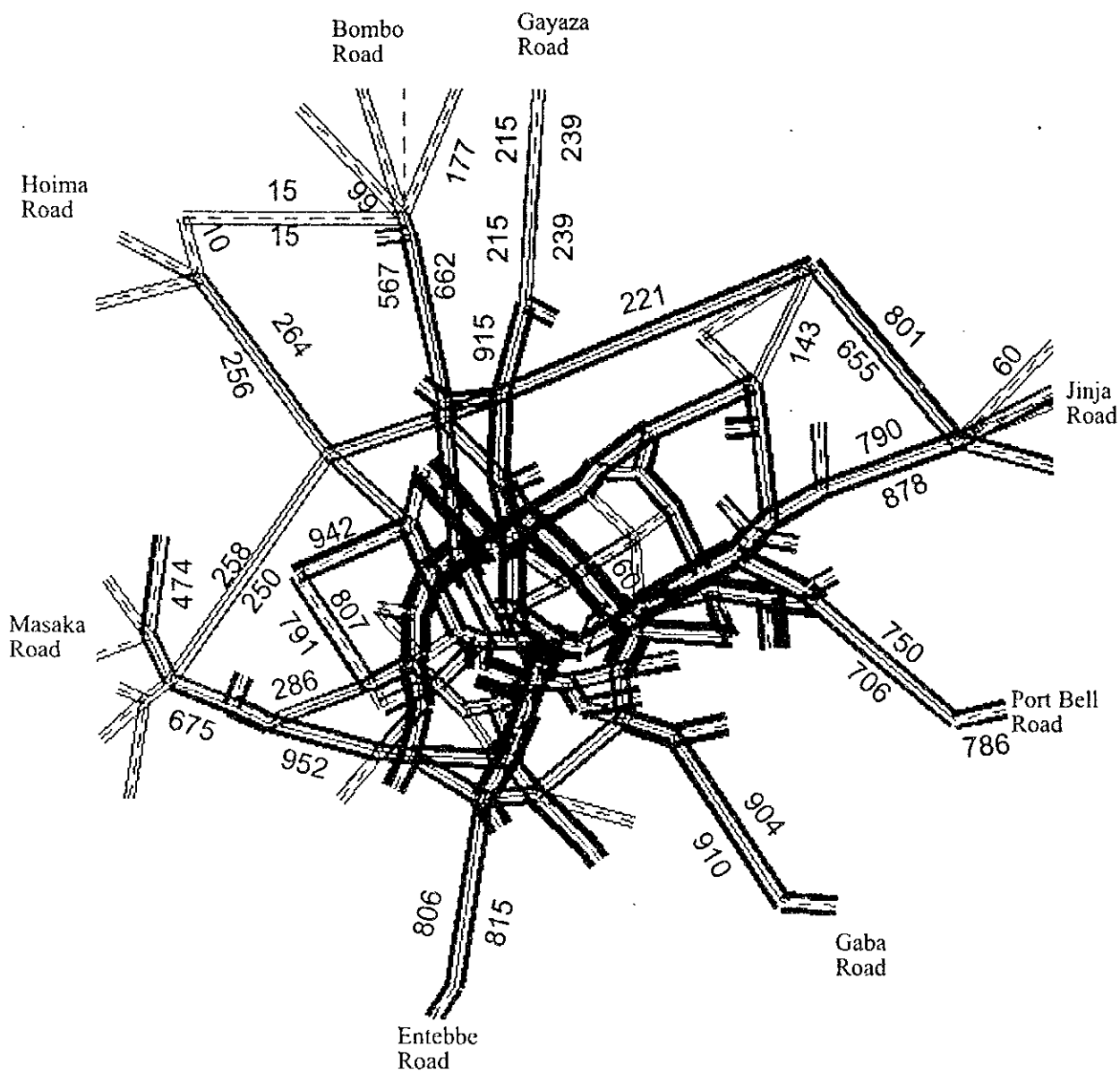
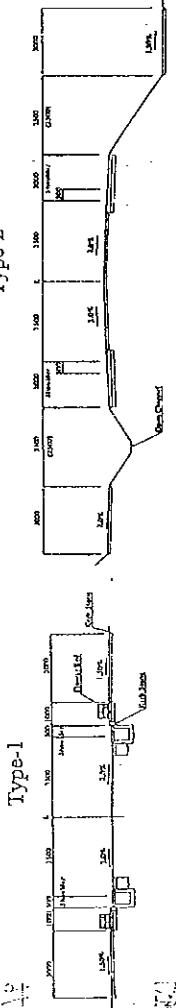


Fig. 7.2 Assignment to Proposed 2015 Network (pcu/hr)

Typical Cross Section, Unit: m.

Type-2



THE FEASIBILITY STUDY OF IMPROVEMENT OF TRUNK ROAD AT KAMPALA URBAN INTERFACE SECTION

**LEGEND**

- Reconstruction Type 1
- Reconstruction Type 2
- Overlay Type 1
- Overlay Type 2

Fig. 7.3 Selected High Priority Projects