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ROAD SAFETY IN NAIROBI

"AN ANALYSIS OF ROAD ACCIDENTS ON NAIROBI
ROAD NETWORK"

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' A THESIS SUBMITTED IN PART FULFILMENT FOR
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THIS THESIS IS MY ORIGINAL WORK AND
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EXAMINATION WITH MY APPROVAL AS
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ABSTRACT

Traffic delays and congestions are the price that towns and cities are paying as a result of inefficient streets and highway operations. This inefficiency also contribute directly to the problem of traffic accidents which kill and injure people and destroy property.

The main causes of urban congestion delays and conflicts resulting in road accidents appear to be overcrowding of population and economic activities into small areas of land with land uses that have maximised transport requirements. The concentration of employment and other activities in the central area of cities create volumes of people and goods movements that become difficult to accommodate effectively.

This thesis attempts to examine the problems of road safety in Nairobi with close reference to road accidents occurring in Nairobi's road network. This is done by the use of descriptive methods with simple analysis which exposes the problem of road safety to come up with viable and implementable solutions to the problems.

The study tries to trace the causes of the road safety problem through examining such factors

as land use arrangements, number of vehicles, population distribution, the road network, the peak hour problems, the road junctions etc. These factors paved the way to closer analysis of the causes of accident, the types of accidents, the dangerous roads etc.

In conclusion the study makes it clear that road safety is a concern for everybody and that there is need to take any measures available to reduce the death tolls on the roads.

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CHAPTER ONE

1. INTRODUCTION

It is now being recognised that the interaction of land use planning, urban form and traffic technology require an interdisciplinary approach which hitherto has not been extensively applied. Many studies now undertaken in the U.K. as well as in the U.S. pay increasing attention to the relationship between traffic generation and land use.¹

The urban structure of many earlier towns developed at a time when movement of people and goods was relatively simple, and therefore resulted in streets patterns more compatible with pedestrian use and activities. Pedestrians were adequately provided for through allowing freedom of movement about the town, ease of access to buildings, free contact between people, and in many cases protection from the weather. With the coming of rapid mechanical means of transport, and the ever growing attraction of commercial and cultural activities, it has become clear that the function of existing streets have a different meaning to both the pedestrians and the drivers;² but to both it serves as a means of communication between one point in a town to another and also

1 Environmental Management "Planning for Traffic
by J. Antoniou.

2 Ibid (Page 24)

provide access to buildings. Sometimes when either the driver or the pedestrian uses the road or street for the wrong purpose without considering other road users, conflicts arise which contribute to road accidents, congestions and delays.

Traffic delays and congestion are the price that towns and cities are paying as a result of inefficient street and highway operations. This inefficiency can damage commercial activities, reduce retail sales, lower property values, ruin residential neighbourhoods, slow down community development and reduce tax revenue. At the same time they contribute directly to another more serious problem, the traffic accidents which kill and injure people and destroy property.³

One would like to ask the question, why do we have traffic delays, congestion and accidents in large towns and cities? The answer to this question is found in the fact that people's activities are found in certain distinct areas, i.e. industrial recreation, residential, shopping areas etc. When anyone wishes to shop, visit a friend, go to work, or to school or do any one of the many things possible

3 Highway Research Board N.R.C. (Godon Sessions)
"Getting the most from City Streets".

in a town, it involves making a journey. In order to make a journey one needs to have:- A means of transport by which he can move like, bus, car etc; a route or channel along which one can move on, like road etc, and access to these channels which is relatively easy except for railways and motorways.⁴ In every city people are involved in many movements which create many conflicts. Many of the traffic problems of today arise from the fact that people are trying to squeeze great volumes of vehicular traffic into street layouts which were almost all built before motor cars came into wide use. The problem today is how to cope with the phenomenal growth in private car traffic, the influx of rural people into city and how to reduce the pedestrian and vehicular traffic conflicts which results in all kinds of accidents. //

It is true that everyone of us will agree that there is a need to reduce and prevent road accidents, but on the other hand very few of us realise how urgent this need has become. A lot has been done and much has been achieved in developing new techniques and ideas conducive to road safety. But unfortunately, the scientist, the planner, the road engineer etc have all been unable as yet to substitute

4. Landscape in towns by J. Forbes.

the human brain and its peculiarities. As a result these experts cannot give a hundred per cent safety warranty to all their ingenious devices. And this is where the 'system' falls down.

Every road user think himself or herself better than anybody else, and rarely do they think that they can cause a road accident or contribute to it. Again many of us think that our journeys, as we use the road, are the most important and very urgent, and that anybody else is trying to obstruct our way and as a result we try to make haste to reach our destinations in time disregarding any road markings or any traffic laws and regulations unless we see traffic policemen or we come across a road accident. When we come across a road accident some of us are horrified, grieved if they are fatal or serious injury cases; others do not even care or even take notice of what may have happened and pass on to reach their destinations. On encountering such an accident some try to drive carefully, others try to explain how the accident may have happened blaming and finding faults with the persons involved in the accident. And for a few miles and for a few minutes they use the road rather carefully as the accident scene is still in their minds. But sooner or later they forget what they had just seen a few minutes, hours or days ago and they begin to drive carelessly, cross the road carelessly and even make very unnecessary and dangerous obstructions to cause yet another accident. If

they escape unhurt they say they were very lucky, if they get maimed they were unlucky and they learn from experience, but if they die, they do not realise their mistake, but the nation, their relatives and friends laments and cry over their misfortune and sooner they are forgotten and the road safety problem continues.

All over the world, man's inhumanity to man takes place in different ways and in different areas of life, but an excellent example of this inhumanity takes place on our roads daily even hourly, and non of the drivers, motor cyclists, pedal cyclists pedestrians or any other road user seem at all worried about this dreadful state of affairs. The approach to the road safety problem must be positive and constructive. Defeatism need not have any place in our thinking when considering the basic element of existence. Motor vehicle transportation is an intergral part of the social, economic and political life of the country and road safety is inseparable from efficient highway transportation. There is no more tragic waste of human lives, no more unnecessary background to human suffering, no more needless source of economic loss than traffic accidents. Needless because a completely adequate traffic safety programme of national and local governments fully supported by the people both through organisations and as individuals can bring down and hold down the highway casualty list. Expe-

rience from other parts of the world proves that such purposeful all inclusive program of traffic will however lower the accident rates.

As a result every organisation of national state and local scope has a stake in road safety for humanitarian and economic reasons.⁵ The use of the systems of streets and highways touches everyman, woman and child in the nation. Road users are not confined to drivers of passenger cars, trucks, buses or other public transportation vehicles or even to passengers. The incidence of responsibility is no less wide. This is not a matter of which it can be said that it is the job of the central government or of the provincial administration or of local authority. All these as well as every other body and every individual who can make a contribution to the prevention of road accident has a duty to make that contribution and should be afforded opportunity in a nation wide organisation to make, otherwise the alarming death tolls will continue to swell up on our roads.

2. THE AIMS OF THE ROAD SAFETY RESEARCH

Road safety research is the study of the road and traffic system in any of its aspects with the

5. Traffic Engineering by T.M. Matson McGraw Hill Book Inc. 1955.

ultimate goal of finding ways and means of reducing the number of road accidents or their degree of severity. This aim can be pursued directly by employing the experimentation and observation of new ideas and devices. Or indirectly one may proceed, and this is characteristic of scientific research, by more fundamental investigation which aim at building up and understanding the phenomena concerned. In this study the indirect approach is followed in an attempt to diagonalise the problem, its causes, its nature and its magnitude in order to suggest ways and means of preventing or reducing it. The developing body of fact and explanation thus obtained is of value not only to the research worker as a guide for further research, it forms the basis of practical conclusions which he draws and which can guide the policy maker when he considers possible measures to increase safety on the roads.⁶

In this study an attempt is made to examine the relationships between traffic generation and land use; the street or road patterns and the movement patterns and modes of transport in Nairobi. This will lead to a look at traffic volumes on various roads, the conflicts arising.

6. Road Research Laboratory. Research on Road safety. H.M.S.O., 1963 Pg. 1.

As a result of peak hours congestion the roads are clogged up with vehicles and pedestrians trying to reach their working places, schools, or business areas and in the evening peak in trying to get to their residential areas. Because of these restricted (by time) and confined (by channels) movements, there are a lot of conflicts arising between the various road users, like vehicles, pedestrians, cyclists etc. This leads to an examination of the types of accidents occurring, places where these accidents occur; who are the casualties and what types of casualties results in these accidents.

This will bring out the black spot areas or very dangerous road sections where accidents are very frequent. This calls for an examination of the causes of accidents in these dangerous areas in attempt to look for remedies to the problem.

Finally the aim is to suggest remedies to the road safety problems in Nairobi, either through planning measures or control measures.

3. THE NEED FOR THE RESEARCH

Research is needed because the work of reducing and preventing the number of accidents presents many technical problems which require more than common sense and common knowledge for their solution. Furthermore many un-tested views are frequently in disagreement as to the important causes and desirable remedies. Many ideas are put forth and many devices are suggested which are worthless.

If reliable information is to be obtained observation and experiment using the techniques that have been developed in scientific work are frequently essential. Moreover the problem of road safety is not static as we advance in one direction we raise fresh problems in other directions. For example, the motorway in many respects, the safest type of road yet devised, raises development problems of signing lighting, surfacing etc.⁶ Some accidents due to very high speed or highway monotony are especially prominent on such roads; tyre bursts due to overheating at high speed, multiple collisions and accidents thought to be due to drivers falling asleep. As each road or street is constructed, embodying the lessons learned from its predecessors, it is found that it could have been built better

6. Road Research Laboratory Research on Road Safety H.M.S.O. 1963 Pg. 2.

and safer if certain facts had been known or understood before hand.

Road safety research is of considerable importance to the social and economic welfare of the country. When a lot of money is being spent on the road and traffic system, and as many calls and appeals have been made to reduce road accidents it is of great importance that such money should be spent as effectively as possible. Research on traffic and safety should substantially contribute to this end. The more information there is available to guide the development to come the smaller the toll of accidents and the need for extra expenditure to rectify errors.⁷ If by implementing a research proposal and recommendation at least five souls or persons are saved, then the research is worthy undertaking.

4. LIMITATIONS OF THE STUDY

As stated earlier, traffic improvements begins with records and without accident records traffic safety programmes are based largely on opinions. The accident record systems is normally established in the traffic ⁶division of the police department which does

7. Richards B. New Movements in Cities

the original reporting and investigation. Some of the data they collect however is of no direct interest or use to the police themselves and one can sympathise with the reluctance of the small force when asked to undertake extra work of this nature on behalf of other bodies. This leads to a lot of inaccuracy in the data and sometimes incompleteness of information. The other problem with the data is that the records on the spot of the accident is so general and not specific and hence no good picture of the accident spots can be accurately obtained. Sometimes only the road along which the accident occurred is mentioned and not the exact location of the accident. This is the major limitation of the study.

Again because of the enormous scope of the subject, it cannot be fully tackled in the short time given for the completion of this thesis. Lack of finance is also another limitation. Due to little finance some very important but extensive time consuming and money consuming surveys could not be carried out, and as a result some analysis and testings could not be carried out. For this reason only secondary sources of data are consorted. Another limitation to the study is that no engineering solutions to the problems have been provided. As a result we try to deal with those planning problems from a physical planners point of view, and the social problems. In other words, the study diagnosis

the problems facing the people of the city and proposes some actions which would be taken to solve or reduce these transportation and especially safety problems.

5(a) STATEMENT OF HYPOTHESIS

The following research hypothesis are to be tested in an attempt to establish why certain roads and spots in the city are very dangerous and why so many accidents occur where they occur.

(i) That the large number of road accidents in Nairobi are related to the land use arrangements. As land uses generate traffic movements, peak hour problems give rise to traffic conflicts and frictions resulting in road accidents.

(ii) Road accidents are directly proportional to the number of vehicles and the population exposed to these vehicles. In that we find that pedestrian accidents which are majority in Nairobi are high in areas of high density population densities and low income areas.

(iii) The major arterial roads leading into Nairobi on which Matatus and country buses operate have the highest number of accidents, and

(iv) That road junctions and intersections have high number of accidents and especially in the central area because of undue care by road users,

entering or leaving the junctions and intersections.

5(b) RESEARCH ASSUMPTIONS

In this study several assumptions are made, which include the following:-

1. Population growth continues in the same rates as today.
2. Car ownership and vehicle numbers continue to increase in the same rates or more.
3. The central area and the industrial area will continue to be the main employment and activity areas - attracting most of the pedestrian and vehicular traffic.
4. Pedestrian routes in the central area of Nairobi are related to the location of the major land uses, and that all the terminus of buses and Matatus will continue to be generation points for pedestrian traffic.

DEFINITION OF TERMS USED IN THE STUDY

A Traffic Accident - is a failure of the road-car driver, pedestrian system to perform one or more operation necessary for completing a trip without damage or injury.⁸

8. Traffic Engineering Handbook by J.E. Baerwald Pg 241.

Vehicles in Use - Total vehicles in use were taken to be the sum of cars, buses, vans, and pickups, lorries, minibuses special purpose vehicles, motor cycles, and autocycles, 3 wheelers and trailers.

Fatalities - Deaths resulting from road accidents, if the victim died on the spot or within 30 days of the accident.

Injuries - The reported number of persons seriously or slightly injured in road accidents

Casualties - The total number of fatalities and injuries resulting from road accidents.

Road Users - Any person or vehicle using the road.

Severity Index - Is a measure of the proportion of the total casualties that are fatal; obtained by dividing the number of fatal accidents by all the casualties:
$$= \frac{\text{FATAL CASES}}{\text{TOTAL CASUALITIES}}$$

City Centre - Area enclosed by the Haile Selassie Avenue, Uhuru Highway, Nairobi river and University way.

Matatus :- Is any form of a public transportation mode which starts as an unwanted mode of public transport but forces its own way for recognition as a contributory system to urban transportation.

ORGANIZATION OF THE STUDY

The study falls into five chapters which are

organised as follows:-

In Chapter One, a general introduction into the road safety problem is attempted. Then the need for the study is examined by stating the aims of the study and the approaches adopted in the study. This is then followed by a statement of the major limitations facing the study and why they pose problems to the study. A statement of the hypothesis or assumptions and definition of terms used in the study follows before reviewing the related literature to the problem and the chapter closes with the statement of the methodology and data collection methods adopted in the study.

In chapter two attempts are made to come more closer to the problem by examining the position of Nairobi in Kenya, the transportation network, land uses, peoples movement patterns, motor vehicles numbers and movement patterns on the Nairobi road network, the peak hour problems and then the problem of road safety in Nairobi is examined. After the problem is examined its magnitude is also brought in, and this is highlighted again by looking at the road accidents as a cause of death. This concludes chapter two.

Chapter three examines the problem in 'situ' because here, the causes of accidents are established first generally and then in Nairobi's context. The

types of accidents and the casualties are also examined followed by a look at the types of vehicles involved in the accidents and also by a look at the places where these accidents occur. This chapter exposes the problem in Nairobi, its magnitude, type, where it occur and calls for action.

Chapter four tries to discuss the problem of road accidents as contributed by land use arrangement to see what role land use configuration plays in road safety problems. Road accidents are also examined in relation to the number of vehicles, the population exposed to danger, and also the problem is examined as contributed by matatus and country buses and especially on the main arterial routes entering Nairobi. Finally road accidents are examined in various inter sections and junction which are supposed to be contributed to by the road users failure to pay due attention to the highway code.

Chapter five is one of conclusions and recommendations. First a synthesis of the findings of chapter four followed by conclusions derived from the findings. Finally policy formulations, suggestion and recommendation, and the study closes by suggestions for further research in the field of road safety.

LITERATURE REVIEW

Road accidents occur all over the world, but each country treats them as a problem peculiar to itself, which it then tries to solve in isolation or in its own way. The only common factor seems to be the firm conviction that strict laws are the most important part of the solution. Attempts have been made to take some actions in order to reduce or prevent the increasing numbers of road accidents in countries of the world.

In Kenya and in Nairobi as well, not much has been written on transportation 'per se' except as part of the general appraisal of development progress or as part of the general geography of the area. One of the most outstanding contributions to the understanding of the road transportation of Nairobi is the recent work by Nairobi Urban Study Group⁹. The N.U.S.G. describes the city as the focus of a series of radial roads from all parts of the country. The radial roads are well connected by a system of ring roads in all parts except the northern parts. The city buses are the most important means of public transport. But because of the poor organisation of

9. City Council of Nairobi. Nairobi Urban Study Group 1973 "Nairobi Metropolitan Growth Strategy Vol. 1 and 2.

taxi services, a big number of unlicensed taxi (matatus), which compete both with the city buses and the licensed taxis are being operated. Trip making in the city shows that the majority of people in Nairobi still travel on foot. The study points out that the major road transport problems are peak hour traffic congestion and the inadequacy of parking in the central area.

Morgan has outlined the historical evolution of the roads in Nairobi and in relation to transport planning problems he saw the ridges and valleys of the Upper Nairobi as presenting difficulty of accessibility to the central area and hence are important factors influencing the pattern of road transport development.¹⁰

People living in the Eastlands have transport problems during the morning and evening peak hours, wrote Walmsley some 21 years ago. He also noted further that in the western parts of Nairobi bus routes are widely spaced as the routes connect residential areas with the city centre but not with one another. According to him a well developed pattern of inter-connecting roads are to be found in the northern suburbs, but there is lack of direct bus routes

10. Morgan W.T.W. (ed) 1967 Nairobi City and Regions, Nairobi Oxford University Press.

connection between Eastlands and the Industrial area.¹¹

It was Soja who noted the dominant position of Nairobi City in the overall transportation network of Kenya.¹² Nairobi, he noted has the greatest number of vehicles compared to any other urban centres of Kenya or East Africa and is a dominant node in the entire communication system of the country.

In the field of road safety Jacobs tried to show the changing patterns of fatality and injury rates with time. He obtained data on vehicles, population, fatalities and injuries for a number of countries over 10 years period 1958 - 1968 or as near to this period as possible. He found that there was an increase in the number of fatalities per head of population in all countries except one. Injuries per head of population rose in all countries it was seen that there was a tendency for fatality and injury rates to decrease with time.¹³ In 1972 Jacobs and Sayer showed that vehicle pedestrian accidents in Kenya were the most frequent types of accident, being over 39% of the total. The vehicle accidents

11. Walmsley R.W 1957: Nairobi, The Geography of a new town. Nairobi, the Eagle Press.

12 Soja E.W. 1963: The Geography of Modernization in Kenya. Syracuse Geography Series No. 2.

13. Jacobs G.D.: The need for Road Accident Research in Developing Countries 1977 RRL Report 546.

accounted for 18.2% and the single vehicle accidents were 27.4% of the total. Accident in rural and urban areas analysis showed that most accidents involving a vehicle and a pedestrian, cycle or motor cycle occurred in urban areas, with vehicle accidents divided almost equally between urban and rural areas.

Almost 75% of all single vehicle accidents occurred in rural areas in Kenya. They also found that the greatest number of accidents and casualties occurred in Nairobi province, which also had the lowest ratio of casualties per accidents.¹⁴

In another paper (unpublished) Jacobs revealed the fact that the cost of accidents as a percentage of the 1965 G.D.P. in Kenya was 41.4%, which could have been lower if the 1976 G.D.P. were used. In his lecture based on this paper he showed that 50% of the total number of road accidents in Kenya took place in urban areas. 60% of all cars in Kenya were based on Nairobi with less than 10% of the Country's population. In comparison with other towns they found that the casualty rates in Bombay, Nairobi and Mombasa were 800,400 and 350 persons per 10,000 of the population respectively. The fatality rate for Nairobi was 40 per 10,000 vehicles

14. Jacobs G.D. and Sayer A.I. Road Accidents in Kenya RRL Report 227.

and 38 for Mombasa. ¹⁵

According to Situma, matatu accidents in Nairobi are mainly due to unroadworthiness of vehicles unnecessary competition with the buses and the incompetence of most of matatu drivers.¹⁶

From other peoples experience in many parts of the world, we find that the answer to road safety problems lies in action. For example the application of sound traffic engineering and planning measures like spot-locations e.g. in Metropolitan New Orleans there had been 64 accidents in one year at a major intersection on the basis of traffic engineering study. The intersection was rechannelized, signalization was improved and left turn bays were provided. Following year accidents reduced to 27.¹⁷ In Denever, conversion of a two way major street to one way operation permitted improvement in speed up to 7 miles per hour.

Professor Smeed found that the percentage change of licensed motor vehicles from year to year has been fairly constant in the countries that provided data (Netherlands, Israel, Italy, Austria, France, Belgium, Sweden, Great Britain, Germany

15. Jacobs G.D. Accidents in Kenya - Lecture on 16th - 17th Feb. 1977.

16. Situma I.W. The 'Matatus' Public transport of Nairobi 1977 (unpublished report)

17. Gordon M. Sessions. Getting the most from City Streets Highway Research Board, H.R.C. (Pg. 1)

Federal Republic, New Zealand, United States, Poland, Switzerland, Australia and South Africa). These rates varied from one country to another and the rate tended to increase with countries with low motorisation. Casualty rates and fatality rates tended to increase and he also found that there was one decrease for every three increases.¹⁸

METHODOLOGY AND DATA COLLECTION

The methodology used in this study is that of close examination of the problem from a broad world survey, then in the developing countries and finally in Nairobi through the help of what other people have done. The examination of the road safety problem in Nairobi helps in the understanding of the causes of the problem which are then tested and analysed to see what can be done to solve the problems.

In the study the data used is from secondary sources. Nairobi and Kenya as a whole has a high standard of road accident data collection with road accident involving personal injury reported by the police using a form known as P41. These forms are stored in every police station but every traffic division in Nairobi and Kenya has to submit its monthly accident returns to areal headquarters. Throughout August 1977 all the traffic police divisional headquarters in

18. Smeed R.J. Variations in the patterns of accidents rates in different countries and causes (O.T.A. study week).

Nairobi were visited and all the information recorded in the P41 forms and P69 forms were copied checking for duplicated cases or wrongly recorded accidents.

The information taken down included roads where the accidents occurred, the spot, date of accident, day of accident time, type of accident, severity of the accident, class of road users, age of road users, severity of injury and types of vehicles involved.

As for the number of vehicles the central bureau of statistics was visited and the number of vehicles for Kenya and for Nairobi registered each month were copied. For traffic volumes the City Council and the Ministry of Works were visited to gather volumetric counts on the major roads, streets and intersections. Close observation of the black spots and dangerous roads were done. Also some close discussions with senior traffic officers were done to get their views to the problem in Nairobi.

These statistical details form the basis of our knowledge of the accidents that have occurred and the various factors which have led up to them. The difficulty is to arrive at correct conclusions regarding any one accident. But certain analysis are carried out in the study such as number of accidents during daylight and during darkness, the number and types of casualties, the dangerous roads and spots. The ages of road casualties etc.

After these analysis, attempts are made to find out planning implications and solutions to road safety problems and also some control policies are suggested.

CHAPTER TWO

FACTORS CONTRIBUTING TO ACCIDENTS IN NAIROBI

Certain features of the transportation system in Nairobi stand out as contributing to the many road accidents reported every year. Some of these features are more important than others and if well studied, and appropriate remedial measures taken some of the road accidents would be prevented. For one to understand the road safety problems in Nairobi, certain features of Nairobi and its transportation system need to be fully understood. These includes Nairobi's position in Kenya - which has made it to attract most of the urban population, trade and commerce, most of the vehicular traffic, and most of the industrial activities. Its position as the capital city, administrative, commercial and industrial centre has given it a very complex movement pattern, both for vehicular and pedestrian traffic.

Nairobi's land use pattern also comes out as a major contributor to traffic problems in that, most of the daily activities revolve around, residential areas - the central area and the industrial area. We therefore find that almost all workers have to proceed to the central area or to the industrial area from their residential areas and also from the surrounding

districts. This plus restricted transportation network and peak hour congestions make movements quite difficult and because, both vehicular and pedestrian traffic move at the same periods we find many conflicts on the roads resulting in road accidents. This is so because of the fact that, as most of the people work or have their business located either in the central area or in the industrial area, the traffic volumes (both vehicular and pedestrian) increases as we get to these two areas.

We also find that as congestion increases, traffic conflicts increases and most of the roads leading into these two areas work beyond their capacities due to increased vehicles. These features of Nairobi's transportation network have greatly contributed to the many road safety problems. What follows in this chapter is a specific description of these factors which directly or indirectly are seen to contribute to road accidents in Nairobi.

2.1 NAIROBI IN ITS NATIONAL CONTEXT

In 1899 Nairobi was established as communication centre and the headquarters of the provincial administration when the railway depot was established. In 1905 it became the capital of Kenya with a population of 10,000. From here the size and the importance of the town increased steadily and it became a muni-

cipality in 1919.

After Independence in 1963 its boundaries were extended from the 'Old City' area of 90 square kilometres (35 sq. miles) to include an area of 690 square kilometres (266 sq. miles) including Nairobi's peri-urban settlements and certain other important features like the Game Park, Embakasi Airport etc. Refer map 2:1:1 showing Nairobi boundary extension.

In its national context, Nairobi is linked to Western Kenya by the heavily used trunk road and rail route via Nakuru. In addition to the railway link with the coast, the city is connected to Mombasa by an all weather road. It is linked to the northern parts of Kenya and the densely populated central province by another trunk road, passing through Thika, Murang'a, Nyeri, Nanyuki via Meru to Isiolo etc. Another link with the rest of East Africa is the new tarmac highway between Athi River and Namanga to serve Arusha and the Nairobi-Ethiopia highway now under construction. Nairobi has developed as the commercial and air communication link of East Africa. Its developing facilities for handling modern air crafts at Embakasi ranks the airport as one of the leading International Terminal in Africa.

Nairobi as the administrative, financial, Indus-

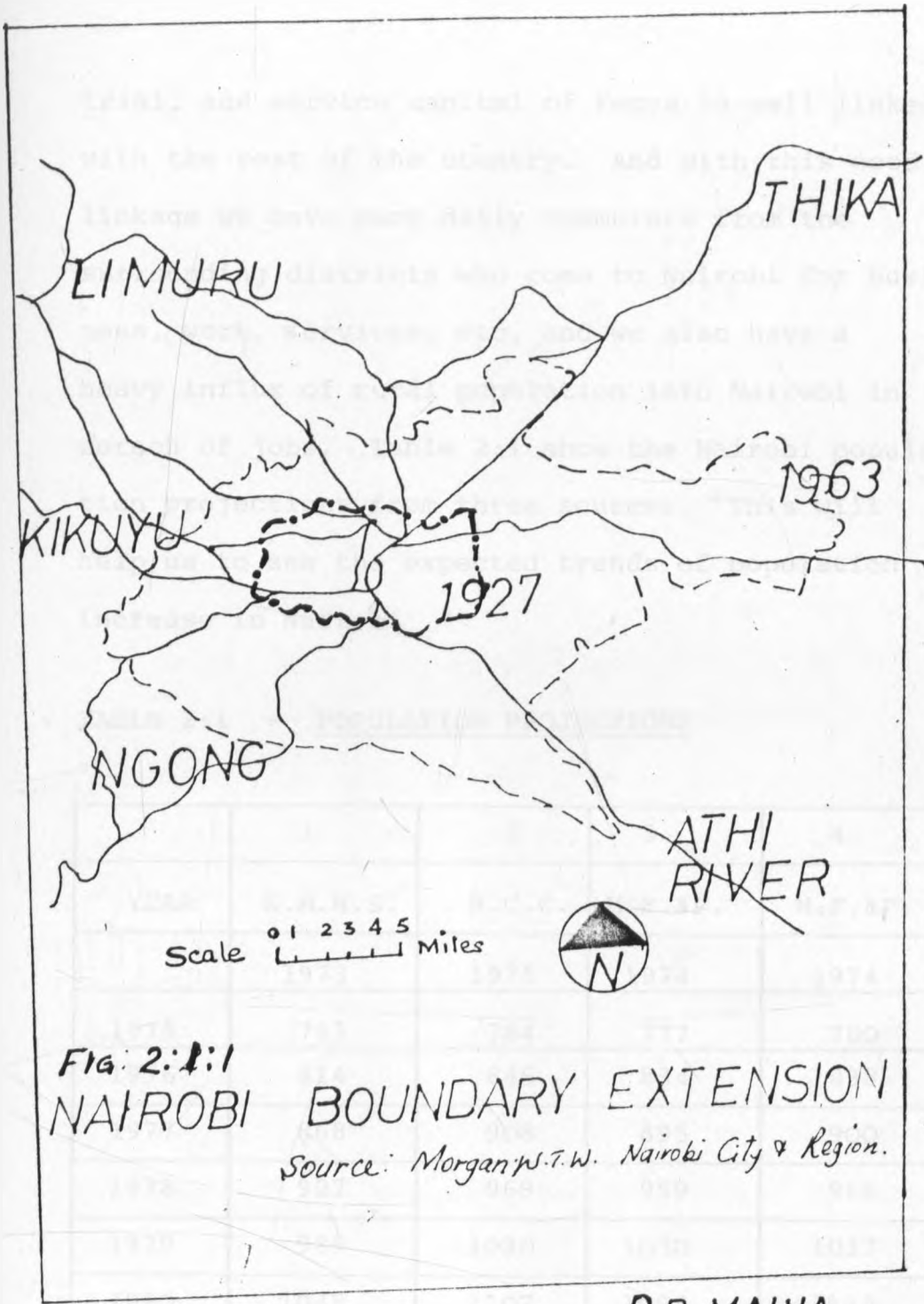


Fig. 2:1:1
NAIROBI BOUNDARY EXTENSION

Source: Morgan, W.T.W. *Nairobi City & Region.*

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trial, and service capital of Kenya is well linked with the rest of the country. And with this good linkage we have many daily commuters from the surrounding districts who come to Nairobi for business, work, services, etc, and we also have a heavy influx of rural population into Nairobi in search of jobs. Table 2:1 show the Nairobi population projections from three sources. This will help us to see the expected trends of population increase in Nairobi

TABLE 2:1 - POPULATION PROJECTIONS

	1	2	3	4
YEAR	N.M.H.S.	N.C.C.	M.F.&P.	M.F.&P.
	1973	1975	1974	1974
1975	763	784	777	780
1976	814	845	834	838
1977	868	908	895	900
1978	927	969	959	966
1979	989	1030	1030	1037
1980	1048	1107	1098	1115
1981	1112	1188	1172	1198
1982	1179	1266	1251	1286
1983	1251	1346	1334	1382
1984	1326	1426	1424	1454
1985	1396	1517	1506	1591

- SOURCES:
1. Nairobi Metropolitan Growth Strategy
1973 Table 1.13
 2. Nairobi City Council Planning Section
1975.
 3. Ministry of Finance & Planning
EPD/SC 417/01 30/10/74 (low) 1974.
 4. Ministry of Finance & Planning
EPD/SC 417/01 30/10/74 (high) 1974.

From Table 2:1 the population of Nairobi is seen to be increasing at an alarming rate, and it can be noted that Nairobi's population will be in the region of 1,591,000 for the highest projections in 1985, while the lowest projections give a figure of 1,396,000 for the same year. The present population is approximately 800,000. It is also estimated that by the end of the century the minimum population of Nairobi will be of the order of 2.9 million, a five fold increase over the present population.

In 1969 Nairobi and Mombasa together accounted for 70 percent of Africans, 89% of Asians and 86% of Europeans in urban wage employment in the formal sector. Earnings in Nairobi and Mombasa accounted for 85% of the total of the total urban wage bill, 60% of the wage paid in the formal sector throughout the country and probably a third of all personal incomes in Kenya. Given this disproportionate posi-

1. I.L.O.: Employment, Incomes and Inequality Kenya
1972 Pg 51-69.

tion of Nairobi and Mombasa in the whole field of jobs and incomes, it is only natural that many people should migrate to Nairobi, mostly to be absorbed into formal employment (enterprises and individuals that operate economic activities largely outside the system of Government benefit and regulations) or left unemployed.

As stated by the Nairobi Urban Study Group (1970), those without work will generally be at the bottom of the income scale. But even among those actually working, there will be many with very low incomes. Since people in the low incomes cannot afford to own private cars and neither can they cope steadily with the ever increasing public transport fares, most of them will undoubtedly be compelled to walk to work or for other essential purposes. This will increase the pedestrian-vehicle conflicts and especially in the central area and the industrial area where most of the activities are concentrated. In these two areas the intense concentration of activities in relation to the available modes of travel is such that almost everybody arriving in the central area and the industrial area, (and while in there) have to walk some part of their journey. We also find that pedestrian movements are very many in high density residential area and in areas of public facilities and services like schools, hospitals, parks etc.

We therefore can say that as people flock to the activity centres in Nairobi from either within the city boundaries or from the surrounding districts very many conflicts arise as the pedestrians try to make their way to their activity centres and as vehicular traffic moves to and fro these centres. This is made worse by the fact that pedestrian facilities in Nairobi are not well provided to ensure that pedestrian trips are made safely, easily and conveniently.

2.2 LAND USES IN NAIROBI

Nairobi has a clearly differentiated land use pattern with Residential, commercial and industrial land uses taking the greatest area. It is mostly within these three land uses that that most of the activities revolve during any normal working day. This is because people move from their residential areas to their working places, in the morning, then to lunch time facilities in commercial and recreational facilities at mid-day and back to their place of work and then to their homes in the evening. It is to these land uses that most people converge and emerge at given peak hours causing traffic congestion and conflicts as they try to reach their destinations in time; through restricted (in width channels.

RESIDENTIAL AREAS:

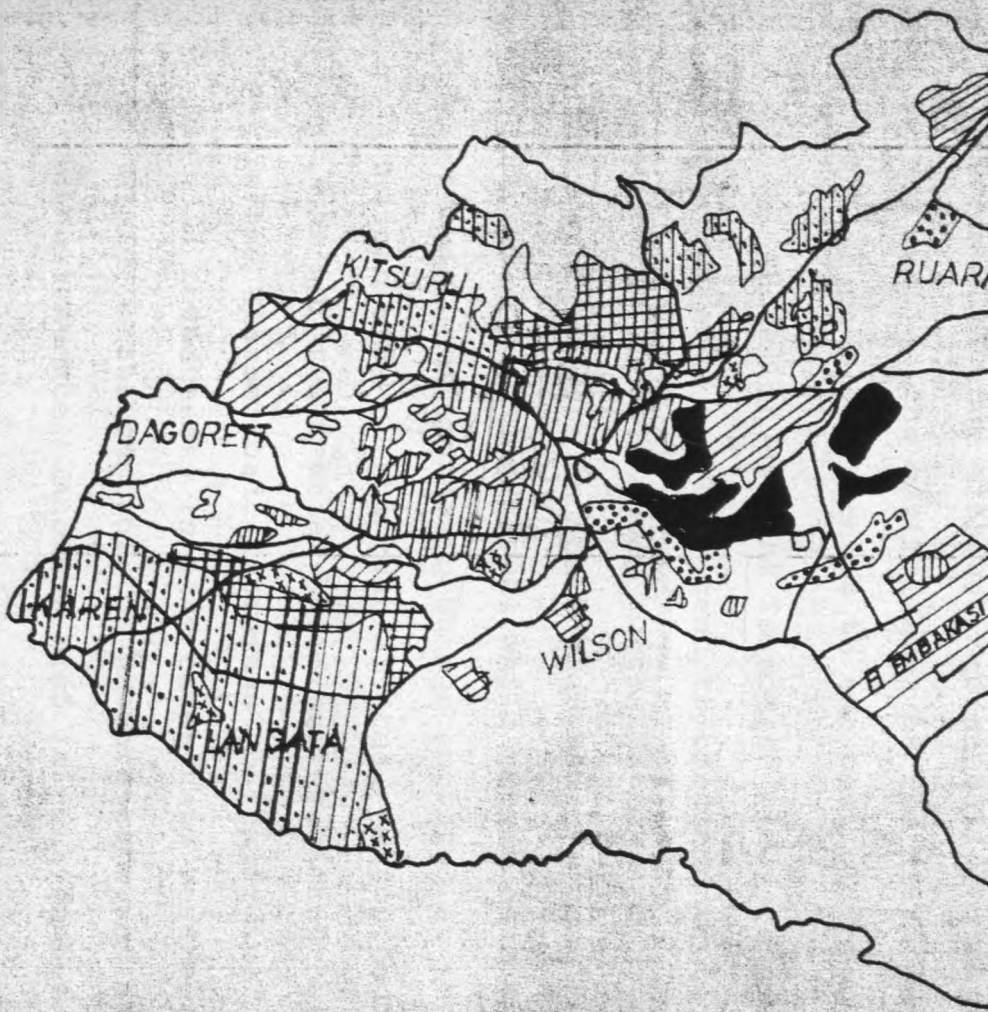
Nairobi's present population of about 800,000 people is catered for in three main types of residential areas primarily located to the north, west, south and east of the central area. The majority of Nairobi residents occupy the high density residential areas to the east and north east of the central area. These high density residential areas have population densities ranging from 10,000 persons per square kilometre to about 30,000 persons per square kilometre. Such places include Muthurua Estate with a total population of 5,634 and an area of 0.43 sq. km. giving it a density of 12,952 persons per square kilometre; Makadara with a total population of 15,375, an area of 0.53 sq. km. and a density of 29,175 persons per square kilometre. The total area of high density residential areas is about 20 square kilometres and these areas are also areas of low incomes. Because of low incomes it then follows that the residents either walk to places of work or use public transport. These areas have a population of 264,871 or 52.0% of the total population of Nairobi. The high density residential areas include - Muthurua, Shauri Moyo, Bahati, Koleni, Makongeni, Maisha, Mbotela, Doonholm, Jerusalem, Maringo, Jericho, Makadara, Mathare Valley, Eastleigh, Kariobangi, Umoja and Dandora.

The medium density residential areas in Nairobi are found to the north and west of the central area, and these areas have populations ranging from 1,000 to 10,000 persons per square kilometre. These are areas like Pangani, Ngara, Parklands in the north and West and Kibera, Otiende, Jamhuri, Langata Buru Buru, Kimathi and Harambee in the east. All the medium density residential areas occupied 84.7 square kilometres in 1969 with a total population of 193,718 or 38.0% of the total population.

The third type of residential is the low density areas which are also the high income areas. These are to be found in the extreme north and west of the central area. They include places like Muthaiga, Kitsuru, Kyuna, Loresho, Lavington, Kileleshwa, Nairobi South C and B, Karen, Langata etc. The residential density here is from 0-1,000 persons per square kilometre. These areas have an area of about 550 square kilometres including the open undeveloped areas around them. The areas have total population of 50,697 or 10% of the total population. These residential areas are shown on map 2.2.1

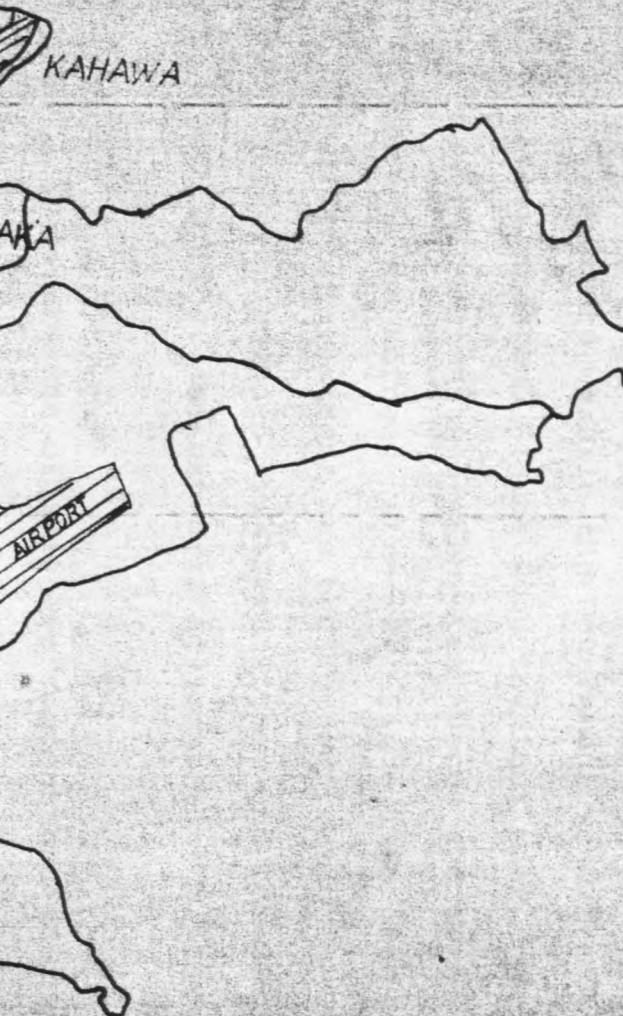
COMMERCIAL AND SERVICE CENTRES

Nairobi has a clearly differentiated central area accommodating business offices and commercial facilities, Government and the offices of the civi













ROAD SAFETY

LAND USE MAP



LEGEND

-  PUBLIC & GOV'T. LAND
-  BUILDINGS
-  FOREST
-  CENTRAL AREA
-  RESIDENTIAL LOW DENSITY
-  MEDIUM DENSITY
-  HIGH DENSITY
-  INDUSTRY
-  OPEN SPACES
-  UNDEVELOPED LAND & AGRICULTURE

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MAP NO. 2

TY IN NAIROBI"

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authorities.

Commerce activity is generally spread over the central area. Earlier concentrations of investments were in the Government Road/Tom Mboya street area and Kijabe Road together with some major investments at Kenyatta Avenue and Muindi Mbingu and Koinange Streets. Since 1968 high building investment has been concentrated in that area bounded by Wabera Street and the General Post Office, and the area adjacent to the Kenya Cinema.

Government offices are concentrated along Harambee Avenue although recent buildings are now outside the central area on the Hill Area Office complex which is to the west of Uhuru Highway.

Hotel investment is not so widespread in the central area and they tend to be concentrated in specific areas. Early concentrations of hotels investment were in the Moktar Dadah Street, Monrovia Street and College Road, while recent developments of this activity has been concentrated at the Western side of the central area. Major concentrations of residential building investment have been in the Kijabe Road, Kirinyaga Road and River Road.

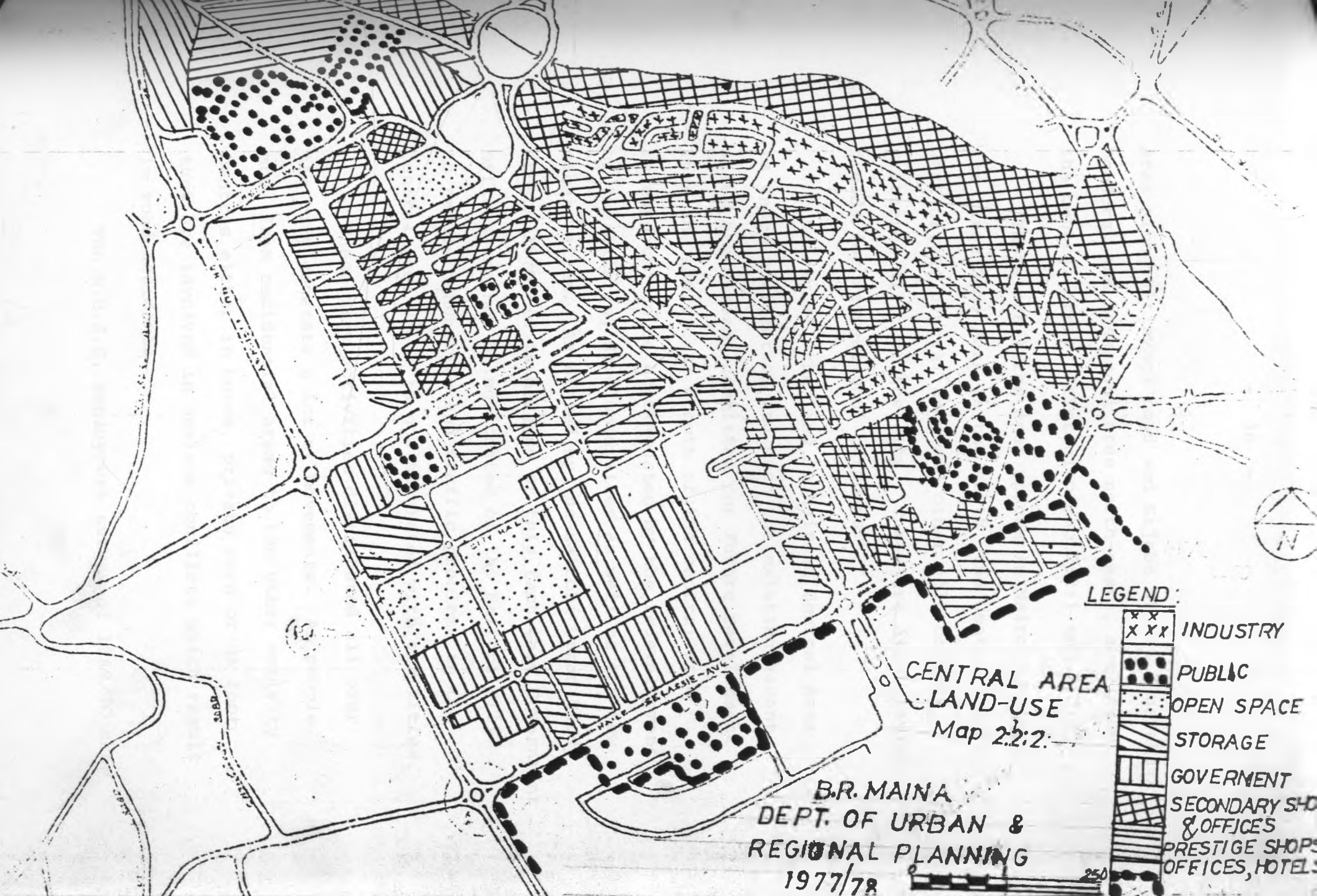
Investments in bars cafes, and restraunts are mainly to the east of Tom Mboya street and South of Luthuli Avenue. Another area is centred between

Government Road and Tom Mboya Street.

Storage facilities are found south of Haile Selassie Avenue and eastwards of the Railway Station. Others are found in Kijabe Road, Kirinyaga Road and River Road. Other activities in the Central Area include some industrial activities in the Pumwani Road, Racecourse Road, Karume Street triangle and at the northern end of the Kirinyaga Road; Public use buildings like churches, schools, etc.

A glance at the central area of Nairobi, at present, gives a picture of an attractive international centre of government and commerce, for the hotels, restaurants and specialist shops provide an aura of relatively affluence and large scale commercial activities. But intermingled into this picture are isolated open spaces or plots of apparently poor quality and inefficient property which in most cases would be under pressure for development as a result of the demands of rapidly growing city. Map 2:2:2 show land uses in the central area of Nairobi. Table 2:2 show land use statistics.

The industrial land and activities are concentrated in the level ground extending from the railway property almost to Nairobi Airport. This is the area where railway activities are concentrated. Other industrial developments are found in the central



LEGEND:

- XX XX INDUSTRY
- PUBLIC OPEN SPACE
- ▨▨▨▨ STORAGE
- ▬▬▬▬ GOVERNMENT
- ▧▧▧▧ SECONDARY SHOPS & OFFICES
- ▮▮▮▮ PRESTIGE SHOPS, OFFICES, HOTELS

CENTRAL AREA
LAND-USE
Map 2:2:2

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area along Kirinyaga road and Kijabe Street, Ruaraka, Dandora, and Kassarani area north-east , away from the central area. Refer also map 2:2:1 and 2:2:2.

There are large open spaces in Nairobi, with the large Game Park in the south, the Central Parks west of the central area and other golf courses scattered all over the city. There are also playing fields for recreational purposes.

Nearly all the land in Nairobi Central Area is under utilization and even the existing vacant sites are already committed for future development. Thus the additional growth of the central area is expected to be accommodated by the redevelopment of the existing developed sites as well as the few vacant sites. As stated by the Nairobi Urban Study Group (1970) it is because of this fact that Government offices are now being located on the Nairobi Hill to reduce congestion and traffic problems in the central area which is now saturated with activities.

These many activities distributed all over the city generate a lot of movements. As people move from residential areas to the other activity centres either in buses, private cars or on foot they are involved in serious conflicts which result in road accidents.

The N.U.S.G. employment survey of 1969/70 show

TABLE 2:2 - BUILDING USES IN THE CENTRAL AREA: NAIROBI 1967 - 1971 = M²

PERIOD	COMMER- CIAL	OFFICE	RESIDEN- TIAL	INDUSTRY	STORAGE	OTHER	PARKING	TOTAL
1967/68	272696	396573	203866	62048	147739	161991	24159	1269072
1970/71	332013	503167	243793	58979	147681	183105	58674	1517412
% Increase/ Decrease	+18	+27	+20	-5	-	+13	+102	+20

Source: N.U.S.G. 1972.

the distribution of employment in Nairobi in 1969 Table 2:3 and 2:4. The initial estimates of employment potential, by the N.U.S.G. totalled about 190,000 jobs out of a total of 650, 000 jobs projected for the whole of Nairobi City by the same year. The projections for the year 2,000 A.D. was based upon the existing trends of employment growth with additional provision for some 90,000 jobs in secondary centres. If these projections materialises the central area will have 29.2% of the total Nairobi employment by 2,000 A.D. N.U.S.G. pointed out that from experiences elsewhere this level of employment would give rise to severe problems of journey to work movements, particularly when seen in conjunction with the movement demands of the nearby industrial zone.

With this kind of employment pattern, a very complex transportation network is required to assure that people get to their places of work in time and conveniently. But in Nairobi, the road network capacity is at times overloaded and especially on the routes leading into the central area and the industrial area. This is because of the concentration of activities in these two areas which in 1972 had 44% of the City's employees.

TABLE 2:3 - DISTRIBUTION OF EMPLOYMENT IN NAIRIBI 1969

EMPLOYMENT TYPE	CENTRAL AREA	SECONDARY AREA	INDUSTRIAL AREA	RESIDENTIAL AREA	OTHER AREAS	TOTAL
Commerce	12500	1800	-	4000	900	19200
Offices	28100	-	-	18300	-	46300
Industry & Storage	5100	-	29400	26400	6500	67200
Hotel	1800	-	-	400	-	2200
Other uses	1500	-	-	27200	-	28700
Self employed	-	600	1600	4,100	3,00	9300
Total	49000	24000	31000	80300	10400	172900

*'Other sites' include Hospitals, further and higher education, barracks and prisons: Source N.U.S.G. 1970.

TABLE 2:4: DISTRIBUTION OF EMPLOYMENT BY AD 2000

EMPLOYMENT GROUP	CENTRAL AREA	SECONDARY AREA	RESIDENTIAL AREA	INDUSTRIAL AREA	OTHER SITES	TOTAL
Commerce	88100	171000	98900	5400	2600	366800
Manufacture	9900	2100	0	108000	12200	132200
Other	2000	3600	86000	5500	53700	150700
Total	100000	177500	184900	118800	68500	649700

Source: N.U.S.G. 1972

2.3 TRANSPORTATION NETWORK IN NAIROBI

Nairobi is the focus of a series of trunk radial roads connecting it with the rest of Kenya and the adjoining countries. Between these have evolved a comprehensive network of interdigitating primary, secondary and minor roads of great complexity nearly all being of tarmac surface.

The construction and maintenance of the primary, secondary and minor roads rests with the City Council, while the City Council received grants from the Central Government for maintenance of the international and national trunk roads passing through the City. Plans for the improvement and expansion of road transport network in Nairobi has been dictated by demand and cost benefit considerations.

Connecting Nairobi with the rest of Kenya are such major radial roads like, Waiyaki-Uhuru Highway-Mombasa road lines; Haile Selassie Avenue- Ngong Road; Aerodrome Magadi roads; Racecourse - Juja-Koma Rock roads; Murang'a - Thika Roads, Kiambu and Limuru road. Lateral connections between these roads are provided by the inner and Outer Ring Road systems which includes the Outer Ring Road to the east of the city centre connecting Thika Road to Mombasa Road, and to the west the St. Austin's Kingara Roads linking Waiyaki way to Ngong Road, and

Langata Road linking Ngong Road to Magadi Road with another new road the Mbagathi way linking Ngong Road to Langata Road.

The construction of new Outer Ring Roads to reinforce the existing ones has been proposed¹ N.U.S.G. 1973.

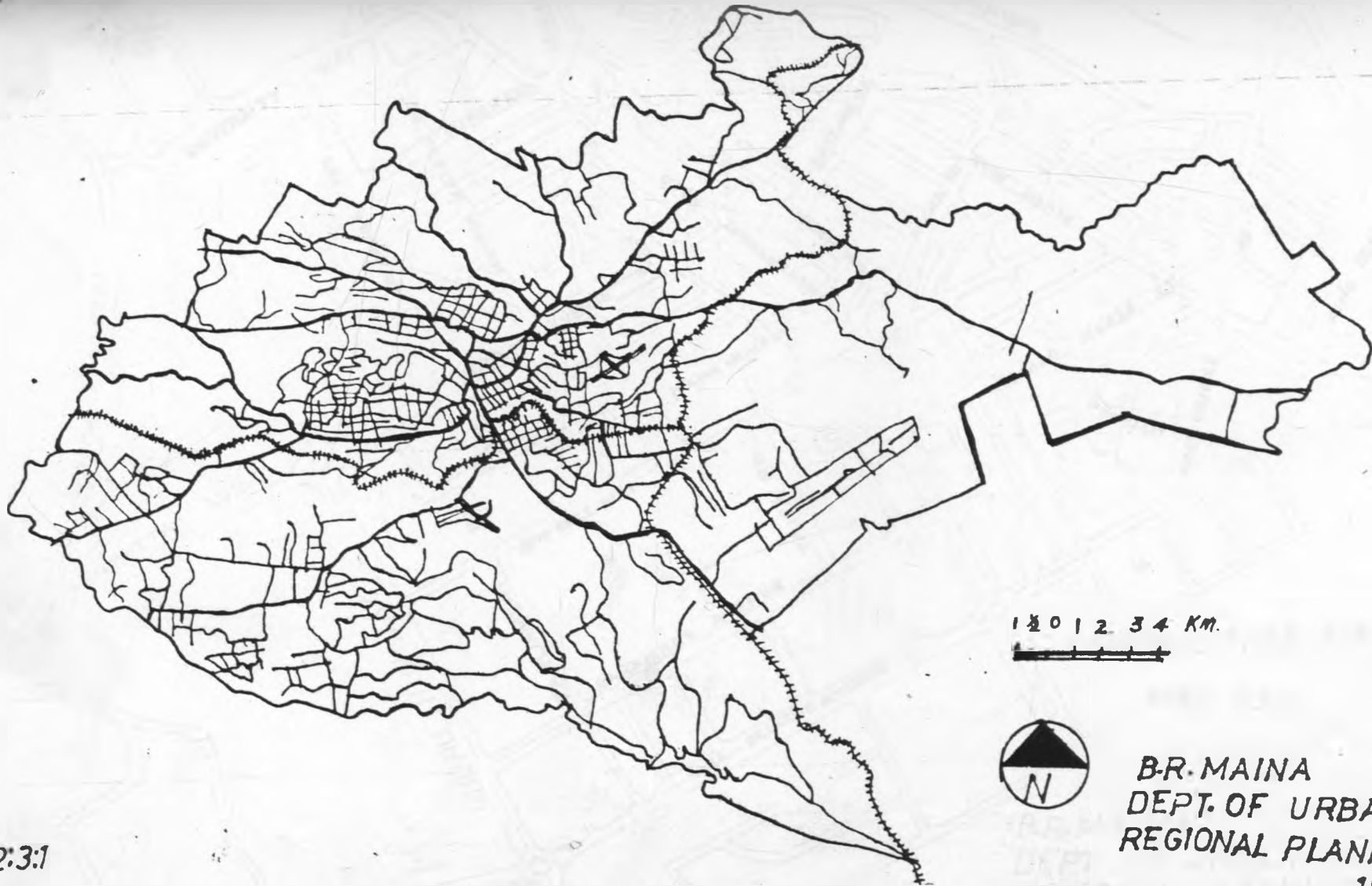
These will include the Limuru-Rosslyn Road to run across the northern side of the city and will be an extension of the St. Austins Road. The Trans-African Highway will join Kikuyu in the north-west to Mombasa Road. In the south, the eastern by pass will connect Mombasa Road near Airport to Thika Road at Kassarani.

These major highways are the backbone of the city road network structure. Linking the various parts of the city to the city centre are the many secondary and minor roads, see road network map 2:3:1.

The city centre is served with streets and roads structure of which is the gridiron layout; see map 2:3:2. In between the central streets and roads countless streets and lanes of minor internal circulatory importance providing access to shopping and other service centres in the central area.

Using the Ministry of Works road classification system we have about six categories of roads in Nairobi. These are:-

1. Nairobi Urban Study Group (Metropolitan growth Strategy Vol. 1 C.C.N.)

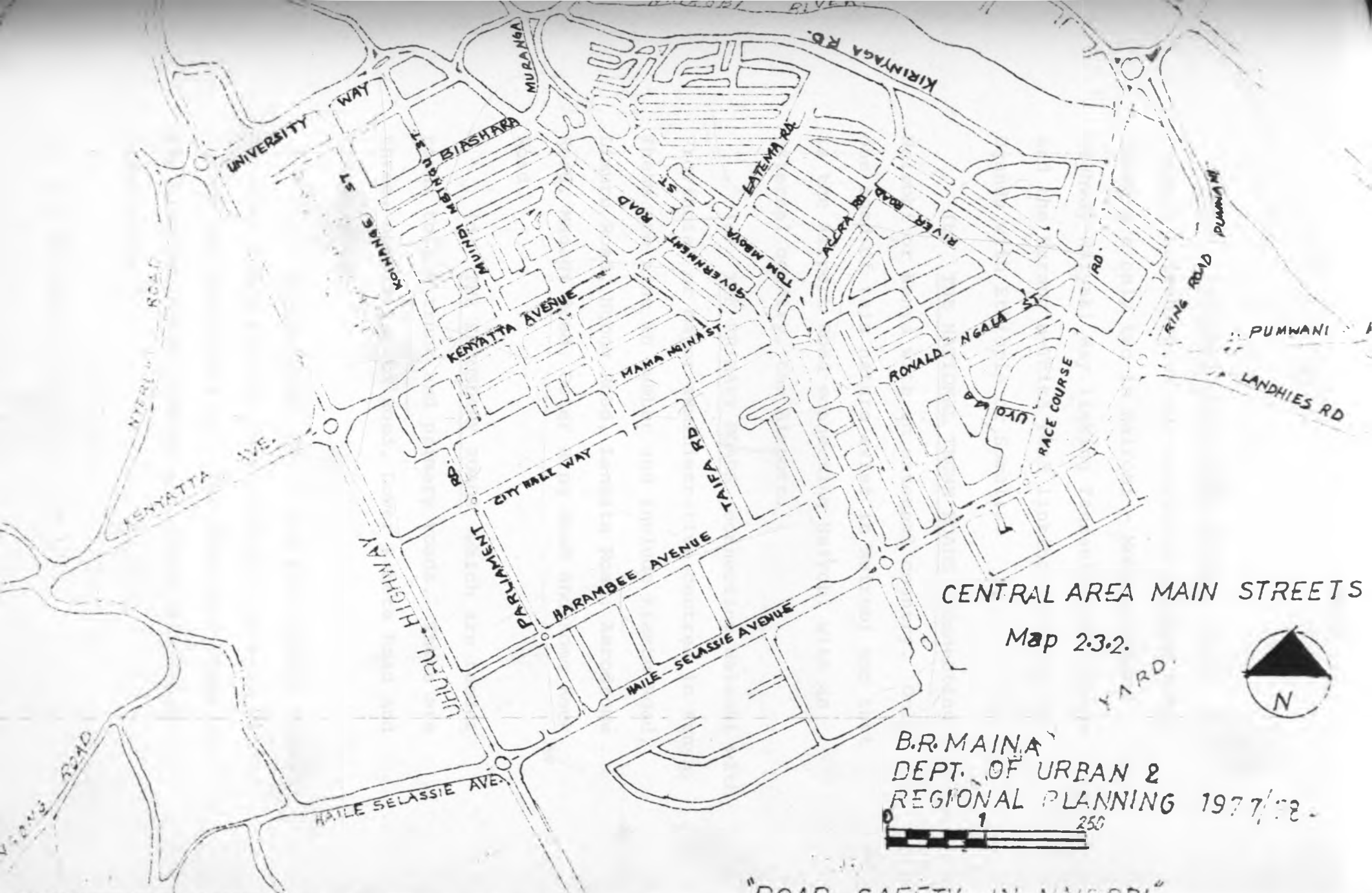


1 2 3 4 Km.



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FIG. 2:3:1
ROAD AND RAIL ROUTE NETWORKS OF NAIROBI 1976.

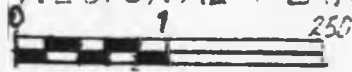


CENTRAL AREA MAIN STREETS

Map 2.3.2.



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(a) INTERNATIONAL TRUNK ROADS which connect Nairobi with two countries outside Kenya. These are only two in Nairobi - Mombasa-Uhuru Highway-Waiyaki Way linking Tanzania with Uganda and the Murang'a-Thika road linking Tanzania or Uganda with Ethiopia or Somalia.

(b) THE NATIONAL TRUNK ROADS connecting Nairobi or Kenya with an external country. Only one road of this nature exist in Nairobi and that is the Airport Road connecting Nairobi with an external country, the Airport.

(c) THE PRIMARY ROADS connecting Nairobi with Provincial or major administrative centres in Kenya. These are nine in number and include Kiambu Road, Limuru Road, Ngong Road, Langata Road, Aerodrome Road, Magadi Road, Outer Ring Road and Komo Rock Road.

(d) THE SECONDARY ROADS which are feeder roads to the trunk and primary roads. These are three, namely Kamiti Road, Lower Kabete Road and Kikuyu Road.

(e) MINOR ROADS which are also feeder roads to other roads but are basically for internal circulation and accessibility. The remaining roads in the city including streets and lanes fall under minor roads.²

(f) X-ROADS These include small roads on the peri-urban areas, some of them being only motorable tracts linking properties to minor roads. These roads may also be termed as special purpose roads and include roads serving settlements strategic places, National parks etc.

Looking at the road density, we find that there is very high road network density in the central area Ngara, Pangani, Westlands, Parklands areas, the medium density residential areas immediately to the west of the central area and in the high density residential areas of the Eastlands. Medium density networks occur in the medium density residential areas of Nairobi and in the industrial area. Elsewhere the densities are relatively low. Comparing the road density map and the road network map makes the point clearer. Refer map 2:3:3.

From the density map (2:3:3) Nairobi can be divided into three broad density zones. One remarkable feature about the zones is that they form concentric cells round the central area which has the highest road network density. This reflects the stages of the city development over the years.

The line dividing the medium to high density zones forms the low density zones show that road network development within the 'Old City' boundary took place before the 1963 boundary extension came into

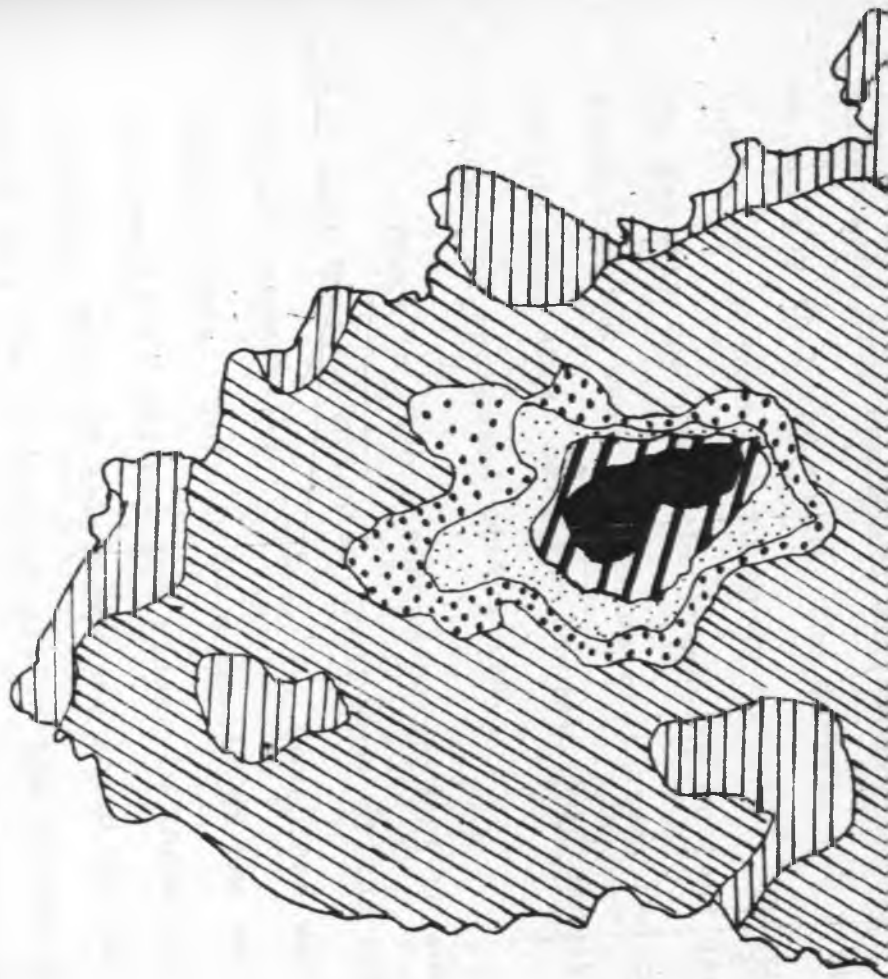


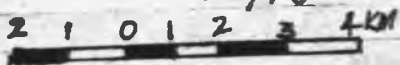
FIG. 2: 3:3

NAIROBI ROAD DENSITY MAP



	Over 80	} HIGH DENSITY
	61 80	
	41 60	} MEDIUM "
	21 40	
	1 20	} LOW "
	0	

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1976. Kilometres/Sq. km.

being. This line traces fairly accurately a central highland of road development. The medium to high road density network contours show steep gradient to the north and to the south of the central area with gentler gradients to the west and east of it.

One conclusion that can be drawn from this road network density analysis is that the road network density is closely related to land use. The high density residential areas, the commercial and cultural centre, and the industrial area having the highest road densities to serve the many people originating from there and visiting these areas. Thus we can say that the higher the density the higher the intensity of land use zones in question, and the lower the density the lower the intensity of land use. Hence central area, the industrial area, and the surrounding areas have the highest road densities; because of increased activities.

There is also a strong north-west to south east or west to east orientation of most of the roads in Nairobi especially those to the north and west of the central area. This is as a result of the general alignments of valleys and ridges in these parts of Nairobi. Most of the roads are found on the ridges with very few or none at all on the valley bottoms. Very little interconnections exist between the settlements on the ridges in the Kileleshwa, Lavington,

Spring Valley, Kyuna, areas. There is also very limited road connections between the industrial area and the eastlands from where the majority of workers commute. Only the Likoni road and Factory Road exist in this area and two bridges one in the far east at Makadara and one across the railway station.

2.4 MOVEMENT PATTERNS

From the findings of N.U.S.G. in 1970, it was evident that walk trips for all purposes dominated the modal split. 44.6% of the commuter trips were made on foot as compared to 38% by private transport and 14% by public transport with cycling having the lowest percentage. These trips were from the various residential areas, and the surrounding districts to either work, school, shopping or other useful purposes.

In 1970 the vast majority of trips, in Nairobi, fell within the range between 0 and 5 miles (8 km). The majority of walk trips occurred in the lower distance ranges, some 70% were below 3.2 km (2 miles) and 85% were below 4.8 km (3 miles). The percentage of walk trips fall rapidly with increasing distance but nevertheless maintains a significant element up to the greatest distances considered.

The major traffic generators to the central area and the industrial area are the various residen-

tial areas with the high density residential areas generating most of the pedestrian traffic and the other two residential zones generating majority of private vehicles. Various residential suburbs in Nairobi are regarded as pedestrian generators, and they include:-

Eastlands - Uhuru, Makadara, Jericho, Jerusalem, Bahati, Kaloleni, and Shauri Moyo.

Inner Eastlands - Eastleigh, Pangani, Ngara and Pumwani, California, Huruma and Biafra.

South-East - (Outer), Embakasi

East-(Outer) - Outer Ring, Buru Buru and Umoja.

North East - Ruaraka, Kariobangi, Dandora, Kariobangi South.

North East (Outer) - Kamiti and Kahawa.

North West (Outer) - Mwimuto, Lower Kabete, Gachie, Wangige, King'eero.

North - Parklands and Highridge

North West - Kangemi, Kabete, Uthiru.

West - Riruta, Dagoretti, Kwangware, Lavington

South West (Outer) - Karen, Langata

South West - Kibera, Jamhuri, Ngei, Kenyatta Hospital.

South - Nairobi South 'B' and 'C' Nairobi West, and Otiende. See figure 2:4:1.

In addition to those pedestrians who walk to the central area are those who commute by means of

public transport, like the Kenya buses, the matatus and the country buses. There are also those who come to the central area by means of private cars. And for this reason, various arrival and departure points of these modes of transport can also be viewed as pedestrian generators in the central and industrial areas. These points include the bus stops of which the busy ones are:-

- Hilton - City Hall Way
- G.P.O. (General Post Office) Kenyatta Avenue
- University Way
- Tusker - Ronald Ngara Street
- Ambassadeur Hotel - Government Road
- Nation House - Tom Mboya Street
- Extelcoms House - Haile Selassie Avenue
- O.T.C. - Race Course Road
- Cross Road
- Bus Station - Mfangano Street and Uyoma Street.

The matatus have no officially recognized stops and stages and they tend to compete with the "Kenya Bus" and the "Country Buses" and therefore utilizes the "Kenya Buses and Country Buses" stops. It is however a common site to find the matatus stopping anywhere on the streets to pick and drop their passengers and often causes dangerous traffic obstruction. Some of the arrival and departure stops within the City Centre include:-

- Accra Road
- Kaka Hotel - Race Course Road near St. Peter Clavers Church
- Near Railway Station - Government Road - Haile Selassie Avenue.
- Agip House - Haile Selassie Avenue
- Railway Headquarters - Haile Selassie Avenue
- Near Bus Station - Turkana Lane
- Opposite O.T.C.-Race Course Road
- River Road - Tom Mboya Street roundabout
- Junction of Landhies road and New Pumwani Ring Road.
- Behind the Retail Market on Pumwani - Landhies Roads.

As far as the Country Buses are concerned, almost all of them arrive and depart at the Country Bus Station along Landhies Road to the east of the central area. Railway Headquarter, Agip House, and Outside the Extelecoms buildings (all along Haile Selassie Avenue) are other busy stops for the country buses. See figure 2:4:2.

Most of the pedestrian commuter traffic to the central area of Nairobi comes from the eastern suburbs via Race Course Road, Landhies Road, Accra Road, and Murang'a Road. Other important routes include Workshop Road from the Industrial area and

Railway yards, Factory Road from industrial area, Likoni Road from the same area, City Hall Way and Kenyatta Avenue from the Hill Area Office Complex and to a lesser extent Haile Selassie Avenue and State House Road, see map 2:4:1 for pedestrian directional flows and conflict zones.

THE MODAL SPLIT - TRIP MODE:

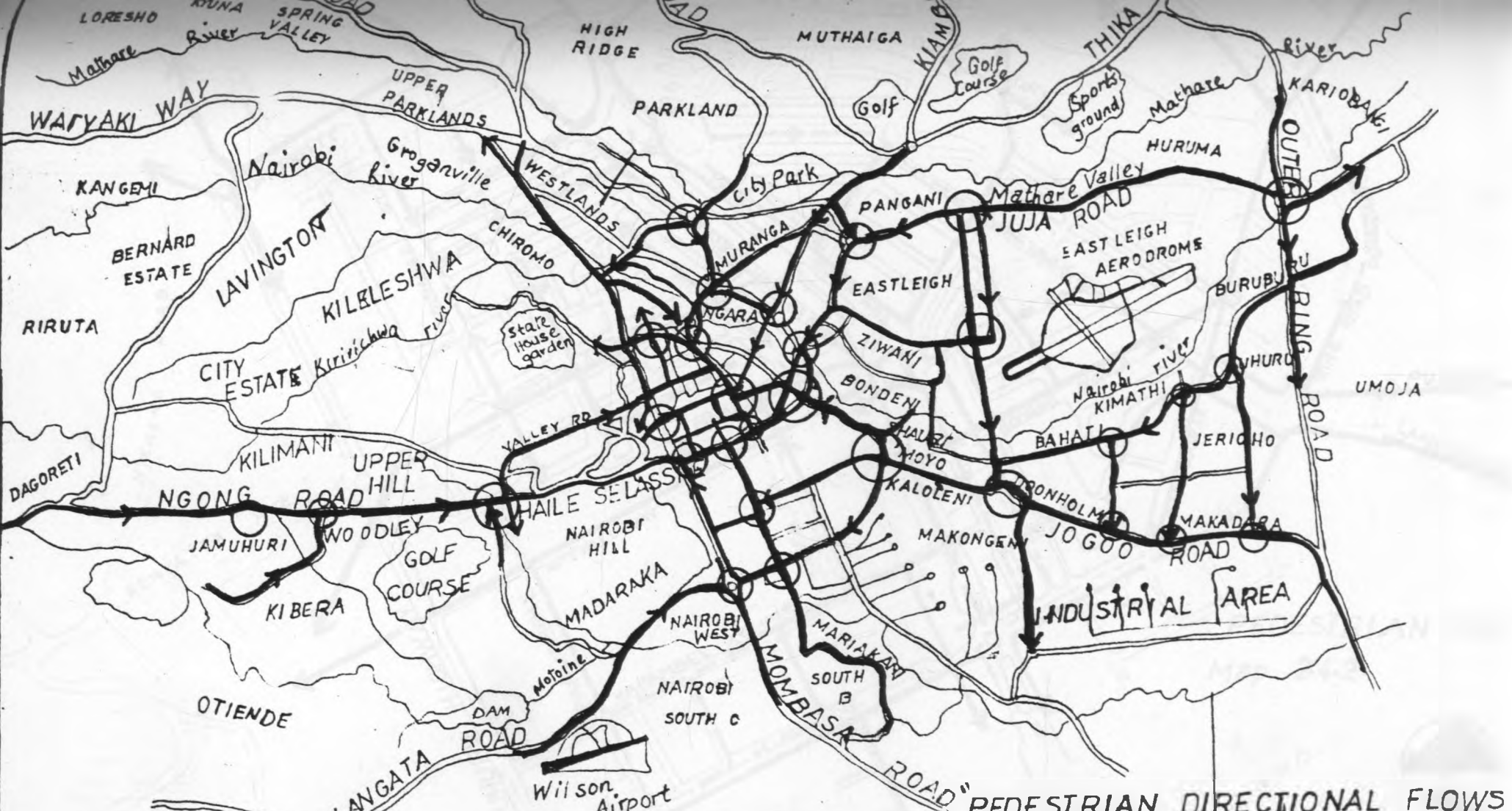
Person trips by all modes of travel in Nairobi amount to over 630,000 trips on a typical weekday. Here trip is defined as one way travel from an origin to a destination for a particular purpose and by either a person or vehicle.³

Table 2:5 show the predominance of journeys on foot overall other modes of travel. While 38% of the trips were made by private transport (cars, vans, etc) only 14% are generated by public transport and the majority of trips are made on foot 44% see figure 2:4A.

Bicycles and motor cycles account for a very small percentage of 2.6%. In Nairobi people who cannot either own or have the use of cars have to make their choice between walking and public transport.

This brings about the condition found on the

3. Nor Consult A.S. and Wilbur Smith & Associates 1974 (Mombasa Transportation Study Vol. 1)

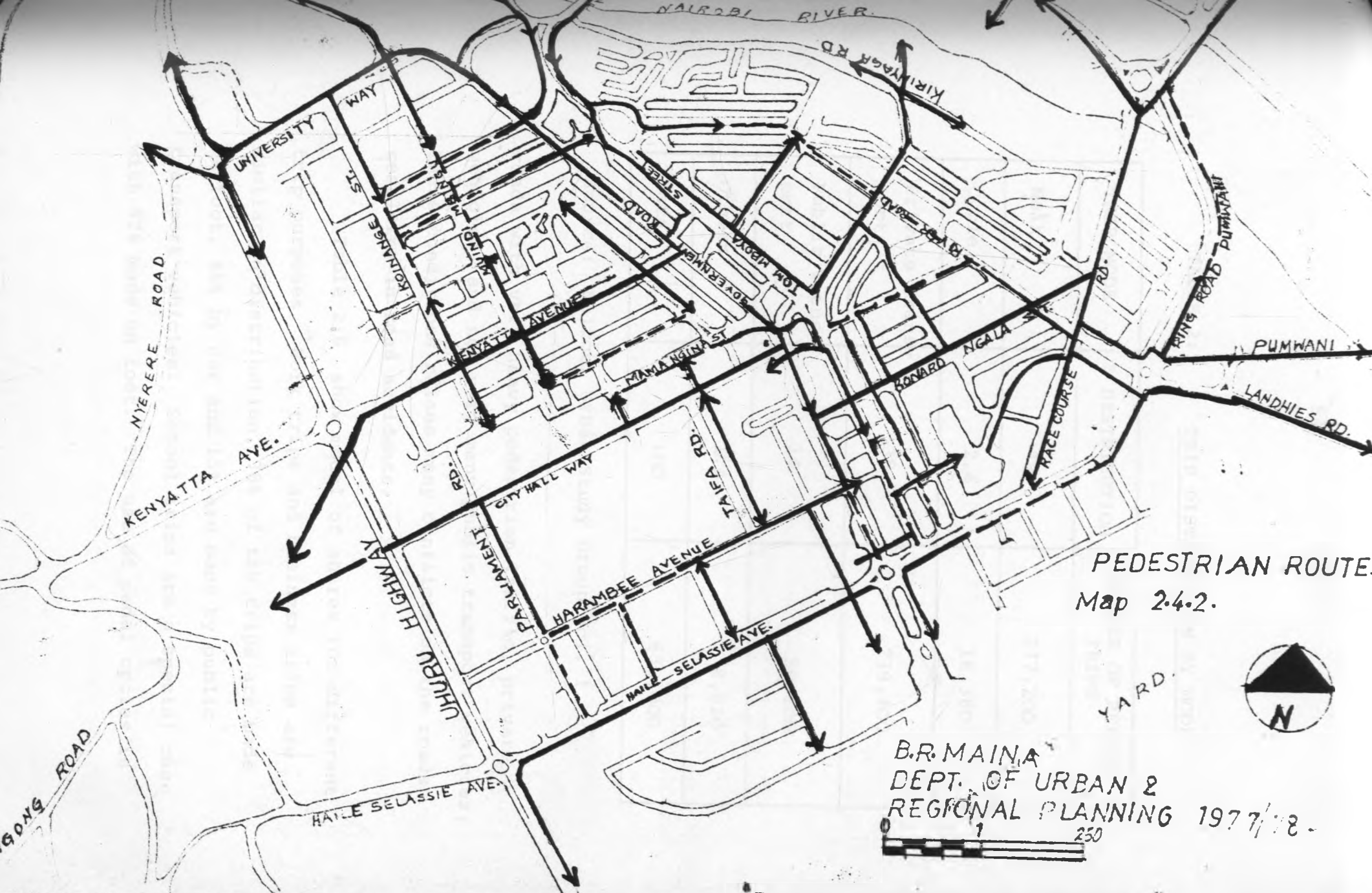


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MAP NO. 2.4.1.



○ CONFLICT AREAS.



PEDESTRIAN ROUTE
Map 2.4.2.

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TABLE 2:5 - TRIP DISTRIBUTION BY MODE

TRIP MODE	% DISTRIBUTION	NUMBER OF PERSON TRIPS
Walk	44	277,200
Cycle	2.6	16,380
Private Transport	38	239,400
Public Transport	14	88,200
Others	1.4	8,820
Total	100	630,000

Source: Nairobi Urban Study Group Vol. 1

roads with very heavy pedestrian traffic, private vehicles, and not very many public transport vehicles. These conditions raises many conflicts on the roads resulting in road accidents.

Table 2:6 show modal of shares for different trip purposes. Work trips and business trips are similar in distribution, 35% of the trips are made on foot, 45% by car and 15% are made by public transport vehicles. School trips are a special case with 62% made on foot. The use of pedal cycles is

TABLE 2.6 TRIP DISTRIBUTION BY MODE FOR
DIFFERENT PURPOSES:

TRIP MODE	WORK%	SCHOOL%	SHOP- PING%	BUSI NESS	SOCIAL	OTHERS
Foot	35	62	48	35	28	18
Cycle	5	0.5	2	5	2	1
Private	44	25	41	45	60	53
Public	15	11	8	14	9	27
Others	1	1.5	1	1	1	1
Total	100	100	100	100	100	100

SOURCE N.U.S.G. 1970

very low only 0.5%. This is expected given the heavy traffic during peak hour periods which are also school trip periods. The rates at which accidents occur at peak periods are generally higher and this may put a check on the use of pedal cycles by school children. The 25% of school trips made as passenger in cars suggest that a substantial number of such trips are also made by parents who own these cars because children are not expected to own cars or to be driving these cars. For shopping trips 48% are made on foot, 41% by private transport and 8% by bus or public transport. This, as is also shown in the social and other purpose trips seems to show that

there is an increase in the use of private transport as the importance of the trip decreases, see figures 2:4.B.

In terms of trip length frequency distribution for the three major modes, buses, cars, and walk, it has been found that the vast majority of trips fall within the range of 0.8 kilometres.⁴ For walk trips the distance ranges are below 3 kilometres and the number of trips fall rapidly with increasing distance. Public transport on the other hand have lower distribution in the shortest distance ranges. The frequency is greatest between 3 and 5 kilometres but then falls rapidly as distance increases. See figures 2:4.C & D. This would seem to suggest that people without cars tend to walk shorter distances but they transfer to public transport as distance increases. Car trips generally cover much longer distances than the other two.

Trip distribution by time and on various roads show that the major arterial roads leading into and out of the central area have very high traffic volumes. According to N.U.S.G. findings, walk trips are concentrated between the City Centre, industrial area and the eastern sector. These walk trips are very many along Jogoo Road, Likon Road, Factory Road, 1st Avenue Eastleigh, Landhies Road, Race Course

4. N.U.S.G. - Vol. 1 Paragraph 4:2

Ring Road Ngara, Juja Road, 2nd Avenue Eastleigh, General Waruingi Street, and Langata Road. Private transport movements predominate to the west and north of the City Centre. These private vehicles comes through Waiyaki Road, Ngong Road, Uhuru Highway, Murang'a Road, Haile Selassie Avenue, Langata Road, Limuru Road, Parklands Road etc. Bus trips are similar in distribution to walk trips except for a heavier concentration between the central area and the south west which can be explained by the existence of high and medium density residential estates like Otiende, Madaraka, Nairobi West and South C where the proportions of private car owning household is low. To the east are concentrated low income household residential areas while to the west and north are the high income household residences.

Within Nairobi the modes of travel for 1970 and possible situations in 1985 and 2000 A.D. are shown on tables 2:7 and 2:8. Table 2:7 show the modal split (unrestrained) in which levels of provision were directly related to the demand with car ownership being determined by income levels. Table 2.8 gives the predicted daily trips by different modes of travel in Nairobi by 1985 and 2000 A.D. These percentages are based on the estimations by N.U.S.G. that there will be 2.5 million daily trips in Nairobi by 1985 and 5.8 million trips by 2000 A.D. as compared

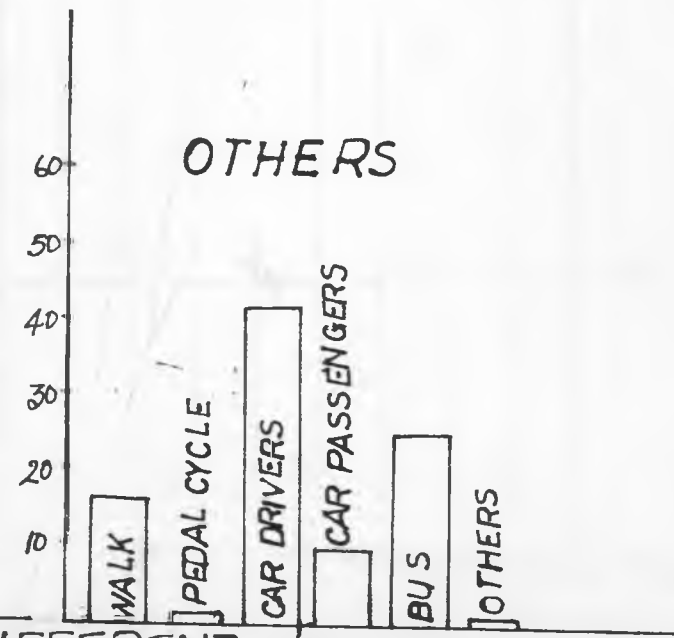
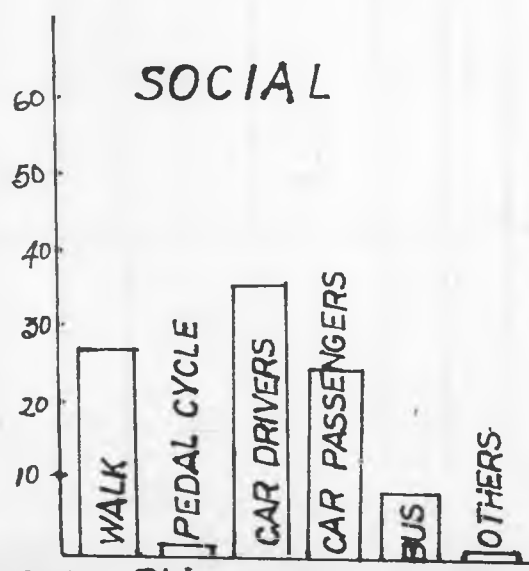
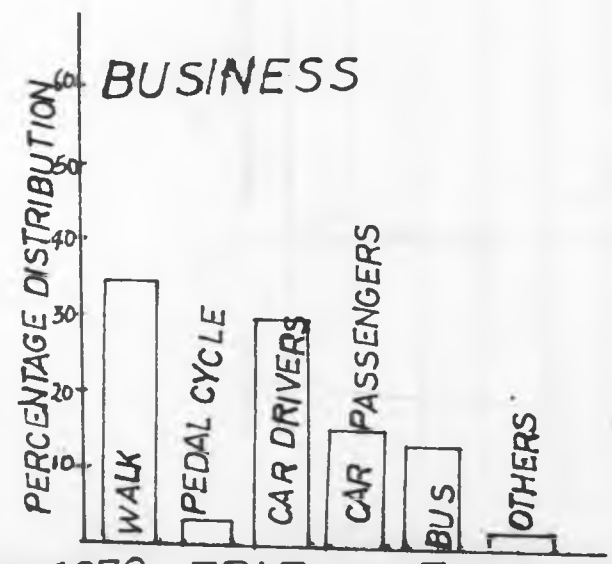
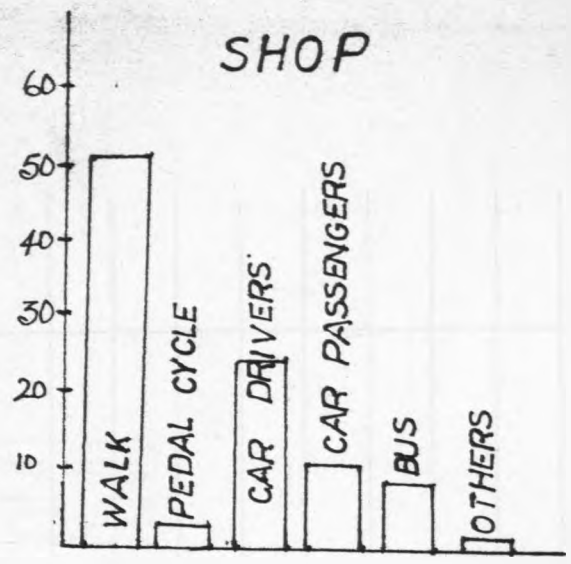
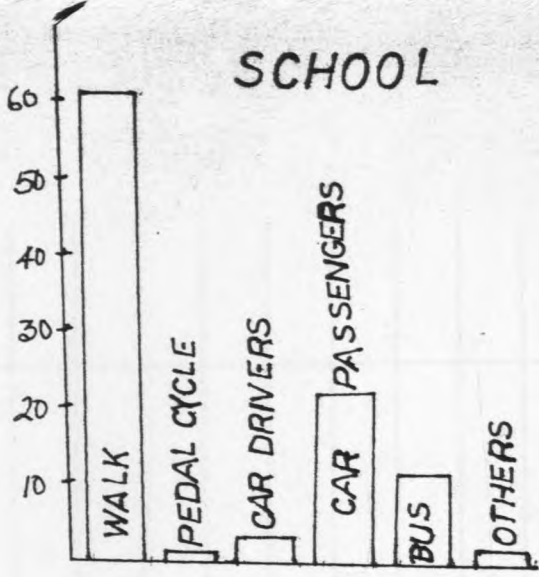
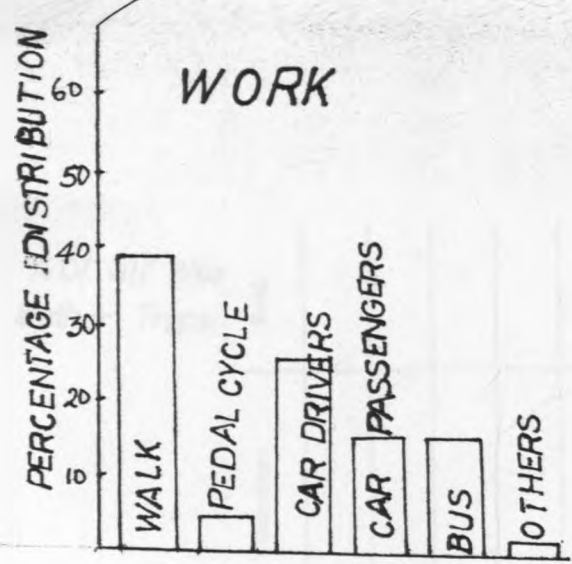
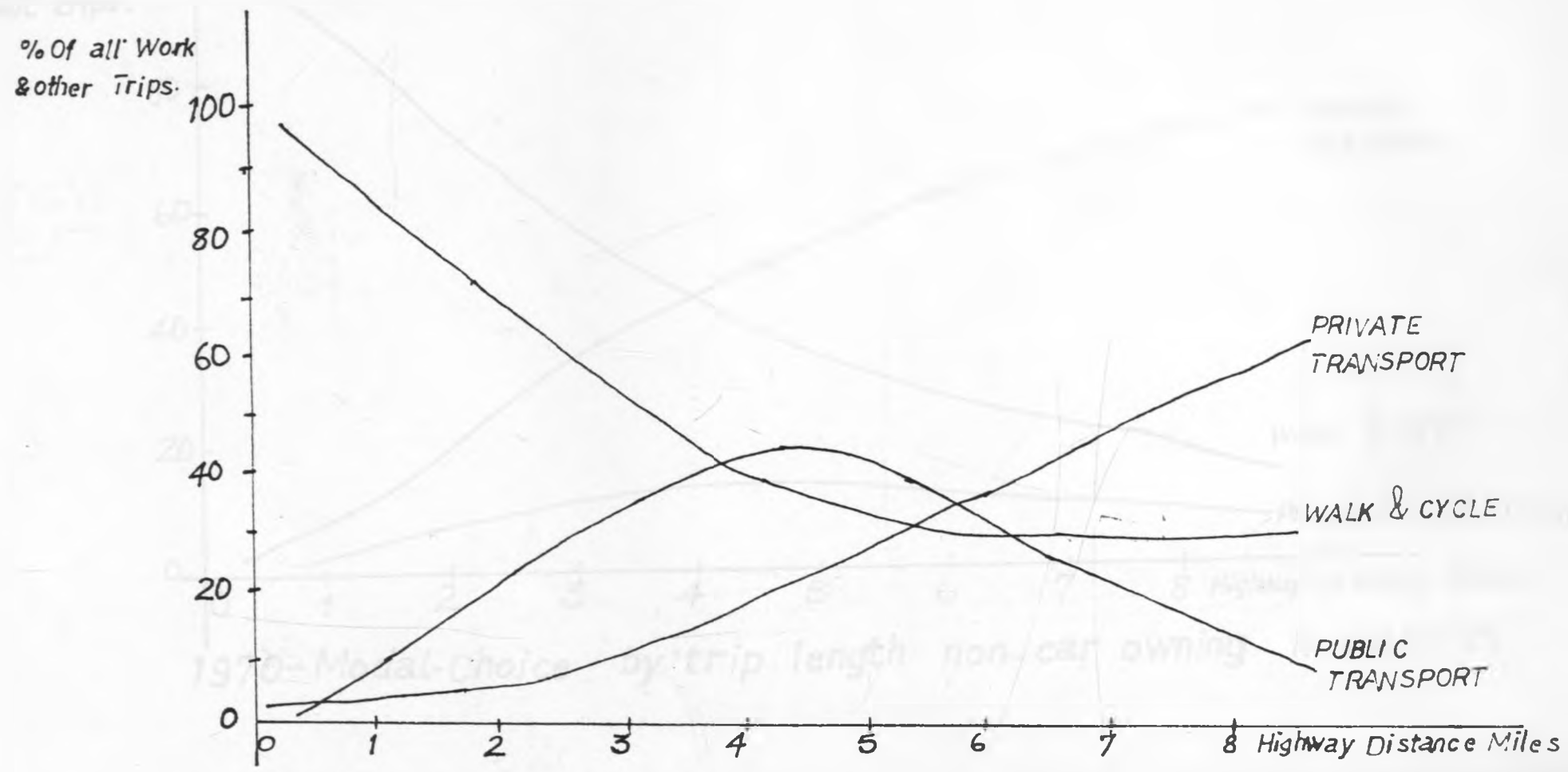


FIG 2.4B:1970 TRIP DISTRIBUTION BY MODE FOR DIFFERENT TRIP PURPOSE.

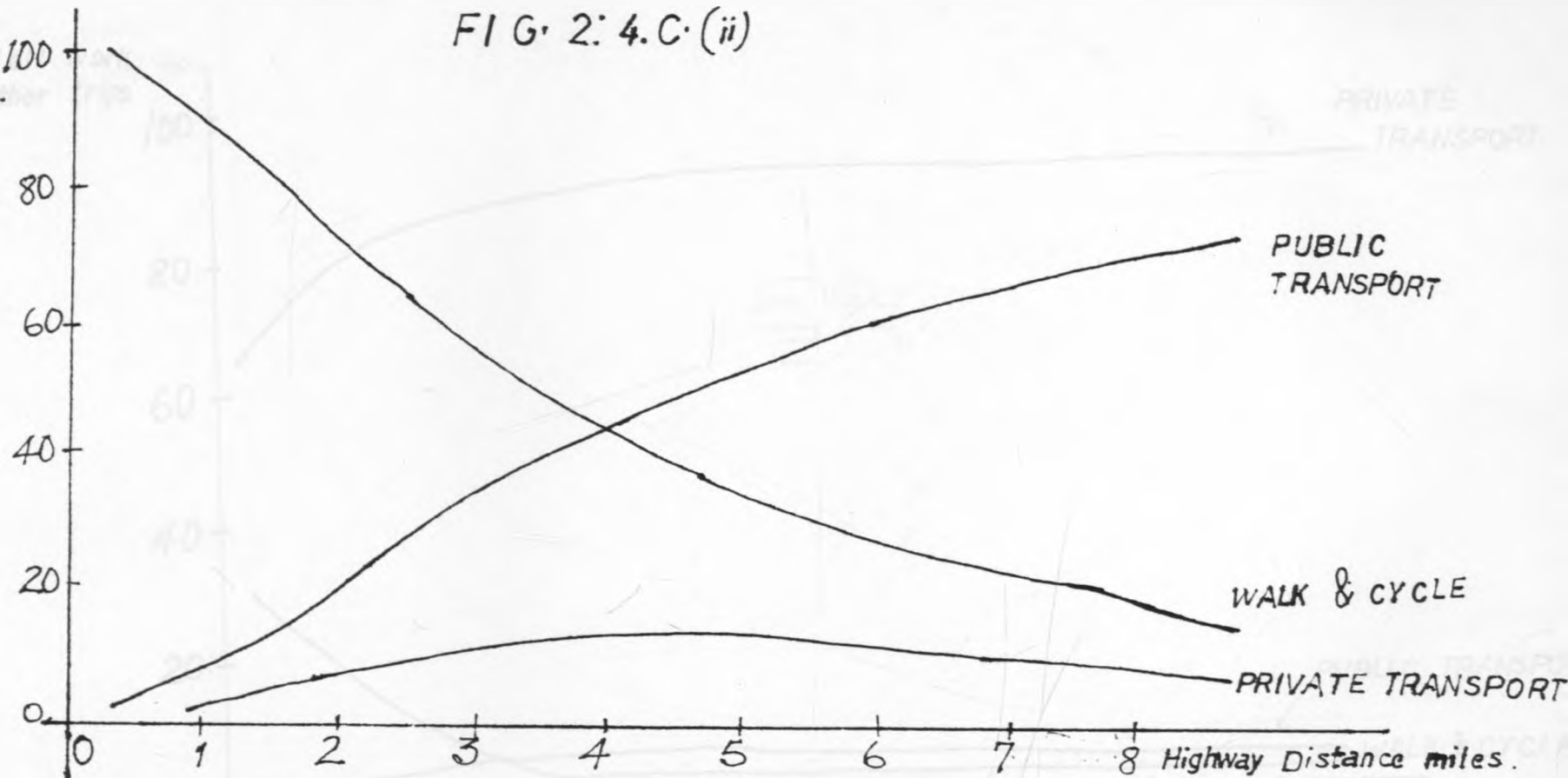
FIG. 2.4.C (i)



1970-Modal choice by trip length-non-car owning households

% of all shops & school trips.

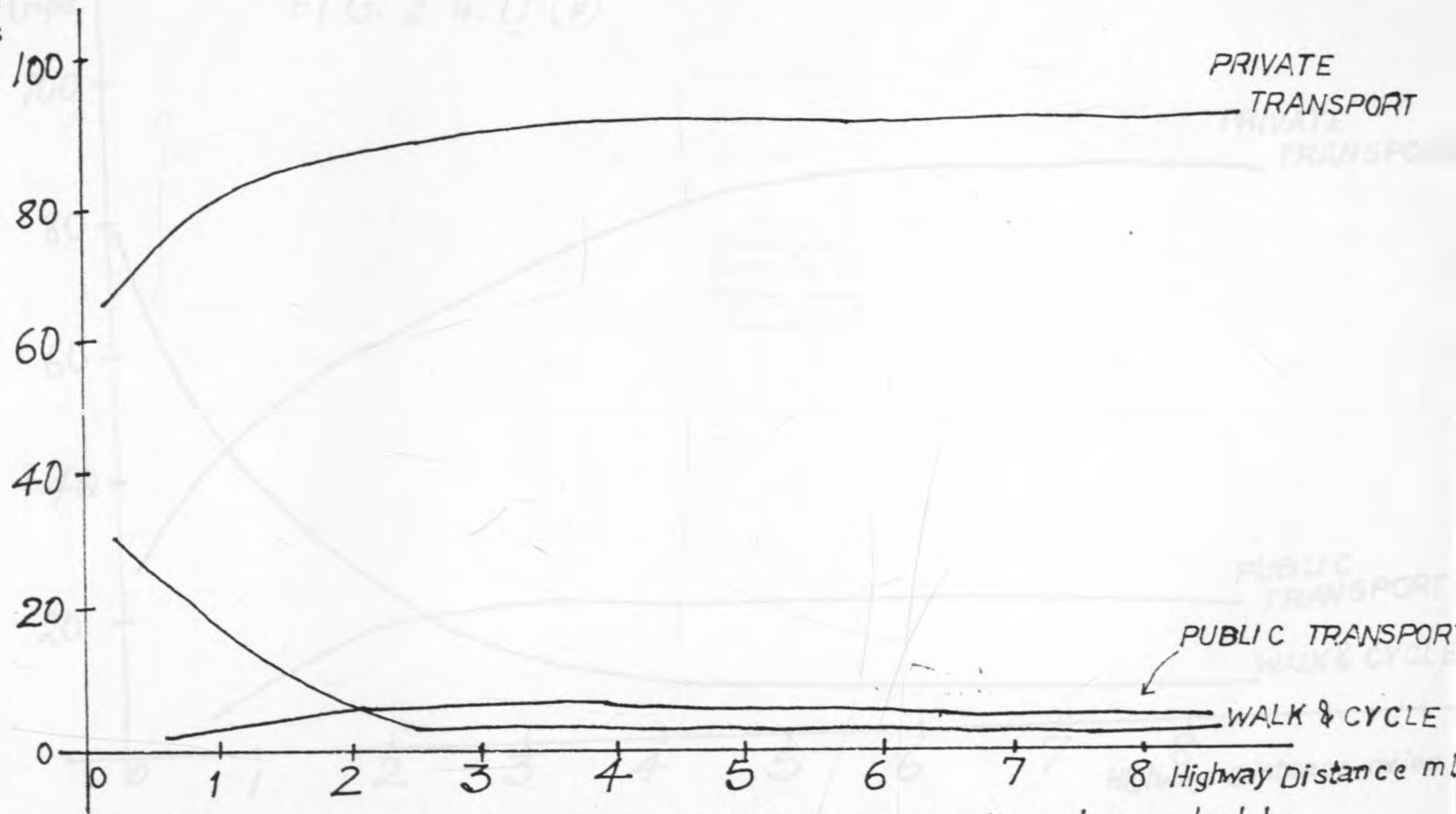
FIG. 2: 4.C. (ii)



1970-Modal-Choice by trip length non-car owning households

FIG. 2:4.D.(1)

% of all work
& other trips



1970- Modal choice by trip length - car-owning - households.

% of all shops & school trips

FIG. 2:4:D (ii)



1970- Modal-choice by trip-length car owning households.

to 0.6 daily trips in 1970.

TABLE 2:7 - MODAL SPLIT (UNRESTRAINED)

NAIROBI

	1970(%)	1985(%)	2000 A.D.
Walk	46	38	24.5%
Public Trans.	14	21.7	19.7
Private Trans.	40	40.3	55.8
All Modes	100%	100%	100%

TABLE 2:8 PREDICTED DAILY TRIPS (in millions)

NAIROBI

	WALK	PUBLIC TRANS.	PRIVATE TRANS.	TOTAL
1985	0.95	0.54	1.01	2.5
2000 A.D.	1.42	1.14	3.24	5.8

Source: N.U.S.G. 1970

In 1970 some 31% of all vehicle trips in Nairobi were to and fro the central area compared to only 9.5% of the vehicles to and fro the industrial area. This in real figures meant that in 1970, there were some 187,000 vehicle trip ends each day (24 hours) to the central area. Later on this was estimated to

have increased to 204,000 in 1972 and to 235,000 by 1975, an increase of about 5% per annum.⁵

This heavy vehicular traffic plus even a more heavier pedestrian traffic poses very serious conflicts and tensions on the limited road network. This has given rise to very many road accidents on some of the major roads in Nairobi.

2.5 MOTOR VEHICLES AND MOVEMENT PATTERNS

If the future usage of the motor vehicles as a means of modern movement is assured the question of how much a city like Nairobi can cope up, with their ever increasing number is fundamental to the understanding of the short term and long term implications. In assessing the problems of the urban future traffic, three questions come into the mind. These are:- How many vehicles are likely to be? What is the composition of vehicles? and What rate will the number increase.

Generally an increase in motor vehicle number is accompanied by the increase in their usage.⁶

-
5. N.U.S.G. - Short Term Traffic and Environmental Plan for the Central Area up to 1985 by G.R. Clarke 1976.
 6. Great Britain Ministry of Transport, Traffic in Towns H.M.S.O. 1963 Pg 27.

On the other hand vehicles move because people want them to move in connection with activities in which people are engaged and so movements are a function of activities. This is emphasized by the fact that traffic flow is a reflection of development and the spatial aspects of flow within a given area represent fairly accurately the spatial patterns of development in general.⁷

From 1970-1976 there was an increase of 56% of the number of vehicles from 90,438 to 161,606. In 1970 Nairobi had 67.6% of all the vehicles in Kenya, and in 1976 the figure was 66.6% of the total. As other towns grew up in Kenya, motor registration became more and more important in other towns and other towns and in Nairobi registered 14,293 vehicles which was 70.9% and the figures for 1976 were 11,311 for Nairobi and 16,083 for Kenya which was 70.3% of the total. This shows that some vehicles are registered in Nairobi, but are not stationed here.⁸

In 1975 and 1976 Nairobi housed (vehicles stationed in Nairobi) 66.3% and 66.6% of all the vehicles in Kenya and in the same years Nairobi had

7. Smith I.A. 1974, Regional Inequalities - The Case Study of Uganda in Spatial Aspects of Development Hoyle B.S. (ed) Pg 308.

8. Kenya Bureau of Statistics "Vehicle Statistics" 1978.

the highest number of motor vehicles per 10,000 population of 1971.6 and 1985.5. To compare with other parts of Kenya we can look at table 2:9 showing motor vehicle registration in Nairobi as compared with other major towns in Kenya for the year 1973 and 1974.

TABLE 2:9 MOTOR VEHICLE REGISTRATION IN NAIROBI
COMPARED TO OTHER TOWNS

TOWNS	TOTAL 1973	%OF THE 1973 TOTAL	TOTAL 1974	%OF THE 1974 TOTAL	%INCREASE OVER 1973
Nairobi	12037	73.61	12680	73.61	5
Mombasa	1509	9.1	1630	9.46	8
Nakuru	918	5.4	854		-7
Kisumu	841	5.1	704	4.09	-16
Eldoret	390	2.3	402	2.34	3
Kitale	257	1.5	275	1.59	7
Kericho	209	1.25	254	1.49	22
Nanyuki	112	0.68	147	0.85	31
Kisii	102	0.62	93	0.54	-9
Kakamega	68	0.41	138	0.80	103
Nyeri	31	0.20	49	0.30	50
Total	16474	100	17226	100	5

Source: Kenya Bureau of Statistics "Vehicle Statistics" 1973 and 1974

As can be seen from the table a total of 12037 and 12680 motor vehicles of all types were registered in Nairobi during the two years. These accounted for both years for 73% of the number of motor vehicles registered in the country. Mombasa the second largest town in Kenya had only 9% in the number of motor vehicles registered. It is difficult to say precisely how many vehicles are registered in Nairobi but have ownerships in other parts of the country.

The ratio of vehicles to population and land area in Nairobi compared to other provinces of Kenya as at the end of 1973 - show that the highest number of vehicles was in Nairobi being (the number of motor vehicles per 1000 population) was 147.7 while the coast province because of Mombasa had a ratio of only 13.8 vehicles per 1000 population. In terms of density of motor vehicles per 100 sq. km. of land area, once again Nairobi with a density of 13579.9 vehicles per 100 sq. km. led the way due to its small size compared with the others. See table 2:10.

Looking at another measure index the vehicle per person we find that in 1970 Nairobi had 0.0165 vehicles per person and this rose to 0.0198 in 1976, which shows a tremendous increase of 78.7% between the six years period.

The case of Nairobi is not unique, for it is also common with most of the other developing

TABLE 2:10 VEHICLE DISTRIBUTION IN THE KENYAN PROVINCES

PROVINCES	POPULATION	MOTOR VEHICLE	VEHICLES/ 1000 POP.	BUSES/ 1000 POP.	LORRIES/ 1000 POP.	VEHICLE/ 100 Sq.Km.
Nairobi	629000	92885	147.7	1.7	15.6	13579.9
Central	1899000	14985	7.9	0.2	1.0	113.8
Coast	1079000	14857	13.8	0.3	1.4	17.9
Rift Valley	2499000	21540	8.6	0.1	0.9	12.7
Eastern	2146000	6728	3.1	0.1	0.4	4.4
Nyanza	2452000	7107	2.9	0.1	0.4	56.7
Western	1542000	2261	1.5	0.0	0.2	27.5
N. Eastern	258000	281	1.1	0.0	0.2	0.2
Not Known	-	3570	-	-	-	-
Total		164222	13.1	0.2	1.4	28.8

Source: Kenya Bureas of Statistics 1973.

countries. In developing countries there are evident car ownership ^adisparities and as such only the very affluent section of the population can afford to own and operate a car. The largest part of the population depend on walking, bicycling and public transport for all their daily movements. Table 2:11 show the very high dependence of the population on walking in selected cities of the developing countries. The table also gives the car ownership ratios in these cities.

In Nairobi car ownership distribution corresponds with the distribution of incomes. The prevalence of low income households to the east of the central area can be seen to restrict car ownership considerably. Car ownership is common among people who live to the north and west of the central area which corresponds both with the distribution of high income population and with private transport trips. This also corresponds with the three residential zones as discussed in section 2:2 see map 2:5:1 showing car ownership in Nairobi in 1970.

With most of the working places, business places located in the central area and the adjacent industrial area there is heavy traffic flows in and out of these areas especially at the peak hours. Map 2:5:1 showing car ownership distribution in Nairobi in 1970 and also map 2:2:1 showing

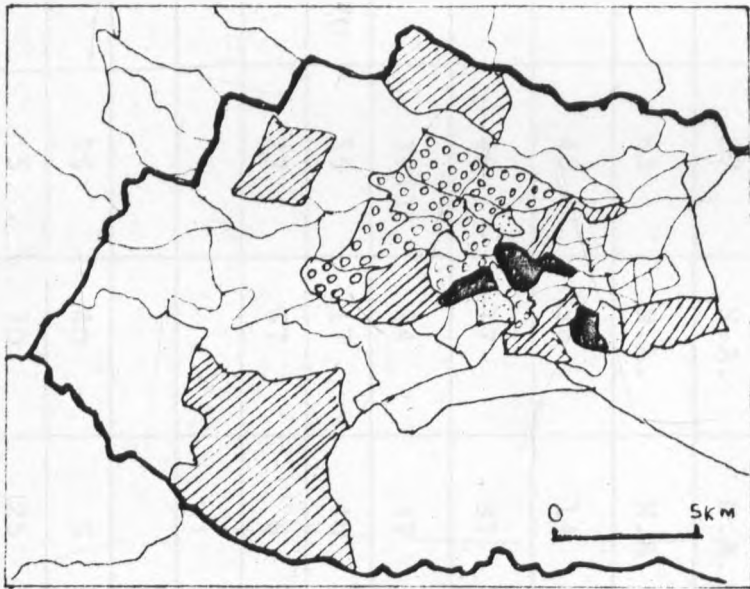


FIG 25.1 Car ownership distribution 1970

— Traffic district boundary

□ 0.0 cars per head

▨ 0.1 cars per head

◻ 0.2 cars per head

◻ 0.3 cars per head

◼ 0.4 cars per head



SOURCE MUSG 1970

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TABLE 2:11 WALKING AND MOTORIZED TRANSPORT IN SELECTED CITIES: 1968 - 1972

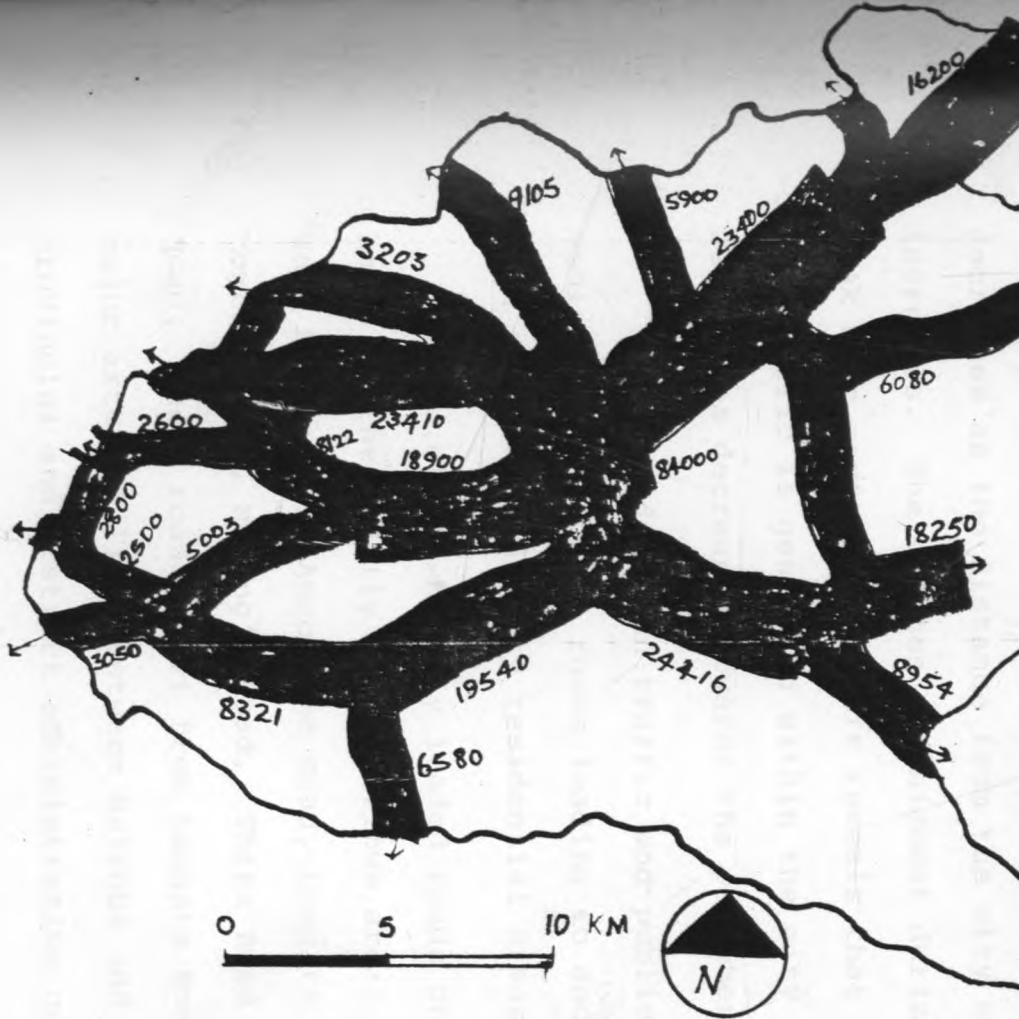
CITIES STUDIES 1968-1972	MODAL SPLIT				CAR OWNERSHIP (AUTO/1000) POP.	
	WALKING (%)	PUBLIC TRANS. %(1)	PRIVATE TRANS. %	TOTAL %	URBAN	NATIONAL
Dar Es Salaam Tanzania	67	N.A.	N.A.	100	33	7
Kinshasha, Zaire	63	N.A.	N.A.	100	N.A.	3
Taipei, Taiwan	48	38	14	100	10	N.A.
Nairobi, Kenya	46	17	37	100	53	12
Singapore (2)	39(3)	24	37	100	68	68
Lausanne (Switzerland(1970	35	17	48	100	230	220
Seoul, Korea	27	67	6	100	22	4
Bogota, Columbia (1969)						
Split by Income Groups						
Low Income	55	40	5	100		
Medium Income	5	70	25	100	22	13
High Income	-	10	90	100		

Source: Owen W. Automobile and Cities-Strategies for developing countries

Bovy, Ph. LE Plan de Transport de la Region Lausannoise.

It is through these roads that daily commuters from the surrounding areas of Nairobi enter the city. See map 2:6:3.

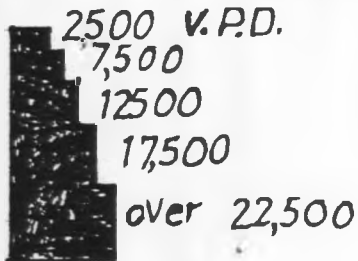
With these many vehicles and pedestrian traffic trying to push their way into the city centre and the industrial area in a given few hours and also getting out of these areas at the same times traffic conflicts are bound to be many. These are increased by the fact that pedestrian traffic is not very well supplied with facilities and therefore we find them walking along the roads, and crossing at very dangerous points. Therefore the many vehicular and pedestrian movements bring about serious conflicts bound to cause road accidents on the Nairobi road network. This is so much so especially nearer the city centre and the industrial area where the movements are very many and concentrated. Hence we expect more accidents to occur near these two areas and especially along roads carrying very high vehicular and pedestrian traffic, like Jogoo road, Juja Road, Ngong Road etc.



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TRAFFIC FLOWS ON THE TRUNK AND
PRIMARY ROADS. Map 2-6-3



TRAFFIC CENSUS DATA 1976 V.P.D.

Notes (Table 2:11):

- (1) Include private automobile, motorized two wheel and Taxi trips.
- (2) Modal split for work and school trips only
- (3) Walk and bicycle trips.

various land uses we can pinpoint some roads which we expect to have very high traffic volumes. These roads are especially those major arterial roads passing through the high income areas to the central and industrial areas. These roads are characterised by very high volumes near the city centre which decreases as the distance from the city centre increases. The volumes are highest during the peak hour periods, and this reveals that most of the traffic is generated within the city boundary as volumes decrease towards the periphery.

Heavy pedestrian traffic and public transport vehicles are high on roads leading to and from the high and medium density residential areas.

Some of the heavily loaded roads on the basis of these daily traffic flows are:- Waiyaki Way, Ngong Road, Aerodrome Road, Langata Road, Mombasa Road, Murang'a Road, Thika Road and Limuru Road. These roads apart from Langata Road are the major arterial links between Nairobi and major provincial and district administrative centres of Kenya.

2.6 THE PEAK HOUR PROBLEMS

Heavy traffic volumes is found on the routes surrounding that part of the central area containing the modern sector - Uhuru Highway, University Way, Nairobi River, Haile Selassie Avenue, and New Pumwani Road. Generally there are no such heavy circulations around the eastern half of the central area as there are no suitable routes to accommodate such heavy movements.

There are 3 peak periods in Nairobi, the morning peak between 7 a.m. and 8.30 a.m., the mid-day peak between 12.30 p.m. and 2.15 p.m., and the evening peak between 4.30 and 5.30 p.m. see figure 2:4:E.

The morning peak occur between 7 a.m. and 8.30 a.m. with maximum flows between 7.30 and 8 a.m. These are dominated by vehicular movements to the west and north of the central area. From the southern end of the Uhuru Highway through Kenyatta Avenue to the Murang'a Road in the north. Roads leading into the central area from these parts of the city together account for 60% of all the traffic entering and leaving the central area. On the eastern parts of the central area only Landhies, Race Course and New Pumwani Roads are comparable to those highways to the west and north. The southern end of Uhuru Highway has the highest traffic movements (20.6%)

% DISTRIBUTION

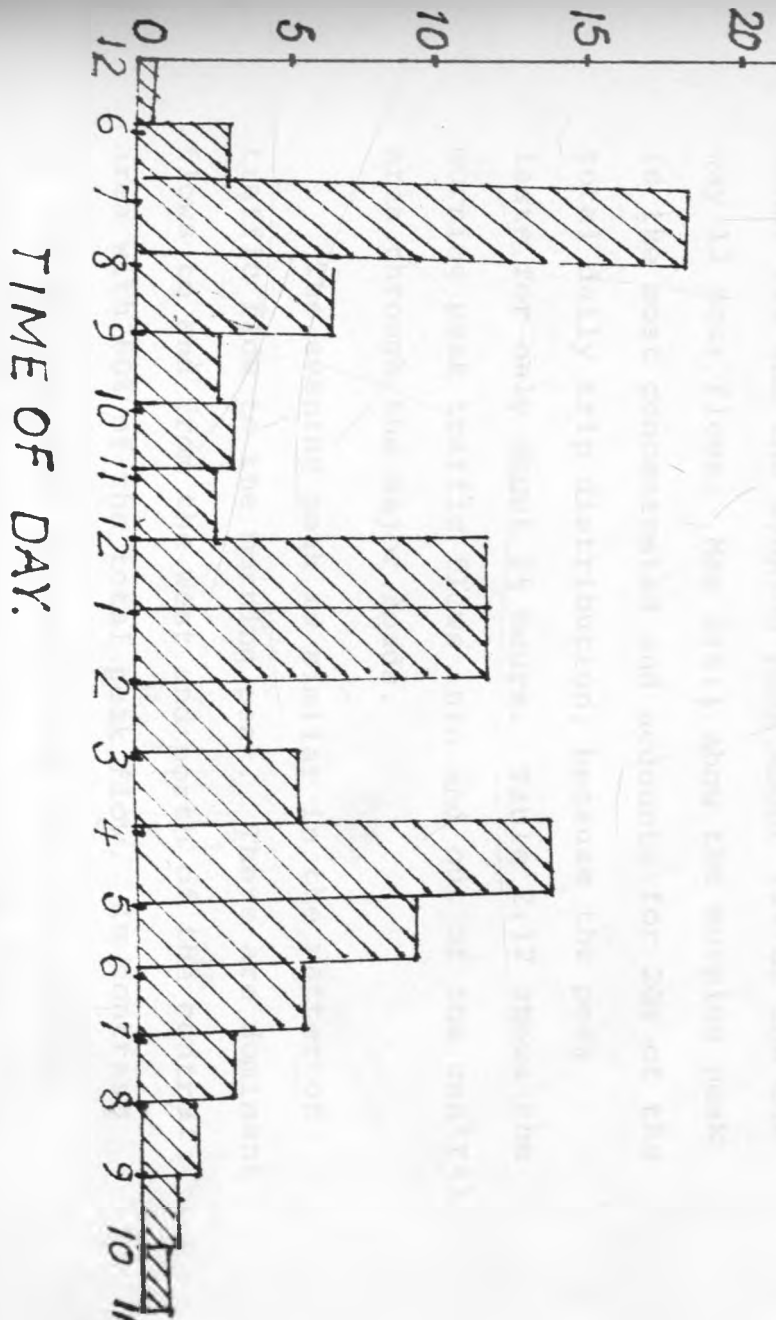


FIG. 2.4A TRIP DISTRIBUTION BY MODE - 1970

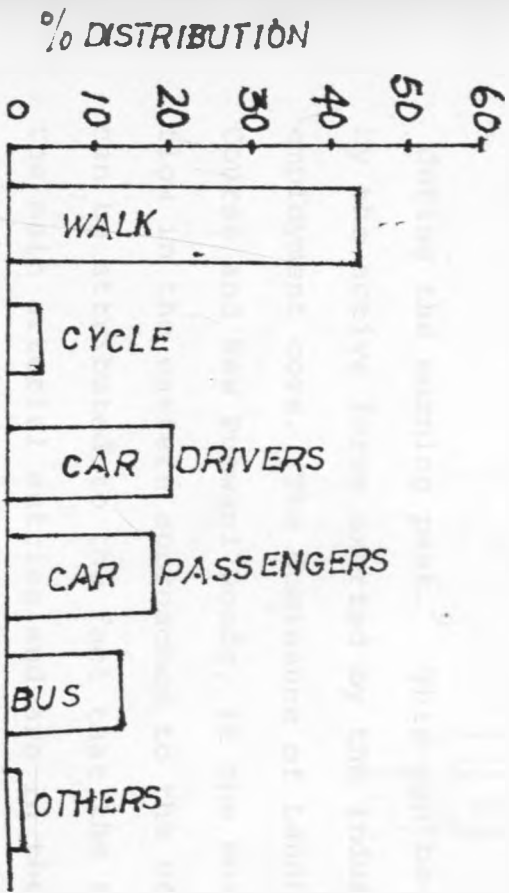
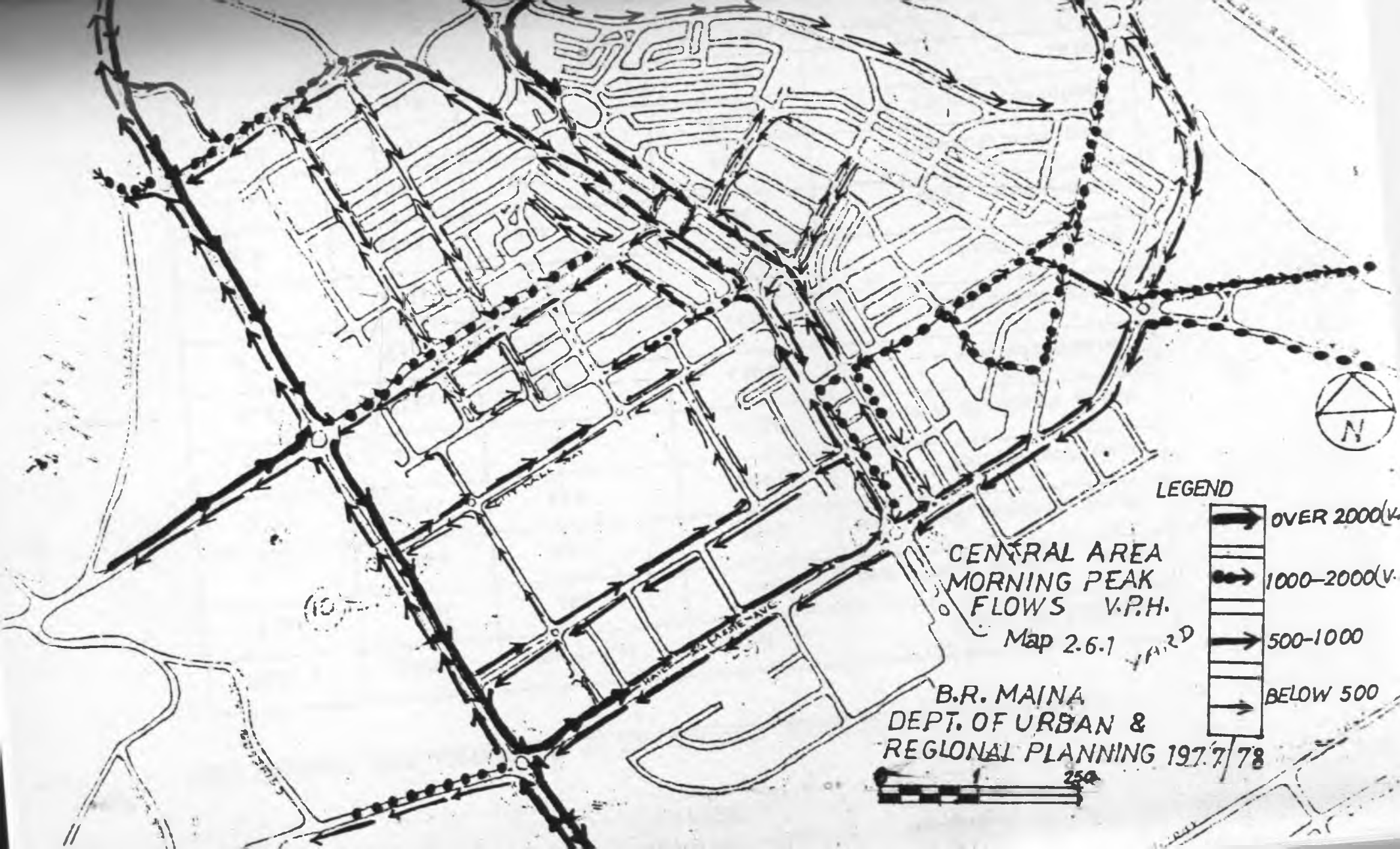


FIG. 2.4.E 1970-Trip Distribution by time.

during the morning peak.⁹ This can be explained by the active force exerted by the industrial area employment core. The dominance of Landhies, Race Course and New Pumwani Roads, in the morning peak flow in the eastern approaches to the central area can be attributed to the fact that the roads are the main arterial entries and are in the heavily populated areas of the Eastlands. Pedestrian traffic is heaviest along Jogoo Road, Factory, Likoni, 1st Avenue Eastleigh, Race Course Roads and Langata Road. The morning peak hour directional flow was about 14% and the evening peak about 13% of the one way 12 hour flows. Map 2:6:1 show the morning peak is the most concentrated and accounts for 20% of the total daily trip distribution, because the peak lasts for only about 1½ hours. Table 2:12 shows the morning peak traffic flows into and out of the central area through the major roads.

The evening peak is similar in the pattern of traffic flow to the morning peak. There are dominant flows to and from the west and north of the central area with 60% of the total peak flow. In contrast to the morning peak Murang'a Road has the highest traffic flow accounting for 21.6% of the total flow into and out of the city centre. Uhuru Highway again carries very heavy traffic as shown in Table 2.13. Traffic volumes in the central area are shown on map 2:6:2.



CENTRAL AREA
MORNING PEAK
FLOWS V.P.H.

Map 2.6.1 V.P. 2D

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LEGEND

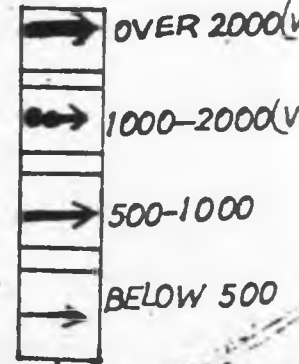


TABLE 2:12 TRAFFIC FLOWS INTO AND OUT OF THE CENTRAL AREA (MORNING PEAK)

STREETS OR ROADS	IN-BOUND	OUT-BOUND	TOTAL	% FLOW
Uhuru Highway North end	2560	921	3571	16.4
Uhuru Highway South end	2098	2388	4486	20.6
Kenyatta Avenue	1499	934	2433	11.1
Haile Selassie Avenue	1531	520	2051	9.4
University Way	1043	279	1322	6.0
Harry Thuku Road	157	257	414	1.9
Murang'a Road	2318	440	2758	12.6
Race Course Road	982	428	1410	6.6
Ring Road Pumwani	694	170	864	4.1
Landhies/Pumwani Road	1422	1034	2456	11.3
Total	14394	7371	21675	100

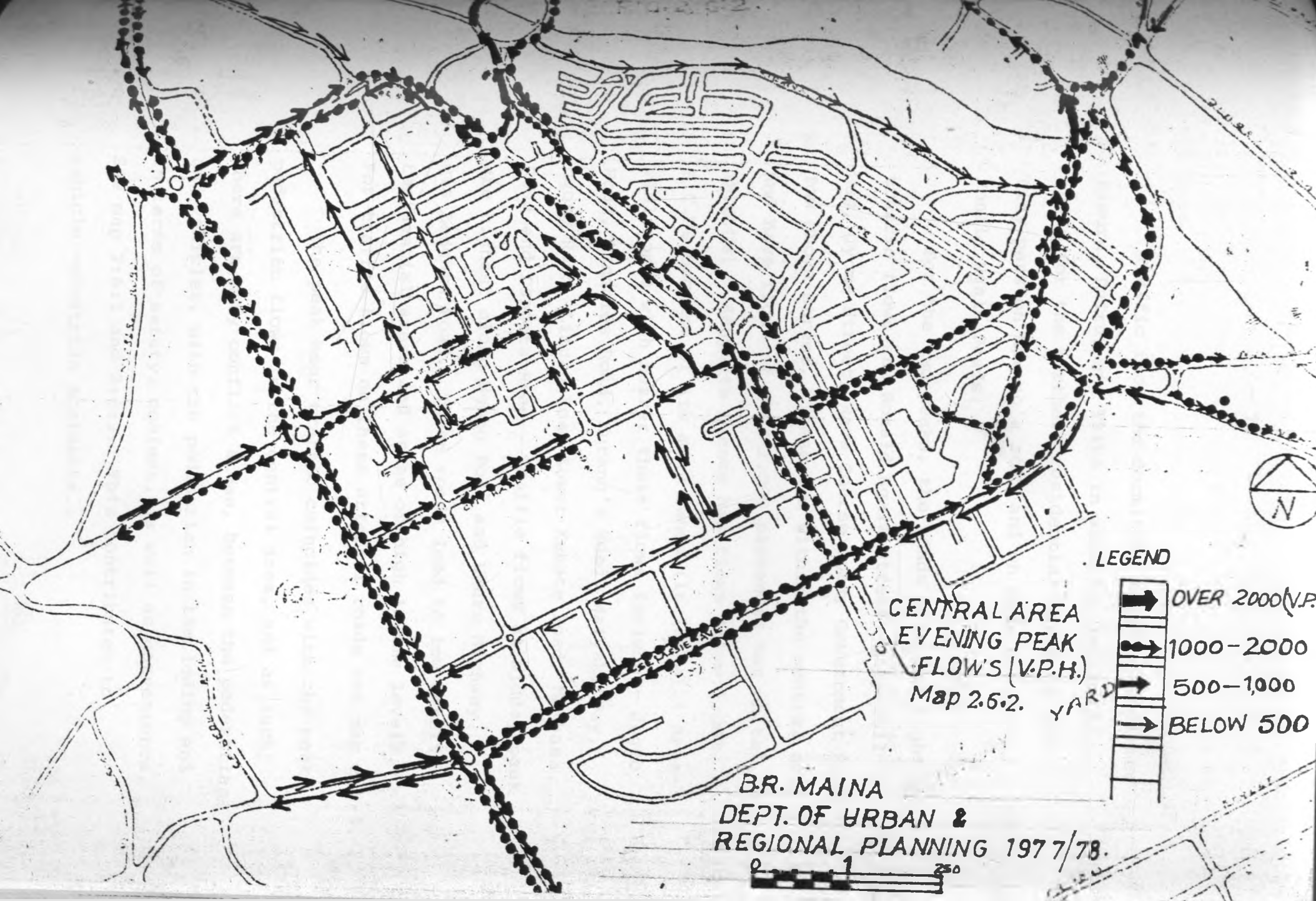
1976 (V.P.H.) Source: Nairobi City Council, Traffic Census 1976

TABLE 2:13 EVENING PEAK TRAFFIC FLOWS ON THE MAJOR ROADS AND STREETS 1976
(VEHICLES PER HOUR - V.P.H.)

STREETS OR ROADS	IN-BOUND	OUT-BOUND	TOTAL	% FLOW
Uhuru Highway	1016	1676	2692	12.4
Uhuru Highway South end	1853	1650	3503	15.8
Kenyatta Avenue	580	1829	2409	10.8
Haile Selassie Avenue	894	714	1608	7.3
University Way	613	373	986	4.6
Harry Thuku Road	577	323	809	3.8
Murang'a Road	1744	3114	4858	21.8
Race Course Road	564	1619	2183	9.8
Ring Road Pumwani	405	177	582	2.6
Landhies/Pumwani Road	1309	1300	2609	11.2
Total	9555	12684	22239	100

Source: Nairobi City Council (Traffic census 1976).





- 73 -



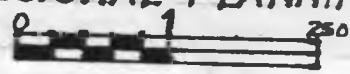
CENTRAL AREA
EVENING PEAK
FLOWS (V.P.H.)

Map 2.6.2. YARD

LEGEND

-  OVER 2000 (V.P.H.)
-  1000-2000
-  500-1000
-  BELOW 500

BR. MAINA
DEPT. OF URBAN &
REGIONAL PLANNING 1977/78.



Traffic from the dormitory towns like Kiambu Limuru, Ruiru, and Thika in addition to traffic bound for the northern residential areas of the city pass on Murang'a road and on Race Course-Ronald Ngala Roads.

For the two peaks, the roads with the highest traffic flows are Ronald Ngala Street, City Hall Way, Uyoma Street, Race Course Road, Government Road Tom Mboya Street. These are within the central area and have flows of over 1,000 passenger car units (P.C.U.s). Kenyatta Avenue has flows below 1,000 P.C.U.s because of its many lanes (16 lanes). Arterial roads with nearer these flows include - Jogoo Road, Landhies Road, Murang'a Road, Waiyaki Way, Ngong Road, Limuru Road Lower Kabete Road, Mombasa Road and Langata Road. Traffic flows at midday peak are highest along Ngong Road and Uhuru Highway vis Langata Road. These roads lead to low density residential areas and areas of high income levels. For traffic flows on these arterial roads see map 2:6:3.

The peak hour traffic coincides with the peak pedestrian flows in the central area, and as such there are many conflict areas, between the pedestrian and vehicles, with the pedestrian in the losing end in terms of safety, comfort, as well as convenience. See map 2:6:1 and 2:6:2. This contributes to vehicle pedestrian accidents.

Lunch time traffic constitute one of the major traffic problems in Nairobi and especially in the outbound direction between 12.30 and 1300 hours each day. This is related to the non-staggering of lunch hours and to the collection of school children and other members of the families at the many schools and offices in the central area.¹⁰

The ever increasing growth in the volume of traffic entering the central area poses another problem. Surveys by Nairobi City Council reveals that traffic growth rates at the major intersections on Uhuru Highway increased between 1972 and 1975 at an average rate of 11% per annum during morning peak hour and at the evening peak hour at an average rate of 6% per annum.

The implications of this traffic growth is that the rate of growth in private vehicle ownership over the next ten years will be approximately 110,000 vehicles about twice the 1975 level,¹⁰ and assuming a level of car utilization similar to that recorded in 1970, this means that traffic volumes are bound to double over 1975-85 period. This would be an increase of some 7% per annum of daily (12 hours) traffic volumes.¹⁰

2.7 THE PROBLEMS OF ROAD SAFETY IN NAIROBI AND ITS MAGNITUDE

In Kenya road accidents cost the Government over £ 12 million annually and millions of shillings in foreign exchange go down the drain owing to motor

¹⁰ N.U.S.G. A short Term Traffic and Environmental Plan for the Central Area Unto 1985 by G.R. Clarke, 1976

vehicle accidents in which over 150 vehicles are written off per month. But the worst side of it is that many of the fatalities and casualties occur to motor vehicle owners and users who generally come from the small minority of educated people the statesmen, teachers, doctors, businessmen and other high ranking persons very much needed in the country, whose loss to the country is serious. Therefore the estimates of costs cannot be in nature of things, allow for the burden of suffering imposed on the victims of an accident supposing them to survive, nor for the value of their lives if they do not. Statistics properly designed can help in the evaluation of costs which are in fact measurable damage to property for example, costs of medical treatment even of output lost through incapacity. But attempts to value the loss caused by accidents to human beings either in sum or individually cannot help to decide the amount which should be spent or the regulations which ought to be accepted by the people able to choose in order to achieve a greater safety for life and limb. The effects of road accidents cannot be put in monetary terms.¹¹

The multiplication and increasing use of vehicles has unhappily led to a greater many accidents. The cause of accidents has been the subject of many

11. G. Walker, Traffic and Transport in Nigeria

disputes and some of the reasons advanced bear the imprints of sectional interests. In theory it would seem beyond dispute that if all road users would take conditions as they find them and exercise unlimitting care all the time, there would be no accident other than those caused by an act of God or some unpredictable mechanical failure. Errors and miscalculations creep in and though they are small in comparison with the total amount of movement that take place, they are nevertheless sufficient to add up to a formidable total.¹²

A look at the past accident trends will reveal the magnitude of the problem in Kenya and Nairobi. Table 2:14 gives the past accident trends in Kenya and in Nairobi over the last 9 years.

TABLE 2:14 ACCIDENT TRENDS FOR THE LAST NINE YEARS, 1968 - 1976

	1968	1969	1970	1971	1972	1973	1974	1975	1976
Kenya	4511	4196	5163	6042	6613	6789	6250	6534	6548
Nairobi	1698	1602	2113	2497	2647	2677	2251	2177	2427
%of Nai- robi over Kenya	37.6	38.2	40.9	41.3	40.0	39.4	36.0	33.3	37.1

Source: Kenya Police - Traffic Operation Headquarters.

12. Traffic in Towns H.M.S.O. Pg. 23.

From the above table we find that road accidents are on the increase, with a peak in 1973 with a total of 6789 in Kenya and 2677 in Nairobi. We also find that Nairobi has about 33-40% of all accidents in Kenya, which is a very high accident rate taking into account that Nairobi has 6.7% of the total population of Kenya. Figure 2:7.A and B show the same trends.

Isolating the fatal, serious and slight injury cases of the total number of accidents in Kenya and in Nairobi will help us to understand the magnitude of the problem and how immediate it is for action. Table 2.15 show the types of injuries sustained. The table shows that Nairobi accounts for quite a big share of all types of accidents. This can be made clearer by examining the percentage shares for fatal accidents, fatal plus serious accidents and for slight injuries *(Fatal accidents are accidents resulting in death of a person serious-injury causes bodily injuries which at times may result to death; slight injury accidents are accidents where only slight bruises and cuts are experienced in an accident). This is shown on table 2:16.

The percentages show that the severity of accidents is on the decrease for all casualty types, although they are still quite high.

G.D. Jacobs and I.A. Sayer in their report on

TABLE 2.15 TRENDS OF CASULTY TYPES IN KENYA AND NAIROBI 1968 - 1976

	TYPES	1968	1969	1970	1971	1972	1973	1974	1975	1976
KENYA	Fatal	670	750	944	1046	1331	1402	1353	1338	1640
	Serious	1472	1605	2204	2439	3062	3386	3268	3106	3924
	Slight	3457	3927	4608	5070	6135	6209	5919	5177	6345
	TOTAL	5599	6282	7756	8555	10528	10997	10540	9621	11909
NAIROBI	Fatal	129	140	189	234	256	283	258	230	257
	Serious	406	383	503	616	684	762	530	638	577
	Slight	1163	1079	1421	1637	1707	1632	1463	1309	1593
	Total	1698	1602	2113	2497	2647	2677	2251	2177	2427

Source: Kenya Traffic Police. Traffic Operation Headquarters.

1969 1970 1971 1972 1973 1974 1975 1976 YEARS

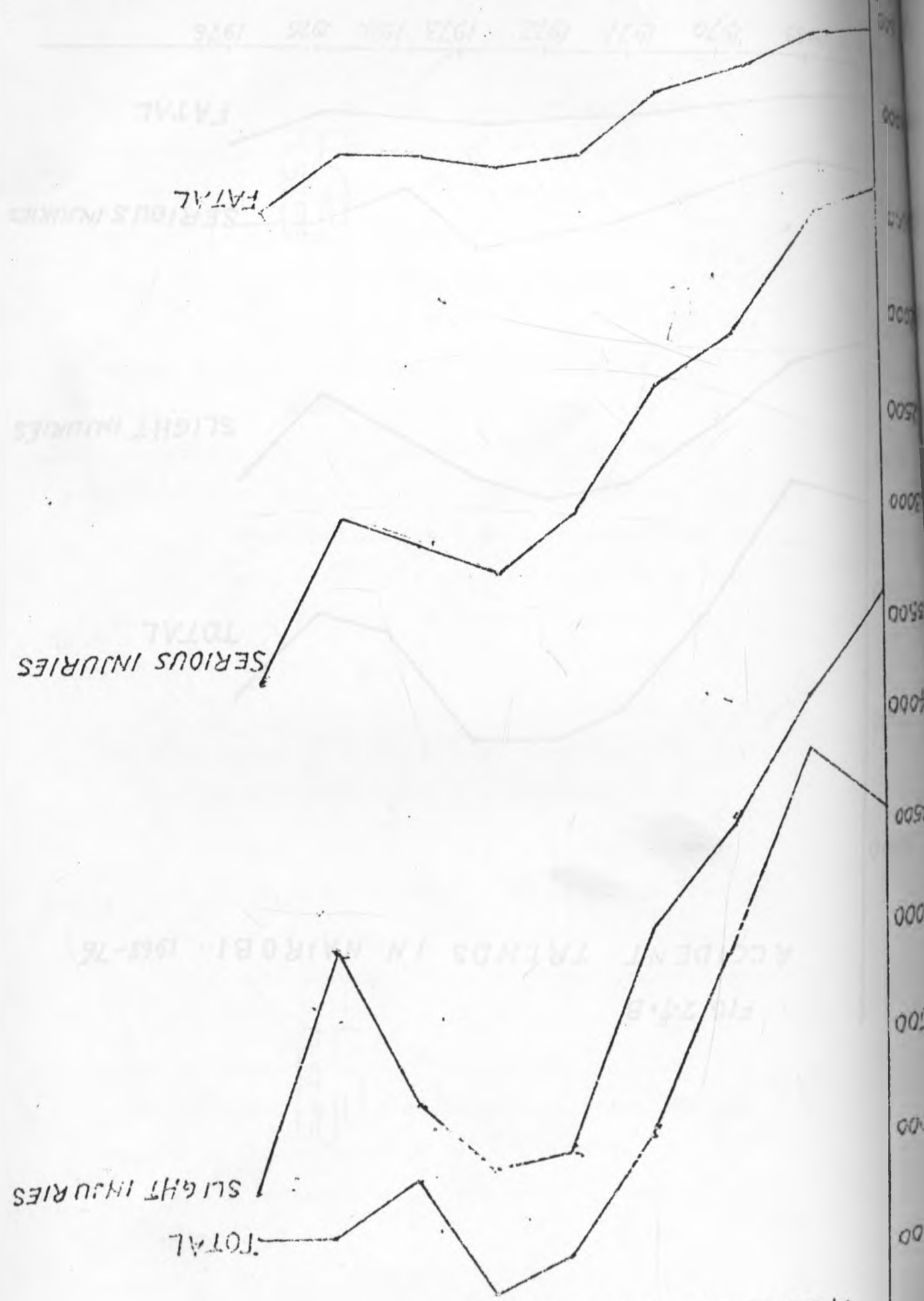
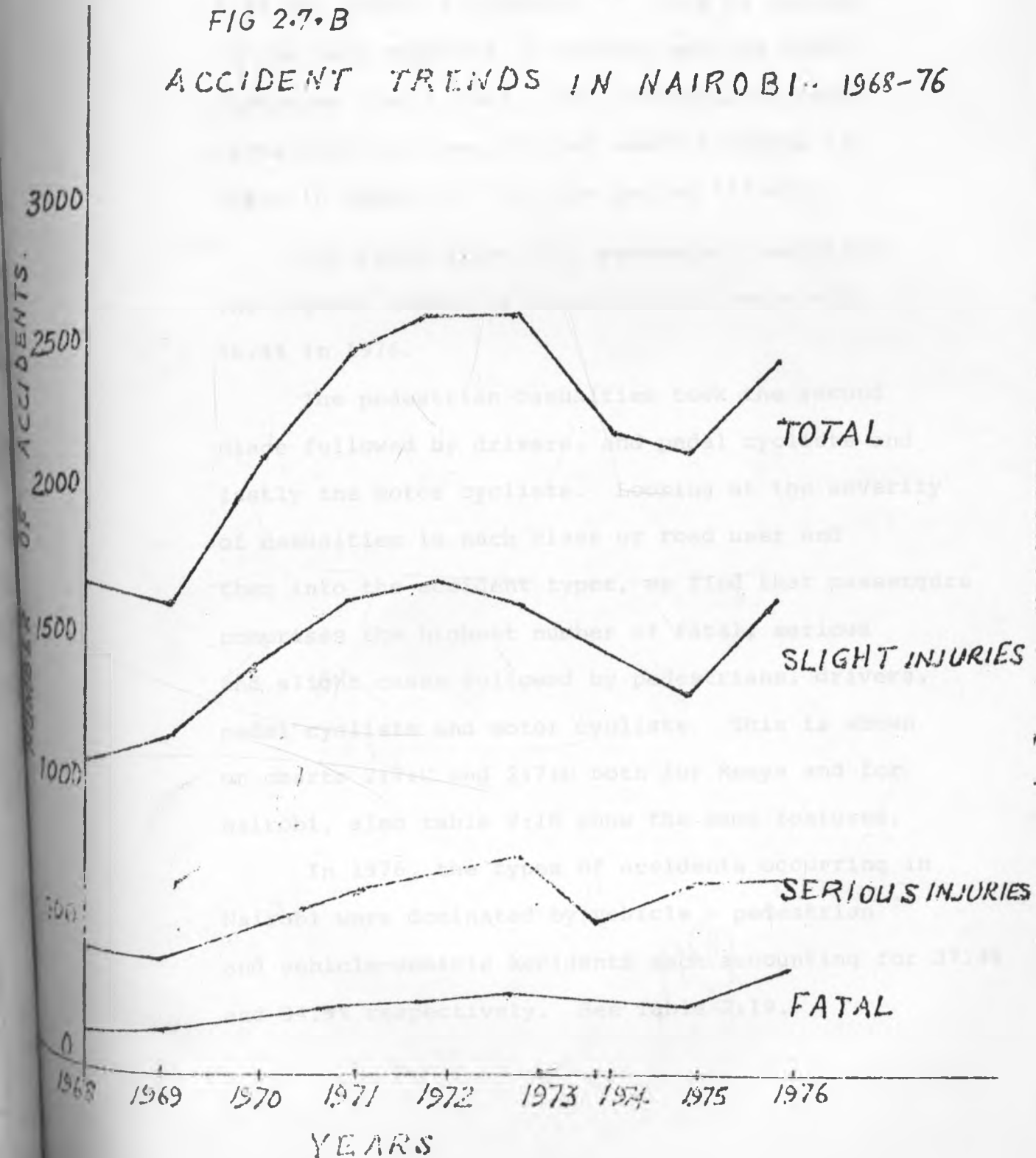


FIG 2.7A ACCIDENT TRENDS IN KENYA 1968-76

FIG 2.7.B
ACCIDENT TRENDS IN NAIROBI. 1968-76



an analysis of road accidents in Kenya in 1972 showed that although the greatest number of accidents and casualties occur in Nairobi province the accident rate per million vehicle kilometres travelled was lowest in Nairobi.¹³ This is because of the many vehicles in Nairobi and the short distances they travel. The incidence of road casualties by class of road users in Kenya is given in Table 2:17 for the period 1973-76.

The table shows that passengers comprised the highest number of casualties in Kenya with 56.4% in 1976.

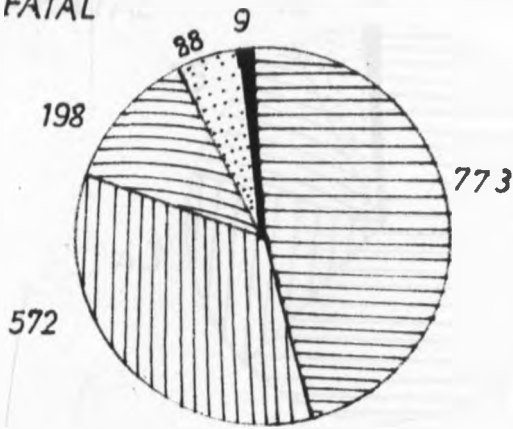
The pedestrian casualties took the second place followed by drivers, and pedal cyclists and lastly the motor cyclists. Looking at the severity of casualties in each class or road user and then into the accident types, we find that passengers comprises the highest number of fatal, serious and slight cases followed by pedestrians, drivers, pedal cyclists and motor cyclists. This is shown on charts/2:7:C and 2:7:D both for Kenya and for Nairobi, also table 2:18 show the same features.

In 1976, the types of accidents occurring in Nairobi were dominated by vehicle - pedestrian and vehicle-vehicle accidents each accounting for 37.4% and 34.9% respectively. See Table 2:19.

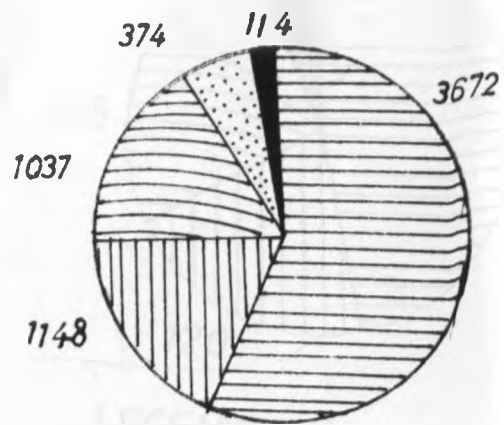
CASUALTIES BY ROAD-USERS KENYA-1976

FIG 2.7.0

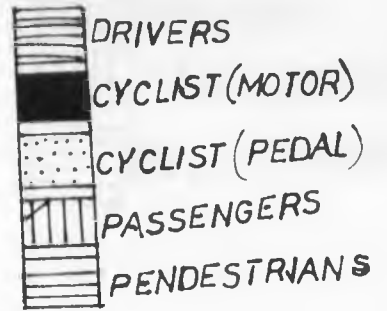
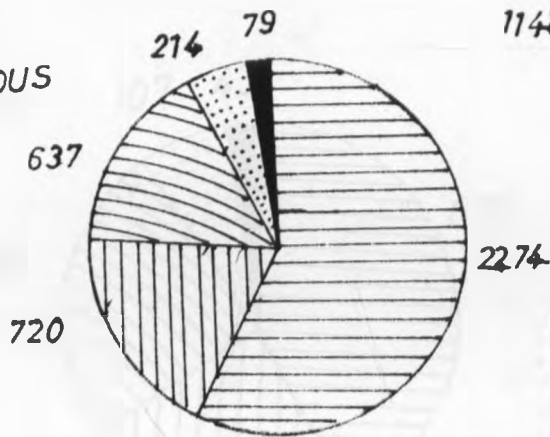
FATAL



SLIGHT



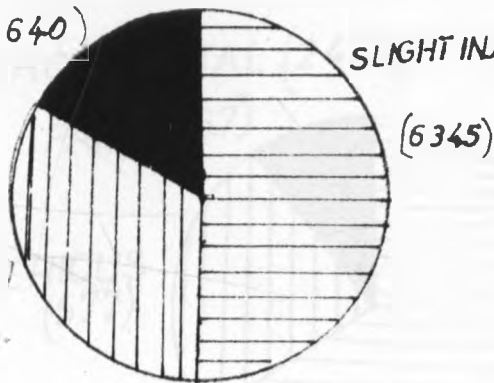
SERIOUS



TOTAL (KENYA)
FATAL (1640)

SLIGHT INJURIES

SERIOUS
(3924)



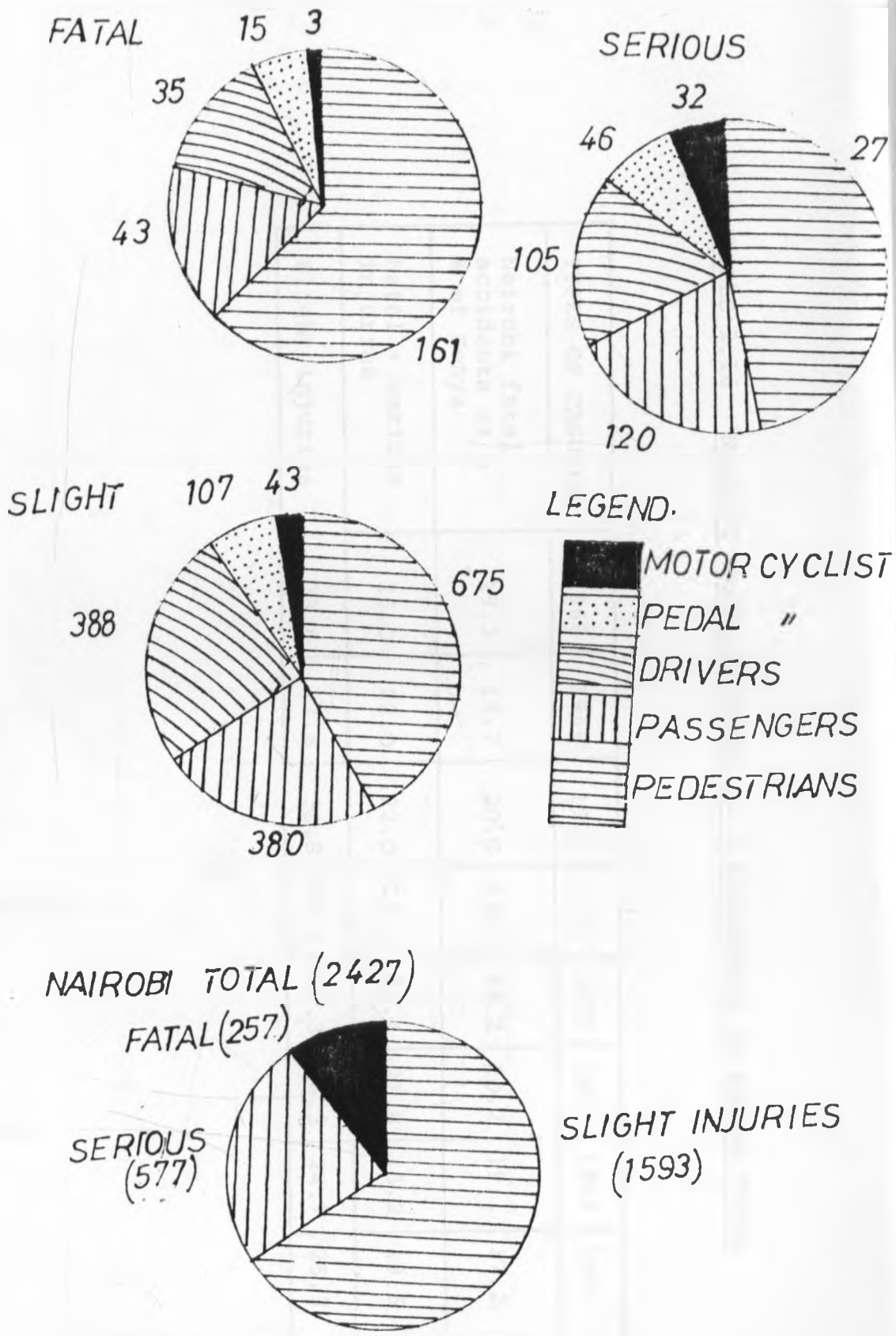


FIG. 2.7.C.
CASUALTIES BY ROAD-USERS IN NAIROBI - 1976

TABLE 2:16 NAIROBI CASUALTY TYPES AS A PERCENTAGE OF KENYAN TOTAL

TYPES OF CASUALTY	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nairobi fatal accidents as a % of Kenya	19.3	18.7	20.0	22.4	19.2	20.2	19.1	17.2	15.7
Fatal + serious injuries	25.0	22.0	22.0	24.4	21.4	21.8	13.2	19.5	15.0
Slight injuries	33.6	27.5	30.8	32.3	27.3	26.3	24.7	25.3	25.1

TABLE 2:17 CASUALTIES BY CLASS OF ROAD USERS IN KENYA 1973-76

	1973	%	1974	%	1975	%	1976	%
Drivers	1980	16.5	1879	17.4	1768	18.4	1872	15.7
Cyclists (Motor)	1269	10.6	210	2.0	205	2.1	202	1.7
Cyclists (Pedal)	833	7.0	635	5.9	642	6.7	676	5.7
Passengers	5203	43.5	5484	50.7	4720	4.9	6719	56.4
Pedestrians	2679	22.4	2503	23.1	2286	23.8	2440	20.5
Total	11964	100	10811	100	9621	100	11909	100

Source: Kenya Traffic Police

TABLE 2:18 CASUALTY SEVERITY BY CLASS OF ROAD USERS 1976

		FATAL	SERIOUS	SLIGHT
KENYA	Drivers	198	637	1037
	Motor Cyclists	9	79	114
	Pedal Cyclists	88	214	374
	Passengers	773	2274	3672
	Pedestrians	572	720	1148
	Total	1640	3924	6345
NAIROBI	Drivers	35	105	388
	Motor Cyclists	3	32	43
	Pedal Cyclists	15	46	107
	Passengers	43	120	380
	Pedestrians	161	274	675
	Total	257	577	1593

Source: Kenya Traffic Police

TABLE 2:19 TYPES OF ACCIDENTS OCCURRING IN
NAIROBI 1976

TYPES OF INJURY ACCIDENT	NUMBER	PERCENTAGE
Vehicle-Pedestrian	727	37.4
Vehicle-vehicle	680	34.9
More than 2 vehicles	181	9.3
Single vehicles	132	6.8
Vehicle-Pedal cycle	113	5.8
Vehicle-Motor cycle	72	3.7
Vehicle-Animal	17	0.9
Vehicle-hand cart	14	0.7
Cycle-Pedestrians	10	0.7
Total	1946	100

Source: Kenya Traffic Police

The magnitude of the road safety problem can further be seen by the fact that the number of road accident patient cases was more than all but one of the number receiving treatment for the various diseases in Kenyatta, Nairobi and Aga Khan Hospitals in 1972. In addition on analysis of the causes of death of trauma patients (i.e. from accidents of all kinds) at Kenyatta hospital in 1974 show that

about 60 out of 62 cases resulted from road accidents.¹⁴ Table 2:20 show these facts. Such studies are continuing but available evidence suggests that a large proportion of scarce medical facilities are already being utilized by road accident casualties and the total number of ^adeaths from road accidents is already considerable. This calls for further investigations in order to suggest remedial measures which would reduce the deaths on our roads.

2.8 GOVERNMENTS POLICY IN ROAD SAFETY

The Government's policy on road safety is well documented in the Traffic Act and the Transportation Licensing Act. These Acts are discussed in much more details in Appendix 1 at the back of the study.

The salient features of the Government Policy on road safety aims at maintaining safety on the roads by ensuring that:-

(i) all vehicles are licensed under the given safety conditions. This is to make sure that all the vehicles on the roads are registered under this Act.

(ii) the vehicle capacities are checked and registered to ensure that vehicles and especially public transport vehicles are not overloaded. A lot

TABLE 2:20 IN PATIENTS NAIROBI 1972:
3 HOSPITALS COMBINED

CAUSES	NUMBER OF PATIENTS	% OF TOTAL
Intestinal infectious Diseases	869	11.6
Tuberculosis	410	5.5
Diseases of the Blood	1026	13.8
Polio	76	1.0
Endocrine-Nutritional Metabolic Diseases	1301	17.4
Bacterial Diseases	224	4.3
Viral Diseases	323	3.0
Diseases of the skin	289	3.9
Diseases of the Central Nervous System	1067	14.3
Musculoskeletal Diseases	758	10.5
Road Accidents	1121	15.0
Total Cases	7463	100

Source: G.D. Jacobs and I.A. Sayer T.R.R.L. SR. 227
1976.

is being done by the traffic police to see that public vehicles are not overloaded, because in case of an accident many people are injured.

(iii) vehicles are in good operating conditions and the licensing officer can send a vehicle for inspection to make sure that the vehicle is fit and in good conditions for the purpose for which it is intended to be used. This is done because many of the accidents results from mechanical failures.

(iv) the drivers observe and obey the traffic regulations, laws, signs etc and that they drive at safe speeds as required for every type of vehicle. Thus drivers should avoid overspeeding in residential areas, commercial areas in municipalities and townships.

(v) the drivers drive with maximum care in regard to road conditions and other road users. This tries to check reckless driving and careless driving which is very common because of drivers states. Some are under the influence of alcohol and drugs and others drive carelessly and recklessly in an attempt to overtake other vehicles or to compete for passengers in case of public transport vehicles.

(vi) all road users observe the traffic code and regulations when on the road.

These are the main features on the Government Policy on road safety, and to ensure that safety is

maintained, the Government has set up the Traffic Police Branch of the Kenya Police. This section patrols the roads to see that the regulations and laws are kept and not violated. When offenders are caught they are either fined, imprisoned or disqualified from holding or obtaining driving licenses.

The Government also spends a lot of money to improve road conditions, road signs and signals in an attempt to reduce the number of casualties on the roads. For example the Government installs traffic lights, signs, speed limits, road markings, pedestrian facilities etc.

CHAPTER THREE

GENERAL ANALYSIS:

The various factors discussed in chapter two are here dealt with in relation to road accidents, in an attempt to see their contributions to the road safety problem. From analysis in this chapter we shall be in a position to say what areas in the Nairobi Transportation system could be changed or modified to enhance safety on the roads.

In chapter two Nairobi as a primate city was seen to have a rapidly growing population employed in the various parts of the city - namely the central area employing 49,000, secondary centres, 2,400, the industrial area 31,000, the residential areas 80,300 and in other sites 10,400 by 1970. This distribution was estimated to be 100,000 in the central area, 177,500 in secondary centres, 184,900 in residential areas, 118,000 in industrial area and 68,500 in other sites* (Hospitals, further and higher education, barracks and prisons) by the year 2,000 AD¹. These people are accommodated in three residential zones differing in densities and incomes located in all directions from the city centre. The spectrum of people from these residential areas and others from outside the city boundaries

come into the city every morning for work and for business and leave the city centre or other working places in the evening squeezing through very restricted channels (roads). The people either get into and out of these working places by private vehicles 38%; public vehicles 14%, walking 44% motor cycles 2.6 etc.

With clearly differentiated residential areas in terms of incomes and densities we find that there is a high rate of car ownership to the north of the city centre in places like Muthaiga, Parklands, Highridge, Loresho, Kyuna etc with 0.4 cars per head. (refer map number 2:2:2), and public and pedestrian movements are concentrated in other directions especially in the east of the central area. With four modes of transport, public, private cycle and walk, there is a conflict between pedestrians and vehicles and between vehicles and vehicles. These conflicts are worse especially during peak hours when we have maximum vehicular and pedestrian traffic on the roads; as people rush to work in the morning or for lunch time facilities or for home in the evening.

In addition to traffic generated within the city boundary we have many vehicles coming into the city bringing in daily commuters from the surrounding districts. These vehicles flocking into the city from the surrounding districts add

to the heavy traffic on the arterial roads leading into and out of Nairobi, for example there are over 250 Matatus operating along Murang'a road from either Kiambu or Thika side, about 300 vehicles (Matatus) along Ngong Road, 200 Matatus along Waiyaki Way etc.* These added to the many country buses and other vehicles make the traffic on these roads quite heavy. For example along Ngong road we had 210 country buses, Waiyaki way 80, Limuru Road 82, Komo Rock Road 11, Landhies 65, Murang'a 190 buses etc, all carrying daily commuters to the city. These daily commuters generate heavy pedestrian traffic from the country bus and matatu stops and terminals in the city. The arterial roads also have mixed traffic which compete for the use of the restricted space on these roads and the passenger vehicles compete for passengers causing many conflicts resulting in road accidents.

3.1 LAND USE AS CONTRIBUTOR TO ACCIDENTS

Transportation is a function of land uses, and different land uses generate different traffic movements. In every city there are different land uses some of them located in different zones from others.² For example in many cities and

* Source Technical paper No. T.10:12/1972 N.U.S.G. Report 1973

2 New Movements in Cities - Brian Richards

towns we have residential, working recreational business and shopping places. Peoples activities rotate between these different land uses.

Nairobi has very clear and distinct land uses, namely the residential areas located in all directions of the city centre, the business commercial and working places located in the central and the industrial areas and other activity centres dispersed all over the city. Because of this land use arrangements people have to move from all the residential areas in all the directions to the central and others to the city centre. Because of lack of direct communication between some residential areas especially those in the north and north east people are forced to come first to the central area and then move to the industrial area.

As a result of concentrated activities in the central and industrial areas, the problems of traffic congestion and delays and especially at peak hours arise. This as discussed in chapter two is characterised by heavy pedestrian and vehicular movements to these two areas and other subsidiary centres. Because the morning peak lasts for only 1½ hours from 7.00 to 8.30 a.m., there are many conflicts especially at the various interchanges terminal intersections and crossings. These

conflicts results in many accidents. The dangerous conflicts areas are shown on map 3:2, which reveals the fact that many of them are along the main roads leading to the central and industrial areas, and others are within these two areas. For example there are many conflict areas along Uhuru Highway Haile Selassie Avenue, Jogoo road, Juja road, Muranqa road, Landhies road Ngara road, Ronald Ngala Street, Race course road etc. These conflicts mostly involve vehicles and pedestrians, and vehicle-vehicles. These conflicts are many especially during peak hours when about 44% of all the trips are made on foot, 38% on private vehicles, 14% on public transport, and 2.6% on cycles. The struggle between these four modes of transport to use restricted road space and footpaths give rise to conflicts that result in road accidents.

This can only be attributed to the concentration of activities in these two areas and to the time factor that people have to get to their place of work or business in given times. Table 3.i and figures 3.1 and 3.ii give the distribution of road accidents in 1976 by time and by the day of the week. These figures show that in 1976, 2427 casualties were reported from 1946 accidents. Out of these 67.5% of the total or 1639 casualties occurred during daylight between 7 a.m. and 6 p.m. The rest 788 or 32.5% occurred during darkness

TABLE 3.1 ACCIDENT DISTRIBUTION BY TIME AND DAY OF THE WEEK

	7AM	8	9	10	11	12	1PM	2	3	4	5	6	TOTAL
MONDAY	40	36	25	13	11	17	19	17	13	18	23	19	251
TUESDAY	32	35	24	15	15	16	21	14	15	20	15	15	237
WEDNESDAY	31	34	29	20	10	14	15	22	14	17	21	12	239
THURSDAY	30	33	21	17	14	15	18	17	16	21	20	21	243
FRIDAY	28	30	24	12	12	12	20	25	17	14	22	16	232
SATURDAY	27	22	25	17	13	19	22	13	19	16	17	15	225
SUNDAY	15	19	23	16	15	17	16	20	16	11	19	25	212
TOTAL	203	209	171	110	90	110	131	128	110	117	137	123	1639
%	12.4	12.7	10.4	6.7	5.5	6.7	8	7.8	6.7	7.1	8.4	7.5	67.5

ACCIDENTS DURING DAYLIGHT.

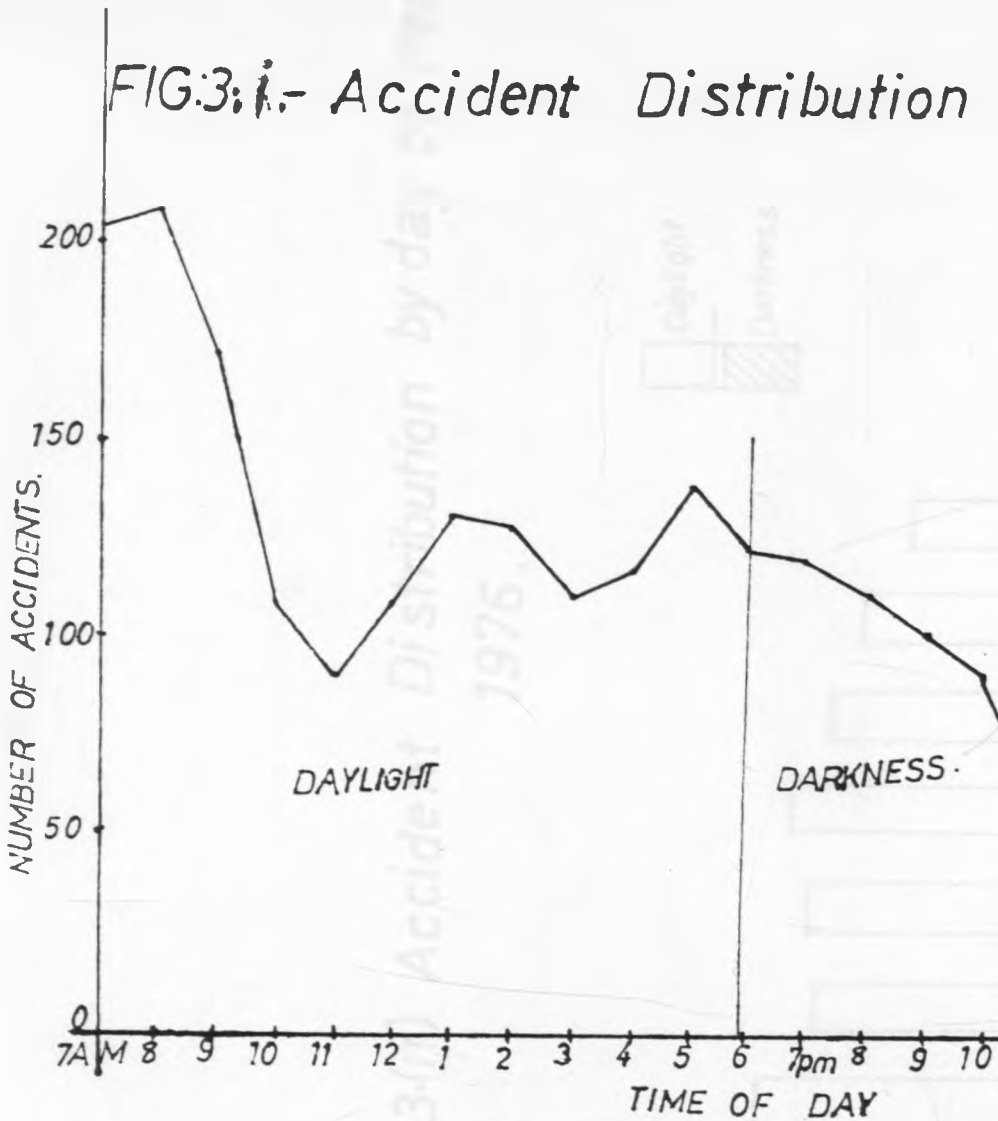
TABLE 3.1 (CONT.)

	7PM	8	9	10	11	12	1 AM	2	3	4	5	6AM	TOTAL
MONDAY	21	15	14	12	6	5	2	1	0	4	10	27	117
TUESDAY	13	13	10	11	8	4	2	2	0	3	9	24	99
WEDNESDAY	14	17	13	10	5	2	1	1	1	2	10	21	97
THURSDAY	14	12	10	12	7	1	2	1	1	2	13	16	91
FRIDAY	13	10	14	13	9	1	1	2	1	2	12	20	98
SATURDAY	23	21	20	15	12	10	4	1	2	3	10	23	144
SUNDAY	22	24	21	19	11	5	2	2	3	1	11	21	142
TOTAL	120	112	102	92	58	28	14	10	8	17	75	152	788
%	15.2	14.2	12.9	11.7	7.4	3.5	1.8	1.3	1.0	2.5	9.5	19.3	32.5

ACCIDENTS DURING DARKNESS

- 99 -

FIG:3.i.- Accident Distribution



by Time, 1976.

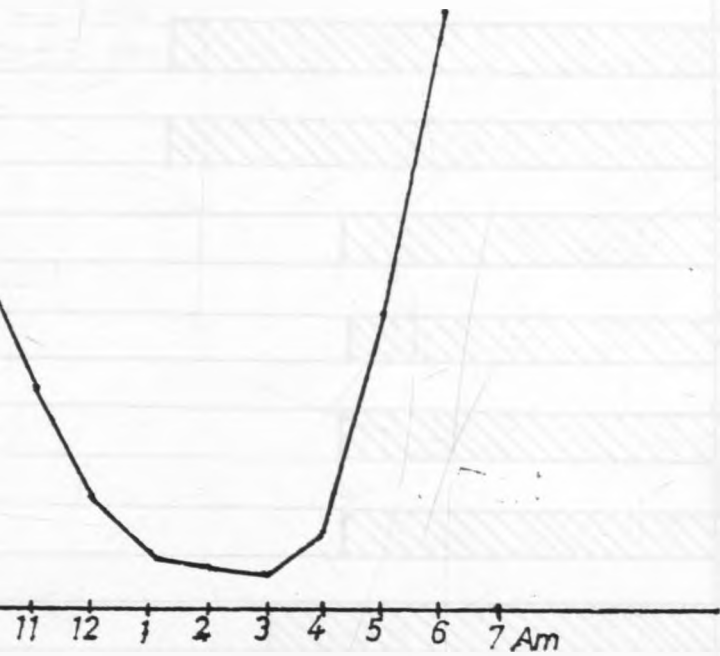
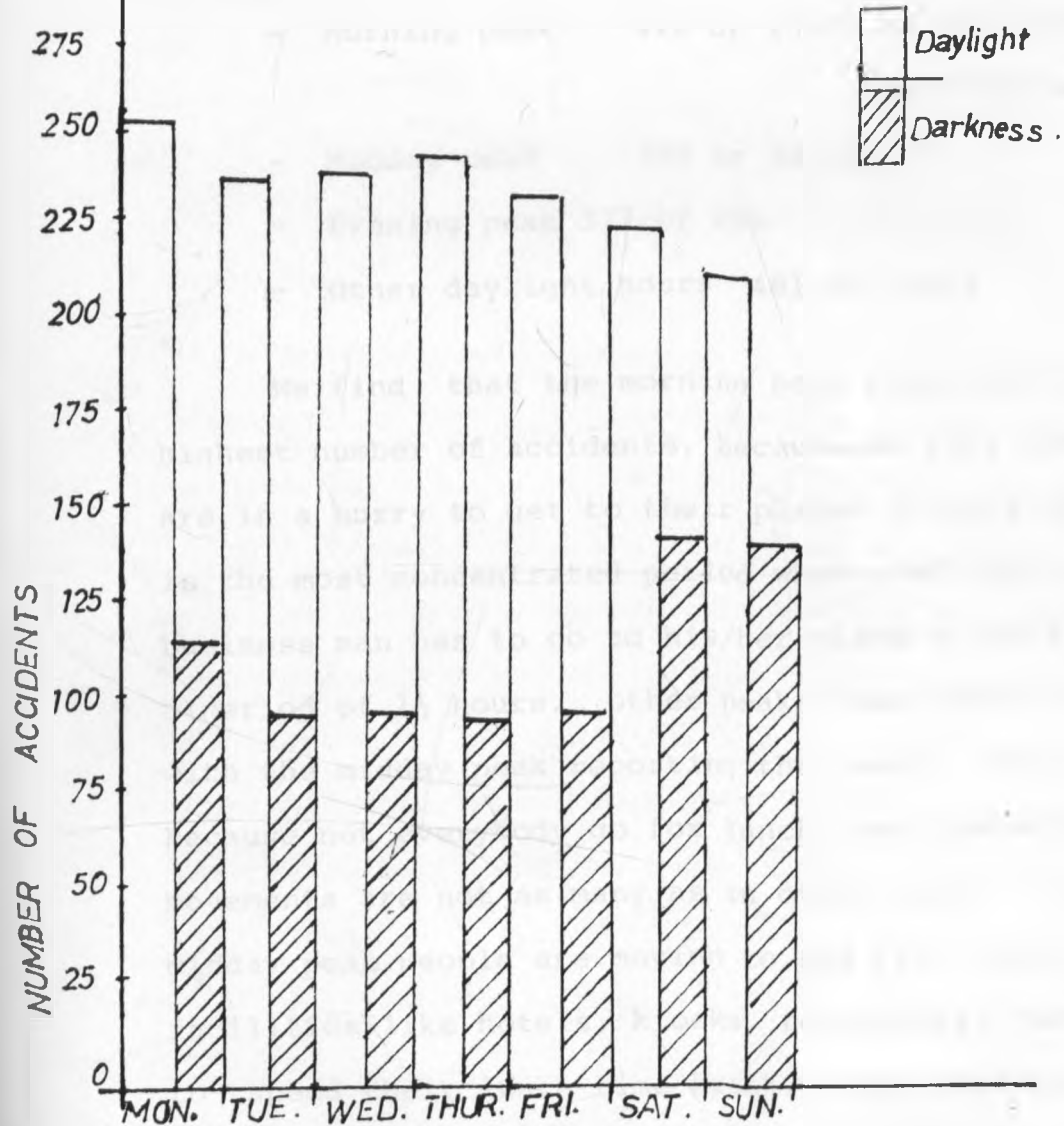


FIG.3.(ii) Accident Distribution by day of week.
1976.



between 7 p.m. and 6 a.m.

Taking the peak hours to last between 7 and 8.30 a.m. in the morning, 12 noon to 2 p.m. during midday peak, and 4.30 p.m. to 6 p.m. in the evening peak, and bearing in mind that these are times of heavy traffic movements and conflicts, accidents in 1976 were distributed as follows:

- Morning peak 412 or 25.1% of the total
daylight accidents
- Midday peak 369 or 22.5%
- Evening peak 377 or 23%
- Other daylight hours 481 or 29.3%

We find that the morning peak reported the highest number of accidents, because at this time people are in a hurry to get to their places of work on time. It is the most concentrated period when every worker and business man has to go to his/her place of work within a period of 1½ hours. Other peaks have fewer accidents with the midday peak reporting the least. This is because not everybody go for lunch, and therefore movements are not as many as in other peaks. During midday peak people are moving to and from lunch time facilities like hotels, kiosks, restraunts, parks etc to spend their lunch time break. Some parents rush to schools, nursery schools etc to get their children for lunch and other children and workers are also going home for lunch.*

The evening peak is extended up into the evening hours from about 4.30 to about 7 p.m.; in the night and as a result there are fewer concentrated movements and the number of accidents reported are fewer than the morning peak hour. But looking at the whole period between 4.30 and 7 p.m. 609 accidents were reported in 1976, which may be attributed to people being drunk after work.

During the three peak hours 1158 accidents or 70.6% of the total number were reported. The rest 481 or 29.4% occurred during other hours of daylight.

Another aspect revealed in table 3:1 is that most of the accidents occurring in darkness are between 7 p.m. and 10 p.m. and between 5 a.m. and 6 a.m. Other hours of darkness reported very few accidents; except on Saturdays and Sundays when many people may be, stay out late, drinking because of no work on Sundays and possibly because on Sunday many people go home in the reserves and are coming back into the city late, many possibly being drunk.

The influence of land uses on road accidents can be seen from the fact that most of the roads reporting the highest number of accidents are either within 3 km of the central area or they are roads in residential areas especially high density area. These roads are mainly arterial roads carrying heavy



LEGEND

XXXX	PUBLIC & GOVT. LAND BUIL
CCC	FOREST
A	CENTRAL AREA
[Dotted pattern]	RESIDENTIAL LOW DEN.
[Dotted pattern]	MEDIUM DENSITY
[Dotted pattern]	HIGH DENSITY
TTT	INDUSTRY
ZZZ	OPEN SPACES
[Blank]	UNDEVELOPED LAND
●	BLACK SPOTS

FIG.3:1

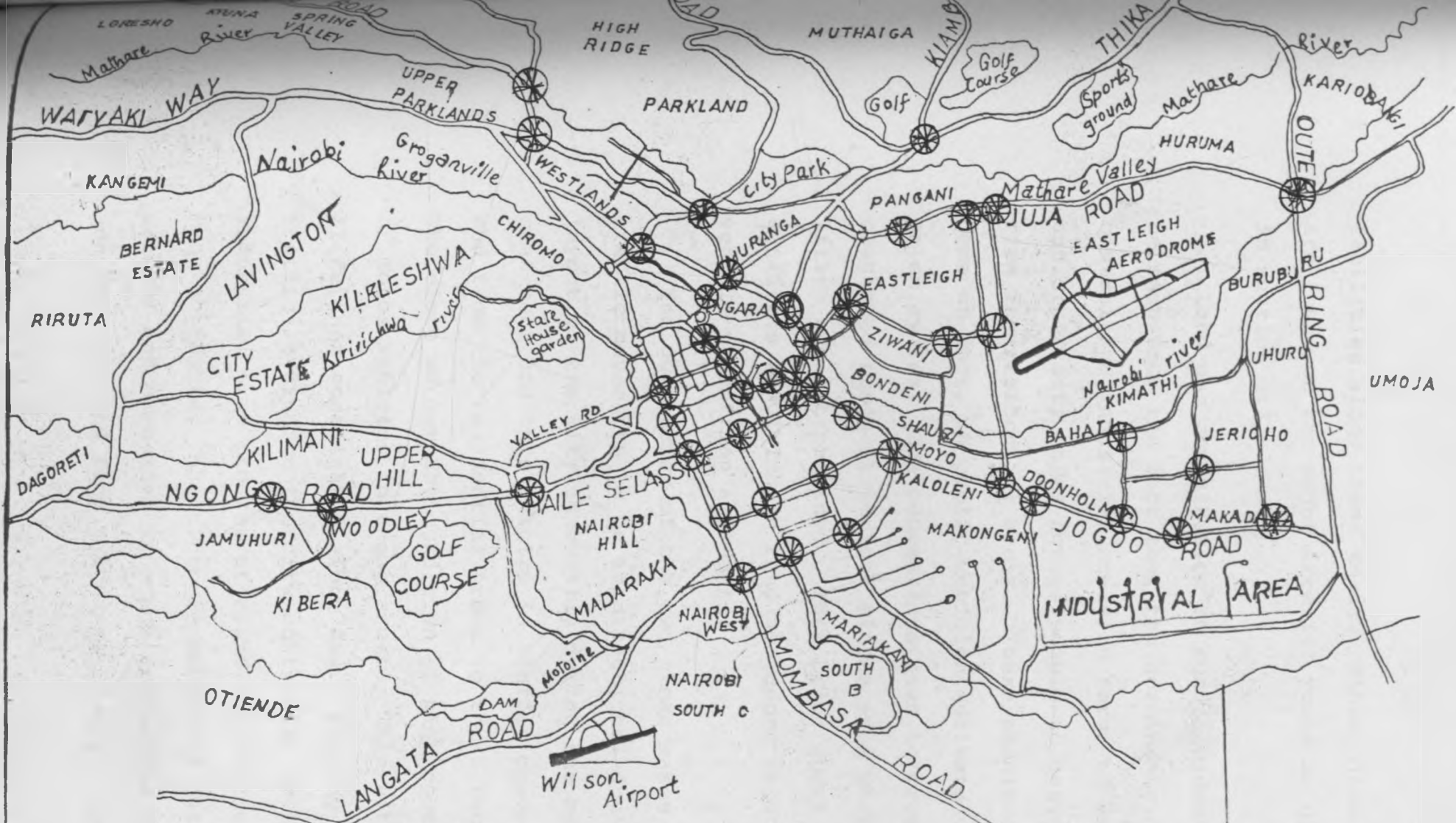
MAJOR ACCIDENT SPOTS AND LAND USES

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traffic to and from the two areas like Ngong Road, Juja Road, Jogoo Road, Waiyaki way, Thika-Murang'a Road, Limuru Road, etc. See map 3:1 showing major accident spots and land uses. These are also areas where many conflicts are experienced as seen on map 3:1.2.

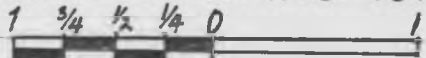
Most of the accident roads are found on the eastern side of the city centre and to the west and they include Landhies Road carrying most of the traffic from the eastlands, Sakwa Road located in high density area, Haile Selassie Avenue carrying most of the traffic from the surrounding districts into the city, and most of the traffic to the industrial area; Race Course Road carrying much of the traffic from the north, north east etc and a heavy pedestrian traffic.; 1st Avenue and 2nd Avenue Eastleigh, Heshima Road, being in residential areas of high density; Likoni Road, Jogoo Road, Juja Road, and Outer Ring Roads.

Most of these roads pass through residential areas (high density) from where hundreds of people commute to the city centre and the industrial area either on foot or in public transport. These people have to walk on restricted pavements along the road and often cross the road at very dangerous places as shown on map 3:2 showing conflict areas. This is because of not providing adequate pedestrian



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MAJOR CONFLICT AREAS*



Scale 1:20,000.

MAP NO. 3.1.2.



facilities along these roads. Other black spots are found on the major arterial roads as discussed in section 3:3.

Land use contribution to road accidents can be seen from the fact that the dorminancy of the central and industrial areas in terms of employment and other activities forces people to converge here from the residential areas. These people either come on foot, in public vehicles, private vehicles or on cycles. The pedestrians have to cross the congested roads at various places even where facilities are not provided. This bring about serious conflicts resulting in road accidents especially vehicle-pedestrian accidents.

The dorminancy of the two areas makes the traffic movements to be unidirectional due to the layout of the city especially during the morning peak hour and this results in traffic converging to and from the residential areas to these two areas. Therefore we get the condition of high concentration of motor vehicles in these areas. This situation if further accentuated along Uhuru Highway where traffic leading to the city centre and to the industrial area crosses at right angles causing many accidents. Again people coming in buses, matatus and cars move from bus and matatu stops and terminus and from car parks to their business

centres creating more conflicts which results in accidents.

We therefore can say that the present land use arrangements generate heavy mixed traffic concentrated in some few areas making movement very difficult and producing many conflicts resulting in road accidents. It can be seen that as one draws nearer the two major activity centres the number of accidents increases and reduces as one moves away except on the major arterial roads. These roads carry very heavy traffic and have more accidents occurring on them.

3.2 ROAD ACCIDENTS IN RELATION TO THE NUMBER OF VEHICLES AND THE POPULATION EXPOSED TO DANGER

Between 1970 and 1976 Nairobi had an increase of 56% of the number of vehicles from 90438 to 161606. This high increase has not been accompanied by an increase in road developments and therefore the space of operation remains unchanged in many cases. At the same time the population of Nairobi has increased by 67% from 547,000 to 814,000*. This high rate of growth of both vehicles and population and the fact that 44.0% of all purpose trips were made on foot in 1970, makes the risk higher and especially where pedestrian facilities are not well provided. This means that the pedestrian have to walk sometimes on the roads, cross

* Nairobi City Council Estimates 1976

the roads at any place and with such a high number of vehicles and pedestrians, the vehicle-pedestrian conflicts are increased. Again, the fact that both pedestrians and vehicle occupants have to go to the same activity areas especially to work, shopping and other business in the central area at the same time, the conflicts are made even more.

As we saw in chapter two walking as a mode of travel dominate the other modes of transport in Nairobi due to other factors apart from car ownership disparities. The alarming world inflation has caused further difficulties among the majority of the population in Nairobi. For example, the public transport of which some of Nairobi residents have had to rely on because of its relatively low fares was hit by inflation and had to increase their fares in February 1976 and March. According to a report, the average fare per passenger has increased from 40 cents in JULY 1973 to 75cents in 1976, a rise of 87.5%. During the same period passenger per bus per day dropped from 1000 to 750. Overall passenger carried have thus declined and adjusting for the rise in population this was a 28% drop in 1976. This would be attributed to an increase in the number of Matatus whose fares are the same or lower than the Kenya Bus Services Limited. The Matatus were allowed to operate without licenses under the Transport Licensing Act, by the Presidential decree

in June 1973.

Most of the people in Nairobi make their trips on foot 44% in 1970 or 277,000 persons trips. The other modes of travel were private transport which accounted for 38% or 239,400 persons trips, public transport with 14% or 88,200 person trips and others accounting for 4% or 252,000 person trips in 1970*.

This explains the conditions found on the roads and paths with very heavy pedestrian traffic private vehicle, lesser public transport vehicles and very few bicycles and other vehicles. These conditions are not uniform all over the city. This gives us some roads with very high traffic volumes like roads to the north west of the central area e.g. Uhuru Highway, Chiromo Road, Waiyaki Way, Limuru Road, Lower Kabete Road, Murang'a Road etc with heavy private vehicle traffic, and other areas with lower volumes like to the east of the central area.

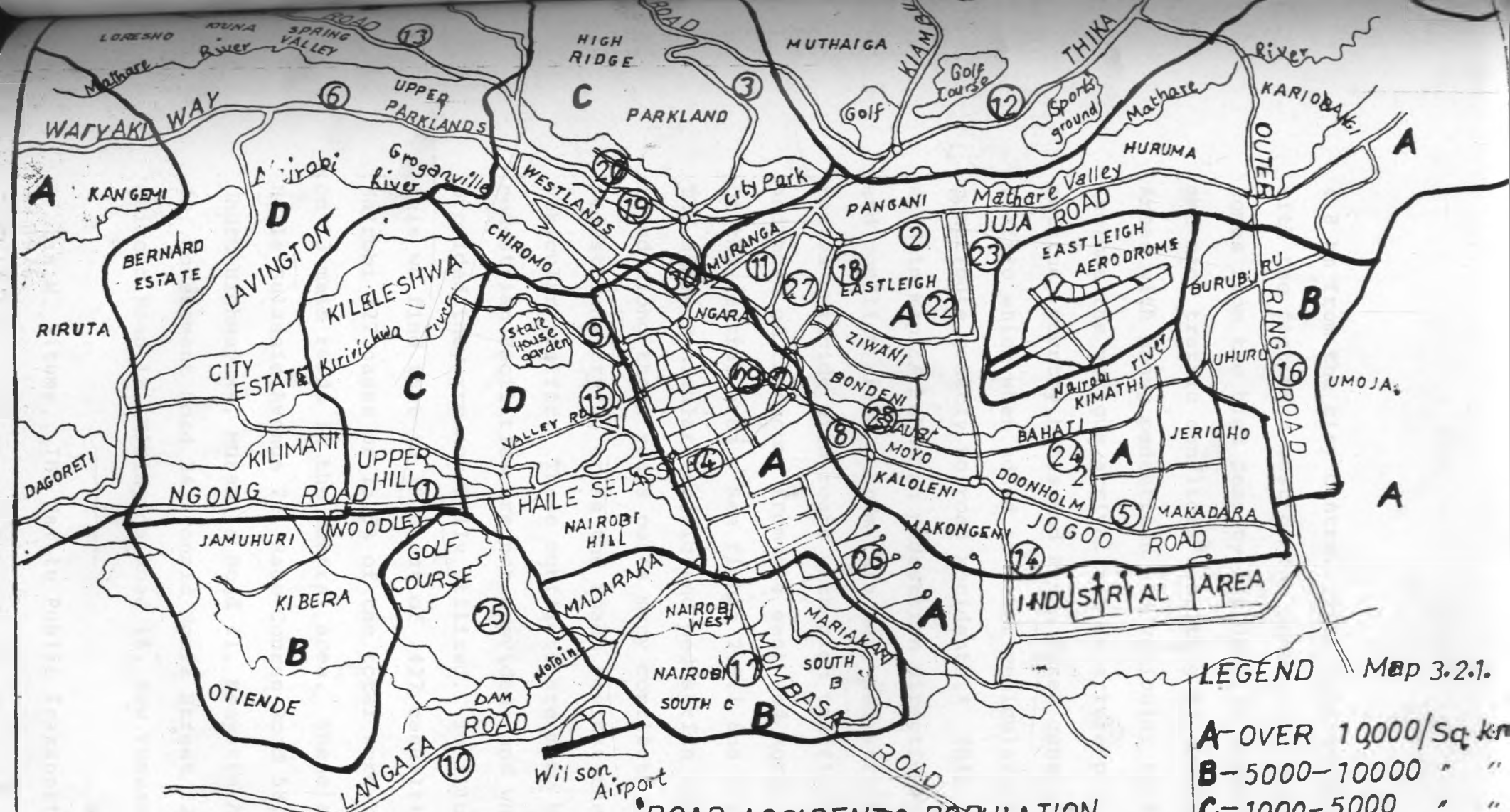
As seen in chapter two sections 2:4, 2:5 and 2:6 the major traffic generators to the central and the industrial area are various residential areas with the high density residential areas generating most of the pedestrian traffic. This include areas like Eastleigh, Shauri Moyo, Bahati, Jericho, Kariobangi, Umoja etc. The other two residential zones medium and low density areas generate most of the private vehicles.

* N.U.S.G. 1972

The high and medium density areas generate most of the public transport and majority of the pedestrian traffic.

With concentration of activities in the central and industrial areas there is heavy traffic flow in and out of these areas especially at peak hours. The roads with very high traffic volumes happen to be the main distributor roads carrying the traffic in and out of the central and industrial areas from within and without the city boundaries. These roads carry mixed traffic of cars, bicycles, pedestrians, city buses, country buses, matatus, trailers, lorries, tankers etc. With this type of traffic many accidents occur on these roads.

Relating road accidents to the population density we find that most of the accidents occur in areas of high population densities as found in the eastern side of the central area. Here population density ranges from 5,000 persons per square kilometre to over 10,000 per sq. km. as shown in map 3.2. Again looking at the road density map, figure 2:3:3, we find that most of the road accidents are to be found in areas where road densities range from 20-80 km per square km. As was discussed in chapter 2:4 we find that the majority of trips in Nairobi, fell within the range between 0 and 8 km and most of the walk trips occurred in the lower distance ranges for example come 70% were below 3.2 km and 85% were below

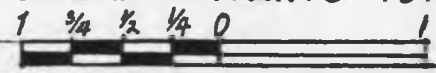


LEGEND Map 3.2.1.

A - OVER 10000/sq km
B - 5000-10000 " "
C - 1000-5000 " "
D - Below 1000 " "

1-30 DANGEROUS ROADS

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Scale 1:20,000

MAP NO. 3-2.1.



ROAD ACCIDENTS & POPULATION DISTRIBUTION

4.8 km from the city centre. With this in mind and with the fact that most of the pedestrian traffic comes from the high density residential areas we get many traffic conflicts resulting to accidents. Areas with heavy pedestrian and vehicular traffic which include the various arrival and departure points of matatus, country buses and Kenya Buses generate heavy traffic which when added to other vehicular traffic contribute greatly to road accidents.* This can be seen in map 2.4.2 showing pedestrian directional flows and conflict areas. From this map, pedestrian commuter routes coincide with roads with high traffic volumes and most of them come from the east and north east of the central area. See figure 2:6:1 and 2:6:2. The heavy vehicular traffic and pedestrian traffic found along these roads poses many conflicts when pedestrians try to cross the roads against the heavy vehicular traffic. These conflicts are many because pedestrian facilities are not provided, and where provided they are not fully utilized. To illustrate this we find that in 1976 out of 2427 casualties in Nairobi 377 cases or 15.5% of the total were reported on 13 main roads in the central area. These are Haile Selassie Avenue 72, Race Course Road 58, Uhuru Highway 44, Murang'a Road 41, Kenyatta Avenue 40, Government Road 24, Ronald Ngala Street 22, Chiromo Road 19, Kirinyaga Road 16, New Pumwani Road

* Ian W. Situma, The Matatu Public Transport of Nairobi 1976.

14, University Way 11, Tom Mboya Street 10 and River Road 6 cases.

In conclusion we find that in areas of high population densities, heavy vehicular traffic and high road density we have many accidents as indicated by the region immediately to the east of the central area. This can also be seen on some areas of the central area, and especially on roads where matatus, country buses, and Kenya buses drop and pick passengers. This can be attributed to the many pedestrian movements found in these areas. In areas of low population density high numbers of private cars and few pedestrian movements we have very few accidents. These two points can be seen from the fact that most of the pedestrian traffic move from the eastlands southwards and to the south west to come to either the industrial area or the central area where they work. These are areas of narrow roads, heavy matatu and bus traffic competing for passengers. Because the pedestrians have to cross various roads before they come to the industrial and central areas at places where no pedestrian facilities are provided, many road accidents occur in some of these roads. For example many people have to cross Jogoo Road, Landhies Road to come to the Industrial area and in the process get knocked by fast moving vehicles along these roads- (in 1976 these two roads claimed 123 casualties). We also get many pedestrian accidents on roads where matatus, and buses operate, for example

along Race Course Road, Ronald Ngala Street, Haile Selassie Avenue, Landhies Road etc where these vehicles pick their passengers. Here many pedestrians cross the roads,. These 4 roads claimed 202 casualties in 1976.

Except on roads passing through high density residential areas, and on arterial roads; the high income low density areas report very few accidents. But as we move nearer the central and industrial area where floating population is quite high, and vehicular traffic increases, the number of accidents also increases.

3.3 ROAD ACCIDENTS ON THE MAJOR ARTERIAL ROADS AND MATATUS AND COUNTRY BUSES AS CONTRIBUTORY FACTORS.

Roads leading into Nairobi carry very heavy and mixed traffic volumes. With this kind of traffic maximum care is needed by the road users while using these roads because any slight misjudgement may result in road accident. But unfortunately it is along these roads that matatus and buses operate competing for passengers, and most of the motorists overspeed along these roads. The problem becomes worse when these roads pass through or near residential areas, or in busy areas where pedestrian movements are high.

Before 1973, there was strong checks on passenger vehicles packing passengers in any place not scheduled for stopping while within the city boundary. But with the increase of matatus in the city following the June 1973 Presidential decree authorising them to operate without any Transport Licensing Board Certificate, the problems along these roads and other roads where matatus operate were increased. This has been so because of the bad behaviour of the matatu drivers, in that they can stop to drop or to pick a passenger anywhere they find one.

It is a fact that matatus carry a large number of people in Nairobi, everyday, and play a significant role in the existing transport system. The knowledge that about 66,300 people travel by matatus every day has established that matatus are providing a much needed capacity for public transport within the CBD. Such capacity is not forthcoming in the near future from either the KBS Limited or the country buses.

Matatus operate on existing KBS Ltd. bus routes and a few of their own routes where bus services are not provided by the KBS Ltd. The latter is in residential areas like Lavington Green, Barnard Estate, Muthaiga and the areas previously in Kiambu County Council where (a) the City Council has restricted bus routes due to light specifications of roads and (b) the Kenya Bus Services Ltd. finds the provision

of high frequency bus services not profitable because of high car ownership in these high income residential areas.*

In areas where these are so established KBS Ltd services, matatus do not pose serious traffic congestion or delay problems. However, the problem of matatu operation lies on the established Kenya Bus Service Limited heavily trafficked roads where matatus cause congestion and delays while plying for hire. Apart from these city matatus there are other matatus which operate on the arterial roads serving the surrounding districts like Kiambu, Limuru, Thika, Machakos, Kikuyu, Dagoretti etc. These ones also have to pick their passengers at some point in the CBD adding to the congestion and delay problems already there.

In 1975 the City Council abolished a few bus stops infested by matatus at Ambassador Hotel on Government Road, Kenya Commercial Bank on Tom Mboya Street, and at New Stanley Hotel on Kenyatta Avenue, in an effort to reduce traffic delays at the junctions in the vicinity, but the exercise merely transferred the problem to the next junction and latter they returned to the same spots. In addition to congestion and delays caused by matatus we find that matatus make road obstructions which

* Ian W. Situma - the Matatus Public Transport of Nairobi 1976.



PLATE I Sometimes when accident vehicles are not removed from the scene, they may cause other accidents.



PLATE 2 Many people lose their lives through road accidents and especially those involving matatus and buses.



PLATE 3 Matatus are number one killer on the roads, because of speeds.



PLATE 4: Speed kills. This Peugeot 404 got so damaged because of speed.



PLATE 5 Rush hours in Nairobi claim a large number of road casualties for all classes of road users: Pedestrians, passengers etc.



PLATE 6 Traffic lights and pedestrian pavements help alot in the flow of traffic.



PLATE 7 Outside peak hours, traffic flow is very little.



PLATE 8 The morning Peak has very heavy traffic bound for the City Centre. (Muranga road roundabout)



PLATE 9 Pedestrians' behaviour has contributed to the number of accidents. They cross the road at their convenience.
(Uhuru Highway - City Hall Way junction)



PLATE 10 Even where guardrails are put as barriers, pedestrians will always risk their lives. (Government road - Haile Selassie roundabout)



PLATE 11. In search of parking space, motorists break road pavement.



PLATE 12. The matatus can break down at any time any where, and can cause a lot of problems. (Right on the University way round-about, it refused to move).



PLATE 13. Normal hours traffic is quite calm.



PLATE L4. During peak hours it is very difficult to pull out of parking lots.



PLATE 15. Pedestrian facilities where provided are under utilized.



PLATE 16. Where pedestrian facilities are not provided, the pedestrian has to make his way through the mixed traffic.



PLATE 17. Wrong parking forces the pedestrians to walk on the road even when the traffic is heavy.



PLATE 18. The peak hours coincide for both vehicular and pedestrian traffic - Morning peak flow into the City, Evening peak flow out of the city.



PLATE 19. Despite the City Askaris patrol and fines on wrong parking people are forced to park on the pavement.



PLATE 20. More of pedestrian facilities are needed to segregate the vehicular traffic from pedestrian traffic.

at times are very dangerous to other motorists and pedestrians. These obstructions are very common along the route along which matatus ply, and in attempts to compete with passenger buses, the matatus make many unplanned stops and turns which at time cause serious road accidents. On the other hand the matatus are generally always overloaded and some of them are in many cases unroadworthy. The unroadworthy nature and the overloading has brought about multiple casualties whenever an accident occur.

The matatus operate along given roads within the city boundary and the main ones are:-

- (1) Landhies Road-Joqoo Road, Nyasa- Nile Road going to Makadara and Embakasi.
- (2) Landhies road - Heshima road, Buruburu Road, Mumias road, Outer Ring Road - to Kariobangi, Kariobangi, South, Umoja, and Dandora.
- (3) Race Course Road - Ring Road Ngara, Juja Road going to Mathare and Kariobangi.
- (4) Race Course - General Waruinge Street, second Avenue Eastleigh, Juja Road - going to Mathare Kariobangi and Eastleigh.
- (5) Murang'a Road, Limuru Road, 3rd Avenue Parklands going to Parklands.
- (6) Chiromo Road - Waiyaki Way - going to Kanqemi etc.
- (7) Kenyatta Avenue - Valley Road - Ngong Road, - Kibera drive to Kibera, Dagoretti and Kawangware.

- (8) Haile Selassie Avenue - Ngong Road to Ngong, Dagoretti Market, Kikuyu,
- (9) Uhuru Highway - Langata Road to Nairobi West and beyond
- (10) Uhuru Highway - Bunyala Road-Machakos Road, Dunga Road to Nairobi South C and Mariakani.

It is along these routes that most of the matatus operate, and because the Kenya Bus Service Limited have their buses operating on these routes and in others we have country buses, there is competition for passengers.

The matatus operating for long distances use the main arterial roads, but have ^{their} there destinations in the city centre. We therefore find that certain areas in the city centre have very many vehicles (matatus) waiting for passengers either for long distances or for within the city boundaries. These operating within the city boundary have their terminals (origins) in towns and also their destinations are also within the city. The following are the origins and destinations within the city boundaries.

TERMINALS (ORIGINS IN TOWN)	DESTINATIONS IN THE CITY
1. Race Course Road near O.T.C. depot	Eastlands
2. Ronald Ngala Street, near Cross road Junction	Mathare, Kariobangi, Eastleigh etc
3. Temple Road	Eastlands
4. Ronald Ngala Street opposite Tusker House	Kangemi, Kibera, Lavington, Kabete
5 & 6. Adjuscent to Hotel Ambassadeur and Development House, on Government Road	Nairobi South C and Mariakani, South B and Madaraka.
7. Adjacent to Old Kenya Commercial Bank (Tom Mboya Street	Parklands, Aga Khan and High Ridge etc.
8. Bus stop at Government Road near Tubman Street Junction	Kangemi, Uthiru
9. Next to Kenya Bus Service Limited Station	Umoja.

From these origins, these matatus ply to their respective destinations throughout the day with peak volumes during the peak hours. From a survey by the City Council, Jogoo Road, Juja Road and Thika Road had the highest number of trips in the City, and the highest number of matatus. Table 3:3:1 show some facts

TABLE 3:3:1 DISTRIBUTION AND FREQUENCIES OF MATATUS

NAME OF ROAD	TOTAL NO MATATUS NOTED	DAILY NO OF TRIPS IN BOUND	DAILY NO OF TRIPS OUT BOUND	AVERAGE NO OF TRIPS VEHICLE PER DAYP	% NO OF TRIPS
Jogoo Road	317	839	850	5	20.6
Mumias Road	107	248	192	3	5.4
Juja Road	342	843	853	4	20.6
Thika Road	502	482	542	1	12.5
Limuru Road	140	256	196	2	5.5
3rd Parklands Avenue	21	139	133	7	3.3
Lower Kabete Road	79	97	92	1	2.3
Waiyaki Way	205	314	337	2	7.9
Naivasha Road	129	225	219	2	5.4
Ngong Road	55	80	92	2	2.1
Kibera Drive	33	130	142	4	3.3
Langata Road	50	127	117	2	3.1
Dunga Road	34	135	121	4	3.1
Mombasa Road	106	102	100	1	2.5
General Waruinge	161	95	105	1	2.4
Totals	2281	4112	4093		100

SOURCE: Ian W. Situma Matatus Public Transport of Nairobi 1976.

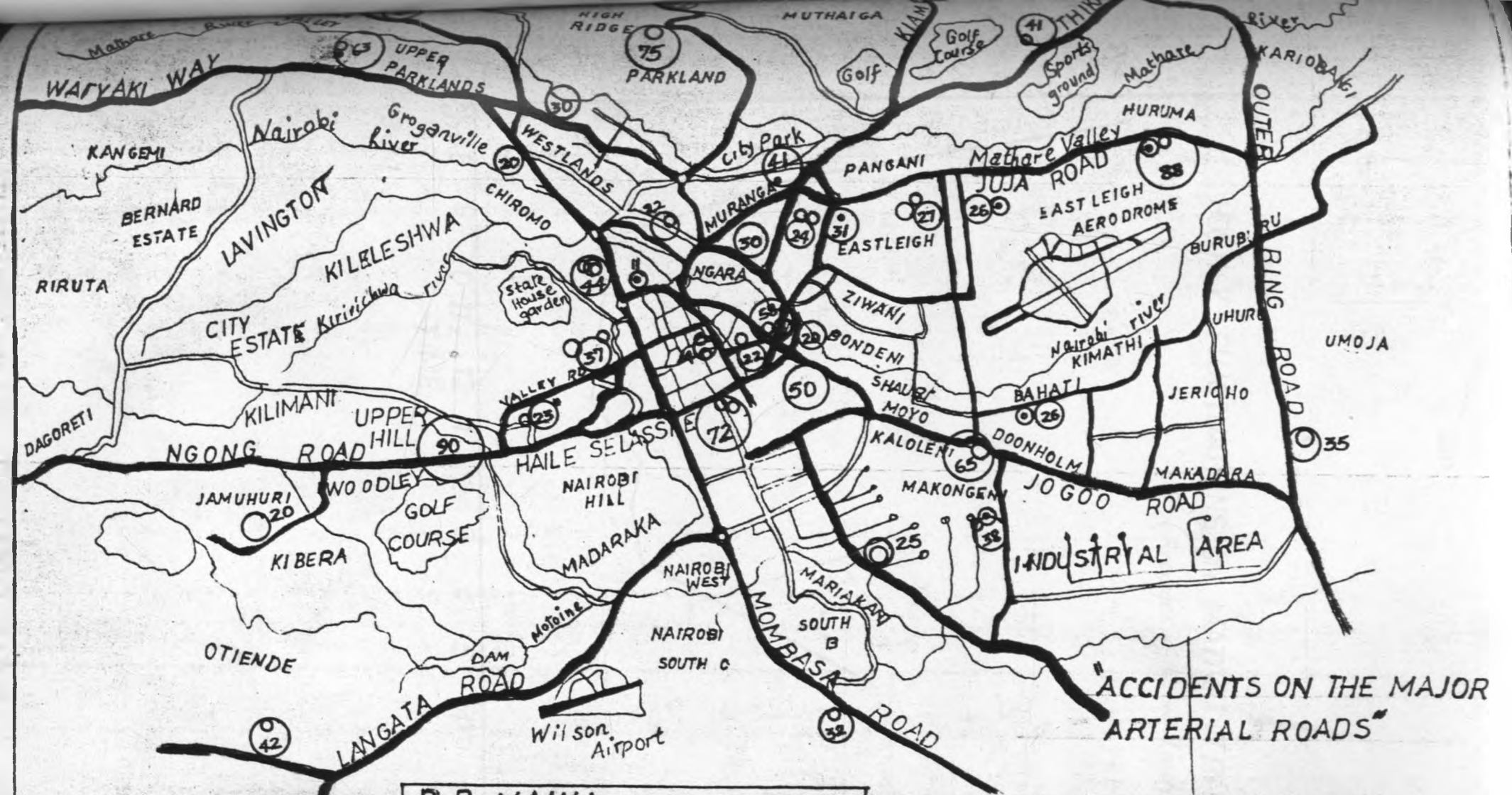
about matatus distribution and frequencies.*

The hourly fluctuations on matatu trips coincide with the peak hours, with the highest number of trips made between 7 a.m. and 9 a.m., with 26% of the total daily trips, the mid-day peak with 15.6% and evening peak with 20.7% of the total daily trips, see figure 3:3:1. A similar condition applies to the country buses operating in and out of Nairobi. Their distribution is rather similar in that we have peak volumes between 7 and 9 a.m. and at lunch and at the evening peak 4 - 6 p.m. as shown in figure 3:3:2. Distribution by route shows that Ngong Road, Waiyaki Way, Limuru Road, Landhies Road and Muranga Road have the highest number of country buses.

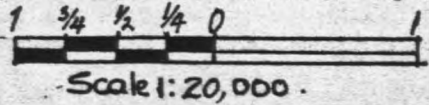
With the matatus, country buses and other vehicles, operating in some of the roads in Nairobi the conflicts are bound to be quite high. We now examine their impacts on road accidents in Nairobi road network.

Looking at map 3:3:1 showing road accidents on the major arterial roads in Nairobi in 1976 we note that these roads are the major black spots in the Nairobi road network; with Ngong Road, Juja Road; Limuru Road, Haile Selassie Avenue, Joqoo Road, Waiyaki Way, Race Course Road, Naivasha Road, Landhies road and Uhuru Highway as the leading roads

* Nairobi City Council, Matatu Survey 1976.



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MAP NO. 3.3.1.



HOURLY FLUCTUATIONS ON MATATU TRIPS.

(Averages of In-bound and Out-bound Trips.)

at Machakos Country Bus Terminals - 1972.

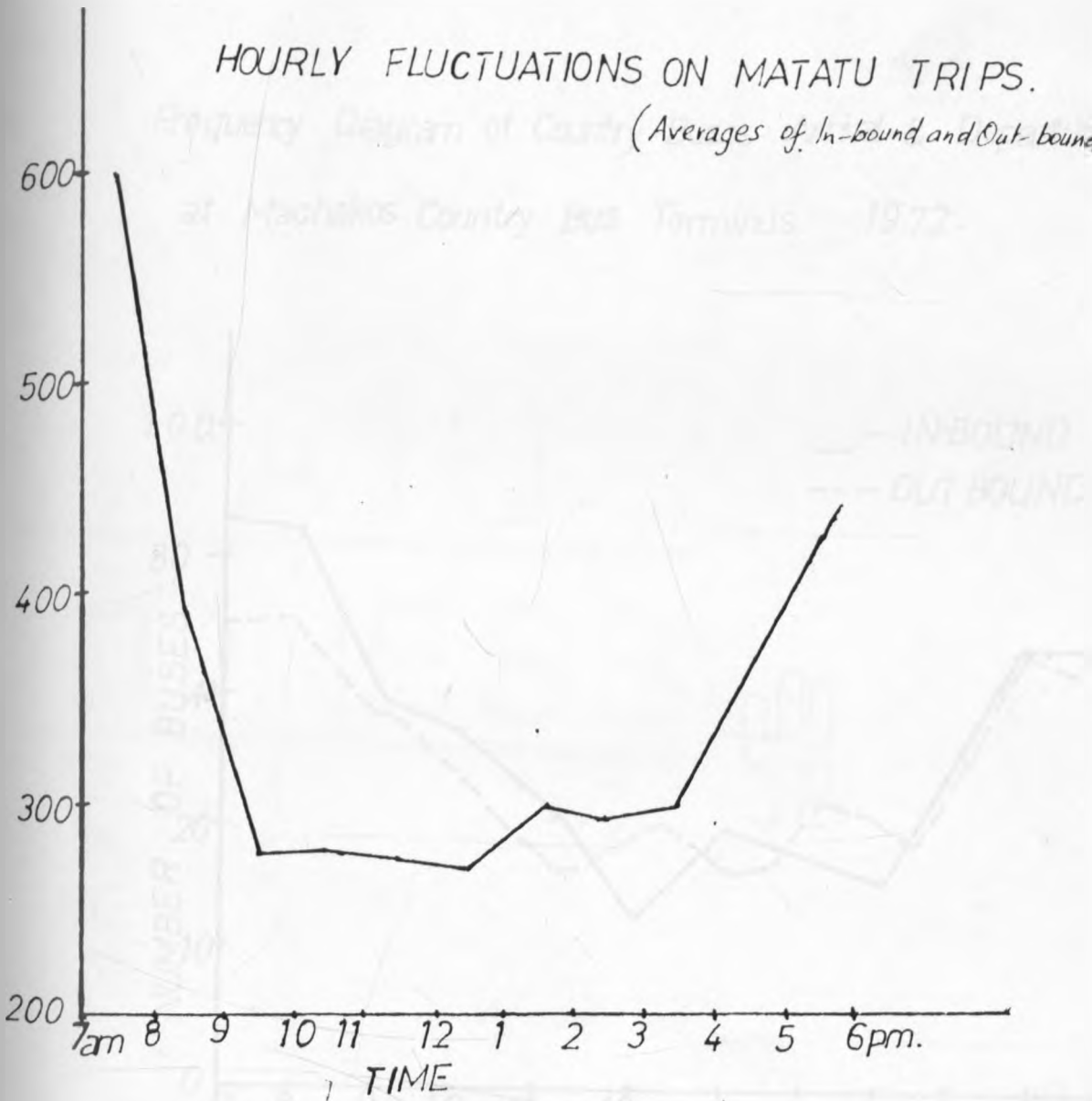


FIG. 33.1

Frequency Diagram of Country Buses Arrival & Departure
at Machakos Country Bus Terminus. 1972.

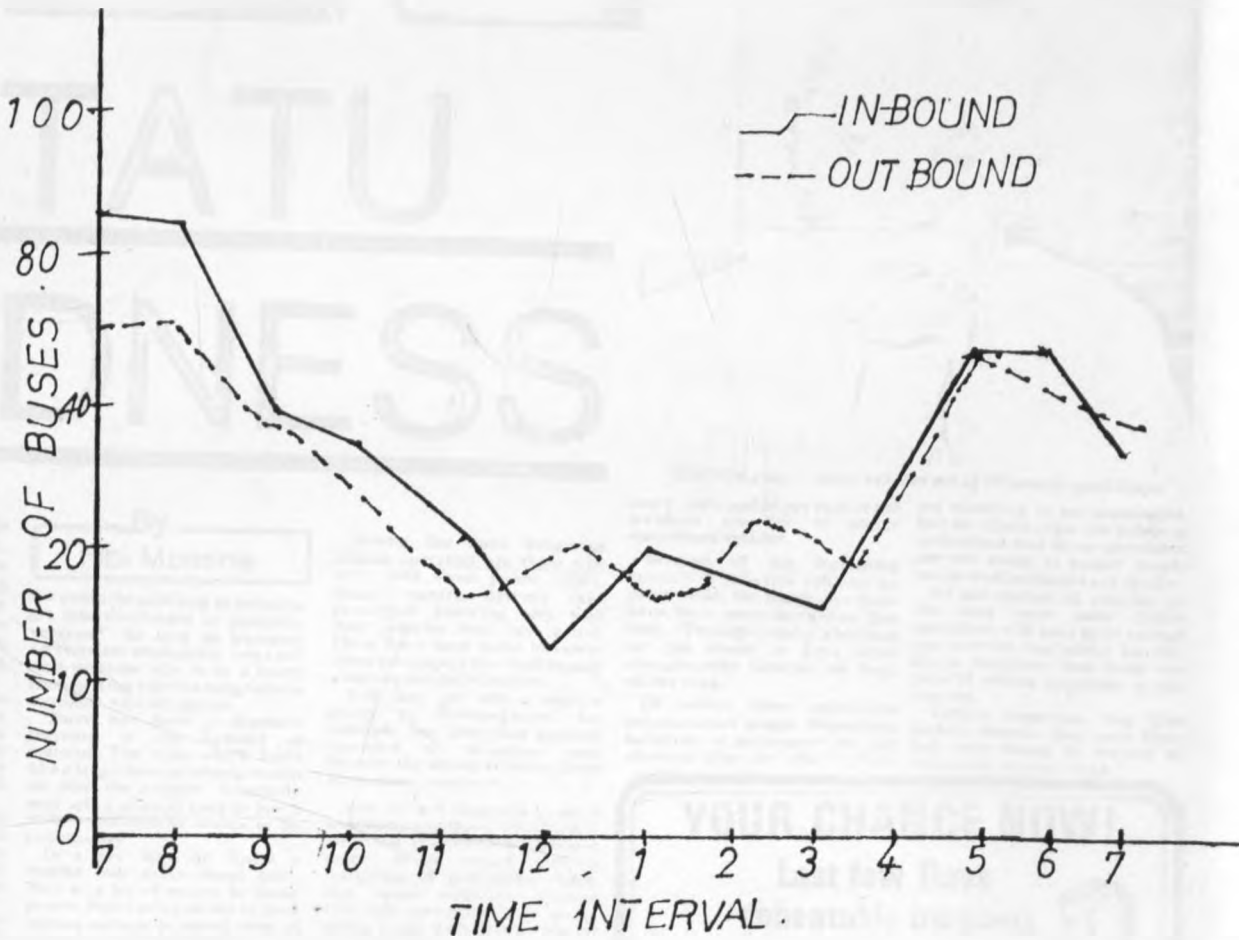
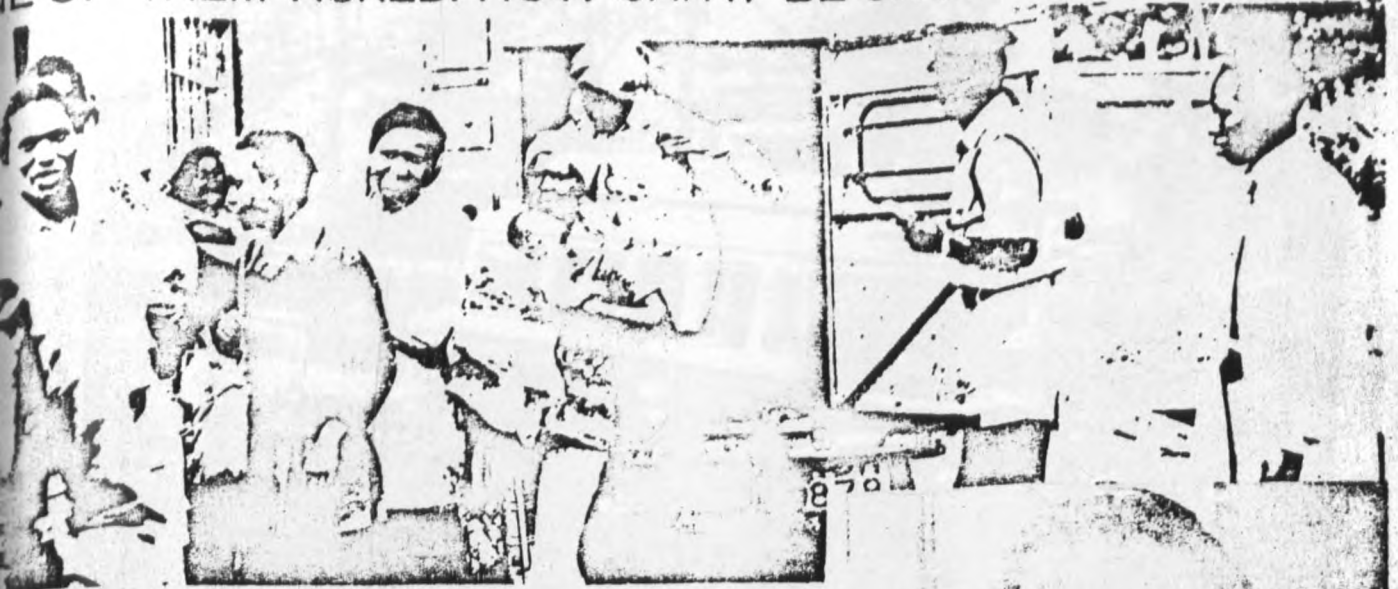


FIG. 3-3-2 .

PEOPLE WERE TAKEN OUT OF A MATATU MADE FOR 10 AND
 ONE OF THEM ASKED: 'HOW CAN IT BE UNSAFE IF IT MOVES?'



MATATU MADNESS



SIMON Kuria... "three vehicles out of 100 were in good shape."

...ome is Thika Vehicle
 Centre For Mr.
 Kuria, Senior Vehicle
 Inspector for Central and
 Western Provinces, the day has
 been because no vehicle
 was allowed of being overloaded
 and a heavy load has been brought

By
Fibi Munene

the public be educated to refuse to
 get into overloaded or defective
 vehicles?" So long as transport
 services are inadequate, you can't
 stop someone who is in a hurry
 from getting into the only vehicle
 available, says Mr. Kuria.

There has been a dramatic
 increase in the number of
 matatus. The type which looks
 like a large chest on wheels is seen
 all over the country. Somebody
 may sell a piece of land to buy a
 matatu because he wants to be
 rich quickly.

In a day, says Mr. Kuria, a
 matatu may make about 400.
 This is a lot of money to many
 people. But it never occurs to most
 matatu owners to spend some of
 this money on maintenance.

It is completely out of
 question for many matatu owners
 to stop their vehicles for a day for
 repair. This is despite the fact that
 if they are charged with a traffic
 offence they may have to pay a
 fine. And in the case of an
 accident they may have to spend
 much more money.

So the biggest challenge as far
 as maintaining safety on our
 roads is concerned is to teach
 people that it is important to
 maintain their vehicles.

"You can take your car to an
 inspection centre, pay 100, and
 you will be told where your car
 has faults. But if you wait until
 you are arrested, you will end up
 spending more money," says Mr.
 Kuria.

Among the most dangerous
 vehicle operators are those who
 don't care about public safety.
 Some matatu drivers take
 passengers knowing very well
 their vehicles don't have petrol.
 There have been many instances
 when passengers have had to push
 a matatu to a petrol station.

You may get into a matatu
 going to Kawangware, for
 example, but later find yourself
 stranded on Mombasa road
 because the driver is hiding from
 the police.

You are not supposed to get a
 road licence unless a vehicle is
 inspected. If a vehicle has a major
 defect, it is issued with a
 certificate of prohibition order.
 But some vehicles manage
 (through corruption) to go to
 public roads without a certificate
 of compliance.

Most vehicles involved in
 accidents, he says, have defects.
 In one week, in one district
 alone, he says, he has as many as 15
 accidents.

Out of about 100 vehicles
 checked at Thika recently, only
 three were found to be in good
 condition. After a sweep on
 vehicles in Kericho last February,
 a police chief noted that "human
 lives were being lost every day
 mostly through unroadworthy
 public transport."

He warned that the police
 would continue to impound such
 vehicles until the owners realise
 the importance of maintaining
 their property. There is at least
 one accident in Kericho district

every week, and 90 per cent of the
 accidents are due to poorly
 maintained vehicles.

Because of the increasing
 number of defective vehicles on
 public roads, Mr. Kuria says there
 have been more operations this
 year. "Through regular checking
 we can ensure at least some
 unroadworthy vehicles are kept
 off the roads."

Of course, these operations
 inconvenience people. Sometimes
 hundreds of passengers are left
 stranded after the vehicles they

are travelling in are impounded.
 But Mr. Kuria urges the public to
 understand that these operations
 are not meant to punish people
 but to avoid accidents and deaths.

As the number of vehicles on
 the road soars, more traffic
 operations will have to be carried
 out to ensure road safety. But Mr.
 Kuria complains that there are
 only 16 vehicle inspectors in the
 country.

Vehicle inspectors "are like
 doctors because they save lives
 and more should be trained to
 ensure safety on our roads."

YOUR CHANCE NOW!

Last few Days
 unbeatable bargains

ENDING 15TH JUNE

RESULTS

- JACKETS
- TROUSERS
- SHIRTS
- SHOES



ANEX STORES

Muindi Mbingu Street,
 Next to City Market,
 Open during lunch hour.

...about to take off his
 and go home when
 policemen direct a matatu
 him to the centre. The
 a Toyota 2000 is
 and by 165 kilograms and

...10 people would
 fully sit in the matatu but
 here 22 adults and five
 was stopped when it
 on a rough road with no

...the driver is asked to put
 on, he pretends he
 knows how to be known
 work "during the
 some bits of the
 full up 1 and 1/2 litres
 are are headlamps."

...Kuria declares the car
 The passengers
 and the driver
 refund their fares. Most
 are not worried about
 but how to get home
 anger innocently asks a
 "How can a vehicle be
 if it can move?"

...to his safety
 suggests that the driver
 allowed to take them
 in bringing the car to the
 question "Can



Life to be made tough for matatus

THE Minister for power and Communications, Mr. Ronald Ngala, yesterday spelt out a new ray of hope for hundreds of people in Nairobi who every day have to put up with the extreme shortage of public transport.

Mr. Ngala said in a statement he was "willing to consider suggestions for the improvement of transport means, if possible by the introduction of a cheaper taxi system such as those operated in some of our neighbouring countries".

The Minister stated this after warning the owners of *matatus* (private taxis) that they would find it extremely difficult to

By NATION Reporter

operate on Kenya roads next year.

The Minister also stated that "very soon the Government intends to introduce very firm measures designed to do away with *matatus* or any unlicensed vehicles that currently operate very dangerously on our roads and are susceptible to accidents because they are badly managed, overloaded, very defective and are driven very recklessly."

He added: "Most *matatus* are in all ways in an unroad-worthy condition and yet they have continued to be on the road, endangering the lives of our innocent citizens."

The Minister's statement went on: "Government cannot

accept the excuse given by the owners of such vehicles or their supporters that they are providing a cheap service.

"The habit of running unlicensed taxis must be stopped. Any person or groups of people who wish to run any type of passenger vehicles will have to comply with transport regulations.

"Legal taxi services can be managed whenever the demand warrants it but Government will not tolerate the existence of vehicles that have no licenses, are not well maintained, uninsured and very dangerous to everybody," the minister concluded.



Thread to road safety

NOBODY could rightly dispute the fact that matatus (unlicensed taxis) are providing a useful perhaps invaluable service to travellers in and around Nairobi. In fact, such is their popularity as a cheap means of conveyance that at rush-hour periods they do a rollicking trade.

But in their rush for riches, some *matatu* operators seem to throw caution to the winds. Their driving leaves much to be desired: and their constant habit of stopping and parking their vehicles — to pick up and drop fares — at virtually any spot on the road is a dangerous trend that constitutes a major threat to road safety. It is about time *matatu* drivers brushed up on their driving.

Matatu and accidents

RECENTLY there has been an increase in accidents involving *matatus*. The other day my car broke down on the Juja Road and as I had an appointment in town I got into a *matatu* thinking that at that moment it was the quickest means of transport available.

The conductor welcomed me with a smile and remarked "Huyu kweli ni mwananchi." As the *matatu* moved on it stopped every now and then picking up more and more passengers although it was already full. Finally it became so over-crowded that the conductor had to hang on the steps holding the door with one hand, thus directly inviting an accident.

The *matatu* was in a dilapidated condition having no rear bumper and lights. I felt as if I was being driven in a funeral procession. In the end I was dropped on Race Course road, which was the *matatus* last destination, although I wanted to go to the Government Road. As it was too late I missed the appointment.

Nowadays there are too many *matatus* on the road. Whilst appreciating that they are the cheapest means of transport for the poor *wananchi*, surely the *matatu* Association could afford to engage their own inspectors who should in liaison with the police put a stop to such dangerous driving. This is one

very good reason why so many accidents take place daily.

F. ADAMJEE,
Nairobi.

M.P. HITS OUT AT DANGEROUS MATATUS

GEMA's national chairman has condemned buses and *matatu* drivers for their dangerous driving and wrong parking "which was a nuisance to drivers and pedestrians".

Addressing a Kiambu leaders conference this week, Mr. James Njenga Karume, who is also a nominated MP suggested that proper parking bays for these vehicles should be built throughout the country.

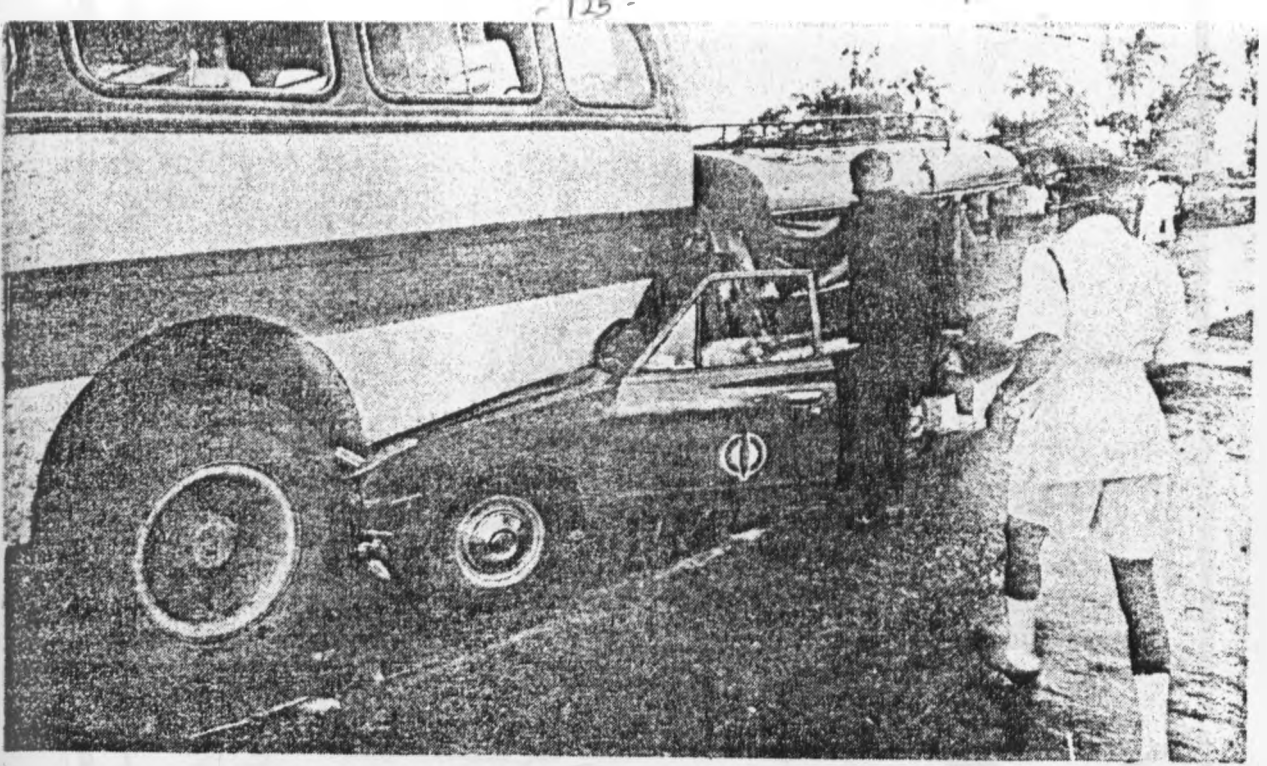
He said he himself owned buses but he was concerned about the way buses and *matatus* were being driven and parked.

The town council chairman, Mr. Eliud Ngara Thuku, said that roads leading to coffee and tea factories should be classified throughout the country.

He added whenever new roads were opened, county councils should take the responsibility of paying compensation to the owners of the land involved.

Kikuyu MP Mr. Amos Ng'ang'a suggested that training of nurses and other medical staff should be started at Kiambu District Hospital.

— KNA



Cutting down on road accidents

KIAMBU DISTRICT Magistrate, Mr. Leonard Thairu Macua issued a warning on Tuesday to owners of "matatus" and country buses who allowed passengers to ride in a dangerous position. It is a fact that in most country buses and matatus the turnboys, in particular, are in the habit of getting on road and off a vehicle in motion or performing other acrobatic feats which are incompatible with road safety regulations.

This sort of behaviour is particularly to be deplored when it is realised that the number of accidents on our roads and the casualties in terms of dead and seriously injured people is a matter of concern to all. It is thus senseless of matatu operators to act in a manner that would inevitably contribute to the number of road accidents.

A host of other accusations have been made against matatus from time to time by wananchi who are not satisfied with their services. One of these is that passengers are normally so tightly packed that it is almost impossible even to breathe. Such a situation, apart from being unhygienic and detrimental to health, is responsible for the higher incidence of pickpocketing in matatus than in other forms of public transport. It is of course appreciated that matatus have been of great help in supplementing the efforts of Kenya Bus Services to provide transport to wananchi within the city. Although there is a large number of city buses operating on various routes, it has not been possible for them to cope with the fast increasing city.

It is indeed in this view of this necessity that the President, Mzee Jomo Kenyatta, issued a decree some time back authorising wananchi to operate matatus. Not only did this measure alleviate the transport problem within the city and in the rural areas but it had also the effect of providing employment to many who were previously unemployed.

It is, however, imperative, if matatus are going to retain

the confidence of those who use them, that they should strictly adhere to traffic regulations in respect of road safety. The sort of action taken by the Kiambu District Magistrate is aimed at ensuring just this.

TALKING POINT

'Matatu' danger

THESE "Matatu vehicles are a great menace on the roads. We know they do not need a licence to be on the road, but are they licensed to misuse roads?

Most of these matatu vehicles are unroadworthy, and the traffic policemen know it. Nearly all of them are not serviced — they are so busy picking up "matatus" that they have no time for a service.

The drivers overtake long queues of cars and lorries in Nairobi during heavy traffic periods — and they manoeuvre in between other vehicles and overtake on blind corners. They stop suddenly, to unload their passengers; and the owners of these vehicles seem to live without water — they never

bother to clean their vehicles.

The Kenya Bus Services Ltd. have constructed a number of bus stops, and these have been taken over by Matatu vehicles; the KBS seem to have given way silently. The buses instead of stopping in their right position, now stop in the middle of the road causing more heavy traffic jams.

The funny thing is that all these abuse of traffic regulations are carried out while the traffic police look on. The worst menace

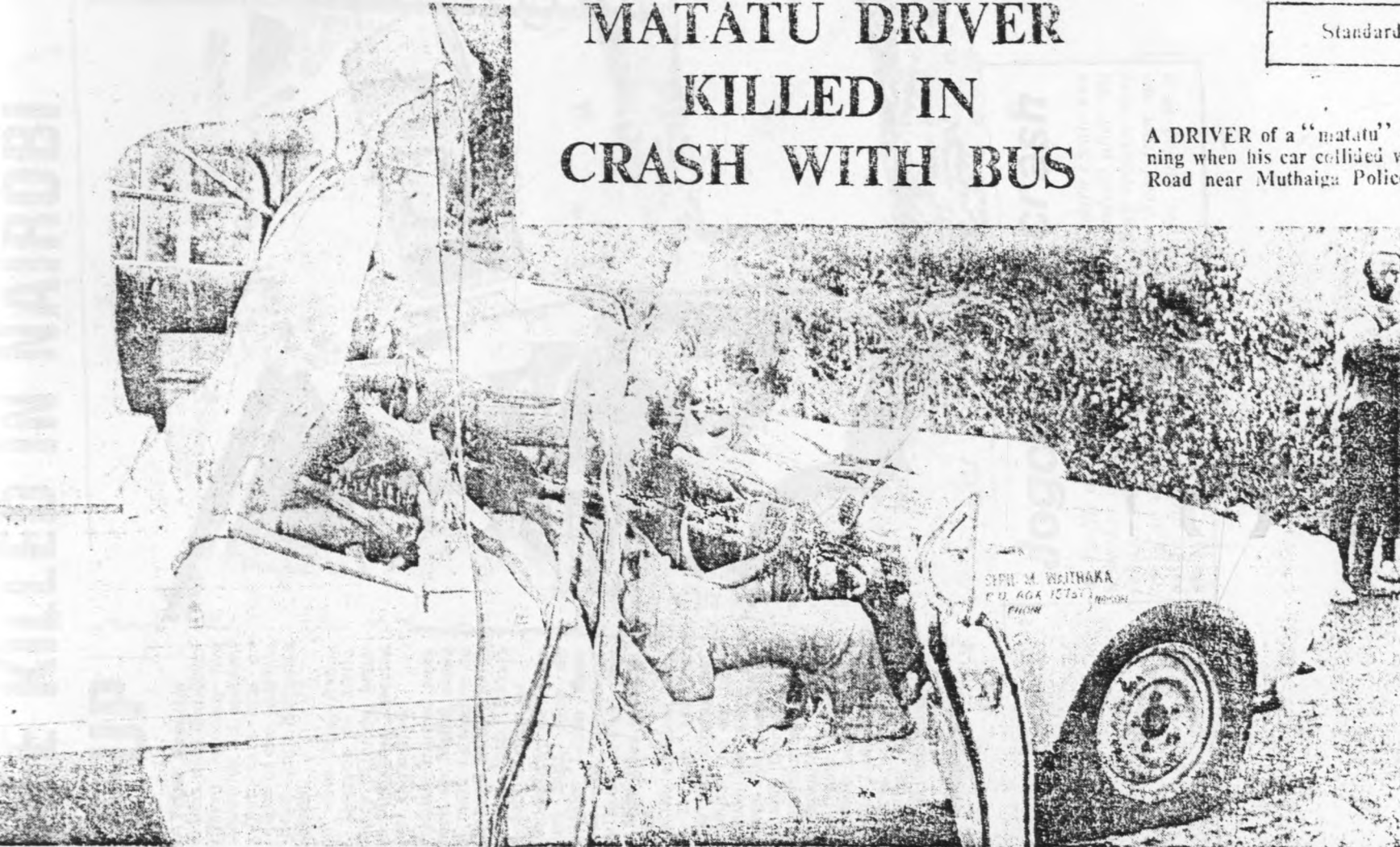
is the number of people who squeeze themselves into these matatus. They overflow and a small shake-up could overturn the vehicle.

Let the drivers of matatu vehicles be told that all of us have a right to use the road. The difference is that we pay for using the road and they don't. They have no right to endanger our lives. If they want to die on the roads, let them, but they should not take us there with them. Let them go it alone!

MATATU DRIVER KILLED IN CRASH WITH BUS

Standard Reporter

A DRIVER of a "matatu" died instantly yesterday morning when his car collided with a country bus on Kiambu Road near Muthaiga Police Station.



Joseph K. Waithaka, a businessman from Kiambu whom a police officer said was the owner of the "matatu", died when he was hit in the chest by the steering wheel.

Onlookers at the early-morning scene of the accident said six other people had been badly injured and when taken out of the car were semi-conscious.

The "matatu", a Peugeot 404 van, Reg. No. KPW 653, was carrying about 20 people from Kiambu to Nairobi when the accident occurred at a very sharp corner.

Mr. James Nguini, who arrived at the scene of the accident, told "The Standard" that a girl who was in the front seat, believed to be the daughter of the driver, "was badly injured and I don't think she can survive".

Passengers travelling in the country bus, owned by Ruaka Bus Service Ltd, were slightly injured, none seriously.

What may have caused extra injuries to the passengers in the "matatu" was the breakages of very many empty soda bottles which the driver was carrying.

Notorious corner

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THREE KILLED IN NAIROBI

PILE-UP

By NATION Reporter

THREE persons died and seven others suffered injuries, five seriously, following an accident involving four cars late on Thursday night at the junction of Kirk Road and Kenyatta Avenue, Nairobi.

The dead were Miss Avena de Sa, 19, Derryck de Mello, 20, and Henry Kibiego, assistant to the Managing Director of the Safari Park Hotel.

Those seriously injured were Miss Maureen de Mello, sister of the dead man; Lawrence de Mello and Samuel Butt, friends of theirs; Chief Insp. Bakari Katibu and John Kiplangat.

Miss de Sa, the two de Mello men, Samuel Butt, Miss de Mello and Miss Lilian Paes were in one car, travelling down Valley Road towards the city centre. Miss Paes suffered minor injuries.

Police said the accident took place about 11 p.m. The car which Kibiego was driving and a Volvo in which the six people were travelling were in collision. Kibiego died instantly. Miss de Sa and Derryck de Mello were pronounced dead on arrival in hospital.

Samuel Butt was yesterday said to be unconscious after a brain operation. Lawrence de Mello was critical with multiple injuries. Miss de Mello, also seriously ill, sustained a

TURN TO BACK PAGE



Jogoo Road crash

• Traffic along Jogoo Road near Makadara Estate was yesterday temporarily brought to a standstill after two vehicles were involved in a collision. Both vehicles were trying to enter Nile Road from Jogoo Road from opposite directions. The damaged vehicles landed in a ditch.

E.A. STANDARD 21-2-77

Car crashes at 'no entry'



Standard Reporter

● A serious accident involving a Kenya Bus vehicle and a Ford Corsair car occurred in Nairobi on Saturday morning in which two people were killed instantly. The car (in foreground) which had four occupants is said to have been travelling along Quarry Road, and tried to cross over towards Ngara at a No Entry point where it hit a bus travelling on Racecourse Road to Kariokor.

The car was reduced to a mangled wreck and its parts spread over the road. Members of the public helped to put the wrecked car back on its wheel to remove the four people trapped inside the car.

According to a K.N.A. report eye-witnesses said if the bus had not been hit many road-side shoe makers sitting on the opposite side of the road would have been crushed by the car.

The car was said to be carrying a lot of "miraa" and was allegedly being chased by police along Quarry Road from the Pumwani area.

Speed of 'matatus'

WONDER if the markings on the back of *matatus* could be explained, and if there are any regulations stipulating the speed at which such vehicle are allowed to travel? Some are marked on the back 50, 60, 65 and 80, most of them with k, some with kph, and some kmh. One would take it that the markings are the speed at which they are allowed to

Buses and 'matatus'

RECENTLY, the Kenya Bus Services Ltd., Mombasa, complained to the Municipal Commission of Mombasa that they will be forced to terminate all their bus services in Mombasa unless something is done to limit the large number of *matatus* in the town.

The Kenya Bus authorities should understand that they are facing a very high competition from the *matatus* because the *matatus* are charging their fares a few cents less than the Kenya Bus fares. Very few *matatus* charge the same fares as the Kenya Bus Services. Now, the whole break-down of the competition between *matatus* and the Kenya Bus Services Ltd, Mombasa, is like this:

- (a) The *matatus* are charging reasonable fares.
- (b) They render quick services.
- (c) Most of them are very luxurious.
- (d) They operate on some routes which the Kenya Bus Services have neglected.
- (e) They drop you wherever you want — just like any other taxi cab.

To avoid all this competition, the Kenya Bus Services authorities should:

- (a) Reduce their fares to the rate of *matatus*, or less than that.
- (b) Advise their conductors not to delay buses at the stages while they issue tickets. They can do that while the bus goes. Time is money, it is said, and especially when people are going to work.

What we *wananchi* want are good services and reasonable fares, no matter what kind of transport.

RICK BROWN KIMANTHI.
Mombasa.

READ

travel but it bears no resemblance to the speed at which they do travel, even in controlled areas. They must overtake everything even in the face of oncoming traffic, much to the consternation of other road users. Rules of the road seem to mean nothing to many of the drivers of such vehicles.

Many good people would be alive and well today but for *matatu* accidents. I understand that passengers in *matatus* travel at their own risk and there is no redress. I note, however, that the *matatus* boss is taking a serious view of the situation

Langata.

NAIROBI ACCIDENTS

FROM PAGE 1

broken pelvis and severe facial injuries.

Chief Insp. Kalibu was injured when the car he was driving crashed into the vehicles involved in the earlier accident. John Kiplangat, who was travelling with him, was said yesterday evening to be serious.

Passengers in another car, KKB 788, piled into the three others. It was not known last night exactly how many people were in it, or who the driver was.

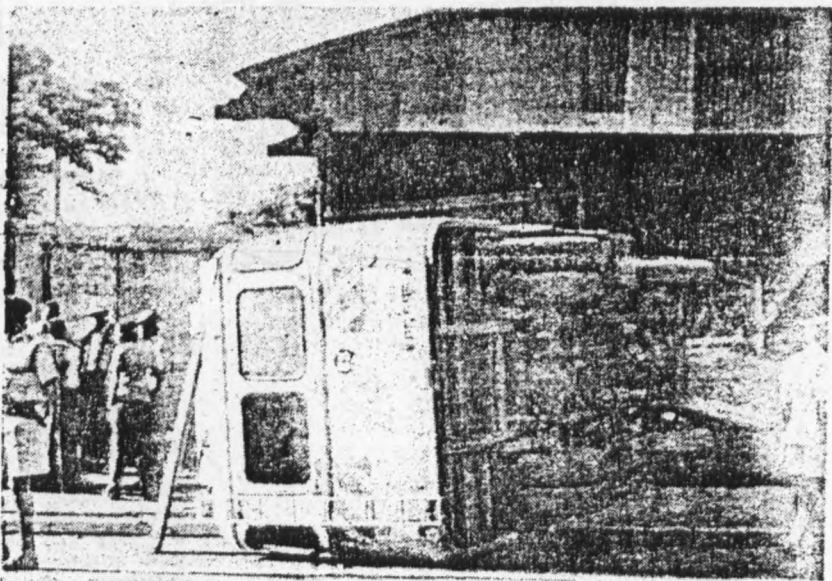
Traffic along Kenyatta Avenue from the Post Office to the scene of the accident opposite All Saints Cathedral was blocked for more than three hours as scores of policemen worked to clear the area.

Police photographers sent up flares to facilitate the taking of pictures.

10/9/77 EAST



A young man's life ended prematurely yesterday when he was knocked down and his head crashed by a tipper at the junction of Jogoo Road and Likoni Road, Nairobi. Many people crowded the scene of the accident and traffic from the spot along the Likoni Road was brought to a halt until police arrived and removed the body from the road. The place has become a notorious killer-spot as hardly a week passes without a fatal accident.



THERE was a lucky escape for a driver, two conductors and three passengers when this matatu-style bus rolled onto its side near Pangani Girls' School yesterday. None of them was injured, but the wall of a store was slightly damaged. The cause of the crash was not immediately known.

Police launch war on 'matatus' and urge public help

Boycott

THE Kenya Police yesterday launched yet another campaign for road safety and asked for maximum public cooperation to make it a success. The campaign, a continuation of one staged on Christmas Eve by the Traffic Division in Nairobi, aims at eliminating matatus — pirate taxis — in the "interests of public safety on roads"

Appealing to the public to boycott matatus, Supt. Mageria said campaigns launched by his division against the operation of these pirate taxis last December resulted in a "huge percentage of these being discovered unroadworthy."

In an interview yesterday, the officer-in-charge of the Traffic Division in Nairobi, Superintendent J. Mageria, told the NATION that matatus were not only illegally operated in the city, but were "uninsured, unhygienic, unlicensed and dangerous" to operators and passengers.

For a vehicle used as a means of public transport to be unroadworthy and uninsured leave alone being unlicensed, Supt. Mageria went on, every member of the public volunteering to use this as a means of transport risks all probabilities, including the loss of his or her own life.

Most of them, Supt. Mageria went on, were unroadworthy and if involved in an accident, nothing at all covered either the passengers or the operators as they were not insured.

The Traffic Division of the Kenya Police in Nairobi, Supt. Mageria went on, will continue its war against matatus in an endeavour to reduce accidents in the city. He appealed to all people to stop using matatus

If a passenger or an operator of the matatu gets injured in an accident involving the vehicle, he added, no claims for damages may be entertained as matatus are not insured.

More matatus netted by police

By NATION Reporter
ANOTHER 50 matatus have been netted in Nairobi for violating traffic rules, Traffic Headquarters reported yesterday.

A spokesman said that after the vehicles were taken for inspection those which were found to be roadworthy were released. Matatu operators of unroadworthy vehicles were taken to court, he said.

The spokesman added that police have allowed matatu operators in Nairobi to use the old Machakos Bus Terminus and Temple Lane as their central terminus from which to pick up passengers.

He noted that if matatus operated from a central terminus, they would stop obstructing other motorists in various parts of the city centre.

But he could not say whether matatu operators were willing to comply with the regulation. He hoped that by next week most of them could be using the old Machakos Bus

in other directions as may be given by the Minister, and in any way authority may cause or permit traffic signs to be placed on or near a road.

(2) Traffic signs shall be of the prescribed size, color, and type except where the Minister authorizes the erection or retention of a sign of another character.

(3) After the commencement of this Ordinance, no traffic signs shall be placed on or near any road except under and in accordance with the preceding provisions of this section.

Provided that—

- (i) nothing in this subsection shall apply to any notice in respect to the use of a bridge;
- (ii) a highway authority or police officer of or above the rank of Inspector may authorize the erection of a traffic sign for any special purpose for a period not exceeding seven days, and such traffic sign shall be deemed to be lawful even though it does not conform to the requirements of this section.

† (4) All traffic signs shall be deemed to have been lawfully erected until the contrary is proved.

Matatu law-breakers

"Like cardbores in a tin" was how one police officer described the number of passengers packed into a matatu recently. "And they're likely to end up just as dead," he added.

This particular matatu was a small panel van, grinding slowly along, its suspension flattened by the vast number of people being carried in it. When it was stopped about twenty foot-hardy passengers got out, people who risked their lives by paying to travel uncomfortably in a clapped-out old vehicle in a dangerous state of disrepair, and overloaded to a degree where it was beyond proper control by the driver.

In the light of this, the remarks made by the Vice-President and Minister for Home Affairs, Mr. Moi, at the week-end, have particular significance.

He alleged, with every justification, that matatus were being overloaded and accused the drivers of speeding. They were, he said, major contributors to the horrifying death toll on the roads. He also warned them that they would be dealt with by the police.

Since matatu operators were given the green light to function without Transport Licensing Board licences, many of them have abused that privilege.

They have complained that they have been harassed by the police.

probably a matter of viewpoint — then they can only blame themselves. Permission from the President to operate without T.L.B. Licences does not absolve them from traffic regulations, and these are very clear on overloading, speeding and road-worthiness, three areas of the law which they seem to delight in flouting.

As Mr. Moi said, some of them are more concerned in "getting-rich-quick" than they are about the lives of their passengers.

But the police have difficulty in catching the law-breakers. No sooner is a road trap set up than the word gets round, and the matatu operators become models of propriety.

But as soon as the police turn their backs they revert to their unlawful ways.

The President's order may have cleared them of the tag of "pirate tacks" but the skull and crossbones emblem of piracy with its significance of death is still appropriate to some of them.

Obviously not all matatu operators are guilty. They have their own reputable association, it would seem that it is up to that association to remove the stigma of illegal operation by ensuring that its members — and non-members as well — heed the Vice-President's warning and sift out those operators who have all matatu owners and drivers a bad name.

POLICE TOLD TO BE STRICT ON CITY MATATUS

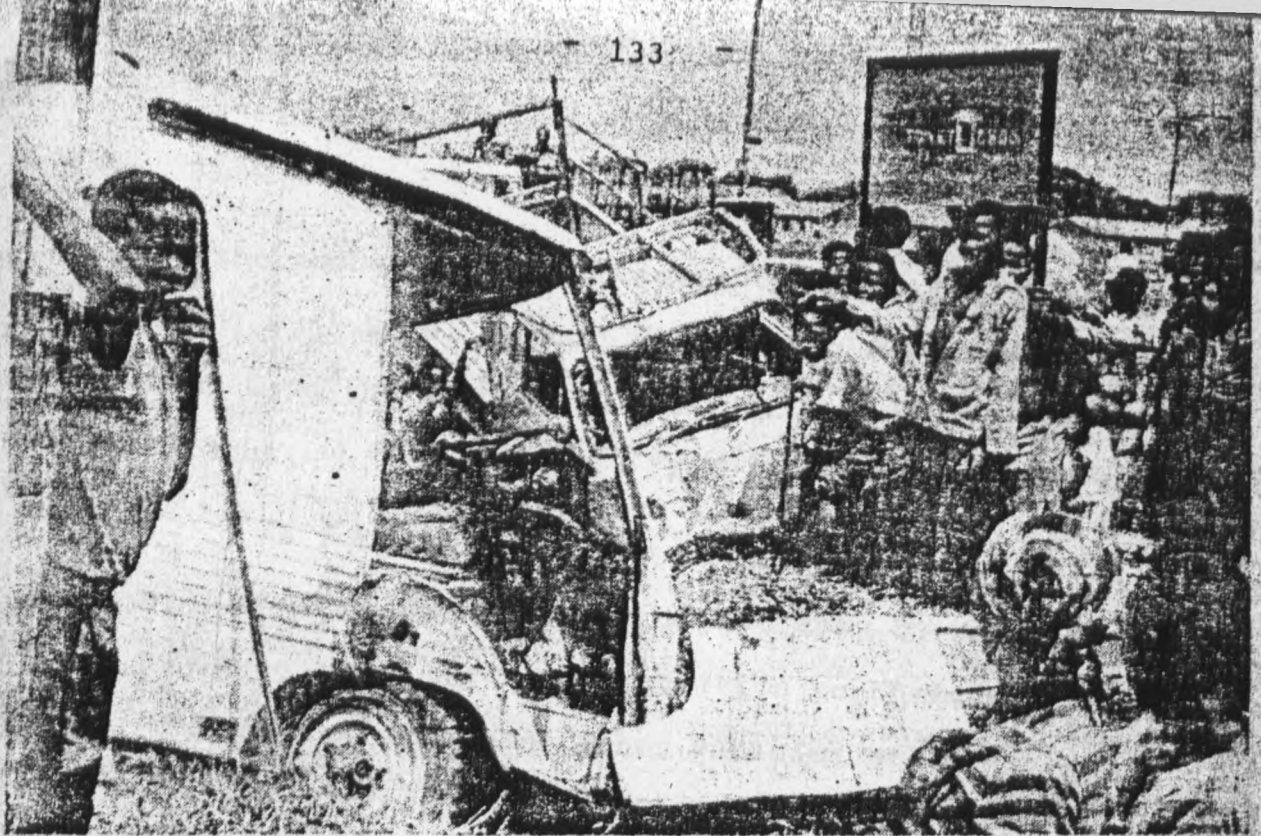
Standard Reporter

TRAFFIC POLICE have been urged to take stringent measures against "matatu" operators who obstruct traffic, which in many cases cause serious accidents in the city.

A meeting of the Nairobi Road Safety Committee yesterday recommended that while police continue to carry out checks on the "matatu", the traffic section of the City Engineer's Department should work out plans to establish convenient parking bays and terminals for the exclusive use of "matatu".

Yesterday's meeting was chaired by Comm. J. H. B. Apudo, and was attended by senior officials from the Nairobi Police Traffic Department and officers from the traffic section of the City Engineer's Department.

The meeting also directed that the traffic section of the City Council should prepare a comprehensive paper on "matatu" movements within the city in collaboration with Traffic Police so that their joint findings should be submitted to the Council for action.



DITCHED . . . The two pick-ups lie in a ditch after colliding at the Jogoo Road-Nile Road junction yesterday.

CAR CRASH CAUSES POWER CUTS

By NATION Reporter

ELECTRICITY was cut off at several estates in Eastlands, Nairobi, yesterday after a crash at the junction of Jogoo Road and Nile Road.

Three people were slightly injured in the crash and taken to Kenyatta National Hospital. It is understood one of the drivers suffered a broken leg.

An eyewitness said two pick-ups travelling towards the city centre collided. One of them hit an electricity pole, cutting high tension cables.

Areas hit by the cut-off were Ofafa Estate, Uhuru Market, Mbotela, Makadara No. One and Harambee

In the number of road accidents. Ngong Road, Jojoo Road, Juja Road, Waiyaki Way, Limuru Road and Landhies Road have the highest number of country buses and matatus.

As for the part the matatus and country buses play in road accidents, it is not easy to tell in concrete terms because in addition to these vehicles operating on the roads other vehicles of all types are found here and in great numbers. So it is difficult to tell whether the matatus or country buses are the major causes of accidents on these arterial roads or it is because of the heavy mixed traffic plying on them. But from close examinations of Newspapers reports one finds that the greatest killers on the roads are the matatus and to some extent the country buses, as seen from the following newspaper extracts.

It comes out very clearly that the matatu menace will continue as long as they continue to be allowed to break traffic regulations by fining any offender low fines. And as long as the matatus are allowed to operate without any given stops, routes or terminus, they will continue to cause serious traffic obstructions in the central area and even on the major roads and streets on which they operate. It then become evident that the traffic Act need to be enforced seriously to control the

matatus. This can be done by launching constant round ups of vehicles for inspection and charging them for minor and major offences related to unroadworthiness of vehicles and overloading. Unfortunately it appears that there is no sufficient police force available at the times when the matatu operators are at their busiest, to carry out the required checks. Such checks which are made from time to time are usually between 8 a.m. and 5 p.m. when the matatu operators are slack. According to figures 3:3:1, matatu operation peak periods are 7 a.m. - 8 a.m. and 5 p.m. to 6 p.m..

Further to the insufficient police force there exists a dangerous misconception between the implications of the Presidential decree and the compliance with the believe that His Excellency the President gave absolute freedom to operate above any form of transportation rules and regulations and any attempt to constrain this freedom is considered a contempt to the Presidential decree. On the other hand the police and the City Council authorities are not prepared for a slow down with the matatu operators. The police are not prepared to enforce the various sections of the Traffic Act, that are grossly violated by matatu operators.* The City Council with a full knowledge to the problems created by matatu operators is not prepared to enact any effective

* Ian W. Situma. The Matatu Public Transport of Nairobi 1976.

by-laws to control matatus within the city boundaries as it is in the case of country buses, Yellow Band Taxis and hand carts. As a result of this apprehension of matatus have been allowed to take over off-street parking facilities at various critical points in the central area as terminal area. For example, matatus have now taken over the Tom Mboya-River Road junction, Hakati Road car park and Accra Road car park near the Tea Room. These are now well known matatu stations. The matatu operators have also taken over several petrol stations on Ronald Ngala Street and several other areas in the central area. Generally we find most of the roads where matatus operate high accident rates are reported because of this bad behaviour.

Another problem in Nairobi is associated with the Kenya Bus Service Limited buses, which also claim a large number of casualties especially because of their speed. When these vehicles break down, even when on the roads they are left there awaiting their own breakdown. This has resulted in many traffic jams, and dangerous obstructions. These buses mostly contribute to road accidents indirectly, as they obstruct other vehicles and as other vehicles try to evade them.

3.4 ROAD ACCIDENTS AT JUNCTIONS AND INTERSECTIONS

This subsection broadly tries to examine the road safety problem at junctions and intersections. Because of inadequate reporting system of accidents it is not possible to come up with the real conditions at junctions and intersections. This is so because the police accident reporters do not give enough information concerning spot of accident, type of junction etc and it is only on few cases do they give the actual spot of the accident. What then is attempted here is a broad analysis of accidents at junctions and intersections without going into details of manoeuvres leading to accidents because such details are not available.

In 1976, 1964 accidents were reported in Nairobi with 2427 casualties. These accidents and casualties were distributed as shown in Table 3:4:1. on various junctions and sections of roads.

Roundabouts accounted for 834 accidents (42.9%) and also claimed 1000 casualties (or 41.2%) of the 1976 total. This shows that people do not fully know how to use roundabouts or else they do not take time to enter them. T or staggered junctions accounted for 326 accidents and claimed 217 casualties (8.9%). The Y junctions accounted for 219 accidents with 294 casualties, a number higher than at T-or staggered junctions. Crossroads accounted

TABLE 3.4.1 INJURY ACCIDENTS AT DIFFERENT TYPES OF JUNCTIONS 1976

JUNCTION TYPES	NUMBER OF ACCIDENTS	% OF TOTAL INJURY ACCIDENTS	NUMBER OF CASUALTIES	% OF TOTAL CASUALTIES
At Junction* Roundabouts	834	42.9	1000	41.2
T-or staggered	326	16.7	217	8.9
Y Junctions	219	11.3	294	12.2
Crossroads	203	10.4	410	16.9
Others	364	18.7	506	20.8
Total	1946	100	2427	100

* Including locations within 70 metres of junction source, Traffic Police.

for 203 accidents with a very high casualty rate of 410 casualties or 16.9% of the total. Other road sections claimed the rest of the casualties.

Various roundabouts in Nairobi stand out as very dangerous and especially on the various dangerous roads. Some of these dangerous roundabouts include:- Adams Arcade, Ngong Road - Valley Road roundabout on Ngong Road claiming 25 accidents in 1976. Outer Ring Road-Juja Road roundabout, Juja Road-Ring Road Ngara roundabout with a total of 19 accidents in 1976; The Haile Selassie-Uhuru Highway, Haile Selassie- Government Road, Haile Selassie-Landhies/Ring Road Pumwani roundabouts on the Haile Selassie Avenue with 36 accidents in 1976. The Jogoo Road-Likoni Road roundabout, the Jogoo Road Landhies Road roundabout, claiming 14 accidents in 1976; the Race Course Road-Ngara Road roundabout claiming 20 accidents in 1976. Other dangerous roundabouts include - Uhuru Highway-Kenyatta Avenue; University Way; Meseum Hill, Uhuru Highway- Mombasa Road, Mombasa Road Langata roundabout; Kiambu Road Thika-Muranga roundabout, Muranga Road-Ring Road Ngara, and Forest road roundabouts, all together claiming 45 accidents.

Most of the junctions on the major arterial roads are very dangerous and many accidents occur here. This is so especially where small roads join these major roads at T or staggerred junctions. Next

to roundabouts, we find many pedestrian accidents and especially near the central area because these are areas where pedestrians prefer to cross. We also find that at roundabouts many vehicle drivers tries to speed trying to enter the roundabouts before other vehicles, and where traffic lights have been installed, they try to beat the traffic lights. Therefore many of the accidents occur due to drivers failing to give way, the largest number of occasions being at roundabouts. At these points the number of accidents caused by either drivers or pedal cyclists failing to keep to near side or to proper traffic lane, cutting in; turning round in road negligently, failing to comply with traffic sign or signals; pulling out from rear side or from one traffic lane to another without due care; turning right or left without due care crossing without due care at road junctions; misjudging clearance, distance or speed and other apparent error of judgement or negligence were 553 accidents or 28.4% of total number of accidents in 1976. The drivers, pedal or motor-cyclists either:-

- (i) enter the junction or roundabout too fast
- (ii) did not enter the correct lane early enough,
- (iii) did not consider their neighbours' position and sight line and
- (iv) did not signal their intended manoeuvres, hence caused accidents.

Looking at the conditions of junctions and intersections of three major roads in Nairobi - the Uhuru Highway and Haile Selassie Avenue, and Juja Road we find that at the Uhuru Highway and Haile Avenue, the following black spots are there in decreasing order in the number of accidents - Haile Selassie Avenue as a road, Uhuru Highway; Haile Selassie Avenue as a road, Uhuru Highway; Haile Selassie Avenue-Uhuru Highway roundabout; Uhuru Highway City Hall way, University way- Uhuru Highway roundabout; Haile Selassie - Government Road roundabout and finally Haile Selassie Avenue - Landhies-New Pumwani Roads..

Table 3:4:2 summarises the injury accidents for 1974 to 1977, and it indicates that the total yearly number of accidents have been on the increase. In 1974 the figure was 121, in 1975 it rose to 152, 1976 it was 182 and in 1977, it shot up to 215 accidents on these roads. From this table we find that all the junctions and intersections on these two roads claimed 333 accidents out of a total for 4 years of 670 or 49.7%. The rest were on other stretches or other minor junctions.

Uhuru Highway-Haile Selassie Avenue roundabout had the highest number of accidents with an average of 14 accidents per year in the four year period followed by Haile Selassie Avenue-New Pumwani Road

about, with an average of 12 accidents per year. Figure 3:4:1 show the distribution of accidents per year on the various junctions intersections or roundabouts along the two roads. Table 3:4:3 show the trends of fatal accidents along these roads, and shows a decrease in fatal accidents on the Haile Selassie Avenue and an increase in fatal accidents on Uhuru Highway. For example on the Uhuru Highway, the total fatal accidents for 4 years was 16 an average of 4 accidents per year, and on Haile Selassie Avenue there was a total of 13 fatal accidents or an average of 3 accidents per year.

The junctions with the highest number of fatal accidents is Uhuru Highway-Haile Selassie roundabout. All the major junctions had a total of 41 fatal accidents in the 4 years or 58.6%. This shows that intersections and junctions are areas of high accident rates. Figures 3:4:1a-d show the conflict points experienced on some of the major junctions and intersections. In figure a, it show a cross-junction, without a round about, figure b, show a T-junction and figure c and d, show different roundabouts.

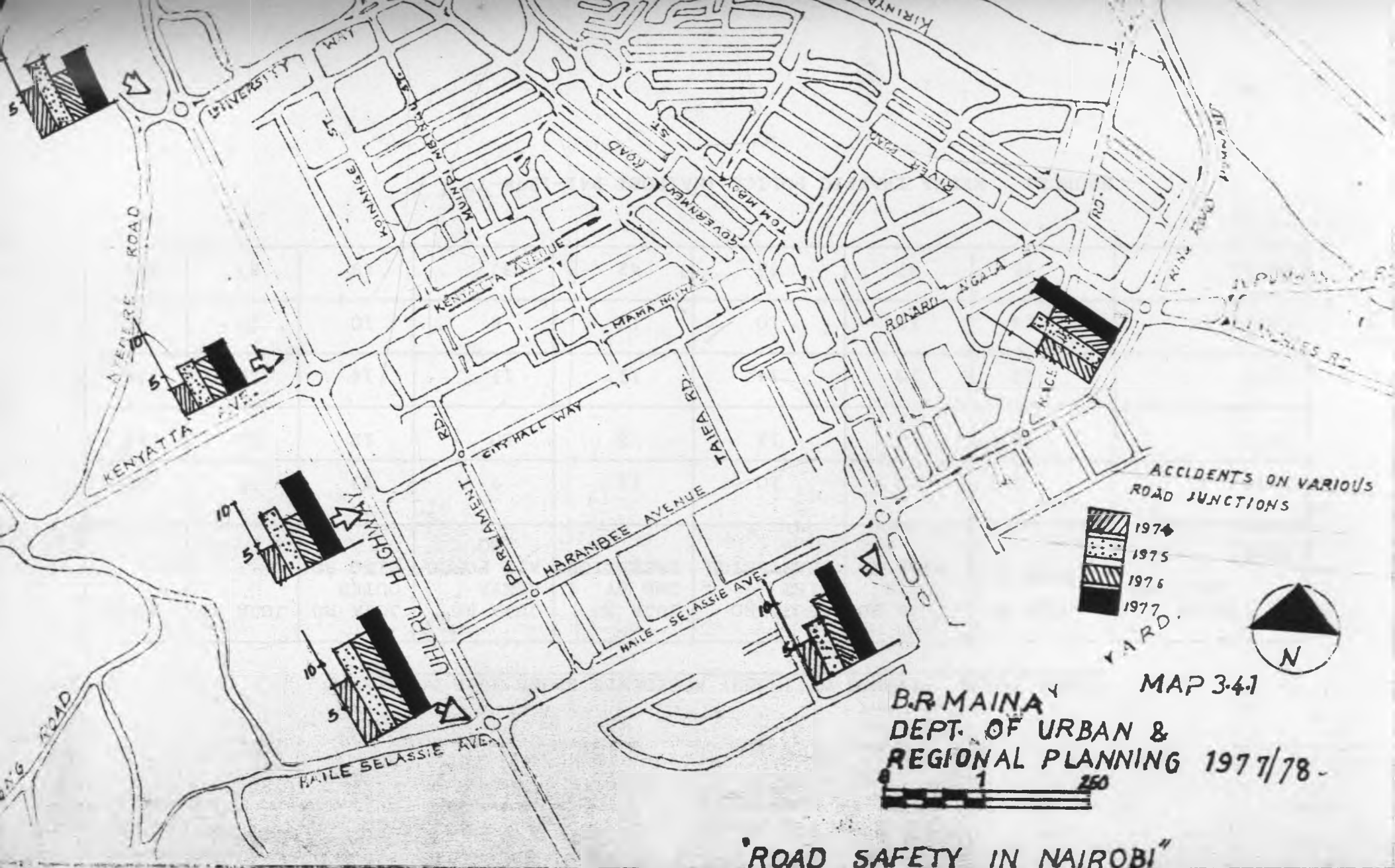
Table 3:4:4 summarises the injury accidents along Juja Road in the last 4 years from 1974-1977. The table indicates that accidents are on the

TABLE 3:4:2 INJURY ACCIDENTS FOR UHURU HIGHWAY AND HAILE SELASSIE AVENUE

	UHURU HIGHWAY	UHURU HWY & CITY HALL WAY	HAILE SELASSIE AVE.	HAILE SELASSIE AVE. & PUMWANI RD	HAILE S. & UHURU HWY.	UHURU HWY & KENYATTA AVE.	HAILE S. & LANDIES RD.	CEREMONIAL RD. & HAILE SELASSIE AV	UHURU HWY & BUNYALA R	UHURU HWY & MESEUM HILL RD.	HAILE S. AV & LOWER HILL RD.	HAILE S.AV. & GOVERN. RD.	UNIV.WAY & UHURU HWY.	TOTAL
1974	14	6	43	10	10	5	12	2	4	3	2	4	6	121
1975	20	11	56	12	15	6	7	2	3	2	1	7	10	152
1976	32	9	64	11	15	6	14	4	2	5	3	10	7	182
1977	36	14	72	15	17	10	10	7	6	4	2	13	9	215
TOTAL	102	40	235	48	57	27	43	15	15	14	8	34	32	670

TABLE 3.4.3 FATAL ACCIDENTS ON UHURU HIGHWAY & HAILE SELASSIE AVENUE

1974	2	1	2	1	1	-	1	-	-	-	-	1	1	10
1975	4	1	5	1	2	-	1	-	-	-	-	2	-	16
1976	5	2	4	-	1	2	2	-	1	-	-	2	1	20
1977	5	1	2	2	3	3	1	-	1	-	-	3	3	24
TOTAL	16	5	13	4	7	5	5	-	2	-	-	8	5	70



'ROAD SAFETY IN NAIROBI'

TABLE 3:4:4 TRENDS OF INJURY ACCIDENTS ALONG JUJA ROAD

ROAD SECTIONS YEAR	JUJA RD PARK RD	JUJA RD NORTH VIEW RD	JUJA RD 1ST AV. EASTLEIGH	JUJA RD 2ND AV. EASTLEIGH	JUJA RD KENYA AIR FORCE HQ	JUJA RD OUTER RING RD	JUJA RD	TOTAL
1974	9	12	10	11	9	13	19	82
1975	10	13	11	8	10	12	20	84
1976	12	10	14	11	11	14	16	88
1977	14	12	10	12	8	10	27	93
TOTAL	45	47	45	42	37	49	82	347

SOURCE: KENYA TRAFFIC POLICE (NAIROBI P41-1974-77)

increase from a total of 82 in 1974 to 93 in 1977. In 1975 there were 84 accidents and 88 in 1976. Several junctions and intersections proved to be very dangerous in terms of road accidents. These were as follows:

- (i) Juja Road (other Sections) - 82 in the four years.
- (ii) Juja Road-Outer Ring roundabout 49 cases
- (iii) Juja Road-North view road junction 47 cases
- (iv) Juja Road - 2nd Avenue Eastleigh 42 cases
- (v) Juja Road - 1st Avenue Eastleigh 45 cases
- (vi) Juja Road - 2nd Avenue Eastleigh 42
- (vii) Juja Road - Kenya Air Force junction 37 cases.

The six junctions accounted for 76.8% of the casualties in 1974, 76.2% in 1975; 81.8% in 1976 and 71% in 1977 along Juja Road. Other sections of the road accounted for the rest of the number of casualties.

With the nature of the road and the population of the area, it is no wonder to have so many accidents along this road. The road is a one lane carriageway either way and carry many matatus and buses serving the low income high density areas adjacent the road.

Another aspect of the area is that many of the people along this road either depend on

public transport or on walking for their transport. As a result we have heavy pedestrian traffic along this road. The people of these areas are also heavy drinkers of the local beer which they make along Mathare Valley.* As a result of the heavy pedestrian traffic, the drinking habits of the people, the nature of the road, the types of vehicles operating along the road and their competition for passengers we have many pedestrian accidents. For the period of 4 years, there were 247 pedestrian accidents and 100 non-pedestrian accidents. In 1974 there were 64 pedestrian accidents or 78%, 58 in 1975 or 69%, 60 cases in 1976 or 68.2% and 65 cases in 1977 or 70% of the total number of casualties along the road.

Most of the accidents reported along the road were caused by drivers or other road users violating cause code 29 which is "misjudging clearance, distance or speed of vehicles or objects", and code 63 which is "heedless of traffic, stepping walking or running off foot path or verge into the road. This explains the high pedestrian casualties of 247 in the four years or 71.2% of the total.

From these three roads we find that road junctions and intersections are very prone to road accidents occurring in Nairobi.

* N.C.C.K. - Slum upgrading Along Mathare Valley 1976

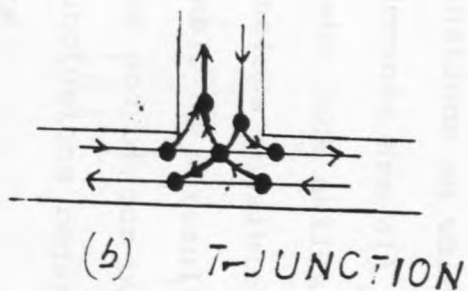
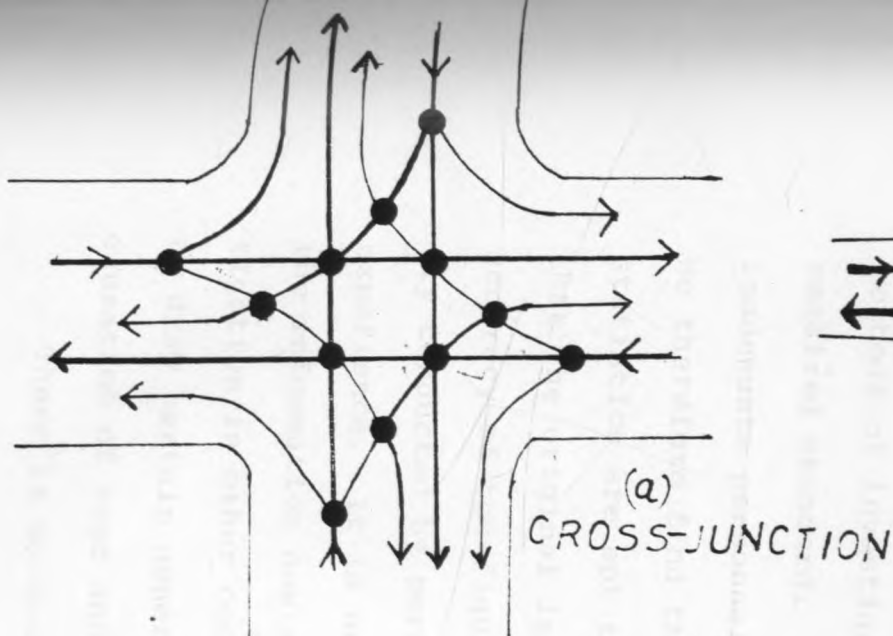
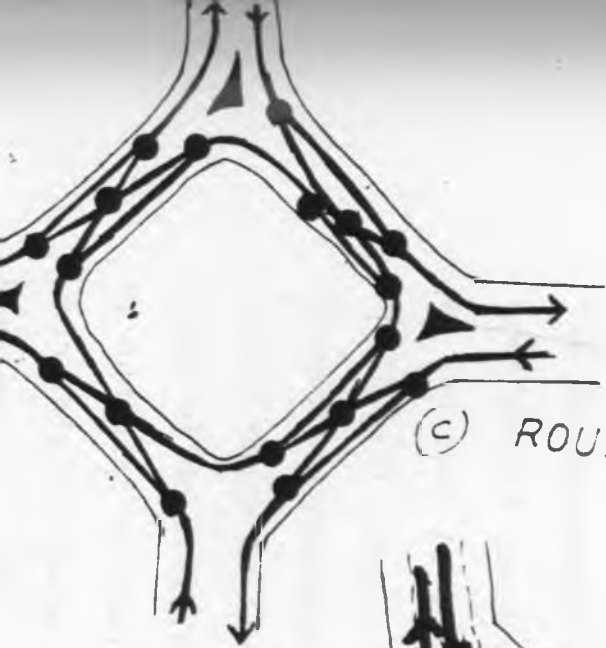
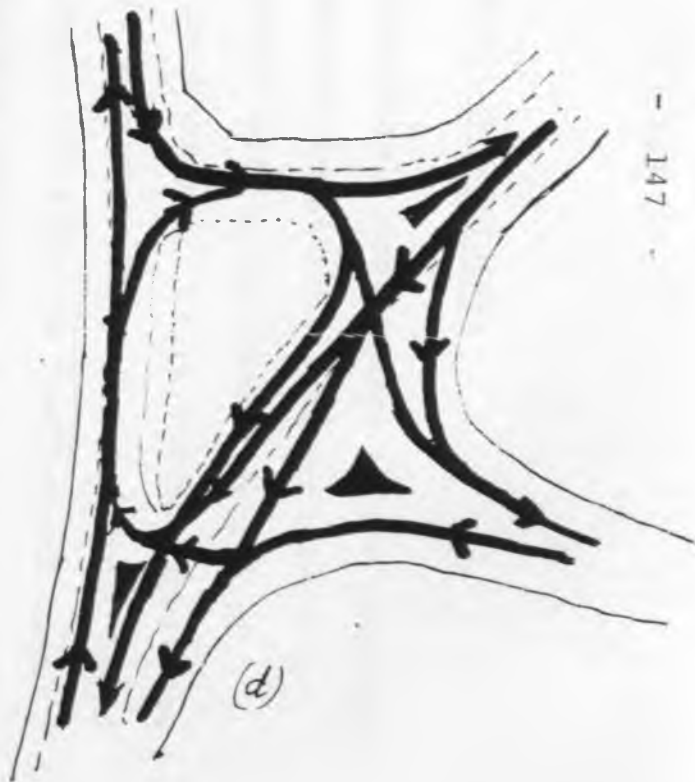


FIG 3.4.1 Traffic Movements at Road



(c) ROUNDABOUTS.



Junctions

(d)

4.1 THE CAUSES OF ACCIDENTS

An indispensable preliminary to the consideration of measures to prevent road accidents is the ascertainment with a reasonable degree of accuracy of their causes. It is almost superfluous to say that if diagnosis is faulty treatment based on it will almost certainly be ineffectual, and preventive measures which are wrongly directed are a mere waste of money and effort. To provide the means of determining with fair precision the causes of accident is the first step to be taken, and when this has been done to devise and put into operation measures for their eradication. The present methods of investigating fall far short of the required standard. This is because of the unqualified inadequate personnel and poor recording standards. We therefore find that conclusions drawn from such statistics are apt to be vitiated by the known fact that the original investigations on which the accuracy of the figures depends are all too frequently conducted by persons who lack skills and experience. It is nevertheless possible even on the information now available as a result of investigation in other countries and of our own experience to draw certain general conclusions regarding the causation of road accidents.

There is no mystery about the cause of the

great majority of road accidents. If we could eliminate human error, raise the standard of the road manners of all road users, make the roads really adequate for today and tomorrow and ensure that vehicles are always in a road-worthy, condition, we should solve the problem of road accidents. The necessary and sufficient cause of an accident is a combination of simultaneous and sequential factors each of which is necessary but non of which is by itself sufficient.³ And under this concept, there may be two kinds of contributory factors which combine to cause an accident, namely:

1. Operational factors or actions failures which may be at one or more of three sequential levels,
 - (a) Evasive action and to escape an immediate hazard;
 - (b) Strategy to be in a favourable position to take evasive action if a hazard develops and
 - (c) Preparation which influences the circumstances under which a trip is made.
2. Condition factors which influence occurrence of the operational factors. These may be of two kinds:-
 - (a) Fundamental attributes of the road, the people using the road or the vehicles with which the road is used and
 - (b) The modifiers which change the attributes of

the road.

It therefore follows that the cause of every accident is a combination of at least one operational factor and condition factor. Usually there are several factors relating to each traffic unit (vehicle, pedestrian) involved.

With these preliminary analysis we find that the Kenya Police (Traffic Section) has categorised the various causes of accidents and whenever an accident occur they record which of the factors contributed to the accident. The greater number of accidents are caused by pedestrians not taking heed to traffic stepping, walking or running off foot path or verge into the road. In 1976 out of 1946 accidents reported, 800 of them were because of the above cause, which represented 41.1% of the total. This can be explained by the fact that most workers in Nairobi make most of their trips on foot, both general purpose trips and essential purpose trips (44%) as seen in chapter 2:4. This is also so because pedestrian facilities are not fully well provided, and where provided, there is a great misuse of them by pedestrians. Again with the big number of vehicles the conflicts between vehicles and pedestrians are bound to be very many giving rise to many accidents - see figure 4:2.1

The second major cause of accidents in Nairobi involves drivers or pedal cyclists misjudging clearance, distance or speed of other vehicles. This contributed to 12.3% of all accidents reported in 1976. The third major cause of accident is found to be contributed by drivers and pedal cyclists failing to comply with traffic sign or signal accounting for 6.1% of all, the cases. The fourth major cause of accidents is that of drivers or pedal cyclists losing control of their vehicles, and this accounted for 5.8% of the total number of accidents in Nairobi in 1976. These four major causes of accidents accounted for 65.3% of all the accidents reported in Nairobi in 1976.

Other significant causes of accidents are represented by cause codes, 10/39; 8/37; 7/36; 60; 22/50; 69; 70; 9/38; 11; 13; 19/47; and 24/52, each contributing 3.8%, 2.1; 1.7, 1.5, 1.5, 1.2, 1.2, 1.4, 1.1 1.0, 1.4 and 1.4 per cent or a total of 19.3% of the total 1976 accidents respectively. These 16 major accident causes contributed to 84.6% of all the accidents reported in Nairobi in 1976.

From Table 4.1 and from figure 4:1 we can make several generalizations as to what cause causes accidents in Nairobi. These are:-

(i) That 98.5% or 1912 accidents out of a total of 1946 accidents in Nairobi in 1976 were caused by Human failures which involves pedestrian misbehaviour and carelessness which accounted for 45.4% or 844 accidents.

- 1 31 Fatigued.
- 2 — Asleep.
- 3 32 Ill.
- 4 33 Under the influence of drink or a drug.
- 5 34 Physically defective.
- 6 35 Inexperienced with type of vehicle in use at the time.
- 7 36 Proceeding at excessive speed having regard to conditions.
- 8 37 Failing to keep to near side or to the proper traffic lane.
- 9 38 Cutting in.
- 10 39 Overtaking improperly.
- 11 40 Swerving.
- 12 41 Skidding (give cause of skid).
- 13 42 Forcing way through persons boarding or alighting from omnibus.
- 14 43 Failing to stop to afford free passage to pedestrians at pedestrian crossing place.
- 15 44 Turning round in road negligently.
- 16 — Reversing negligently (other than from parking area).
- 17 45 Failing to comply with traffic sign or signal.
- 18 46 Failing to signal or giving indistinct or incorrect signal.
- 19 47 Pulling out from near side or from one traffic lane (not from parking area) to another without due care.
- 20 48 Inattentive or attention diverted.
- 21 49 Hampered by passenger, animal or luggage in or on vehicle.
- 22 50 Turning right without due care.
- 23 51 Turning left without due care.
- 24 — Driver negligently opening door of vehicle.
- 25 52 Crossing without due care at road junction.
- 53 Pedal cyclist holding on to another vehicle.
- 26 54 Losing control (particulars to be specified).
- 27 55 Dazzled by lights of another vehicle.
- 28 56 Stopping suddenly.
- 29 57 Misjudging clearance, distance or speed (vehicles or objects).
- 30 58 Other apparent error of judgment or negligence (specify).
- 30a — Reversing from *angle* parking space negligently.
- 30b — Entering parking space (*angle or flush*) negligently.
- 30c — Leaving flush parking space negligently.

Pedestrian

- 59 Heedless of traffic—crossing road masked by stationary vehicle.
- 60 Heedless of traffic—crossing road not masked by stationary vehicle.
- 61 Heedless of traffic—walking or standing in road.
- 62 Heedless of traffic—playing in road.
- 63 Heedless of traffic—stepping, walking or running off footpath or verge into road.
- 64 Slipping or falling.
- 65 Physical defects or sudden illness.
- 66 Under the influence of drink or a drug.
- 67 Holding on to vehicle.
- 68 Error of judgment or negligence, other than above (specify below).

Passengers, etc.

- 69 Boarding or alighting from vehicle without due care.
- 70 Falling when inside or falling from vehicle.
- 71 Other negligence on part of passenger.
- 72 Stealing ride.
- 73 Negligence on part of conductor or goods vehicle attendant.

Animal

- 74 Dog in carriageway.
- 75 Other animal in carriageway, including bolting horse.

Obstruction

- 76 Stationary vehicle dangerously placed.
- 77 Other obstruction (specify).

Vehicle Defect

- 78 Mechanical defect or failure—brakes.
- 79 Mechanical defect or failure—tyres or wheels.
- 80 Mechanical defect or failure—steering.
- 81 Mechanical defect or failure—other cause.
- 82 No front light.
- 83 Inadequate front light.
- 84 No rear light.
- 85 Inadequate rear light.
- 86 Unattended vehicle running away.
- 87 Driver's view obstructed, e.g. by equipment, load, or obscured windscreen.
- 88 Vehicle overloaded, shifted or defective load.
- 89 Any other feature of vehicle or equipment which contributed to the accident (specify below)

Road Defect

- 90 Road surface slippery.
- 91 Excessive dust obscuring driver's view.
- 92 Road surface in need of repair (state defect).
- 93 Other road condition, view obscured, etc. (specify).

Weather

- 94 Fog or mist.
- 95 Torrential rain.
- 96 Glaring sun.

Other Causes

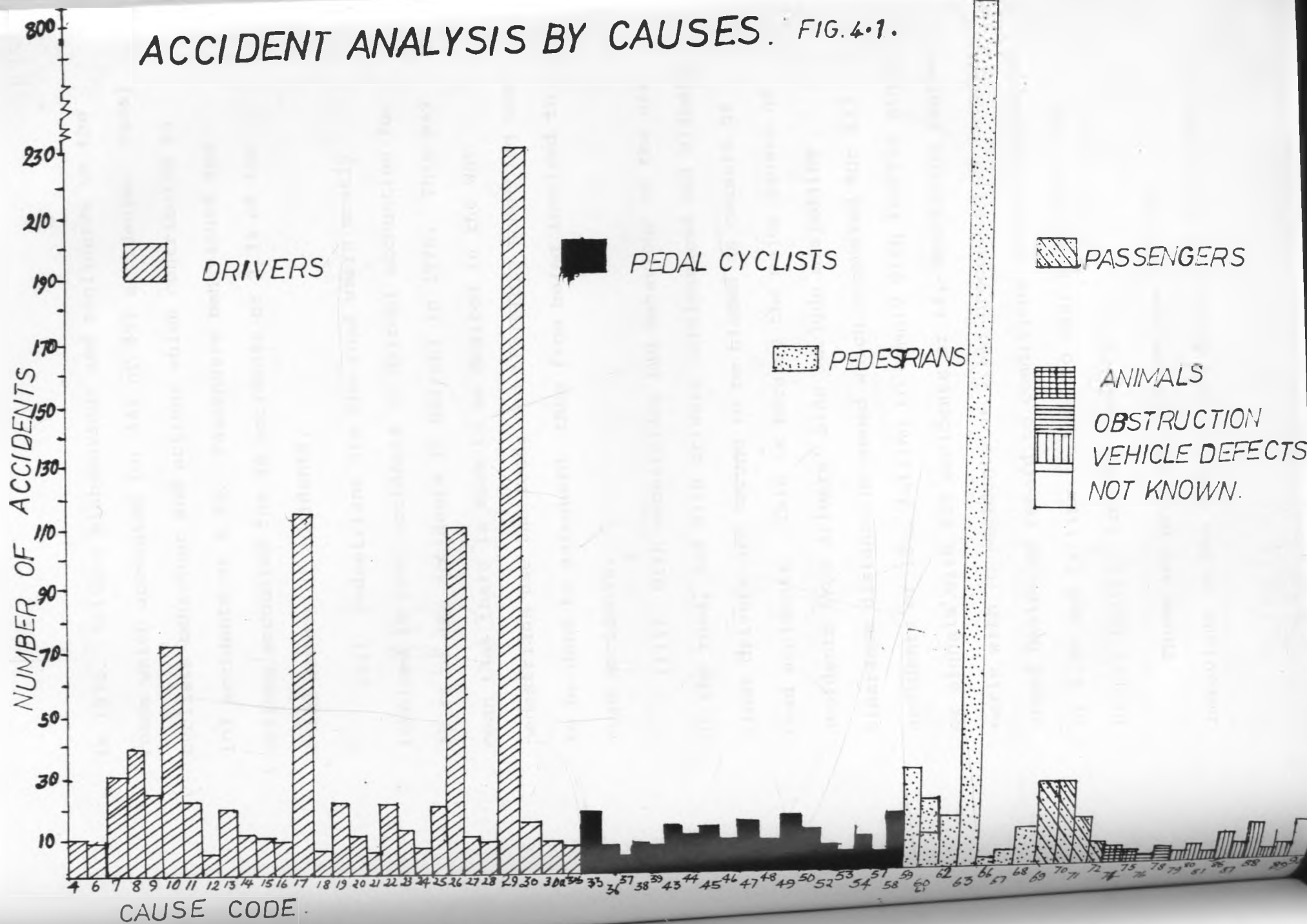
TABLE 4.1 ACCIDENT ANALYSIS BY CAUSES IN 1976

CAUSE CODE	NO. OF CASES	% OF TOTAL	CAUSE CODE	NO. OF CASES	% OF TOTAL	CAUSE CODE	NO. OF CASES	% OF TOTAL
4	10	0.5	30	14	0.7	63	800	41.1
6	9	0.5	30a	7	0.4	66	2	0.1
7	30	1.5	30b	6	0.3	67	3	0.1
8	38	2.0	33	15	0.8	68	10	0.5
9	24	1.2	36	4	0.2	69	24	1.2
10	70	3.6	37	2	0.1	70	24	1.2
11	21	1.1	38	4	0.2	71	12	0.6
12	6	0.3	39	4	0.2	72	4	0.2
13	19	1.0	43	9	0.5	74	3	0.1
14	10	0.5	44	5	0.3	75	2	0.1
15	9	0.5	45	6	0.3	76	1	0.05
16	8	0.4	46	4	0.2	78	2	0.1
17	112	5.8	47	7	0.4	79	1	0.05
18	6	0.3	48	4	0.2	80	3	0.1
19	19	1.0	49	10	0.5	81	1	0.05
20	10	0.5	50	6	0.3	86	2	0.1
21	5	0.3	52	8	0.4	87	1	0.05
22	24	1.2	53	5	0.3	88	5	0.3
23	12	0.6	54	4	0.2	89	2	0.1
24	6	0.3	57	6	0.3	98	11	0.6
25	20	1.0	58	4	0.2			
26	110	5.6	59	15	0.7			
27	10	0.5	60	30	1.5			
28	9	0.5	61	10	0.5			
29	233	12.0	62	15	0.8			

SOURCE: Traffic Police/ P41, forms 1976

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ACCIDENT ANALYSIS BY CAUSES. FIG. 4.1.



in 1976. Drivers misbehaviour and negligence on the roads which accounted for 44% or 857 accidents. Pedal cyclists behaviour and actions which contributed to 107 accidents or 5.5%. Passengers behaviours and actions accounted for 64 accidents or 3.3% of the total number of accidents.

(ii) Pedestrians are the road users mostly involved in road accidents in Nairobi accounting for 45.4% of the accidents in Nairobi in 1976. This may mean that there is much to be desired in the way pedestrians use the roads and therefore something need to be done to safeguard them from being involved in road accidents.

(iii) With pedestrians bad behaviour on the use of the road, and with drivers carelessness and misbehaviour drivers are second to be blamed as causers of road accidents. This is because the major causes of accidents from drivers' side include misjudging clearance distance or speed which accounted for 233 accidents or 12%, failing to comply with traffic sign or signals with 112 accidents or 6%, overtaking improperly with 70 accidents or 3.6%; proceeding at excessive speed having no regard to conditions with 30 accidents or 1.5% and failing to keep to near side or to the proper traffic lane 38 cases of 2%.

These are problems of careless and bad behaviour on the drivers part which can be controlled

by drivers taking heed to traffic regulations and the prevailing conditions. And if not, by imposing more stricter rules, regulations and heavy fines.

(iv) There is want of care in all the road users in Nairobi because the major cause of accidents is want of skill, continuous vigilance or judgment of drivers and pedestrians. Want of skill may be due to either absolute inability to acquire it, or to inadequate or insufficient tuition, but is more often to be attributed to insufficient experience.

Want of judgment or of vigilance contribute to a lot of accidents in Nairobi. This is either because of carelessness or ignorance of the prevailing conditions. Judgment consists in the ability to appraise accurately the consequences of taking one course or another in a given situation and the contribution to those consequences of the possible actions, whether reasonable or unreasonable, of the road users, and a correct appraisal having been made in the avoidance of a course, the consequences of which are likely to be dangerous. This fact can be illustrated by noting that in 1976, 541 accidents were caused by either driver or pedal cyclist not taking the right judgment or neglecting some driving regulations and rules. In the same year 922 accidents (47.4%) involving pedestrians and passengers falling from vehicles were caused by not taking heed to conditions or neglecting the conditions and crossing

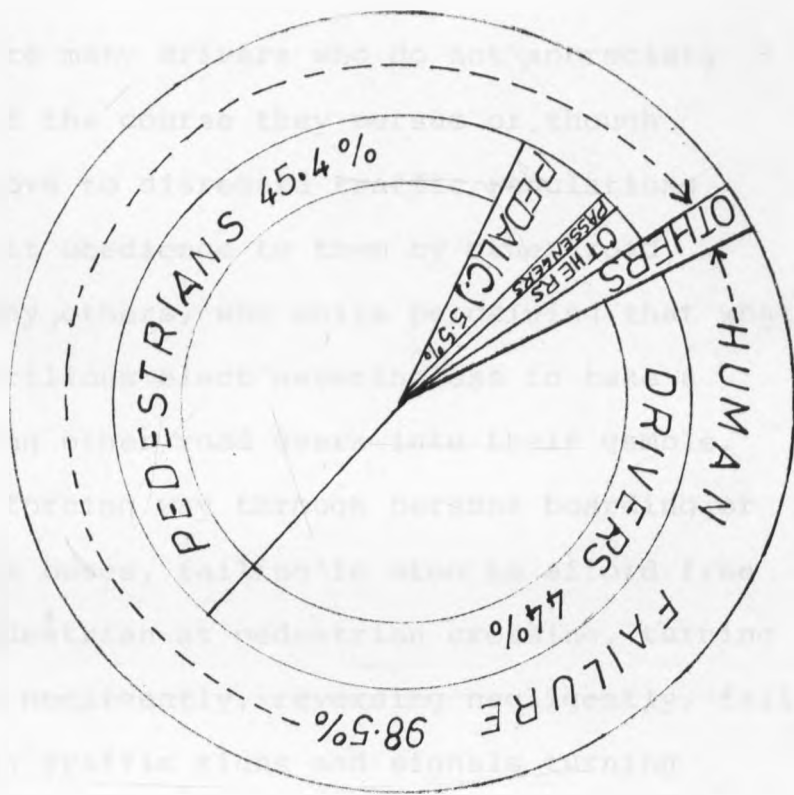


FIG.4:1.

Analysis of the causes of Accidents in Nairobi in 1976 ~~76~~ showing the computed distribution of human failure between drivers, pedal cyclists and pedestrians.

the road or acting carelessly. These two failures in the case of drivers, pedal cyclists, pedestrians and passengers contributed to 1463 accidents or 75.2% of all the accidents in 1976.

There are many drivers who do not appreciate the dangers of the course they pursue or though themselves prove to disregard traffic regulations assume implicit obedience to them by other road users, and many others, who while perceiving that what they do is perilous elect nevertheless to take a chance dragging other road users into their gamble. For example, forcing way through persons boarding or alighting from buses, failing to stop to afford free passage to pedestrian at pedestrian crossing, turning round in road negligently, reversing negligently, failing to comply with traffic signs and signals turning without due care etc which are very common with matatus, caused 258 accidents or 13.3% in 1976.

The error or failure of a motor vehicle driver has much more disastrous consequences than that of any other road users. This is so because by his failures, he may cause his vehicle to overturn; cause an accident with another vehicle or hit a pedestrian. In 1976, 857 accidents or 44% were caused by drivers failures or errors.

Other dangerous situations are created by the negligence of pedestrians, cyclists, drivers of hand-

carts or horse drawn vehicles; but even when the situation is created, it is usually possible for the driver of a motor vehicle and for him only to avoid the threatened accident.

Another major cause of accident is overspeeding which leads to loosing control of vehicles. These two contributed to 148 accidents or 7.6% of the total 1976 accidents. Deffective vehicles accounted for 17 accidents in the same year. Mechanical faults or the vehicle speed, condition of the road, or its surface, drinking and drugs, faulty manoeuvres all find a place in the list of factors contributing to these accidents but for reasons given earlier it is impossible to be dogmatic or to attempt to produce a true order of precedence of the various contributory factors.

It would be fairly wrong to say that speed of itself is the cause of accidents. Speed in the wrong place, at the wrong time, or undertaken by the wrong person can be a major contributory factor. Accidents are definitely caused by making haste and making haste always means going faster than all the circumstances of the moment warrants.

Recent check ups by police and vehicles inspection has shown that far too many motor cars are apparently being used on our roads in ignorance of faults which were found in them when inspected.

Many of the vehicle manoeuvres which causes many accidents include, vehicles, motor cycles, pedal cycles turning right. And also pedestrians crossings are misused and drivers would each learn more and appreciate better the difficulties and limitations of the others. These two brief examples of manoeuvres which has so often led to accidents emphasize the need for all road users to exercise much more care consideration and courtesy when using the road. From all these analysis more than $\frac{3}{4}$ of all road accidents are as a result of human element, and this suggest that all road users require more education in proper use of the highway code.

4.2 THE TYPES OF ACCIDENTS

In 1976, 1946 accidents were reported in Nairobi with 2427 casualties resulting from them. Of the 1946 accidents they were distributed as shown in table 4:2:1 and as shown in figure 4:2:1.

From this table, vehicle-vehicle, and vehicle-pedestrian accidents are the main types of accidents in Nairobi accounting for 1407 accidents or 72.3% of all the accidents in 1976. The high number of accidents involving vehicle-pedestrians (727 or 37.4%) of the total number of accidents was revealed in the last section where we saw that many of the accidents were caused by pedestrians not taking heed to traffic stepping, walking or running off foot path or verge into the road. This one cause accounted for 800 accidents or 41.1%.

TABLE 4:2:1 THE TYPES OF ACCIDENTS IN 1976

TYPES OF ACCIDENT	NUMBER	PERCENTAGE
Single-vehicle(v)	132	6.8
Vehicle-vehicle (v-v)	680	34.9
Vehicle-Pedestrian(v-ped)	727	37.4
More than 2 vehicles (v ^s)	181	9.3
Vehicle-motor cycle (v-mc)	72	3.7
Vehicle-Pedal cycle (v-pc)	113	5.8
Vehicle-Animal (v-A)	17	0.9
Vehicle-hand card (V-Hc)	14	0.7
Motor cycle-pedestrian(mc-ped)	10	0.5
TOTAL	1946	100%

SOURCE: Kenya Traffic Police Nairobi P41. 1976

LEGEND

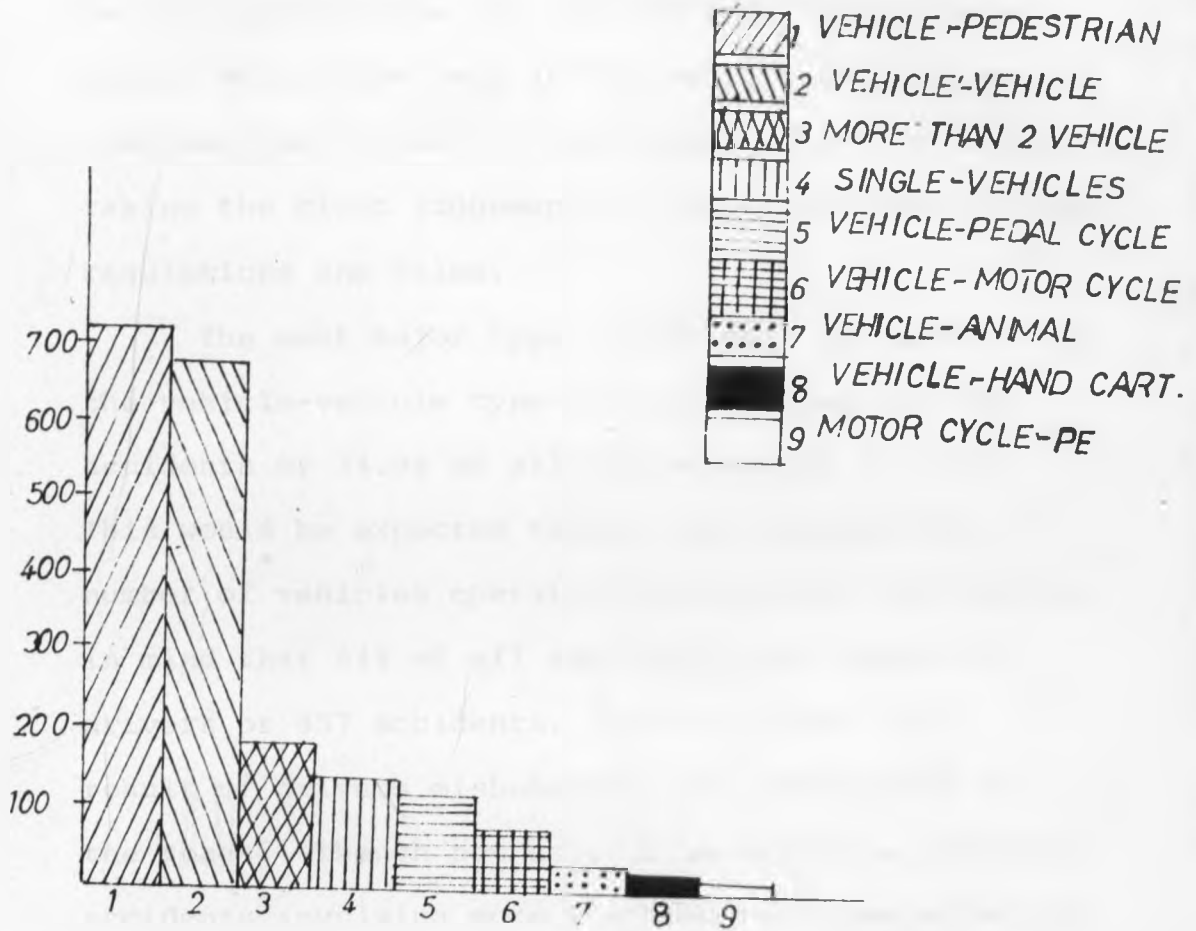


FIG. 4.2.1

THE TYPES OF ACCIDENTS

Because pedestrians are not involved in accidents alone, we can now look at the vehicle drivers who in the same year caused 541 accidents or 28% by either not taking the right judgement or neglecting some driving regulations and rules.

The next major type of accident in Nairobi is the vehicle-vehicle type which accounted for 680 accidents or 34.9% of all the accidents in 1976. This would be expected taking into account the number of vehicles operating in Nairobi, and bearing in mind that 44% of all accidents were caused by drivers or 857 accidents. This has been as a result of drivers misbehaviour and negligence on the roads. Though not as high as might be expected, accidents involving more than two vehicles accounted for 181 accidents or 9.3%. This type of accident is more common with non-injury accidents because of congestion during peak hours.

In a place like Nairobi it is quite unusual to have such a high number of single vehicle accidents. This type of accident is common especially on the major arterial roads where vehicles go at very high speeds. In other areas, although there are speed limits, we find that single vehicle accidents also occur due to drivers overspeeding regardless of conditions. There are very few accidents involving vehicles and motor cyclists which can be explained as due to the low usage of motor cycles

in Nairobi. There is a big number of accidents involving vehicles and pedal cycles, but this type is decreasing as can be seen by the fact that in 1974 there were 155 vehicle-pedal cycle accidents, and 142 in 1975 and 113 in 1976. This can be attributed to the decline in the use of pedal cycles due to the dangers posed by increased motor traffic. Other types of accidents are few in Nairobi and these are very few animal drawn vehicles and hand carts. But when we add up the total for accidents involving vehicles-pedal and motor cycles, and motor cycles and pedestrians, we get quite a high number of 209 or 10.7%. This calls for action to safeguard these vehicles from other traffic.

4:3 WHO ARE THE CASUALTIES:

In this subsection an attempt is made to analyse the severity of the casualties reported in Nairobi. This will help us to understand the seriousness of the accidents reported. This breaks down the total number of casualties into fatal, serious and slight injury cases.

Looking at the casualties by class of road users and by severity we find that the majority of casualties of all severity are pedestrians followed by passengers in motor vehicles and drivers. Other road users like motor cyclists and pedal cyclists

are not very much affected. See table 4:3:1 and figure 4:3:1.

From this table we learn that out of 257 fatal cases reported in 1976, 161 of them or 62.6% of the total involved pedestrians, and out of 577 serious injuries reported 274 or 47.5% were pedestrians, with 675 cases out of 1593 slight injuries or 42.4%. This gives a very high casualty rate of pedestrians as they contributed to 1110 casualties out of 2427 cases which was over 45.7% in the year. The other class of road user seriously involved in road accidents are the passengers which contributed to a total of 543 cases out of 2427 or 22.4% of the total. They also take the second place in terms of severity in that they contributed to 16.7% fatal cases, 20.8% serious injuries and 23.8% slight injuries. This can be explained by the fact that apart from few private cars most of the vehicles in Nairobi carry more than 2 passengers and in case of an accident, the casualties are bound to be many. In the case of pedestrians, it is because of the high number of trips made on foot and the absence of many pedestrian facilities and also by the careless usage of roads and facilities by both pedestrians and drivers.

It is also alarming to see that 21.8% of all the casualties in Nairobi involve drivers of motor vehicles, with 13.6% of the fatalities, 18.2% of the

TABLE 4:3:1 ACCIDENT CASUALTIES BY CLASS OF ROAD USERS AND SEVERITY

TYPE OF INJURY	FATAL		SERIOUS		SLIGHT		TOTAL	
CLASS OF ROAD USERS		%		%		%		%
Drivers	35	6.6	105	19.9	388	73.5	528	21.8
Motor cyclists	3	3.8	32	41.0	43	55.1	78	3.2
Pedal cyclists	15	8.9	46	27.4	107	63.7	168	6.9
Passengers	43	7.9	120	22.1	380	70.0	543	22.4
Pedestrian	161	14.5	274	24.7	675	60.8	1110	45.7
Total	257	10.6	577	23.8	1593	65.6	2427	100
Percentage	10.6		23.8		65.6		100	

SOURCE: Kenya Traffic Police 1976.

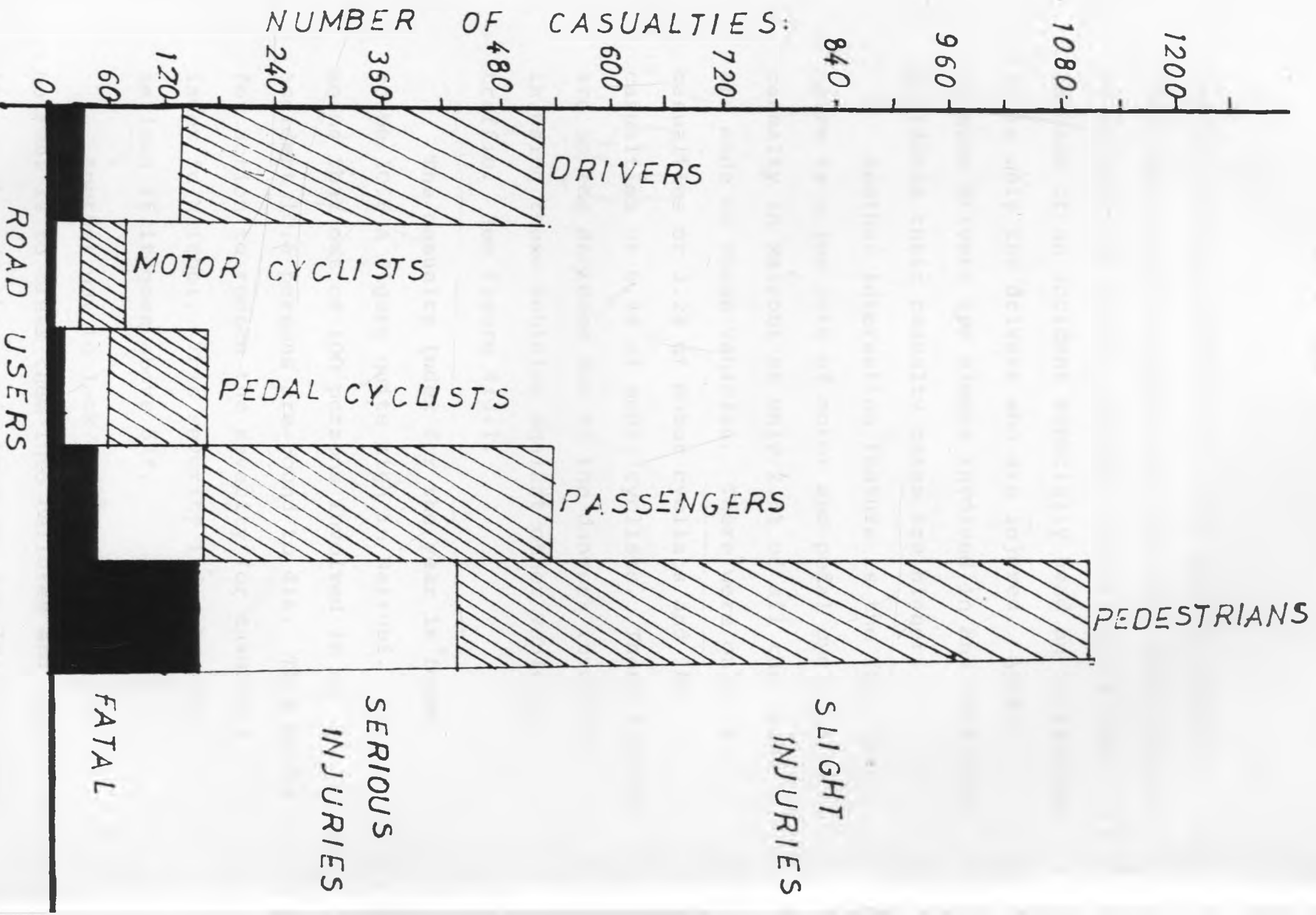


FIG 4.3.1 ACCIDENTS CASUALTIES BY CLASS OF ROAD USERS AND SEVERITY.

serious injuries and 24.4% of the slight injuries. This can be said to be due to many cars being driven or occupied by single persons (drivers only) and in case of an accident especially head on collisions it is only the drivers who are injured. Again because drivers are always involved in any vehicular accidents their casualty rates are higher.

Another interesting feature is the fact that there is a low rate of motor and pedal cyclists casualty in Nairobi as only 2.6% of all the trips are made on these vehicles. There were only 78 casualties or 3.2% of motor cyclists and 168 casualties or 6.9% of pedal cyclists. These figures are on the decrease due to the dangers involved in using these vehicles against other vehicular traffic. See figure 4:3:1.

The casualty index for the year is found to be 10.6 a figure quite high in Nairobi. This means that out of 100 persons involved in an accident 10.6 persons are bound to die. This calls for action to reduce the severity (or casualty) index in Nairobi. This severity index becomes serious if it goes above 5%*.

Another way to look at the casualties in Nairobi is to break them into children and adults to see who are the people that are involved in road accidents. Table 4:3:2 illustrates this point.

* D.G. Jaccobs: Road Accidents in Developing Countries
Unpublished paper 1976.

TABLE 4:3:2 ROAD CASUALTIES BY AGE AND SEVERITY
1976

TYPE OF CASUALTY	OVER 16 YEARS		UNDER 16 YEARS	
	NUMBER	%	NUMBER	%
Fatal	232	10.6	25	10.2
Serious	500	22.9	77	31.3
Slight	1449	66.5	144	58.5
Total	2181	100	246	100

From this table we find that out of 2427 casualties in 1976 2181 cases were adults or 89.9% of the total, and 246 cases were children under 16 years. (10.1%). This shows that most of the casualties in Nairobi are adults and few children, see figure 4:3:2. The high number of adult casualties can be attributed to the fact that apart from the school children who may be involved in much movements in the city, most of the movements are made by grown ups. Again most of the schools are located in residential areas where the children do not have to cross main roads to go there.

The high number of passenger casualties can only be explained by the fact that most of the public transport vehicles - matatus and buses - even cars at times are always overloaded, and in case of an

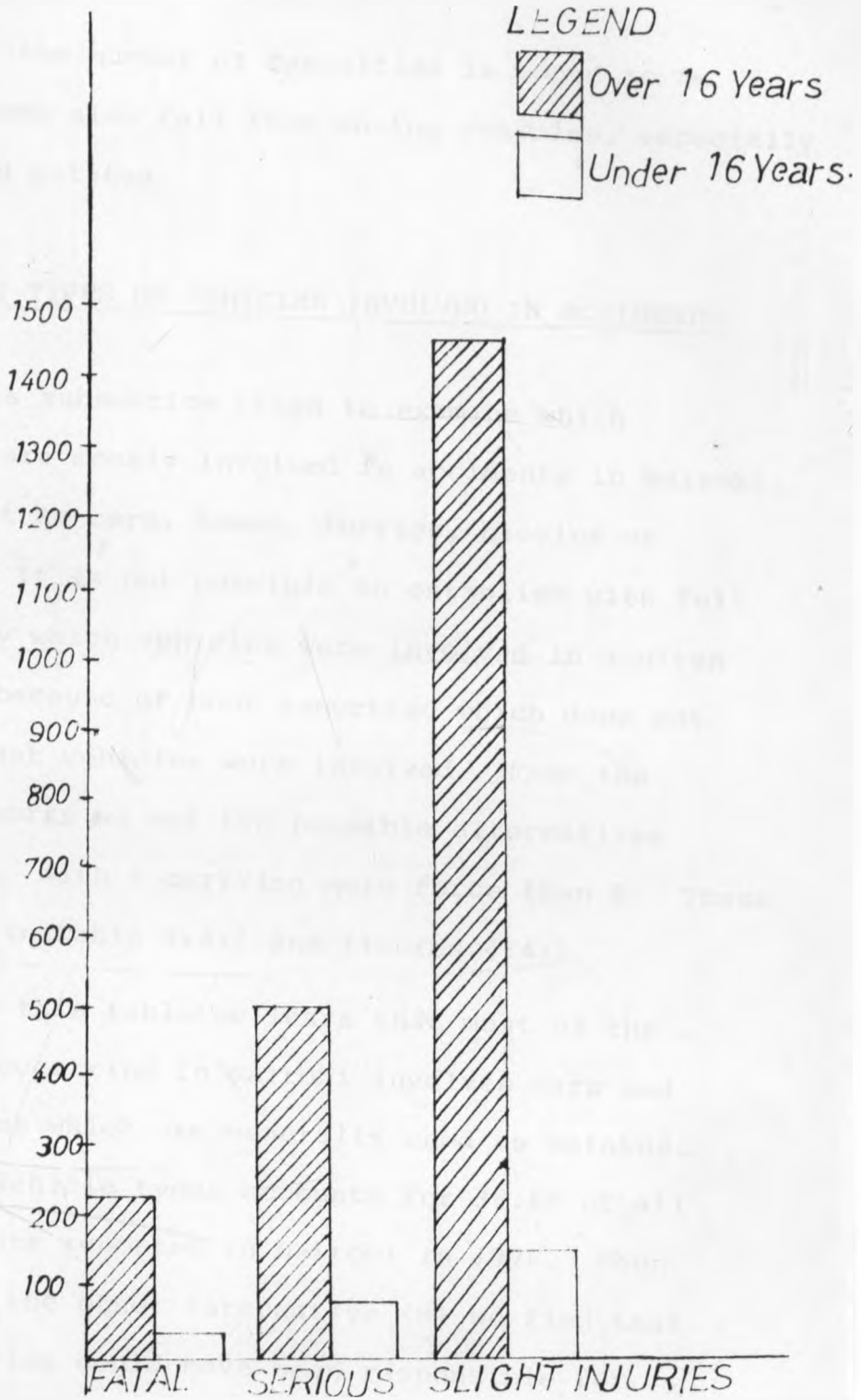


FIG. 4.3.2.

ROAD CASUALTIES BY AGE AND SEVERITY.

accident the number of casualties is bound to be high. Some also fall from moving vehicles, especially buses and matatus.

4.4 THE TYPES OF VEHICLES INVOLVED IN ACCIDENTS

This subsection tries to examine which vehicles are mostly involved in accidents in Nairobi; whether it is cars, buses, lorries, bicycles or matatus. It is not possible to establish with full certainty which vehicles were involved in a given accident because of poor reporting which does not specify what vehicles were involved. From the police reports we get two possible alternatives (A and B). With A carrying more force than B. These are given in Table 4:4:1 and figures 4:4:1.

From this table we learn that most of the accidents occurring in Nairobi involves cars and utility vans which are generally used as matatus. These two vehicle types accounts for 38.6% of all the accidents reported in Nairobi in 1976. When we look at the other laternative (B) we find that these vehicles could have been responsible for 43.2% of the accidents or in other words they indirectly contributed to these accidents.

The table also reveals that pedestrians directly contributed to 38% of all the accidents

TABLE 4:4:1 PERSONS OR VEHICLES PRIMARILY RESPONSIBLE FOR ACCIDENTS (1976)

PERSONS OR VEHICLES	A* NUMBER	A %	B NUMBER	B %
Cars and vans	752	38.6	841	43.2
Lorries & heavy vehicles	100	3.0	467	24.0
Bus + Taxi	116	6.0	129	6.6
Motor cycles	62	3.0	55	2.8
Hand carts	22	1.1	22	1.1
Pedal cycle	66	3.2	68	3.5
Animals	2	0.1	15	0.8
Persons	746	38.0	299	15.4
Not known	80	4.1	50	2.6
TOTAL	1946	100	1946	100

SOURCE: Traffic Police: A* Directly responsible for accidents
Indirectly responsible for accidents

Persons or Vehicles Primarily Responsible 1976

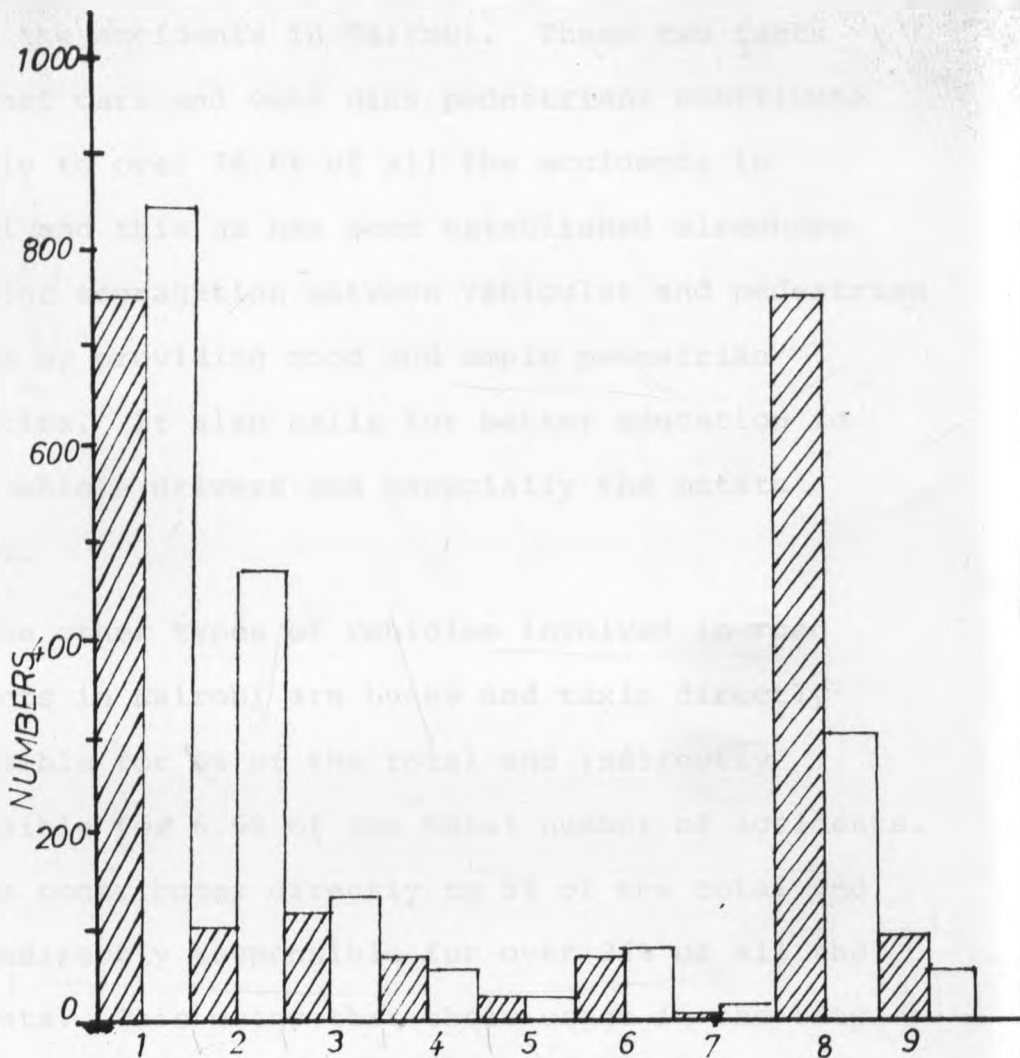




FIG. 4:41

	DIRECTLY RESPONSIBLE
	INDIRECTLY RESPONSIBLE
1	Cars & Vans.
3	Bus & Taxi
4	Motor Cycles
5	Hand Carts
6	Pedal Cycles
7	Animals
8	Persons
2	Lorries
9	Not Known

They were also indirectly responsible for 15.4% of all the accidents in Nairobi. These two facts show that cars and vans plus pedestrians contribute directly to over 76.6% of all the accidents in Nairobi and this as has been established elsewhere calls for segregation between vehicular and pedestrian traffic by providing good and ample pedestrian facilities. It also calls for better education to motor vehicle drivers and especially the matatu drivers.

The other types of vehicles involved in road accidents in Nairobi are buses and taxis directly responsible for 6% of the total and indirectly responsible for 6.6% of the total number of accidents. Lorries contributes directly to 5% of the total and were indirectly responsible for over 24% of all the accidents. This means that their usage in the city has very many side effects although not direct effects. This could be explained by the fact that their large sizes makes other vehicle drivers to find it difficult to manoeuvre their way and thus indirectly cause accidents.

Two wheeled vehicles hand carts and animals contribute very little to the total number of accidents. This is shown by the fact that these four types of vehicles directly contributed to only about 8% of the total number of accidents.

If we combine lorries, buses and taxis in Nairobi and see what percentage of the total they contributed we find that they were directly responsible for 11% of the total and indirectly responsible for 30.6% of the total. A very high figure which may suggest another type of segregation between buses and lorries from other vehicles to reduce the number accidents.

4.5 ACCIDENT BLACK SPOTS OR DANGEROUS ROADS

Much has been said regarding the black spots or dangerous roads in Nairobi, and what follows in this section will inevitably have some repetitions. But it is necessary to summarise the road safety problem in Nairobi by bringing together all the problems as discussed in earlier chapters.

Looking at the various roads in Nairobi and the number of accidents reported in them we find that some roads in Nairobi stand out as having more accidents than other. The first thing that we note is that most of the dangerous roads are the major arterial roads, and roads with very heavy traffic volumes. They are also the roads where most of the matatus and country buses operate in addition to other vehicles.

Table 4:5:1 gives a list of 40 dangerous roads in Nairobi with the number of casualties reported

TABLE 4.5.1 THE FIRST 40 DANGEROUS LOADS ROADS IN NAIROBI

ROADS OR STREETS	FATAL	SERIOUS	SLIGHT	TOTAL	
1. Ngong Road	10	20	60	90	Fatal cases in the first 10 roads = 75 or 29.2% Serious cases 187 or 32.4% 393 slight injuries or 24.7% Total 655 cases or 27% of the total.
2. Juja Road	11	35	42	88	
3. Limuru Road	6	14	55	75	
4. Haile Selassie Avenue	7	20	45	72	
5. Jogoo Road	10	15	40	65	
6. Waiyaki Way	7	21	35	63	
7. Race Course Road	7	21	30	58	
8. Naivasha Road	8	11	31	50	
9. Landhies Road	5	20	25	50	
10. Uhuru Highway	4	10	30	44	

TABLE 4.5.1 (CONT.)

ROADS OR STREETS	FATAL	SERIOUS	SLIGHT	TOTAL	
11. Langata Road	10	15	17	42	Fatal = 69 = 26.8%
12. Thika Road	11	11	17	41	Serious = 124 = 21.5%
13. Murang'a Road	8	13	20	41	Slight = 182 = 11.4%
14. Lower Kabete Road	6	11	23	40	Total = 367 or 15.1%
15. Likoni Road	4	16	18	38	ROADS 1 - 20
16. Kenyatta Avenue	2	10	25	37	Fatal = 144 = 56%
17. Outer Ring Road	10	5	20	35	Serious = 311 = 53.9%
18. Mombasa Road	5	10	17	32	Slight = 575 = 36.1%
19. Ring Road Ngara	6	10	15	31	Total = 1030 = 42.4%
20. Magadi Road	7	13	10	30	

TABLE 4.5.1 (CONT.)

ROADS OR STREETS	FATAL	SERIOUS	SLIGHT	TOTAL	
21. Parklands Road	6	9	15	30	Roads 1 - 40 Fatal - 208 = 80.9% Serious - 501 = 86.8% Slight - 829 = 52% Total = 1500 = 61.8%
22. Masari Road	2	7	21	30	
23. Ngara Road	1	11	18	30	
24. 1st Av. Eastleigh	4	11	12	27	
25. 2nd Av. Eastleigh	3	7	16	26	
26. Heshima Av.	6	7	13	26	
27. Enterprise Road	2	7	16	25	
28. Mbagathi Road	7	10	8	25	
29. Government Road	2	10	12	24	
30. Park Road	3	12	9	24	

TABLE 4.5.1 (CONT.)

ROADS OR STREETS	FATAL	SERIOUS	SLIGHT	TOTAL
31. Sakwa Road	4	8	12	24
32. Valley Road	7	10	6	23
33. Kipande Road	2	8	12	22
34. Ronald Ngala Str.	2	10	10	22
35. General Waruinge Str. Street	3	5	12	20
36. Ring Road Pumwani	2	10	8	20
37. Kiambu Road	3	7	10	20
38. Lusaka Road	3	7	10	20
39. Chiromo Road		10	10	20
40. Kibera Drive	2	6	12	20

Source Kenya Traffic Police 1976

on them and their severity in terms of fatal, serious and slight injuries in 1976. See map 4:5:1, 4:5:2 and 4:5:3.

From the table and the 3 maps we learn that Ngong Road is the most dangerous road in Nairobi which reported 90 casualties in 1976; Juja road is number two with 88 casualties followed by Limuru road 75, Haile Selassie Avenue with 72 casualties. Of the first 10 dangerous roads 8 of them are or are parts of the main arterial roads on which matatus, country buses and other heavy traffic operate. This is as a result of heavy traffic, narrow roads, competition for passenger and lack of pedestrian facilities. Even if the matatus buses and heavy commercial vehicles are not directly responsible for the accidents they are indirectly responsible. These 10 roads in 1976 reported 75 fatal cases of 29%; 187 serious cases, or 32.4%, 393 slight injuries or 24.7% of the total number of cases in 1976. This made a total of 655 cases or 27% of the 1976 total.

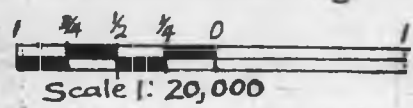
Looking at the first 20 roads in Nairobi, we find that they reported 56% of all fatal cases, 53.9% of all the serious injury cases and 36.1% of the slight injuries, making a total of 1030 cases or 42.4% of the 1976 total. Of these 20 roads, 15 are arterial roads on which matatus and country buses



FIG. 4.5.1.

DANGEROUS ROADS IN NAIROBI 1976 (Numbers are accident figures)

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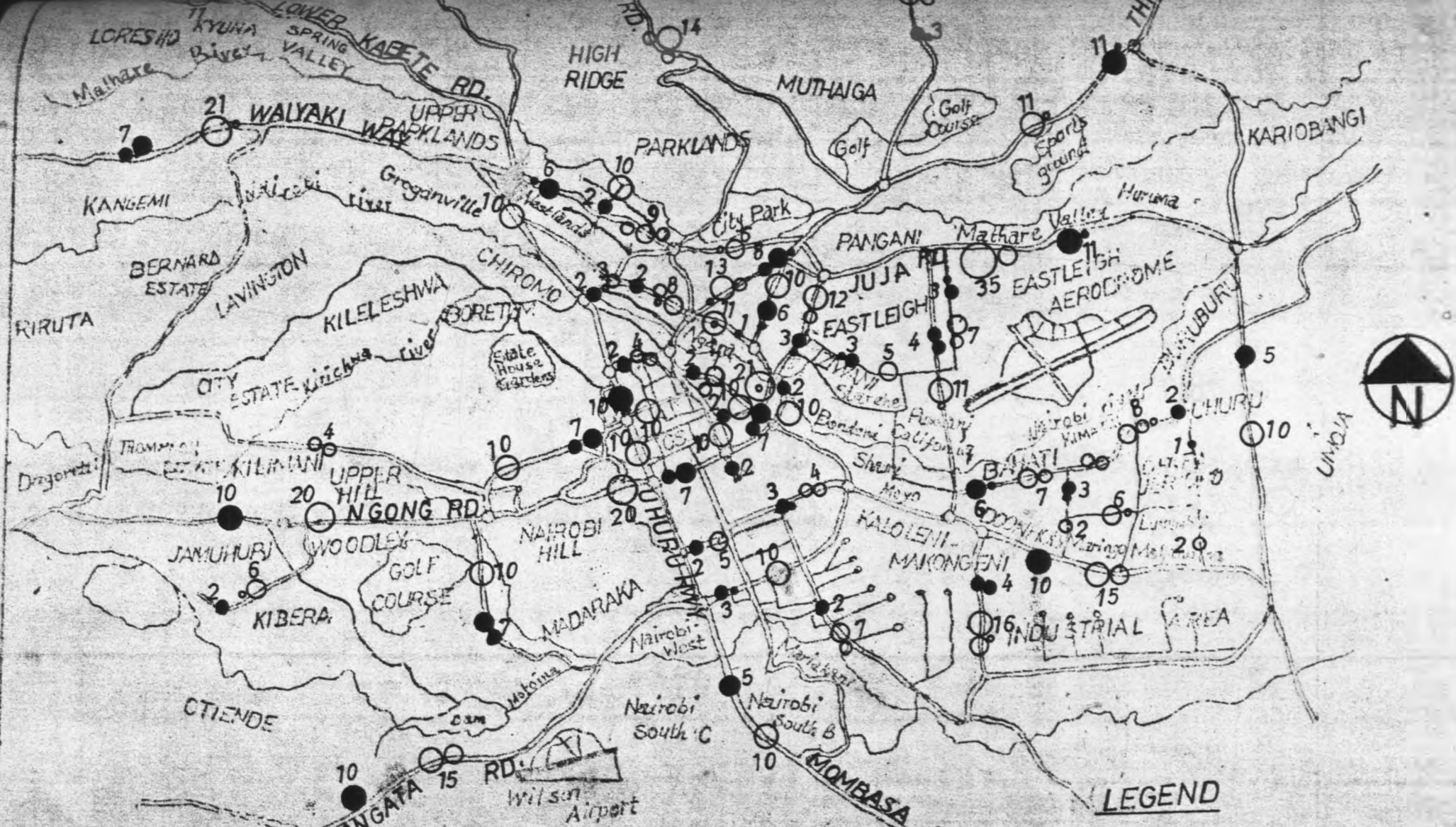
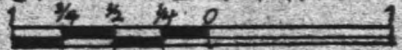


FIG. 4.5.2

FATAL AND SERIOUS ACCIDENTS (1976)

● FATAL
○ SERIOUS

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Scale 1:20,000

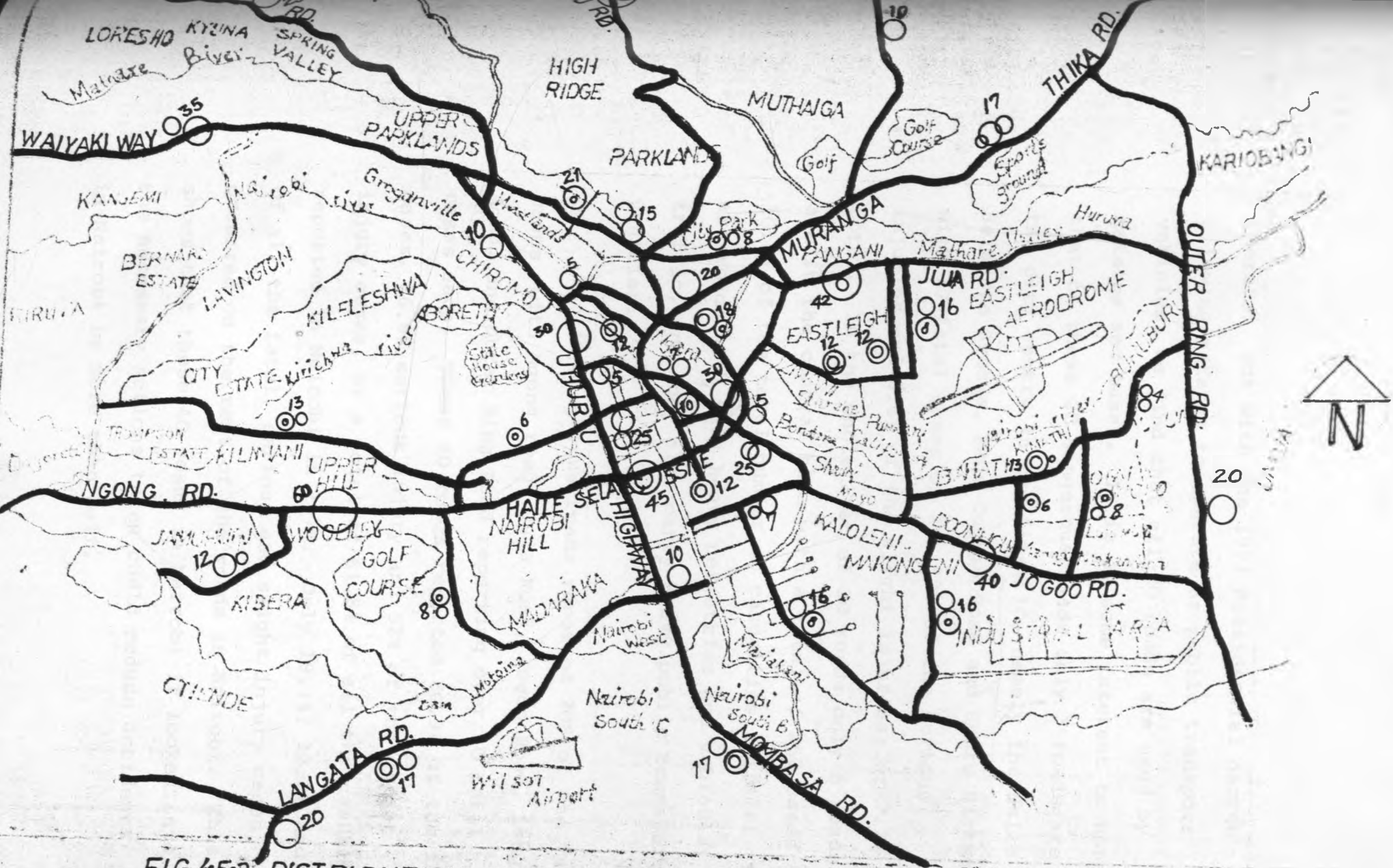
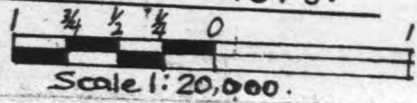


FIG. 45.3. DISTRIBUTION OF SLIGHT INJURY ACCIDENTS 1976.
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operate. But with the 1973 Presidential decree allowing matatus to operate as public transport vehicles, we find that all 20 roads are used by matatus and buses. It is of some interest to note that of these 20 dangerous roads only 3 roads are in the city centre in the first 10, namely the Haile Selassie Avenue, Race Course Road and Uhuru Highway with 17 fatal cases or 7%; 88% of the serious injuries and 6.6% of the slight injuries; or 7.2% of the total. In the whole list of 20 roads only 5 roads are in the central area with a total of 261 cases or 10.8% of the total number of casualties in 1976. These are roads with very heavy pedestrian and vehicular traffic, and they also carry heavy public transport vehicles.

The 40 dangerous roads reported 208 of the fatal cases with Ngong road, Juja Road, Jogoo Road, Langata Road, and Outer Ring Road reporting over 10 fatal cases each. These 40 roads reported 80.9% of the fatal cases, 86.6% serious injury and 52% of the slight injury cases, or a total of 61.8% of all the casualties reported in Nairobi in 1976. Only 19.1%; 13.2% and 42% of all the fatal, serious and slight injury cases occurred on the rest of the roads in Nairobi. This shows that these 40 roads in Nairobi if looked into and the necessary actions taken could reduce accidents in Nairobi by more than half.

It is interesting to note that most of the accidents occur within a distance range of from 0-5 kilometres from the city centre, where movements are very concentrated. It is within this distance that most of the vehicular and pedestrian traffic is to be found, revolving between the activity area located here. In chapter two we saw that 70% of the pedestrian trips are to be found within 3.2 km of the city centre and 85% within 4.8 km. of the city centre. Therefore we find that most of the high and medium density residential areas are located within this distance range, from where most of the traffic comes from to the central and industrial area. It was also found that traffic decreases as one moves away from the central area except on the major arterial roads. This is why the number of accidents decreases as one moves away from the central and industrial area except on the main arterial roads.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

All along we have tried to expose the problem of road safety in Nairobi with close reference to the number of accidents occurring in the Nairobi Transportation network various factors responsible for road accidents have been identified and some have been found to contribute more to the problem than others. Special attention has been given to certain contributory factors, like land use arrangements, the number of vehicles and the population exposed to danger, the matatus and country buses on the main arterial roads, and the road junctions and intersections. Other aspects of the problem to which more emphasis has been given include the types of accidents occurring, their causes, the types of casualties, the type of vehicles involved in accidents and the black spots or dangerous roads in Nairobi. These analysis have added to our knowledge of road safety problems in Nairobi, and armed with this knowledge can now move to make certain policy recommendations and planning proposals to be followed in order to solve or reduce the road safety problems. This chapter deals with policy recommendations and planning proposals to the road safety problem in Nairobi.

PROBLEMS IDENTIFIED

through the study, several problems have been identified as contributing either directly or indirectly to the road safety problem in Nairobi. These problems fall into 4 categories namely:-

Problems relating to land use arrangements, the vehicular traffic, the pedestrian traffic and finally problems or human failures.

(1) Problems relating to land use arrangements, include:

- (i) the distinct land use zones concentrating most of the employments and activities between 3 zones - namely the central, the industrial area and the many residential areas scattered in all directions of the central area. From the residential areas, both vehicular and pedestrian traffic move to either the central or the industrial area and the areas around these two places for work or for other businesses. As a result we have heavy concentration of traffic in these areas during the day.
- (ii) The problem created by the same working hours in Nairobi has resulted in heavy traffic flows during the peak hours when people are either going to work in the

morning, or for lunch at midday, or when going home in the evening. The peak flow is between 10,000 and 20,000 cars per hour for a period of 30 minutes in the morning peak on approach roads like Murang'a Road, Uhuru Highway, Kenyatta Avenue, and Haile Selassie Avenue. Normal traffic flow is between 2,000 and 5,000 vehicles per hour. The morning peak when everybody is heading to the central and industrial area is the busiest with other peaks not as busy. These peak flows experience maximum vehicular and pedestrian movements creating many conflicts, congestion and delays.

(iii) Some intersections especially, Uhuru Highway- University Way roundabout, Uhuru Highway - Haile Selassie Avenue, Uhuru Highway-Langata Road, Haile Selassie Avenue Landhies Road, Muranga Road-Tom Mboya roundabout etc leading to the central and the industrial areas acts as bottlenecks during the peak periods. This causes considerable delays and congestions.

(iv) Heavy pedestrian movements found in the Eastlands and along other busy sections of the central area poses a lot of problems

in these areas.

(2) Problems relating to vehicular traffic are varied and includes:

- (i) Mixed traffic in some areas of the central area and on certain approach roads like Jogoo-Landhies Road; Ring Road Ngara-Race Course Road, Ngong Road, Waiyaki Way, Langata Road and Limuru Road. Some of these roads operate beyond maximum capacity at peak hours especially on section where they carry single-lane traffic either way.
- (ii) Considerable delays and dangerous conflicts occur at busy intersections and roundabouts, like Race Course Road-Ngara-New Pumwani Road, Haile Selassie Avenue-Landhies-New Pumwani Roads roundabout; River Road-Tom Mboya roundabout; Murang'a Road-Limuru Road roundabout; Murang'a Road-Kipande Road, Uhuru Highway-Bunyala Road; Uhuru Highway-Lusaka Road etc.
- (iii) The many stops made by matatus and buses pick and drop passengers on some of the busy roads poses a lot of problems to other traffic.
- (iv) Parking problems in Nairobi central area is quite acute and poses a lot of problems

to the traffic movements. Some people park on the carriageway others park on the pavements forcing pedestrians to walk on the roads.

- (v) Some of the matatus and buses are unroad-worthy, uninsured, unlicensed and have often been accused of overloading and operating at very high speeds competing for passengers.
- (3) Pedestrian Problems - include the following:
- (i) The heavy pedestrian traffic found in in the Eastlands and in areas of matatus and bus stops and terminus face the problems of lack of pedestrian facilities.
 - (ii) Lack of pedestrian facilities risk safety. This is made worse when motorists park their vehicles on pavements, footpaths etc forcing pedestrians to walk on the main carriageway exposing them to vehicular traffic.
 - (iii) Misuse of pedestrian facilities both by pedestrians and motorists.
- (4) Problems relating to human failures include:-
- (i) A lot of negligence and misjudgments on the case of drivers and cyclists.

- (ii) Ignorance of drivers and other road users to traffic signs and signals, which may be due to lack of knowledge or due to ignorance.
- (iii) Misusing of facilities by all road users; and not taking heed to prevailing conditions while using the road.
- (iv) The problem of making haste and overspeeding while on the roads and not regarding the prevailing conditions.

POLICY RECOMMENDATIONS

Having identified the problems the next thing is to formulate some policy recommendations which would be used as guidelines to solve or reduce the problems of road safety in Nairobi. Some of the policy recommendations are:-

1. Provide for dispersal of industrial area
2. Restrict employment levels in the central area
3. Stagger the working hours
4. Provide enough links to the industrial area from the Eastlands.
5. Reduce the problems of mixed traffic on certain approach roads.

6. Reduce congestion problems on dangerous roads and provide for the improvement of busy intersections
7. Eliminate the conflicts between vehicular and pedestrian traffic.
8. Improve pedestrian facilities and create shopping precincts.
9. Manage and organize public Transport
10. Promote road safety education and propaganda
11. Stricter enforcement of laws to be adopted.

PLANNING PROPOSALS

The broad policy recommendations could be further broken down into planning proposals which are viable and implementable either in the short term or in the long term period. These proposals includes:

(1) Restriction of employment level in the central area can be done by discouraging the location of such land uses as whole sale shops, small scale workshops and manufacturing activities, petrol filling stations, etc which occupy a considerable portion of land in the central area, and they attract labour and heavy commercial traffic in the central area. Such activities should be located in some shopping centres like Westlands, Ngara, Adams Arcade, Parklands, Nairobi West etc.

We can also relocate some office blocks from the central area and locate them on the Nairobi Hill, along Thika and near the Airport.

(2) Dispersal of the industrial area can be achieved by opening up new industrial centres away from the present industrial area. We therefore recommend that new industrial sites to be opened in places like Dandora, Ruaraka, along Thika road to serve the population of the Eastlands and northern areas. Other industrial centres can be set up in places like Waithaka, Dagoretti and Kangemi. These new sites would reduce the traffic problems experienced in both the central and the industrial areas. It can be done by forcing any company wanting to expand or to open new firms in the central and industrial area to do so in these new sites.

(3) We recommend that the working hours should be staggered by one hour and especially the morning peak in order to reduce the traffic congestion, delays, rush and conflicts resulting in road accidents. The morning peak to be staggered by one hour from 7 a.m. to 9 a.m.. This can be done through an agreement with all employers for some of the big firms and Government offices to begin their daily work at 7 a.m. and other at 9 a.m.. This in turn would stagger the midday peak and the evening peak.

(4) We recommend that new road links to be opened up in the industrial area to the Eastlands. This could be located in Mbotela as a continuation of Nile Road (see map 5.1)

(5) In reducing the problem of mixed traffic in the central area we recommend that no heavy vehicle should be allowed in the central area between 7 a.m. and 9 a.m.

(6) We recommend that traffic lights be installed in the following junctions and intersections, Tom Mboya Street-River Road and Murang'a Road roundabout, Murang'a Road-Government Road, Murang'a Road Kipande Road, Race Course Road-Ngara Road-New Pumwani Road. Haile Selassie Avenue-Landhies Road-New Pumwani Road; Haile Selassie Avenue Government Road, Ronald Ngala Street- River Road, Uhuru Highway Langata Road, Uhuru Highway-Bunyala Road, Forest Road-Limuru Road-Parklands Road. Enterprise Road-Factory Road, Lusaka Road-Enterprise Road, Jogoo Road and Likoni Road etc in the next two years. Later other major junctions may be light controlled. see map 5.1.

(7) We recommend that pedestrian overhead bridges be constructed at following critical places - City Hall way junction with Uhuru Highway, Next to Kholja Mosque, Next to Haile Selassie Avenue-Landhies Road roundabout, next to Machakos bus station, at

Kaloleni and Doonholm on Jogoo Road, across Juja Road in Mathare Valley, and between Bunyala road and Lusaka road. See map 5.1. Other dangerous pedestrian crossings are next to junctions and roundabouts already recommended for traffic lights which will solve the problem of pedestrian crossings.

(8) We recommend that road safety education to be coordinated into a system that begins in the pre-primary school extending through all the education levels and grades ending with the driving school. This would provide road users with the awareness of the elements that are involved in the traffic complex.

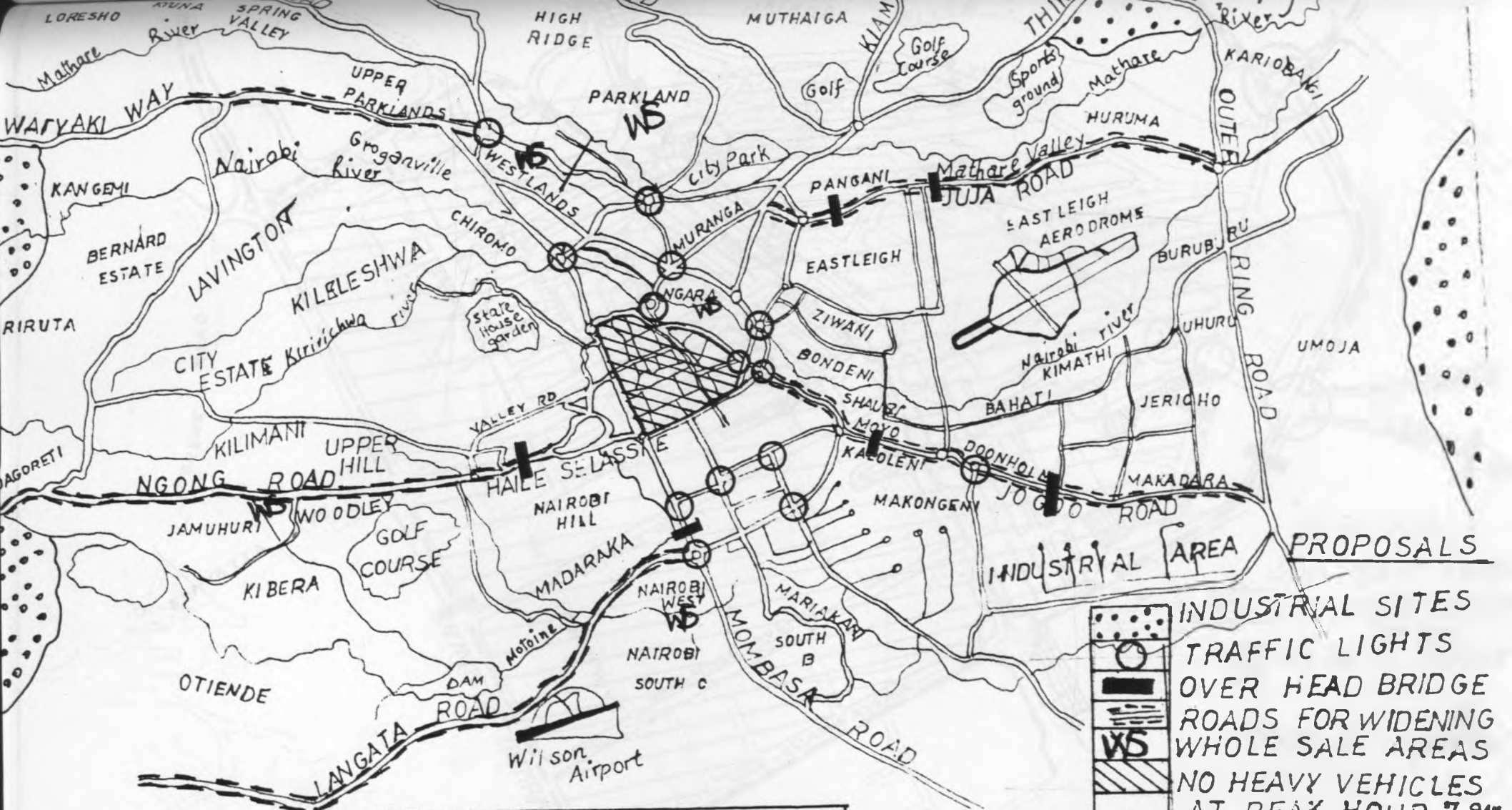
(9) We recommend that public transport should be well managed and organised, by establishing routes stops and terminus for matatus. Provide zones where matatus can be boarded in the city. We recommend that matatus operating along Ngong Road-Haile Selassie Avenue, Uhuru Highway-Lanqata or Bunyala and Enterprise road to be stopping around the Railway Headquarters. Those operating along Landhies, Jogoo Road, Race Course Road, Ngara Road should have their terminus at Hakati Road next to Kenya Bus Service Limited Station and along Temple Lane. Those operating along Uhuru Highway, - Waiyaki Way, Murang'a Road, Kipande Road and Limuru Road should have their terminus at the Murang'a Road big round about and around Kholja Mosque. These places are

quite accessible to the city centre and are free from heavy traffic.

(10) During peak hours we recommend city buses to avoid the central areas as much as possible, except those plying along University Way, Tom Mboya Street and Government Road. All others should follow from the north through New Pumwani Road, Haile Selassie Avenue, to Uhuru Highway. see map 5.1

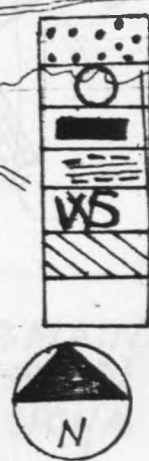
(11) We recommend that constant checks, to be carried out by traffic police in order to reduce the number of unroadworthy vehicles and cases of overloading and speeding.

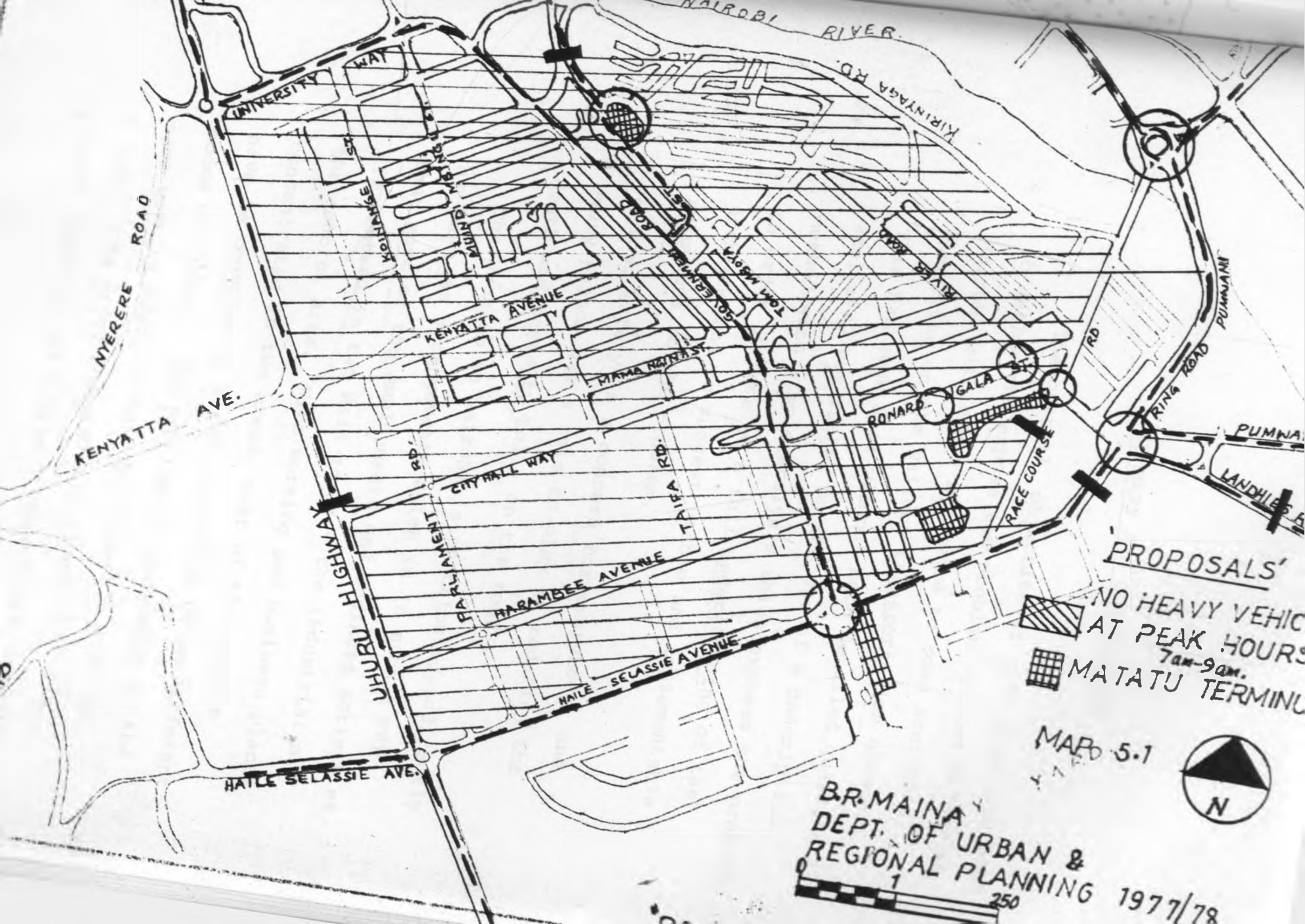
(12) We also recommend that stricter enforcement of laws be adopted with regular check ups and to impose severe punishments and penalties to anybody found violating any of the traffic regulations and rules.



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 1 3/4 1/2 1/4 0 1
 Scale 1:20,000.

MAP NO. 5.1





NYERERE ROAD

KENYATTA AVE.

UHURU HIGHWAY

HAILE SELASSIE AVE.

UNIVERSITY WAY

KHANTAKI ST.

KENYATTA AVENUE

CITY HALL WAY

HARAMBEE AVENUE

HAILE SELASSIE AVENUE

PANAFWAY RD.

TAIFA RD.

MAUNDI DRIVE

MAMA NGINA ST.

SPRING ROAD

HELMUTH ROAD

WIDEN WAY

GODFREY ROAD

RONARD NGALA ST.

RACE COURSE

KIRINYAGA RD.

RITA ROAD

PUMWANI

PUMWANI

LANDHILLS

PROPOSALS

NO HEAVY VEHICLES AT PEAK HOURS 7am-9am.
MATATU TERMINUS

MAR 5-1



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SUMMARY AND CONCLUSIONS

The overall objective of this study has been to define and expose the problem of road safety in Nairobi with close reference to road accidents occurring on the Nairobi transportation network. This has been done without much detailed quantitative analysis, but rather by the use of a descriptive method with simple analysis which exposes the problem in order to come to a full understanding of the problems and to suggest viable and implementable solutions to the problem.

Road safety is a concern for everybody, and every person has a role to play in reducing the death and casualty tolls on the roads.

The problem in Nairobi is contributed indirectly by land use arrangement; which is in such a way that most of the employments and business activities are centred in two main zones - the industrial and the central area. With working and business places concentrated in two areas, most of the workers have to converge in these two places using different modes of travel. The problem is aggravated by the same working hours in Nairobi between 8 a.m. and 5 p.m.. The major modes of travel are foot 44%, private vehicles 38% public transport 14%, cycling

2.6%. All these modes compete to use the restricted channels, and because of their mixed nature various conflicts arises which results in road accidents.

From the analysis it has been found that the casualties involves pedestrians, passengers, and drivers in order of severity and numbers. The major causes of accidents have been found to be human failures and errors which contribute over 85% of all the accidents. The most common types of accidents are those involving vehicles and pedestrians and vehicle-vehicles which indicate that these two modes need to be separated as much as possible.

Accident rates are found to increase as one draws nearer the activity centres and on the major arterial roads. It was also found that matatus and buses contribute greatly to the number of accidents reported in Nairobi and there is a need to re-organize the public transport system.

The study found that there is a need to apply some planning principles to ensure that safety especially for pedestrians is assured, and that drivers and other road users obey the traffic regulations and rules. There is need for proper traffic management in the city if smooth and convinient traffic flow is to be maintained on the roads.

The study has therefore recommended that the pedestrian mode of travel should be included in the overall transportation planning process and that the supremacy of the central and industrial areas should be reduced by decentralising through opening of other employment centres. This would reduce the traffic in these two areas and in turn reduce the conflicts causing road accidents. A system of traffic lights at intersections, overheadbridges were recommended.

SCOPE FOR FURTHER RESEARCH

This study has not by any means exhausted the research aspects of the road safety problems. Owing to limitations already stated the study has only tried to expose the problem of road safety in Nairobi and to offer broad solutions to the problem.

From all these, one may well conclude that more research is definitely needed on the following fields.

(1) The types of traffic management that could be applied in Nairobi in order to have smooth and co-ordinated traffic flows in the city streets.

(2) Research on pedestrian safety and the needs and conditions of pedestrians in each Geographical area before large programmes of standardization are initiated. This type of research should

include psychological and perpetual analysis and testing.

(3) Research on the most effective methods of promoting road safety education in a much wider frame is needed.

(4) A research on matatus and their contribution to public transport in Nairobi is needed.

PROBLEMS	POLICY RECOMMENDATIONS	PLANNING PROPOSALS
<p>1. Concentration of employ-ments and other activi-ties in the central and the industrial areas</p> <p>2. Problems of same working giving rise to peak hour congestions, delays and conflicts.</p>	<p>1. Provide for dispersal of industrial area</p> <p>2. Restrict employment levels in the central area.</p> <p>2. Stagger working hours</p>	<p>1. Areas around Dandora, Ruaraka Thika Road, Dagoretti, Kangemi and Waithaka.</p> <p>2. Locate whole sale shops, small scale workshops, etc in places like Adams Arcade, Westlands Ngara, Parklands, Nairobi West and Eastlands. Locate offices in places like along Thika Road, Nairobi Hill and the way to Embakasi.</p> <p>2. Especially morning peak from 7 a.m. - 9 a.m. by one hour.</p>

PROBLEMS	POLICY RECOMMENDATION	PLANNING PROPOSALS
<p>3. Problem intersections act as bottlenecks during the morning peak hour</p> <p>4. Problems of mixed traffic in the central area</p> <p>5. Problem of matatus and buses in the central area-matatus problems of lack of routes, stops and terminals.</p>	<p>3. Reduce congestion at various junctions</p> <p>4. Reduce problems of mixed traffic</p> <p>5. Manage and organize public transport.</p>	<p>3. Install traffic lights at Uhuru Highway - Bunyala Road, Uhuru Highway-Langata Road Enterprise Road-Factory Road, Enterprise Road-Lusaka Road, Haile Selassie Avenue-Landhies Road, Landhies-Ring Road Pumwani New Pumwani Road-Ngara Road-Race Course Road, Ronald Ngala Street-River Road, Murang'a Road-Limuru Road, Limuru Road-Forest Road-Parklands Road etc.</p> <p>4. No heavy vehicles to be allowed in the central area during the morning peak hours.</p> <p>5. Provide matatu terminus in the central area at Railway Headquarters, Hakati Road, Temple Lane, Kholja Mosque, and the big Murang'a Road roundabout</p> <p>- Buses to avoid central area at the peak hours except those passing along Government Road and Tom Mboya Street.</p>

PROBLEMS	POLICY RECOMMENDATIONS	PLANNING PROPOSALS
<p>6. Many vehicular and pedestrians conflicts</p> <p>-poor and inadequate pedestrian facilities</p> <p>7. Problems of narrow roads.</p> <p>8. Problems of negligence, misbehaviour and carelessness on the roads.</p> <p>9. Violation of traffic rules and regulations</p>	<p>6. Eliminate the conflicts between vehicular and pedestrian traffic</p> <p>-provide and improve pedestrian facilities.</p> <p>7. Widen the roads.</p> <p>8. Promote road safety education and propaganda</p> <p>9. Stricter enforcement of laws to be adopted.</p>	<p>6. Install pedestrian overhead bridges along Jogoo Road, Juja Road, Landhies Road, Race Course Road, and City Hall Way-Uhuru Highway Junction.</p> <p>- Other crossings will be served by traffic lights at junctions</p> <p>- Widen pavements, provide zebra crossings and tarmac or improve foot paths.</p> <p>7. Widen Waiyaki Way Jogoo Road, Landhies Road, Ngong Road, Juja Road and Langata Road, and provide dual carriage way or multiple lanes in these roads</p> <p>8. Co-ordinated system of road safety education from pre-primary school up, ending in driving school.</p> <p>9. Regular check ups by traffic police for cases of overloading, overspeeding, unlicensed, and uninsured vehicles etc.</p> <p>- Impose severe punishments and penalties to any offender of the traffic rules and regulations.</p>

APPENDIX I

THE GOVERNMENT POLICY ON ROAD SAFETY

The Governments' policy on road safety is well documented in the Traffic Act and the Transportation Licensing Act. These Acts aims at obtaining maximum safety on the roads by ensuring that all vehicles are licensed under the given safety conditions, that drivers observe given traffic regulations; that vehicles carry the right loads and that traffic signs are observed. In this section only the relevant sections of the Traffic Act and the Transportation Licensing Act are quoted and especially the sections which are often violated and as a result cause road accidents.

THE TRAFFIC ACT - CHAPTER 403

(Revised Edition 1962)

Part II 6(1) of this Act spells out the procedure to be observed in registration of vehicles - "No person shall possess a motor vehicle or trailer, other than a vehicle exempted from this part, unless such vehicle is registered under this Act."

Section 6(3) "A Licensing Officer, before he registers any motor vehicle or trailer, may verify all the particulars in the form of application, and may if he thinks fit, send the vehicle to an inspector

for examination in order to satisfy himself that the vehicle is in fit and proper conditions for the purpose for which it is intended to be used and to conform in all respects to the provisions of this Act." This section of the Act reads very pertinent as far as the licensing of the motor vehicles which are eventually turned into matatus use are concerned. The reason being that an observer of some of the matatus on the roads doubts whether the provisions of the section are closely adhered to since it is noticeable that some of the matatus could be unroadworthy.

Section 6(4)... to register any commercial vehicle or trailer, the road capacity of which has not been declared by the manufacturer of the chassis, a licensing officer shall not register the vehicle or trailer until an inspector has determined its load capacity, and such determination shall be final." The relevance of this section to the licensing and operation of the country bus transportation in the country is its application as far as it attempts to restrict the overloading of these passenger vehicles. It is not uncommon to observe severe cases of overloading in matatus and country buses. This endangers the safety of the passengers especially in the case of the uninsured ones, in the event of an accident. However the section fully states that all commercial vehicles must have their load capacity established and in the case of public service overloading

above the determined capacity; it is fragrant violation of this section of the law. Matatu or country bus operators are no exemption from this.

Part XI - Public Service Vehicles (P.S.V.)

section 95(e) "No public service licence (T.L.B.) shall be issued in respect of any motor vehicle which is intended to be used as a taxi-cab unless such a vehicle has been registered as a taxi-cab under by-laws in force in a municipality or township." Matatu cannot certainly be regarded as taxi-cabs according to the definition of this section. In fact matatus fall in a class of their own since they do not conform with the existing Nairobi City Council by laws governing taxi-cabs. That is why over the years they have not been taken into consideration by the City Council in its planning process e.g., no proper parking has been provided for them within the City. But the altitude is changing now as we have the old Machakos Bus Station and the area next to Kenya Bus Station reserved for matatu parking.

Section 100(1) "The registrar shall in respect of any public service vehicle determine the maximum number of passengers whether sitting or standing, and the weight of baggage or goods allowed to be carried at any time on such a vehicle or any vehicle of a similar class or description." The aim of this clause is further to enhance the safety of any

would be passengers on any vehicle that is meant for the purpose of passenger transportation. This clause also states that "No vehicle shall be used on a road if it is loaded in such a manner as to make it a danger to other persons using the road or to persons travelling on the vehicle, and should any load or part of the load fall from any vehicle on to a road such fact shall be prima facie evidence that the vehicle was loaded in a dangerous manner until the contrary is proved to be the satisfaction of the court." For the purpose of this section persons travelling on a vehicle shall be deemed to be part of the load.

Section 70(1) Subject to and in conformity with general or other directions as may be given by the Minister of a local authority may cause or permit traffic signs to be put on or near a road.

(2) Traffic signs shall be of the prescribed size, colour and type except where the Minister authorizes the erection or retention of a sign of another character.

(3) After the commencement of this Ordinance no traffic sign shall be placed on or near any road except under and in accordance with the preceding provisions of this section.

Provided that:-

(i) Nothing in this subsection shall apply to any notice or respect to the use of a bridge.

(ii) A highway authority or police officer or or above the rank of Inspector may authorize the erection of a traffic sign for any special purpose for a period not exceeding seven days and such traffic sign shall be deemed to be lawful even though it does not conform to the requirements of this section.

(4) All traffic signs shall be deemed to have been lawfully erected until the contrary is proved.

Many times the road users do not observe the road signs and others do not know how to use the traffic signs and as a result contribute to road accidents. All the traffic signs and their meaning are contained in the Traffic Code of Kenya and their specifications are recorded in the Road traffic manuals volumes one and two.

PART V - DRIVING AND OTHER OFFENCES

RELATING TO THE USE OF VEHICLES ON ROADS

Speed of Motor Vehicles

42: (1) No person shall drive, or being the owner or person in charge of a vehicle, cause or permit any other person to drive, a vehicle on a road at a speed greater than the speed specified in the second schedules to this Ordinance as the maximum

speed for that class of vehicle.

(2) Every vehicle which is subject to a speed limit under subsection (1) of this section shall have painted or affixed to the rear thereof, as close to the rear number plate as possible, and in such a manner as to be conspicuous to any person within twenty five feet of the rear of the vehicle, a mark in the prescribed form indicating its maximum speed.

(3) No person shall drive, or being the owner or person in charge of a vehicle, cause or permit any other person to drive any vehicle at a speed exceeding thirty miles per hour on any road within the boundaries of any trading centre, township or municipality.

Reckless driving:

47:(1) Any person who drives a motor vehicle on a road recklessly, or at a speed or in a manner which is dangerous to the public having regard to all the circumstances of the case, including the nature, condition and use of the road and the amount of traffic which is actually at the time or which might reasonably be expected to be on the road shall be guilty of an offence and liable to a fine not exceeding two thousand shillings or to imprisonment for a term not exceeding six months or to both such fine and imprisonment, and the court shall order particulars of any such conviction to be endorsed on any driving license held

by the person convicted.

(2) On a second or subsequent conviction for reckless or dangerous driving, the court shall exercise the power conferred by Part VIII of this Ordinance of ordering that the offender shall be disqualified for holding or obtaining a driving licence for such period as it thinks fit, unless the court having regard to the lapse of time since the date of the previous or last previous conviction or for any other special reason think fit to order otherwise but this provision shall not be construed as affecting the right of the court to exercise the power aforesaid on a first conviction.

(3) Where a person is convicted of aiding, abetting counselling, procuring or inciting the commission of an offence under this section, and it is proved that he was present in the vehicle at the time the offence of which he is convicted shall, for the purpose of the provisions of this Ordinance relating to disqualification for holding or obtaining driving licences be deemed to be an offence in connection with the driving of a motor vehicle.

Careless Driving

49: (1) Any person who drive a motor vehicle on a road without due care and attention or without reasonable consideration for other persons using the road shall be guilty of an offence and liable for a first offence to a fine not exceeding one thousand shillings and for a second or subsequent offence to a fine not

exceeding one thousand shillings or to imprisonment for a term not exceeding three months.

(2) A first or second conviction for an offence under this section shall not render the offender liable to be disqualified for holding or obtaining a licence for a longer period than in the case of a first conviction, one month, or in the case of a second conviction three months.

TRANSPORTATION LICENSING ACT 404

(Revised 1962)

Part II 4(1) " No person shall except under and in accordance with the terms of a licence (P.S.V.) use a motor vehicle on a road for the carriage of goods or people for hire, or reward in connection with any trade or business."

Section 4(6) "The Minister (in charge of Transportation may, by a notice in the Gazette (Kenya Gazette) except any person or class of persons or any vehicle or class of vehicle from all the provisions of this Act."

Section 4(1) quoted above states that for any vehicle to operate as passenger carrier, it must first obtain an operating licence. In the case of the buses and matatus, these are particularly known as T.L.B. licences. Further down, section 4(6) of the same Act empowers the Minister in charge of transportation to exempt some operations from

obtaining such licences. This is what happened in June 1973, when the Minister issued Legal Notice No. 59 in supplement Gazette issue No. 27. This notice allowed any vehicle owner whether private or public of any class of ownership except Government vehicles to operate as a passenger carrier if he so desired provided his vehicle is below 3 tons tare weight or its passenger seating capacity is 15 seating or below.

The above official legal document ushered a new phase into the legal status of the hitherto illegal trade, officially known as pirate taxes. Under the newly created atmosphere by the June 1973 Gazette notice, all that became necessary was acquisition of a vehicle that was not more than 3 tons tare weight, a road licence and then the person could operate a passenger transport. However, these operators who wished to operate vehicles above the 3 tons limit were required to adhere with the licensing Act. All the country buses fall within the latter category. Beside the free operation permission the matatu were still required to observe the sections of the Traffic Act as regards roadworthiness of the vehicles.

The allowance of free operation has resulted in increased numbers of matatus on the roads. These range from the conventional inter-urban Peugeot service to the less conventional pick-up vans and

coaches which are predominant outside the city. The impact of the free operation has even enabled some hitherto licenced inter-urban matatu operators to drop applying for a P.S.V. licence as was the case before and now they operate just like any other private matatu operators.

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