PUBLIC TRANSPORTATION SYSTEM IN ILORIN
(STUDIES, PROPOSALS AND PLANNING)

M.Sc. (U.R.P.) THESIS

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DEDICATED TO MY DEAR MOTHER

"The growth of megalopolis owes much to the automobile, but highway traffic jams are beginning to strangle city activities and to take the pleasure and efficiency out of driving a car. At the same time, cars contribute to the ruination of other means of transportation, made more necessary than ever by the massive tidal currents of people and goods .... The highways and the automobiles have been a great help in alleviating for a time the flow of traffic through the crowding of megalopolis. Now, however, a degree of saturation has been reached that calls for new solutions."

- Jean Gottman.

ACKNOWLEDGEMENTS

This thesis is a part fulfilment of a two-year professional training in Urban and Regional Planning. I am grateful to the Kwara State Government for giving me an opportunity to participate in the training programme. Also, I express my profound gratitude to Officials of Ministry of Works, Lands and Housing, Ilorin for their co-operation throughout the period of my training.

My special thanks are due to my dear mother - Madam C. A. Megbolugbe - for her continued moral and financial support.

I owe a world of gratitude to Dr. Olusegun Adebisi of Civil Engineering Department, Ahmadu Bello University, Zaria for helping to reduce this thesis by half and also his many useful suggestions; Professor Romaya of Institute of Planning Studies, Nothingham for his advice and encouragement; H. O. James (Miss) of Department of Biochemistry, Ahmadu Bello University, Zaria, for correcting all the typographical errors and also her moral support and Mr. G. P. Khana-my supervisor--and other members of the Department for their critical appraisal of the essence of the study and assisting in the graphic presentation of the thesis materials.

I praise God Almighty for His Grace that is more than sufficient for my needs.

ISAAC F. MEGBOLUGBE

ZARIA

JUNE, 1979

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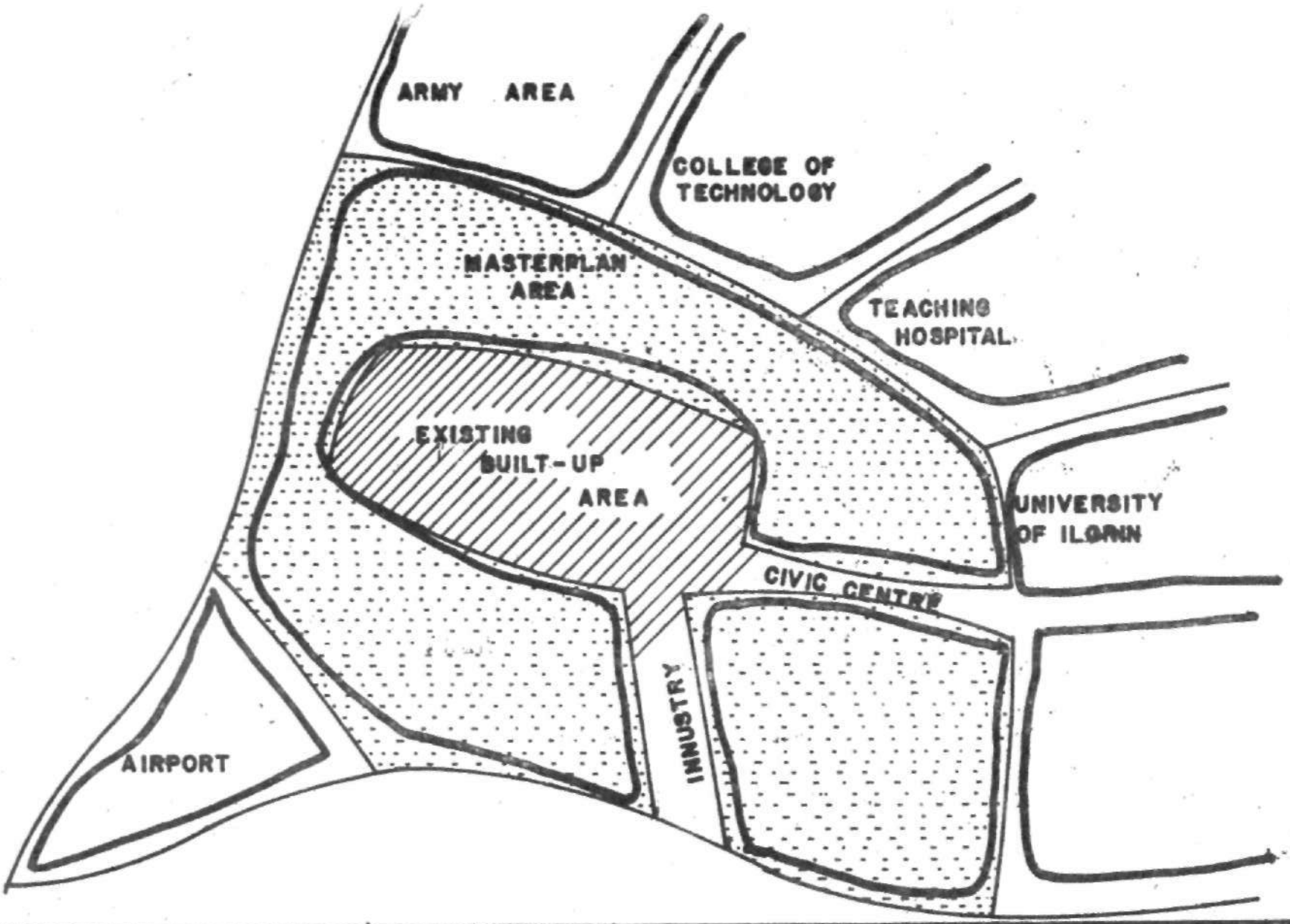
CHAPTER ONE

INTRODUCTION

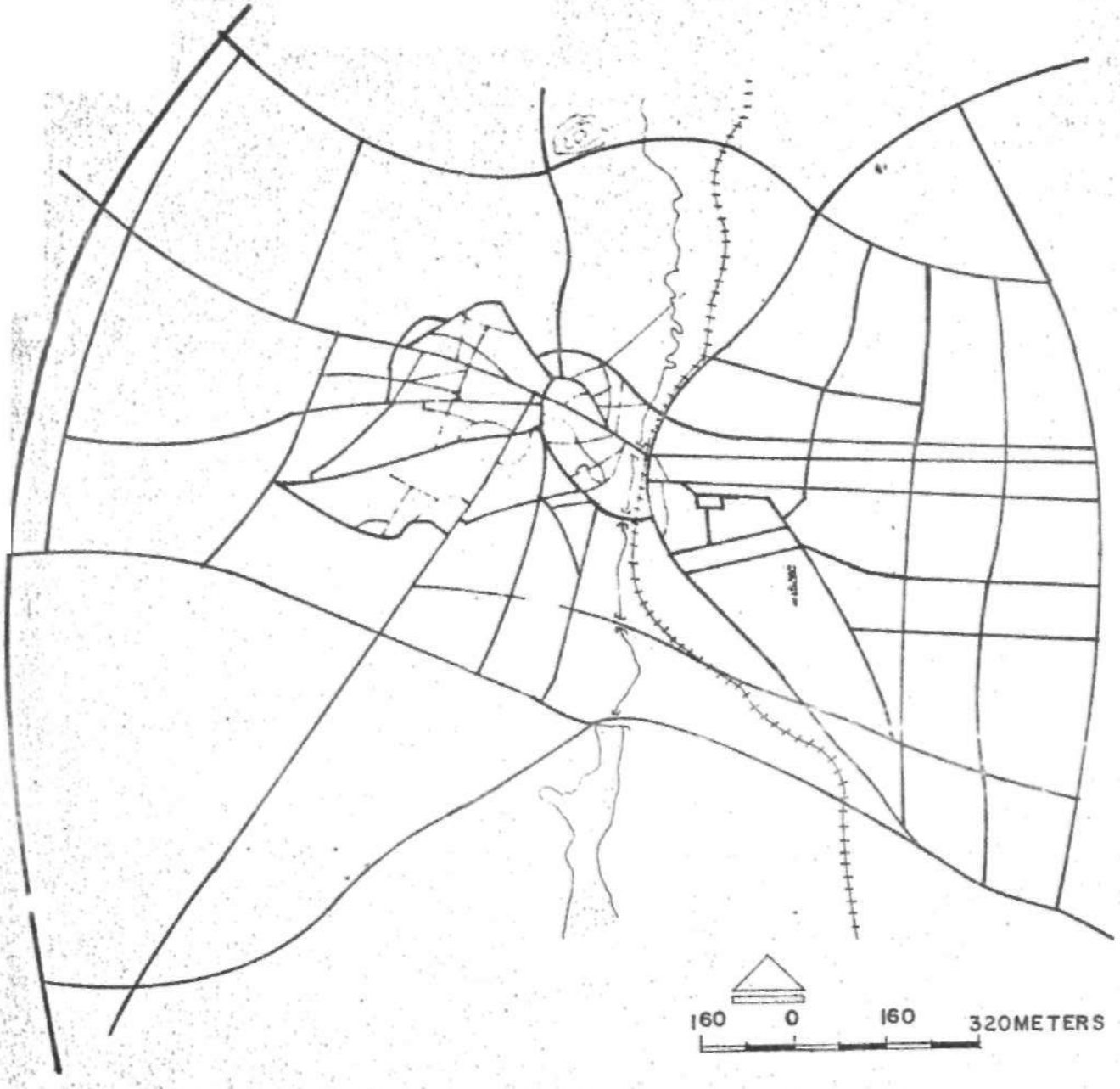
1.10 RESEARCH JUSTIFICATION

There is an existing masterplan for Ilorin prepared by the Doxiadis Associates in 1976 and which was revised in 1979 by the Town Planning Division of Ministry of Works, Land and Housing, Ilorin. The general land use proposal in the revised masterplan is shown in fig. 1.1. The concept for the distribution of main functions in the Ilorin masterplan is illustrated by Fig. 1.2.

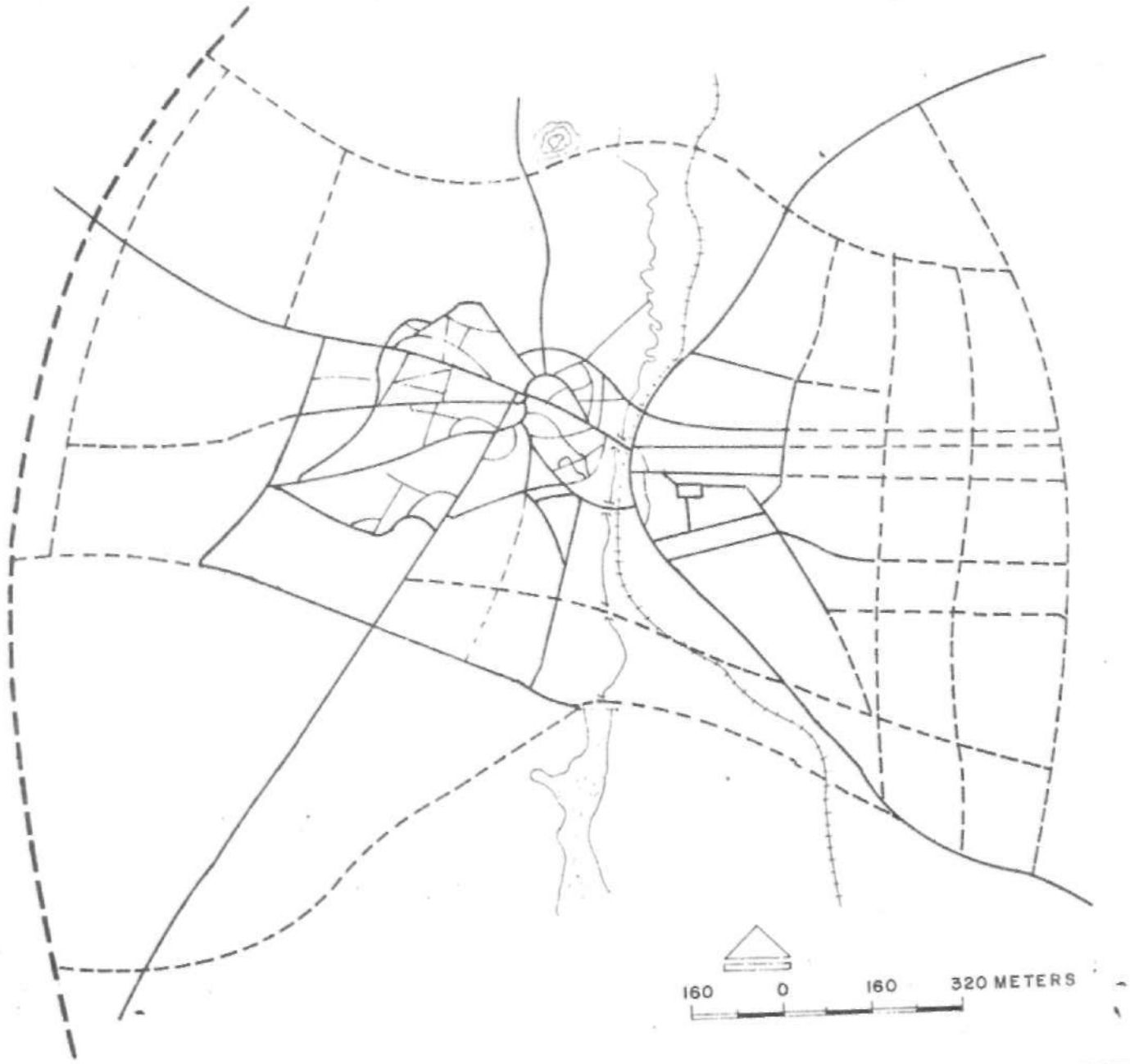
Within the existing built-up area, the general pattern of land use is not changed in the masterplan. The new residential areas are located around the existing built-up area except for existing villages that have been absorbed into the masterplan that are found at the periphery of the masterplan area. Examples of such villages are Gama; Shao and Fate. Educational, industrial, commercial and other uses that tend to generate much traffic are located at the periphery of the masterplan area. Such land uses include Kwara State College of Technology, University of Ilorin, Army Cantonment, International Airport, Industrial areas etc. Furthermore, basic road network structure within the built-up area is incorporated into the revised road network proposal as shown in Fig. 1.3. All the new roads proposed within the built-up area by the Doxiadis Associates (1976) have been rejected in the revised plan. Instead, few of the existing roads are upgraded and



ILORIN	LOCATION OF MAIN FUNCTIONS		U.R.P. DEPT ISAAC MEGBOLUGBE A.B.U. ZARIA	FIG No 1·2	DWGN By megbolugbe Mac 1978/79



ILORIN	REVISED MASTERPLAN ROAD NETWORK	SOURCES	U.R.P. DEPT	FIG No	DWGN By
		ILORIN MASTERPLAN FIELD WORK	A.B.U.ZAR.	1·3	ISAAC MEGBOLUGBE May 1978/79



ILORIN

EXISTING AND PLANNED ROADS

SOURCES	U.R.P.DEPT	FIG No	DWGN By
ILORIN MASTERPLAN FIELD WORK	A.B.U. ZAR.	1·4	ISAAC NEGBOLUGBE Msc 1978/79

car. The result of these different circumstances is that while cars are many in U.S. and public transport a bit costly, the reverse is the case in Europe. The approach of various countries to the role of public transport is not consistent either in developing countries. In Asian countries, public transport is favoured while in Africa the private car seems to be having the priority. In Nigeria, for instance, most of her cities are plagued with automotive congestion due principally to too many vehicles on too few roads. Ilorin is one of such Nigerian towns. Thus, the need for an efficient public transportation within the town can not be over emphasized in light of the traffic congestion. The only way to reduce the number of vehicles on the road is through a priority development of public transport.

Unfortunately, the least understood phase of traffic analysis at the present time even in developed countries is that of modal choice. However, if the most efficient and economic balance between the public and private sectors of any urban transportation system is to be achieved, then the problem of modal choice and the factors which motivate this choice must be fully understood. Once this situation is achieved, then a method can be devised for assigning the total transportation demand in any urban area to the various competitive systems in a transportation system. This will result in accurate estimates of demands for the detailed design and development of the systems. Also, if the factors which motivate modal choice are well understood,

policies can be developed.

Finally, a research aimed at studying the existing transportation system with a view to removing the common strain now associated with travels within Ilorin town cannot be said to be at variance with the general yearnings of the political and administrative hierachy to make life more convinient and abundant for the masses.

1.20 AIMS AND OBJECTIVES OF THE RESEARCH

The research is aimed at:

(i) attempting to investigate the nature of existing transportation system in Ilorin urban area;

(ii) establishing a balanced system composed of public transport and private cars in an efficient, economic, convinient and safe way.

The broad aims can be achieved by working towards the realization of the following objectives:

(i) understanding the nature of the existing relationship between various kinds of development and the demands for movement that they generate;

(ii) estimating the existing level of travel demand;

(iii) forecasting the expected level of travel demand within the context of Ilorin masterplan land use proposals;

(iv) investigating the problems surrounding the viability and operation of city bus service system at Ilorin and planning for an adequate and efficient

system;

(v) examining the problems and prospects of existing employers' transport system otherwise known as staff bus service system;

(vi) examining the nature of taxi service operations with a view to improve them;

(vii) concluding the study by rationalising a strategy for a priority development of an integrated and comprehensive public transportation system within the state.

1.30 STATEMENT OF THE RESEARCH PROBLEM:

A research statement helps in the operationalisation of a research problem so that one can clearly proceed with the technical part of the research - type of data, selection of data collection techniques, data analysis, etc.

This research statement has four main elements:-

(a) the question to be answered or hypothesis to be tested;

(b) methodological purpose of the study;

(c) practical uses of the study and

(d) the principal method to be employed in the study.

First the questions to be answered by the current research include the following:

(i) How much is the volume of traffic at Ilorin in 1978?

(ii) How are they distributed, that is, what is the travel demand pattern?

(iii) How far do the present transport facilities and services satisfy the level of present travel demand?

(iv) What is the travel demand level and pattern like by 1985 on the basis of Ilorin masterplan proposals?

(v) How will this travel demand level and pattern be met?

(vi) What is the existing nature of the transport situation?

Second, a descriptive methodological purpose will be adopted. This is because the transport, economic, population and land use phenomena in urban areas are fairly understood. What is not known at Ilorin is the size and distribution of the variables that influences travel demand pattern being investigated.

Third, there are transport proposals contained in an existing masterplan for Ilorin. The findings of this study will be used mainly for program planning and policy implementation. The object of the research in this direction is to determine the appropriateness of various planning proposals available in light of the prevailing conditions at Ilorin.

Fourth, though we are interested in the entire population of Ilorin only few characteristics of the population are relevant to the understanding of travel demand pattern. Interview Questionnaire Survey method has been selected and only a sample of the study population are studied.

1.40 SCOPE AND LIMITATION OF THE RESEARCH

The scope of urban transportation problems is quite wide and varied. Urban transportation problems vary from road geometrics through highway planning and financing to transport mode co-ordination and traffic management. This study hopes to concentrate on the movement of people within Ilorin alone. The study shall limit its detailed examination to various public transportation systems.

The urban transportation system may be classified into two categories on the basis of use to which the modes are put:

(i) private urban transportation system;

(ii) public urban transportation system.

Private urban transportation involves the following: walking; cycling; cars; etc. while public urban transportation system covers the following:

(i) Mass rapid transist systems:

These are transport technologies that operate on fixed guideways, have fixed on-line station locations, fixed schedules and are mostly well-suited for corridors with heavy travel-demands. Examples are the commuter trains; undergrounds, etc.

(ii) Personal rapid transist systems:

These are transport technologies that operate on fixed guideways, have fixed off-line station locations and may have flexible vehicle routing and schedules.

(iii) Bus systems:

These are transport systems that use buses that may have a range of passenger capacities and performance

characteristics and may operate on fixed routes with fixed schedules or may be flexibly routed and the schedule may be demanded responsive.

(iv) Automobile system:

These are transport systems that use cars that may have a range of passenger capacities and performance characteristics and may operate on fixed routes with fixed schedules or may be flexibly routed.

This study intends to focus only on buses and cars. Other linehaul systems as described in the last paragraph will not be considered. This is not only because bus and automobile systems have greater prospects in developing countries but also for the following reasons:

(i) The infrastructural base of rapid transist systems cost much time and money to build and only very few cities even in the developed countries can show sufficient flows of movement to justify investment in them.

(ii) Given the present state of technology, some kind of motorized transport on the surface will continue to be the practical transit solution. It is therefore only too reasonably to concentrate on how these systems - bus and taxi - can be made more functional.

(iii) The manpower required to manage these technologies are lacking in the developing countries and there is even the problem of safety of complex control systems.

Research studies in urban transportation problems are as scarce as the paucity of comprehensive urban data

in Nigeria. This limits the comparative slant of survey findings in this study.

The sampling fraction for the home-based interview survey was reduced to two per cent because of financial and manpower constraints.

The study does not intend to undertake an evaluation of the planning programmes that will be proposed neither shall it consider their costing. However, a general institutional framework for the policy implementation is investigated and streamlined to indicate the administrative and executive profiles of programme of proposals.

1.50 THE STRUCTURE OF THE THESIS

The thesis is divided into three main parts of seven chapters, but concluded by a short chapter rationalising a strategy for a priority development of public transport in Kwara State.

The first part deals with general introduction to the study in three chapters. The first chapter deals with the research justification, aims and objectives of the research, statement of the research problem and scope and limitations of the research. The second chapter describes the characteristics of the study area while the third chapter discusses the methodology of the research.

The second part is concerned with survey of existing conditions; analysis of data and forecasting the travel demand pattern. The second part consists of two chapters. The first chapter deals with the process of travel demand analysis

and the second chapter summarises highlights of the survey findings on existing transport situation in Ilorin.

The third part contains two chapters also. The first of the chapters discusses the programme of planning proposals while the second chapter suggests few guidelines for plan implementation.

The last chapter of the thesis - chapter eight - is not a summary of the main findings already discussed in the main body of the thesis, but a brief argument on why public transportation system deserves a priority attention from policy makers and the public alike.

CHAPTER TWO

CHARACTERISTICS OF THE STUDY AREA

2.10 INTRODUCTION

Ilorin, which is the study area, came to the limelight of Nigerian history in 1810 when it became the capital of the Fulani Jihadists and subsequently became headquarters of Ilorin Emirate.

Territorially, Ilorin town has been growing since 1900. However, since 1968 when the town became the capital city for the newly created Kwara State, the growth rate has increased tremendously. As a result of its sudden change in status, Ilorin became a melting point for most civil servants of the state origin.

The tempo of the growth was reinforced by the systematic concentration of State and Federal Government Project within Ilorin urban area. Ilorin, now has within its borders an International Airport, a University, a College of Technology; a School of Nursing; a Motor Assembly Plant, etc.

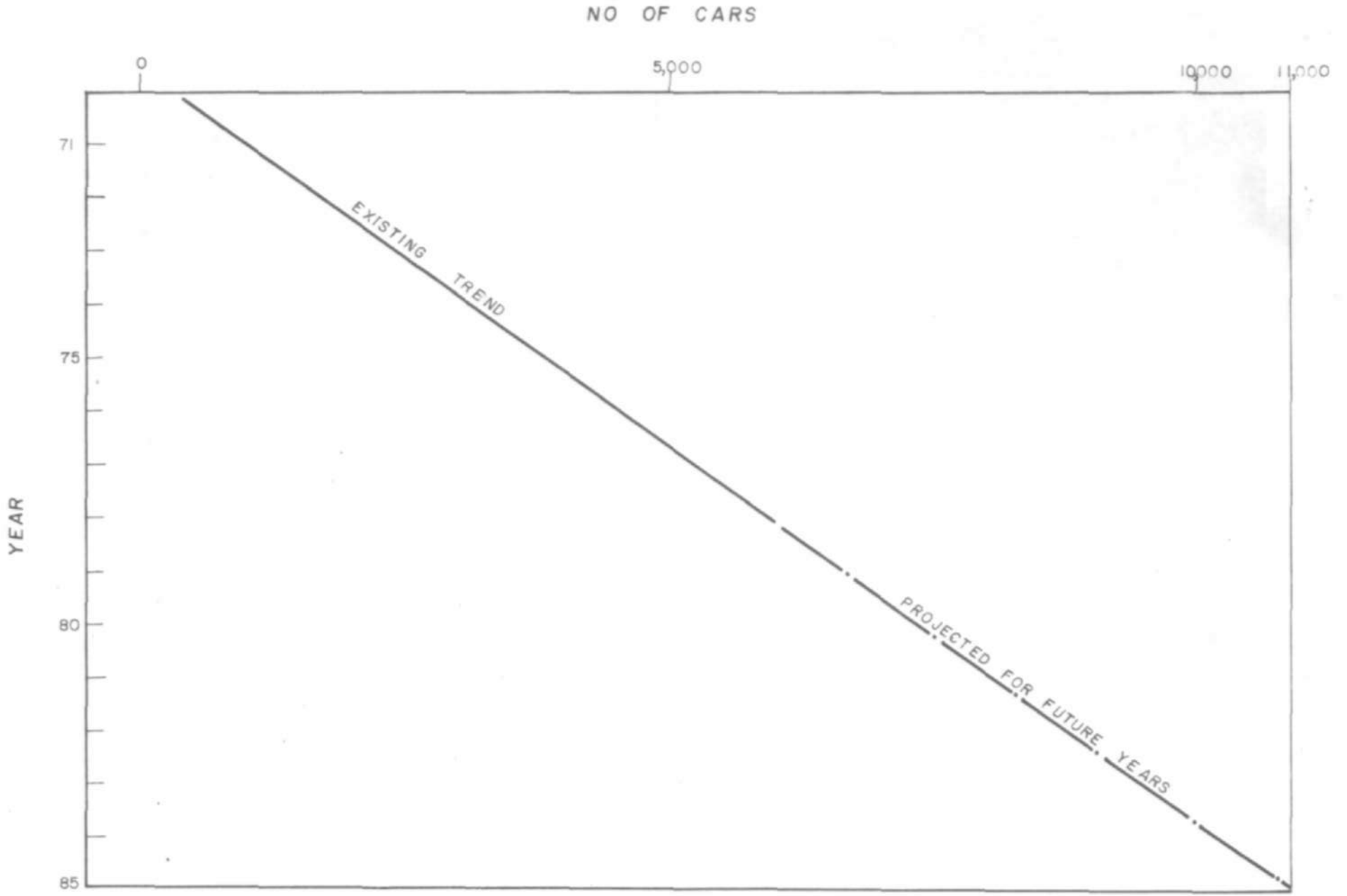
The demographic resultant of the processes described in the preceeding paragraphs has been quite dramatic too with a population figure of 208,546 in 1963[1] increasing to an estimated size of 300,000[2] in 1974 and to above 400,000 in 1978[3]

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1 Population Census of Nigeria (1963)

2 Ilorin Masterplan Report (1976)

3 Field Work Survey Findings (1978)

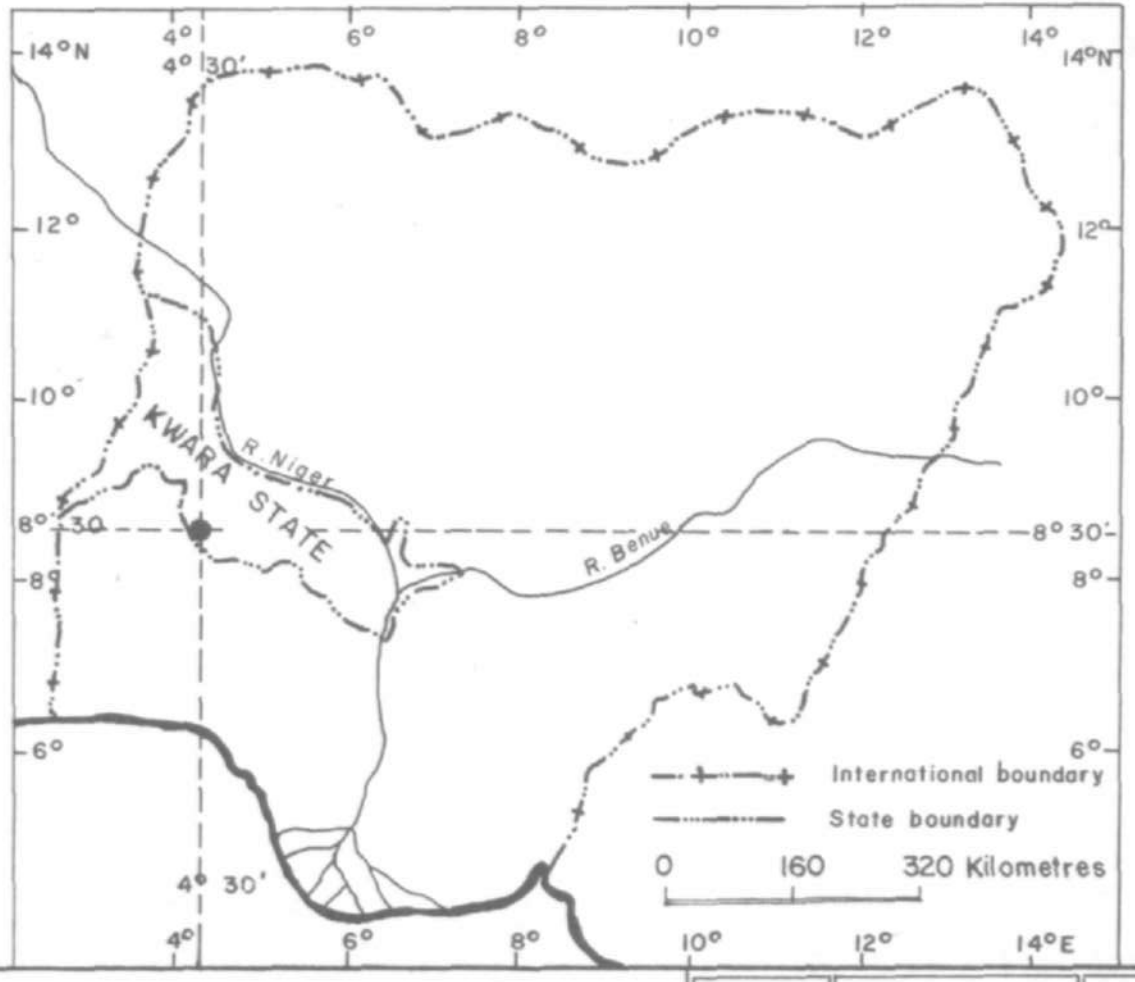


ILORIN	GROWTH OF CAR OWNERSHIP		U.R.P. DEPT. A. B. U. ZARIA	FIG No 2·1	DWGN By isaac megbolube Msc. 1978/

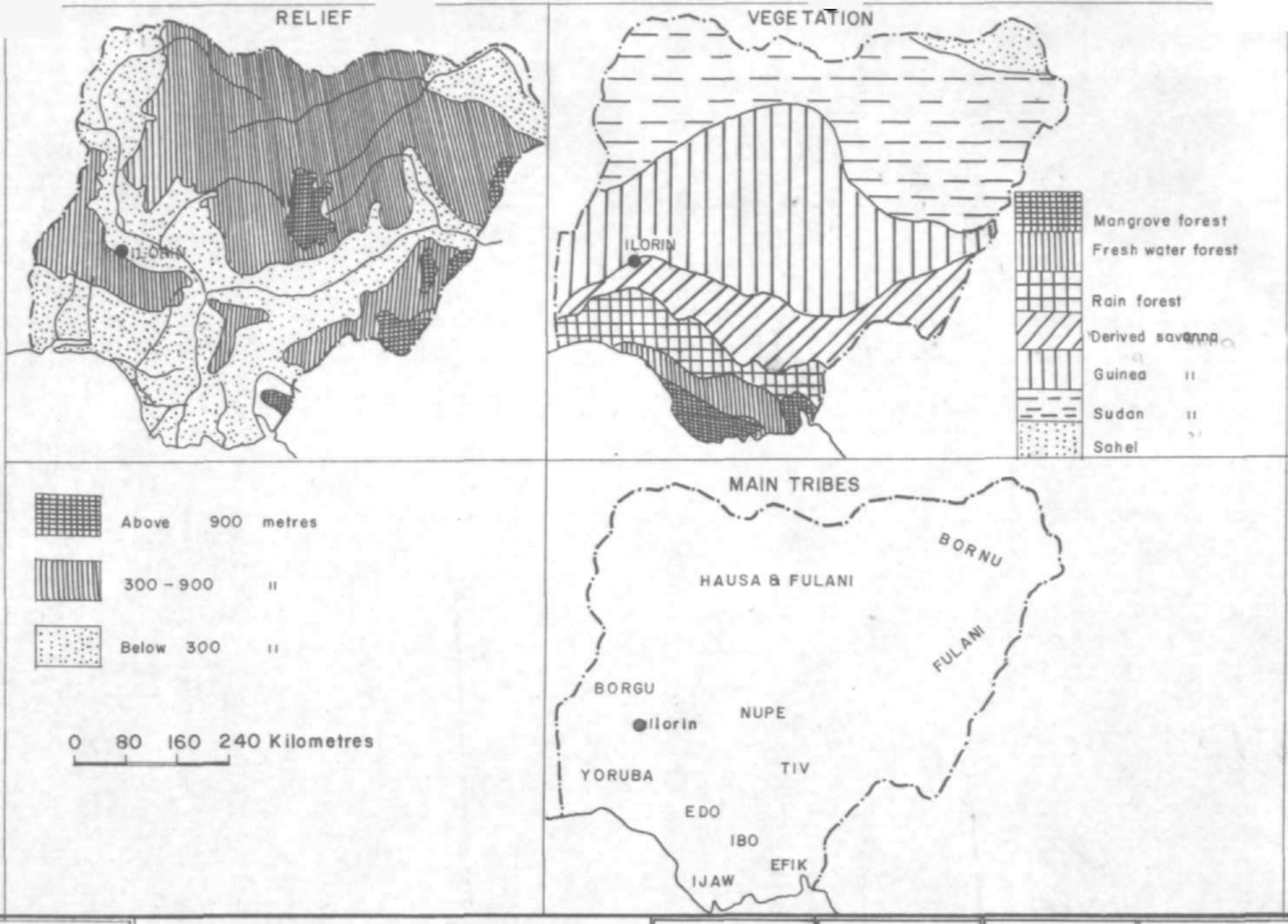
With the oil boom in the seventies, there was a spate of emergency contractors and the residents of Ilorin had a fairly befitting share in the general wind of economic prosperity that blew across the country. There was an unprecedented increase in the rate of car ownership and use within Ilorin urban area. The annual growth of car ownership in Ilorin based on information collected from Vehicle Licensing Office between 1971 and 1978 is illustrated in Fig 2.1. The existing trend is projected to 1985 and a total of 11,000 cars are expected to be owned within the town. Even, if accident and breakdown vehicles are adjusted for, the continuation of existing trend is still not satisfactory.

The establishment and successful implementation of the small scale industry loan scheme in 1971 led to the exodus of many professionals from the public service and a compensating increase in the number of small scale industrial and commercial firms. There was a 250 per cent increase in such type of firms between 1970 and 1976[3]. There was an accompanying increase in job opportunities and a further increase in car ownership and use.

Today, Ilorin is faced with the problem of automotive congestion, which is not only a result of the boom in car ownership and use but also a consequence of insufficient and inefficient operation of public transport. The public transportation system in Ilorin has witnessed a number of changes since the town became a state headquarters:



ILORIN	LOCATION MAP	Scale	U.R.P. DEPT A. B.U, ZARIA	FIG No 2.2	DWGN By isaac megbolugbe Msc 1978/79



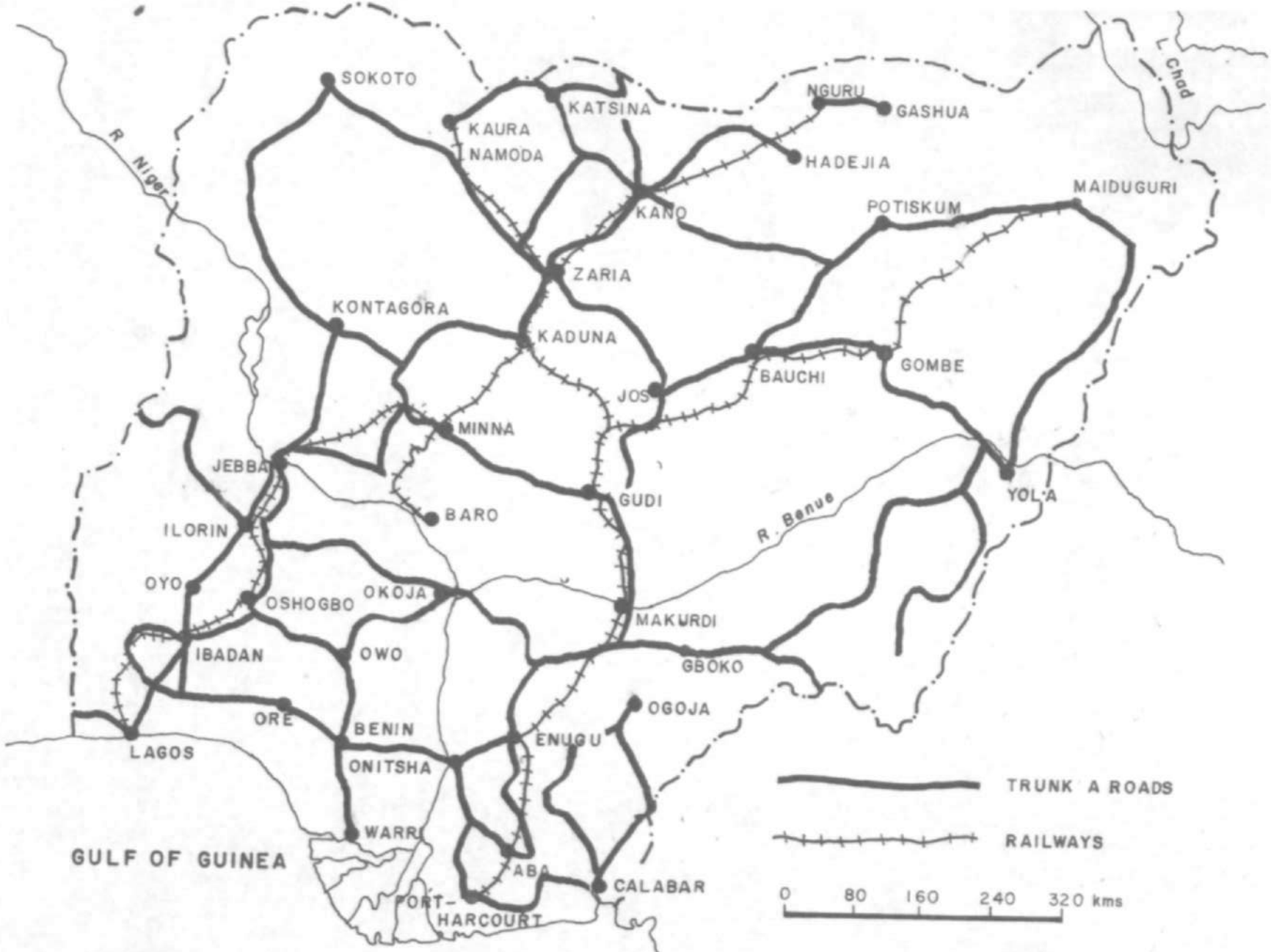
ILORIN	ENVIROMENTAL POSITION		U.R.P. DEPT. A. B.U, ZARIA	FIG No 2·3	DWGN By isaac megbolugbe Msc 1978/79

There were less than about two hundred taxis in Ilorin before 1967. There was hardly a mini-bus operating, towards the end of the year 1967, however, the number of taxis had increased significantly and a few mini-buses began to appear. At that time, both taxi and mini-buses serviced most routes, but traffic congestion had become prevalent on Emir's road and Muritala way. Mini-buses started to limit their services to those routes where traffic hold-ups were minimal. These mini-buses ceased operating in 1975 shortly after the establishment of Kwara State Transport Corporation. This was because the newly established Transport Company introduced a city bus service. For a number of reasons, the city-bus service deteriorated beyond tolerable limits afterwards. The mini-buses then came back in full swing and this time in larger numbers. The number of taxis operating within Ilorin has increased too - resulting in traffic hold-ups on most routes.

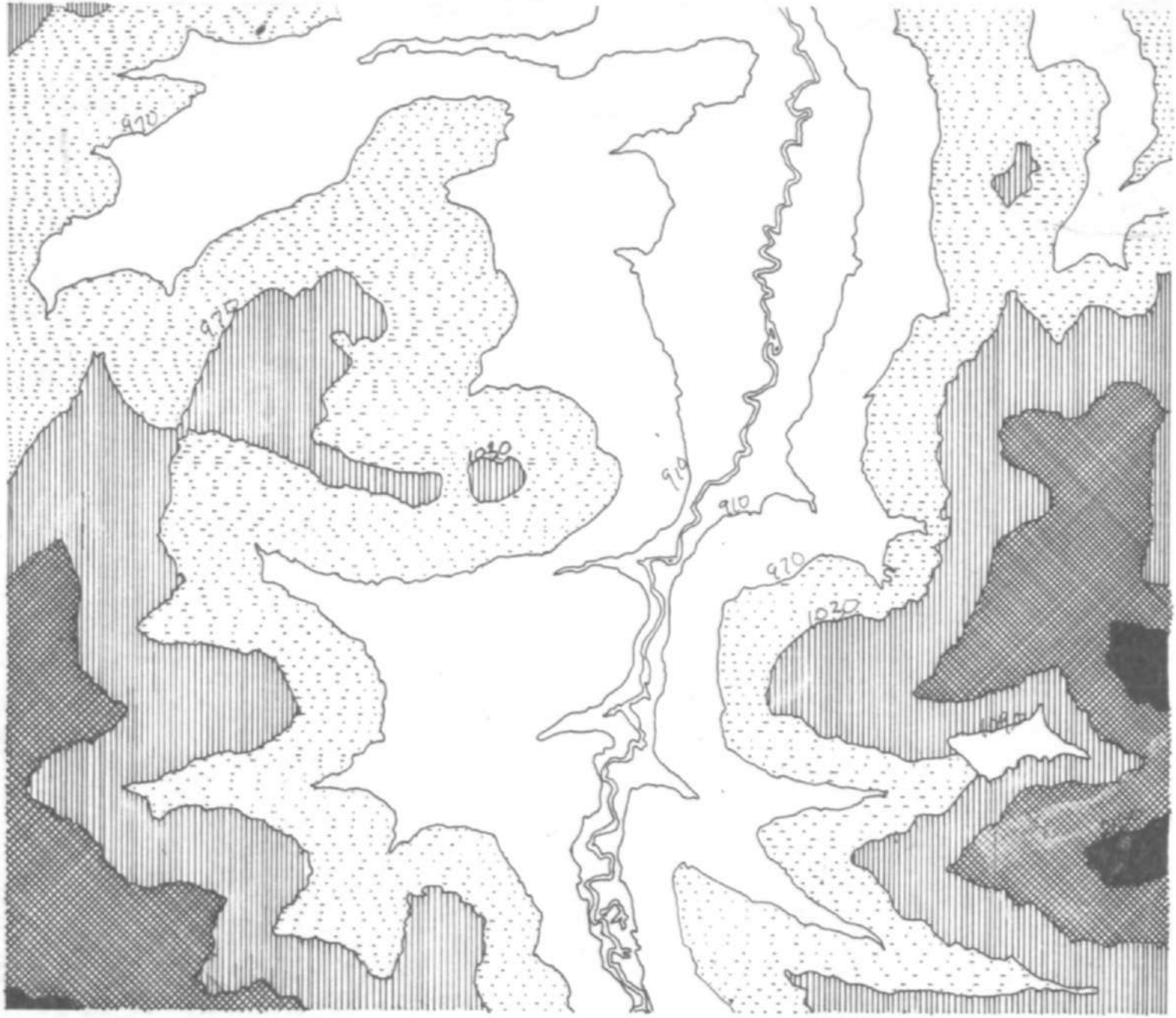
2.20 GEOGRAPHICAL SETTING

2.21 Location

Ilorin is situated on latitude 8^{o} 26' W and longitude 4^{o}E (Fig 2.2). It lies on the northern margin of Yoruba Plateau which covers one-third of south-western Nigeria. It lies in between the southern rain forest and the northern sudan savanna - a position that is commonly referred to as the middle belt (Fig. 2.3).



NIGERIA	MAIN LINES OF COMMUNICATION		U.R.P. DEPT A.B.U. ZARIA	FIG No 2·4	DWGN By isaac megbolugbe Msc 1978/79



ILORIN	RELIEF MAP		URP DEPT. ABU ZARIA	FIG No. 2.5	megbolugbe

Ilorin is a frontier town between the Hausa-Fulani cultures of the north, to which it has had political and religious affiliation since the early parts of the nineteeth century, and the Yoruba culture of the south from where her cultural background took root. The environmental position of Ilorin is shown in Fig 2.3.

Her geographical and cultural juxtaposition is reinforced by her transportation modal position on north-south and the west-east nation-wide overhead lines of communication as presented in Fig 2.4.

The geographical position of Ilorin, lies political and economic importance along with varied functional connections she has with many of Nigerian main urban centres especially those located in the south-western Nigeria, makes her an effective and dynamic element in the emerging urban systems of Nigeria.

2.22 Physical Features

(i) Relief:- The town of Ilorin is located in the southern part of Kwara State in an undulating plain with elevations of 300 meters near the existing impounding reservoir, 305 meters north of the present built-up area and 340 meters in the south-western of the town.

The highest contour line of 304 meters passes through the heart of the town in a semi-circular nature towards where the ground rises from both the west and the east as in Fig 2.5.

(ii) Drainage:- The basin system of River Oyun and its numerous tributaries drain the whole area but the largest of the tributaries actually runs through the town. These are river Asa and river Aluko.

2.30 LAND USE PATTERN

The description of the existing land use pattern is based on the land use survey conducted by the Doxiadòs Associates in 1974. The survey is supplemented by the fieldwork survey of the author in August, 1978.

Ilorin is a typical twin-centre city concept. The whole settlement is physically divided by the Asa river into two district parts. The old settlement is on the west bank and the new district on the east bank.

The old town was surrounded by a wall developed concentrically around the traditional, administrative and religious centre. Despite the fast rate of urbanization which has caused a breakdown in the homogeneity of the traditional pattern of growth with the introduction of new functions and vehicular traffic, the city still comprises a number of astonishingly large compound. Eighteen of these can be identified in the area around the Emir's Palace. These compounds made the selection of sampled dwelling units in the home-interview survey conducted by the author difficult.

The new part has developed along two right-angled axes, the main one being the Ajasse-Kaduna road which has

attracted industrial, residential, commercial, administrative, educational and other uses. The second branch is mainly occupied by the Government Reserved Area (GRA).

Residential areas in Ilorin are distributed all over the city, and they are often mixed with other uses especially commercial and administrative.

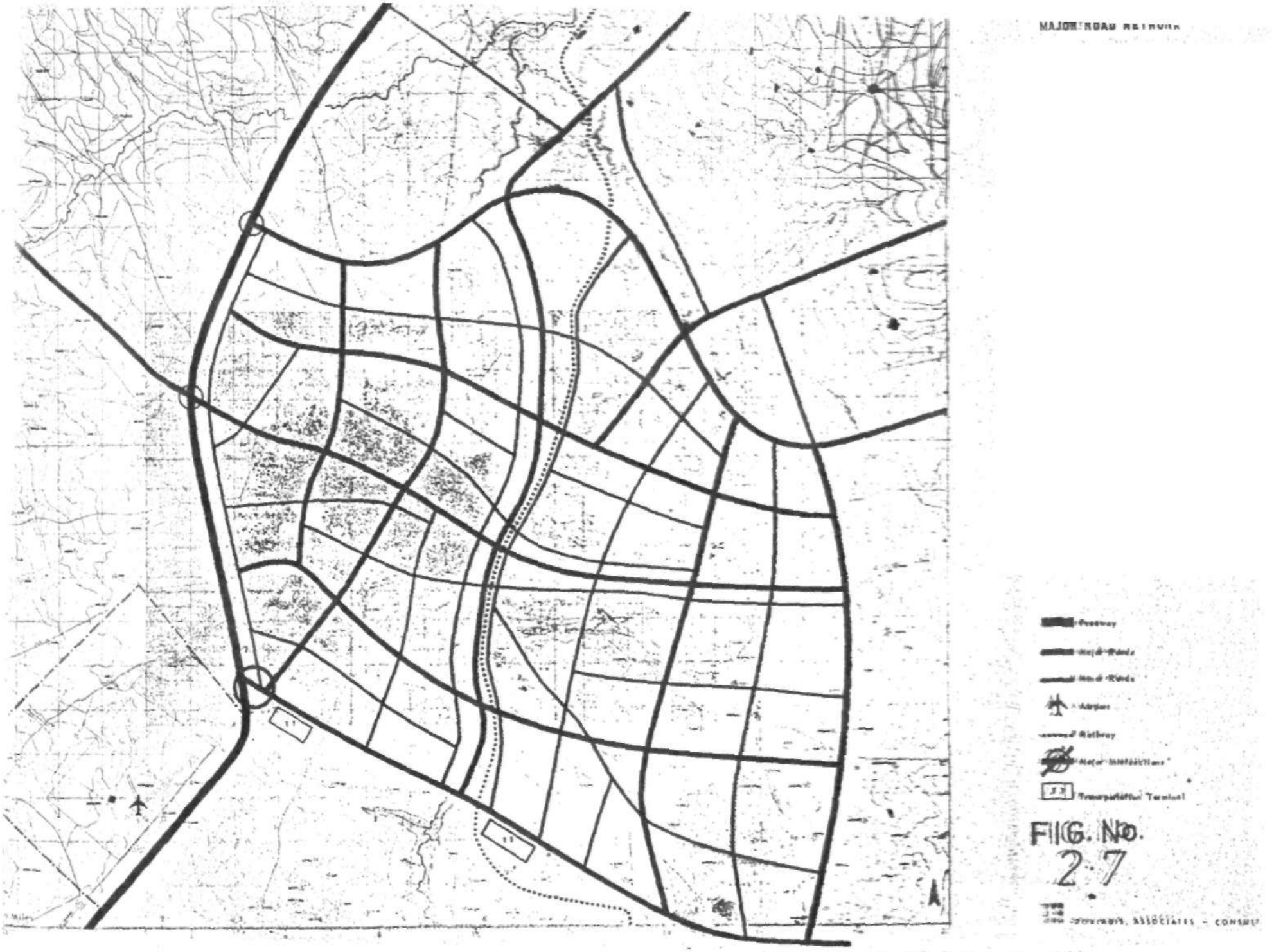
The relocation of the Emirs Market from the district centre has caused the focal point of intense activity concentrations to be shifted to areas along Midland Stores and Muritala Road, There are few business streets notable among them are Muritala way; Emir's road; Taiwo; Attah; Amilegbe; Oloje roads, etc. There are also a number of markets both traditional and modern scattered over Ilorin.

Almost all the State Ministries and other Government services are located in the new part of the city. The Administrative areas are mainly located around the Secretariat and Government House (GRA) - see Fig 2.6. The Ilorin Local Government Secretariat is located close to the Emirs Palace.

Most of the schools have now been swallowed up by urban expansion. Hitherto, they were mainly distributed around the periphery of the built-up area of the city. The main educational establishments are shown in Fig 2.6.

2.40 TRANSPORTATION CHARACTERISTICS

The main transportation problems in Ilorin as identified in the Ilorin masterplan were categorized into nine as described below:


MAJOR ROAD NETWORK
Freeway
Airport
Railway
FIG. No.
2.7

(i) Irregularity of street pattern in the old city areas and the radial pattern converging at the district centre around the Emir's Palace leading to longer movements and usually causing traffic congestion in the district centre.

(ii) Lack of proper street hierachy so that existing pattern hardly conforms to the actual traffic desires for movement within the city.

(iii) Lack of roads by-passing Ilorin.

(iv) Lack of roads by-passing the central area of the city.

(v) Improper street alignment characteristics and pavements.

(vi) Chaotic and unsafe pedestrian movement.

(vii) Lack of signals, signs and markings.

(viii) Lack of parking and improper location of bus terminals.

(ix) Improper operation of the mass transportation system:

Due to increase of population, the consequent number of trips effected and the distances covered, the need for an improvement in the mass transportation system is obvious. Service taxis, now used extensively as public transport, will not be able to cope adequately with future trip demands.

There are two main proposals in the Ilorin masterplan to solve the varied transportation problems outlined above: The first group may be termed highway proposals in which new roads are proposed; existing access roads suggested to be widened and alignment of many others to be improved. The main road network of Ilorin as contained in the masterplan is shown in Fig 2.7. The second category of proposals relate

to improvement of public transport. A mention was merely made of the need to plan for an adequate intra-urban bus service, but no definite guidelines were given as to how this might be done.

It is true that the transportation problem in Ilorin today, like in most urban areas, is essentially an engineering problem, but this study will argue that it does not have to demand an engineering solution. Planning and management measures, if adequately implemented, can provide the needed relief at reduced cost.

CHAPTER THREE

METHODOLOGY OF RESEARCH

3.10 THE EVOLUTION OF URBAN TRANSPORTATION PLANNING METHODOLOGY

What has come to be known as urban transportation planning methodology today has been a product of a series of attempts especially in United States of America and Great Britain to effect the free flow of urban development. The methodology has evolved over a dramatically short peric of four decades as highlighted below:

(i) Engineering Feats (1930s - 1940s)

Prior to the early 1950s, transport problems were seen largely in terms of road traffic. During the 1930s techniques were devised especially by Federal Bureau of Public Roads in U.S.A. to collect and analyze data for highway planning. The emphasis was on the supply of transp facilities.

By 1940s, however, it had become clear that to effectively design highways for future traffic there was a need to determine, in some measures, the level of travel demand. Towards the end of the decade, the Federal Bureau of Public Roads in U.S.A. published a manual which stated, details, principles of design of roads based on their theo tical capacity according to specified speed. Throughout th period, transportation problem was conceived essentially as an engineering problem and efforts were focused on perfecti various aspects of highway designs.

(ii) Land Use Planning Approach (1950s - 1960s)

In 1953, a major break-through was achieved with the work of the University of Pennsylvania[1]. Following an analysis of movement and land use data for Philadelphia, they expounded the thesis that different types of land use generate different and variable traffic flows. This approach brought fundamental changes in the study and understanding of the urban transport phenomena. It is now universally accepted that movement desires can be manipulated by controlling the land uses that represent the origins and destinations of journeys. The approach was successfully applied in the Detroit Area Traffic Study (1953), the Chicago Area Transportation Study (1956), the Penn-Jersey Transportation Study etc

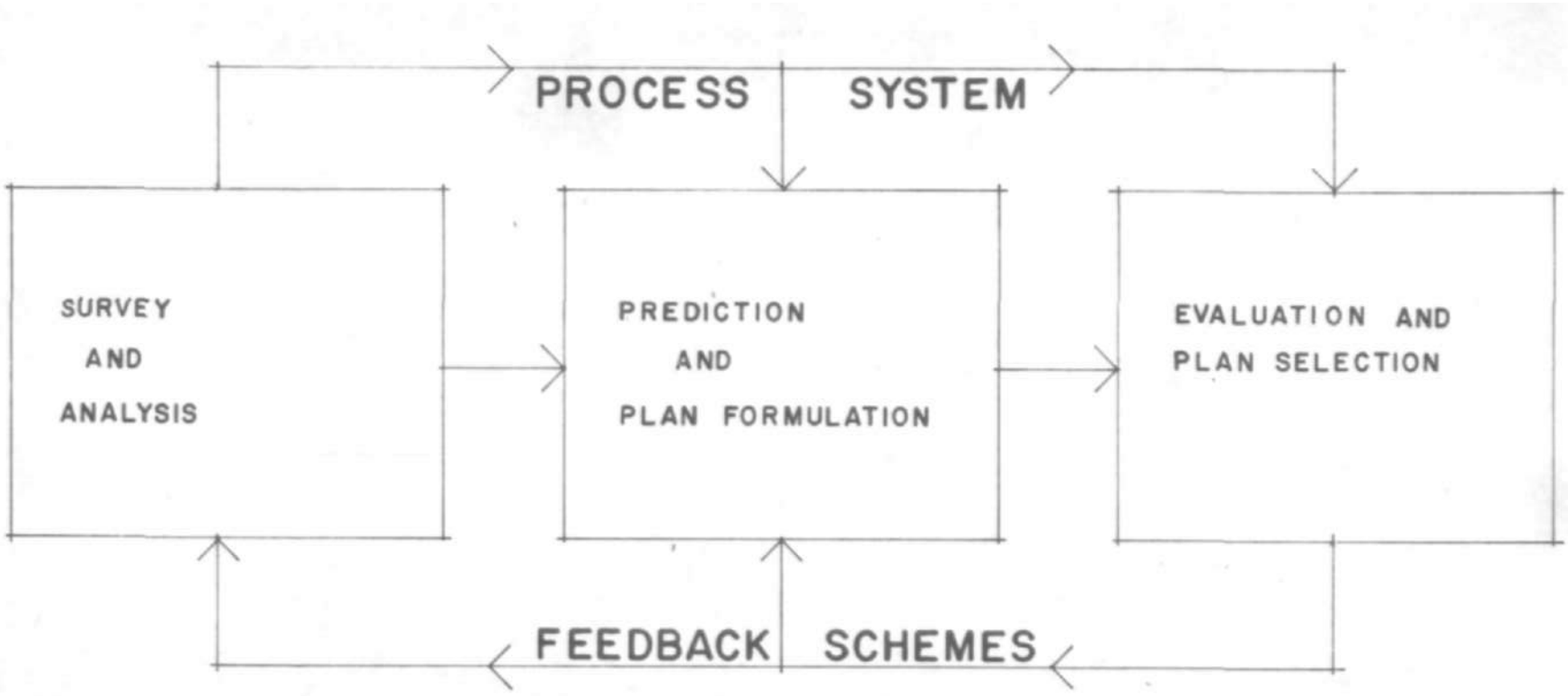
The Publication of the "Buchanan Report" of 1963 in Britain further introduced another dimension to the whole process of planning the urban transport system. There was a greater concern expressed for the environment and the hitherto over-emphasised concept of traffic functional was questioned and reduced to the level of a contributory input into the urban planning process.

(iii) Land Use/Transport System Approach (1970s)

The 1970s witnessed a number of studies carried out by scholars, largely in North America and Great Britain. The urban transportation planning methodology has been criticized

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1 Mitchell and Rapkin of University of Pennsylvania



ILORIN	TRANSPORTATION PLANNING PROCESS		U. R. P. DEPT A. B. U. ZARIA	FIG No 3·1	DWGN By isaac megbolugbe Msc 1978/79

by them on both operational and conceptual grounds. Some of them have even ventured to propose alternative procedure: system's approach[2]; cyclic approach[3], etc.

Despite the fact that there have been varied conceptual approaches adopted in applying the land use/transport planning process in different countries, similar techniques have been applied to develop alternative land use plans; to estimate the future pattern of movements associated with the land use plans and develop and evaluate alternative network proposals.

Those techniques dealing with travel demand forecasting are used extensively in this study.

3.20 CONCEPTUAL FRAMEWORK

3.21 Transportation Planning Process

The essence of section 3.10 is to introduce the nature of conceptual framework for this research. Transportation studies are usually designed to meet different objectives, but they all have the same basic conceptual framework as illustrated in Fig 3.1.

The use to which research findings are put is what differentiates transportation studies from one another. Each Transportation Planning process as represented in fig 3.1 involves:

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2 The Urban Transportation Planning Process, Consultative Group on Transport Research, O.E.C.D. Paris (1971)

3 Boyce D., Day N. and McDonald C., Metropolitan Plan Making, Regional Science Research Mongraph No.4, Philadelphia (1970).

(i) A survey and analysis stage which establishes the present demand for movement and how this is met, and the relationships between this demand for movement and the urban environment.

(ii) A prediction and plan formulation stage, which projects for some future date, the likely travel demand based on the data collected and the relationship established in the survey and analysis stage-and puts forward proposals to meet this demand.

(iii) An evaluation and plan selection stage which attempts to assess the relative merits of proposals put forward at stage two and selecting the best proposal for implementation. There may be need for feedback scheme as illustrated in Fig. 3.1.

3.22 Urban Transportation Planning Process (UTPP):

The Transportation Planning Process is characterised by the same conceptual strucutre as shown in Fig. 3.1. Nevertheless, it is based on a special set of principles and assumptions:

(i) that travel patterns are tangible, stable and predictable;

(ii) that definite relationships exist between all modes of transport and the future role of a particular mode cannot be determined without giving consideration to all other modes;

(iii) that the transportation system influences the development of, as well as, serving that area;

(iv) that areas of continuous urbanization require a regional-wide consideration of the transport situation;

(v) that the transportation study is an integral part of the overall planning process and cannot be adequately considered in isolation and

(vi) that the transportation planning is a continuous process that requires constant up-dating, validating and amendments.

Also, the process may be described as consisting of the following steps:

(i) the formulation of goals and objectives;

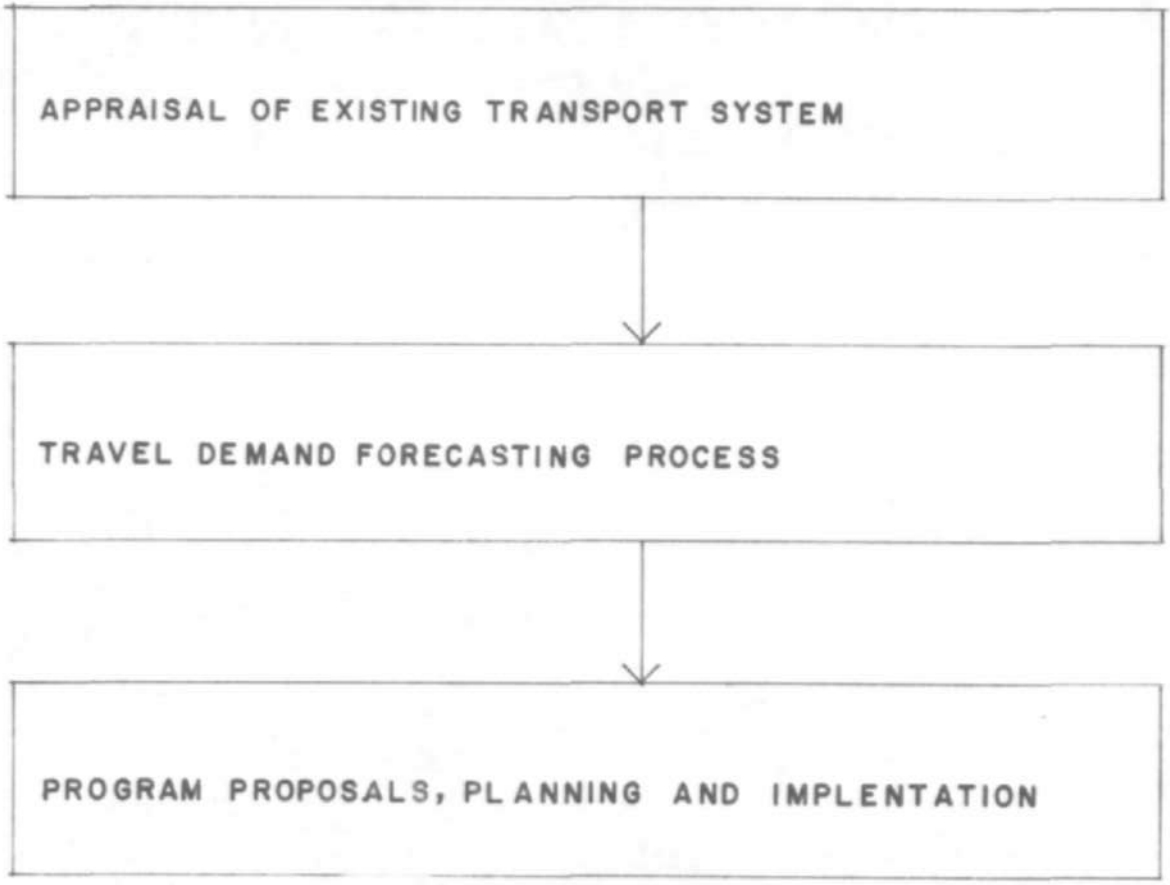
(ii) the collection of land use, population, economic and travel pattern data for the present - day situation;

(iii) the establishment of quantifiable relationships between present day movements and land use, population and economic factors;

(iv) the prediction of land use, population and economic factors to the target date for the study and the development of a land use plan(s);

(v) the prediction of the origins, destinations, choice of mode and distribution of the future movement demands, using the relationships established for the present-day situation, and the predicted land use population and economic factors;

(iv) the proposal of alternative highway and public transport networks to fit the predicted land use plan and accommodate the estimated pattern of movements;



ILORIN	TRANSPORTATION PROGRAM PLANNING PROCESS		U.R.P. DEPT. A.B.U. ZARIA	FIG No 3·2	DWGN By isaac megbolugbe Msc. 1978/79

(vii) the assignment of predicted trips to alternative co-ordinated transport networks/systems;

(viii) the evaluation of the efficiency and economic viability of the alternative transport networks in terms of both economic and social costs and benefits and

(ix) the selection and implementation of the most appropriate policies and programs.

Although, the individual steps in the urban transportation planning process can be readily identified as listed above, the relationship and interaction between them is vitally important for they are interdependent and individually almost meaningless.

3.23 Urban Transportation Program Planning:

The conceptual framework adopted in this study derives from the general structure described in section 3.22. It is illustrated by Fig 3.2. The thesis is structured after this framework to a large extent.

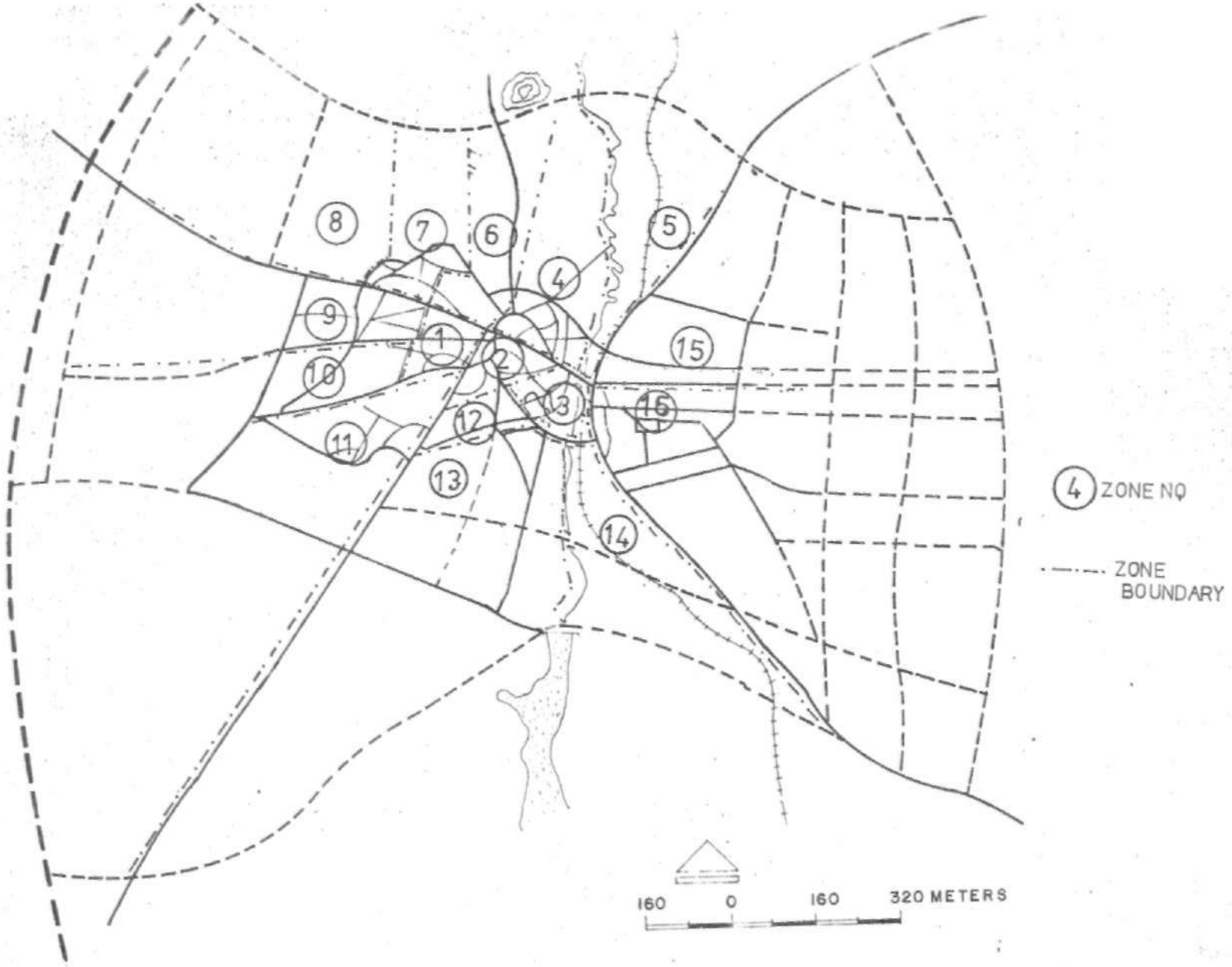
3.30 TYPE AND COLLECTION OF DATA

The objectives of the survey and analysis stage of Transportation Planning Process are to:

(i) determine where journeys begin and end;

(ii) determine the factors which influence trip generation and

(iii) establish the main corridors of movement.



ILORIN	TRAFFIC ANALYSIS ZONES	SOURCES: LORIN MASTERPLAN FIELD WORK	U.R.P.DEPT: A.B.U.ZAR.	FIG No: 3·3	DWGN By: SASC MEGBOLUGBE Msc 1978/79

The mass of data collected relates to individual journeys and households and the home-interview method was principally used. Ilorin was divided into fifty four zones for the purpose of data collection, the objective being to make the size of a traffic zone as small as possible so that the enumerators can cover each zone on a visit. The small zones are merged to form larger zones for the data analysis. Sixteen of such zones are delineated as shown in Fig 3.3.

3.31 Home-Interview Survey:

The questionnaire used in the home-interview survey is shown in appendix 3.1. The objective of this survey is to collect with the aid of a questionnaire, information on certain characteristics of the households and also determine their trip patterns.

The underlying principle of the home-interview method is that travel is an expression of an individual's behaviour and as such it has the characteristics of being habitual. As a habit, it tends to be repetitive and the repetition occurs in a definite pattern. The pattern is similiar for different individuals within urban areas. It is, therefore, not necessary to obtain travel information from individuals for long periods of time; nor is it necessary to interview all residents of an urban area in order to determine their travel habits and needs for traffic facilities.

The same facts can be collected with predictable margin of error if a sample is taken.

The sample will be representative if the persons included are distributed geographically throughout the survey area in the same proportion as the whole population. This is why a dwelling unit was used as the basis of sampling in this study.

A dwelling unit, for the purpose of this survey, is defined as that housing structure occupied by a household. A household is defined as a group of persons living in the same house and eating from the same 'pot'.

The house types encountered during the survey include the following:

(i) Bungalow

(ii) Duplex - contains two flats

(iii) Multi-flat-contains more than two flats

(iv) Apartments - multi - family dwelling but not partioned into flats.

(v) Rooming housing - the housing structure is divided into rooms or rooms and parlour.

The sampling fraction is 2%. So as to avoid any biasing problems, the enumerators were instructed to start counting the sampling units from 25 for each traffic zone until they got to 50. The 50th household was therefore selected and the questionnaire administered. After this, counting started from one and the questionnaire administered on the 50th household and so on.

If members of 50th household were not in or did not want to co-operate the enumerators were instructed to try the 49th or 48th household. Afterwards, counting would start from 50th and not 48th or 49th.

With the sampling procedure, the bungalow was taken as a dwelling unit because it is likely to be occupied by a household. A duplex was taken to consist of two dwelling units while in a multi-flat, each flat was counted as a dwelling unit. In apartments and rooming housing types, the enumerator were instructed to ask for number of households living in the house. The number of the households is the number of dwelling units. Each household found in a structure used for commercial purposes is counted as a separate unit in selecting the sample. A commercial structure that does not include any dwelling unit is omitted while hotels and institutions are ignored but staff quarters are included in the sampling frame and the housetypes treated as outlined earlier in the paragraph.

Twenty-five university undergraduates and seven town planning assistants participated in this survey. The interviewers were trained by the researcher over a period of a week during which the questionnaire schedule was pretested and minor adjustments made to ensure that interpretation of certain questions was as uniform and exact as possible.

.32 Taxi/Mini-Bus Questionnaire Survey

Another survey was conducted to interview taxis' and

mini-buses' drivers. Interviewers were posted to major and strategic road intersections and with the assistance of policemen the taxis and mini-bus questionnaire was administered. The questionnaire is shown in appendix 3.2.

3.33 Interviews

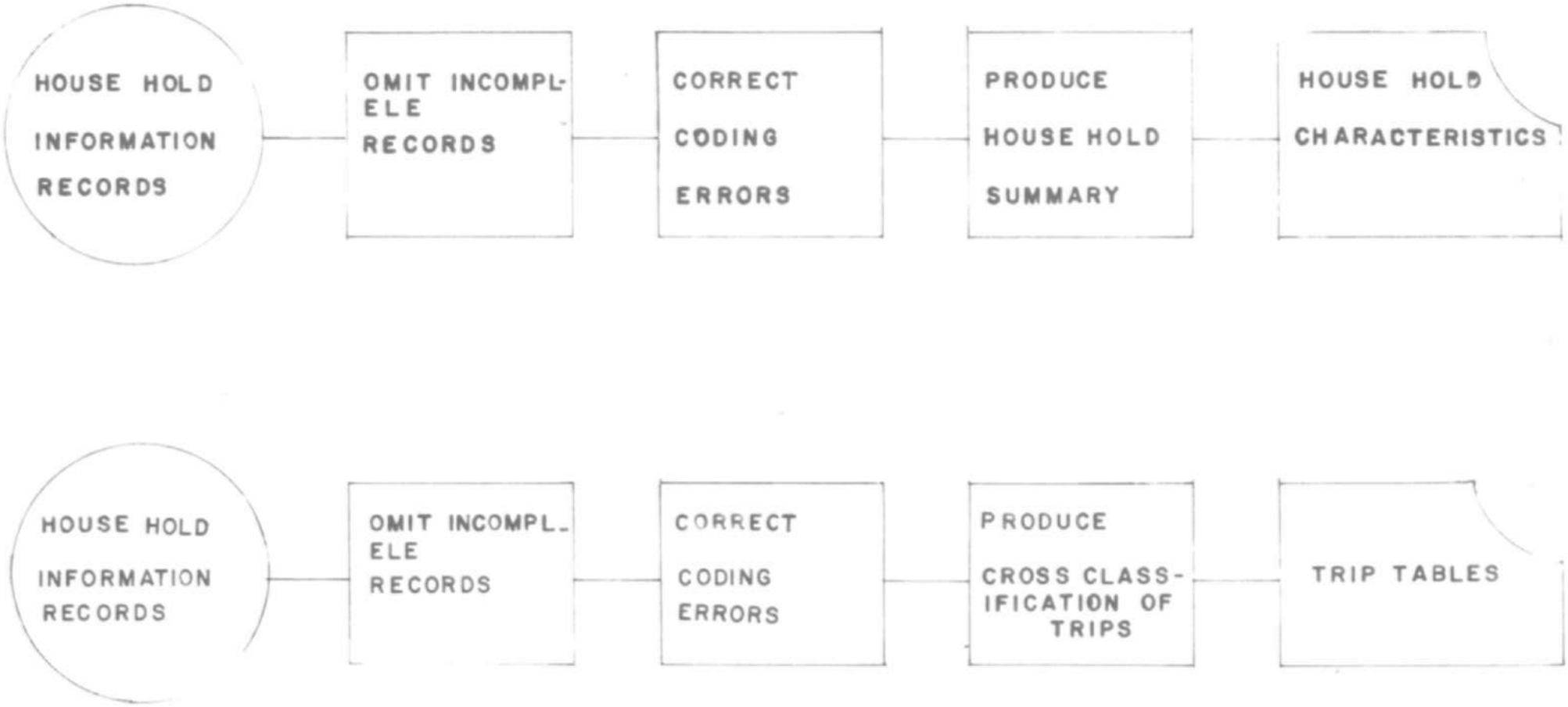
An opinion survey was conducted by the researcher. A list of sixteen questions was constructed in a questionnaire format and distributed to specially selected persons. The Delphi technique was used to analyze the data. Another set of questions were formulated based on the responses of the various participants and the people were asked to react to them. The results were collated to reflect the spectrum of opinions on key issues covered by the study. These opinions have been cited on different aspects of the public transport proposals and planning presented in part three of this thesis. The questions are reproduced in appendix 3.3.

The General Manager, Corporation Secretary and the Operations Manager of Kwara State Transport Corporation were also interviewed. The interviews were based on a set of prepared questions, though, other issues that crept up during the interviews were probed further. The interviews were conducted by the researcher himself.

3.40 DATA ANALYSIS

3.41 Coding and Checking of Data

On the completion of the field work, the participants in the surveys were further trained on data coding. The



ILORIN	ANALYSIS OF HOME-INTERVIEW DATA	U.P.R.DEPT. A.B.U.ZARIA	FIG No 3·4	DWGN By isaac megbolugbe Msc 1978/79

coding and checking of data were supervised by the researcher.

The coded data was transferred on to computer cards before they were fed into the computer and stored in a disk file.

A series of checks were carried out on each item of data on each card. Errors were corrected. The correction was undertaken by the researcher on the computer terminals with the use of text editing facilities available at Ahmadu Bello University Computer Centre.

3.42 Analysing the Data

(i) home interview survey

Figure 3.4 represents the processes and computer programs that were used to analyze the home-based interview data. Each rectangle in the diagram represents a step in the process, which in practice meant several runs of the computer program concerned.

(ii) The processes and computer programs involved in analyzing the taxi information is illustrated in figure 3.5. Each rectangle in the diagram represents a step in the process also.

CHAPTER FOUR

TRAVEL DEMAND FORECASTING

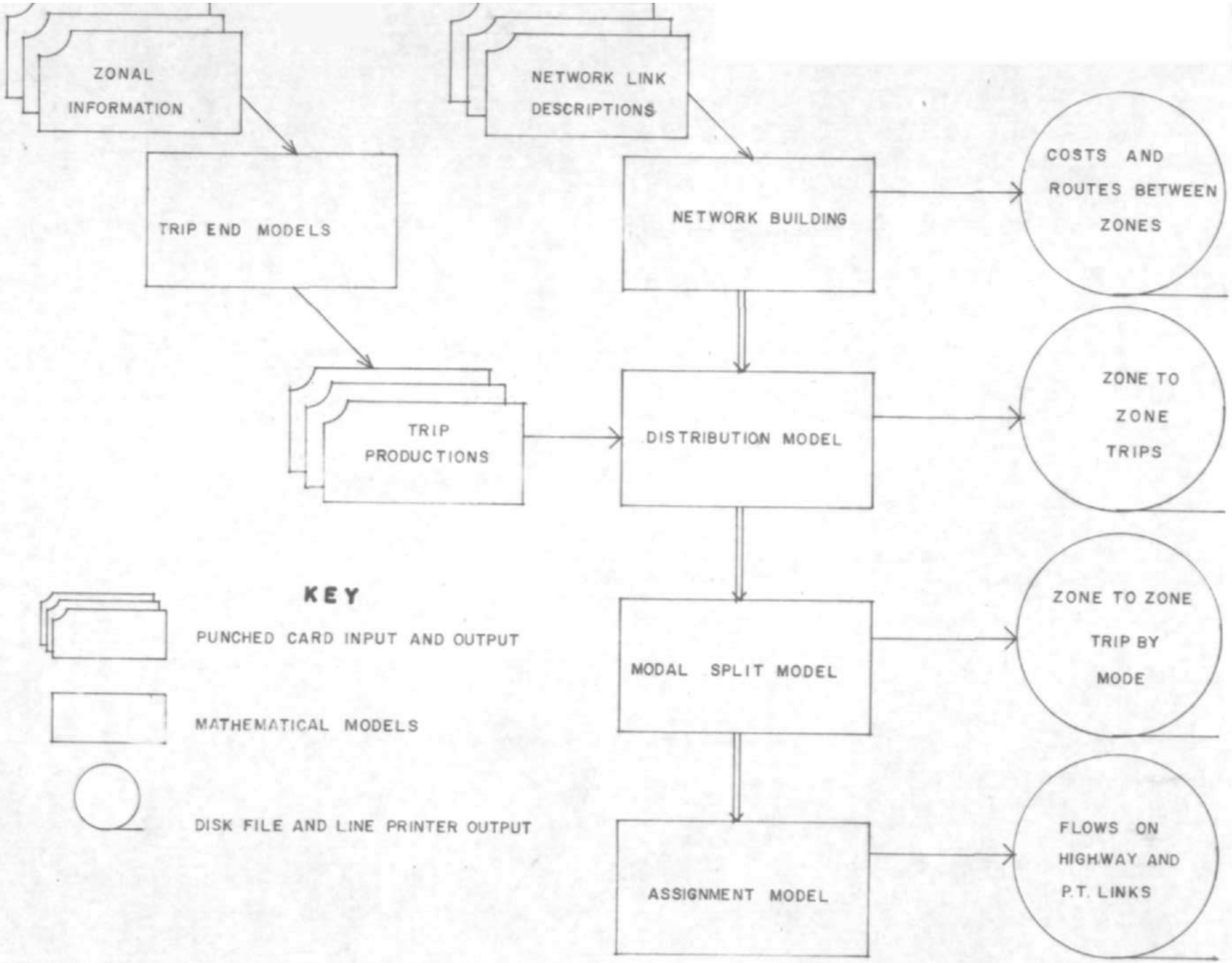
The sequence of activities involved in urban travel-demand forecasting has been described as stages in the urban transportation planning process in chapter three. The place of this forecasting process within the framework of the Ilorin Urban Area Transportation Study has been indicated, also, in chapter three. The structure of the mathematical models used in the process of travel demand forecasting is illustrated by fig 4.1. It describes the relationships between the models usually involved in any Transportation Planning Process.

4.10 TRIP PRODUCTION ANALYSIS

The first stage of the process of travel demand forecasting is the Trip Generation. The principal task of this trip generation analysis phase is to relate the intensity of trip making to and from land use parcels to measures of the type and intensity of land use.

There are two types of trip generation analysis: trip production and trip attraction. The term Trip Production refers to trips generated by residential zones where these trips may be trip origins or trip destinations. While trip attractions are trips generated by activities at the non-home end of a home-based trip such as employment, retail centres and so on.

This study limits itself to trip production analysis



ILORIN	STRUCTURE OF THE MATHEMATICAL MODELS	U.R.P. DEPT A.B.U. ZARIA	FIG No 4.1	DWGN By ISAAC MEGBOLUBE Msc. 1978/79

because of reasons given below:

(i) The zonal differentiation of land uses in Ilorin is not distinct and the problem of mixed land used prevalent there makes the collection of relevant data for the trip attraction analysis difficult. For instance, area of retail floor; floor space for service and office functions; floor area for manufacturing and wholesaling, etc.

(ii) If it is possible to solve the problem in (i); how about been able to obtain the corresponding figures for future year as they are not considered in the Ilorin masterplan.

4.11 Urban Trip Classification

Trips in any urban area can be classified into home-based and non-home based. Home-based trips are those that have one trip end at a household. The percentage of home-based trips in each of the sixteen traffic zones identified in chapter three ranges between seventy - six and ninety-three. Nine categories of journey purpose were included in the questionnaire used for the collection of journey information during the home-interview survey as shown in Table 4.1 below:

TABLE 4.1 ILORIN: CATEGORIES OF JOURNEY PURPOSE

	PURPOSE	%	PCT
1	To work	26	26
2	To school, college	3	29
3	In course of work or on firm's business	6	35
4	To personal business	15	50
5	To social, sport and hotel	8	58
6	To pick up or set down passenger	3	61
7	Change method of travel	2	63
8	To return home	32	95
9	To shops, food, drink, tobacco etc.	5	100

Source: Fieldwork, August 1978

The data on the journey purpose was further processed giving only four trip categories

(i) Work trips

(ii) Shopping trips

(iii) Socio-recreational

(iv) Other trips

4.12 Factors Influencing Trip Production

Many of the earlier studies of Trip Generation in urban areas have attempted to relate trip production to a wide range of factors some of which are described below:-

(i) Land Use Factor:- Residential land use is an important factor which influences the degree of productivity of trips per traffic zone in urban areas. The measure of residential

development used in trip generation studies varies with the type of study being undertaken. The size of population and the number of households are some of the quantifiable indicators employed by the analyst. This is because these measures can be readily estimated from the sample survey. Also, they can easily be projected adjusting the masterplan figures to reflect the survey findings.

Commercial, industrial, educational and recreational land uses are also important in trip generation studies, but for trip production they are not considered as earlier hinted. They are more important in the estimation of the level of trip attraction.

(ii) Household factors: - Household factors relate to different aspects of the household characteristics that have influence on the trip making ability of the household. Household size, income, car ownership, use and availability are some of these factors. These are also considered by the analyst.

(iii) Other factors: - A variety of other factors relating to the characteriestics of the resident population are equally relevant to trip production analysis. Some of these characteristics of the resident population are equally relevant to trip production analysis. Some of these characteristics relate to the age structure: degree of urbaniation and so on of the urban population.

4.13 The Calibration of the Trip Production Models

The stepwise regression procedure is adopted in this study to develop the prediction equations for the estimation of trip production levels in 1985.

Stepwise regression analysis allows the analyst to develop and test a large number of potential regression equations using various combinations and transformations of both the dependent and independent variables. The planner may then select the most appropriate prediction equation using certain statistical and empirical criteria.

Dependent Variables:-

Y_1 = number of work trips per zone per day

Y_2 = number of shopping trips per zone per day

Y_3 = number of socio-recreational trips per zone per day

Y_4 = number of other trips per zone per day

Independent Variables:

X_1 = zonal population

X_2 = zonal population aged 0-4

X_3 = " " " 5-20

X_4 = " " " 21 and above

X_5 = number of employed residents per zone

X_6 = number of females employed per zone

X_7 = number of cars owned per zone

X_8 = number of residents with a driving license per zone

X_9 = number of other vehicle means of transport per zone

TABLE 4.2 MATRIX O

DEPENDENT

1	Y1	Y2	Y3	Y4	X1
Y1	1.00				
Y1	1.00				
Y2	.8270	1.00			
Y3	.8002	.6109	1.00		
Y4	.3801	-.0013	.4573	1.00	
X1	.9300	.8353	.7690	.3329	1.00
X2	.7789	.8926	.5843	.0678	.9019
X3	.8452	.7802	.8234	.2915	.8871
X4	.7964	.7146	.7597	.3667	.9167
X5	.6808	.9047	.4527	.4702	.7977
X6	.6232	.8994	.4556	-.1635	.7468
X7	.6698	.9128	.3983	-.1701	.7542
X8	.6539	.9130	.4147	-.1713	.7496
X9	.8696	.8687	.6527	.0378	.9421
X10	.6622	.9011	.4603	-.1564	.7899
X11	.5415	.8670	.3221	-.2791	.6402

X_{10} = number of households per zone

X_{11} = average household income per zone

A zero-order correlation co-efficients between each pair of both dependent and independent variables were computed as shown in Table 4.2. The co-efficients are generally high especially between each of the dependent and independent variables except for dependent variables four (Y_4). A logarithmic tramsformation of the variables were attempted to ensure that the linearity assumption was satisfied, but the exercise had little effect on the correlation co-efficients. The transformed variables were even used in the regression analysis, but the original variables performed better, The fourth dependent variable (Y_4) was dropped because of its spurious relationships with other variables.

The independent variable were factor[1] analyzed to remove the error of multiple collinearity between independent variables. Two factors were extracted only from the eleven variables which are labelled economic and demogfaphic factors. The factors could not be used because of the difficulty of forecasting composite variables of which the factors were made. The stepwise regression method was therefore used to obtain the prediction equations.

The factors put into consideration before the selection of the prediction regression equations to characterise the trip production models are:

---

1 Factor analysis is a statistical procedure used to create new variables which are composite scale of the set of highly intercorrelated variables.

(i) the value of the multiple co-efficient of correlation; (R)

(ii) co-efficient of determination; R^2

(iii) value of standard error of estimate;

(iv) value of Y intercept;

(v) significance of both the multiple co-efficient of correlation and partial regression co-efficients;

(vi) zero-order correlation co-efficient between dependent and each of the independent variable;

(vii) R change at each step

(viii) causal basis of the relationship summarised by the prediction equation.

(ix) ease of forecasting of the independent variables.

The equations selected are presented below while the details of the result can be seen in appendix 4.1:-

$Y_1 = 0.3x_1 - 13.59$

where

Y = expected number of work trips per zone per day

X_1 = number of residents per zone

$Y_2 = 0.94X7+0.14X_1+44$

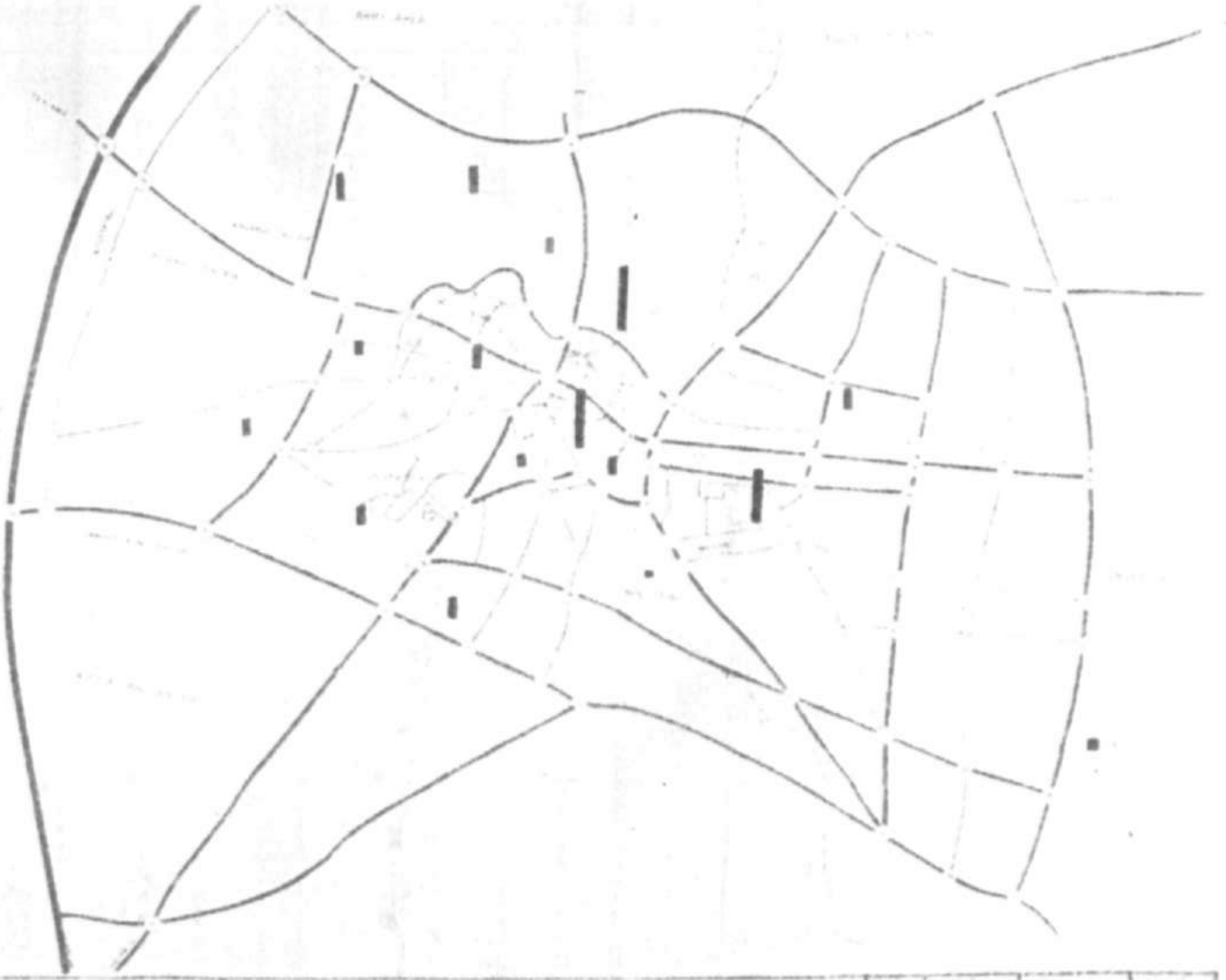
where

Y_2 = expected number of shopping trips per zone per day

X_7 = number of cars owned per zone

X_1 = zonal population size

$Y_3 = 0.7x_1 - 0.54X5 - 4.54$



ILORIN | ZONAL DISTRIBUTION OF TRIP VOLUMES (1978 & 1985)

where

Y_3 = expected number of socio-recreational trips per zone per day

X_1 = number of residents per zone

and X_5 = number of persons in employment per zone

The statistical validity of the three regression models were tested, but a compromise was struck between statistical and empirical validity.

The zonal data on trip production estimates in 1978 is shown in appendix 4.2. while the predicted volumes for 1985 are shown in appendix 4.3.

The spatial distribution of the trip volumes for 1978 and 1975 is presented in Fig 4.2.

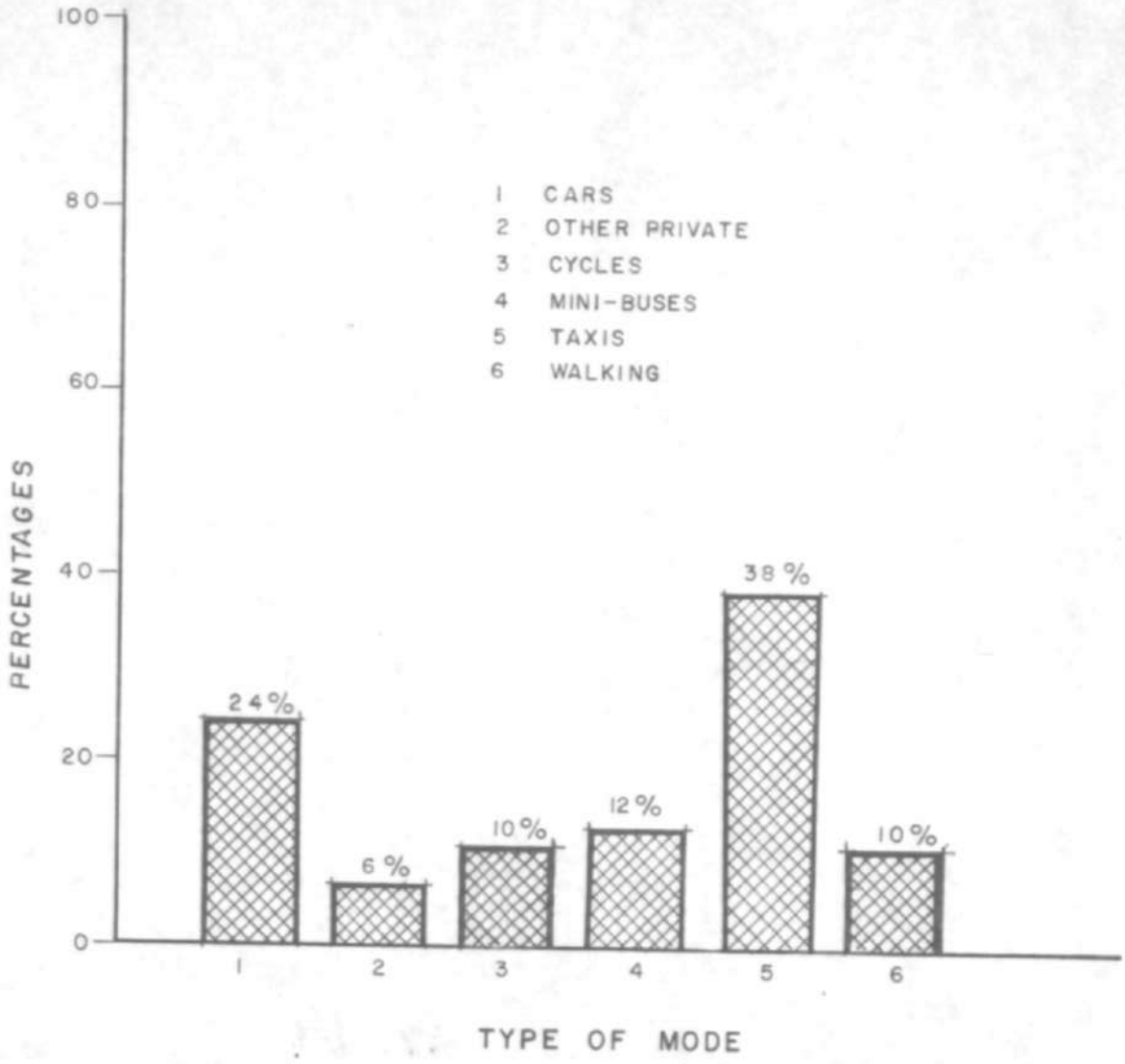
4.20 MODAL SPLIT AND TRIP DISTRIBUTION ANALYSIS

Modal Split and Trip Distribution represent the second and third stages in the process of travel demand forecasting Any of the two procedures can be completed during the second or third stage. It depends on the type of models that interest the analyst or whether there are choice transit users or not.

The two types of modal split models commonly used are:-

(i) Trip end modal split model which allocates total person movements to alternate modes of travel before the trip distribution stage of the process and

(ii) Trip interchange model which allocates movements to the alternate modes after the total movements have been distributed between zones of origin and destinatio-



ILORIN	MODAL XTERISTICS(1978)		U.R.P. DEPT. A.B.U, ZARIA	FIG No, 4.3	DWGN By Isaac megbolube Msc. 1978/79

TABLE 4.2

MATRIX OF INTERCORRELATION OF VARIABLES

	DEPENDENT				INDEPENDENT										
1	Y1	Y2	Y3	Y4	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Y1	1.00														
Y1	1.00														
Y2	.8270	1.00													
Y3	.8002	.6109	1.00												
Y4	.3801	-.0013	.4573	1.00											
X1	.9300	.8353	.7690	.3329	1.00										
X2	.7789	.8926	.5843	.0678	.9019	1.00									
X3	.8452	.7802	.8234	.2915	.8871	.1481	1.00								
X4	.7964	.7146	.7597	.3667	.9167	.8307	.8122	1.00							
X5	.6808	.9047	.4527	.4702	.7977	.9704	.6595	.7002	1.00						
X6	.6232	.8994	.4556	-.1635	.7468	.9357	.6951	.6586	.947	1.00					
X7	.6698	.9128	.3983	-.1701	.7542	.9104	.6789	.5951	.9534	.9652	1.00				
X8	.6539	.9130	.4147	-.1713	.7496	.9176	.6930	.6110	.9644	.9828	.9956	1.00			
X9	.8696	.8687	.6527	.0378	.9421	.9208	.8370	.8267	.8509	.8306	.8598	.8480	1.00		
X10	.6622	.9011	.4603	-.1564	.7899	.9443	.7279	.7180	.9667	.9833	.9636	.9769	.8817	1.00	
X11	.5415	.8670	.3221	-.2791	.6402	.8603	.6060	.5049	.9324	.9745	.9780	.9849	.7696	.9517	1.00

X_{10} = number of households per zone

X_{11} = average household income per zone

A zero-order correlation co-efficients between each pair of both dependent and independent variables were computed as shown in Table 4.2. The co-efficients are generally high especially between each of the dependent and independent variables except for dependent variables four (Y_4). A logarithmic tramsformation of the variables were attempted to ensure that the linearity assumption was satisfied, but the exercise had little effect on the correlation co-efficients. The transformed variables were even used in the regression analysis, but the original variables performed better, The fourth dependent variable (Y_4) was dropped because of its spurious relationships with other variables.

The independent variable were factor[1] analyzed to remove the error of multiple collinearity between independent variables. Two factors were extracted only from the eleven variables which are labelled economic and demogfaphic factors. The factors could not be used because of the difficulty of forecasting composite variables of which the factors were made. The stepwise regression method was therefore used to obtain the prediction equations.

The factors put into consideration before the selection of the prediction regression equations to characterise the trip production models are:

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1 Factor analysis is a statistical procedure used to create new variables which are composite scale of the set of highly intercorrelated variables.

(i) the value of the multiple co-efficient of correlation; (^{K})

(ii) co-efficient of determination; R^2

(iii) value of standard error of estimate;

(iv) value of Y intercept;

(v) significance of both the multiple co-efficient of correlation and partial regression co-efficients;

(vi) zero-order correlation co-efficient between dependent and each of the independent variable;

(vii) R change at each step

(viii) causal basis of the relationship summarised by the prediction equation.

(ix) ease of forecasting of the independent variables.

The equations selected are presented below while the details of the result can be seen in appendix 4.1:-

$Y_1 = 0.3x_1 - 13.59$

where

Y = expected number of work trips per zone per day

X_1 = number of residents per zone

$Y_2 = 0.94X7+0.14X_1+44$

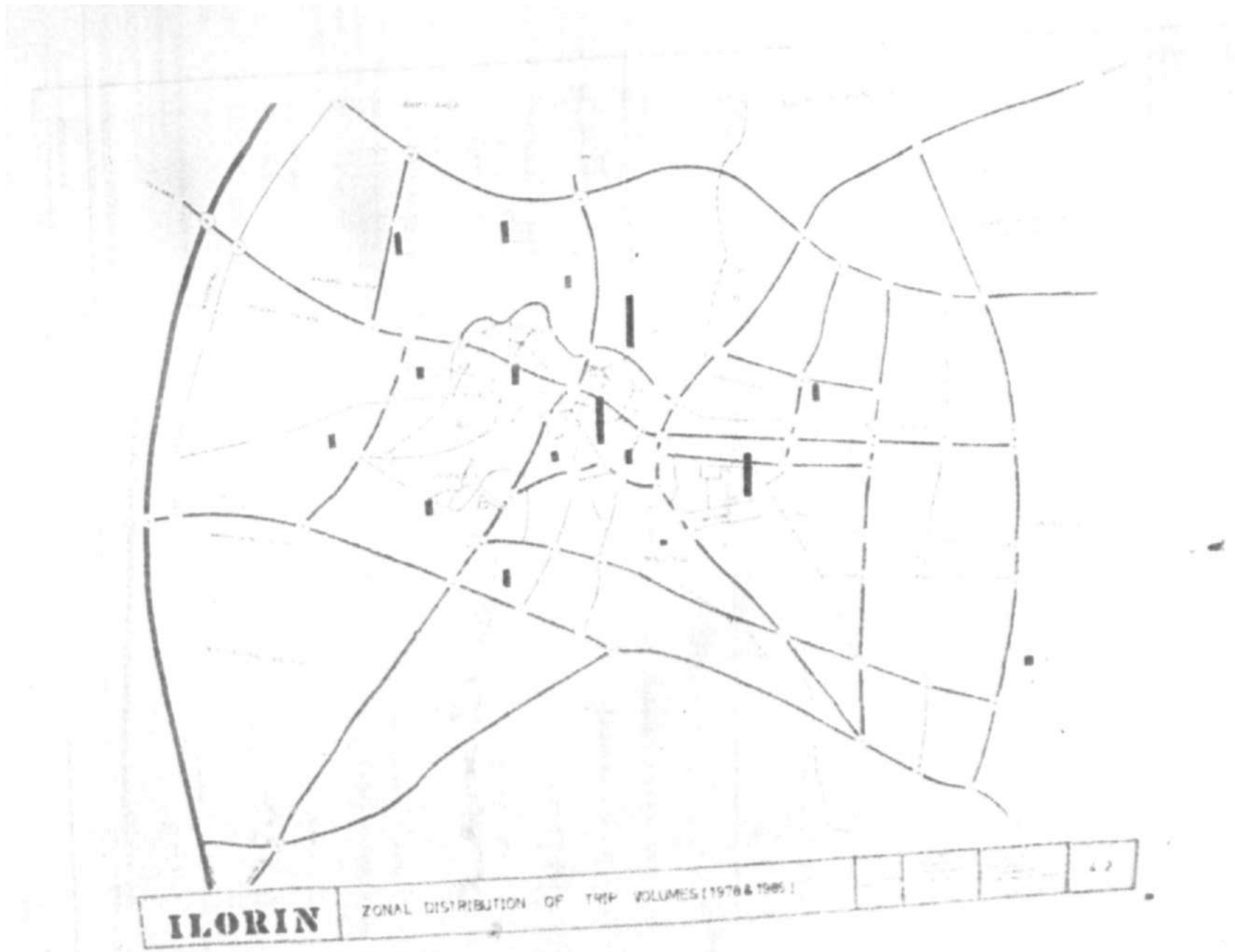
where

Y_2 = expected number of shopping trips per zone per day

X_7 = number of cars owned per zone

X_1 = zonal population size

$Y_3 = 0.7X_1 - 0.54X5 - 4.54$


ILORIN
ZONAL DISTRIBUTION OF TRIP VOLUMES (1978 & 1985)

where

Y_3 = expected number of socio-recreational trips per zone per day

X_1 = number of residents per zone

and X_5 = number of persons in employment per zone

The statistical validity of the three regression models were tested, but a compromise was struck between statistical and empirical validity.

The zonal data on trip production estimates in 1978 is shown in appendix 4.2. while the predicted volumes for 1985 are shown in appendix 4.3.

The spatial distribution of the trip volumes for 1978 and 1975 is presented in Fig 4.2.

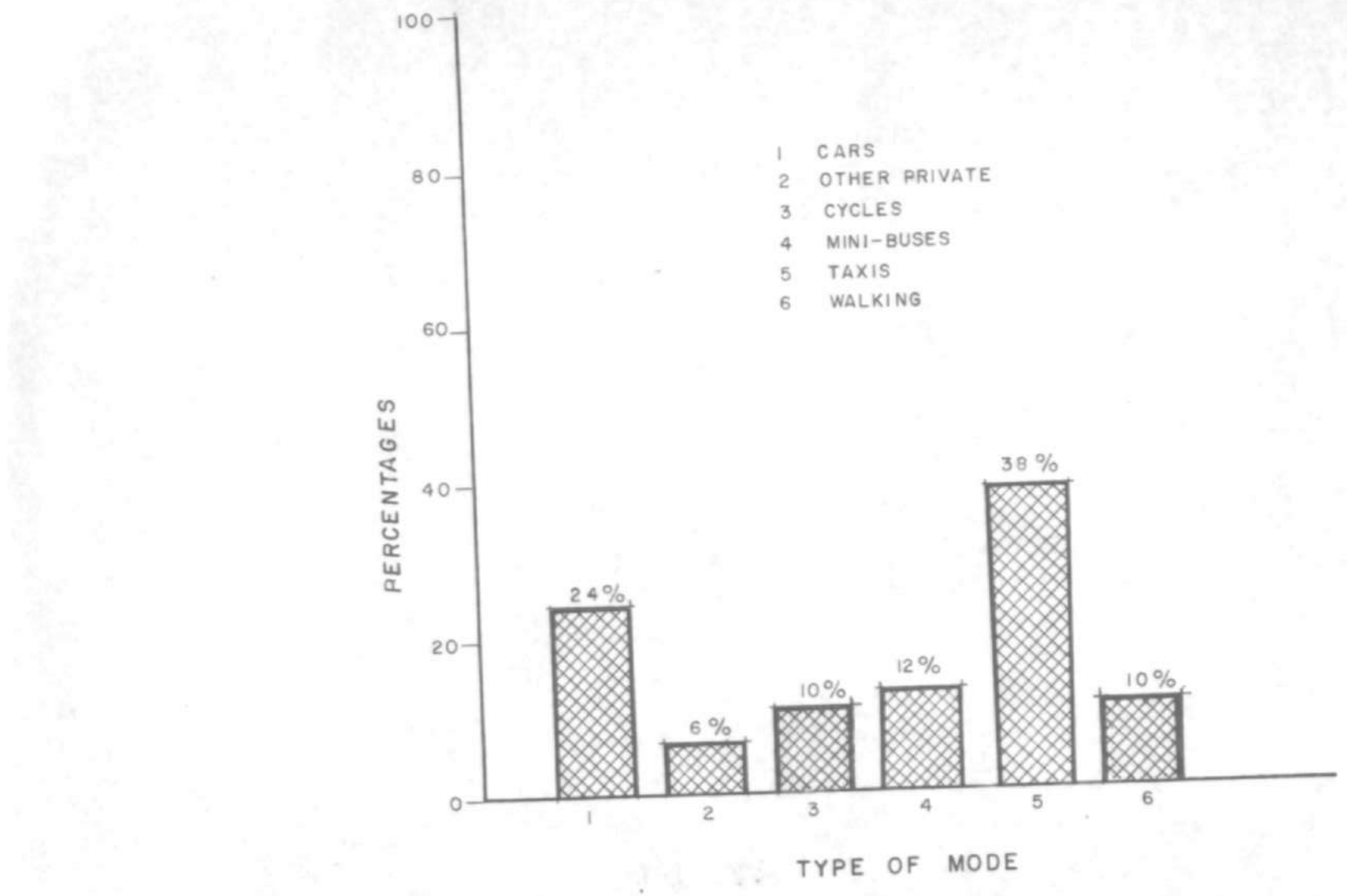
4.20 MODAL SPLIT AND TRIP DISTRIBUTION ANALYSIS

Modal Split and Trip Distribution represent the second and third stages in the process of travel demand forecasting Any of the two procedures can be completed during the second or third stage. It depends on the type of models that interest the analyst or whether there are choice transit users or not.

The two types of modal split models commonly used are:-

(i) Trip end modal split model which allocates total person movements to alternate modes of travel before the trip distribution stage of the process and

(ii) Trip interchange model which allocates movements to the alternate modes after the total movements have been distributed between zones of origin and destinatio-



ILORIN	MODAL XTERISTICS(1978)		U.R.P. DEPT. A.B.U, ZARIA	FIG No. 4.3	DWGN By Isaac megbolube Msc. 1978/79

There are many procedures[2] available to derive this split in the Transportation Planning Process, but modal split modeles of the generalised-cost type are useful only in large urban areas where transist plays an important part in satisfying the overall transportation demands. It is only then that special analyses can be performed to define factors that affect the choice travellers make between transist and automobile. Most transist riders in Ilorin are of 'captive' status-those riders who have no choice but to travel by public transport. Also, the questions that were included in the questionnaire used for the home-based interview survey relating to choice of mode; reasons for choice of mode and details of the time budget and expenditure for each trip maker were not adequately answered. Sixty two percent of the respondents answered "not applicable" and fourty-three per cent of those who responded did not complete all the relevant questions.

The idea of calibrating orthodox modal split model was dropped and a percentage distribution of person movements to different modes was estimated as shown in Fig 4.3.

The respondents were asked in the home-interview survey which mode they would prefer if public transport is substantially improved along lines suggested in this thesis. About forty-five per cent of the existing level of travel demand will be consumated through bus mode. A further breakdown of the data on the responses to the

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2 Bruton, M. J. Introduction to Transportation Planning Hutchinson of London (1975) reviews some of the procedures

question is shown in Table 4.3.

TABLE 4.3: POTENTIAL BUS TRIPS IN ILORIN (1978)

	EXISTING MODAL GROUP	PERCENTAGE OF TOTAL TRIPS SHIFTED TO BUS MODE
1	Mini-bus	12
2	Taxi	16
3	Cycling	5
4	Car	3
5	Other Private Vehicles	4
6	Walking	5
	TOTAL	45

Source: Fieldwork, 1978

It is pertinent to emphasise that the treatment of modal split model in this study should not be miscontrued as playing down the role of such a model within the framework of transportation planning process more so when the problem of modal choice and factors which influence this choice is one of primary interest in this study. Rather, it is aimed at pointing out the fact that most of the public transport modes of travel in Ilorin share similiar characteristics with the private car. Taxi, which accounts for thirty-eight per cent of travel demand level in Ilorin, for instance, share, to a certain extent, many advantages of the private car. It is true that any model calibrated on data obtained in such a situation may not really simulate the reality of travel behavioural pattern

within Ilorin, Even, if it does, it has been pointed out earlier that there is no adequate data for the exercise.

Nevertheless, efforts were made to investigate the problems associated with the use of available public modes. The attitude of people to car ownership and use was also measured. These and other related issues will be discussed in chapter five.

4.21 Trip Distribution Analysis

(i) Trip distribution is that part of the demand which is concerned with the determination of the trip-interchanges between pairs of traffic zones. It is not necessarily concerned with the mode of travel used for a given trip nor the routes which could be taken to complete the trip. Rather, it is concerned with establishing the links between a number of zones for which trip production calculations have previously been made. The information on the trip distribution is the basic data for the construction of desire lines presented in figs. 4.4 to 4.9.

The desire line maps for work, shopping and socio-recreational trips in the year 1978 are shown in fig. 4.4; 4.5 and 4.6 respectively. The maze of desire lines which characterize the town of Ilorin goes further to butress an earlier stand in this study on the nature of transportation problem in Ilorin. Apart from large volume of trips ending or originating in the Secretariat area and the District centre, the pattern of travel demand is not


ILORIN
DESIRE LINES FOR WORK TRIPS (1978)
44

easily discernible.

(ii) Trip Distribution Model:- There are two categories of techniques in use to find out how the trips produced by a traffic zone will be distributed to other traffic zones in the area of study:

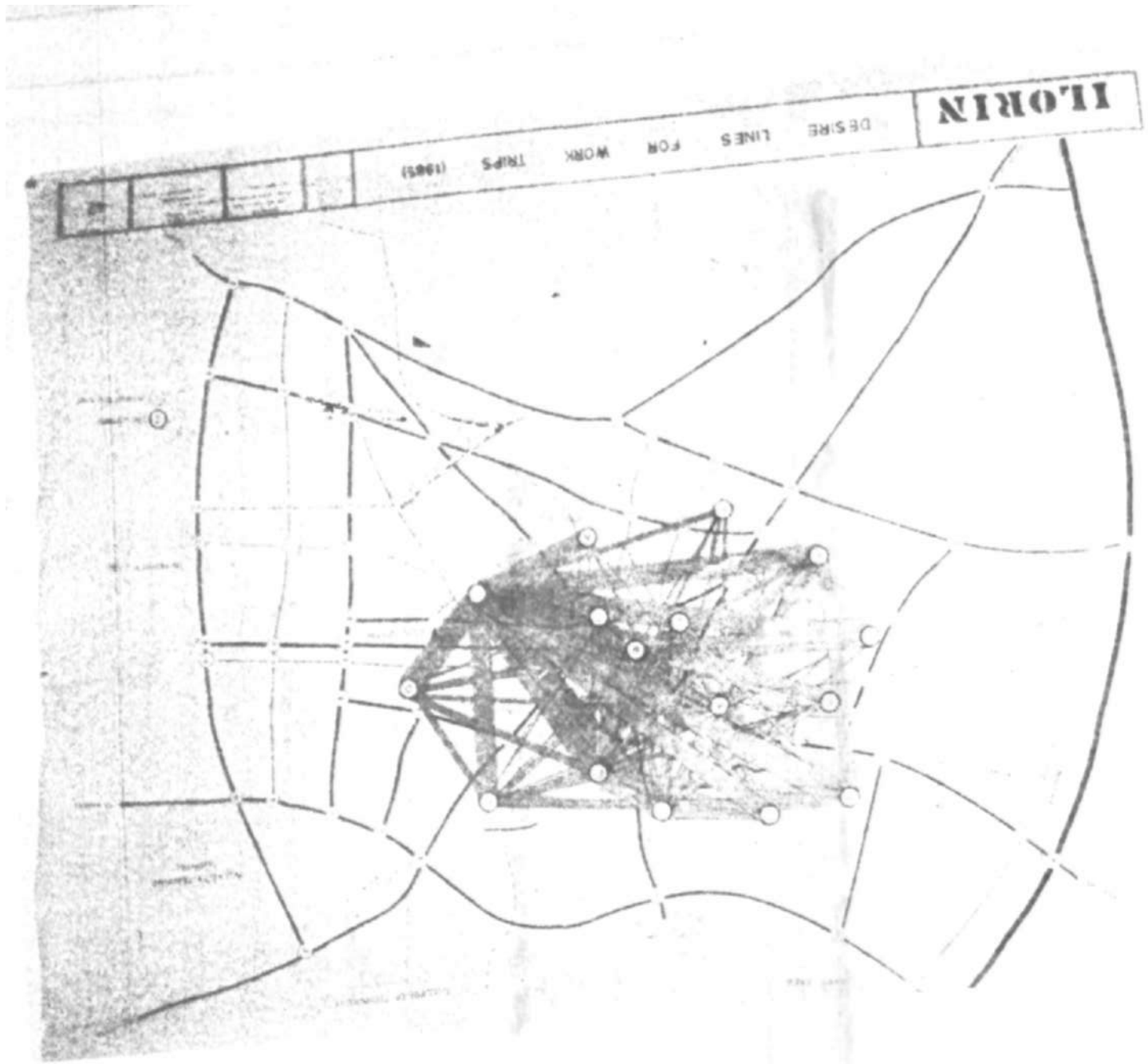
The first category of methods attempt to extrapolate existing patterns. Traffic is projected into the future on the basis of existing origin-destination patterns and anticipated growth in zonal trip generation. All growth factor procedures are in this category[3]. The main advantage of this method is that unique travel patterns are taken into account while the chief disadvantage is that this technique becomes unreliable if substantial changes are anticipated in land use patterns, social patterns or even in transportation services.

The second category of techniques develop formula or mathematical models to estimate trip interchanges. Such mathematicl procedures include Gravity model, Opportunity model, Regression model etc.

The travel demand is being projected over a short-term period of five to six years. It is felt, therefore, that the first category of techniques can be used not only because of the ease of understanding; simplicity of application, but also one does not anticipate drastic changes in the land use pattern of the sort that has subjected the procedures to much vituperations. As earlier

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3 Bruton M. J. Introduction to Transportation Planning. Hutchinson of London (1965)


ILORIN
DESIRE LINES FOR WORK TRIPS (1985)

pointed out, there is a masterplan for Ilorin, at least, up to the year 2000 A.D.

The Uniform Factor[4] is applied in this study since only the production component of trip generation analysis was considered in stage one of the process of travel demand analysis.

Mathematically, the uniform factor model can be expressed as:-

$$Ti\text{-}j = ti\text{-}jE$$

where

$$E = \frac{T}{t}$$

and

Ti-j = Future number of trips from zone i to zone j

ti-j = Present number of trips from zone i to zone j

T = Total number of trips in the area of study

t = Total present number of trips in the area under study.

The desire line maps for work trips, shopping trips and soci-recreational trips for 1985 are presented in figs. 4.7; 4.8 and 4.9 respectively. The travel demand

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4 Davinroy T. R.; Ridley T. M., Wootton H. J., Predicting Future Travel, Traffic Engineering and Control (1963) O; W. Y. and Schuldiner P. W.; An Analysis of Urban Travel Demands, Chicago (1962)

pattern does not deviate much from the 1978 position - a further fortification of an earlier stand on the future nature of transport situation in Ilorin in chapter one.

4.30 TRAFFIC ASSIGNMENT ANALYSIS

Traffic assignment analysis is the last stage in the process of travel demand forecasting. It is that part of the process which allocates a given set of trip interchanges to a specific transport network or system. It can be used to estimate the volume of trips on various links of the system for any future year or to simulate present conditons.

The traffic assignment process requires as input a complete description of either the proposed or existing transportation system, and a matrix of interzonal trip movements. The output of the process is an estimate of the traffic volumes on each link of the transportation system. The scope of the traffic assignment analysis in this study has greatly been limited by the fact that for the period of data analysis the Ahmadu Bello University Computer system was out of order for most of the time. This prevented the perfection of the necessary route-building algorithms for the traffic assignment analysis. It is necessary to describe the highway network, code and store in the computer, for the task to be accomplished by the computer, What the computer does is to choose the minimum path between zones, assigns the estimated trips to

this path and accumulates traffic volumes for each section of the route.

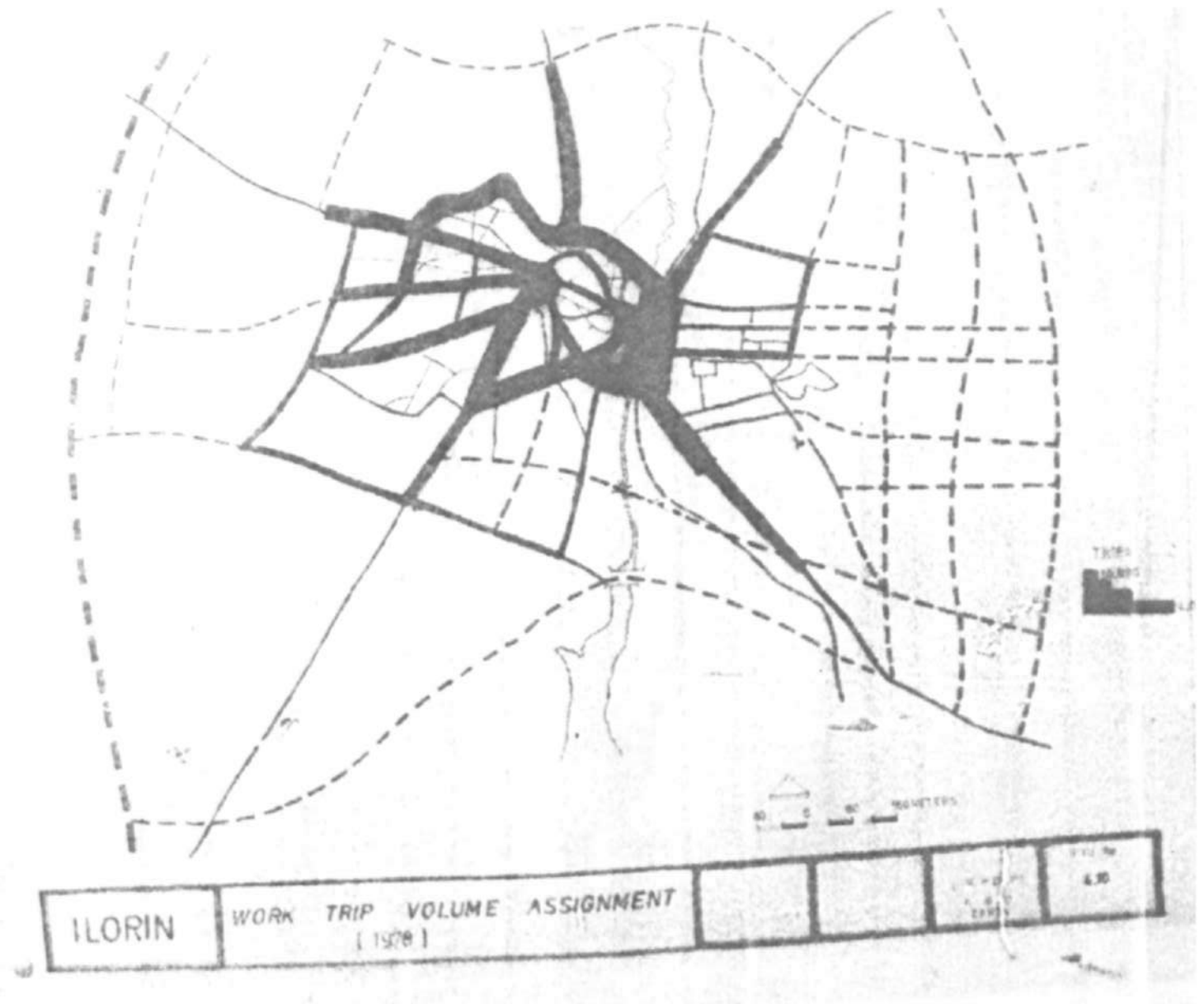
The procedure in mannual operations is based on the same principle outlined above. It is, however, difficult to achieve an optimum assignment since the number of iterations needed to achieve this is beyond what an individual can handle.

There are two main methods currently in use for the performance of traffic analysis. These are the all of nothing and capacity restraint assignments:

(i) All or nothing assignments are based on the assumption that the path taken by vehicles travelling from a zone or origin to a zone of destination will be one with least travel resistance. Although, travel resistance can be measured in terms of distance, cost, time or some combination of these factors, the measure used in this study is time.

(ii) A capacity restraint assignment is an alternative method of dealing with over loaded links in traffic assignment exercises. There is no existing computer program package that could be used as the case of Statistical Packages for Social Sciences (SPSS). Also, there was no opportunity to write one.

It had been the intention of the analyst to use the output ofthe traffic assignment process to plan the details of the scheduling of the main public transport mode proposed in chapter six. This is because it would


ILORIN
WORK TRIP VOLUME ASSIGNMENT
(1978)

have been possible to determine small and large volume routes within the transport network for Ilorin. The traffic assignment analysis in this study has, therefore, been limited to mere illustration of this stage in the whole process of travel demand analysis.

4.41 General Procedure of Traffic Assignment Analysis: The traffic assignment procedure is based on the selection of a minimum time path over an actual route between traffic zones. Although, the process is invariably carried out by the computer, it was done manually in this study as explained above. It is necessary to describe the highway network, code and store in the computer memory, for the task to be accomplished by the computer. What the computer does is simply to use the set capacity limit on each link to constraint the assignment of trip volumes at every level of iteration. As an example the all or nothing technique was used to assign the work trips in 1978 as shown in fig. 4.10.

CHAPTER FIVE

SURVEY FINDINGS ON EXISTING TRANSPORT SITUATION IN ILORIN

5.10 INTRODUCTION

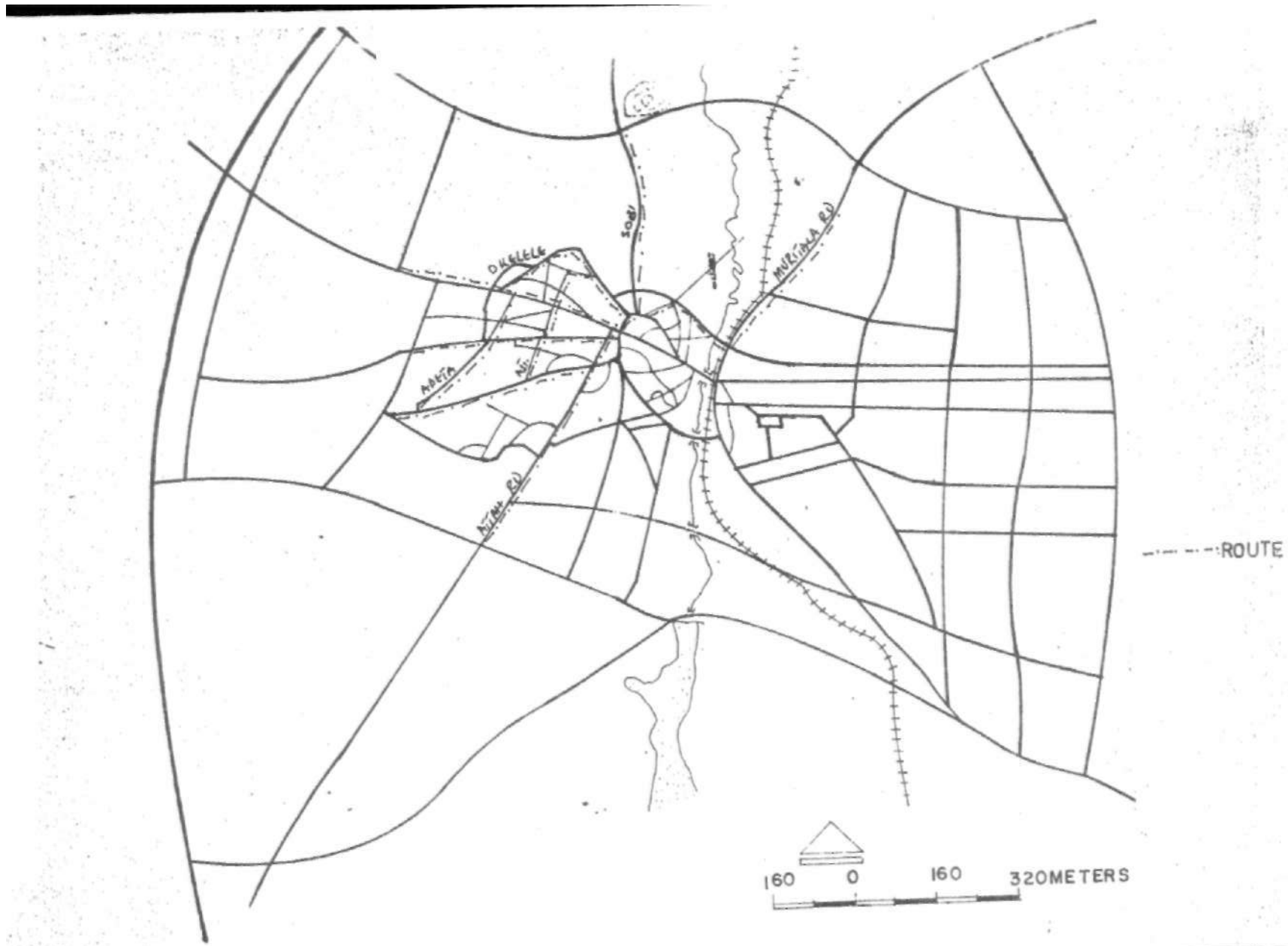
A number of surveys were conducted to determine the nature and characteristics of the existing transport situation in Ilorin with a view to planning to remove the undesirable features of the transport phenomena. Surveys were conducted on mini-buses; city bus service offered by the Kwara State Transport Corporation (KSTC); taxis and private transport. The findings of the survey are discussed in this chapter in the order listed above.

5.20 MINI-BUS TRANSPORT SERVICE

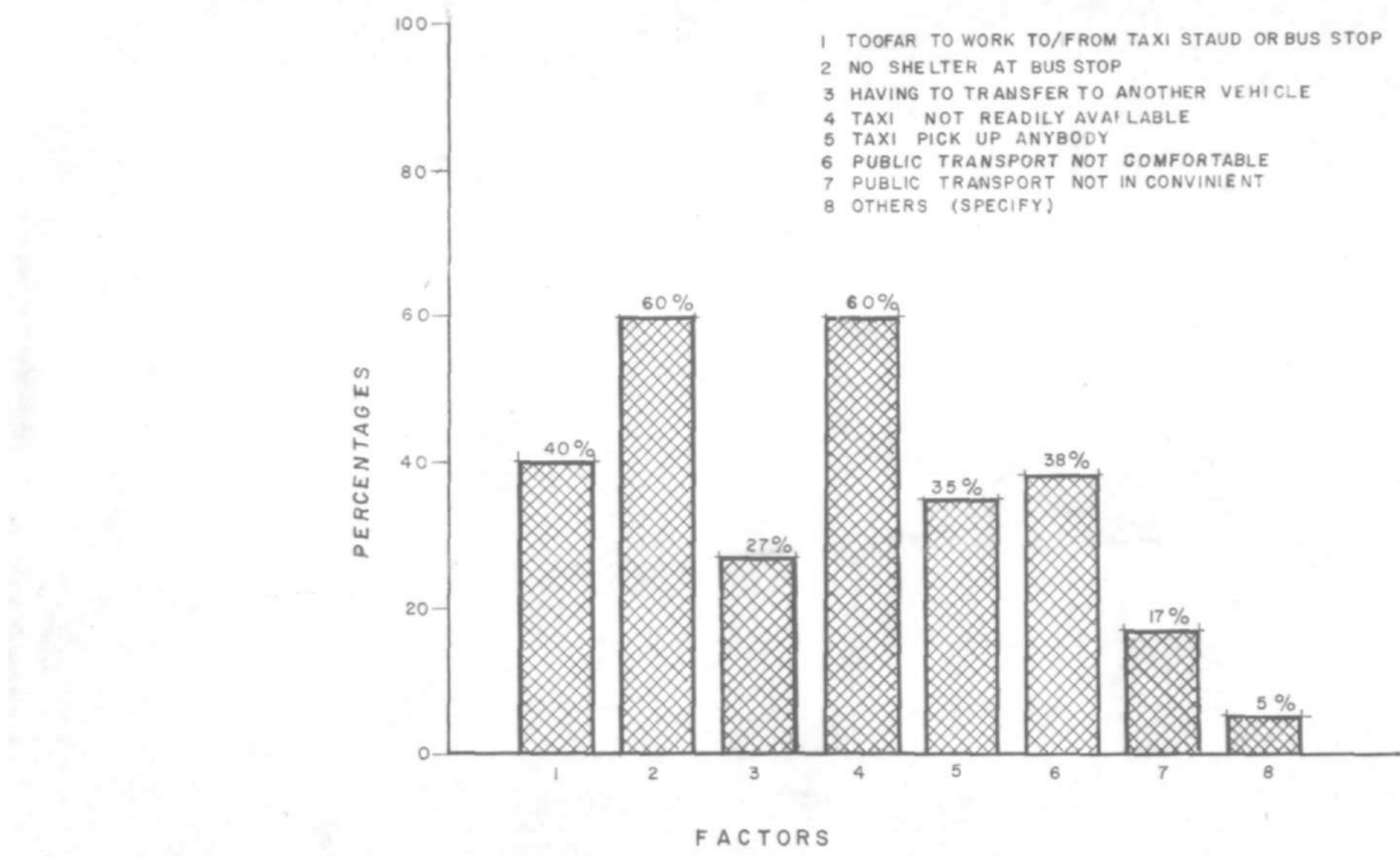
The mini-buses, presently, account for twelve per cent of the existing level of travel demand in Ilorin. There are many problems, however, which make the services of these mini-buses unsatisfactory:

(i) The mini-buses in use have an average capacity of about fifteen - passenger spaces. Thus, the number of mini-buses required to meet the existing travel demand is very high and this leads to traffic congestion and excessively long travel times.

(ii) Most of the mini-buses are not convinient for passengers. They are small and compact with hard seats and small windows for ventilation. Examples are the Kombi and Dahatsu mini-buses. This type of mini-buses constitute seventy-four percent of mini-buses surveyed.



ILORIN	EXISTING MINI-BUS ROUTES	SOURCES: ILORIN MASTERPLAN FIELD WORK	U.R.P.DEPT: A.B.U.ZAR.	FIG No: 5·1	DWGN By: ISAAC MEGBOLUGBE Msc 1978/79



ILORIN	INCONVINIENCE FACTORSIN PUBLIC TRANSPORT USE		U. R. P. DEPT A. B. U. ZARIA	FIG No 5·2	DWGN By isaac megbolube Msc 1978/79

(iii) Presently, limited routes are serviced by the mini-buses as shown in Fig 5.1. It will be difficult to get private operators to serve some new routes under the present operating circumstances.

(iv) The mini-buses' drivers are generally very reckless. Most of the drivers often attempt to manoeuvre like their taxi counterparts thereby causing a lot of traffic hazards for other road users.

(v) There are no regular schedules and this prolongs the waiting time of riders especially at peak hours. It has increased, in no small measure, the incovinience factors in the use of public transport at Ilorin. Some of the inconvinience factors in public transport use are illustrated by Fig 5.2. as identified during the home-interview survey.

5.30 CITY-BUS SERVICE

The City-Bus Service is offered by the Kwara State Transport Corporation. This service has since been suspended because of a number of problems that, apparently, have overwhelmed the corporation since its establishment in 1975;

(i) Problem of capital mobilization and cash flow: The Corporation is financed from the annual grants made to it by the Kwara State Government. This grant is usually limited and like any other Parastatal Organizations, it suffers from an inadequacy of financial resources to take

off as it should. The cash from grants awarded to the Corporation is often not forthcoming. Thus, for instance, only ₦0.1 million of the ₦0.5 million alloted to the Corporation during the 1978/79 Financial year had been received by September of 1978. This situation has hindered the scope of Corporation's activities very greatly.

The Corporation has since proposed to the Government to allow it apply for and receive loan grants from Banks and other Financial Institutions. The Banks, on their own, are prepared to grant this if the government will give a full guarantee but there has not been a response up to date.

(ii) Problem of Supply of Buses:- The Corporation has experienced much difficulties in this respect. All of the buses acquired by the Corporation upon its establishment broke down after two years. Several factors were responsible for this, perhaps, the most important being their unsuitability for short distance trip as required within the city. This was found to create severe mechanical faults in them. The circumstances in which the buses were purchased were some what dubions. For instance, the buses had already been rejected by the Bendel Line Corporation at Benin, Bendel State. It was, therefore, suprising why a new Corporation such as the Kwara State Transport Corporation was at that time should acquire such buses.

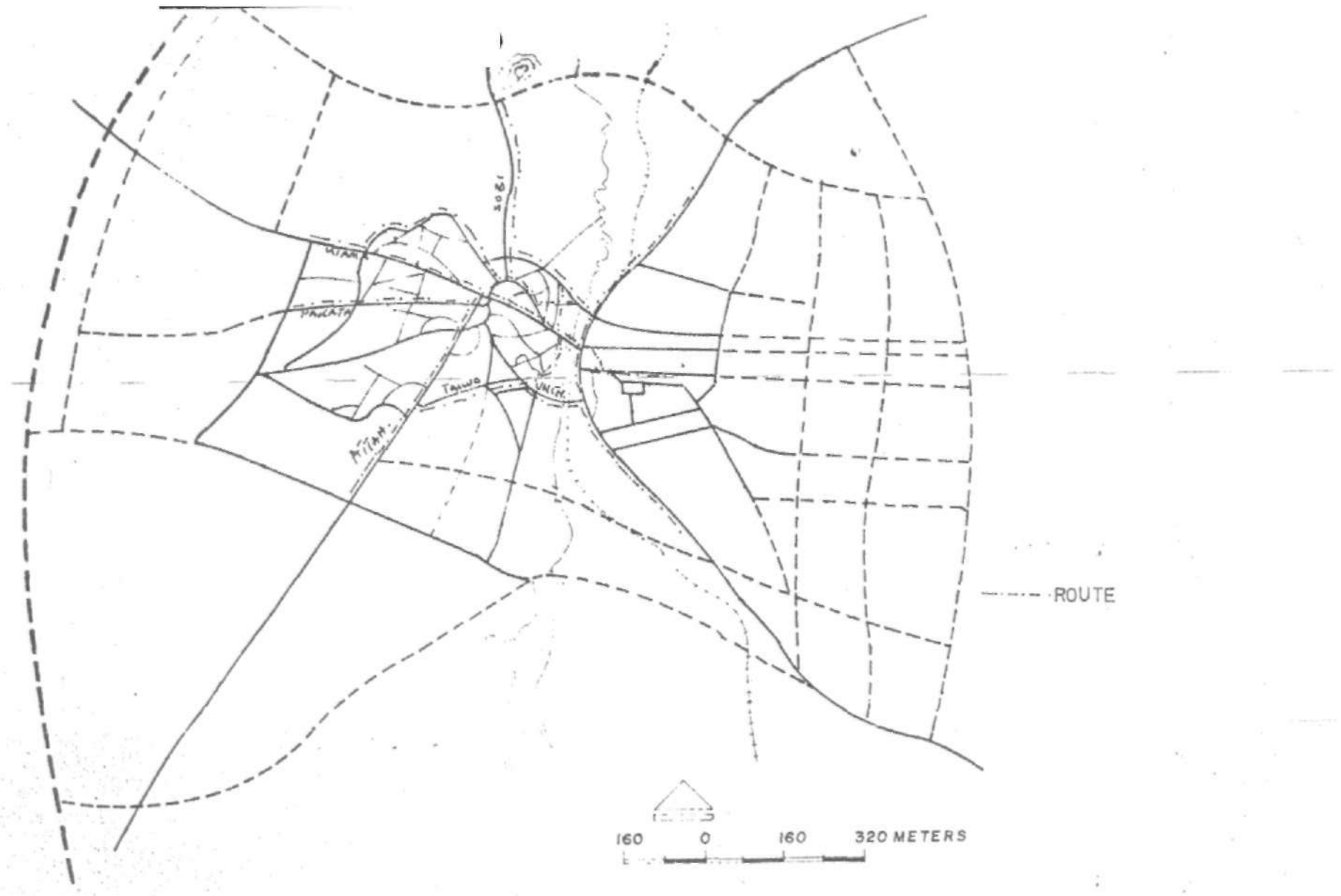
The Kwara State Government had a share of thirty out of the FESTAC buses. One was defective and returned to Lagos, nine were sent to schools and the remaining

twenty were transferred to the KSTC. The FESTAC buses are luxury buses and they are in no way ideal for transport service. The spare parts were hardly available and after the Corporation had cannibalised on one bus for another for a short spell of time, the buses have all broken down.

It seems, therefore, that the Kwara State Government always has a cause to give buses directly to KSTC for its transport service operations. Also, it appears that this fact has accounted for increasing reduction of the annual grants awarded to the Corporation. It is hardly no wonder then that the Corporation's essential services such as the City Bus Service collapsed in a short time.

(iii) Problem of Personnel: The Operation Staff are the drivers; conductors and inspectors. This category of staff are usually in short supply since most people see their appointment as temporary before moving on to move promising jobs.

The problem of personnel also relates to the efficiency of the operations staff. "There are no incentives in the Corporation to make them work hard", some of the staff members interviewed complained. There is also lack of discipline on the part of staff which in turn generates the widespread lack of honesty and dedication. For example, due to the shortage of operation inspectors to supervise them, it was not uncommon for bus conductors and drivers to collude for no justifiable reason to stop for well over an hour at a bus terminus.



ILORIN	EXISTING BUS ROUTES	SOURCES	U.R.P.DEPT	FIG No	DWGN By
		ILORIN MASTER PLAN FIELD WORK	A.B.U.ZAR.	5·3	SAAC MEGBOLUGBE Msc 1978/79

(iv) Problem of Management Control:- Due to the long-winding bureaucratic procedures through which decisions making may go, the management of the Corporation finds it difficult to take many decisions on time.

(v) Problem of Accommodation:- The KSTC is faced with the problem of suitable accommodation at the present site. There is not enough space for workshop and grave yard. This has led to an increase in debit charges arising from vehicle servicing and maintainance which are under-taken outside the Corporation Workshop. Yet the Corporation paid about₦7,000 per month for vehicle servicing and mechanics earned about ₦2,000 per month for doing practically nothing. When buses go for servicing, they are usually delayed - a situation that would not have developed if they were serviced in the Corporation's Workshop. This has resulted in underutilization of buses, in turn, leading to frequent break downs and therefore low revenues.

(iv) Problem of Duplication of Bus Routes and Low Utilization of bus capacity due to the same. The existing bus routes are shown in Fig 5.3.

There are twelve routes on the links of the road network shown in Fig 5.3 as bus routes. Many of the links are duplicated in the routing of the buses so that buses ply certain links all the time while others are neglected thereby forcing passengers to wait. After a time, many people made up their mind against patronising the buses

(vii) Problem of Low Patronage because of:

(a) absence of regular schedule which increases waiting

time;

(b) faulty location and spacing of stops;

(c) lack of shelter at bus stops;

(d) indiscipline and insurbodination of bus conductors towards passengers and

(e) preference for taxi because of comfort and flexibility

5.40 TAXI TRANSPORT SERVICE

Taxis play a very important role in the overall satisfaction of the urban travel needs within Ilorin having accounted for thirty-eight per cent of the total travel demand as estimated in 1978. The stage-taxis are owned by private individuals, though, controlled to a large extent by the Kwara State Transporters' Union (Ilorin Branch) - KSTU. The KSTU has no accurate figure of the number of taxis currently operating within the town, but a conservative estimate will put it at one thousand and five hundred. The growth of taxis in Ilorin has been stumpendous rising from below two hundred per annum in 1971 to over eight hundred per annum in 1971[1].

The high number of taxis operating in Ilorin is due to the inefficient and insufficient operation of City Bus Service. It is expected that the number of taxis required to meet the existing level of travel demand will decrease as the Bus Service Systems are developed and

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1 Fieldwork Survey Findings

improved along lines suggested in this thesis. It is expected that sixteen per cent of the total travel demand presently met by the taxi mode will shift to the bus mode. Nevertheless, there is still a need for a taxi service within the town, hence the taxi-interview survey:

(i) Trip Origin:- The taxi drivers interviewed were asked to state where they start their trips most of the time. A wide range of locations were indicated. Twenty - nine different locations were named by the one hundred and sixty-six drivers surveyed. The first eight locations that were mentioned most frequently are shown in Table 5.1:

TABLE 5.1 TAXI TRIP ORIGINS IN ILORIN (1978)

	LOCATION	NO OF DRIVERS	PERCENTAGE OF DRIVERS
1	Pakata Market	22	13.3
2	Emir's Palace	16	9.6
3	Alanamu Market	12	7.2
4	Alore "	12	7.2
5	Baboko , "	10	6.0
6	Gambari "	10	6.0
7	Maraba Motor Park	10	6.0
8	Opomalu	10	6.0
	TOTAL	102	61.30

Source: Fieldwork, Aug. 1978

The eight locations are shown in fig. 5.4. Most of the drivers start their trips from a market location. In fact, sixty-four per cent of the sampled drivers start trips from market locations while eighty-two start from either a market location or a supermarket or an important shop like Oredola Trading Company at Muritala way (see fig 5.4)

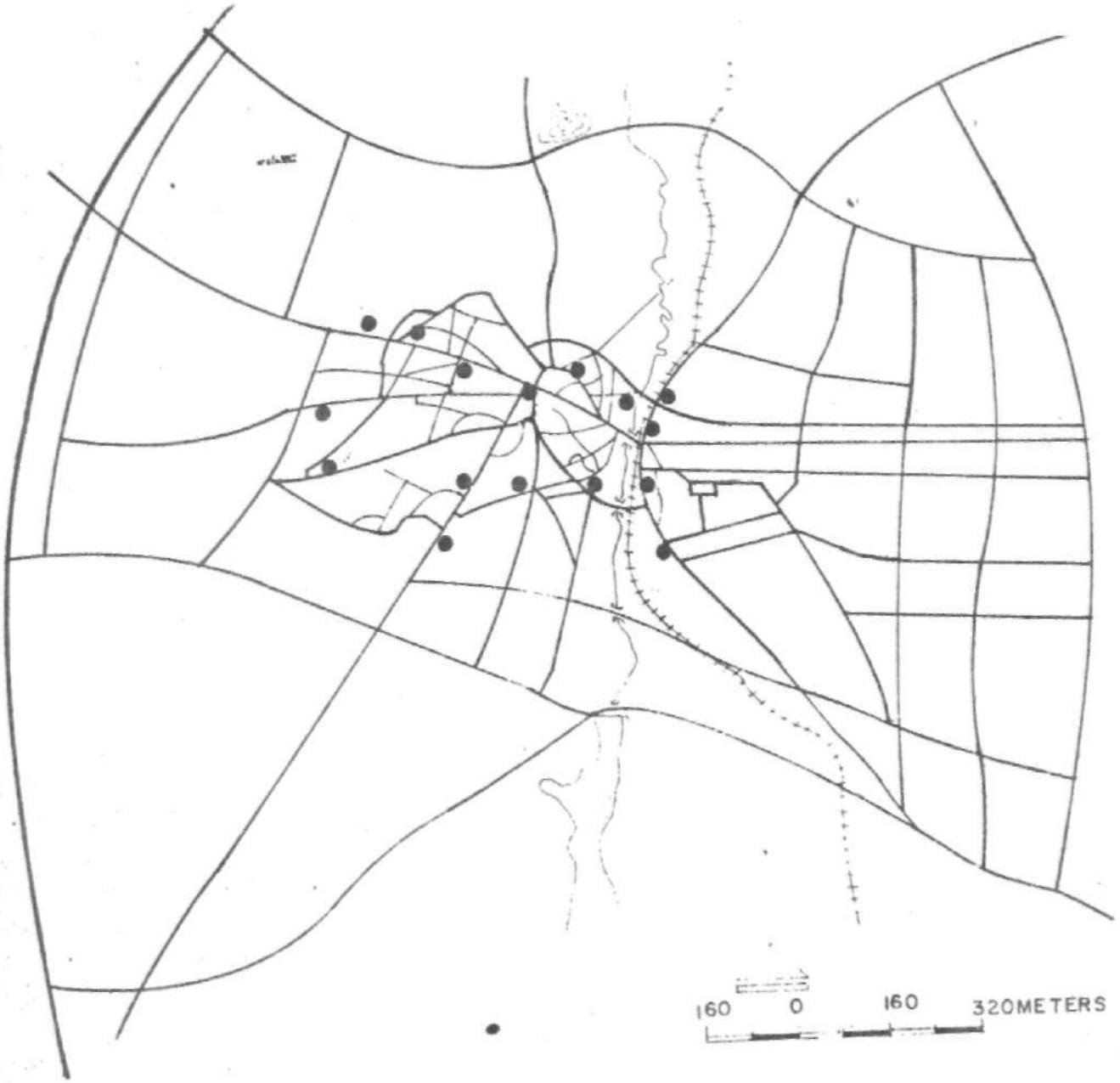
(ii) Trip Destinations:- Twenty-seven locations were recorded as points of usual taxi trip destinations. Table 5.2 presents information on the first five most frequently mentioned locations by the taxi drivers. A relatively high proportion of the respondents (23%) terminate their trips at the District Centre around the Emirs Palace (see Fig 5.4.

TABLE 5.2: ILORIN: TAXI TRIP DESTINATIONS (1978)

	Location	Absolute Frequency	Relative Frequency
1	Emir's Palace	38	22.9
2	Anywhere	16	9.6
3	Gambari	10	6.0
4	Maraba Motor Park	10	6.0
5	Offa Motor Park	10	6.0
	TOTAL	84	50.50

Source: Fieldwork Aug. 1978

(iii) Taxi Routes:- The study of routes plied by taxis at Ilorin reveals that virtually all available routes are reached by taxis. Despite this fact, majority of the



ILORIN	SUGGESTED LOCATION OF STOPPAGES	SOURCES: ILORIN MASTERPLAN FIELD WORK	U.R.P.DEPT: A.B.U.ZAR.	FIG No: 5·5	DWGN By: ISAAC MEGBOLUGBE Msc 1978/79

taxis have specific routes on which they operate. Fourteen per cent of the respondents alone have no specific route. Fig. 5.4 shows the first eight routes most generally serviced by taxis.

Most taxi drivers alter their route at will. This means, in essence, that passengers, on boarding a taxi, could be asked to come out if the driver of the taxi in question feels that it would be more profitable for him to take another route or head for another destination. This is not only inconviniencing to passengers who are apparently forced out but it may also be difficult to get another taxi at that location or in that route the taxi driver decides to changes his mind.

(iv) Location of Stops:- The taxi drivers were asked to state whether they generally stop enroute to collect or drop passengers. They were asked to list the location of stoppages according to routes that they usually ply. About forty per cent of the respondents collect/drop passengers anywhere along the routes. Most of the drivers expressed their liking for provision of fixed stoppages for buses and taxis. The drivers were asked to suggest convinient locations for such stoppages. Few of the suggested locations are shown in fig. 5.5.

(v) Number of Taxi Trips:- A single taxi trip is completed when a taxi leaves a zone of origin to a zone of destination. The mean number of trips per taxi per day in Ilorin is thirty - seven while the mode is forty. The modal class represent thirty-nine per cent of the

respondents. The minimum number of trips is twenty while the maximum is sixty given a range of forty trips. The mean number of taxi trips is very small and this is a result of traffic congestion. To underline this point, the distributin of trips during peak hours gives a mean of ten trips with a standard deviation of six during morning peak hours and nine during evening peak period with a standard deviation of five. It means that every taxi makes, on the average, three single trips per hour giving an average journey time of twenty minutes. This is certaintly not satisfactory because there is no trip longer than five kilometres within the existing built-up area and even at an average speed of forty kilometres per hour, the journey time should not be mofe than ten minutes.

(vi) Number of Passengers carried under differing circumstances. Table 5.3 sumarises the result of the survey

TABLE 5.3: NUMBER OF PASSENGERS CARRIED IN ILORIN BY DRIVERS

Number of Passengers Carried	Mean	Minimum	Maximum	Range	Std. Dev.
Per trip	4	1	6	5	0.65
At point of Origin	2	0	4	4	1.21
Enroute	3	0	4	4	0.96

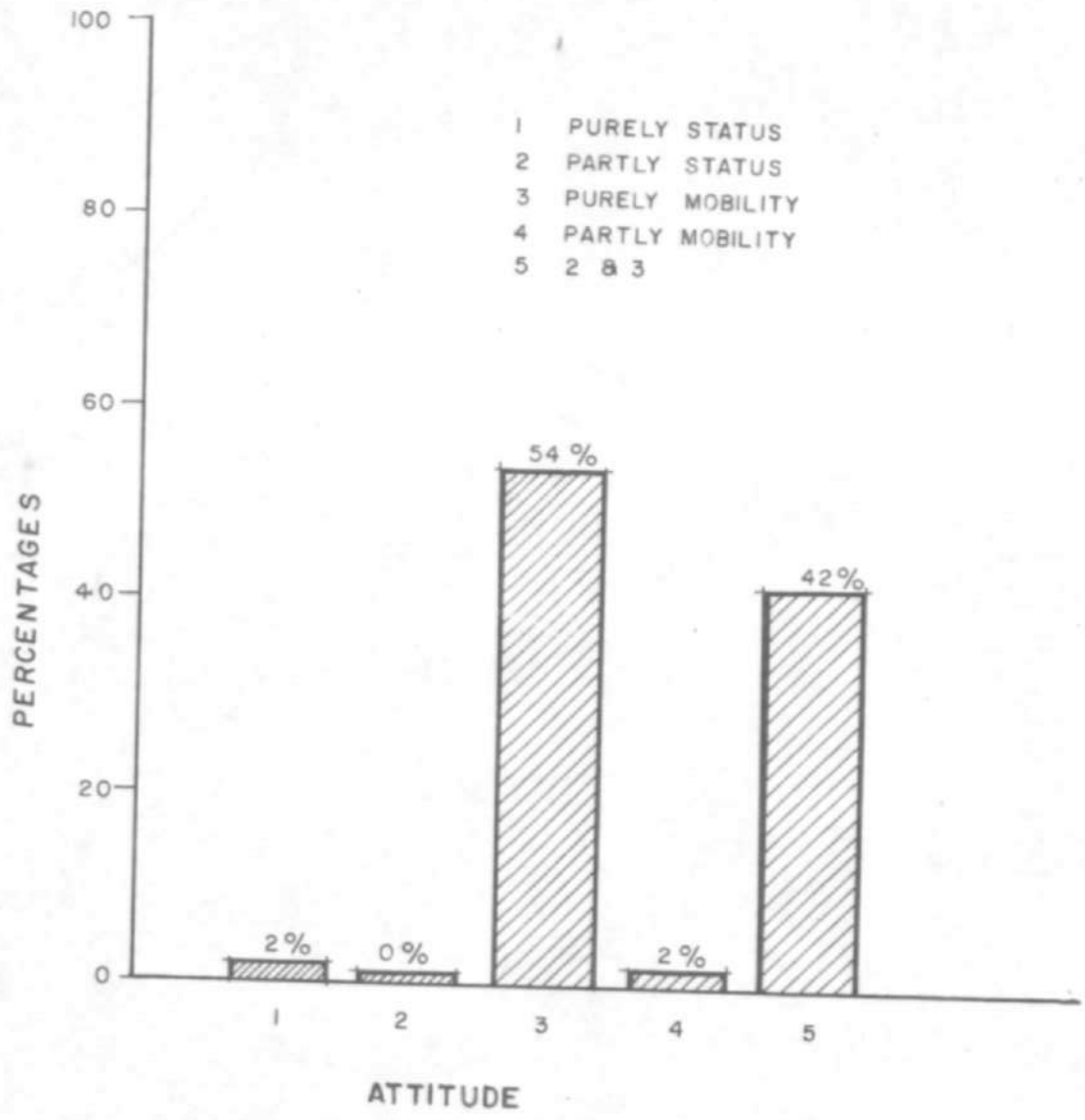
Source: Fieldwork Aug. 1978

(vii) Peak Periods:- The morning peak period is between 7. a.m and 10 a.m. while the afternoon peak period is between 3 p.m. and 5 p.m.

(viii) Trip Time:- The taxi drivers were asked to estimate the average time it normally takes them to make a single trip. The mean average time per single trip is twenty-one minutes while the minimum is ten minutes and the standard deviation is 9.2 minutes. It takes between thirty-five to fifty minutes to make a single trip during peak hours.

(ix) Taxi fare Structure:- Drivers were also asked to indicate their preference for the system of transport fare between bargaining and fixed fare typologies. Forty-eight per cent opted for the system of individual bargaining while fifty-two per cent prefered fixing of taxi fare. The difference of four per cent does not appear significant to make the finding conclusive.

(x) The taxi drivers were able to recognise a few problems incidental to taxi operation within Ilorin. They were instructed to name two problems that they consider top most. The distribution of the respondents into problem categories identified by them is shown in Table 5.4.



ILORIN	ATTITUDE TO CAR USE & OWNERSHIP		U. R. P. DEPT. A. B. U. ZARIA	FIG No 5·6	DWGN By isaac megbolcube Msc 1978/79

TABLE 5.4: TRANSPORTATION PROBLEMS AS IDENTIFIED BY TAXI DRIVERS IN ILORIN

	PROBLEM	Number of Driver	Percentage of Driver
1	Traffic Congestion	156	94
2	Few Access Roads	56	34
3	Parking Problems	46	28
4	Poor Road Geometrics	6	4
5	Poor Driving Habits	48	29

Source: Fieldwork, Aug. 1978

(xi) Transportation olution Proposals:- The respondents were asked to suggest solutions to the transport problems identified in (X). Each respondent was requested to make only two suggestions. More than ninety-eight per cent of the respondents recommended construction of more roads and widening of existing ones. They appear to perceive the problem of transportation system in Ilorin essentially in terms of highway engineering. This may be true but does not have to be so.

5.50 PRIVATE TRANSPORT SITUATION

The use-characteristics of main transport modes within Ilorin were analyzed from the household information data obtained during home-interview survey by cross-tabulating journey time and transport mode for all households sampled. Table 5.5 shows the result

Of the analysis:

(i) Cars tend to be prefered for all trip categories;

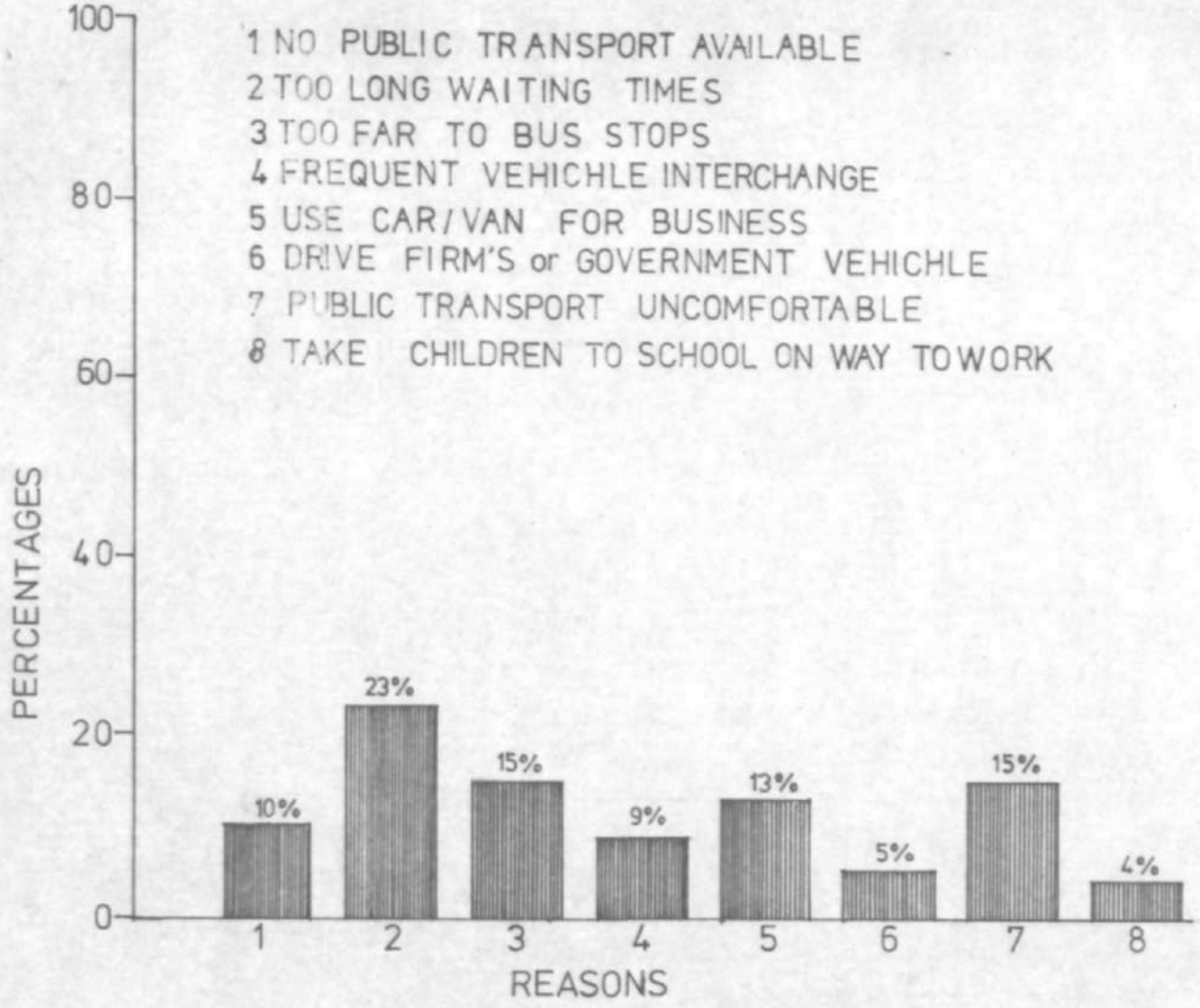
(ii) as journey time increases people start to opt for the use of the bus;

(iii) people want taxis mostly for short trips and

(iv) for all trip categories people regard taxi and buses as one and the same, that is, public transport mode.

TABLE 5.5: USE XTERISTICS OF TRANSPORT MODES IN ILORIN

COUNT ROW PCT COL PCT TOT PCT	Transport Mode		
Journey Time (in minutes)	Car	Taxi	Bus
Below 5	37	0	2
	94.9	0	2.3
	5.3	0	2.0
	3.9	0	0.2
5 - 9	39	4	1
	88.6	9.1	5.1
	5.6	3.1	1.0
	4.1	0.4	0.1
10 - 14	63	8	7
	79.7	10.1	7.4
	9.1	6.2	7.1
	6.7	0.8	0.7



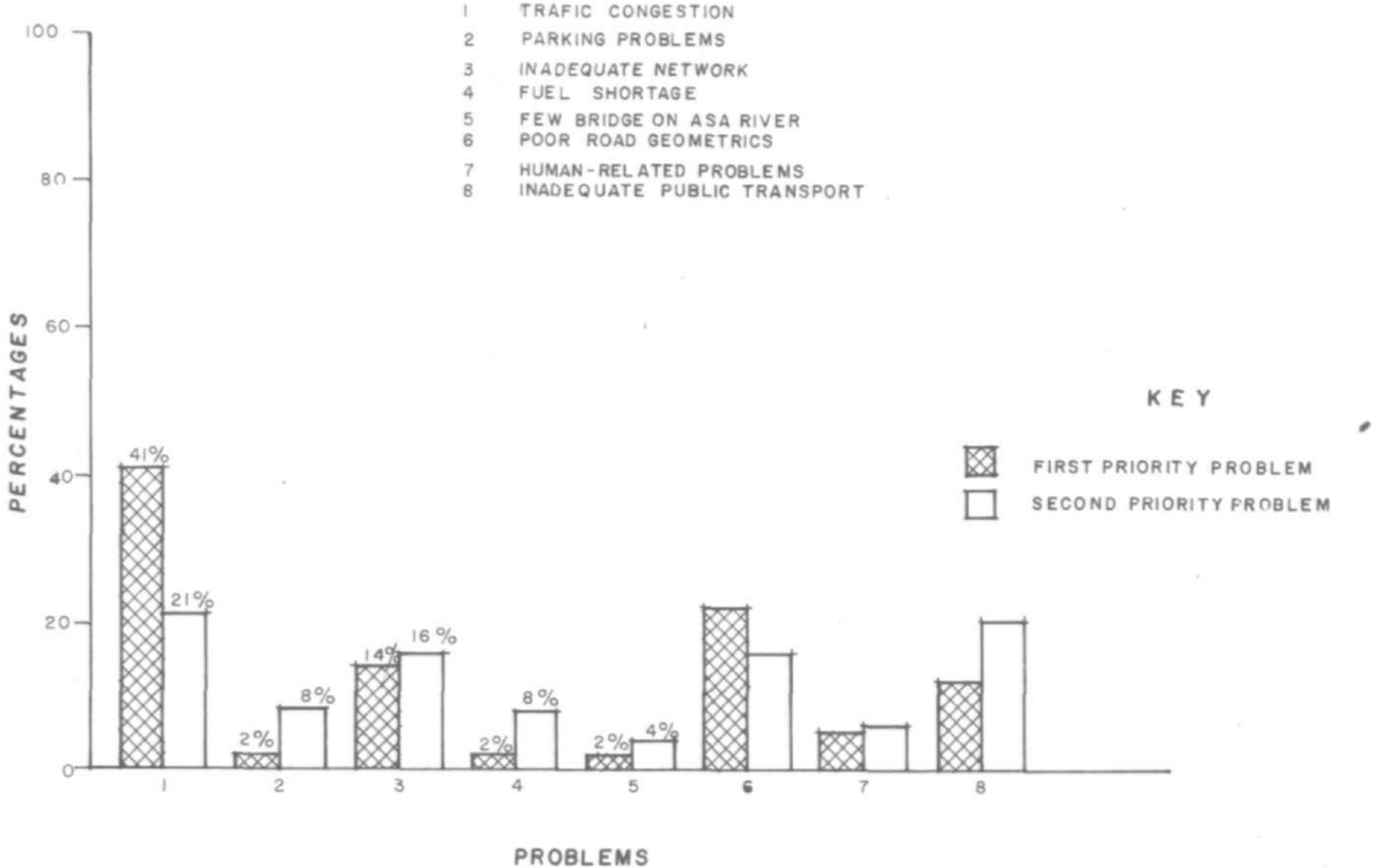
ILORIN	REASONS FOR THE USE OF PRIVATE TRANSPORT.	U.R.P. DEPT. A. B U ZARIA JUNE, 1979	FIG No 5.7	megbolugbe isaac m sc. thesis

15 - 29	61	8	6
	13.3	9.9	8.9
	8.8	6.2	6.1
	6.4	0.8	0.6
30 - 60	68	62	26
	89.5	7.9	11.1
	9.8	4.7	2.0
	7.2	0.6	0.2
Others	18	1	4
	78.3	4.3	17.4
	2.6	0.8	4.1
	1.9	0.1	0.4

Source: Fieldwork, Aug. 1978

The attitude of people to car ownership and use was investigated during the home-interview survey. Fig. 5.6 describes the distribution of the respondents into attitude groups. Fifty-four per cent of the respondents perceive a car purely as a means of mobility and forty-two per cent, purely as a status symbol and partly as a means of mobility.

Reasons for the use of private transport are further illustrated by Fig 5.7. The proportion of total respondent distributed to each category as shown in fig 5.7 is small, the highest being twenty-three per cent. The



ILORIN	TRANS PORTATION PROBLEMS		U. R. P. DEPT A. B. U. ZARIA	FIG No 5.8	DWGN By isaac megbolugbe Msc. 1978/79

figure shows, therefore, that most passengers in taxis and buses in Ilorin are captive riders or users.

During the home-interview survey, respondents were asked to mention two top most transportation problems and two top most solution prposals. The results of the households are presented in Fig 5.8 and fig 5.9 respectively.

5.60 CONCLUDING REMARKS

There are a number of incovinience factors in the use of public transport in Ilorin as already illustrated in Fig 5.2. These inconviniences are removable or at least reduceable so that public transport may be made more attractive. It is on this pedestal coupled with the result of the analysis of the use characteristics of major transport modes in Ilorin as presented in Table 5.5. that the author builds his optimism for the feasibility of using taxis and buses effectively for public transport planning in Ilorin.

CHAPTER SIX

PROGRAMME OF PLANNING PROPOSALS

6.10 INTRODUCTION

The nature and salient characteristic features of the existing transport situation in Ilorin have been discussed directly or indirectly, in the preceding five chapters. Some of the transportation planning problems in Ilorin were also described. The purpose of this chapter is to identify and discuss a programme of planning proposals aimed at improving the transportation system in Ilorin with special attention given to public transportation.

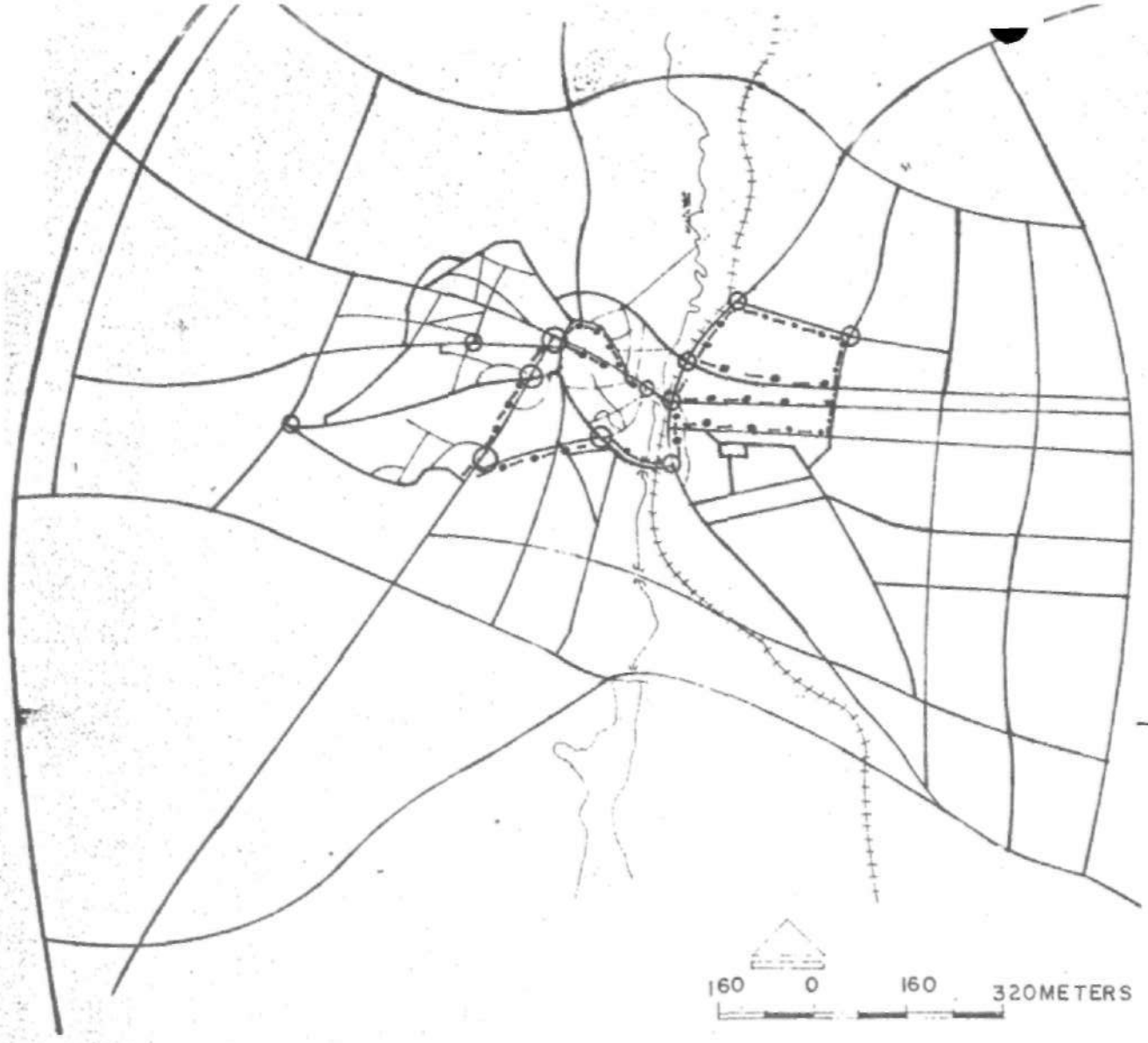
6.20 REGULATION OF THE MINI-BUSES

The operation of the transport services offered by mini-buses owned by the private sector are to be regulated. This policy proposal may be miscontrued as a negation of the intents and purposes of government: It is the cherished and avowed policy of the Government, a school of thought contends, that she does not in any form pitch camp that apparently potrays the government as being in competition with or operating against the interest of the private sector. It is in light of this that some people might feel that even when the government can muster all the resources needed to run an efficient City-Bus Service, the number of buses owned exclusively by the Government should as a matter of deliberate strategy, be limited so that government is not regarded as a

tactical monopolist whose objectives amount to a systematic climination of the private enterprise. The author believes that the private sector should participate in the task of moving people around within the city. However, this belief is predicated on arguments different from those outlined above:

It is a fact that most City Councils in cities of developing countries, Ilorin inclusive, do not possess the requisite resources to go all it alone with meeting the urban travel demand. For this reason of resouree limitation, the private sector are to provide buses and guidelines are to be provided to make the operation of such buses compatible with and complementary to that of the public sector. The guidelines are to cover vehicle capacity and general performance characteristies.

The privately-owned buses are to use the tickets of the Kwara State Transport Corporation. The routing, scheduling and operational control are to be supervised by the officials of KSTC. The buses may be serviced at the KSTC's workshop at reduced charges along with KSTC's buses. KSTC can even provide the drivers8 The buses will, however, bear the name of the owner and agreed formula worked out as to the sharing of revenue acrueing from the use of such buses for the City Bus Service. This type of co-operation between the public and private sectors has worked in New Delhi in India and Lagos in Nigeria and if adequately supervised and managed, the arrangement can be a penacea to the problem



O PRIORITY INTERSECTION

—•—•— BUS LANE

160 0 160 320METERS

ILORIN	BUS PRIORITY SCHEMES	SOURCES: ILORIN MASTERPLAN FIELD WORK	U.R.P.DEPT: A.B.U.ZAR.	FIG No: 6.1	DWGN By: ISAAC MEGBOLUGBE Msc 1978/79

of supply of buses for the operation of City Bus Service in Ilorin.

6.30 INTRODUCTION OF BUS PRIORITY SCHEMES

Buses are to pass at major road intersections without having to queue like other transport modes. During the peak hours (7 a.m. - 9 a.m; and 2.30 p.m.- 5 p.m.), bus lanes are provided on large volume routes as shown in Fig 6.1. On - street parking is prohibited at these times.

Bus Priority Schemes are intended to give better conditions for buses and advantage over cars in accessibility especially during peak hours. Apart from removing excessive delays caused when too many vehicles attempt to make use of an intersection or street as it is now the case in Ilorin, changes in average speed of buses may not really be substantial and even if it does, it may not be desirable because it may increase pedestrian accidents. This is why the schemes should be limited only to peak hours when such measures are, infact, most needed.

6.40 INTRODUCTION OF BETTER BUS SERVICES

The introduction of better bus services in Ilorin will involve provision of comfortable buses in terms of size, type and number; adequate routing of buses; convinient location and spacing of bus stops and terminals; adequate bus scheduling and efficient control and

supervision of the bus operations.

(i) Number of Buses:- About forty-five of the trips produced per day are expected to be made by bus mode as estimated in chapter four. Thirty - five per cent of the total daily work trips are concentrated between 6.30 am.and 9.30 am. during the morning peak hours. Using the work trips data, about seven thousands passenger-seats in buses are estimated per hour during the peak hours. The average hourney time for a bus per round trip is sixty minutes. It means that a bus can make six single trips within the peak period. The number of buses required to meet this level of travel demand can be estimated if the passenger capacity of the bus to be used is known. Also, it depends on the percentage of peak-hour demand that one wants to satisfy.

A bus of one hundred passenger capacity with forty-two sitting and fifty-eight standing is recommended. The number of buses required to meet peak-hour demand by workers is seventy-two. The use of work trip data alone is rationalised by the fact that about eighty per cent of trips during the morning peak hours and work trips and about sixty-five per cent of potential bus riders during this time are going to work.

It should be realised that there are other trip categories that are not considered in the estimation of bus travel demand. Yet, the number of buses required in 1978 during the peak hours appears unrealistic. However, it is pertinent to note that there is usually

a gap between the level of bus travel demand and supply as the level of demand cannot be used as a rigid index for determining the number of buses required for the City-Bus services. Also, there is the problem of what to do with the buses during off-park hours. This is why only a percentage of the bus travel demand is usually satisfied so as to ensure an almost one hundred percent utilization of bus capacity everywhere within the urban area in question. This is an important consideration for the economic viability of City-Bus Service. A percentage of sixty to seventy five of peak hour demand is usually adopted in the developed countries for City Bus Service Plannin in cities of 400,000 - 800,000 popolation. A percentage of sixty is recommednded for Ilorin. There will be a need for about forty-two buses to run the City-Bus Service effecitvely throughout the day. The number could be more but not less.

(ii) City Bus Service Operations:

Four types of Bus Services are recommended to be operated in Ilorin:

(1) Ordinary Bus Service (OBS)

(2) Express Bus Service (EBS)

(3) Origin - Destination Bus Service (O/D)

(4) Park and Ride Bus Service (P&R)

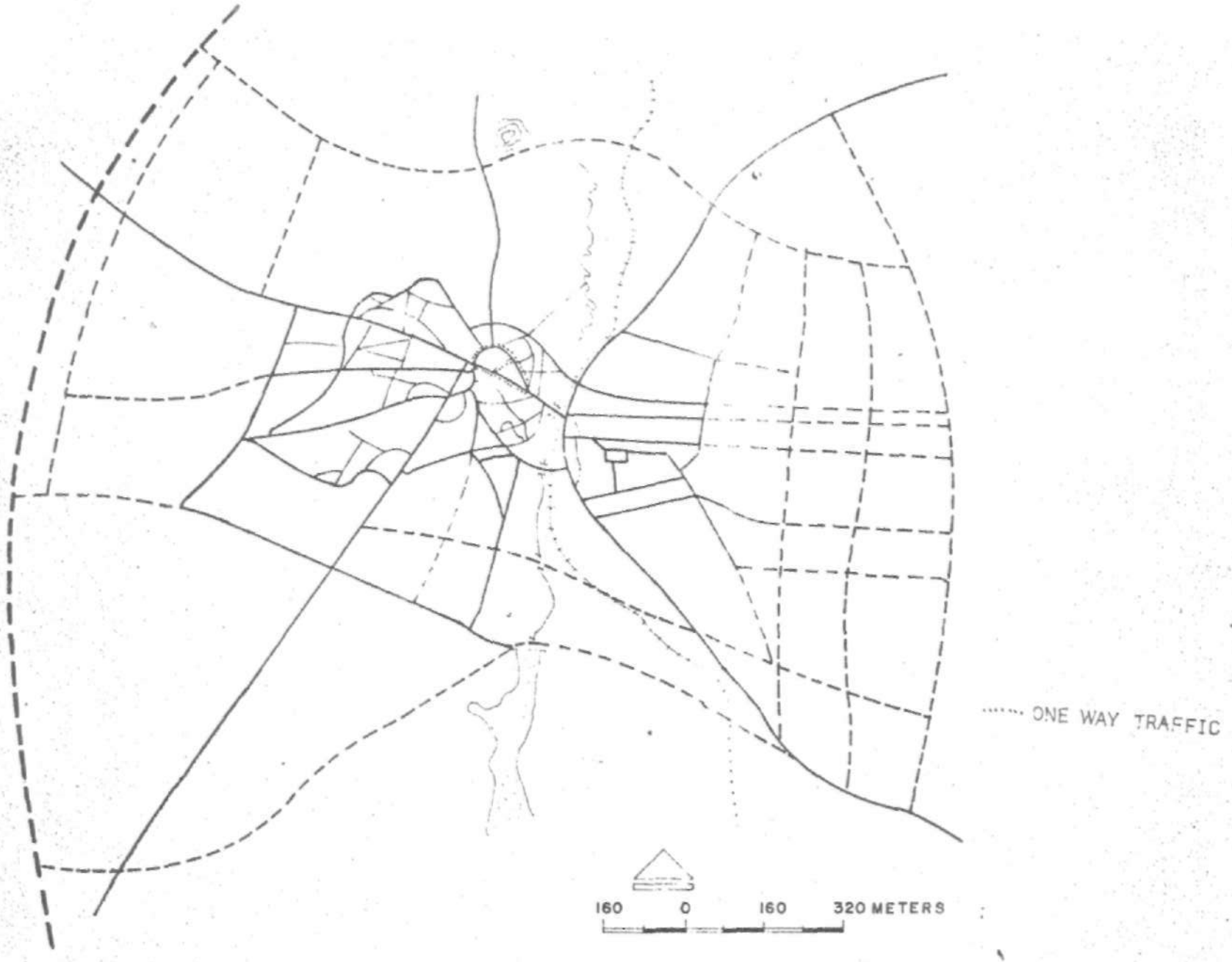
The Ordinary Bus Service will be offered on all the proposed bus routes. Buses are expected to stop at all bus stops, except when at full capacity or no passenger wanting to alight or board. This service

is expected to be cheapest. It will operate between 6.30 a.m and 8.30 p.m. daily.

Express Bus Service are limited to large volume routes. Buses will not be required to stop between a zone of origin and a zone of destination. The service is expected to be faster than the OBS and will therefore, attract a higher bus fare. The introduction of the service will require a high volume of traffic between same origin and destination pairs, but this condition may not be met during the first phase (1979-1981). The service will be operated between 6.30 a.m and 5 p.m from Monday to Saturdays.

Origin- Destination Bus Service will be operated only during the peak hours in the morning when people are going to work and afternoon when workers will be returning home. Between an origin and destination, an origin-destination bus will not stop. Sometimes, apart from the peak hours demand, the demand for bus travel during other hours of the day may not be enough to justify a network of bus services such as the EBS. This is why there is a need to introduce O/D to take care of such peculiar demand. This service is a special variant of EBS.

Park and Ride buses are expected to be used by workers during office hours and breaktime for trips made usually during office hours. The service will operate between 10 a.m. and 4 p.m. from Mondays to Fridays. The service will be limited to specified routes.



ILORIN	ROADS EVALUATED FOR BUS ROUTING	SOURCES: LORIN MASTERPLAN FIELD WORK	U.R.P.DEPT: A.B.U.ZAR.	FIG No: 6·2	DWGN By: ISAAC MEGBOLUGBE Msc 1978/79

Luxury buses are to be bought for this purpose so that people in the car owning group can be encouraged to patronize the service. The service will be available to any user. It means the riders do not have to be workers all the times.

The four variant of City Bus Services proposed for Ilorin require a top quality co-ordination. Buses are to be withdrawn from one type of service to another depending on the circumstances. For instance, EBS's buses may be diverted to O/D. This will be one simply by changing the operating label of the bus. What these proposal require to work is an efficient team of bus operation supervisors who are expected to ensure that all the four services are optimally utilized. There is also a need for a more accurate O-D counts since the data in this thesis constitute the result of an individual's efforts.

(iii) Bus Routes:

The streets which could be used as bus routes are shown in fig 6.2. All the roads except those shown with dots lined against them operate two-way traffic. The geometric features, especially the with and surfacing, of theroads are taken into account in their selection. There is no road selected that is less than seven meters wide and all existing roads are surfaced with a minimum of six millimitres layer of asphalt concrete.

The Proposed Bus Routes are shown in Fig 6.3. The routes have been laid out so as to provide maximum

service to the community as a whole. The Bus Service is conceived on a system-wide basis, but in the development of individual bus routes a few guideline are employed to aid the selection of links making up a route:-

(1) that the routes should be direct with respect to origin and destination of passengers with transfers which riders must make held at a minimum. The maximum number of transfers envisaged is two.

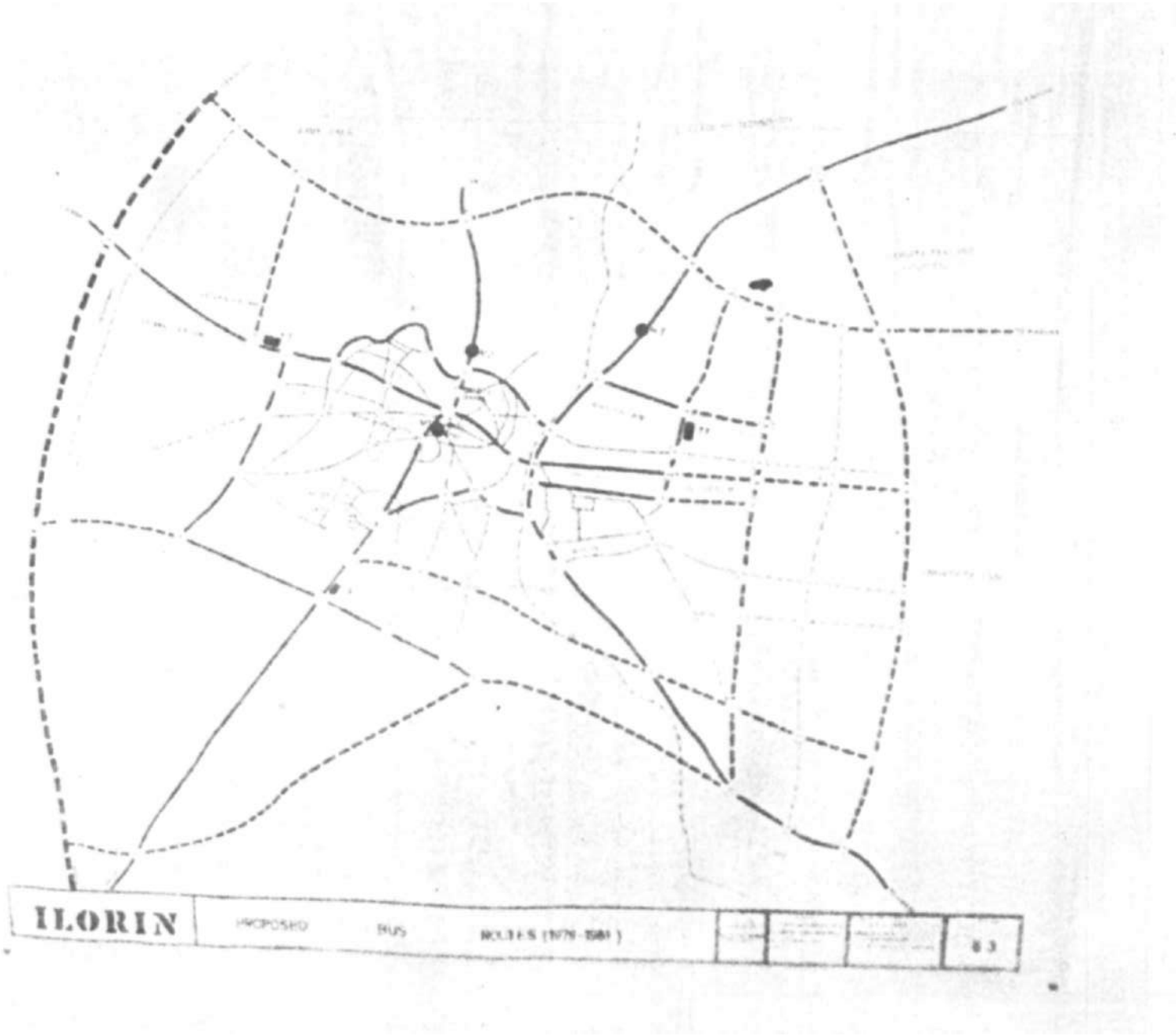
(2) that the routes should be free of duplication except where they converge or on a road section that has a large volume of load.

(3) that the routes should include a minimum number of turning movements and should have adequate provision for turn around at both ends. The loop system of routing is preferred.

(4) that the routes should have a reasonable long-term flexibility to meet changing conditions. This is why no route is dead-ended. All routes can be extended as the spatial extent of Ilorin increases.

(5) that the routes should be laid out to take full advantage of street characteristics and possible operational improvements. Factors considered include the condition and type of road ways utilized in terms of design features, traffic management measures, etc.

The road network utilized in the designing of the proposed bus routes is described by numbering major


ILORIN
PROPOSED BUS ROUTES (1979-1981)
83

road intersections. The numbering system has helped in describing various bus routes. The routes shown in fig 6.3. covers only the first phase in the implementation of the proposals contained in this thesis. The first phase is between 1979-1981, Seven routes are proposed in this phase:-

Route I:

T_3 - 24 - 23 - 22 - 21 - 20 - 29 - 30
- 42 - 41 - 44 - 55 - T_1 - 46 - 47 - 45
- 48 - 16 - 14 - 5 - 12 - 11 - 10 - 9 -
- 8 - 25 - T_3

Route 2:

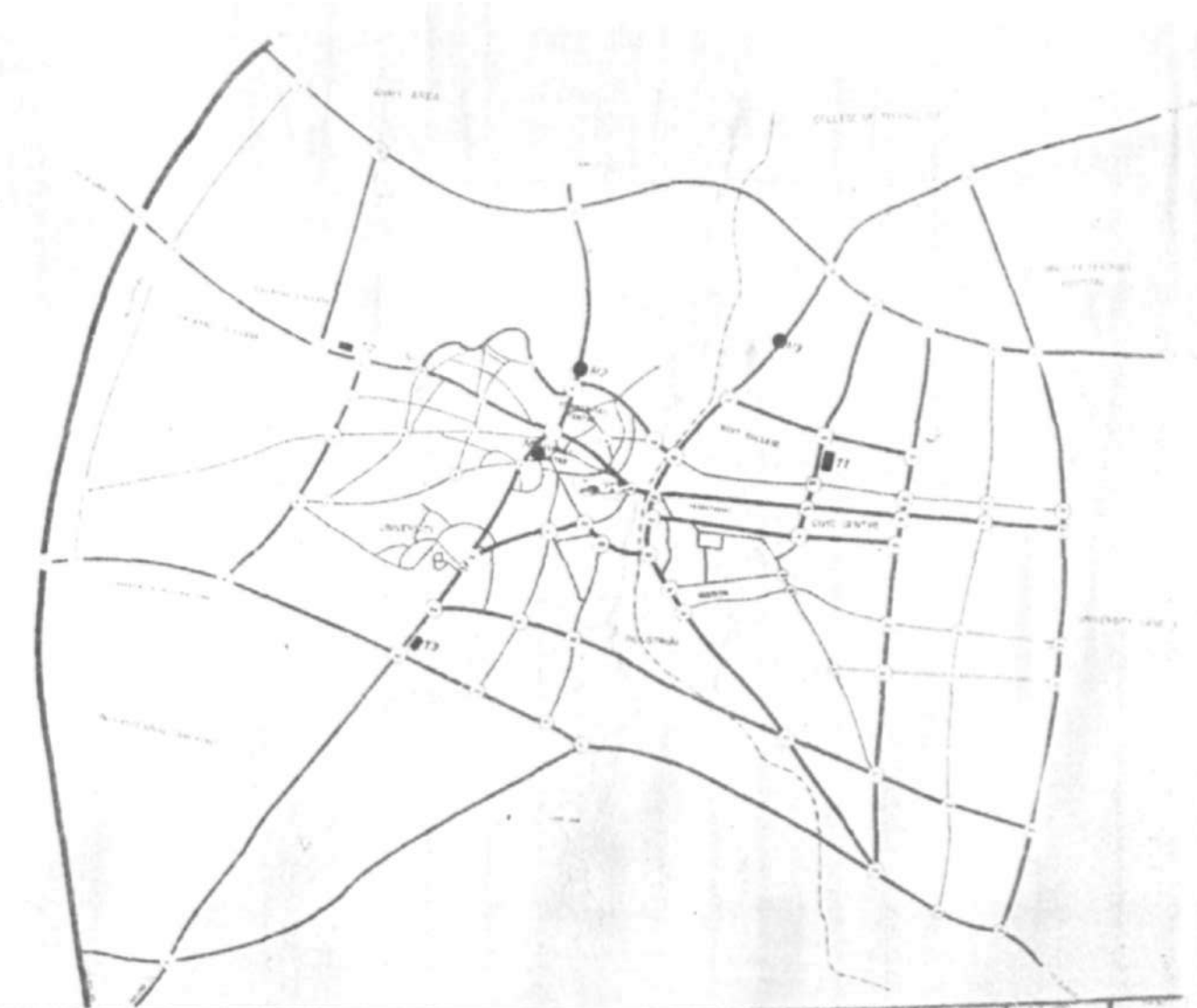
T_1 - 46 - 47 - 45 - 48 - 18 - 17 - 1 -
2 - 4 - 7 - 9 - 23 - 22 - 21 - 20 -
29 - 30 - 42 - 41 - 44 - 55 - T_1

Route 3:

M_3 - 47 - 45 - 43 - 42 - 30 - 31
- 32 - T_2 - 32 - 31 - 30 - 42
- 43 - 45 - 47 - M_3

Route 4:

1 - 3 - 6 - 10 - 11 - 12 - 5 - 6 - 7
- 4 - 3 - 13 - 1



ILORIN	PROPOSED BUS ROUTES (1982-1985)				64

Route 5:

14 - 12 - 5 - 13 - 1 - 19 - 43 - 44 - 45
- 45 - 48 - 18 - 17 - 1 - 13 - 5 -
12 - 14

Route 6:

T_1 - 55 - 45 - 48 - 18 - 17 - 1 - 2 -
20 - 19 - 43 - 44 - 55 - T_1

Route 7:

15 - 16 - 1 - 2 - 22 - 4 - 7 - 9 - 23
- 22 - 22 - straight to 18 - 17 - 6 - 15

The proposed roads are expected to be constructed during the second phase in the implementation of the masterplan of Ilorin which is between 1980 - 1990. It is assumed in this study that the main road network connecting the main activity areas in the masterplan would have been constructed by the end of the Fourth National Development Plan which is expected to commence from 1981. Hence, in the second phase (1982-85) of the bus route proposal shown in fig 6.4., some existing bus routes are extended and new routes proposed:

New Bus Routes Proposed are:-

(1) 74 - 75 - 77 - 78 - 8 - 25 - 26 - 27
- 71 - 34 - 37 - 65 - 60 - 59 -
58 - 56 - 54 - 51 - 50 - 49 - 15
- 72 - 74

(2) $1\tilde{4}$ - 73 - 72 - 15 - 16 - 1 - 2 - 22
- 23 - 24 - 25 - 8 - 9 - 10 - 11- 12 -
$1\tilde{3}$

(3) T_1 - 50 - 52 - 57 - 61 - 63 - 66 - 68
- 35 - 34 - 37 - 38 - 39 - 40 - 41
- 44 - 55 - 46

Some of the existing bus routes extended are:-

(1) Route 4 extended to include link 10 - 17

(2) Route 5 extended to link 55 -
56 - 57 - 62 - 61 - 58 - 44

It is pertinent to note that the routing of buses has to be very flexible to reflect changing conditions. The routes proposed in this work are not to be followed rigidly since there is a need to observe the operation of buses for some time before any routing strategy can be stabilised. However, all the links utilized in the design of the bus routes are to be included in any review of the proposals in this study.

The bus routes can be used for any of the four types of bus service operations outlined earlier on. Eight main traffic generating zones are identified as shown in fig. 6.5:

(1) Secretariat - Civic Centre Zone

(2) Kulenda Zone

(3) District Centre Zone

(4) Sobi Area Zone

(5) Oloje Area Zone

(6) University and Adewole Housing Estate Zone

(7) Industrial Zone

(8) College of Technology Zone

The objective of the Express and O-D buses will be to convey passengers from one zone to another. The route followed in every trip does not have to be the same. This will be determined by the Operations Supervisors and Inspectors who are to stay at the Bus Termini and Main Bus Stops. Express Buses will not connect College of Technology and other areas of Ilorin in the first phase (1979-81). This is because there will still be a large tract of undeveloped land between the College and Ilorin town. O-D buses will take workers to work in the morning and bring them back in the evening. It is expected that as soon as passengers get to one of the zones they will be able to find their way to their respective homes or offices as the case may be.

The Park and Ride buses will be expected to carry workers between the Secretariat Zone, District Centre Zone, University Area, Oloje Area and Industrial Area. The routes to be followed by Park and Ride buses are shown in fig 6.6.

(iv) Location and Spacing of Bus Stops:-

The location of Bus Stops is based essentially on the local knowledge of the study area in the existing built-up area and on application of standards in the

new areas. The nature of existing development,

new areas. The nature of existing development, especially site characteristics of the selected spots, is put into consideration.

The elements of total time in a single trip comprise:

(1) walk to public transport stop;

(2) wait for bus to arrive;

(3) board vehicle;

(4) vehicle accelerates to steady speed;

(5) vehicle runs at steady speed;

(6) vehicle decelerates to stop;

(7) intermediate stop time;

(8) alight from vehicle

(9) walk to destination or interchange point, for further public transport journeys forming part of a linked trip;

(10) (iv) - (vii) cycle repeated for each intermediate stop. The objective constraint in urban transport system design is the total travel time.

The problem in network design is how to achieve optimum stop spacing to minimize total travel time. There are a few techniques to derive the solution as scientifically as practicable under specified assumptions[1]. No attempt was made to apply any of these techniques because sixty-two per cent of respondents in the home-interview survey did not answer questions on time budget and expenditure on the applicable trip. A further twenty-six

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1 White P. R. (1976), Planning for Public Transport, Hutchinson of London reviews some of these techniques

BERLIN

per cent did not complete all the relevant questions. Hence, a few creteria are developed to guide the spacing of bus stops. The distance between two bus stops should not be more than a ten-miniute - walk which is not more than a kilometre. The bus stops are located near, as much as possible, to intersections. Undesirable though it may be from a traffic aspect, intersections are the most convinient for passengers. The location of bus stops and termini are shown in fig. 6.7.

(v) Bus Station Design Proposals[2]:

The great majority of bus passengers are usually picked up and set down at Kerbside stops. This is not merely a measure enforced by low investment in public transport but is often desirable. Stops are placed close to main traffic attractors and buses are not expected to be diverted from their routes. Nevertheless, the need for improving conditions, at conventional bus stops will be part of a general improvement of the public transport system in Ilorin Urban Area.

Bus stops, if adequately designed, will limit parking by other vehicles which obstruct bus movement. Also, if a bus cannot pull up at a lay - by insert into the kerb, it will block a lane intended for traffic as it picks up and discharges passengers. If buses do not stop frequently at desirable locations, then passengers will be

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2 The author acknowledges the permission of Mr. S. K. Kulshiestha of Dept. of Planning A.B.U. to use some of his materials in the Zaria Study Programmes.

encouraged to take taxis or use private transport, thereby increasing traffic congestion and demand for road and parking facilities.

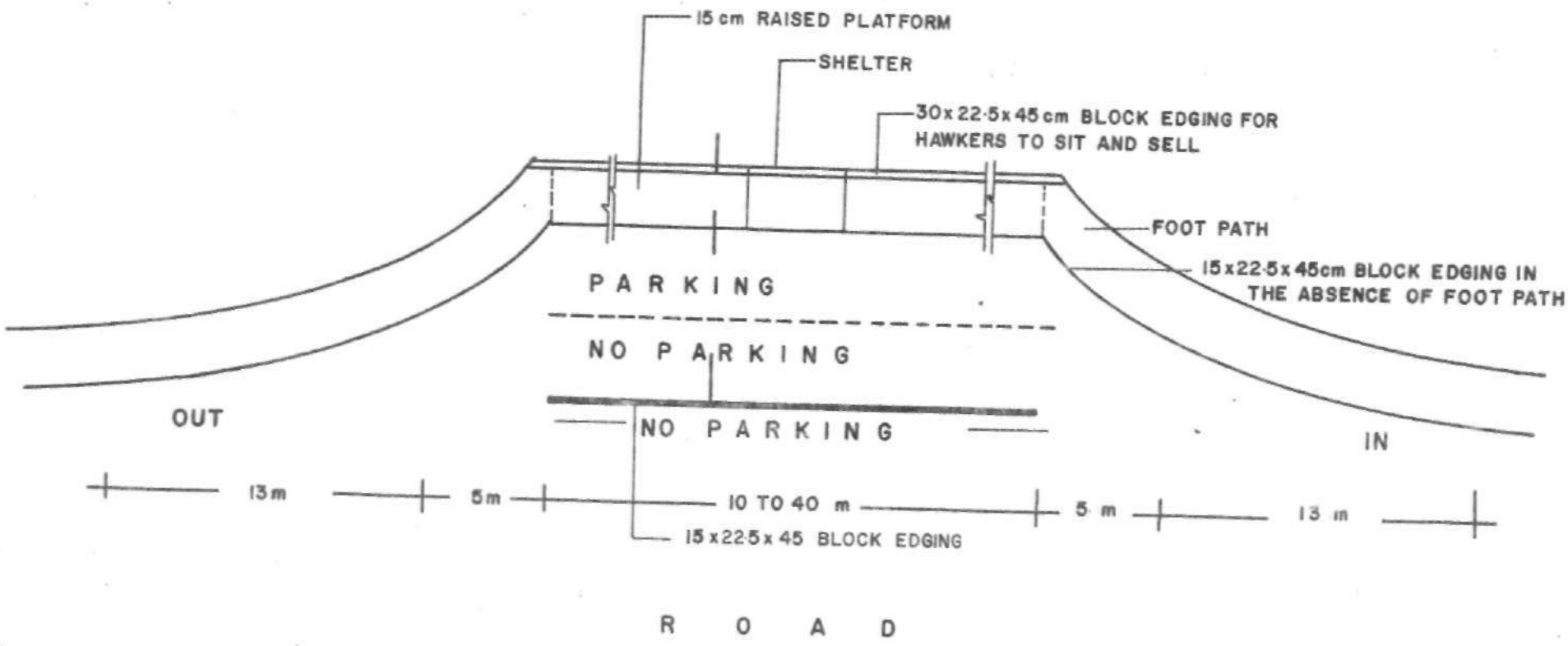
Better shelters and time-table information will reduce umpleasantness of waiting and minimize the impact of the inconvinience factor in the use of public transport within Ilorin:

(1) The Design of Bus Bays:- Figures 6.8 and 6.9 give the design of a typical bus bay. It includes raised platform, location of shelter and place for hawkers along with the bays showing the circulation system.

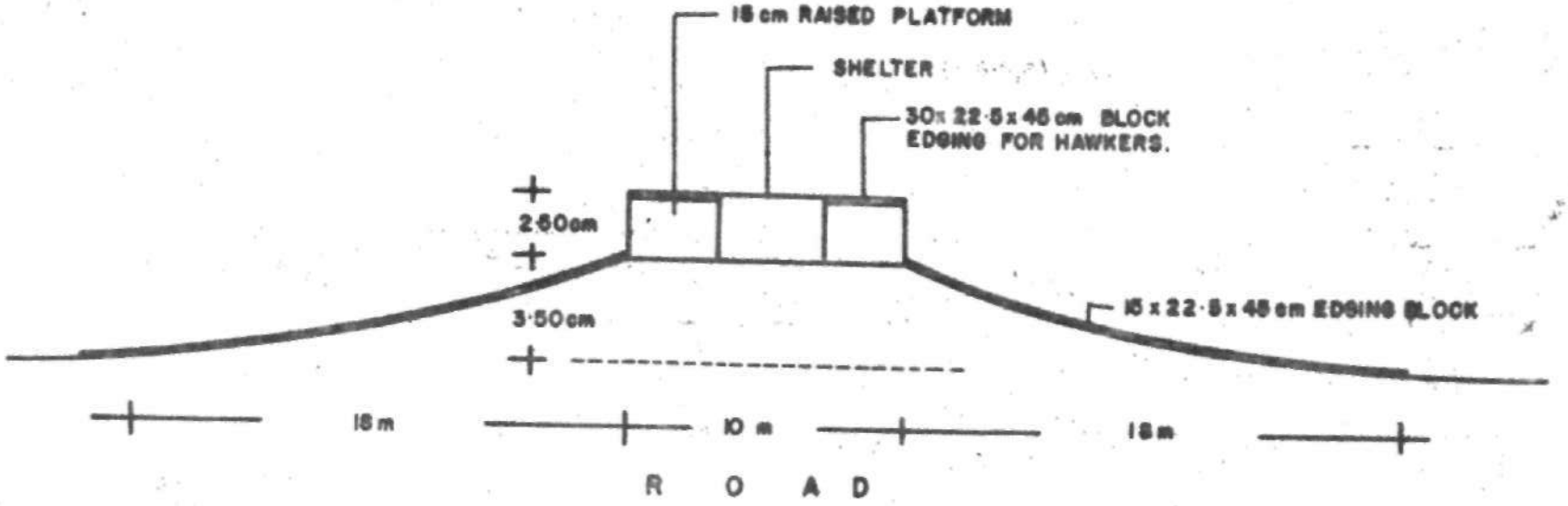
(2) The Design of Shelter: Figures 6',10 and 6.11 give the design of a typical shelter. For the convinience of passengers a bench has been provided as an integral part of the design. It, also, has four panels for advertisements. For the safety of passengers, the platform has been raised by 15 cms. from the ground. Place for hawkers has also been provided on this platform.

(3) The Design of the Terminus:- Figure 6.12 shows the design of a typical bus/taxi terminus as recommended for the four proposed termini. The existing motor parks for inter-city transport are not part of the proposals.

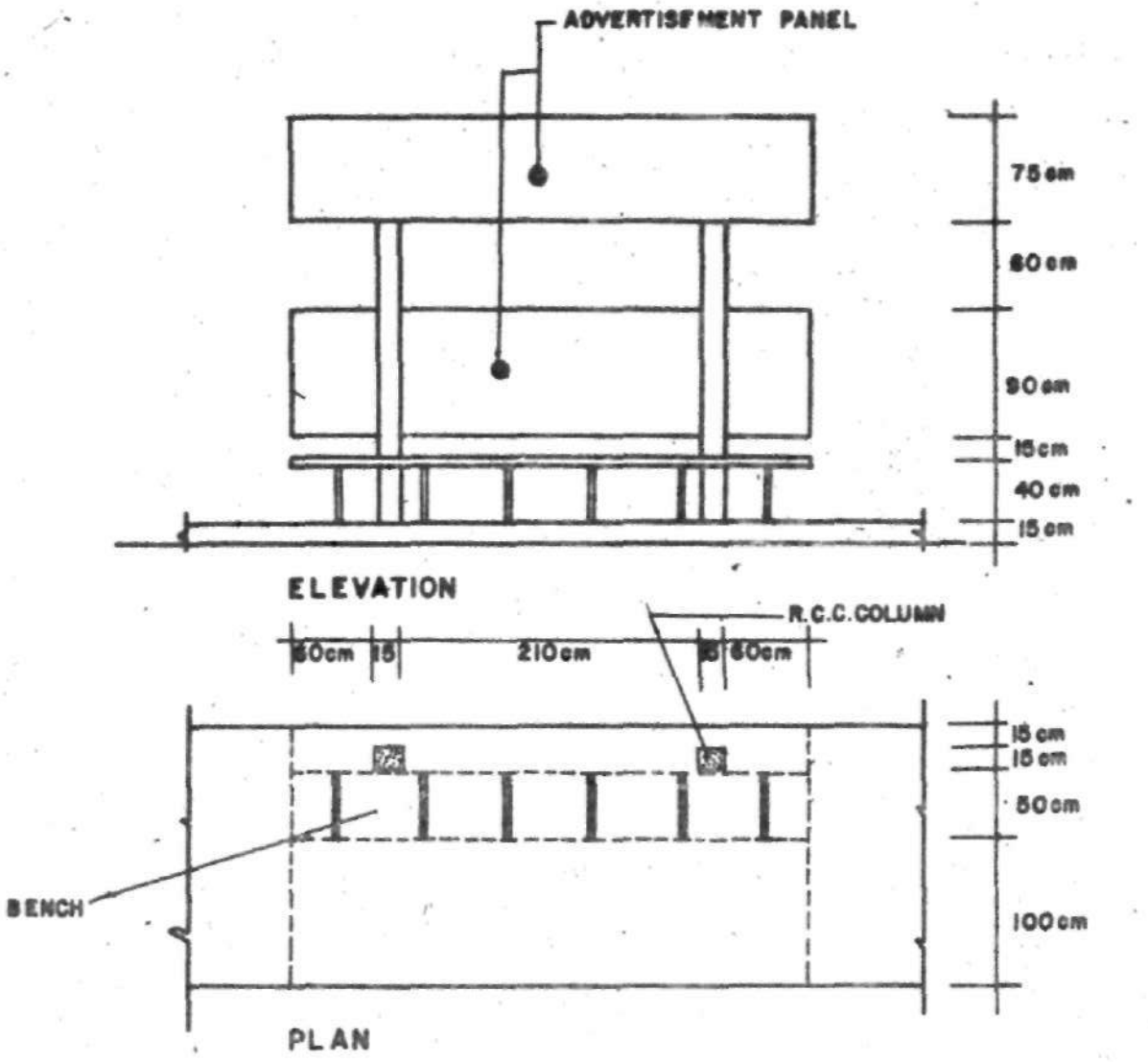
(4) The Design of Advertisement Tower:- Figure 6.13 gives the design of advertisement tower which may be provided at the termini and selected bus stops especially at the main bus stops.



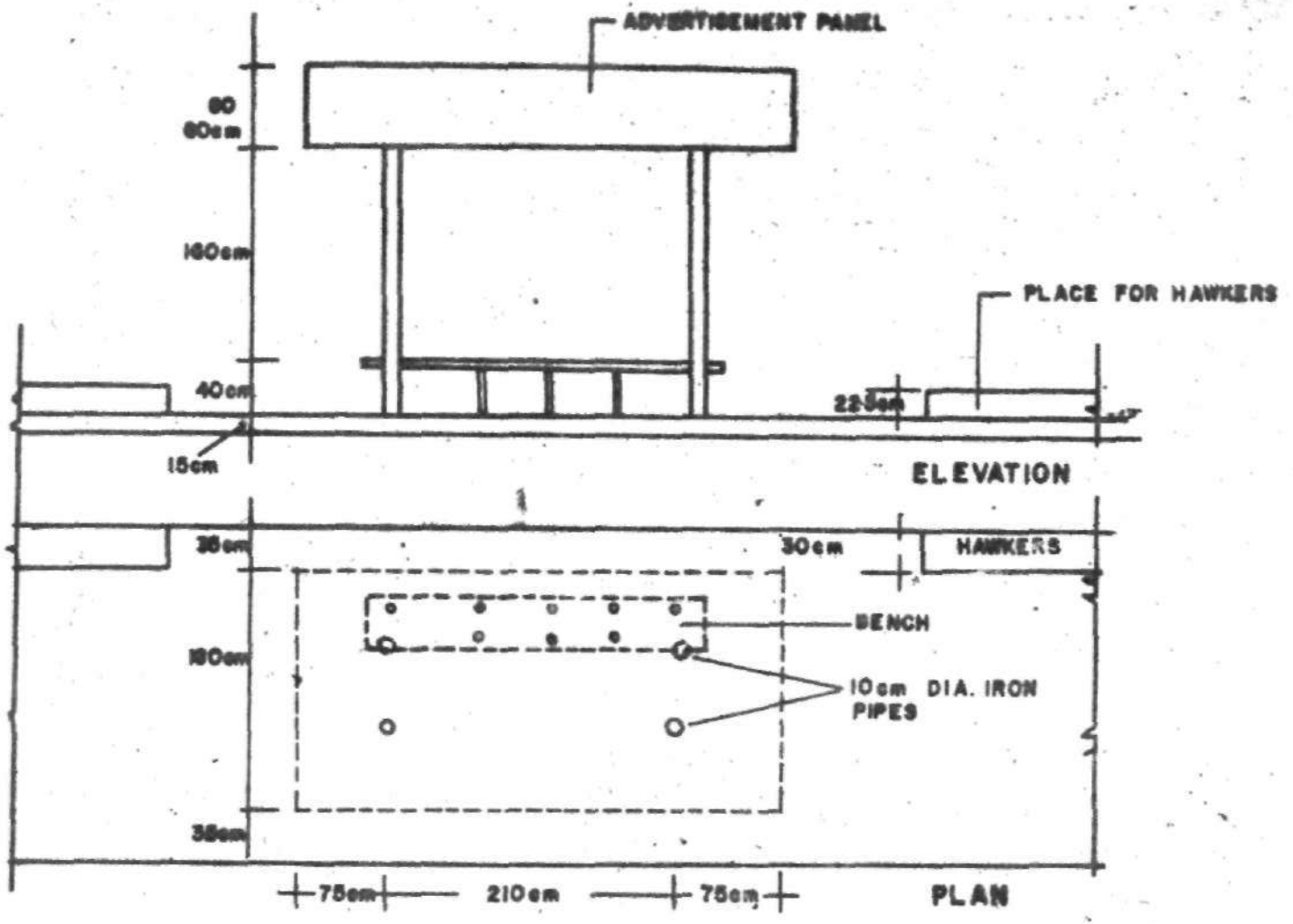
LORIN	DESIGN OF A TYPICAL BUS BAY (FOR VERY BUSY ROADS)	Scale 1:250	U.R.P. DEPT. A. B.U, ZARIA	FIG No 6·8	DWGN By- isaac megbolugbe Msc. 1978/79



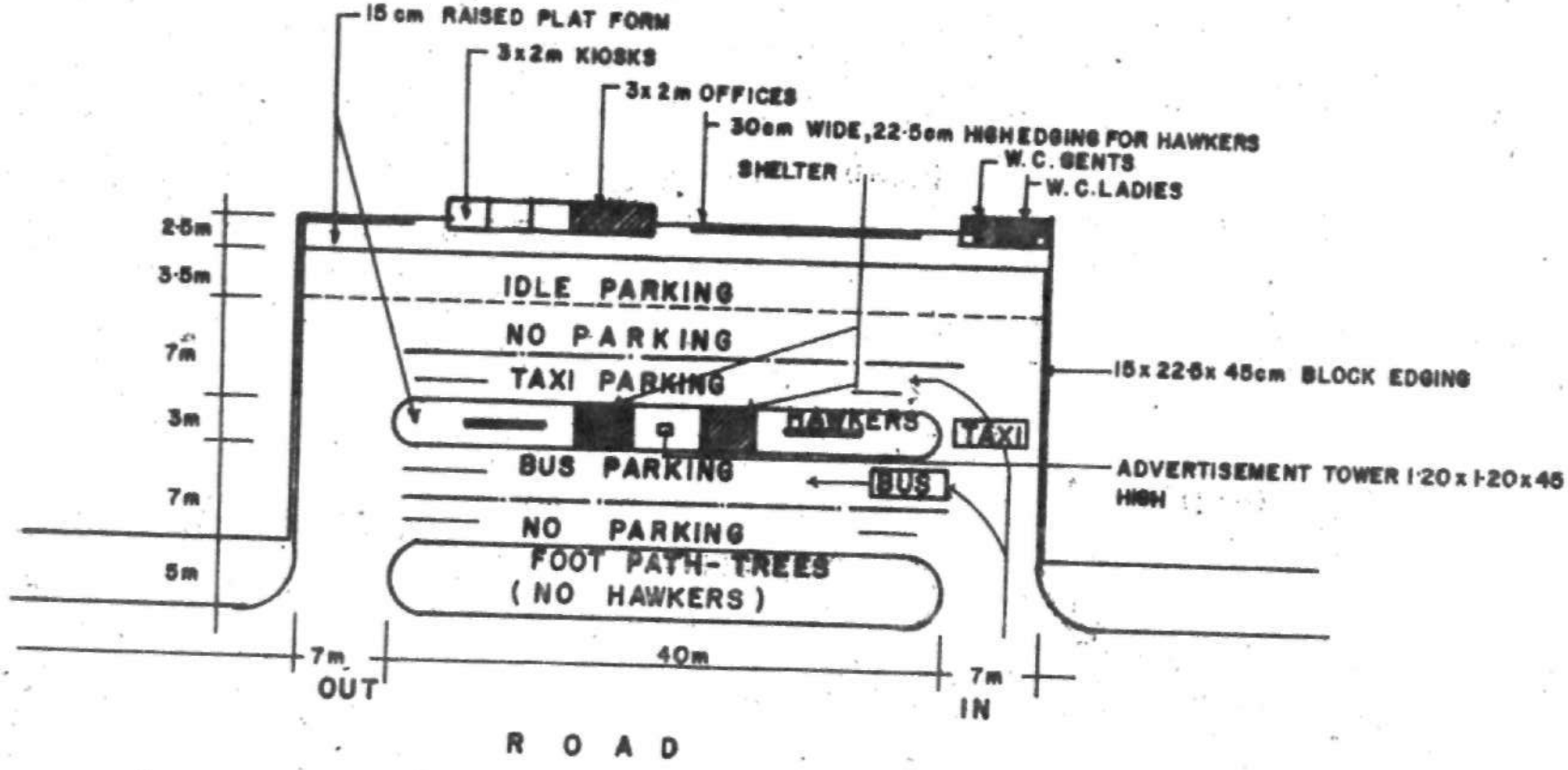
ORIN	DESIGN OF A TYPICAL BUS BAY (LESS BUSY ROADS)	Scale 1:250	U.R.P. DEPT. A. B. U, ZARIA	FIG No 6.9	DWGN By - isaac megbaluba Msc. 1978/7



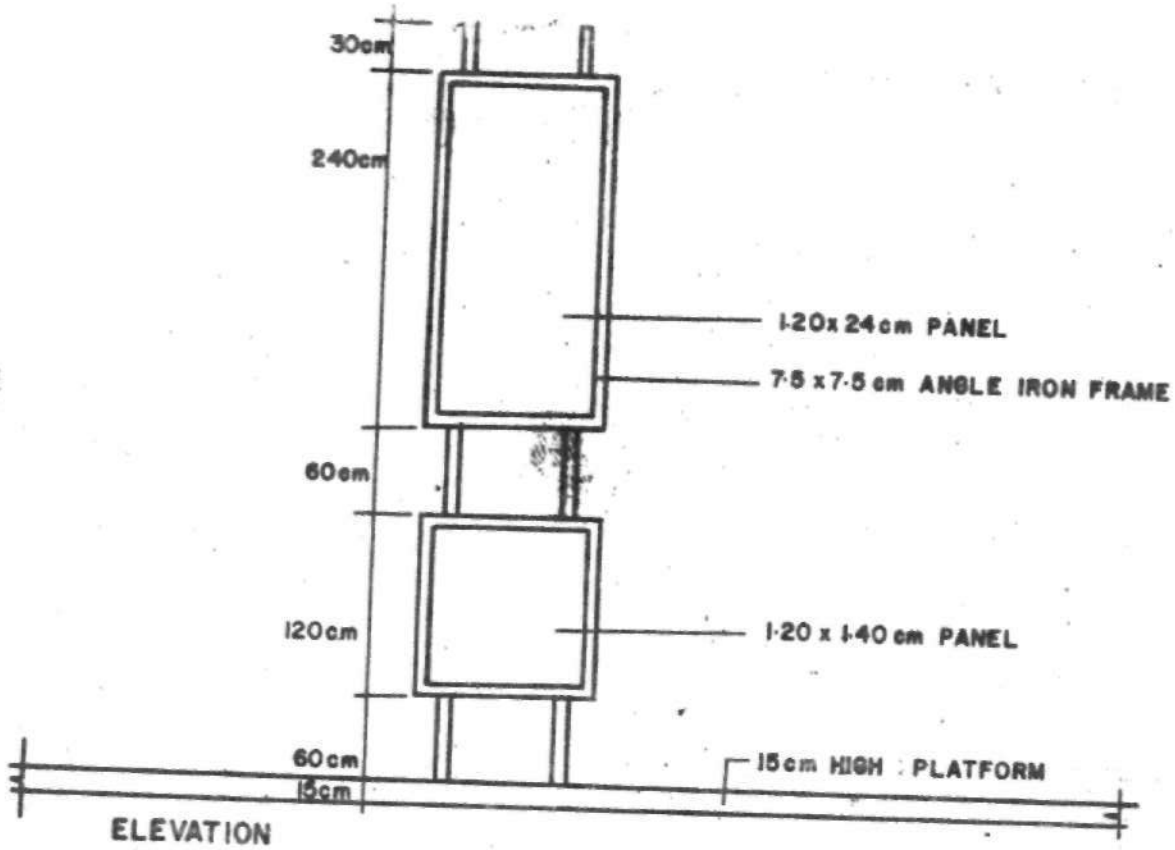
LORIN	DESIGN OF SHELTER AT BUS STANDS	Scale 1:250	U.R.P. DEPT. A.B.U, ZARIA	FIG No 6.10	DWGN By:- Isaac megbolouba Mec. 1978/79



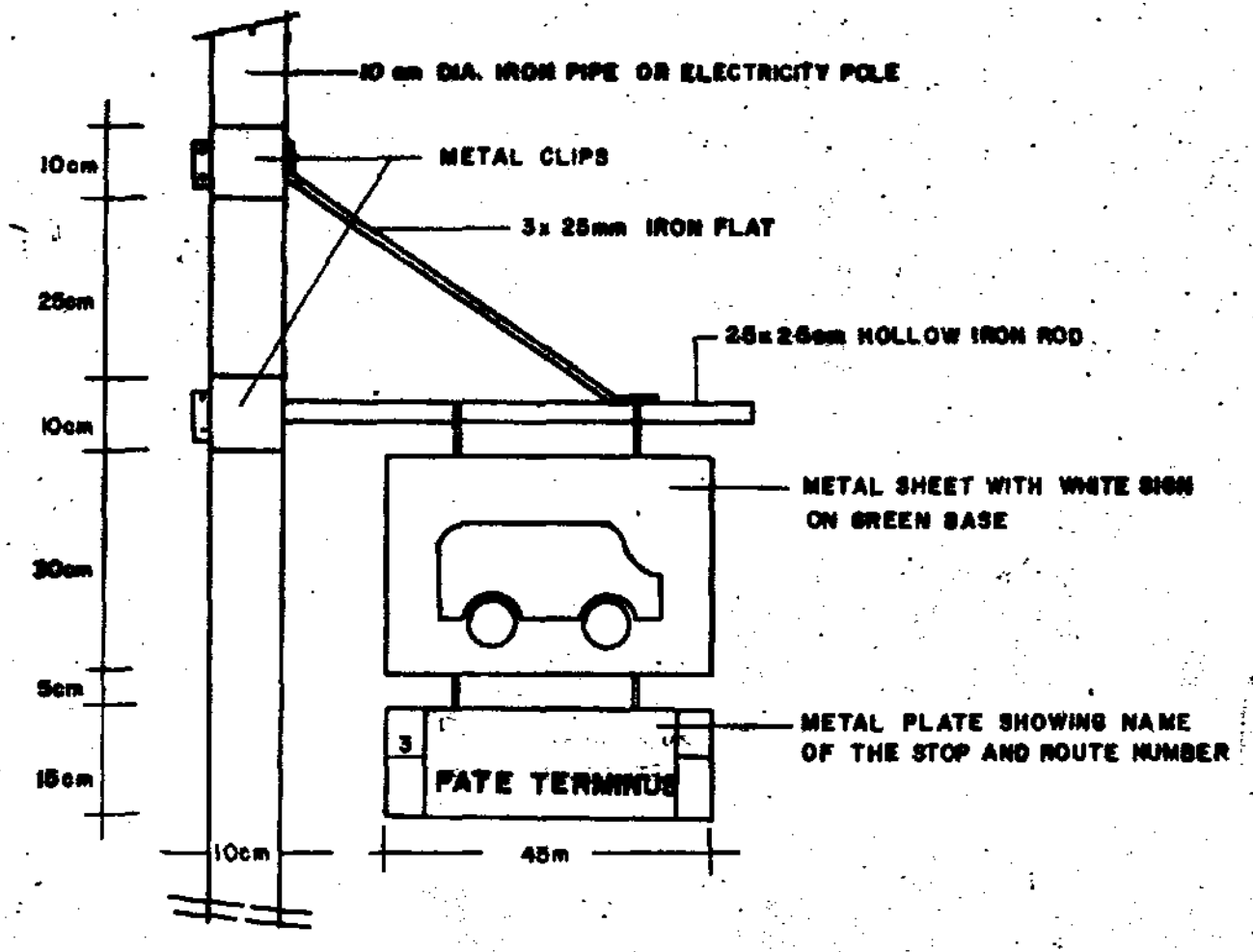
LORIN	DESIGN OF SHELTER AT BUS STANDS (AL TERNATIVE)	Scale 1:50	U. R.P. DEPT. A. B. U., ZARIA	FIG No 6·11	DWGN By– Isaac Ishaku Mac. 1978/79



ILORN	DESIGN OF A TYPICAL BUS TERMINUS (PLOT SIZE 28 x 54m)	Scale 1:500	U.R.P. DEPT A.B.U, ZARIA	FIG No 6·12	DWGN By- Isaac megbolube Msc. 1978/79



.ORIN	DESIGN OF ADVERTISEMENT TOWER	Scale 1:50	U. R. P. DEPT. A. B. U, ZARIA	FIG No 6·13	DWGN By – isaac megbolesugbe Msc. 1978/79



ILORIN	DESIGN OF A BUS STAND SIGN	Scale 1:10	U.R.P. DEPT A.B.U, ZARIA	FIG No 6.14	DWGN By Isaac megbolugbe Msc. 1978/79

(5) The Design of Bus Stand Sign:- Figure 6.14 shows the design of the bus stand sign. It is proposed to provide it at every bus stand in the town. No effort has been made here to prepare working drawings.

(vi) Bus Scheduling:-

The issue of scheduling of bus service relates to frequency and timing of service per route within the urban area. This issue hinges chiefly on two widely differing conditions: Bus routes that serve large volumes of passenger traffic and routes that serve small volumes.

No attempt is made in this study to determine the specific frequency of service in each of the bus routes proposed. It is believed that there is a need for a much detailing which are based, essentially, on computer activated system designs. Sometimes, the problem of scheduling may not even be much the frequency, as the proper timing of service, that is important. It is, therefore, proposed that a test service be operated for a month during which reliable volume counts can be collected, before a detail operational schedule is be worked out. The resultant schedule must very flexible.

Nevertheless, in the first phase of the implementation of the proposals contained in the chapter (1979-81), it is expected that about 60% of bus travel demand during peak hours will be met requiring the use of about forty-two buses. Twenty are to be provided by Kwara State Transport Corporation (KSTC) while the rest are expected to be supplied

by the private sector. The distribution of buses to the proposed routes is shown in Table 6.1.

KSTC should acquire three luxury buses in addition to the twenty suggested above for the operation of Park and Ride Bus Service.

TABLE 6.1 ILORIN: DISTRIBUTION OF BUSES TO PROPOSED ROUTES FIRST PHASE (1979-1981)

ROUTE NUMBER	NUMBER OF BUSES
1	10
2	6
3	6
4	6
5	4
6	3
7	6
TOTAL	42

Source: Fieldwork, Aug. 1978

During the second phase (1982 - 85), three new bus routes are provided and two existing routes extended as presented earlier. The number of buses required to keep the level of service at sixty per cent of peak - hour demand still using work trips data is about fifty-five. The distribution of the fifty buses to the proposed routes in the second phase is shown in Table 6.2.

TABLE 6.2. ILORIN: DISTRIBUTION OF BUS TO PROPOSED ROUTES SECOND PHASE (1982-85)

Existing Routes	Number of Buses	New Routes	Number of Buses
1	10	1	10
2	6	2	4
3	4	3	5
4	5		
5	3		
6	4		
7	3		
TOTAL	36		19

Source: Fieldwork, August 1978

(vii) Supervision and Control of Bus Services:

A number of electonic systems are available for control and supervision of bus services some of these include Closed - Circuit Television, Radio Telephone, Bus Electronic Scanning Indicator, etc. These electronic systems require sophisticated technology to make them functional and hitch-free. None is, therefore, recommended for Ilorin. Rather, it is suggested that the existing practice be maintained, but improved upon.

Presently, supervision is confined to inspectors at termini and major intersections checking running numbers of buses against scheduled timings. It is recommended that

observations be conducted at frequent intervals and effective co-ordination between inspectors be ensured. This method is labour-intensive, but it is better, more so under the prevailing conditions with respect to the unemployment situation in the state.

6.50 ENCOURAGING THE USE OF STAFF BUSES

Many people have questioned the appropriateness of Staff Bus Service as a sub-system of public transport system in urban areas. This should not be so. The relevant consideration in this study is not really whether or not the Staff Bus Service is a form of public transport. Instead, the fact that such a service have similiar operational characteristics with orthodox public transport systems qualifies it for attention. More importantly, such a service, if adequately planned for, can better integrate with the services of the public modes with the aim of improving journey - to work conditions and many trips made during working hours.

Presently, many of the industrial, commercialand educational establishments in Ilorin have one form of a Staff Bus Service or another. The industrial establishments include Tate and Lyle Company Nigeria Limited; Match Company Nigeria Limited; Philip Morris; Heral Publishing Company Limited; Afro Works, etc. While commercial establishments include Jase Motors, Midland Stores, etc and educational

institutions including mainly College of Technology and University of Ilorin.

Generally, the objective of the Staff Bus Service is not to convey staff from and to home except in cases where the bus could drop staff members at specified places. The staff bus can also be used to convey shift workers to ensure that they are not delayed by public transport operational inefficiencies.

In the main, most establishments surveyed in Ilorin agree that the staff bus is used essentially for trips being made during office hours - the objective being to keep disruption at work to a minimum. For example, staff buses are frequently used to carry children of members of staff from school.

The case of Kwara State College of Technology is a bit peculiar since there are three buses which carry staff from and to work every day. This is because of the remote location of the institution with respect to the existing development. There is still a large tract of undeveloped land between the College and the town. This has made it relatively difficult to get any form of public transport. Nevertheless, it is expected that when a comprehensive City-Bus Service is introduced as proposed in the preceding section, the Origin - Destination buses will take adequate care of the peculiar nature of the College of Technology.

The Management is generally responsible for the cost of purchase and maintanance of the staff buses.

There is no reason, to the author's mind, to recommend that this service be discontinued. In fact, all relevant establishments are encouraged to acquire, at least; a bus for this purpose.

The 32 - seater Toyota Coaster bus is very popular with the establishments earlier mentioned.

6.60 INTRODUCTION OF SCHOOL BUSES

It is proposed that a special Bus Service be introduced to cater for students and primary school pupils.

The parents will be required to buy tickets in bulk which are given to each pupil everyday. These tickets are then collected by the bus conductor inside the bus.

The proposal will involve mapping out all schools within the town and routes selected to scan the whole operation.

This arrangement, if well planned and adequately implemented, has a number of advantages:

(1) It will help to relieve the parents of the strain of taking children to and from school.

(2) It will reduce traffic congestion arising from people going to pick-up their children at school and taking them there every school day.

(3) It would be more feasible to enact legislation such as forbiding motorists to pass or overtake

school buses while loading or unloading, thereby making them safer for the children to use.

(4) It will be cheaper for each parent and also the community.

The buses used for this purpose can always be diverted to other Bus Service operations as soon as the school-hours are over. This is why the service has to be provided by Kwara State Transport Corporation.

This proposed service is similiar to the inter-city transfer of students at the beginning and ending of every vacation period which is already being well operated by Kwara State Transport Corporation.

6.70 IMPROVING TAXI SERVICES

(i) Types of Taxi Services:- Four service types are to be offered by taxis. Attempts are made to regionalize taxi operations. Taxis will be expected to ply between regions and also within regions. There will be a Hired-Taxi Service and an Airport Taxi Service.

There are six taxi regions proposed for Ilorin:-

(1) Airport region

(2) District Centre region

(3) Oloje region

(4) Maraba region

(5) Stadium region

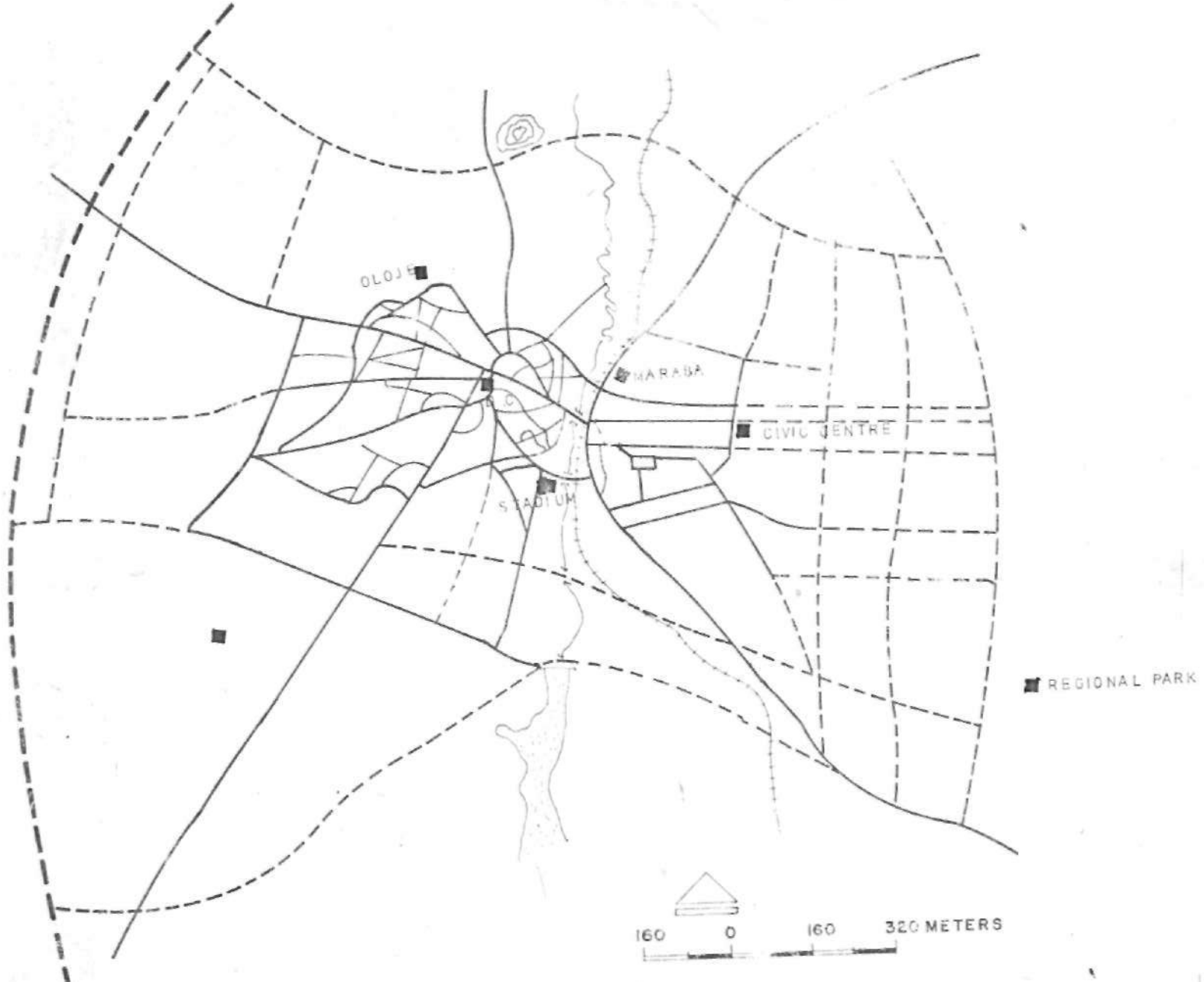
(6) Civic Centre region

The locations of highest traffic generating points in each region are shown in fig 6.15. Taxis will be expected to provide services within each of these region and also between them.

The Hired-Car service is to take care of special travel demand by persons who may be visiting Ilorin and having no means of moving around. The service is to be better organized since the present practice is for any body requiring this service to stop any taxi and negotiate. Instead, it is proposed that in each taxi region there will be a taxi park where taxis offering such a service will attend to the needs of this category of urban travellers.

The Airport Service is already in operation and will be continued. The four types of taxi services are to be co-ordinated in the same way it was proposed for Bus Services. For instance, a taxi will not only carry passengers from the Airport to the town, but also carry passengers around like a Hired-taxi, if such passengers require such a service.

(ii) Routing: It is proposed that the routing of taxis be made flexible and complementary to Bus Services. Taxis will ply all routes including those not plied by buses for reasons of road width, surfacing or economic viability. Defined taxi routes will lead from and to Bus Stops and Routes. No attempt is made here to lay out taxi routes.



ILORIN	PROPOSED TAXI REGIONS	SOURCES: ILORIN MASTERPLAN FIELD WORK	U.R.P.DEPT: A.B.U.ZAR.	FIG No: 6.15	DWGN By: ISAAC MEGBOLUGBE Msc 1978/79

(iii) Location of Stoppages:- Regional taxi parks are proposed as shown in Fig 6.15. There is no need for special stoppages apart from these regional parks. This is because there are provisions for taxis in the design of Bus Bays already proposed as presented earlier on. Frequent taxi stoppings on major routes slow down other traffic and cause delay.

(iv) Taxi Fare Structure:- It is proposed that the meter system of measuring taxi fares be introduced. Fares on defined routes within each taxi region will be fixed when taxis carry more than a passenger. When a trip deviates from defined routes, the passenger will be left to bargain with the taxi operator. There will also be an arrangement to impose a flat rate for any inter-regional trip. This will be done by setting the meter to this flat rate and the taxi fare will be an addition of meter readings plus the flat rate. This proposal is aimed at discouraging the use of taxis for inter-regional trips which are usually more than two to three kilometres.

6.80 CONCLUDING REMARKS

Buses, as they are proposed to be used in Ilorin, have a future and will increasingly be seen to have one as measures are taken to free them from congestion and restore their dependability. But by themselves, they can not possibly cater for all different occasions

on which people wish to travel. Many journeys involve routes or luggage or necessiate some degree of comfort or privacy that is beyond the ability of buses to produce. Taxis and Hired - Cars will fill these gaps and this is why they are considered in this thesis as much as part of passenger transport as their big brothers- the bus.

CHAPTER SEVEN

PLAN IMPLEMENTATION

Plan implementation is a very important stage in the planning process as experiences have shown that many good plans often come to naught because of lack or inadequacy of implementation. Sometimes, there is no sound institutional framework to articulate the execution of plans. There are other aspects of plan implementation apart from establishing a sound institutional framework, but this chapter will limit itself to just that.

Most of the planning proposals discussed in the preceding chapter revolve around the Kwara State Transport Corporation (KSTC). Thus, the need to examine the nature of existing structure and functions of the Corporation with a view to making proposals that may improve her performance. Hitherto, the problems of the Corporation have been described in chapter five. Some of the proposals discussed in this chapter relate to such problems:-

7.10 FINANCING THE CORPORATION

The Corporation is financed presently with annual grants from the Kwara State Government; returns from fuel haulage and bus services. Funds from these sources have proved inadequate to sustain the Corporation. The Kwara State Government has got to assist the Corporation

to solve some of its problems especially that of initial capital mobilisation. Local Government Councils in the State are encouraged to buy shares in the Corporation to enable it extends bus services to their respective Local Government Areas. This is to make for effective co-ordination of public transport in the State and guarantee broad base financial resource.

Philantropist organizations and public spirited people are encouraged to contribute to financing the Corporation, while the Corporation, on its own, will engage in other more profitable business ventures apart from Bus Services: With the general scarcity of fuel in the country, the Corporation is engaged in the distribution of fuel from Lokoja Depot to parts of Kwara and Ondo States. It, also, hauls fuel from Apapa to the Depot in Lokoja and other parts of the country.

Also, the Corporation are to take advantage of the existence of manufacturing industries in and around the state capital to engage in Cargo Haulage.

The Corporation will acquire more Towing Vans and give them to the public on hire This service brings a lot of money which the Corporation will utilize for its primary functions.

7.20 MANPOWER DEVELOPMENT

The Corporation is to open a Driving Training School

to improve the manpower quality supply especially the operation staff. The school will train drivers especially for the Corporations' Services. Mechanics and other para-engineering professionals are to train on the job. This proposal is aimed at reducing debit charges due to vehicle servicing outside the Corporations' Workshop. Also, it will raise the level of utilization of bus capacity while cutting down on the frequency and number of breakdowns.

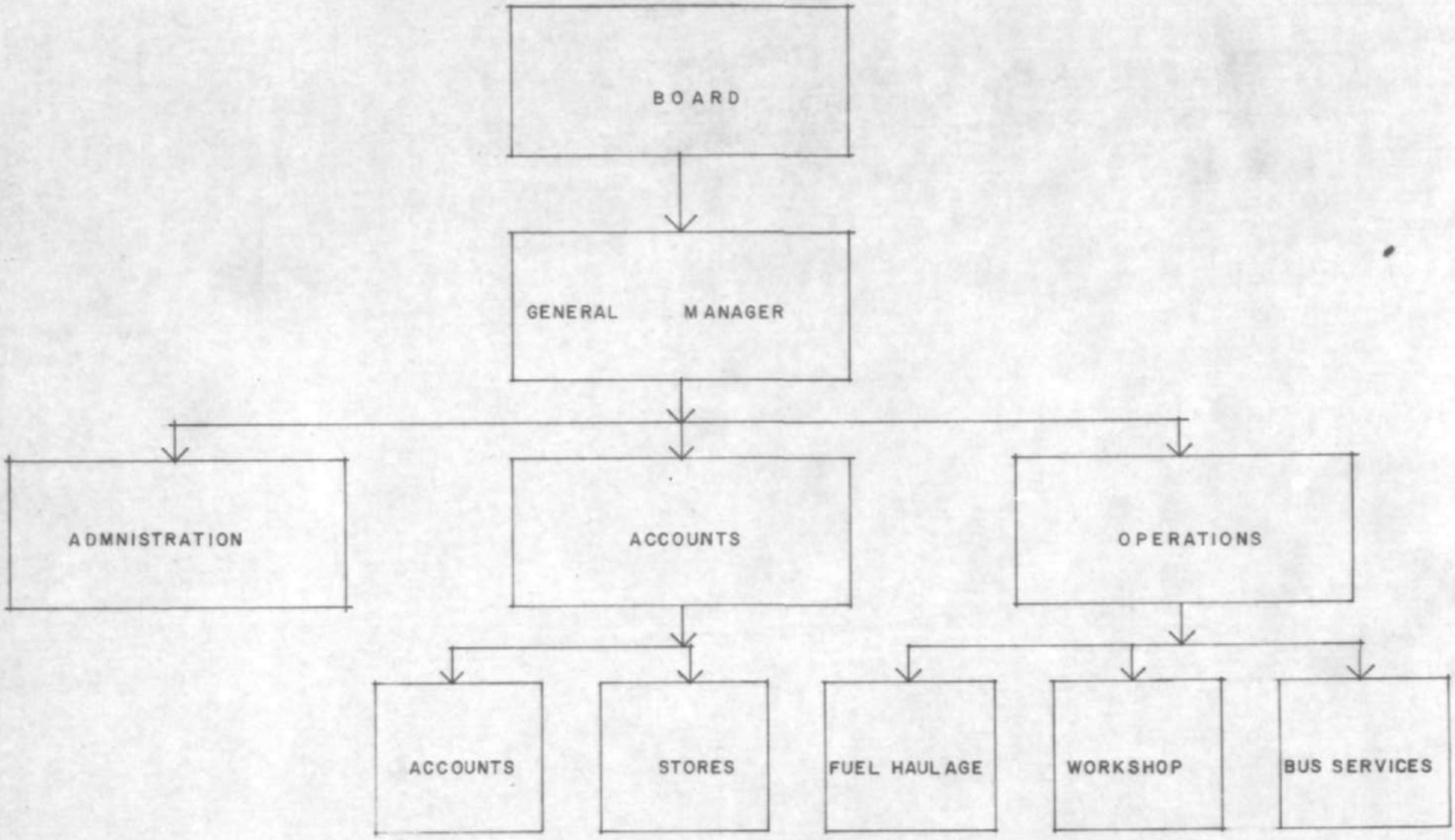
Appointment of drivers and conductors are to be made permanent and other more lenient disciplinary measures will be devised instead of the present practice of outright dismissal at any slight misbehaviour.

7.30 ACCOMMODATION

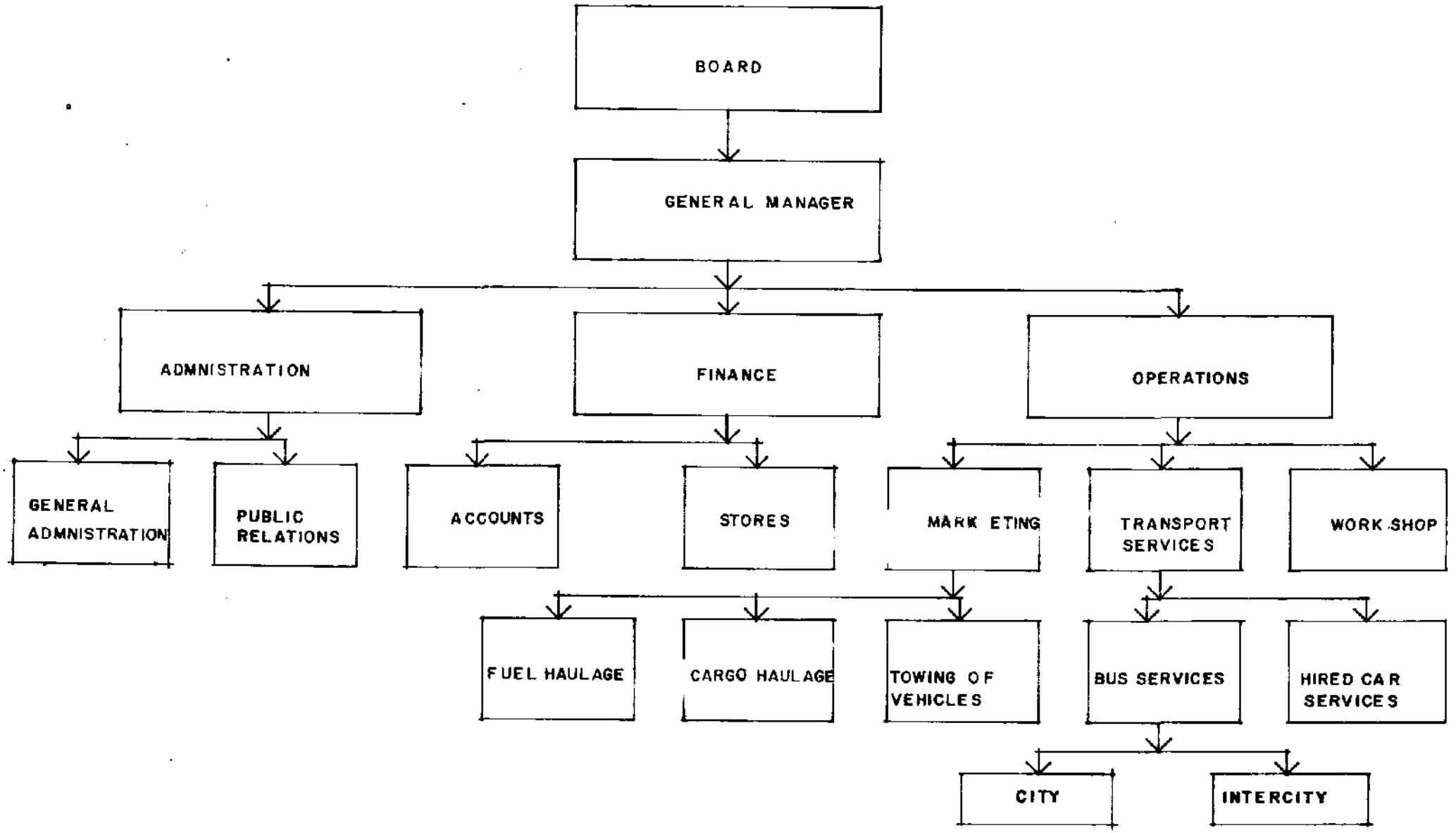
The Corporation is to acquire a much larger area for the building of its offices, workshops and grave yards.

7.40 MANAGEMENT CONTROL

The Corporation is to be given some margin of freedom to enable her functions the way she should. Some people are of the opinion that if the Board and Management of the Corporation are given a free hand in running the affairs of the Corporation, it shall need no subsidy from the Government to operate its essential services for which it is established. For instance, the Management of the Corporation, on their own initiative, bought



KSTC	EXISTING ORGANIZATIONAL STRUCTURE		U.R.P. DEPT. A.B.U. ZARIA	FIG No 7.1	DWGN By isaac megboloube Msc 1978/79



KSTC	PROPOSED ORGANIZATIONAL STRUCTURE		U.R.P. DEPT. A.B.U. ZARIA	FIG No 7·2	DWGN By isaac megbaloube Msc. 1978/79

two Mercedes Benz Buses on hire-purchase facility against the scepticism of the Board members and the nonchallant attitude of the Government. But the buses are performing quite well on road and are actually sustaining the Corporation as a Transport Company.

7.50 ORGANIZATIONAL STRUCTURE

Figure 7.1 shows the existing organizational structure of the Corporation. There is a governing Board which was inaugurated in November, 1977 to bring about greater effectiveness and efficiency. The Board is composed of eight members and a chairman.

The present organizational structure is divided into three board departments viz: Administration; Accounts; and Operations. The Administration includes the General Administration, the Accounts includes Stores while Operations include Vehicle Maintainance, Fuel Haulage and Bus Services.

The proposed organizational structure is presented in fig. 7.2. The three board departments are retained as Administration; Finance and Operations. The Administrative Department is taking on new functions such as the training of staff and public relations. The Operations Department is divided into three sections: Marketing, Transport Services and Workshop. The Marketing Department deals with fuel and Cargo haulage and Towing of Vehicles; Transport Services is divided into Bus Services and Hired-Car Services; the Workshop Section will look after

the maintainance and repairs of Corporations' vehicles. The workshop will also provide services to the public at the market charges.

There are other institutions that are also important with respect to the implementation of suggested planning proposals apart from the Kwara State Transport Corporation. These are the Kwara State Transporters' Union: Kwara State Transporters' Employee Association. All of these organizations have their headquarters at Ilorin. They are to be consulted as much as it is necessary to win their confidence and support for the successful policy implementation.

The establishment of an Adhoc Committee on Public Transportation in Ilorin is proposed. The committee will be composed of officials of the Kwara State Transport Corporation; Kwara State Town Planning Authority and representatives of the private sector. The committee will be expected to examine some of the proposals contained in this thesis and make further recommendations as to how they can be best implemented.

CHAPTER EIGHT

CONCLUSION

Public transportation has an incoherent history in this country. Many Transport Corporations have been set up in Nigeria with high hopes on the part of the Government. No sooner are they inaugurated than general inefficiency, lack of foresight, planning and co-ordination, corruption, etc. set into drastically undermine their operational capability. Nevertheless, it should still be realised that the desirability of an efficient public transportation system can neither be compromised nor overemphasised especially in urban areas. One of the rationale behind the stoppage of car loans by Government and Private Establishments was the Public Transport Agencies would improve to provide cheap and efficient services for communities.

It has been contended in this thesis that the public transportation system can be made efficient in order for it to play the role it should within the framework of a comprehensive urban transportation system envisaged by the author. What it requires is a seriousness of purpose and genuiness of interest on the part of the government:

It is high time that the government considered the financing of passenger services in urban areas an important object of public expenditure.

For example, Europe provides a classical evidence that an urban population can be reasonably served by public transportation, that people without cars can be mobile and that car owners benefit from having an alternative. This high standard of public transportation in European cities reflected generous subsidies, since the cities recognize that the wider benefits to the community cannot be charged to the user alone. The majority of public transport undertakings in Europe operate at a loss and most cities have arrangements for meeting the deficits. This is far from suggesting that public transport companies in Nigeria should be encouraged to operate at a loss. At least, the criteria on which such subsidies are based normally reflect, to a large extent, economic considerations.

It is important to note at this juncture that at Ilorin, like in many other urban areas, public transport is catering for a specific sector of the population which has little alternative choice of mode and is thus dependent on continued public transport provision. If governments concern for the welfare of this sector of the population is genuine as it seems with respect to widespread implementation of public housing for low-income group, then public transport should be seen also as a social welfare industry so that it could receive the deserved attention of the policy makers. As it is with all public policy issues so it is with public transport - not until public transport is raised to the

desirable level of awareness, it may never really attract much public policy resources.

APPENDIX 3.1

ILORIN URBAN AREA TRANSPORTATION STUDY
HOME INTERVIEW QUESTIONNAIRE

Name of Interviewer ----------

1. Day ---------- Date ----------

2. Location: District ---------- Zone: -----

3. Address of dwelling unit ----------

4. House Type ----------

(1) Bungalow.
(2) Duplex.
(3) Multi-flat.
(4) Apartment.
(5) Rooming Housing.
(6) Others specify.

5. Tenure of occupacy ----------

(1) Owner - occuppier.
(2) Family house
(3) Rented Accommodation.
(4) Others specify

6. How many members in your household? ----------

7. What is your position in your household? ----------

(1) Husband
(2) Wife
(3) Son or daughter.
(4) Male or female lodges.
(5) Others specify

8. How many members of your household fall within the following age group?

0-4 ---------- 5-20 ---------- 21 and over ----------

10. How many members of your household are employed for at least 10 hours per week? ----------

11. How many female members of your household are employed for at least 10 hours per week? ----------

12. What is the type and place of work of each member of your household employed? (Please list starting from the head of the household)

	Type	Place of work (Precise address)
1.	----------	----------

2. ---
3. ---
4. ---
5. ---
6. ---
7. ---
8. ---
9. ---
10. ---

13. How many cars owned by your household? ---

14. How many members of your householdare licensed drivers (including learners' permit)?

---

15. If the household owns no car, is there one available for use by any member of your household?

--- (1) Yes (2) No.

16. What other forms and no. of means of transport owned by your household?

Form	Number
Light Van	---
Pick-up	---
Taxis	---
Motor-cycle	---
Bicycle	---
Others specify	---

17. What is the estimated annual income of your household?

---

18. What is the estimated annual income of the head of your household? ---

(1) Below ₦750.00 (3) ₦3,000 - ₦7,000
(2) ₦750.00 - ₦2,999 (4) ₦7,000 and over

19 How much does the household pay for the dwelling unit per month? ₦---

20. If you have no car or any means of transport, please answer the following questions:

(i) How far did you walk before you took a taxis or got a lift? ----------

(ii) How far did you walf from where you came off to your ultimate destination? ----------

(1) 0 - 9 meters
(2) 10 - 19 meters
(3) 20 - 39 meters
(4) 40 - 59 meters.
(5) 60 - 100 meters
(6) 100 meters and over.

(iii) How long did you wait before you got a taxis?

---

(1) Below 5 minutes.
(2) 5 - 9 minutes
(3) 10 - 14 minutes.
(4) 15 - 29 minutes.
(5) 30 - 59 minutes.
(6) 1 - 2 hours.
(7) Others specify.

(v) Where was your destination? ----------

(vi) How much was the transport fare? ----------

(vii) How many times did you change modes or vehicles vehicles before getting to your destination?

---

(1) None
(2) Once
(3) Twice
(4) Thrice
(5) Others specify

(viii) If you changed mode or vehicle how long did it take you get another transport?

(1) Below 5 minutes.
(2) 5 - 9 minutes
(3) 10 - 14 minutes
(4) 15 - 29 minutes
(5) 30 - 1 hour.
(6) Others specify.

21. If you drove a car during your trip please answer the following:-

(i) How long did you take to get to your destination?

---

(1) Below 5 minutes. (5) 30 - 59 minutes
(2) 5 - 9 minutes. (6) 1 - 2 hours.
(3) 10 - 14 minutes. (7) Others specify
(4) 15 - 29 minutes.

(ii) What is the place of your destination? ----------

(iii)1 Approximate time spent parking at your destination
---------- ---------- ---------- ---------- (Use above time categories).

(iv) Approximate time spent walking from where you parked to your ultimate destination.
---------- ---------- ---------- ---------- (Use above limit categories)

(v) What are your reasons for using car/van/cycle for the trip?

(1) No public transport available.
(2) Too long to wait for bus or taxis
(3) Too far to walk to or from taxis stand or bus stops.
(4) Having to transfer to another vehicle.
(5) Use car/van for business.
(6) Drive firm's or government vehicle.
(7) Public transport vehicles uncomfortable.
(8) Take children to school on way to work.
(9) Other reasons specify. (Please tick appropriate) reasons).

22. What are the inconvinence factors relating to use of public transport in Ilorin Urban Areas?
(1) Too far to work to/from taxis stand or bus stop.
(2) No shelter at taxis stands or bus stops.
(3) Having to transfer to another vehicle.
(4) Taxis not readily available.
(5) Taxis pick up anybody.
(6) Public transport not comfortable.
(7) Public transport not inconvenient
(8) Others specify. (Please tick as many as are applicable).

23. If public transport e.g. bus, taxis, etc. are improved so that they become faster and cheaper than private cars which mode would you still prefer?

(1) Private car.
(2) Taxis.
(3) Bus.
(4) Others specify.

24. How do you conceive of a car? ----------

(1) Purely as a mark of status.
(2) Partly as a mark of status.
(3) Purely as a means of mobility.
(4) Partly as a means of mobility.
(5) 2 and 3.

25. What do you consider to be two top most transportation or planning related problems at Ilorin?

---

26. What are your suggested solutions?

---

27. No. of trip forms filled by or for the household

THANKS.

JOURNEY INFORMATION

Trip No	Where did the trip begin	At what time did you start the trip	Where did the trip end?	At what time did you finish the trip	How did you travel?	Why did you go?
					Drove Private car 1	To work 1
					Drove light van (Private) 2	To school, college 2
					Drove light van (Commercial) 3	In course, of work or on firm's business 3
					Rode Motor cycle 4	To personal business 4
					Passenger in Car light Van or on Motor cycle 5	To social, sport end hotel
					Passenger in Taxi 6	To pick up or set down Passenger 6
66						
6					Passenger in Minibus 7	Change method of travel 7
					Rode Pedal Cycle 8	To return home 8
					Walked 9	To shops, food, drink tobacco etc. 9
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

APPENDIX 3.2

ILORIN URBAN AREA TRANSPORTATION ON STUDY

TAXIS & MINI-BUS QUESTIONNAIRES

(Questions are to be answered by Taxi/Mini-Bus Drivers)

Name of Interviewer ---------- Date ----------

1. Where do you mostly start your trips from? ----------
2. Where do you mostly terminate your trips? ----------
3. Do you alter your destinations at will? ----------
4. What are the routes do you generally follow

(1) ---------- (2) ----------

(3) ---------- (3) ----------

5. Where do you generally stop enroute to collect/drop Passenger (List Route Wise) ----------
6. Which of the above stoppages attract generally more passengers (List Route Wise.) ----------
7. How many trips do you make on the average per day. ----------
8. How much do you realise per day on the average? ----------
9. What are the peak period in your opinion?

Morning ---------- (Time)

Evening ---------- (Time)

10. How many trips do you make during each of the peak periods

Morning ----------

Evening ----------

11. How many passengers do you carry in each trip on the average? ----------
12. How many passengers do you carry at the starting point on the average? ----------
13. How many passengers do you carry on the way on the average? ----------
14. What time do you take to reach the normal destinations? ----------

(specify by different routes and by peak/normal hours

15. Do you like the idea of providing fixed stoppages enroute? ----------

16. If yes where will you want these stoppages located?
    (List according to routes)
    (1) ---------- (2) ----------
    (3) ---------- (4) ----------

17. Which of the stoppages will you want developed on priority basis from your experience (state route wise) ----------

18. What system of fares do you suggest? ----------
    (1) Fixed (2) Bargain

19. What problems do you encounter during your operation -----

20. What solutions do you suggest ----------

THANKS.

APPENDIX 3.3

ILORIN URBAN TRANSPORTATION STUDY

OPINION SURVEY

1. The Town Planning Division of Ministry of Lands and Housing under the Supervision of Mr. Isaac F. Megbolugbe is carrying out a comprehensive transportation study within Ilorin Urban.

2. We shall be most grateful if you will complete this questionnaire.

3. Mr. Isaac F. Megbolugbe shall come around to collect them after a week.

4. We would assure you that any opinion expressed shall be cited annonymously and kept in strict confidence.

1. Name of Repondent .....
   .....
   .....

2. What in your opinion is the nature of transportation problems in Ilorin Urban area
   .....
   .....
   .....

3. What are your suggested solutions .....
   .....
   .....

4. To what extent do you agree with the view that Government should subsidize bus operations as a matter of social welfare services
   .....
   .....
   .....

5. Do you consider indefinate construction of roads a panacea to urban transportation problem?
   .....
   .....
   .....
   .....

6. Do you see the boom in car ownership as a threat to urban mobility?

.....

.....

.....

7. To what extent do you think granting of vehicle advances has contributed to this boom?

.....

.....

.....

8. Should public transport not be given preference to private transport?

.....

.....

.....

.....

9. What forms of public transport system do you suggest for Ilorin Urban area

.....

.....

.....

.....

10. Are you satisfied with the present formof planning administration in Ilorin Urban Area, if not what suggestion will you make to improve the set up.

.....

.....

.....

.....

11. To what extent do you think the use of traffic wardens has solved the automotive congestion on our roads?

.....

.....

.....

.....

12. Do you see any connection between the inefficiency of telephone operations and traffic congestion in our cities?

.....

.....

.....

13. What reasons, in your own opinion, are responsible for poor geometric features of our reads in Ilorin Urban Area?

.....

.....

.....

.....

.....

14. Do you not think government vehicles are often mismanaged and if so in what ways do this manifest itself?

.....

.....

.....

.....

.....

15. Do you know of any government policy that have transport implications?

.....

.....

.....

.....

16. Please comment freely on such policies if any.

.....

.....

.....

.....

.....

THANKS.

APPENDIX 4.1

THE STEPWISE REGRESSION RESULTS

1. $Y_1 = 0.3X_1 - 13.89$

where:

Y_1 = expected number of work trips per zone

X_1 = number of residents per zone

Multiple R = 0.93

R. Square = 0.90

Standard error of Estimate = 49.23

F. Value = 89.56

Significance level = 0.1

Mean of Y_1 = 167.75

Standard Deviation + 129.41

Bi for Xi = 89.56

2. $Y_2 = 0.94X7 + 0.14X_1 + 4.4$

where:

Y_2 = expected number of shopping trip per zone

X_7 = number of cars owned per zone

X_1 = zonal population

Multiple R = 0.94

R. Square = 0.88

Standard error of Estimate = 6.29

F. Value = 49.18

Significance = 0.1

VARIABLES IN THE EQUATION:-

VARIABLES	B.	S.E. OF B.	F.	SIGN.
7	0.94	0.21	20.67	.001
1	0.14	9.61	5.57	.035

Constant 4.40

Mean of Y_2 = 19.19

Standard Deviation = 17.13

3. $Y_3 = 0.7X_1 - 0.54X_5 - 4.54$

where:

Y_3 = expected number of socio-recreational

X_1 = zonal population

X_5 = number of persons in employment per zone

Multiple R = 0.81

R. Square = 0.66

Standard Error of Estimate = 15.62

F. Value = 12.76

Significance = .01

VARIABLES IN THE EQUATION:-

VARIABLES	B.	STD. ERROR	F.	SIGN.
1	0.70	0.17	17.62	.001
5	-0.54	0.33	2.74	.001

Constant -4.54

Mean of Y_3 = 28

Standard Deviation = 25.

APPENDIX 4.3

ILORIN: TRIP PRODUCTION VOLUMES (1978)

ZONE	WORK TRIPS	SHOPPING TRIPS	SOCIO-RECREATIONAL TRIP
1	8,297	598	1550
2	18,292	1401	4,791
3	5,597	599	950
4	21,893	1,650	2,401
5	2,100	352	50
6	4,255	201	1,080
7	7,986	994	2,153
8	7,990	1,100	2,150
9	4,198	802	802
10	6,293	352	751
11	4,649	711	1,249
12	4,255	639	352
13	8,095	886	400
14	1,100	151	201
15	7,798	751	551
16	16,223	1,650	3,745

APPENDIX 4.4

ILORIN: TRIP PRODUCTION VOLUMES (1985)

ZONE	WORK TRIPS	SHOPPING TRIPS	SOCIO-RECREATIONAL TRIPS
1	13,276	8,224	21,905
2	19,023	12,609	29,898
3	5,544	4,397	9,302
4	20,142	54,748	31,693
5	9,093	7,413	14,750
6	10,552	7,330	17,405
7	9,421	6,557	15,092
8	10,836	7,205	17,200
9	11,107	7,067	15,529
10	6,277	2,046	11,715
11	9,083	7,267	11,872
12	7,319	4,808	13,275
13	9,391	6,202	15,200
14	14,789	3,696	8,643
15	9,127	9,921	12,664
16	9,248	10,758	14,358

B I B L I O G R A P H Y

1. Adeyemi E. A. (1977), "The Role of the Physical Planner in Nigeria" A Public Lecture at the inaugral meeting of N.A.T.P.S. held at A.B.U., Zaria

2. Ajaegbu (1976), Urban and Rural Development in Nigeria, Macmillian Press, London

3. Bendixson (1975), Instead of Cars, Temple Smith, London

4. Berry, B. J. L. (1973), The Human Consequences of Urbanization, Macmillian Press, London.

5. Bruton, M. J., (1971), Introduction to Transport Planning, Huchinson, London.

6. Creighton, R. C. (1970), Urban Transportation Planning Illinois, U.S.

7. Cowlconsult (1973), Bus Transport for Site and Service Areas, Dar es Salaam being a Preliminary Planning Report.

8. Dwyer, D. J. (1974), ed. The City in the Third World Macmillan

9. Farris, M. T. et al (1973) ed. Modern Transportation H. M. Company Boston, U.S.A.

10. Foster, C. D. (1963), The Transport Problem, Blackie, London.

11. Jacobs, J (1963), The Death and Life of Great American Cities: The Failure of Town Planning. N.Y., U.S.A.

12. Kulshrestha, S. K. (1975), Location of Bus/Taxi Stands in Zaria Urban Area; Departmental Publication, Dept. of Planning A.B.U. Zaria

13. Hutchinson B. G. (1974), Principles of Urban Systems Planning, Scripta, Washington, U.S.A.

14. Johnson, E. A. (1970), The Organization of Space in Developing Countries, Cambridge Mass.;

15. Johnson, J. H. (1976), Urban Geography, Pergamon Press, London.

16. Jones, S. I. (1977), Urban Transport Appraisal, Macmillan Press, London.

17. Leibrand, K. (1970) Transportation and Town Planning, M.I.T. Press Cambridge Mass.

18. Megbolugbe, I. F. (1976) The Spatial Pattern and Process of Retail in Ilorin Urban Area; An Unpublished B.Sc. Thesis, Department of Geography, U.I., Ibadan.

19. Meyer, et. al. (1966), The Urban Transport Problem; Cambridge Howard University Press.

20. Miller, (ed) Urban Transportation Policy: New Perspectives, Lexington, Mass; (1970).

21. Mumford, L. (1964), The Highway and the City, N.Y., U.S.A.

22. Owen, W. (1972), The Accessible City, Washington D.C., U.S.A.

23. Plowden, S. (1972), Towns Against Traffic, Andre Deutsch, Ltd., London.

24. Public Administration Service (1954), Conducting A Home Interview Origin - Destination Survey, Chicago, U.S.A.

25. Quarmby (1967), "Choice of Travel Mode for the Journey - to Work: Some findings" Journal of Transport Economics and Policy, Vol. 1 No. 3, 1967.

26. Reekie, R. F., (1972), Design in the Built Environment, Edward Arnold, London

27. Ridley and E. D. Turner (1968), "The Valve of Traffic Management" Journal of Transport Economics and Policy, Vol II, No 3, 1968.

28. Richard Brian, Cars for Cities; Report by a Steering Grou and Working Group, Ministry of Transport, H.M.S.O.

29. Royal Institute of Public Administration, (Mackinder I. J. et. al. 1974): Structure Plan: Transportation Study for Denbighshire, London.

30. Schnore, Leo F. (1962) "The Use of Public Transportation in Urban Areas" Traffic Quarterly, Oct. 1962

31. Smerk, G. M. (ed), Readings in Urban Transportation. Indiana University Press, U.S.A. 1968.

32. Smith, P. F. (1974), The Dynamics of Urbanism, Hutchinson, London.

33. Starkie, D. N. M. (1976), Transportation Planning, Policy and Analysis, Pergamon Press, London.

34. Stone, T. R. (1971), Beyond the Authomobile, Prentice-Hall, New Jersey.

35. Wilson, F. R. Journey to Work. Maclaren, London.

36. Wingo, L. Jr. (1961), Transportation and Urban Land
The John Hopkins Press, Baltimore.