PLANNING AND MANAGEMENT OF UTILITIES AND SERVICES IN A CITY.

Casestudy of Ilesha.

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

FADUMILA, TAIWO'ADSTAYO
B.Sc (Hons) A.B.U. 1980

Department of Urban and Regional Planning
Faculty of Environmental Design
Ahmadu Bello University, Zaria

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BY

FADUMILA, TAIWO ADETAYO

B.Sc (Hons) A.B.U. 1980

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Department of Urban and Regional Planning

Faculty of Environmental Design

AHMADU BELLO UNIVERSITY, ZARIA.

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Head of Department

Dean, Postgraduate School

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DEDICATION

To my parents, Chief B.A. Fadumila and
Madam Alice Fadumila
and
Benedicta Iheoma
For creating the requisite environment for
the maturity of this ambition.

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Room F3/22
Suleiman Hall
Samaru-Zaria.

Fadumila, Taiwo Ade
June, 1983.

CHAPTER ONE

1.00 INTRODUCTION

Worldwide the growth of cities has been recognised as a historical phenomenon attaining alarming proportions in post-industrial revolution era. In the developed countries of Europe and America 'Urban Clusters' formed as a result of population being attracted by development impulses here. Urbanization in the developing world has on the other hand, been attributed to a catalogue of socio-cultural, politico-historic, and colonial influences.

What ever factors accounted for growth of cities in developing countries chaos has always been the ready characteristic, due to poor planning and lack of effective management. The consequent spatial impacts manifest in this case have been haphazard growth, poor housing, unhealthy environmental conditions to mention a few. All these have led to demands, attendant needs, and efforts by various city authorities to provide utilities, services, and facilities among the other set of urban infrastructural provisions needed to enhance the emergent culture of this population.

The history of urban provision of utilities and services in Nigeria of the form available today, received a boost during the colonial era.

During this period, utilities and services were provided discriminately in only those towns and parts thereof which served a meaningful function in the governments framework of exploitation. Apart from this spatial disparity, the same conditions have been confirmed for situations within the city as in the Government Reservation Areas (G.R.A) occupied by colonial civil servants as against what obtains in other districts of the town. Further these discriminate provisions of utilities and services has proved inadequate due to unforeseen influx of migrants into these cities. After independence, and in a bid to industrialize the cities grew enormously in population and areal extent without compatible planning efforts and management. This has compounded the problem of effective provision of infrastructure. The result of this has been haphazard and unrelated developments meaning environmental degradation in certain instances. For the purpose of this thesis, adequacy of utilities and services is stressed as an important task in any resolve to rescue the situation. It thus represents an attempt to show how it can be done meaningfully in specific situations of a particular town.

Following from the above, it is established that the major foundation of any effective and forward looking town plan is the adequate provision of utilities and services. Inadequate provision naturally "scares-off" developments. It is therefore adopted as a basic principle

that for a city to grow and prosper, utilities and services of acceptable standard must be provided not only to attract people and industry but to attain economic prosperity in a congenial environment. The thesis holds that mere provision is not all that is needed but also a devise of full implementation strategies.

1.20 STATEMENT OF PROBLEM

The relatively rapid rate of population growth in Ilesha, as in many other Nigerian cities especially within the last 50 years has brought a lot of problems to its environment both directly and indirectly. It has given rise to the situation whereby human needs and demands within the city are quite ahead of the opportunities available. Not only are the utilities and services inadequate they are also overutilized. This culminates in general degeneration of the city environment.

Furthermore, poor management as is reflected in inefficient administrative, finance, and implementation strategies has inhibited efforts in the maintenance and provision of the utilities and services. All the above, coupled with a high tolerance level and awareness of the population has further worsened the situation. The overall effect of these is general dissatisfaction of the city population with the utilities and services as well as a slowdown in the pace of development in Ilesha.

1.30 GOAL AND OBJECTIVES

The major goal of this thesis is to propose planning techniques and management strategies for utilities and services in Ilesha. It hopes to achieve the above goal through the following set of objectives:-

(1) To establish a theoretical framework for design and implementation of utilities and services.

(2) To analyse the existing situation in Ilesha.

(3) To establish future trend of development based on (2) above.

(4) To evolve principles, standards, and strategies of planning and management as are applicable to Ilesha based on observed trends.

(5) To design the infrastructures layout in relation to landuse and town structure.

(6) Suggest implementation and management strategies for the proposed infrastructure.

1.40 SCOPE AND LIMITATION

The thesis will consider Ilesha town as a whole for the provision and design of utilities and services. The management aspect is also made to reflect this. The considerations are only of the existing situation on the basis of which future development is projected of user demands and landuse types.

For a thesis with the above set of objectives, it is not possible to exhaustively treat all of the utilities and services found in the town. Without underplaying their importance however, it is common understanding that for Ilesha electricity supply, water supply, and dry solid waste disposals pose more crucial and challeging tasks for planning and management in the town. Thus they form the focus of this study and are reffered to in the thesis both simply as infrastructures or by the general terminology - utilities and services. The evolved standards and principles relate to existing practise and are harmonized with local conditions. The design of infrastructure mentioned in objective number five above is not concerned with technical engineering details as to, for example, type and strength of materials, specifications on machinery and power operations. Instead it focuses on layouts, load/volume calculations, establishment of thresholds, and relationships with landuse as is practised in physical planning.

1.60 METHODOLOGY OF RESEARCH

The set of data used in this study to analyse existing situation and which also formed the basis for future proposals, are obtained from the following sources:-

(a) Reconnaissance Survey:- This is to determine extent of existing developments and inadequacies by personal observation. Photographs were employed

both to give visual impressions and to help in explaining situations that are depicted in the study area.

(b) Questionnaire Administration:- Two types were undertaken:

(i) The first questionnaire to establish user-demand, satisfactions, and to aid the thesis work in the derivation of standards and strategies for planning. (See appendix I).

(ii) 'Institutional interviews' are administered at departmental levels on agencies with responsibilities for the utilities and services (See Appendix II).

(c) Cadastral Maps and typical layouts:- To give a better understanding of existing situations and collating other data that helps our appreciation of spatial development and trends.

(d) Documents and Government files:- Includes probes into various masterplan of towns with the same growth characteristics with Ilesha and institutional files belonging to the National Electric Power Authority, the Water Corporation of Oyo State and the Local Government to ascertain policy issues, administrative arrangement and laws on electricity, water supply, and solid waste disposals.

(e) Informal interviews/discussions with government officials and professional individuals with bias on the thesis subject.

1.70 Thesis Framework

The whole thesis is treated in five chapters. It opens with an introduction which is based on general statements as regards the intent and purpose of the thesis. In Chapter Two which follows is a theoretical background which appropriately is drawn on to provide the basis for design and implementation. Chapter Three is one of data analysis and inferences of the existing situation on the basis of which principles of design are drawn onto part of Chapter Four, this is amplified in proposals considered suitable for Ilesha. In this chapter also, requirements vis-a-vis landuse, population densities, the various capacities of the utilities for example pipe sizes, distribution network etc, are defined to ensure efficiency. Chapter four thus focuses on a discussion of design proposals and criteria used. Chapter Five highlights strategies for management as such relates to administration, finance, and Law.

CHAPTER TWO

2.00 BACKGROUND TO STUDY AREA

2.10 Historical Background

Ilesha is an old cultural town in Oyo State serving thus as the headquaters of Ijesha sub-ethnic group of the Yoruba. Before being stabilized at the present location in early nineteenth century, it had variously been sited at Ipole, Iwoye, and Ibokun in a series of migration trends from Ile-Ife- "cradle of Yoruba race". These early settlements however still form her 'region' defining as it were Ileshas growth and development over years,

Accentuating this cultural role of Ilesha has been her importance in the colonial economy and administration. Economically, it served as the collection centre of the mainly agricultural produce (cocoa, coffee and kolanut) and gold mined in some quantities in the region. Nowadays more radical characteristic as the growth of industries and establishment of educational institutions in the town are becoming important features of her development. The above factors of growth are enhanced by her being granted urban status by the state government.

Further to the growth factor of Ilesha is her dynamic community whose peculiarity is seen in their exploits in the distributive trade. The acknowledgement of this attribute by the neighbouring

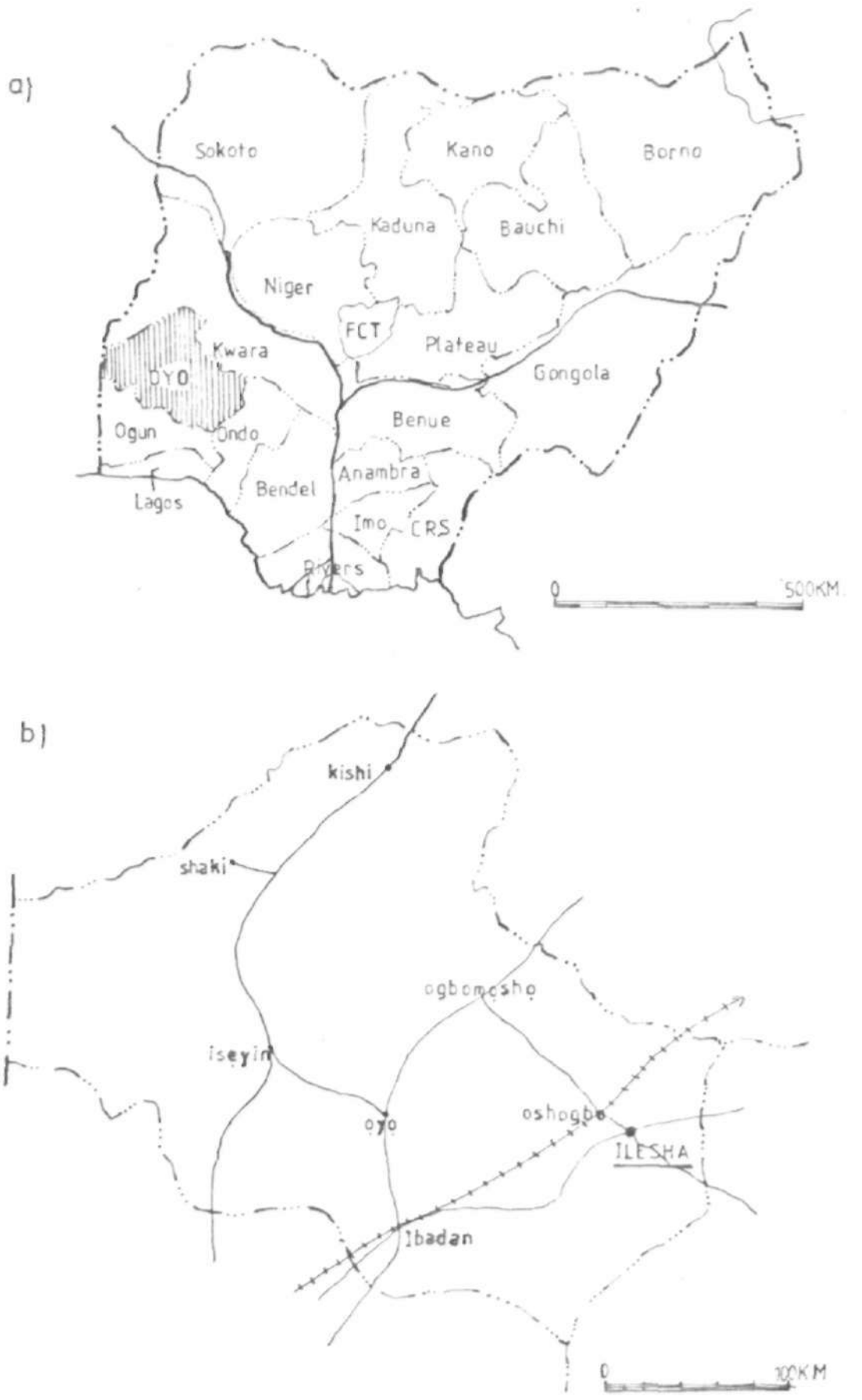


Figure 1

a) Oyo State in Nigeria setting

b) Ilesha in Oyo state regional setting.

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Dept. of U.R.P.
A.B.U., Zaria.

ethnic groups led to the evolvement of the insignia 'Osomaalo' lending thus credence to the peoples (Ijesas) craft at striking terms! This dynamism on the part of the people has not only brought social progress but also spatial implications from the zeal in which they carry out development projects (property) at home.

2.20 Geographical/Physical Characteristics

Ilesha is located some 127 Kilometres to the northeast of Ibadan (Oyo State Capital) and lies approximately between latitudes $7^{o}37'$ and $7^{o}40'$ and longitudes $4^{o}43'$ to $4^{o}46'$. It thus covers an area of 648.9 hectares. This regional locational characteric is illustrated in Figure 1.

It is situated on a geological formation known as basement complex and made up of such materials as gneiss and pegmatites which has a poor ground water yield; but it is well traversed by surface flow of rivers and streams such as Ayao, Ogburu, and Alagbafo. The topography is rolling and gently undulating with heights ranging from 400 to 316 metres on Imo hills to the northeast. Vegetation is rainforest with annual temperature range of $26^{o}C$.

2.30 Operational definitions

2.31 Utilities: It refers to those attributes which are crucial to life and without which it is difficult to live in cities. The thesis focuses on electricity and water supply.

2.32 Services: Refers to the set of urban activities set up to ensure a continuous operation of the city system with an intent of preserving life therein. Study is here confined to dry solid waste refers to garbage, refuse, and other discarded solids including materials from residential, commercial and industrial operations. It does not include solids or dissolved materials in domestic sewage or other significant pollutants in water resources.

2.33 Planning: Refers to physical planning as it concerns landuse relations of the services and utilities leading to an application and evolvement of basic principles, standards, and criteria for the operation and layout. It is thus a systematic study of city need given a set of goals and objectives.

2.34 Management: This thesis considers appropriate the view that it is the evolvement of strategies for implementation, co-ordination, and organisation for effective functioning of utilities and services.

2.40 LITERATURE REVIEW/THEORETICAL ARGUMENTS

Much of the earlier works done in this connection has been in the engineering profession as mostly planners rely on these professions to provide standards/criteria as planning guides in what they regard as a purely technical affair. This belief is carried into their masterplan preparations.

Recent masterplan preparations could however be cited here as showing attempt to improve in this wise. The works by the Department of Urban and Regional Planning[1] and the Federal Capital Development Authority[2]. Through surveys, standards were established for planning these utilities and prepared accordingly. They however exhibit commitments which underscores the importance of this infrastructure in our urban environment.

The present work however thrives on sieving relevant informations from these sources and tempers them with the environment for planning and management. Significant in this wise had been an adoption or modification of the set of criteria/standards that are comprehensively spelt out in works of Joseph de Chiara, et al (1967)[3] and the Technical College, Ibadan[4] among others. The various methods of planning differentially discussed for the utilities and service are also important mention here.

---

1. Department of Urban and Regional Planning. Zaria Masterplan Gaskiya Corporation 1981.

2. Federal Capital Development Authority. The Masterplan for Abuja 1978. Government Printer PP. 181 - 217

3. Joseph de Chiara, et al Planning design Criteria Reinhold Coy 1967. PP.306

4. Technical College Ibadan. "Manual of Space Standards for Urban Development in the Western State of Nigeria." Being class project of HND final year students 1972.

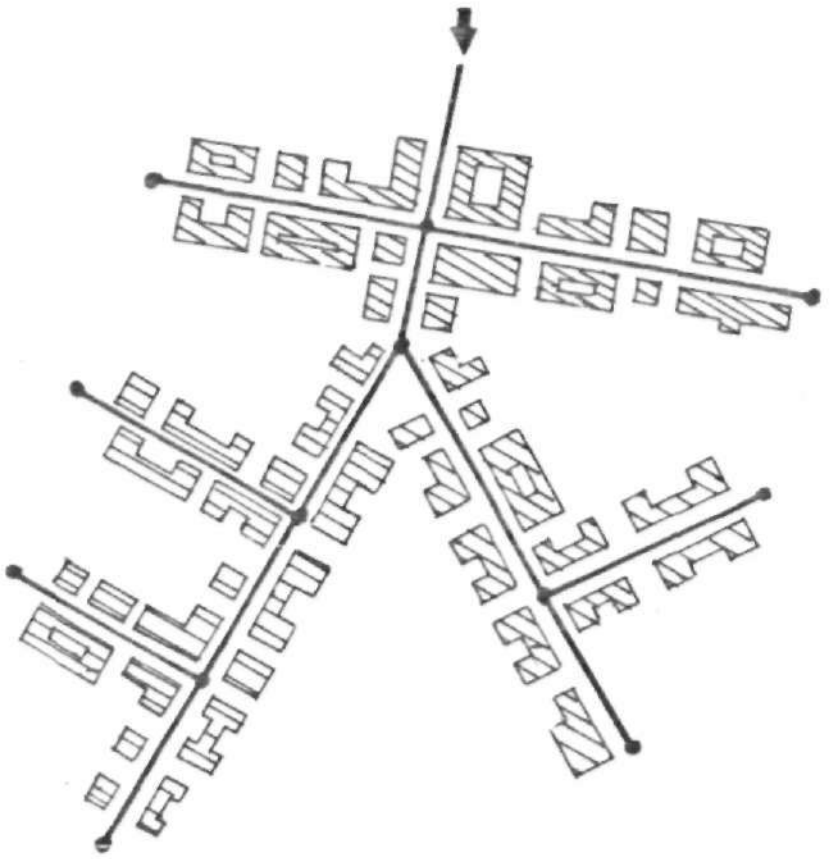
Generally the design of a water supply system follows a sequence of operations which has been variously identified in texts as estimate of need, analysis of water available at the source, the design of a reservoir of adequate capacity, the determination of the various pipe sizes, and methods of distribution. In some cases, as we have in Masterplan preparations, the supply system is phased out.

The various methods of determining the estimates above were discussed too. Water demand of a city is established as use per capita per day which in turn are highly dependent on the requirements of the population for various activities as domestic and industrial use. The fire hydrant requirements and loss from distribution also calculated as a percentage of this. The texts has for this established 200 litres/person/day as the ultimate demand of cities. The reservoir capacity on the other hand is usually determined by the likely withdrawal demand during a long dry period of usually several weeks depending on local hydrological situation. This however is usually an engineering technical affair. The various pipe sizes are determined by the total peak demand of the various landuses within the town and to ensure efficient supply of fire hydrant withdrawal at a time of a big fire outbreak.

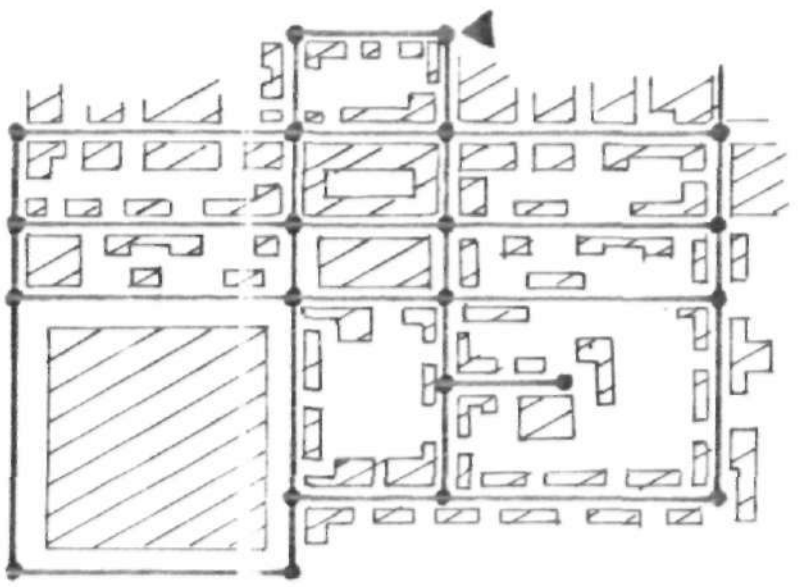
The various types of water distribution systems commonly agreed upon in texts are two, and namely the 'branched' system, and 'looped' network system.

This is illustrated in Figure 2 below. The branched system could thus be likened to the tree-branch which sprawls out in given directions from the main system to supply the consumers. Apart from the advantage that flow rates in pipes are easily determined and faults easily traced a breakdown in any of the mains usually results in disrupted supply to consumers. The 'looped' network system on the other hand is a comprehensive effort to ensure efficient supply throughout the system even in events when one of the mains goes out of operation. As is shown in figure 2, the 'looped' network usually has a ring of mains to which the secondary pipes are connected which in turn are inter-connected with each other. However, this system in expensive and requiring considerable manpower for its operation than the 'branched' distribution. The basic philosophy of water provision in Nigeria, earlier reffered to, makes the recommendation of the 'looped' system attractive.

Electricity supply also follows the same format as water supply in the search first of a viable source of supply given the population and landuse demand of the city and the determination of a suitable method of supply and streetlighting situations given the road network. The various energy supply sources have been identified as hydro, thermal, and nuclear. In most cases they are nationally or regionally planned to accomodate all power needs of the country or the region as it is.



(a) Branched sy: tem .



(b) Looped Networ system.

FIG. 2

WATER DISTRIBUTI N METHODS

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Dept of r.p
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From here power is distributed over a series in a transmission system. This system functions to distribute electric power which are received from ".... bulk power sources and to distribute it to consumers at voltage levels and with degrees of continuity that are acceptable to the various types of consumer"[5]. At the city level this system consists of Primary circuits or "feeders" which supplies a defined city size; the distribution transformers which converts the energy to utilityable voltages; the secondary mains delivering the energy along the street or alley "to within a short distance of the users"; and the service drops branching off from the secondary mains to the consumer. The various methods of distribution has also been reviewed in texts as "simple radial circuits", "parallel or loop circuits", and "interconnected circuits". The Radial Circuit system is the simplest and of lowest initial cost. Here eadh sub-transmission line serves as normal feed to certain distribution lines and emergency feed to others. In each substation manual or automatic switches properly interlooked, transfer power to the auxilliary if the normal line is interrupted. Despite the fact that this arrangement requires considerable spare capacity, it does not prevent an extensive service interruption for a short time.

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5. Leonald M. Olmstead and Julius Bleiwess "Power Distribution. Section 16 in Donald G. Fink and John M. Canoll (ed) Standard Handbook for Electrical Engineers. 10th Editions Mc Graw Hill New York.

The efficiency level is thereby how to support industrial uses within a town. The parallel or loop network ensures uninterrupted service to all distribution substations especially during any single fault. A system of "breakers". Thirdly we have the network or grid trans-mission which has been rated as providing the best service reliability to consumers. It supplies consumers from two or more lines on the network. Despite the inherent advantages/ attractions of the grid transmission over others an effective choice is dependent on cost and reliability of power supply, load distribution as determined by landuse type in the city.

Solid waste disposal which forms the third consideration of this thesis is perhaps the most reviewed in texts. The reason for this has not only been due to the increasing volume and variety on the onset of industrialization and city growth, but also the need to evolve an efficient method for disposal. Challenges posed by physical growth of the towns has also been found to define the need to evolve suitable methods of disposal. Initial consideration of solid waste has always been its classification in order to define the various types, characteristic, and source of generation. When analysed by kind, solid waste is found to be made up of garbage, rubbish, ashes, street refuse, dead animals, abandoned vehicles, industrial waste, demolition, construction, and special wastes.

In the same manner, their composition has been found to vary significantly as the source of generation. For example, in the U.S.A., the various percentages for residential, commercial with institutional, industrial, mineral and agricultural wastes has been established to be 5.8%, 6.0%, 2.5%, 31.1% and 52.6% respectively[6]. The per-capita waste generation is put at 17.92 Kg as at 1980. A review of the trend show increases in per-capita generation, changes in physical composition and volume, without necessarily a corresponding increase in weight. This very fact creates need for effective management of solid wastes. This is often treated in terms of separate problems concerned with collection and disposal leading ultimately to evolvement of standards, criteria, and principles.

Discussions on collection practises have often revolved along collection responsibility, procedure frequency, type and number of vehicles usually required.

Responsibility for collection has been identified as falling into three categories. These include direct collection by public institutions which could be the local government, municipal government or an agency set up for the purpose, secondly are private collections. Private collections are made under formal municipal contract with collection costs financed through tax receipts and for

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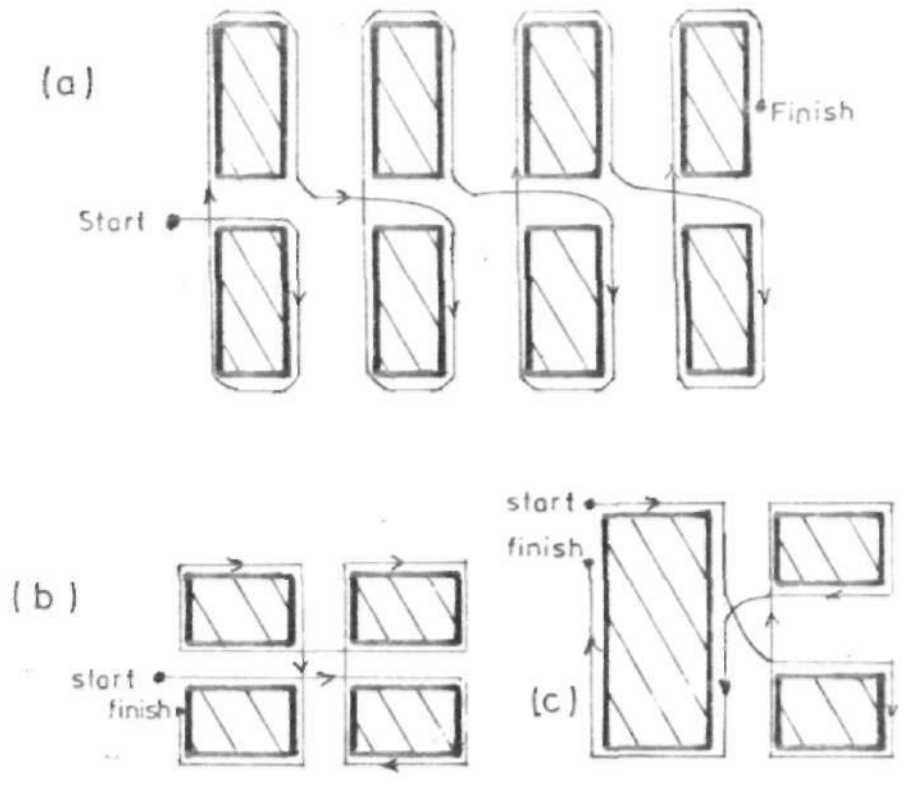
6. David Rimberg Municipal Solid Waste Management. 1975. Noyes data Corporation, New Jersey, PP.6

service charges. Other type of private collections are based on contractual forms with particular waste producers usually industrial users. Public collections has been found to have obvious advantages over others despite its susceptibility to political interference since it allows for public scrutiny of the activities and performance of a municipal sanitation and is not motived by profit motives. Authors however does regard susceptibility is its strength and advantage over others.

The procedure for collection are usually an adaptation of particular landuse needs based on volume of waste generated and the layout pattern for streets in the city. The Heuristic analysis[7] provides the most comprehensive routing system that makes for efficiency in collection of waste from given residential layouts, and given the fact that backdoor collection procedure has become obsolete among otherthings because of its labour intensive nature. The content of this heuristic routing is based on the fact that "...those responsible for the work are in the best position to improve routes they follow". It is further illustrated in figure 3. All the above presupposes existence of a good road network and orderly layout of building. Since their adaptation depends on local condition of landuse and network we can have a combination of two or more of the above.

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7. American Environmental Protection Agency quoted in W.S. Foster Handbook of Municipal Administration and Engineering Mc Graw Hill Coy. NY. PP. 86



key: -

(a) Routing pattern for a one-way street.

(b),(c),(e) Routing in four-block configurations

(d) Routing in three-block configurations.

Refuse generating blocks.

FIG. 4

HEURISTIC ANALYSIS OF COLLECTION METHODS.

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A.B.U. Zaria.

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The types and number of vehicles required are dependent on type of ultimate disposal method intended, and the type and volume of refuse generated, they do vary with communities, and are subject to changes over time.

Secondly considerations in solid waste management focuses equally well on method for disposal. The economic value of wastes could result in some physical processing or salvaging to preceed disposals though in some cases outright disposal is carried out. Three basic methods of disposal are sanitary landfilling, incineration, and compositing.

Sanitary landfill consists of disposal of solid eastes on land by careful engineering designs, operation and control of facility on site. The steps involved are recognisably three. First is the depositing of refuse at the working area of face, Secondly, the refuse is spread into this layer (approximately 0.7m) and compacted by heavy equipment, and thirdly the refuse layers are covered with earth material daily followed by further compaction. Depending on local conditions two types of operations are involved in landfills and are namely 'trench' and 'area' operations. Area operations are carried out where there are nearby hills or mounds, so that refuse distributed over a controlled space are covered with earth from these hills and mounds.

The trench method is carried out in areas of flat topography so that large excavations into which refuse are deposited and compacted are progressively filled up with excavate's earth or brought from other parts of the region.

However the amount of land needed for sandfill depends on the character, quantity of the solid waste received, the depth of the fill, and the desired life of the fill. Various criteria has also been identified as to the determination of the location of the site. This has been well elaborated on by Mantell (1975)[8] whose formulae for calculating the volume of disposal site and hectrage requirement for disposal given the total amount of refuse generated/day and handled at the site, population served density of landfill waste in kilogrammes per year.

The advantage of sanitary landfill lays in flexibility especially in accommodation of peak load and being most economical where land is available, its ability to curtail pollution and other environmental effects especially in minizing odors, blowing paper, preventing seavenzer birds, rodents, and being effective in land reclaimation and subsequent refuse as parks, playgrounds, golf course, and landscaped urban buffers.

Incineration is another method of refuse disposal and consists of controlled burning of wastes in specially made purpose furnance, boiler or container.

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8. C.L. Mantell (Ed) Solid Wastes: Origin, processing and disposal. John Wiley & Sons New York 1975.

It acts as a volume reduction mechanism as it reduces wastes to gases and ashes. They are of varying temperature and capacities and choices made are dependent on the composition of such wastes, and the volume generated. The obvious advantage of incineration is manifest in transport cost savings reduced volume of wastes, and enhancing safety to neighbourhoods by disposing of such refuse which may be difficult, expensive, and dangerious to dispose off by other methods. However, the high capital and operation costs serves as its obvious disadvantage and reluctance of acceptance by agencies.

Other disposal methods include composting, refuse shredding and compaction alongside newly emergent methods of disposal. Compositing is "a controlled process where domestic, agricultural and commercial refuse to first prepared and then allowed to decompose resulting in an in-offensive material that can be used as a soil conditioner"[9]. It is a development on the old method of using backyard refuses for manuring.

Which-ever of these methods we may wish employ should be guided by existing local conditions of economy, policy or environmental protection and sanitation, and the form of waste to be disposed off.

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9. Ibid pp. 56

Towards ensuring an effective management of our utilities and services, a set of Acts and legislations to form a legal framework for operation vis-a-vis consumer rights and obligations has been worked out. Important here are works by J.B. Wikeley (1964)[10] and Hagerty (1974)[11] which are based on situational practise in Britain and USA. Various other sources are important considerations here since they influence our decisions. This includes the various newspaper articles, reports, and media opinion polls. The electrical campain promises made by politicians at rallies also serve as environments for planning.

The discussions above reveal the fact that utilities and services operate in very complex environments, so that any singular effort at planning should aim at complete integration with elements of the city system.

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10. Wikeley, J.B. Municipal Engineering Law and Administration, 1964. Wiley & Co New York.

11. Hagerty, D.J. et al (ed) Solid Waste Management 1974. Reinhold Coy. New York.

CHAPTER THREE

3.00 REVIEW AND ANALYSIS OF EXISTING SITUATION

3.10 POPULATION AND LANDUSE

3.11 Population: The 1963 census gave the population of Ilesha as 165,822. In the absence of later official figures, a recent analysis[12] which assumes 2.5% natural increase and 4% for migration as growth rate for Ilesha as most other Nigerian towns was adopted. This puts the population in 1980 at 483,710. This shows rapid increase in population meaning increase demand and pressure on existing electricity and water supply, and increase in gross amount of solid waste generated. It also means an ever increasing need to expand and plan for accomodation of such challenges to services and utilities that is posed by this rapid rate of population growth.

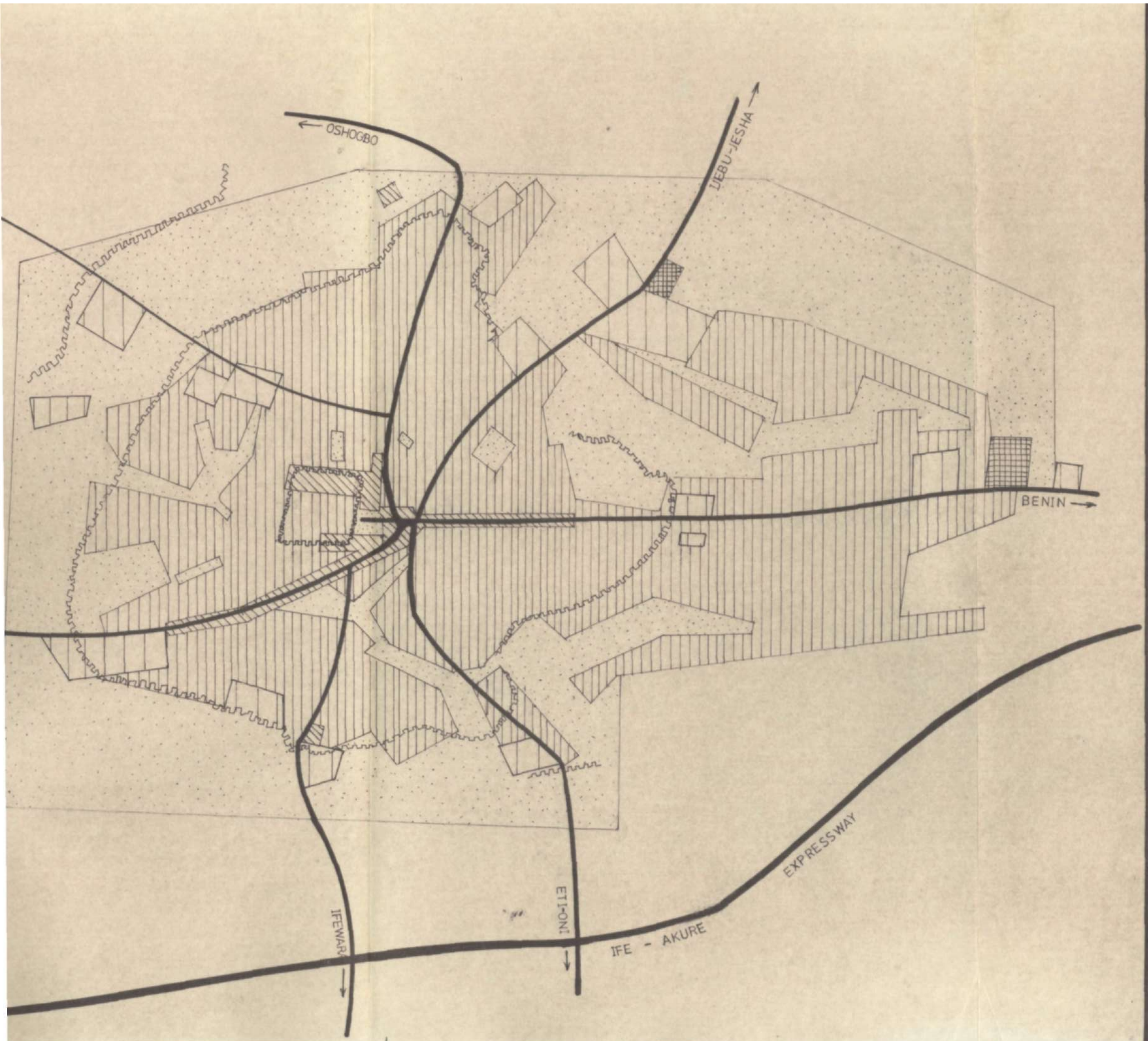
3.12 Landuse: At present Ilesha occupies a total land area of 648.9 hectares. The table below shows the various uses and their percentage composition.

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12. Ogbonna, D.O. "Urban Population Growth and Problems of Water supply in Nigeria". Being title of paper presented at the Zaria Water resources and Environmental Engineering Workshop on Water distribution system - Analysis and design. August 1982.

FIGURE 4

ILESHA : EXISTING LANDUSE.



key

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- PUBLIC / SEMI-PUBLIC
- AGRIC. / OPEN SPACES
- MAJOR ROADS

Scale :

200 0 400 600 Metres

1 :20,000

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A. B.U. Zaria.

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Table 3.1 Ilesha: Proportion of the various landuse types

Type	Area in Hectares	Percentage of Total
Residential	356.9	55.00
Commercial	32.4	5.00
Industrial	19.5	3.00
Public/Semi Public	97.3	15.00
Roads and Streets	64.9	10.00
Others	77.9	12.00

Source: Ilesha Town Planning Office.

It is thus shown that the dominant use is residential (55%) and the bulk of the people are engaged in public and semi-public activities mainly educational institutions as is denoted by the percentage land under the use (15%). The percentage allocation to roads and streets (10%) is occasioned by the need for accessibility between residential uses and places of work (the public/semi-public uses) usually located some distance off the main residential uses.

This is further illustrated in Figure 4 showing the present landuse pattern in the town. What readily becomes observable is the marked course of developments along the road networks. The commercial landuse follow closely in this pattern of development moving first westward along the main regional road to Ibadan, and eastward along Benin road as well as at the roads intersection in the citys central area with evident

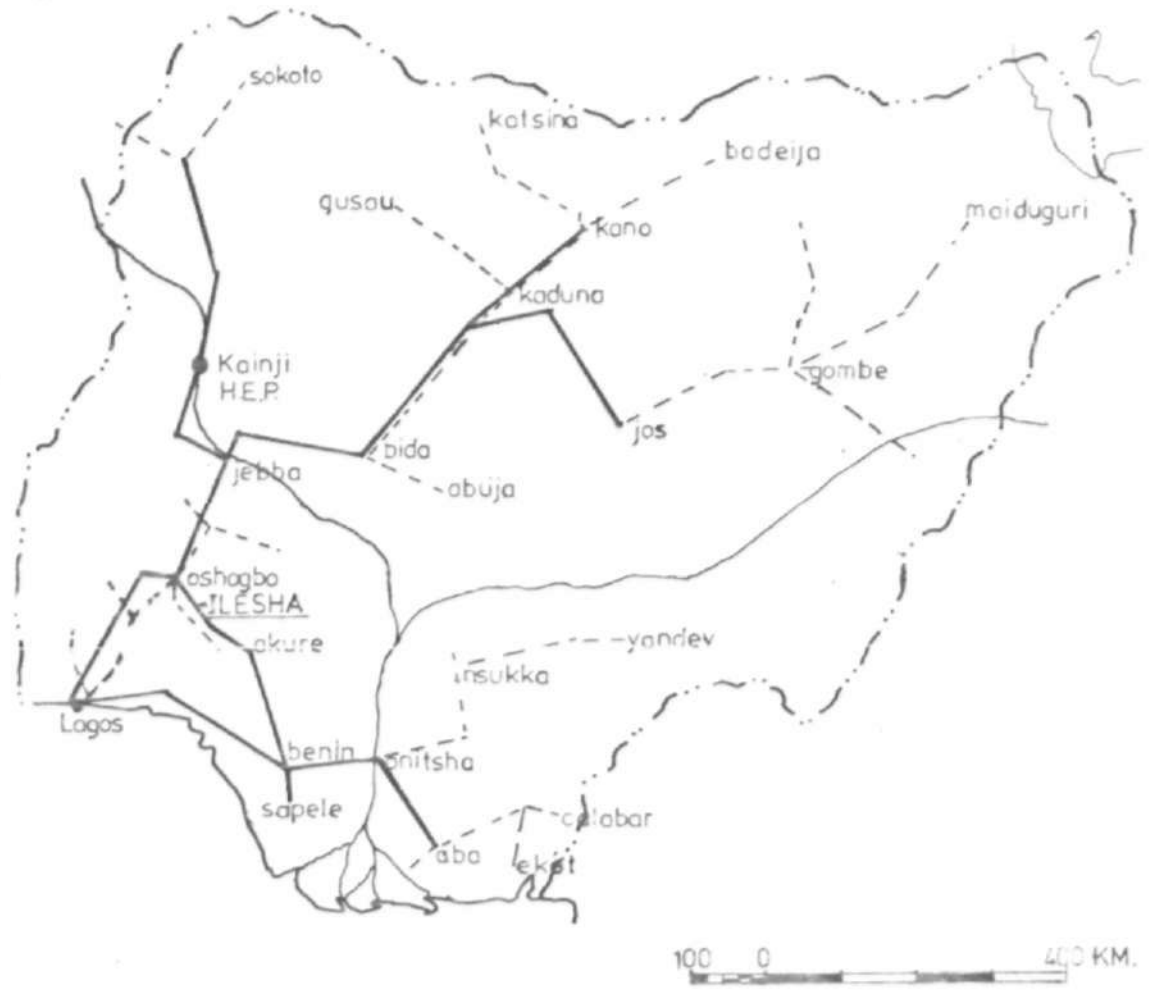
linkages to the traditional market beside Owa's palace. The public and semi-public uses apart from their scattered distribution over the area are also closely linked with the road pattern observed. Except where these public and semi-public uses have developed before the residential they are located at convenient sites between uses. The places marked as "other uses" and of 12% land allocations are usually reserved lands for market gardening because of its favourable hydrological conditions as in the akuro and the proximity as is the case with backyard farms or Oko etile.

3.20 ELECTRICITY SUPPLY

The source of power supply to Ilesha is the Kainji hydro-electric power station. The capacity of this sources to cope with the forecasted national demand has been established.[13] Figure 5 illustrates the national network of this transmission further establishing the relative location of Ilesha within the system. Supply to Ilesha is however ensured through the Oshogbo bulk supply station which is located some 29 Kilometres away. At Oshogbo this 330 KV line is stepped down to 33/11 kV to supply Ilesha. At the Ilesha substation the power is further stepped down to 11,.415 kV at which distribution to consumers commence.

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13. National Electric Power Authority "Monthly Bulletin" Lagos Nigeria. December 1981.



Source :-

NEPA Monthly Bulletin
(Dec. 1981)

figure 5

ILESHA WITHIN THE NATIONAL ELECTRICITY DISTRIBUTION NETWORK .

Figure 6

ILESHA : EXISTING ELE

DISTRIBUTION SYSTEM



Legend :-

- Main substation
- 33 / 11 KV. High voltage
- 415 KV. Low voltage line
- Transformers
- Roads
- City wall / ditch.

Scale:-

200 0 400

1 : 20,000

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DEPT. OF U.R.P.
A.B.U, ZARIA

Figure 6 shows the present distribution pattern, and the relative locations of the transformers.

The distribution network is run on three-phase supply overhead systems borne on concrete poles laid 25 metres apart on one side of the road. The 33/11 kV high voltage lines are laid along the three regional roads: Oshogbo, Benin, and the Ibadan roads with the main branch along the Oshogbo road. The 11/.415 kV low voltage lines from here brances off to supply consumers at voltage points differentially defined for the land-uses giben the various peculiar demand situations computed for the uses. The initial demand of 300-500 kVA has landuse risen to 10mVA. The various landuse consumptions is computed as :

Table 3.2

Ilesha: Power Consumption by landuse categories as at 1983

Type of User	Power consumption in megavolts.	% of Total
Residential	5.2	52%
Commercial	1.5	15%
Industrial	2.8	28%
Public/Semi Public	5	5%
	10 MVA	100.00

* Source: NEPA Office, Ilesha.

It follows from the above that residential landuse accounts for the greatest percentage (52%) of total energy consumption in Ilesha. The industrial uses are mainly made up of the Brewery's consumption as other industrial concerns are cottage and mixed up with other uses, so that their actual consumption cannot be marked out. We cannot thus make forecasts for individual industrial uses without those informations.

Through questionnaire and other survey efforts were made to assess the present level of efficiency of electricity supply. It reveals a number of problems of which the most prominent is irregular supply of electricity to homes. While 50% of the respondents indicated a fair supply situation, 29.5% rated it as poor, while 20.5% said it is just good enough. The same set of opinions went for the street lighting situation where 58.5% felt its about right, the rest are either not bothered or ignorant about the situation. The reconnaissance survey among other things established total lack of supply to some areas. This situation is especially found in newly developed areas,

The surveys revealed further certain management constraints that are crucial to the performance of the system. This includes the apparent lack of information and effective organisation system for keeping abreast of physical development in the town so as to provide electricity where and when it is so needed.



PLATE I Electric pole in the middle of road as a result of road expansion. Along Ifofin-Ogbon Idio Streets.

Also is the frequent damage to distribution lines by developers and road users knocking down the distribution poles. This conflict situation is shown on Plate 1 of a scene along Ogbon Idio/Ifofin street where road widening has claimed utility line leaving the distribution pole right at the centre of the road! There is also a plierage on distribution line especially in residential areas. The consequent overloading of transformer capacity leads to disruption of supply in such neighbourhoods.

The responsibility for power supply lies with the National Electric Power Authority (N.E.P.A) which operates at regional level through its zonal office at Oshogbo. This Oshogbo office control operations at Ilesha with dominant responsibilities for distribution, implementation, maintenance, while the area office at Ilesha only serves to recieve payments of bills, hearing complaints and detection of damages to distribution networks for onward relay to the Oshogbo head-office. The head-office then analyze and mobilizes resources (manpower, finance) to rectify them. This process apart from being slow is often ineffective to cope with demand situations at Ilesha.

3.30 WATER SUPPLY

The existing source of water supply to Ilesha is from the Oni River (a surface flow) located some 29 kilometres away. At a point on the river a weir was constructed and at present holds back a volume of 2.3 million litres per day of water. Although this volume held has been found to be of sufficient quantity to supply water to Ilesha, the survey established that such is not matched with total supply of piped water to the population at Ilesha. Plate II illustrates the fact that households still rely on commual brooks or 'omi akuro' to supplement their domestic water requirements. Artesian wells are also dug by households for the same reasons. This holds true for 28% of the population. However, the bulk of the towns population (71.5%) gets conventional water supply for their various uses.

This is either by private or public connections See figure 8^{b}. The raw water thus tapped from Oni River is piped through a 300 millimetre main to the treatment works situated along Benin road where full treatment is undertaken and water is pumped into underground reservoir with a capacity of 2,250 cubic metres of water. From this works station, the water gravitates to supply other parts



PLATE II. Households still rely on spring for their need



PLATE III. Damage to water distribution main along Iloro Street.

of the town through a hierarchy of pipes. The distribution network is shown in Figure 7.

Distribution is attained mainly by gravity flow, there are no booster stations and overhead tanks. The effect of inadequate and lack of sustained level of flow into areas has meant inefficient supply and shortages in many neighbourhoods especially those located towards the end of Iperindo, Etioni, Ifewara and such others with specially acute conditions in neighbourhoods bordering Muroko roads. To exercibate this has been the rather poor relationship of the various pipe sizes with distance and demands landuses. To curb this supply situation, the Water Corporation resorted to rationing of supplies and total disconnections as we have in 13% of the cases of which 50% are located along Muroko and Irojo areas situated along Etioni road.

Other problems of the distribution network include damage to distribution mains by road contractors and other property developers in the town. In certain instances they do completely exhume these lines as in the example illustrated on Plate III. Haphazard developments of this nature coupled with lack of information and poor coordination of developments in the town has meant non-supply to newly developed areas.

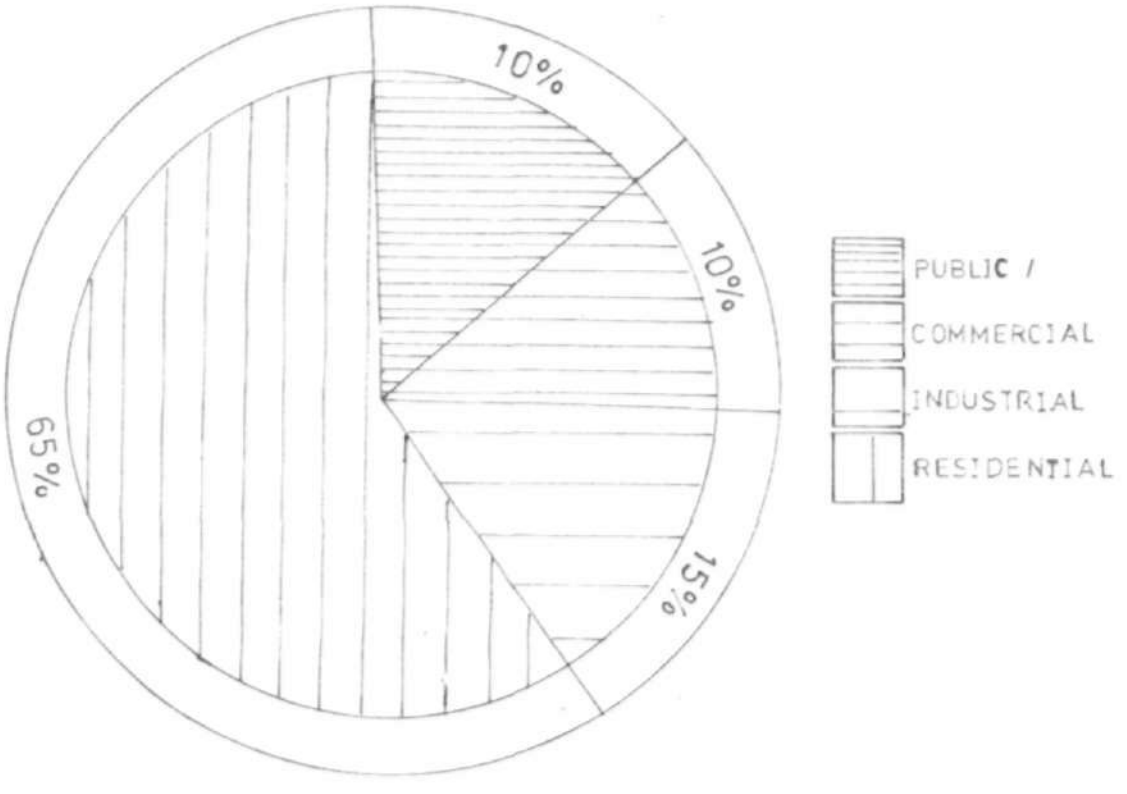


FIG. 9 (a) Water consumption by landuse types

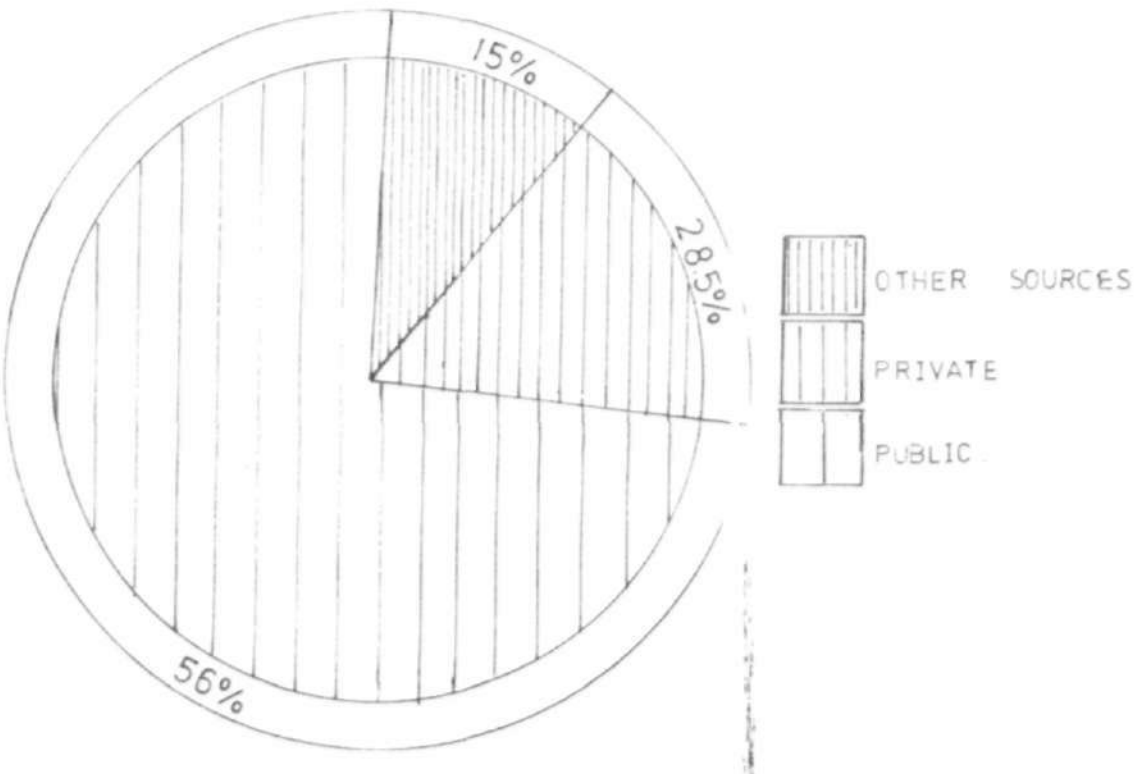


FIG. 9 (b) Consumer population by type of service received

Figure 7

ILESHA: EXISTING WATER DISTRIBUTION SYSTEM.



Legend:-

- Pumping station
- Storage tank
- Fire hydrant point.
- 250 mm.
- 200 mm.
- 150 mm
- 100 mm.
- 75 mm

pipe sizes

- Roads
- City wall / ditch.

Scale 200 0 400 600 M

1 : 20,000

Fadumila, T. A.
Dept. of URP,
A.B.U. Zaria

M.Sc Thesis, June '83

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Having discussed the distribution system above, it is necessary to discuss the present levels of supply with regards to demand of the landuses. Table 3.3 below serves to illustrate this situation.

Table 3.3

Ilesha: Water Consumption by Landuse types

Landuse type	Proportion in million Litres	% of Total
Residential	5.31	65%
Commercial	0.82	10%
Industrial	1.22	15%
Other uses	0.82	10%
Total	8.17	100.00%

* Source: Water Corporation of Oyo State Office Ilesha.

Residential users forms the bulk of consumers here with percentage consumption of 65%. Industrial consumption followed closely on this with some 15% This level is attained with the establishment of brewery and proliferation of construction industries all over the town. This is further illustrated in Figure 8a. As has been shown in figure 5 that a mixed landuse with no distinct zonations. This has meant a poor relationship of uses with supplies as is illustrated in the poor relation of pipe size hierarchies with the various landuses.

This has meant overstressing of supply in certain areas and inadequacy in relation to demands. The distribution network follows closely the road pattern while the pipe sizes shows more relationship with the hierarchy of roads. It is made up of the main and secondary lines, the standpipes and fire-hydrant withdrawal points.

The locations of the fire-hydrants are in the major commercial points (the commercial banks and petrol stations) in the central part of the city and the market. In all six fire hydrant points are found in the town. This is considered inadequate given the landuse variety as is shown earlier in figure 5 and the high population density.

3.40 SOLID WASTE DISPOSAL

In Ilesha. the disposal of waste is best understood from a consideration of the twin processes of collection and disposal. This is highlighted below as:

3.41 Generation: The amount of refuse generated per day is in Ilesha is calculated at 800 grammes per head per day or 29.2 Kilogramme or 1.41 x 1011 kilogramme for the whole population at Ilesha.

The absence of a standard for quantifying waste as per given population makes an assessment difficult. In the case of Ilesha, that large amount of waste being generated cannot be disputed. Also since the the proportion increases with population, and standard of giving evident in the city, makes it a crucial challenge to planning. This is the various categories of is shown in table below.

Table 3.4

Amount of Waste Generated by landuse Types in 1982 at Ilesha (in grammes/capital/day)

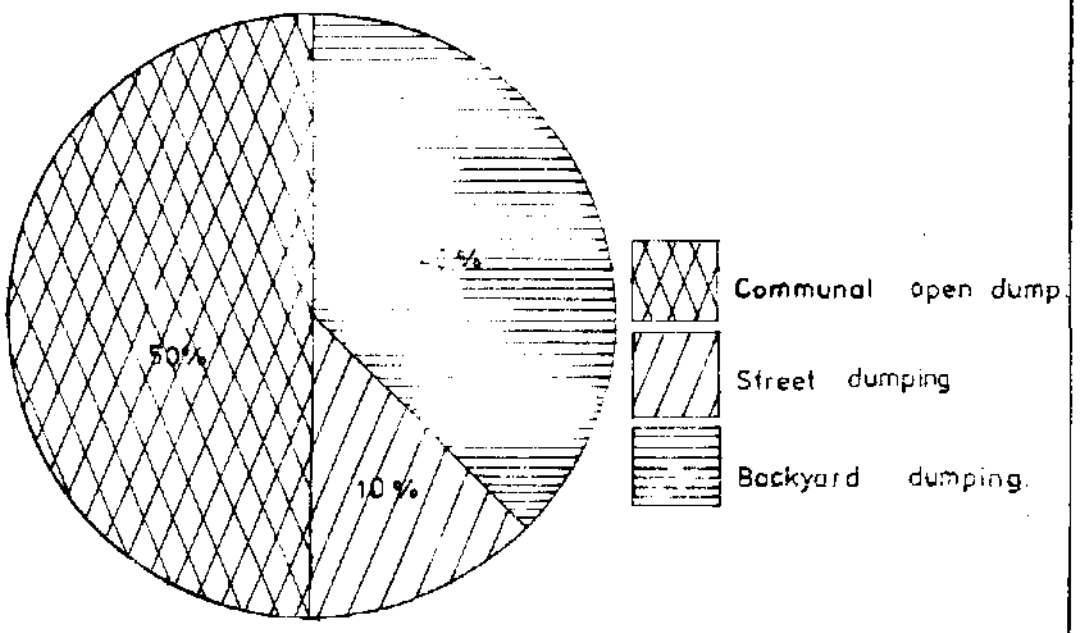
Landuse Category	Amount in Grammes	% of Total
Residential	240	30.00
Commercial and Institutional	136	17.00
Industrial	200	25.00
Others uses	224	28.00
	800	100.00

* Source: Field Survey.

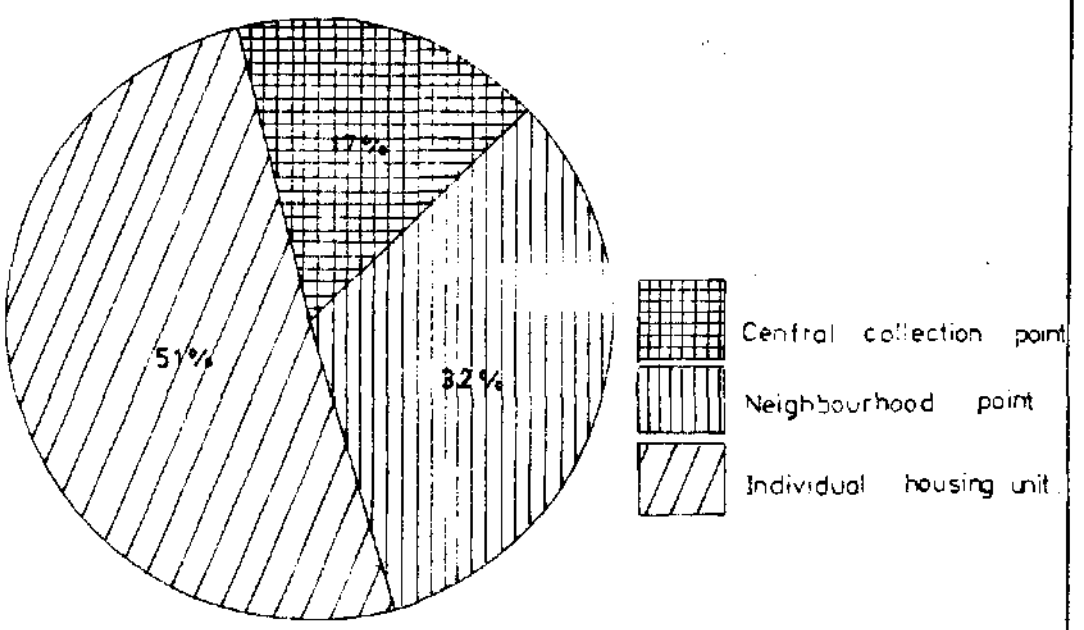
It revealed that the bulk of waste generated are from residential sources. The mixed nature of landuses in Ilesha makes categorisation difficult and as will be shown later, this further compounds waste collection problems.

3.42 Collection: There is no organised collection system for refuse in Ilesha both in relation to the procedure, frequency, and various sites of collection. The result is that people resort to dumping refuse at any convenient spot in the neighbourhood. These various points are identified in Plates IV to VIII. This spontaneous collection centres are thus vacant plots, incidental open spaces, streets, backyards and stream bank.

The proportion of the various modes of collection are further illustrated in figure 9 (a) which shows that 50% of the people dump at their backyards, 10% on the streets and some 40% at spontaneously developed points in the neighbourhood. This neighbourhood collection centres whose areal distribution in the town is shown in fig. 11 ultimately are the points from which the local government collect refuse. Following from the above, we can say efficiency levels of this service is low resulting among other things from lack of an organised collection system as an insignificant percentage (35%) of refuse being collected for onward transport to the disposal site. Also there is inadequate coverage of the whole area so that some points are left uncollected on a regular basis. This situation is further highlighted in table 3.5 below:-



(a) Disposal practise by households.



(b) Opinion on collection methods

FIGURE 10

REFUSE DISPOSAL PRACTISES AND OPINIONS ON APPROPRIATE COLLECTION METHODS



LATE VI. Vacant plots as open dumps at Ishida Area



PLATE VII Stream banks used for neighbourhood indiscriminate dumping as is recorded at Ogbon-Okun.



PLATE IV. Street dumping of refuse along Adeti Street.



PLATE V. Backyard dumping of refuse at Ereja-Ereguru Area.

Table 3.5

Frequency of collection from Neighbourhood in Ilesha.

Frequency	Household interviewed	% of Total
Daily	39	19.2
2-3 days a week	69	34.5
Monthly	50	25.0
Yearly	11	5.5
Never	31	15.5
Total	200	100.00

* Source: Field Survey 1982.

The implication of this is in unequal service of the households all over the town. So that no visual influence is established for the town as a whole.

3.43 Disposal: No formal arrangement for disposal is made in Ilesha. As is shown on Plate VIII opposite, the refuse is dumped on bare ground at the disposal site. Being dumped carelessly they are blown about by winds, become breeding ground for rodents, and flies constituting on the average an 'aesthetic nuisance'. Further compounding this is the fact that the site lies in the direction of the towns growths increaseing costs of development at such sites.

3.44 Management and Finance: Presently the responsibility for solid waste disposals is being carried out by the Local Government through its Health Office

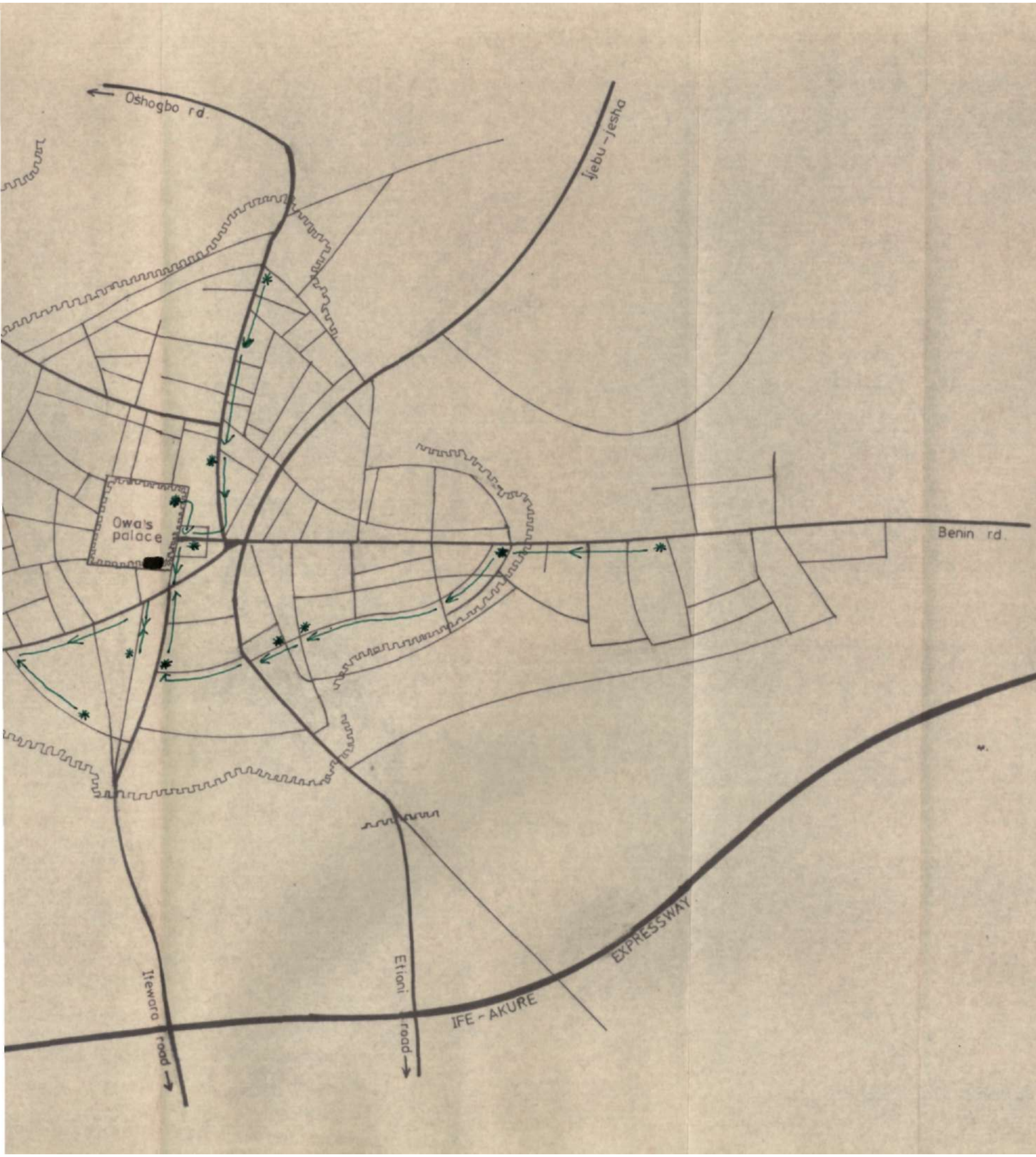


Figure 11.

ILESHA : EXISTING COLLECTION SITES FOR SOLID WASTE.

Legend : -

- Collection sites
- Disposal site
- Local government office
- Roads.
- City wall / ditch.
- Refuse collection route.

Scale :-

200 0 400 600 M

1 : 20,000.

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Fadumila, T. A.
Dept. of U.R.P,
A.B.U., Zaria.

M.Sc. Thesis, June '83

which also has responsibility for general sanitation in Ilesha. At present the office has nine health superintendents and 34 labourers engaged in refuse collection. For collection purposes the office has two vehicles of the type shown in Plate IX.

The observations which can be made with reference to the above are two. First is the 'inadequacy of health superintendents with relation to the whole populations the standard[14] ratio of 1 health inspector to 1,000 population, 48 is thus needed under the present circumstances. The number of vehicles also is inadequate, again the vehicles are old and constantly breaking down due to mechanical faults. As at the time of survey only one was in operation. This has meant inadequate coverage, and insufficient number with regards to total volume of refuse ultimately disposed at site per day (put at 35% of total).

The department faces financial constraints in its operation since it does not generate sufficient revenue of its own. It instead depends on their departmental share of local government allocation which are got by making requisition order from the central store for equipments, and cash requests to the registery before

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14. Nze, F.C. "Managing Urban Waste in Nigeria for Social and Economic development". Paper presented at the conference on 'Environment and development held at the Institute of Administration, A.B.U, Zaria 28-29 November, 1977. PP.5



PLATE VIII Final disposal site at Eruru
(Note the surface dump)



PLATE IX. One of the two disposal vans collecting refuse from the clinic centre.

they can make purchases. The amount accruing to the department from this source has been diminishing especially of late following creation of more local governments in the state. This has meant reduction in departments share allocation of the whole allocation for Ilesha Local Government.

CHAPTER FOUR

4.00 DESIGN PROPOSAL FOR UTILITIES AND SERVICES IN ILESHA.

4.10 POPULATION AND LANDUSE

For a thesis of this nature an analysis of the existing as well as profected population and landuse forms a prerequisite data base in any realistic proposal for effective planning.

The thesis foremost considers appropriate an adoption of population projections for the year 1980 as 483710; 1990-907991; and the year 2000 as 1704424. The assumed rates are 2.5% of natural increase and 4% migration rates with 1963 census figures, which is the latest official source as base year.

The future pattern for landuse development is also established through a rationalisation of standards used in cities of similar growth characteristics as Ilesha as well as observed trends Table 4.1 shows this rationalised percentages, while Table 4.2 represents the hectrages under different uses.

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15. Ogbonna (1982) Op Cit.

Table 4.1

Existing and Proposed Landuses in Ilesha
(rationalized percentages)

Type	% Range of landuse in 39 Urban Centres.	(1) Zaria	(2) Ilesha Existing	Ilesha Proposed
Residential	51.0-46.0	50.0	55.0	51.0
Commercial	3.0-4.0	3.0	3.0	3.5
Industrial	7.0- 9.0	3.0	5.0	8.0
Public/Semi Public	14.0-17.0	17.0	15.0	15.0
Parks, Playfields	7.0- 8.0	7.0	8.0	7.5
Roads and Streets	12.0-13.0	16.0	10.0	12.5
Other Uses	3.0- 6.0	4.0	5.0	2.0
		100.0	100.0	100.0

1. Kulslirestha, S.K. "Landuse Patterns of Urban Centres of India". Ekistics, No. 180 November, 1970, PP.436-440.
2. Department of Urban and Regional Planning: Zaria Masterplan, 1983. Gaskiya Coy.

The calculated land areas under various landuse categories are as follows:

Table 4.2
Proposed Areas (in Hectares) under different landuses

Type	Percentage Area	Total Area
Residential	51.0	817.19
Commercial	3.5	56.08
Industrial	8.0	128.18
Public/semi Public	15.5	248.36
Parks and Playfields	7.5	120.18
Roads and Streets	12.5	200.29
Other Uses	2.0	32.04
	100.0	1602.32

The above standards are applied to evolve a judicious spatial pattern of landuses punctuated by land characteristics and developmental trends of Ilesha. This proposed pattern is shown in figure 11. In this wise the rate and direction of development of residential landuse is determined by two factors. First is the reduction of gross density to 110 persons per hectare. Secondly is the allocation of percentage to the various districts based strictly on anticipated rate of growth and proportion of development given the existing situation. The same goes for commercial landuse where the observed trend along the main roads and major districts is developed and additions made accordingly to 56.08 hectares in all. Other uses are allocated considering the basic planning practise of neighbourhood and functionality.

4.20 ELEMENTS OF THE DESIGN FOR UTILITIES AND SERVICES

The provision of power stations, substations, water treatment plants, storage tanks, booster stations, distribution networks, waste collection, routing, and disposal are all related to road network, pattern of physical development, topography, and landform of the city. These are regarded as its design elements.

4.21 Road network

The road network in Ilesha is a combination of radio-centric and grid pattern. The efficiency derives from the ability to provide good access to

neighbourhoods within the city. In Ilesha, neighbourhoods are identified by street names further stressing the importance of roads within this framework.

4.22 Pattern of physical development

The basic layout pattern reveals a group of houses facing the road on all of its sides with incidental open spaces created in-between them. In Ilesha, the challenge this poses to planning has earlier been highlighted in indiscriminate disposal and poor access to existing collection points. Also in Ilesha, it is an established fact that direction of development is defined by the road network.

4.23 Topography and Landform

The characteristic form has been described earlier on as being undulating and rolling landscape with heights ranging from 416.7m to 516.7 metres above sea level. This is crucial to the task of laying out water distribution lines, the site of storage tanks as well as in refuse disposal All of these are closely guided by the topography of the area.

4.30 CONCEPT OF THE DESIGN

4.31 Water Distribution Concept

The advantages of these various distribution methods has been discussed earlier in the literature review. The evolved concept shown in figure 4.1 is a combination of 'grid', 'loop' and 'ring' methods

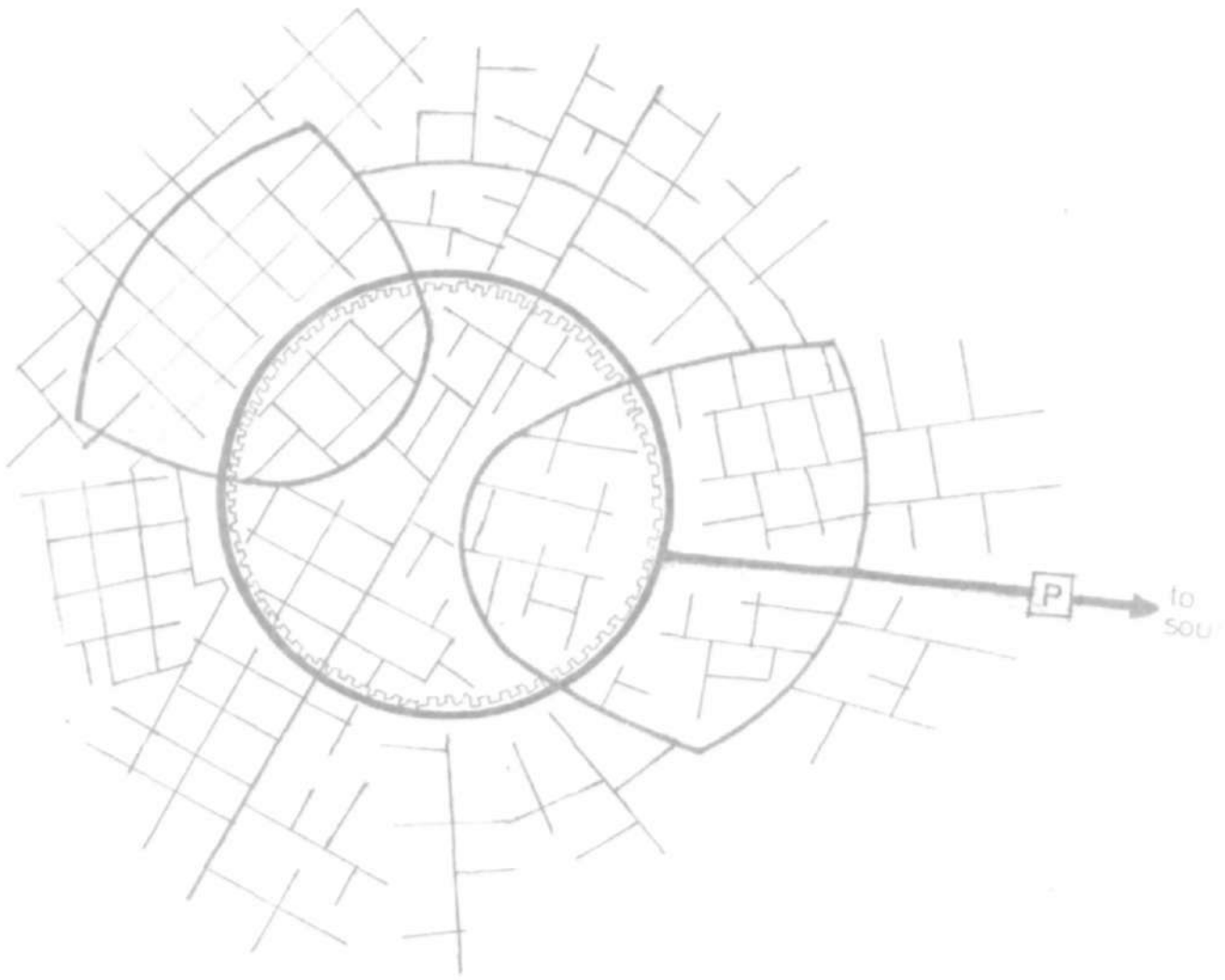
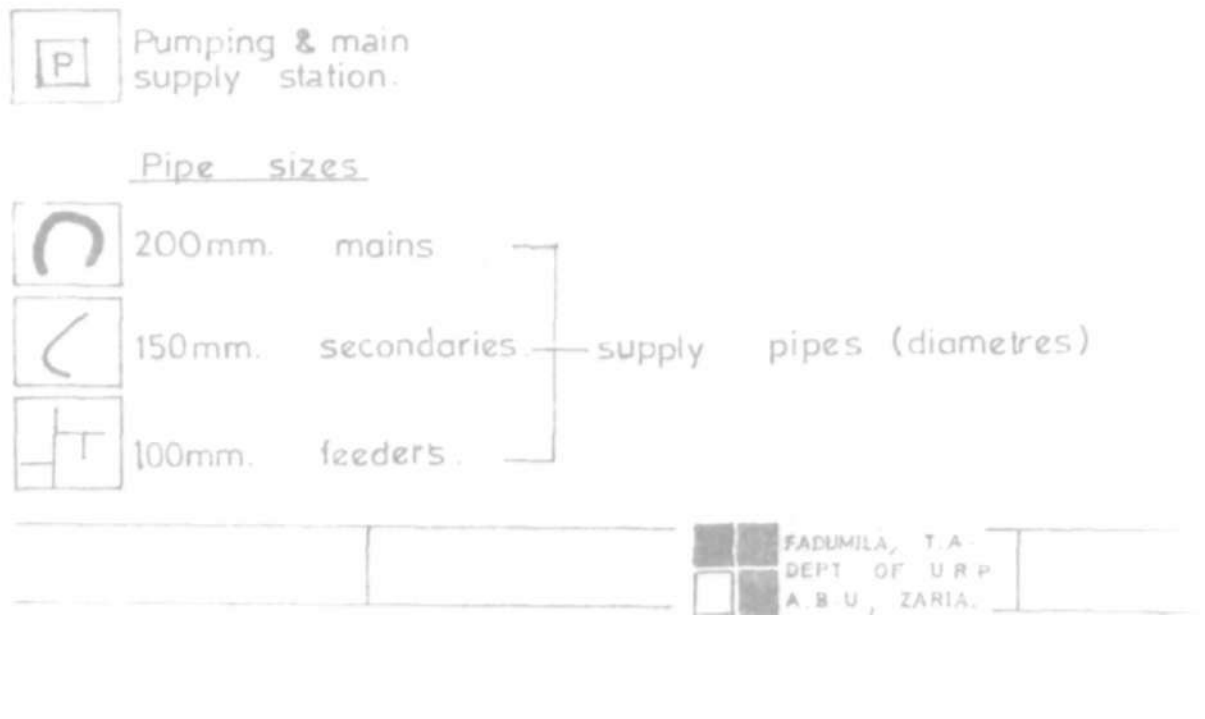


Figure 12.

PROPOSED CONCEPT FOR WATER DISTRI-
-BUTION IN ILESHA.



and is meant to tap the design advantages of these methods to evolve a distribution system for Ilesha. This also has earlier been discussed.

The design is made up of a main ring supply to be situated around the city wall and having direct supply from the primary supply station. These mains are to be made of 200 milimetre pipes. From here two major loops of secondary distribution lines crosses the mains with another major bisecting it. This is to allow for feeders criss crossing at these points. For a city of Ilesha's size only one ring can be accommodated following the recommendation that another ring be introduce. Another ring is to be introduced each 1.5 Kilometre. Considering economy, a city of Ileshas size and structure can only accommodate one of such rings. This concept has obvious advantages which can be listed as follows.

(i) It fits into the town structure particularly as defined by the road network. The road network being a mixture of both the radiocentric and grid pattern thus readily absorbs the proposed network for water supply. The proposed laying of main pipes along the ditches forming thus a ring is meant to utilize the free space due to these trenches.

(ii) Being flexible, the utility can progressively develop to keep pace with the city's physical development. This is achievable through an introduction of 'loops' of secondaries, and feeders within the network.

(iii) It is a functional and efficient approach since pipelines are laid along the roads. This is a recognision of the fact that property development usually takes place along the road.

(iv) Being a system of interconnections extensions are easily made into new areas.

(v) By allowing for connections at two ends for the distribution lines, uninterrupted supply is assured to consumers. This will further heighten the efficiency level planned for the utility in Ilesha.

4.32 Distribution Concept for Electricity

Considering the structure of Ilesha, the grid system of supply is recommended. This is illustrated in figure 4.3 above. Other specific recommendations include phasing and adoption of standards in practise to local conditions. Phasing is to involve a stepped development of supplies within the national planning framework. Three phases of development is therefore recommended for Ilesha as 1983-1990, 1990-1995, and 1995-2000.

4.33 The Concepts of Neighbourhood and Threshold

The threshold concept is used to determine the minimum population that can effectively support a service. Neighbourhood on the other hand defines an effective grouping of households that can effectively support a service.

In Ilesha this latter concept becomes crucial considering the existing cultural division of the town into quaters or adugbo based on lineage and age of settlement. Each of these quaters are entities on their own and are defined by the road network. Both concepts has the obvious advantage of yielding maximum financial returns to investment while achieving social and economic justification for our proposals.

4.34 Environmental quality and Aesthetics.

It defined the minimum environmental requiremert for neighbourhood cleanliness. It was used in determination of frequency of collection practises and in the location of incineration and ultimate disposals for refuse. It also defined conditions for such locations.

These concepts are henceforth applied to each of the electricity, water supply, and solid-waste disposal to achieve the objectives set forth earlier on in the study.

4.40 DESIGN PROPOSALS

4.41 Electricity Supply

It is not possible to forecast electricity consumption for Ilesha just as in any other city the world over. This is because of the unpredictable nature of demand. As was pointed out earlier, demand and need for industrial landuses for example, varies both between and within industries and

production types as is determined by the varied machinery employed in production processes.

There is no doubt that electricity consumption in Ilesha will rise considerably during the planning period given the fact that over 350% growth rate was recorded for 1951 - 1982 period. It was also established from survey that increasing level of economic activities, standard of living; and industrial activities all serves to raise power consumption in Ilesha. The assurance of a steady source of supply from Kainji hydro-electric power station to Ilesha is infferrable from the fact that "the present production levels exceeds the present consumption and demand levels in the whole country"[16]. Consequent upon this one can claim that requirements at individual city levels is concious planning and management of supply.

The proposed routeing of supply distribution lines phasing, and relative location of transformers is shown in Figure 14.

The developments are to be carried out in three phases as is highlighted below.

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16. National Electrici Power Authority "Monthly Bulletin of Power Supply" NEPA Headquaters, LAGOS. December, 1981.

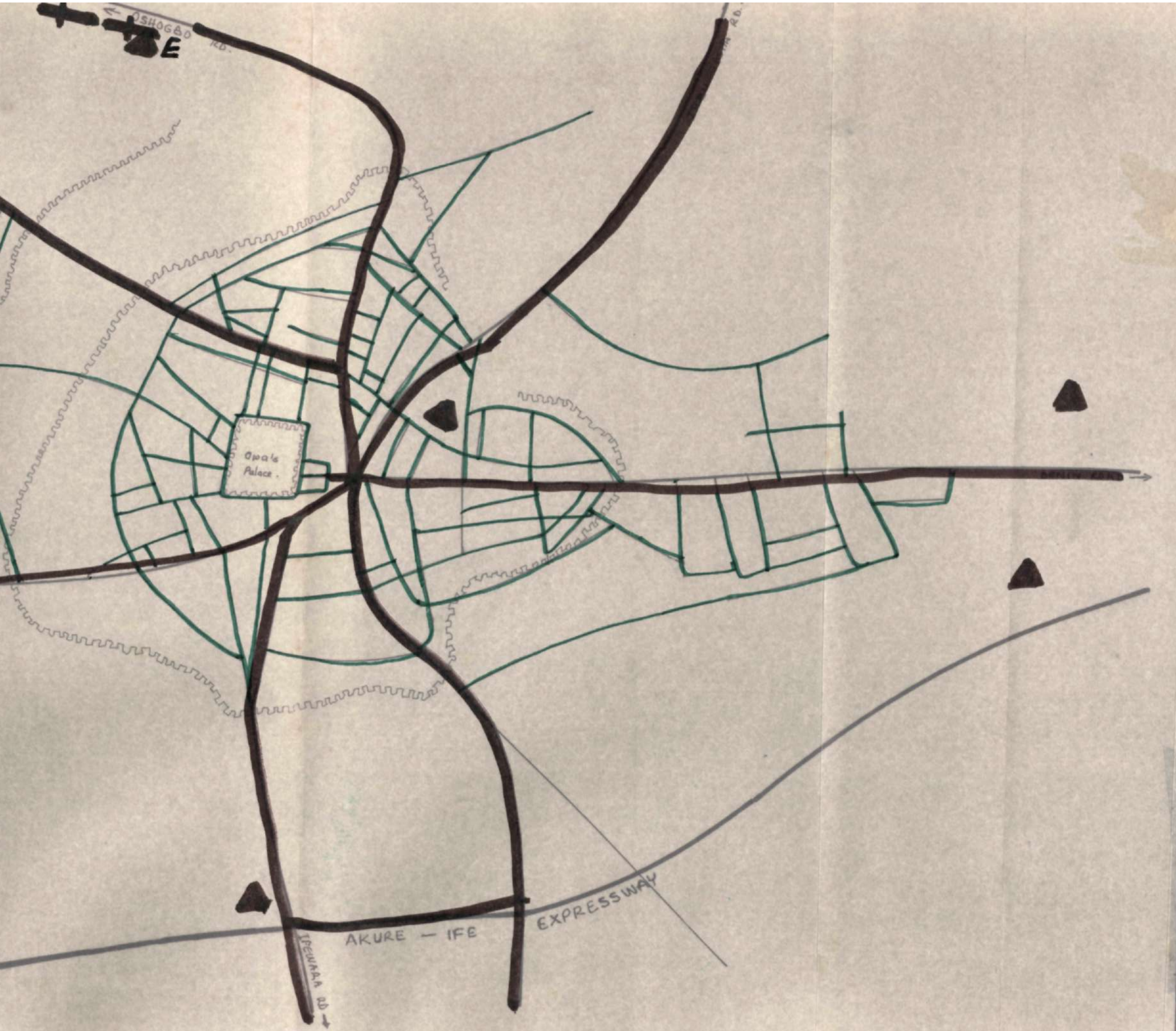


FIGURE 14

ILESHA : PROPOSAL FO
ELECTRICITY DISTRIBUTIO

LEGEND :-

- Main substation.
- Transformer locations.
- 330 kV. incoming supply line.
- 33 / 11 kV line.
- 11 /.415 kV line.
- City ditch / wall
- Roads.

Scale 1 : 20,000.

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Phase III (1995 - 2000)

(i) Further extensions of the High Voltage lines along the regional roads to a distance of 1.5 kilometres off the zone of latest developments.

(ii) Completion of network of supplies through interconnection of feeders of low Voltage lines from consumers.

(iii) Completion of the street lighting system throughout the city.

Other recommendations are given below as:-

1. All distribution lines is to be overhead and be borne on nine metre poles [17], and to be routed through the roads for ease of maintenance.

2. For street lighting, the thesis considers the adoption of 30 metres as the standard distance between poles which are to be lined on one side of the road as a presently being done.

3. Industrial and large commercial uses are to be supplied directly by the 33/11 KV distribution line. Each landuse is to be provided with appropriate step-down transformers which is determined by forecast need.

4. Within residential clusters, transformers should be sited within incidental open spaces or such other areas will allow safety to residents to within a nine metre radius. Such transformers are also to be fenced in strong wire netting protection.

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17. Technical College, Ibadan. "Manual of space Standards for Urban development in the Western State" of Nigeria, 1976. Being class project of final year HND class.

4.42 Water Supply

It has been established by an earlier review of that there is the abundance of surface water resources in Ilesha area. It can therefore be said that the main problem of supply are determination of demand and distribution system vis-a-vis landuse.

For Ilesha, the standard of 78.88 litres per capita per day for domestic consumption has been established by survey. For industrial consumption, the standard[18] of 68.20 litres per capita per day is adopted. Additionally, 52.92 litres per capita per day is to accommodate the need of other landuses as well as losses during distribution. The above leaves us with an adopted standard for calculating water consumption at 200 litres per capita per day for Ilesha. This rate is retained as constant over the planning period. Based on the above standard, Table 4.3 shows the forecast demand given the population of Ilesha over the planning period. The calculated capacity for the storage tanks is given in table 4.4, while table 4.5 shows such in relation to the various categories of landuses.

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18. Technical College, Ibadan (Op-Cit).

Table 4.3

Forecast Water demand for Ilesha (1983-2000)

Year	Population	Water demand/ day	Annual Water demand
1983	483,710	96742000	3.5×10^{10}
1990	907,991	1.8×10^{8}	6.6×10^{10}
2,000	1,704,424	3.4×10^{8}	1.2×10^{11}

For the various levels of demand put the the capacity of storage tanks required is calculated in the table below as:-

Table 4.4

Capacity of Storage Tanks (in Cubic Metres)

Year	Volume in M^3
1983	96742
1990	181,598.2
2000	340,804.8

In the same wise, we can compute the water demand of the various landuse types as is shown below.

Table 4.5

Ilesha: Water Consumption by various landuses per day (in litres)

	Years		
Landuse Category	1983	1990	2000
Residential	49338420	92615082	1.73×10^{8}
Commercial	3385970	6355937	11930968
Industrial	7739360	14527856	27270784
Public/semi public	14995010	28147721	52837144
Other Uses	21283240	39951604	74994656
	96742000	1.8×10^{8}	3.4×10^{8}

The design of the distribution network shown in Figure 15 is along the evolved concept of distribution earlier discussed as involving the development of ring main around old section of the town from which other supply feeders branches off to supply users following landuse patterns and the pace of development.

For a design basis, the road network provides suitable routing, with the location of the various landuses added to define pipe sizes, volume water carriage in pipes, location of firehydrants, and the topography to define pressure and location of overhead tanks and booster stations. From the above specific recommendations for the above includes the following:-

(a) Water supply should be on continuous basis with the pumping station being run on a 22 hourly basis for each day. The two hour break should be carefully timed so that supply at hours of need are not hampered. The break period is to be used for maintenance which should be undertaken at between 2 - 4 a.m hours of lowest use by consumers.

(b) Constant electricity supply is needed on the works station. It is to be supplied with a 33/11 kV High voltage line with appropriate stepdown transformer of 650 kVA capacity.

(c) Pipe-sizes should be able to carry the needed volume to the various landuse types. The various grades of 200, 150, and 100 millimetre diametre pipes are recommended for the town.

(d) Firehydrants are to be located along the main distribution lines, and should serve the major industrial, commercial, and major residential concentrations in accordance with their level of electricity consumption. Thus potential high power uses should have firehydrants located near them. In the case of industrial landuses, each establishment is to have two withdrawal points exclusively for its use. The distance between firehydrants vary with landuses it should not be more than 300 metres.

(e) Distribution lines should be laid out first on site before development is commenced. Prospective developers of such sites should be made to submit individual water demand in view of anticipated use.
The various demands are collated and supply network (pipe sizes and volume of water carried) is designed to take care of such specific demands.

(f) The development of this network proposed should be in three phases as 1983-1990, 1990-95 and 1995 - 2000.

Phase I (1983-1990)

(i) Modification of existing pipe sizes in accordance with demands of landuses and population densities; and where appropriate to take care of additional demand.

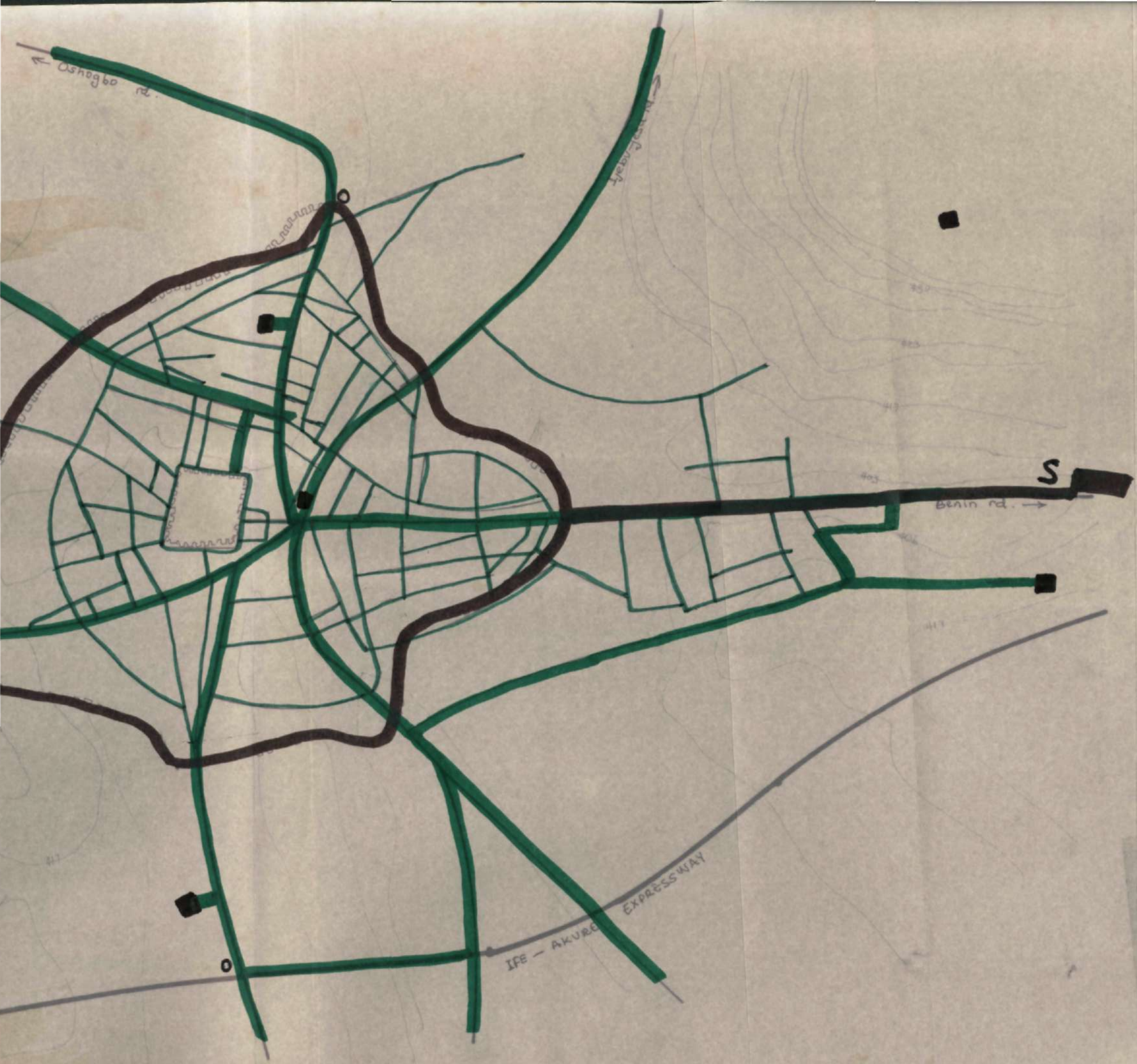


FIGURE 15

ILESHA: PROPOSAL FOR WATER SUPPLY DISTRIBUTION.

LEGEND :-

- S — Main pumping station
- Booster stations
- Overhead tanks
- 300mm pipelines
- 200mm "
- 150mm. "
- 100mm. "
- Contours
- Roads
- City ditch

Scale 1 : 20,000

Fadumo, T. A.
Dept. of URP
A.B.U. Zaria.

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- The construction of main supply to run from the pumping station along the Benin road location is to commence in this phase.
- The ring system of supply also is to be completed in this phase. This is to involve a construction of ring mains along the city ditch. This ring is linked at one end to the main line from the pumping station. The mains are to be laid with 200mm diametre pipes.

(ii) Other internal connections are made from the rings and the Benin road mains network. These internal connections are made espeically within the city ditich ditch of 150 mm diametre pipelines for secondary supply and 100 mm for feeders. This assures frequent supply to old areas of the city i.e. areas within the city ditch.

(iii) Installation of fire hydrant withdrawal points.

Phase II (1990 - 1995)

(i) Further extensions of the main are made from the ring to run along the regional roads - namely Etioni road, Oshogbo, Ibadan, Ifewara, and Ijebu-jesha roads. This extension is to be made to a distance of two Kilometres of the citys extent of development.

(ii) Construction of overhead tanks to increase pressure and boost supply to consumers. Three of such is recommended.

- A water tank to be located at the central point to serve residential clusters of Eregure, Isare, Itabalogun Ereja and Otapese/Okepadre areas.

- Overhead tanks are also proposed for Ayesho and Adeti to boost supply to neighbourhoods here.
- Other areas to be served are Ijofi and Bolounduro areas.
- Encouragement of household connections.

Phase III (1995 - 2000)

(i) Interconnections of the feeders with 'loops' of secondaries to complete anticipated network for Ilesha. Extensions are also made to ponds of new levels.

(ii) Completion of household connections with systematic phasing away of public supply.

(iii) Installation of overhead storage tanks at Ayeso districts and the industrial areas.

(iv) Further extensions of the main line form the ring to a distance of 500 metres off the zone of development from where second ring connection is expected to form.

4.43 SOLID WASTE DISPOSAL

The fact that the economy is growing at a fast rate and the people of Ilesha are experiencing rising standards of living has resulted in proportional increases in the amount of waste generated. It also means increasing sophistication and variety in its composition. There is little one can do to stop this trend. The proposals therefore incorporates an effective collection and disposal methods.
This should be dynamic enough to accomodate the demands. The set of proposals which follow is shown in figure 16.

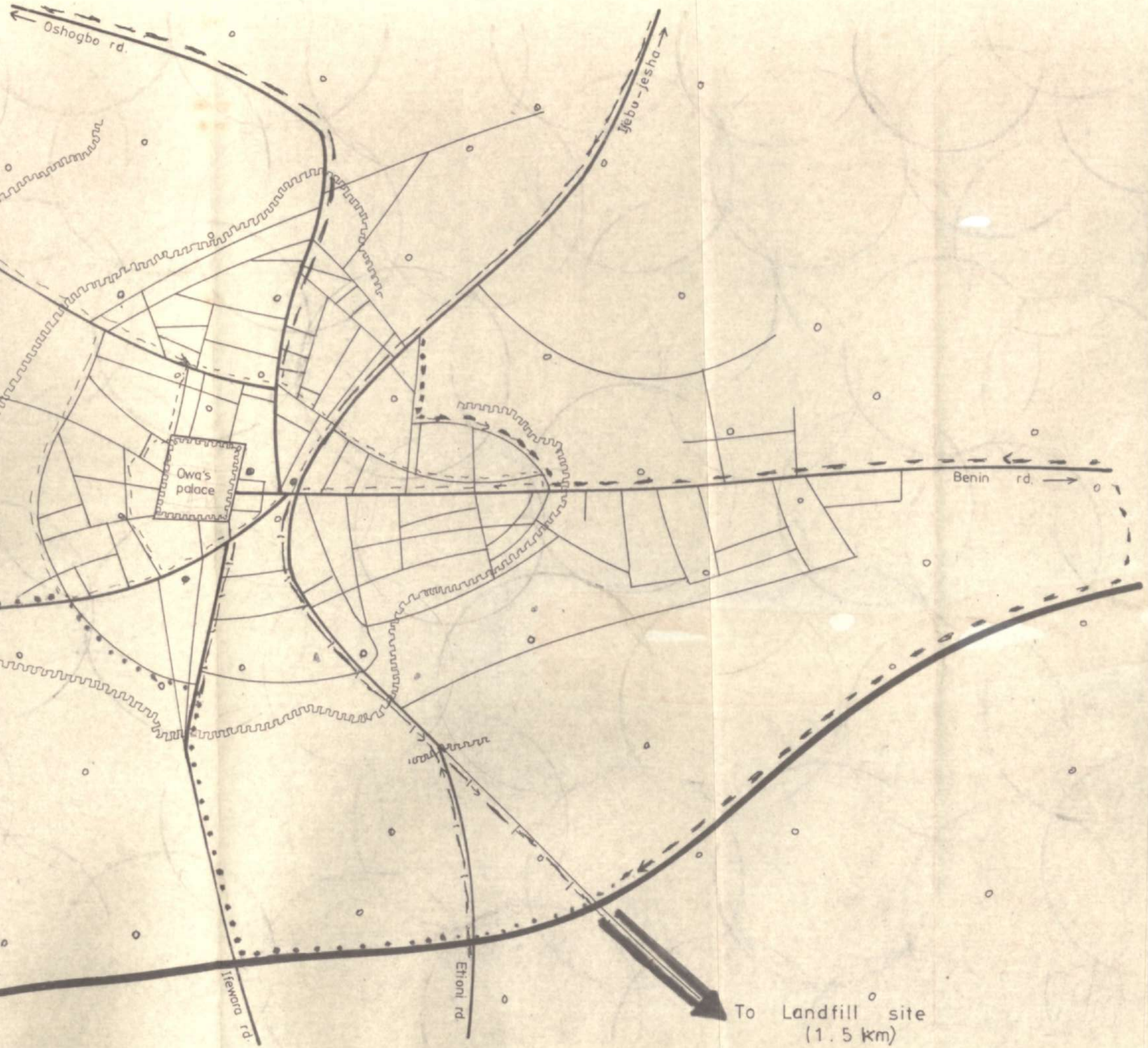


Figure 16.

ILESHA : PROPOSED SYSTEM OF SOLID WASTE DISPOSAL.

Legend: -

- Neighbourhood dump.
- Route 'A'
- Route 'B'
- Route 'C'
- Route 'D'
- Route 'E'

Scale 200 0 400 600 M
1 : 20,000

Fadumila, T. A.
Dept. of U.R.P.
A B U Zaria

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(i) Collection

In Ilesha the method for refuse collection can conveniently be categorized into four stages. This method disposes of the various orders for city planning. They are namely household units, the neighbourhood, district, and town levels. Distance time, and modes of collection are harmonized to attain efficiency. The stages with their various activities are thus treated below:-

Stage I

This consists of individual households collecting their refuse in plastic bags which they remove individually to their communal collection centres. This has been designed to cater for each neighbourhood with distance between them being 50 metres within purely residential areas and 30 metres in commercial and other landuse types.

Refuse from these points are to be collected two to three times per week.

Stage II

At this stage refuse collected from neighbourhoods are brought to the district collection centres. It is here that salvageable refuse such as bottles, papers, metal scraps, and other refuse of value are sorted out by men on the site. For this operation 15 labourers are needed per site. For all sites five vehicles are expected to ply to remove communal refuse to these collection sites. The location of district collection centres should be between 350-500 metres.

The site selected should be lowlying as in prefferably river peneplains or akuro. Where such sites are not available, use should be made of such other sites in the neighbourhood where trees can be planted to screen off men from view. It should not be an aesthetic bore. Town will have (40) of such centres.

Stage. III

This consists of the loading into vehicles separately the salvaged materials and the waste. The wastes are transported to the incineration site from here so as to reduce the weight of refuse before final disposal, at the landfill. This stage is very crucial since it bothers on the health (pollution) of the neighbourhood.

Incinerators should have a free space of four metres around it and should be taller than nearest building by at least two metres.

(ii) Disposal

The ultimate disposal method in Ilesha should be by sanitary landfill. The location of the site is 15 Kilometres away from direction of growth, other specific recommendations include:-

(i) Fencing of site and planting of trees.

(ii) It should not be located along primary roads.

(iii) Its location with regards to the hydrology of the area should guide against underground water pollution.

CHAPTER FIVE

5.00 IMPLEMENTATION STRATEGIES

The need for an efficient management and administrative arrangement cannot be overstated in making earlier planning proposals a reality. The attempt at phasing earlier undertaken points to the significance of this. At this stage however, it is important to go further in proposing effective administrative, financial, and legal framework for managing the proposal infrastructure.

5.10 MANAGEMENT AND ADMINISTRATION

The importance of utilities and services has been recognised "... as a means of effecting immediate improvement in the quality of life in our urban areas (being part of the general aim of furthering).... the process of establishing a solid base for the long run economic and social development of Nigeria"[15]. In order to achieve the above, management efforts has to be within the national programme of action, and as such should reflect participation at the various levels of government.

In this wise an autonomous body to be known generally as Utilities and Services Management Board is proposed for governments in each state of the Federation. The proposed Board should be of limited liability to the government by ensuring private interests

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15. Federal Ministry of National Planning. Fourth National Development Plan 1981 - 85. Vol.1, 1981 LAGOS PP.1

through sale of shares. It is proposed therefore that the government retains 40% of the shares, the Boards staff some 20%, and 40% to other private individuals and organizations. The advantage of this arrangement includes:-

(i) Limited government interference in the running of the day to day affairs of the Board. However, by retaining a 40% share it can fulfill the basic governmental role of protecting public interests. Also this share is enough strength and encourages governments to provide needed security for loans and other financial commitments the Board needs for independent operations.

(ii) At the same time, the Board by limiting government share is saved undue delays that characterise procedures of bureaucracy. From this, policies peculiar to individual cities can be hatched with minimum delay.

(iii) The 20% share to the staff will lead to increased productivity by ensuring staff dedication and output. The Staff now sees itself as having a stake in the organisations viability.

(iv) At the same time, the 40% share to private individuals and organisations is to ensure public participation. The cruciality of this consideration is treated later on in this work.

The proposal for an autonomous Board to manage utilities and services can therefore be seen as having enviable advantages (enumerated above) and serves to bring about improvement in the living conditions of the people at Ilesha.

Thus the basic national goal is fulfilled for our city population of which each has peculiar needs and demands. Also the importance of utilities and services in our cities is enhanced through establishment of such Boards to take care of their operations in a collective manner. This is to permeate through all levels of governmental organisation as shown below in Figure 5.1

5.11 Federal Level

There should be no formal organisational arrangement for utilities and services at the national level. The Federal Ministries of National Planning; and Mines and Power liases with state Boards and undertakes the formulation of broad and general policies for utilities and services in Nigerian cities.

The National Electric Power Authority as exists at the present should be abrogated for it will become redundant under the present proposal.

The Ministry of Mines and Power however should assist states in surveys of potential sites for electricity generation.

5.12 State Level

Each state in Nigeria is to have independent Boards to be known as State Utility and services Management Board. In relation to the Federal body they should serve to critically appraise national policies and prepare consequent upon this specific projects to be implemented in each of the city Board

within it in relation to their peculiar needs and demands. The Board also prescribes specific standards for operation at each of these cities.

It is also at this level that the Board becomes incorporated limited liability organisation. The composition is to be made up of shareholders, proffessional individuals, a representative of the Oyo State Government, and a representative from each of the city's Utilities and services Management Board. The proposed organisational setup is opthy illustrated :- in figure 17 above.

Apart from policy evaluation and standardization other functions of the state Board includes project planning. For each of the utilities and services such powers can be as defined below:-

(a) Electricity Supply:- The Oyo State USMB should purchase electricity in bulk from National Electricity Power Authority sources other than engaging in own generation as at now. The ultimate plan however, is that it develops own hydro sources by daming and developing thermal power station as sources independent of NEPA after year 1990. This is to be for exclusive use of cities within the state.

At the Phase 1 (1983-1990) when cities relies on bulk purchase from NEPA, the OSUMB should be responsible for distribution and maintenance. If of course takes over all of generation, distribution and maintenance in phase II (1990-1995), and phase III (1995-2000).

The policy for distribution should be geared towards meeting ultimate demand of the city population in the plan

period as is derived from projections supplied from individual city's Utilities and Services Management Board.

(b) Water Supply:- The present management arrangement under the Water Corporation of Oyo State handles supplies to cities is unacceptable under the present arrangment. It should therefore be abrogated, and its staff and equipment mobilited to fit into the new set up. So that the Board takes full responsibility for Water Supply as such relates to Capital, equipment, and machinery procurement as well as in staff training.

(c) Solid Waste Disposals: As was earlier pointed out, no organisation exist at the state level for solid waste management. It is proposed, that the Oyo State utilities and services Management Board takes full responsibility for this. Such a responsibility at the state level should be in terms of purchase of equipments: trucks, caterpillars, incinerators, and spares; as well as in staff training and recruitment for the various local city Boards.

5.13 Local Level

Local utility and services Management Board is proposed and is to be established to take care of cities in the state. Thus a Board will exist to take care of Ilesha under this arrangement. At this level, concrete projects are pursued as is consequent on the Oyo State standard. Actual project execution will be undertaken on city wide basis and covering all activities within the plan period.

have significant effect on efficient performance of the utilities and services within the city. They are further important in idea and information dissemination within the city. Their contribution is channelled in the planning and projection unit of the city Board.

5. Attempt should also be made to involve voluntary public effort. This can be achieved by encouraging the various voluntary agencies, charitable organisations, social clubs, educational and cultural organisations, trade associations like the mechanic association to mention a few. Their participation should be sought both directly and indirectly. Direct participation should be in the form of elected membership into the local Board. Indirect participation should be in the form of capital donations and in kind.

6. At community meetings, no informations should be hidden away from the public neither should they be distorted in the attempt to hide away the truth. This is to ensure mutual trust and confidence between the public and the Board.

7. A 'campain week' should be launched with a multi-purpose aim of raising awareness through education and some fund for the project. It is during this week that voluntary organisation and charitable individuals are called upon to engage in lectures, symposia, and other activities all of which are geared towards raising the awareness of the population as well as in supporting the programme.

It is important to note that different 'Campain Week' should be organized for each of the utilties and services. This is both to achieve individual identity for each of the utilities and services as well as stress their significance within the framework. A 'Campain week' should be held at least once yearly for each of Electricity, water supply, and solid waste disposal in fixed months of the year differentially fixed as well. The timing should be well spaced out throughout the year to allow for preparatory work and launching.

5.20 FINANCE

Following from above discussion we can recognise various avenues which can be exploited to finance the implementation of this project, and enhance its management as well.

5.21 Fourth National Development Plan Provisions.

The financing of projects were made according to groupings into sectors and subsectors under which each of electricity, water supply, and solid waste disposals were given certain allocations. These are clearly stated out as below:-

(i) At the Federal level, ₦3,106.259 million is to be spent on electricity supply, while no direct allocations were made for water supply and solid waste disposals. For example, the Federal government contribution to water supply is supposedly taken care of under the water resources subsector of the Agricultural sector.

Allocations to solid waste disposal, on the other hand, is shared with sewerage and drainage. This arrangement does not make for a cohesive development of utilities and services in the cities It also has that implication of causing delays in delivery of funds to the project. It is suggested therefore that the proposed NUSMB is given all these subventions for onward remittance to the various state Boards. The criteria for allocation should be based on need as calculated from individual city demands. These demands are in turn based on maximum demand for plan period at city level.
(ii) The Oyo State Government plans to spend ₦26.869 million on electricity, ₦167.458 million on Water supply, and the ₦100 million on Solid waste disposals sharing allocations with drainage and sewerage in the 1981-85 period. The allocation from the Federal revenue remitted from Nigerian USMB will alongside with this State allocation to the utilities provides the Oyo State Board some financial base on which operations can start.

5.22 LOANS

Following the proposal that Oyo State Board becomes autonomous ultimately in the management of utilities and services after the year 1990 (Phase I), adequate financial base is needed to supplement this National Plan provisions.

Towards this end, it is proposed that the Oyo State USMB negotiates for Loans from commercial Banks and other available sources in the capital market. Interest on this loan should not exceed anticipated returns on investments. This is to be determined following a cost analysis of capital to be purchased as well as forecast revenue that will accrve to the Board.

5.23 Charges on Services Rendered to Consumers.

To achieve the self-financing character of the proposed USMB, it is essential that the Board generates its own revenue. This is achieved by charging levies on services rendered to consumers. This is achieved at two levels by such strategies listed below:-

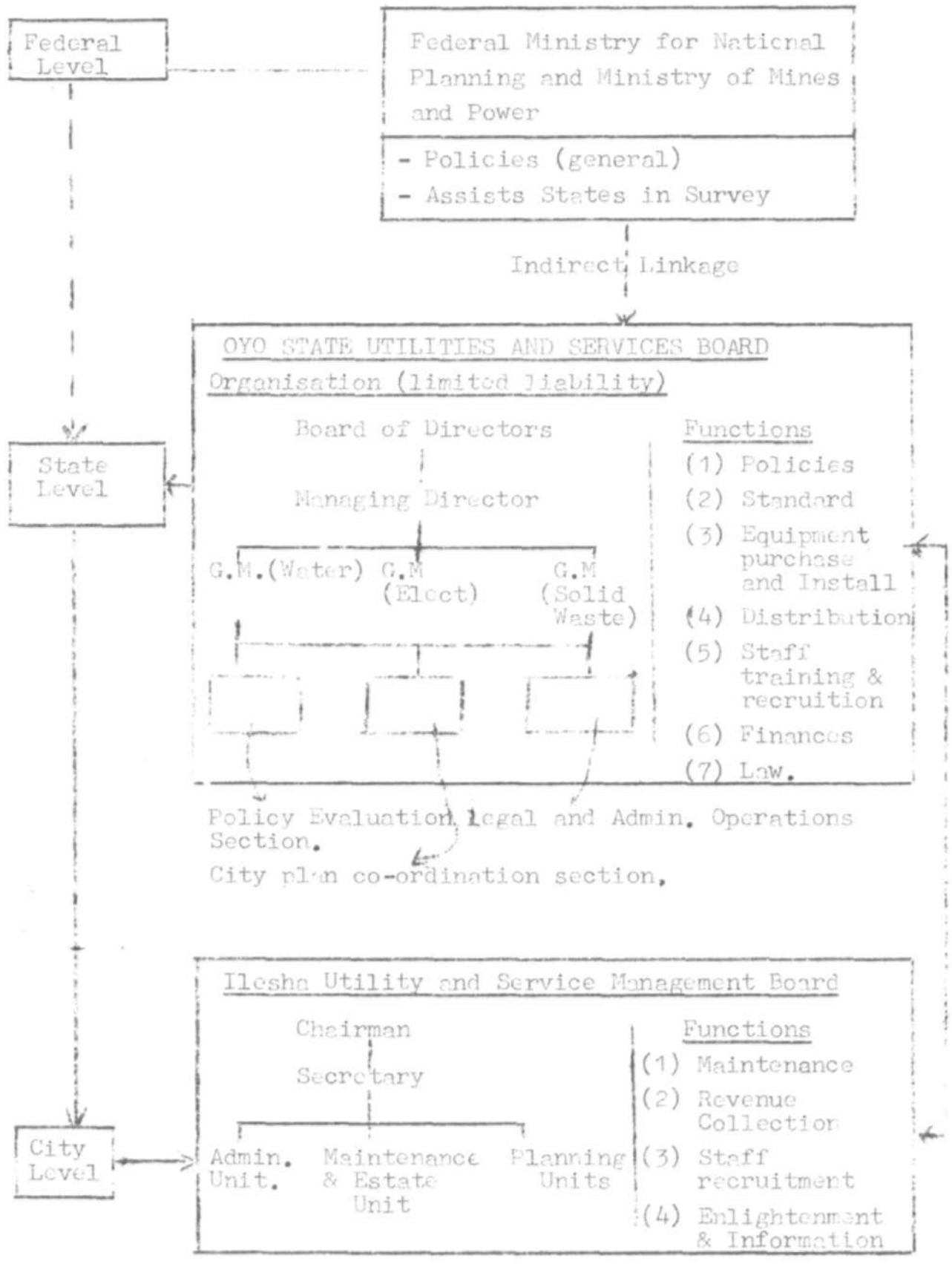
(a) Payment by Local USMB to State USMB.

This is essential to meet up costs of capital investment to the city made by the state. The percentage payment by each local Board should be 60% of total revenue realised from the city. This ensures also that equipment and spares are supplied on time to the city in cases of repair and expansion needs.

(b) Levies of Local utilities and services Management Board on consumers. The determination of appropriate levies varies with the infrastructure.

(i) Electricity and Water Supply: Foremost consideration here is an installation of a good metering system.

FIGURE 17 PROPOSED ORGANIZATION AND FUNCTIONS OF MANAGEMENT BOARDS FOR UTILITIES AND SERVICES IN CITIES.



This consists of meter boxes as exists now but whose design specifications are in ranges of consumer demands. In this case, the meter supplied to any consumer should be within the range of consumption computed as per the landuse. This system forestalls overloading and pliferage as people do not report added potential electricity consuming appliances to present bodies (NEPA and the Water Corporation). Secondly, meter readings should be done promptly at fixed periods each month and bills served on consumers within two days. Defaulters should have their supply line disconnected one week from the the date they are served with such a bill.

In new areas, where supply is laid before other developments by law, development costs are to be charged directly from plot holders by the Board.

(ii) Solid waste disposals: It is planned in such a way that it is both income generating and self-sustaining. Towards this end, earlier planning proposal for sale of salvaged refuse and recycling is coupled with charges on the consumer.

The salvaged and recycled refuse is to be sold by the Ilesha local utilities and services Board. The rate is determined by the Board considering the current market value of the salvaged refuse. This sale is made directly to the firms eliminating thus the middleman and allowing the Board to make maximum profit from the venture.

The Estate and Accounts Division of the Board carries out this responsibility.

Apart from this, consumers should be made to pay for cost of collection. The foundation for this has been well laid by the present practise of charging private services 75 kobo per week at 25 kobo per collection for 100 households presently involved. With involvement of households in Ilesha a total amount of ₦51,825.75 is expected to be realised from 69101 households given a minimum collection of three rounds/week. This rate is considered appropriate and is recommended for Ilesha.

For industrial and commercial consumers however, rates charged should be based on volume and cost of disposal. Both levies however should be on the basis of pay-before-service.

5.24 Share-holding Basis

The conditions for this has earlier been listed as being 40-20-40 for government, staff, and the public respectively. The advantage is that this system ensures a sustained source of capital to the Board, and thus provides security for purchase of equipment and spares. It is a ready stock for investment. However, conditions for sale of this stock should be within reeach of the common man. It is therefore suggested that each share should not cost more than 50 kobo.

5.25 Endowment Fund

As is contained in earlier propositions for public participation, the commemorative weeklong activity for each of the utilities and services should concciously be organised towards fundraising. Invitations should be made to individuals and charitable organizations (earlier listed out) both within and outside the city. It should however involve the whole community.

5.30 LAW

At present no comprehensive law exists to guide utilities and services in our cities Ilesha inclusive. They are usually peculiar to each and their contents unclear and unfamiliar to the public. This underplays the importance of the infrastructure (earlier stressed). Towards alleviating this situation the following proposals are made.

(a) The proposed utilities and services Management Board should be backed with an Act of the State Assembly both in composition and operations. This will establish its legality as a body, as well as specify the rights and obligations viz-a-vis that of the consumers.

(b) The Board should be prosecutable in a law court for reasons of inefficiency especially when damages are incurred by the consumer. In situations when service will be interrupted notice of not less than a day is given on the media (radio, Television, and newspapers).

(c) In the same vein, the Board reserves the right to prosecute consumers under specified conditions. This is readily within the knowledge of consumers. For example, with regards to pliferation and such other offences which could cause disruption to supplies consumers are made to pay costs for damages incurred by their actions.

(d) Any staff of the Board found as accomplice with regards to the above and such other anti-operation activities should be dismissed and prosecuted, and in the process made to pay cost.

(e) In order to achieve efficient performance there should be specific statement that utility should be established first on site before other development is allowed.

(f) With regards to damage of distribution lines caused by contractors and other property developers in the city, there should be a law to guide their activities vis-aviz the utilities. In old areas, there should be a penalty such as imposition of fines to cover cost of restoration and other damages. This charge should be paid by developers before they are allowed to proceed with work on such sites.

(g) The legislation against indiscriminate waste dumping should be that the "offender pays" for cost of collections. The amount imposed should reflect the convenience of collection, the volume and type of refuse collected. This charge should be received from consumers before collection is made by the Board.

SUMMARY & CONCLUSION

The need for city growth to be channelled so that we can achieve a functional role for our cities has led planning to the standard we have today. Lack of planning therefore has produced unpleasant effects on our cities as is epitomized in chaotic developments, degenerated environments and stress on infrastructure among others. Within this context the thesis holds that planning approach be systematic and wholistic if efforts are not to be frustrated on the long run.

Ilesha thus serves a good casestudy in an attempt at providing a better concept of utility and service planning and management. It has been shown that failure results in general inability to cope with demand leading to ultimate stress on the available infrastructure in the face of ever increasing population, and demand by and increasingly varied set of landuses.

The adoption of systematic and wholistic methods for planning utility and services in Ilesha has led to a review of existing theories and concepts within the city's peculiar. First of the 'loop' and 'grid' systems of distribution is adopted to evolve the concentric ring concept which is a distribution system made up of a secondary and tertrary lines interconnecting to form a network. This system is progressively developed to keep pace and embrace city development in the plan period. Secondly threshold concept was applied to determine what judiciously constitutes economical and rational use of proposed infrastructure in view of the planning principles

adopted in the thesis. Neighbourhood concept proved useful in this wise too to determine the number of adugbo or quaters employing thus the distinct cultural divisions existing in city.

In proposing management strategies for the infrastructure thesis noted the inadequacy of existing bodies. This includes poor organisation and or ill-definition of specific role of agencies which ultimately carries out the functions as well as the poor financial and legal framework which on the average has meant poor and ineffective management of the utility in Ilesha. The thesis proposes therefore that for efficient and functional management of utilities and services in our cities a defined Board is needed to carry out the junction. This Board to be set up at state and local government levels is to be autonomous limited liability corporation selling shares to the government, staff, and the public. Constituted by law it operates own finance and legal framework to guide operations so that the enterprise becomes both self-financing and income generating.

From the foregoing, the need to conciously plan our utilities and services has not only been stressed but that such tasks only becomes functional if it keeps pace with city growth and development as judged from the varied need of the landuses. Management strategies evolved should be under an all-embracing autonomous organisation to be set up at state and local levels to take care of cities within its juridiction. It is only under such concise organisation that meaningful level of performance can be achieved for utilities and services in Ilesha.

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APPENDIX I

1. (a) House number .....

   (b) Number of occupants in the House .....

2. Personal information of Respondent.

   (i) Age ..... (ii) Occupation .....
   (iii) Educational level .....

3. How long have you stayed in this town (months/ years) .....

4. Are you an owner ☐ or tenant ☐ in the house you now occupy (tick as appropriate).

5. Would you rate the following services performed and utilities provided the city as Excellent, Good, Fair, or Poor

	Excellent	Good	Fair	Poor	Don't know
a. Police Services					
b. Fire Services					
c. Electricity Supply					
d. Water Supply					
e. Postal Services					
f. Garbage collection					
g. Sewerage					

6. Would you consider that the city needs to improve on its services and utilities (i) Yes ☐
   (ii) No ☐

7. Water Supply

   (a) Which source of water do you rely on for your use.

   (i) Well ☐

   (ii) Spring ☐

   (iii) Public water supply system ☐

(b) If well or spring supply sources, why?

(Give reasons) .....
.....

(c) If public water supply system, which of the below do you use.

(i) Communal public tap system.
(ii) Private household supplies.

8. How much do you pay as water rate per month ..... (state in ₦.k)

9. How often do you get your water supply.

(i) All round the dock per day ☐
(ii) Only in the afternoons ☐
(iii) Only in the mornings ☐
(iv) At nights only ☐

10. In a year, how frequent could be your supply.

(i) less than 2 months ☐
(ii) 2 - 4 months ☐
(iii) 4 - 8 months ☐
(iv) All year round ☐

11. How much water do you require for the following household activities per day.

Type of Activity	Litres required
Cooking	
Laundry	
Washing/Personal/ ablutions	
Other Uses	
Total	

12. When do you use water most frequently in a day (tank in order of priority).

.....

13. Do you feel there is need for improvement in the water supply situation to your neighbourhood.

(i) Yes, very urgently ☐

(ii) Yes, only slight improvements ☐

(iii) Its Okay ☐

14. In the case of the system's breakdown say in your neighbourhood. Do you report.

(i) Directly to the Water Corporation Office ☐

(ii) Leaves them to discover such ☐

(iii) Try to ment it yourself ☐

Electricity Supply

15. With particular observation of condition in your neighbourhood, would you think the streetlighting situation is

(i) About right ☐

(ii) Too low (needs more lighting) ☐

(iii) Too Bright ☐

(iv) Dont know ☐

16. How regular is your electricity supply at home

(a) (i) Fair ☐

(ii) Poor ☐

(iii) Good ☐

(b) How much bill do you pay .....

17. Do you have other source (s) of electricity supply other than NEPA.

a) (i) Yes ☐ (ii) No ☐

b) If yes, specify type

(i) .....

(ii) .....

18. How do you report cases of disruption to your supply.

i) Direct to the district office ☐
ii) Waits till their vehicle passes by ☐
iii) Waits till meter reader comes ☐
iv) Do not usually report, but leaves them to discover such ☐

Solid waste disposals

19. How many buckets of waste do you collect daily.

i) Half a bucket ☐
ii) One bucketfull ☐
iii) 1 - 2 buckets ☐
iv) 3 - 4 buckets ☐
v) Over 4 buckets ☐

20. Which of these is you disposal method.

(i) Communal bins ☐
(ii) On the street ☐
(iii) On heaps at the backyard ☐

21. Which of the following do you consider most appropriate collection method.

(i) Individual disposal method. ☐
(ii) Communal efforts ☐
(iii) Governments sole responsibility ☐

22. Do you think the general waste collection method is:

(a) (i) Poor ☐
(ii) Fair ☐
(iii) Good ☐
(iv) Excellent ☐

(b) How often are collections made from this neighbourhood.

(i) Daily ☐
(ii) 2 - 3 days/week ☐
(iii) Once monthly ☐
(iv) Once yearly ☐
(v) Never regular ☐

(c) Do you consider waste dangerous to human health.

Yes ☐ No ☐ (tick as appropriate).

23. Turning now to your neighbourhoods cleanliness, would you say, it is

(i) Very clean ☐
(ii) Fairly clean ☐
(iii) Fairly dirty ☐
(iv) Very dirty ☐
(v) Don't Know ☐

24. Suggest improvements to your neighbourhood cleanlines.

(i) .....
(ii) .....
(iii) .....

25. Would you support extre series by the various agencies for improvement on the present level of utilities and services.

a) (i) Yes ☐ (ii) No ☐

b) (i) .....

(ii) .....

26. Do you feel you could have a say about the way the city government is running things, it allowed to

(i) Yes ☐
(ii) No ☐
(iii) Don't Know ☐

(Thank you very much)

APPENDIX II

Dear Sir,

This is a M.Sc. (VRP) thesis work on the "Planning and Management of Utilities and services in a city" with Ilesha as a casestudy.

I will appreciate if you can kindly supply the following relevant information as may apply to your organisation.

1.00 Water Supply

(a) Source of Water Supply to the City .....
(b) Distance to works station .....
(c) Date of first supply .....
(d) Growth Information of system .....

Phase	Date	Capacity	No of Reservoirs

(e) Information on User by Capacity consumption.

User	Total Capacity

(f) Maintenance Problems (in order of importance)

1) .....
2) .....
3) .....
4) .....

(g) Responsibility for maintenance (indicate % involvement)

(i) Government by direct labour

(ii) Private individuals.

(iii) Contract.

(h) Water rate collections

Year	Expected	Realised
1979		
1980		
1981		

(i) Water rate collection problems (in order of importance)

(i) .....

(ii) .....

(iii) .....

(j) Implementation Problems (in order of importance)

(i) .....

(ii) .....

(iii) .....

(k) Management Problems

(i) .....

(ii) .....

(iii) .....

2.00 Electricity Supply

(a) Date of first supply .....

(b) Source of supply .....

(c) Growth Information of system

Date	Capacity	Number of suscribers

(d) User Classification

Type of User	Power Consumption	% of Total
Residential		
Commercial		
Industrial		
Public/Semi Public		

(e) Criteria for supply (in order of importance)

(i) Growth in consumer demand

(ii) Noticed areal expansion in the town.

(iii) Others (specify)

.....

.....

(f) Operational Problems

1. .....
2. .....
3. .....

(g) Management Problems

1. .....
2. .....
3. .....

(h) Other Informations

1. .....
2. .....
3. .....

3.00 Solid Waste Disposal

(a) Which is the main method of disposal in Ilesha,

(b) Rank the following classification of waste in their of importance here.

Type of refuse	Rank order
i) Refuse, Gabbage, Rubbish	
ii) Industrial wastes	
iii) Construction, demolition wastes	
iv) Market, street refuse	
v) Animals and vehicles	
vi) Air pollution particles	
vii) Shidges	

(c) Which do you consider as the most important problem in refuse collection in Ilesha.

(i) Negative attitude of people to waste collection.
(ii) Insufficient infrastructure for operations.
(iii) Others (please specify)

.....
.....

(d) Planned frequency of refuse collection in the town by your agency.

(i) Daily
(ii) Weekly
(iii) Monthly

(e) Average collection costs (in Naira)

(i) Per month .....
(ii) Per year .....

(f) Number of vehicles by type

Number	Type	Function