NEW EYE HOSPITAL KANO

BY

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DEDICATION

To my late father Mallam Yahaya Adamu and Mother Hajiya Hauwa Salisu, whose moral and material supports throughout the duration of this course and indeed my life as a whole, can never be quantified nor repaid. May Allah reward their efforts with His mercy and grant them eternal peace in the hereafter. Amin.

DECLARATION

I Yahaya, Haruna declare that, this Thesis is the result of my research and is the record of my work, for the award of a higher degree. All sources of information are specifically acknowledged by means of references and listed in the bibliography at the end of the Thesis.

Yahaya, Haruna

Date:.....19...

CERTIFICATION

This Thesis entitled New Eye Hospital, Kano by Yahaya, Haruna meets the regulations governing the award of the degree of Master of Science, Architecture, (M.Sc. Architecture), of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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ABSTRACT

preamble

It is the desire of all developing countries to attain in upward level in terms of socio-economic advancement, This is important in view of the fact that, in the modern contemporary world set-up, greatness is measured within the contex of developed and developing countries. Among the parameter used to determine the above categorisation is the level of efficiency of the modern health care delivery system of a country. One of the ways of achieving an efficient health care delivery system in any society, is through a careful study of the existing state of health care services in that society, and recommending ways of improving them, to meet the modern requirements. It is the desire for the realisation of the above that prompted the choice and the pursuance of this Thesis, entitled, New Eye Hospital, Kano, The role of the eye in the human visual system is a vital one. This is because, the eye, though among the smaller organs of the human body structure, is the principal agent of one of the main networks of the brain system, that is, the sense of seeing. Without the eye, the human visual system is rendered ineffective.

Philosophy

Mukhtar (1987) defined hospital "as an institution staffed and equipped for the diagnosis of the sick or injured, for their housing during treatnent, health examinations and for the management of child birth,"

Diagnosis and treatment, in the modern health care services, are effected using modern scientific and te technological instruments, with specially trained personn Hence, specially designed buildings are needed to act as a nice environment for the staff end the patients.

Aims a nd objectives

It is the aim of this Thesis to evolve:

1, adesign of en eye hospital based on a careful study and analysis of the climatic end environmental conditions of Kano City.

2, a design proposal that will meet the standard requirements of an eye hospital as an institution.

The aims could be achieved through the following objectives:

(a) case study of the existing eye hospitals and clinics in and outside the state,

(b) study of some hospital design texts and journals,

Scope

The scope of the proposed hospital is limited to the following:

(i) the out-patient department (O.P.D.),

(ii) a 180 beds in-patient care department,

(iii) the services department which includes, kitchen, laundry, central stores, and so on.

Conclusion

This exercise intends to serve es a contribution towards the realisation of the Federal Government's target of health for all by the year 2C00 A.D.

TABLE OF CONTENTS

Chapter		Page
	Title Page	(i)
	Declaration	(ii)
	Certification	(iii)
	Acknowledgements	(iv)
	Abstract	(v)
	Table of Contents	(vi)
	List of Tables	(vii)
	List of Figures	(viii
	List of Plates	(ix)
	Definitions	(x)
1.0	INTRODUCTION	1
1.1	Brief assesment of Federal Government's role in health care services in Nigeria.	3
1.2	Kano State government's efforts towards the betterment of health care services in the State.	6
1.3	Historical evolution of health care services in Kano State.	10
1.3.1	Health care Services in Pre-colonial Kano	10
1.3.2	The advent of modern medicine in Kano	11
1.3.3	Classification of hospitals	12
1.3.4	The eye hospital	14
1.3.5	Some common eye diseases	17
1.4	Problem definition and analysis	21
1.4.1	Circulation	22
1.4.2	Inadequacy	22
1.4.3	Climatic conditions	23
1.5	Outline of Thesis proposals	23
2.0	CASE STUDIES	27
2.1	Murtala Muhammad Hospital, Kano	27
2.1.1	Historical background	27
2.1.2	The eye department	28
2.2	Nassarawa Hospital, Kano	39
2.2.1	Historical background	39

		Page
2.2.2	Facilities	39
2.2.3	The eye clinic	40
2.3	S.C.W.A. Eye Hospital, Kano	44
2.3.1	Background	44
2.3.2	Facilities	44
2.4	Maiduguri Eye Hospital	47
2.4.1	Historical background	47
2.4.2	Facilities	48
2.4.3	Hierachy of Staff	48
2.4.4	Layout principle	50
2.4.5	Construction	55
3.0	BRIEF ACCOUNTS ON KANO STATE	59
3.1	Historical background of Kano City	59
3.2	Physical features	63
3.2.1	Vegetation	63
3.2.2	Soil group	63
3.2.3	Relief and drainage	66
3.3	Climatic conditions	66
3.3.1	Humidity	66
3.3.2	Temprature	67
3.3.3	Rainfall	67
3.4	Population distribution and culture	71
3.5	Existing town structure	74
3.5.1	Architecture	74
3.5.2	Building materials	75
4.0	PLANNING PRINCIPLES	77
4.1	Out-patient department	79
4.1.1	The consulting clinics	80
4.1.2	Adjunct diagnostic and treatment Facilities.	85
4.2	In-patient care department.	92
4.2.1	Operation theatre suite	92
4.2.2	The nursing unit	97
4.3	Services department	105
4.3.1	Dietry	106
4.3.2	Laundry	110

		Page
4.3.3	Central Sterile Supply department	111
4.3.4	Central general stores	113
4.3.5	House Keeping	114
4.3.6	Maintenance and generator room	115
4.4	Fire protection in hospitals	116
4.4.3	Control of fire outbreaks in hospitals	117
4.5	Sound control in hospitals	120
4.5.1	Factors to be considered in sound control	120
5.0	DESIGN REPORT	125
5.1	The Site	125
5.1.1	Location	125
5.1.2	Site selection	126
5.2	Site planning	129
5.2.1	Zoning	130
5.2.2	Fire/Noise control	132
5.2.3	Traffic pattern	133
5.3	The design concept	133
5.3.1	The contiguity principle	134
5.3.2	The courtyard concept	135
5.4	The design	136
5.4.1	The out-patient department	136
5.4.2	The in-patient department	140
5.4.3	Services department	143
5.4.4	Space allocations	144
5.4.5	Construction	145
6.0	SCHEDULE OF ACCOMMODATION	147
	BIBLOGRAPHY.	

LIST OF TABLES

1. Table 1: Budget allocations to the defence and health ministries for 1986-88 fiscal years.

2. Table 2: Number of health care buildings in Kano State

3. Table 3: Summary of health care institution by type in Kano State.

4. Table 4: Summary of health establishments by category of ownership.

5. Table 5: Ratios of doctor/population and beds/ population for some foreign countries.

6. Table 6: Record of attendance at the M.M. Eye Clinic 1983-87.

7. Table 7: Summary of O.P.O. and ward attendance at the M.M. Eye Clinic and the Eye Wards.

8. Table 8: Record of attendance at the clinic and the minor operations performed from 1984-87.

9. Table 9: Summary of O.P.O. and ward attendance at the E.C.W.A. Eye Hospital from 1984-86.

10. Table 10: Summary of O.P.D. and ward attendance at the M.E.H. for the year 1987.

11. Table 11: Functional Programme: maintenance and operations.

LIST OF FIGURES

1. Fig. 1.3.5 (i),(ii): Normal eye vision is shown here.
2. Fig. 2.1.2 (i): Plan of the male eye ward, M.M.E.C.
3. Fig. 2.1.2 (ii): Plan of the female ward, M.M.E.C.
4. Fig. 2.1.2 (iii) Plan of the M.M. Eye Clinic.
5. Fig. 2.2.2: Plan of the Nassarawa Eye Clinic.
6. Fig. 2.4.3 (i): Layout plan of the Maiduguri Eye Hospital.
7. Fig. 2.4.3 (ii): Plan of the administrative block of the Maiduguri Eye Hospital.
8. Fig. 2.4.3 (iii) Plan of one of the wards at the Maiduguri Eye Hospital.
9. Fig. 3.0: Map of Nigeria showing the location of Kano State.
10. Fig. 3.1: Map of Kano City showing the locatior of the Dala Hill.
11. Fig. 3.2.1: Vegetation Zones of Nigeria.
12. Fig. 3.2.2: Showing the different soil groups Nigeria.
13. Fig. 3.2.3 Relief and drainage in Nigeria is shown in this figure.
14. Fig. 3.3.1: The range of humidity for Kano is shown here.
15. Fig. 3.3.2: Temprature range for Kano is shown here.
16. Fig. 3.3.3: Average rainfall for Kano is shown in this figure.
17. Fig. 4.1.2: Diagnostic radiology functions are shown here.
18. Fig. 5.1.2 The proposed site location is shown in this figure.

LIST OF PLATES

1. Plate I, showing the interior of the dark room at the Nassarawa Eye Clinic Kano.

DEFINITIONS

1. Ambulant: Ability to walk about. Ambulant patients, refers to those patients who are able to walk about without the aid of a stretcher or wheel chair.

2. Diagnosis: This is the art or act of distinguishing one disease from another.

3. Focal length: The distance between a refractive surface and the point at which the light rays meet.

4. Cornea: The curved, transparent membrane forming the front 1/6 of the outer coat of the eyeball; it serves primarily as protection and is the outermost refractive surface of the eye.

5. Opthalmology: The scientific study of the structure, functions and diseases of the eye.

6. Therapy: This means treatment.

CHAPTER ONE

INTRODUCTION

The role of the health care services in the development of any society is a vital one. This is because, health care services are among the basic inputs for the attainment of the much needed, socio-economic advancement of a society. For these reasons, the study of the state of health care services in any part of this country, with the aim of suggesting how it could be improved, is important, in view of the Federal Government's target of health for all by the year 2000 A.D. This however, depends largely upon the ease with which the health care services are accessible to the majority of the people, at reasonable and affordable costs.

Health care delivery system in any society, like all other sectors of social services to the people, is highly influenced by the political orientation of the society. In this regard, there are countries that offer free medical services to their people, and in other cases certain fees are charged before or after the services.

In most of the developing countries including Nigeria, health care services are rendered free of charge in most cases, in order to improve the quality of living of the people and the desire to incorporate them into the modern health care delivery system.

In the developed countries however, where the modern orthodox medicine is firmly rooted, health care services are rendered free or otherwise, as a state policy. In the socialist block, like the Soviet Union, medical services are offered free of charge at all levels. This is in conformity with the socialist doctrine that all segments of the social services should be free to all citizens. In return, the people of these countries are not allowed to own large wealth more than their needs and that of their families. In the capitalist countries like Britain and the United States of America (U.S.A.) certain fees are charged in most cases, for the medical services offered. This is similarly, tied to the economic policies of these countries where individuals are allowed to own as much of the national wealth as possible.

In the case of Nigeria, as indeed all other developing countries, where the majority of the people are poor, that depend on small-scale farming, the emphasis now is suppose to be on how to improve the quality of health care buildings and properly equip them with modern technological aids, continuous supply of drugs as well as trained medical personnel in order to boost their productivity. This is suppose to be part of the foundation upon which the national development programmes are to be built. The academic community has a role to play here by making recommendations to the policy makers on the above subjects. This could be pursued from an inter disciplinary perspective.

For instance, the pharmacists could contribute their quota in the area of drugs procurement, to reduce our dependence on the importation of drugs, the medical schools could intensify the training of medical doctors to effectively man our health care institutions while the architects could make theirs by evolving design proposals of health care buildings to aid in the speedy recovery of the patients and the efficient performance of the medical personnel. It is sad to notice however, that a harmonious environment for the mutual coexistence of the academic and the policy making communities, for the common aim of evolving an efficient health care delivery system in this country, does not exist.

1.1 Brief Assesment of Federal Government's Role in Health Care Services in Nigeria.

As a developing country, Nigeria gained its independence since 1960. This country is blessed with both human and material resources. In terms of population, it is the largest in black Africa, and as for natural resources even before the advent of petroleum Nigeria was a leading exporter of cash crops like cotton, cocoa, groundnut, and so on. That is probably why,

> "the Second National Development Plan of 1970-74 correctly observed: 'the country is fortunate in having the resource potential in men, material, and money to lay a solid foundation for a socio-economic revolution in black Africa;"[1]

With the discovery of petroleum in commercial quantity, it becomes the sole most important foreign exchange earner for this country, accounting for more than 80% of our external revenue to date.

However, despite all these resources, this country remains backward in terms of health care services, with a high percentage of malnutrition, infant mortality rate and other social problems. This is due to the fact that, the economy of this country during and after the independence was not geared towards forming an economic broadbase at the grassroot, to integrate the mass of the population of this country into a socio-economic self-reliance. Instead, an economic system inherited from British was nurtured and sustained, which later gave birth to a national elite that exploit the resources of this country to the fullest, including among others, enjoying free medical services here and abroad while the majority of people are left at the mercy of cholera, malaria, kwashiokor and all other products of improper sanitary living conditions, and now, the dreaded killer disease, AIDS!

Abdulkarim (1987) observed that

> "the World Health Organisation (W.H.O.) defines health as 'a state of complete physical, mental and social well being, AND NOT merely the absence of disease or infirmity;"

(Emphasis mine). In the light of the above, the Federal Federal Government of Nigeria (F.G.N.) pledges to pursue programme of total eradication of diseases, through the implement tion of the W.H.O.'s campaign of health for all by the year 2000 A.D. But the pledge is not reflected in its budget allocations to the health sector vis-a-vis the other sectors of the economy, like defence. The table below, gives the figures for the recurrent expenditures of the defence and health ministries respectively, for the 1986-88 fiscal years.

Table 1: Budget allocations to the defence and health ministries for 1986-88 fiscal years.

Year	Total expenditure(₦)	Defence (₦)	Health (₦)
1986	10.915 billion	742.392million	279.226 million
1987	17.860 "	717.650 "	166.896 "
1988	24.294 "	830.000 "	259.938 "

The above fiures shows that the F.G.N. places more emphasis on defence than on health. The argument here is not that the defence of the territorial integrity of this nation should be taken lightly. The point is that, such huge amounts of money in times of peace is not justifiable, in view of the fact that thousands of Nigerians die yearly from hunger, malnutrition and diseases. The welfare of the people is more useful as a defensive strategy than keeping a large standing army that is economically redundant.

A healthy and well fed citizenry can easily be mobilised in times of danger than a mighty lot of remnants of unemployment, hunger and diseases.

1.2 Kano State Government's Efforts Towards the Betterment of Health Care Services in the State

Since its creation in 1967, the state governments embarked upon a lot of programmes aimed at raising the quality of the modern health care delivery system in the state. This includes the establishment of many general hospitals and health centres in various parts of the state, establishment of the School of Nursing in the state capital Kano for the training of para-medical staff, like nurses and mid-wives, investment of large sums of money for the purchase of drugs and other medical equipments needed in the hospitals and clinics throughout the state. These were pursued through the state ministry of health. Later in 1978, the Health Services Management Board (H.S.M.B.) was established and charged with the task of overseeing the general day-to-day affairs of the health institutions in the state, in addition to dealing with health staff matters and discipline. The table below gives existing number of health care buildings in the state.

Table 2: Number of health care buildings in Kano State.[3]

No.	Health care institutions	Number
1.	General hospitals	14
2.	Health training institutions	7
3.	Total number of doctors in the state	198
4.	Total bed capacity in the state	4,298
5.	Total number of comprehensive health centres.	15
6.	Total number of specialist hospitals	5
7.	" " primary health centres	4

In the next table, a summary of health care establishment by type, in Kano state is given.

Table 3: Summary of health care institutions by type.

66

No.	Health establishment	Number
1.	General hospitals	14
2.	Maternal and child health centres	1
3.	Infections diseases hospitals (I.D.H.)	1
4.	Psychiatric hospital	1
5.	Orthopaedic hospital	1
6.	Leprosy hospital	1
7.	Eye hospital	1
8.	Leprosy clinics	25
9.	Dispensaries	208
10.	Dental clinics	5
11.	Dental centre	1
12.	Mobile clinics	2
13.	Armed forces (Army, Air Force)	2
14.	Private medical clinics	16

Table 4: Summary of health establishments by category of ownership in Kano State.[5]

No.	Ownership	Number	Bed
1.	Federal government	3	143
2.	State government	53	3,046
3.	Local "	450	57
4.	Missions	15	175
5.	Private	19	70
	Total	540	4,298

In spite of all these achievements as mentioned in the text and represented numerically in the tables, the figures fall short of the W.H.O. stipulated ratio of 1 doctor/500 people. Assuming a population of 10 million in Kano State with 198 doctors, the ratio is approximately 1 doctor/ 50,000 people. As for the number of beds in hospitals in the state, assuming 10 million as the total population with a total of 4,298 hospital beds throughout the state, the ratio is 1 bed/1,865 people. The table below shows a comparison of doctor/people and hospital bed/people ratios for the underlisted countries, as at July, 1987.

Table 5: Ratios of doctor/population and beds/population for the countries mentioned in the table.

No.	Country	Doctor/Population ratio	Beds/Population ratio
1.	Soviet Union	1 doctor/238people	1 bed/77 people
2.	West Germany	" /333 "	" /92 "
3.	U.S.A.	" /435 "	"/98 "
4.	France	"/ 455 "	"/125 "
5.	Britain	"/556 "	"/175 "

A comparison between the figures in the above countries and what obtains in Kano state shows a glaring inadequacy in the state. Thus, for the W.H.O. campaign of health for all by the year 2000 A.D. to be realistic, Nigeria should intensity effort to catch up with the above countries, its being a third world country notewithstanding. One of the ways of achieving the above goal is through the appraisal of the existing situations in our health care institutions and making fresh recommendations to the authorities concerned, for prompt action. The implementation of the recommendations is essential as a practical step. The attitude of the policy makers towards some of these recommendations in the past are not encouraging, because they were not given the due considerations they deserved. Instead, most of them are now in the cooler, securely locked under the tables of some bureaucratic chieftains.

1.3 Historical Evolution of Health Care Facilities in Kano State

Health care services went through different stages of development and sophistication before reaching the present level.

1.3.1 Health care services in pre-colonial Kano

Before the advent of the modern orthodox medicine in Kano, it was the traditional healers (Yan masu ganye), who performed the task of curing the sick and the injured. The traditional healers include; the 'Yan bori,' who cured their patients by invoking the powers of spirits, whom they claimed to be communicating with, and the herbalists who cure patients by administering some shrubs and herbs on them. These groups still exist and are being patronized especially in the rural areas.

It is noteworthy however, that the modern drugs used for medical purposes originate from the plants. The difference between the herbalists and the orthodox medicine is basically in the method of purification of the shrubs, and the quantity to be taken at a time.

The traditional healers in most cases did not have specially designated places of curing the sick people. Treatment used to be administered either in the patients homes or those of the herbalists.

This situation still holds as far as the berbalists and those patronizing them are concerned. However, the reverse is the case with the advent of the modern health care services.

1.3.2 The advent of modern medicine in Kano

Hospital planning based on the modern scientific and functional relationship came up in Kano with the establishment of a hospital known as African Hospital at Bompai quarters in Kano metropolitan by the european missionaries. Unlike in the case of the herbalists, here the patients are kept together in specially designed buildings, hospitals, and treated with different types of drugs, administered at regular intervals of time.

The African Hospital started with 20 beds. Later, it was moved to Fagge quarters with 60 beds, before reaching its present location within Kano City in 1929 with a total bed capcity of 144 under the name City Hospital. It was eventually renamed Murtala Muhammed Hospital in 1976.

The advent of the modern medicine was recieved with cold reception because, its operations run contrary to the beliefs and cultural values of the people as well as t the already established methods of treatment by the traditional herbalists.

The other reason is to do with the fact that the new hospital was managed by mainly non-muslim european missionaries, who were viewed as using the hospital as an avenue of converting the people to their religious beliefs. These psychological fears were however allayed gradually, through the efforts of the traditional rulers in particular, and the subsequent governments under whose responsibility the health care needs of the people lies. The role of psychology in effecting the cure of patients within the framework of the modern health care delivery system is a vital one. This is because, any design proposal for the health care institutions has to be consistent with the cultural values of the users in its approach, in order to enhance the efficiency of diagnosis and treatment of the patients.

1.3.3 Classification of hospitals

Hospitals are classified in accordance with the type of health care services they render to the people, and the level of sophistication of the adjunct diagnostic and therapeutic facilities. In this respect, there are clinics community hospitals, general hospitals, teaching hospitals and specialist hospitals.

Clinics: These differ from hospitals in terms of the diagnostic and therapeutic facilities, and the degree of complexity of diseases they are equipped to handle.

They are actually parts of hospitals or institutions where mdical advice and treatment are given, and where students are taught through observation of cases.

Community hospitals: These are also refered to as health centres and are, "smaller hospitals of between 50 and 150 beds, intended to be staffed by local governments. They usually cater for patients transfered from small village dispensaries".[8]

General hospitals: As the name implies, these are hospitals that treat all patients regardless of the type of ailment. These type of hospitals are called general hospitals because"they are large enough to provide for all but the more estoric of specialist services. They at times refer patients for a completion of treatment to specialist hospitals. Their size, measured in terms of beds range from about 200 beds to well over 1000 beds."[7] Many general hospitals are initially planned for 500-800 beds capacity. They are, however developed in phases, starting sometimes with 100-200 beds. In most of the general hospitals, practical aspects of training are provided to nursing and midwifery students.

Teaching hospitals: These provide training for under-graduate medical students and invariably contain significant reserch facilities.

Though major general hospitals do offer teaching facilities like training of technicians and others, they are totally different from those facilities required by advanced medical students and professors.

Specialist hospitals: These type of hospitals treat one category of patients only. That is, they specialise in treating a particular type of ailment. They include psychiatric hospitals, who specialise in the diagnosis and treatment of mental illness, opthamic hospitals, who deal with all diseases pertaining to the eye, and so on.

The specialist hospitals are among the leading centres for post-graduate teaching and reserch in their speciality. They are usually scarcely bedded, with a range of between 50-150 beds, due to the limitation of services they offer.

Most of the various types of hospitals discussed above exist in different parts of Kano State. Figures 1.4.3 (i) (ii) shows the distribution of disfferent types of hospitals in Kano metropolitan and the state as a whole, respectively.

1.3.4. The eye hospital

This is another type of specialist hospital that deals with the treatment of all diseases pertaining to the eye. Initially, the treatment of eye diseases were handled in the same hospital department that deal with ear, nose and throat, called E.E.N.T.

Later, the treatment of the eye was separated from the above mentioned, under the term, opthalmology, which is a branch of medicine dealing with the structure, function and diseases of the eye.

Eye hospitals handle various types of eye diseases, ranging from simple to complex cases that require major surgical operations. Hence, their designs should take into account the types of services they offer and the diagnosfic and therapentic facilities used in them. For instance all the consulting rooms in eye hospitals, should have a length of not less than six metres, irrespective of the width. It is at this distance that the visual acuity of the eye is determined. Visual acuity is the sharpness of vision, as determined by a comparison with normal optical ability to define certain letters at a given distance, usually six metres. It is normally denoted by a term 6/6 vision, which is an expression indica indication that the test subject can see at six metres, what a normal-seeing person sees at six metres. Another characteristic of an eye hospital is that at least one of the consulting rooms, usually refered to as the dark room, is painted black in the interior. A special lighting instrument with a sharp focusing beam called opthalmoscope, is normally provided. The dark painting reduces the effect of glare and reflection inside the room,

and the sharp lighting instrument is used for closer examination of the eye. Plate 1 shows the interior of the dark room at the Nassarawa Eye Clinic Kano.

Other important features of the design of an eye hospital include, the control of glare, with its accompanying temporary blinding effect, caused by excessive brightness and the hazards of the dusty harmattan wind. These are important aspects that must be taken care of in the design of an eye hospital.

Glare is defined as a physical phenomenon whereby the human eye is physically strained due to the presence of a very bright light source. There is disability glare under which the visual functions of the eye is reduced practically to zero, due to a bright light source, and discomfort glare, by which case the visual ability of the eye is theoretically reduced to between 30-40%. Glare produces contrast, which is the comparative difference in terms of brightness which happens as a result of variation in the intensity of light. Kano is noted with a high intensity of sunlight and it is one of the areas affected yearly by the dustry harmattan wind blowing from the Sahara Desert. For these reasons, the design of an eye hospital has to take care of these problems because of the eye's sensitivity to them.

1.3.5 Some common eye diseases

It is important to note that environmental factors play a significant role in the spread of some eye diseases. This is possible when suitable environments for the latter's survival exist. Most of our urban centres like Kano City are characterised by slumps, stagnant waters and other unhealthy materials that make the environments unfit for human habitation.

Abdulkarim (1987) states that "the W.H.O. identified three factors that contribute to health problems in developing nations as follows:

- the tropical climate
- poor hygiene
- overcrowding in cramped living conditions, enhancing quick spread of epidemics."

An effective health care delivery system starts from the grassroot by enlightening the people on the basic individual and community hygiene, as a first step towards total eradication of diseases. "It is important to note that most diseases in developing countries are preventive infectious ones which can be avoided by simple sanitation practice."[8]

River blindness

Dirty environments like stagnant waters provide b breeding grounds for some disease carrying insects. In some cases even the rivers provide a nice abode to these insects. For instance, river blindness (onchocerciasis) which is caused by a bacteria known as onchocerca, is spread by an insect called Black Fly that breeds in the riverine areas. Statistics indicate that 20 million people are affected worldwide by river blindness, out of which 10% are blinded.[9]

Glaucoma

This is an eye disease which is characterised by increased pressure within the eye ball. It is of different types, as shown below:

- acute glaucoma; this is indicated by a sudden and severe increase in intraoculer pressure causing severe pain, redness and visual blur,
- absolute glaucoma; it is the final stage of untreated glaucoma generally characterised by blindness and eyes that are painful and chronically inflamed.

Glaucoma is responsible for about 13.5% of cases of blindness in the third world countries and normally appear after the age of 35 years.

Trachoma

This is a contagious external eye infection, and if untreated, may cause scarring of cornea. It is a common cause of blindness in the developing countries particularly the sub-saharan Africa. It can be complicated and lead to blindness, if not properly diagnised and treated. The W.H.O. estimated that about 500 million are suffering from trachoma, worldwide and that about 10 million are blind because of its complications.[12]

Defects of vision

These are basically classified into two categories: the ones associated with the refractive ability of the cornea and the eye lens, and the ones caused by the defects of the ciliary muscles.[10]

The cornea, which is the surface in front of the eye, appears to refract the light much more than the eye-lens itself. The latter forms an image on the retina R, which is the light-sensitive screen at the back of the eye, in order to be clearly seen. Figure 1.3.5 (i). The eye-lens L, is adjusted by the ciliary muscles to be able to focus at different points. This is a property of the eye known as its power of accomodation.[11] Figure 1.3.5. (ii).

For a normal eye, it can focus objects on the retina from a far point, that is, infinity and the near point, which is 25cm.

Fig. 1.3.5 (i)

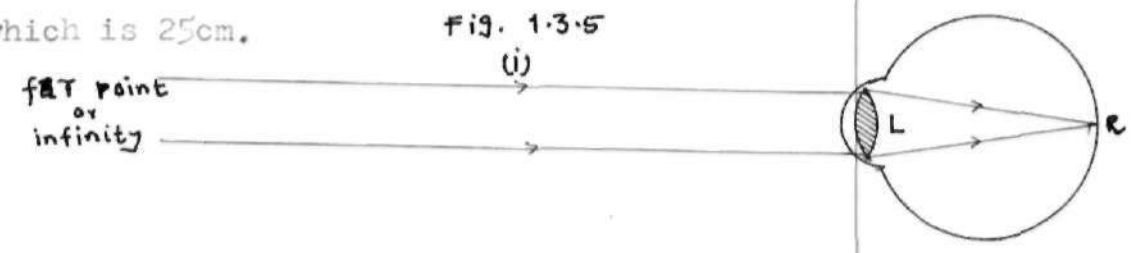
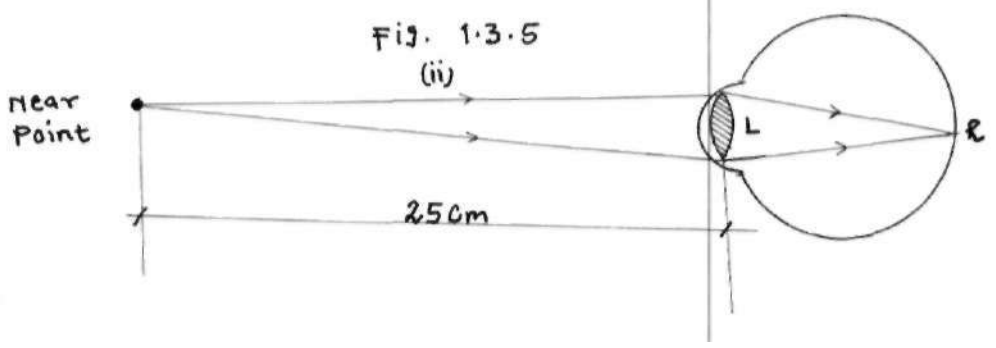


Fig. 1.3.5 (ii)



Short sightedness: This is an optical error in which an object is focused in front of the retina. A suitable dirverging lens is used to correct it.

Long sightedness: This is another type of optical error and it occurs when a person's far point is normal but is unable to focus objects from the near point on the retina. Instead the images are formed behind the retina. A suitable converging lens is used to correct for the defect.

Presbyopia: Short sight and long sight are defects of refraction. A person with these defects of vision still has the power of accomodation. Presbycpia, however, is a defect of vision where the eyelens becomes inelastic because, the ciliary muscles have become weak through old age. Thus, eye is unable to accomodate. Bifocals are used to correct for both near and far points.

1.4 Problem Definition and Analysis

Various types of hospitals exist in Kano State, where different kinds of diseases are treated. They include general and specialist hospitals as shown in Table 3. A study of the planning proposals applied in them shows some problems which this Thesis intend to solve. Some of the problems identified with the existing trend of hospital design in Kano State are briefly stated as follows:

(i) circulatin, (ii) inadequacy, (iii) improper planning and organisation with respect to the climatic conditions.

1.4.1 Circulation

This is an important consideration in any hospital design. But in most of the existing hospitals in the state, the circulation pattern is not properly defined, with no clear separation between staff and patient's routes. This is brought about, in some cases, as a result of cramming the various hospital units in one place. This causes congestion of staff and patients, thus, affecting the performance of the staff, in addition to encouraging cross-infection, within the hospital.

1.4.2 Inadequacy

Another problem associated with the health care facilities in the state is inadequacy. In the eye ward of the Murtala Muhammad Eye Clinic, the number of beds are insufficient, considering the fact that it is the only one that provides inpatient care services in the whole state under the government. Investigations show that people from other states of the federation as well as the neighbouring Niger Republic, are refered to the eye clinic for treatment. As a result of limited number of beds and insufficiency in terms of diagnosis and treatment facilities, patients are sometimes refered to the E.C.W.A. Eye Clinic which is owned by a missionary organisation, where high fees are charged before the services are offered.

1.4.3 Climatic conditions

Most of the health care buildings were planned without taking a proper account of the climatic situations in the state. As pointed out earlier, improper planning and bad designs result into serious congestion, cross-infection of contagious diseases and slowing down of the whole process of diagnosis and treatment. The climatic elements like wind and direct sun radiations, if not properly tackled also pose a serious threat to the health care services. The W.H.O., as earlier indicated identified the tropical climate as one of the factors contributing to the health problems of the developing countries.

For these reasons, serious attention should be devoted here to the climatic hazards in order to achieve a successful design solution.

1.5 Outline of Thesis Proposals

This Thesis tries to propose a design solution that addresses itself to the problems discussed above. The design proposal is a courtyard concept within an octagonal form. This is an attempt to solve the circulation problem and the long corridor effect within a single hospital block. The proposed concept tends to soften the psychology of the patients and the medical staff more than the long corridors, which create an impression of a long distance in the minds of the users.

The proposed concept also makes it possible to have a wider visual coverage at close proximity more than the rectangular forms. This is of utmost benefit to the eye patients, who are in some cases half blind. The integration of the courtyards into the design proposal is in response to the hot dry climate that characterised Kano State. The centrally located courtyards would provide a nice scenario within the hospital units. This will aid the process of diagnosis and treatment and at the same time enhance the speedy recovery of the patients. In particular, this provides a visual softens to the eye patiens who find hard surfaces as visually uncomfortable. Indeed, the plant bodies have been found to be of benefit to the health of the people, generally and not patients alone.

Appropriate routes and covered walkways are provided to link the different departments within the proposed hospital design. The administrative block as well as the accident and emergency department are separated from the main O.P.D. block to solve the problem of congestion and overcrowding in one department. Provision is made for a 180 bed, in-patient care division segregated into male and female units, in line with the cultural values of the people of the state.

The surgical suite is located away from the noisy O.P.D. block and closer to the accident and emergency department, to facilitate quick services to the critically injured and seriously ill patients. The services department is located such that quick and efficient services are offered to the various hospital units at shorter distances.

FOOTNOTES

1. Academic Staff Union of Universities
   The Nigerian Economic Crisis-Causes and Solutions

2. Abdulkarim, M. Planning for Health Care Facilities

3. Mousa-Booth, M. This is Kano State-20 yearsof Progress

4. ASIKPO, E. Three Faces of Silent Revolution in Kano State.

5. Ibid.

6. Soviet Monthly Digest Socialism - Principles, Practice and Prospects

7. Mukhtar, Ali. Dambatta Maternity Hospital

8. Abdulkarim, M. Planning for Health Care Facilities

9. Abdulkarim, M. National Eye Centre. Kaduna

10. Nelkon, M. and Parker, P. Advanced Level Physics

11. Ibid.

CHAPTER TWO

CASE STUDIES

2.1 . Murtala Muhammad Hospital, Kano

2.1.1 Historical background

As mentioned earlier in the text, the hospital was established in 1924 with twenty beds under the name African Hospital. The staff strength at that time was one doctor and ten nurses. Later the hospital was moved to its present site in 1929 to form the nucleus of what is now known as the Murtala Muhammad Hospital. The original plan consisted of the following:

1. 'A' Ward Male - male ward
2. 'B' Ward Female - female ward
3. Emergency ward
4. X-ray Department
5. Eye Clinic
6. Children's Ward
7. Dispensary
8. The main administrative block comprising of laboratory, dispensary and X-ray units and the present telephone room.
9. Mortuary.

These were the only completed parts of the plan, as at the time of its opening in the present site. The hospital continued to expant spontaneously from that time onward up to its present level today; a maze of functions haphazardly brought together with no rationale of relationships controlling their developments.

Present staffing

- Number of doctors - 92
- Nurses and midwives - 332
- Clinical assistants - 21
- Pharmacists - 15
- Laboratory technicians - 34
- Community health assistants - 8
- Physio therapists - 5
- X-ray technicians - 10
- Dental therapists - 1

2.1.2 The Eye Department

The department is made up of the Eye Clinic and the Eye Wards. The war's are located about 250 meters away from the clinic, with no clear and well defined route l linking the two units.

The Eye Clinic

The clinic consists of five consulting rooms altogether. The first two are for new patients one each for males and females

The other two are for old patients in that order, while the fifth room is for the chief consulting opthalmologist where complex cases are refered to. There are two rooms for the optometrists, a dispensing room, a staff rest room and a store. There are also two theatres; the minor and the major operation theatres. Close to the major operation theatre is the waiting room capable of taking about ten patients at a time, a changing room for anyone going into the major theatre, the scrub-up room and the sterilizing room, all located very close to the major theatre. A large covered space directly facing the entrance hall is used as the card issuing section. It is seperated into males and females sides though not partitioned. There is no provision for records store where cards can be kept. There is a classroom located at the western end of the clinic for demonstration and some tutorials to the students as well as the nursing staff. Four toilets are provided, two each for the staff and patients.

The Eye Wards

This consists of two main wards; one each for males and females. The male ward otherwise known as the Rotary Ward was built and donated to the state government by the Rotary Club of Kano State, and was declared open in June, 1980.

The Rotary Ward contains 16 beds arranged in rows without partitioning. At the entrance, the nurses duty room, which also serves as the treatment room and the sluice, is located directly opposite the store. At the other extreme end of the ward, the toilet is located and it is partitioned to provide six toilets. At the outside, a verandah is provided under the same roof to cater for the relations of the patients or any extra number of patients that the main hall of the ward cannot accomodate.

Since the ward is not partitioned and it is a single hall with beds arranged in two rows ono provision is made for dirty (septic) patients that is patients with contagious eye diseases, surgical or, medical patients. All these categories are put together in the same room, thus cross-infection is encouraged among the patients, brought about by the septic patients whose eye diseases could be contagious to the other patients. See figure 2.12 (i).

The female ward was initially a paediatric ward before it was converted to the female ward. It contains six separate rooms, two each for surgical, medical and isolated patients. The latter contains one bed each while the rest contain two beds each, making a total of ten beds altogether in the ward.

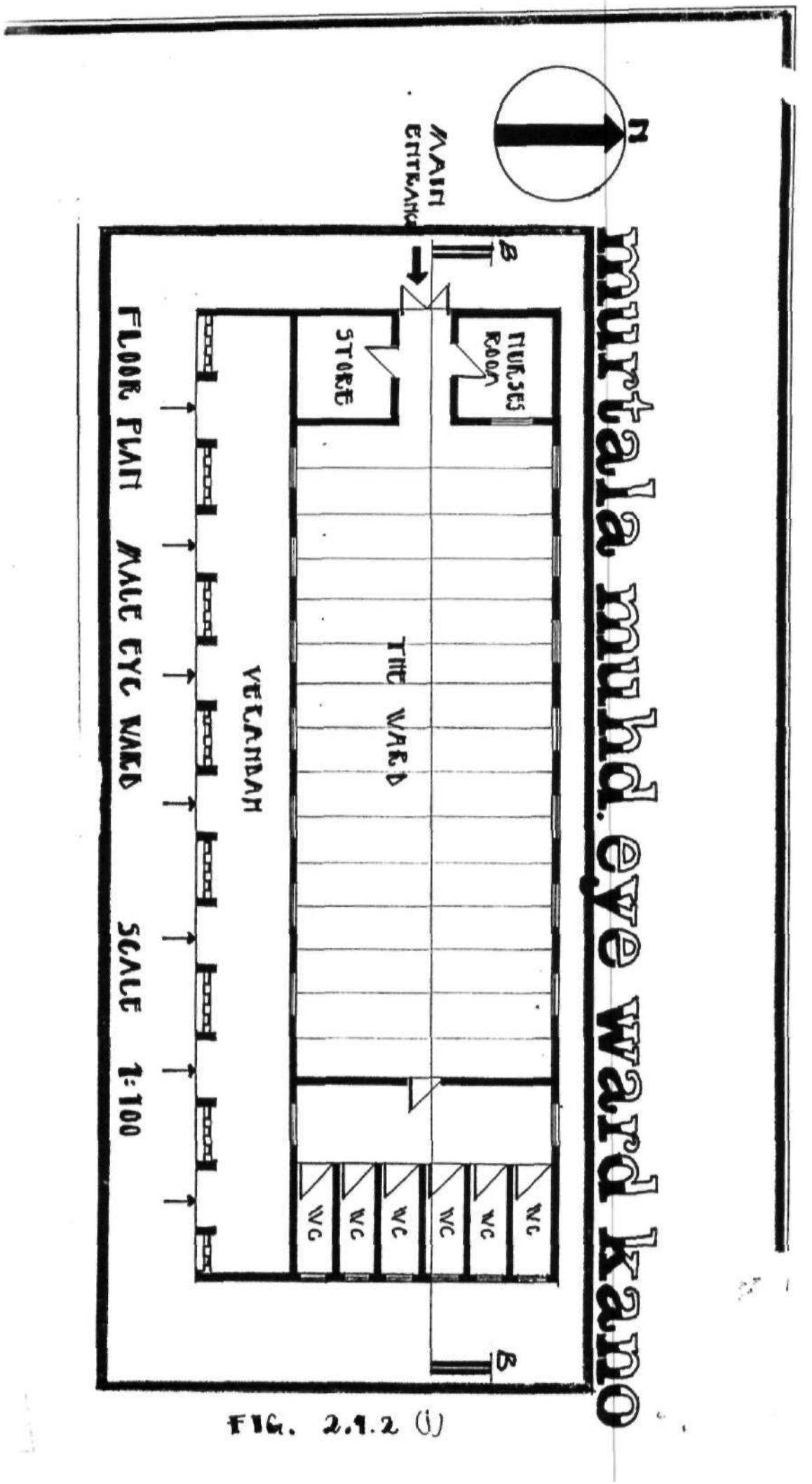


FIG. 2.1.2 (i)

Murtala muhd. eye ward kano

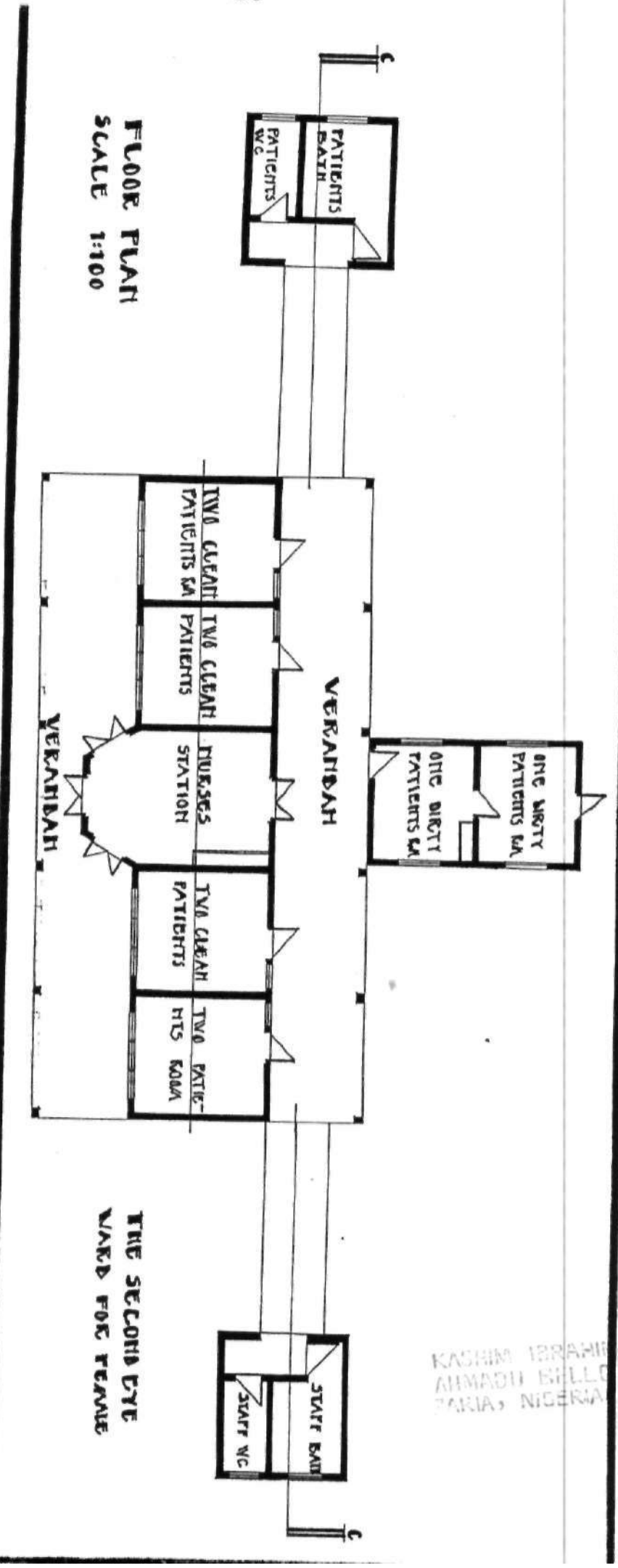
The two rooms for the septic patients are separated from the other rooms by a covered verandah. The nurses duty room, which also serves as the treatment room, is located central to all the rooms, while the patients and the staff toilets are located at the two extreme sides of the ward. See figure 2.1.2 (ii).

Planning

The Eye Clinic is planned such that, all the consulting rooms are arranged on the two boundary sides of the clinic, that is east and south, with the chief consultant's room at the extreme southern end. The surgical suite, compriesing of the major and minor operation theatres, the waiting, sterilizing and scrub-up rooms, are located on the northern end of the clinic. These are connected by a single corrider that leads to the main entrance hall. The classroom and the cards section are bordered on two sides by courtyards. The wohole clinic has a single flow traffic pattern, with the main hall serving as the entrance and outlet to the clinic. This is hazardons in case of some accident like fire outbreak, as provisions are not made for emergency outlet. See figure 2.1.2 (iii)

Construction

The construction style used in both the clinic and the wards is such that adequate ventilation and lighting is allowed to enhance the process of diagnosis and treatment.



female eye ward

KASHIM IBRAHIM LIBRARY
AHMADU BELLO UNIVERSITY
ZARIA, NIGERIA

FIG. 2.1.2

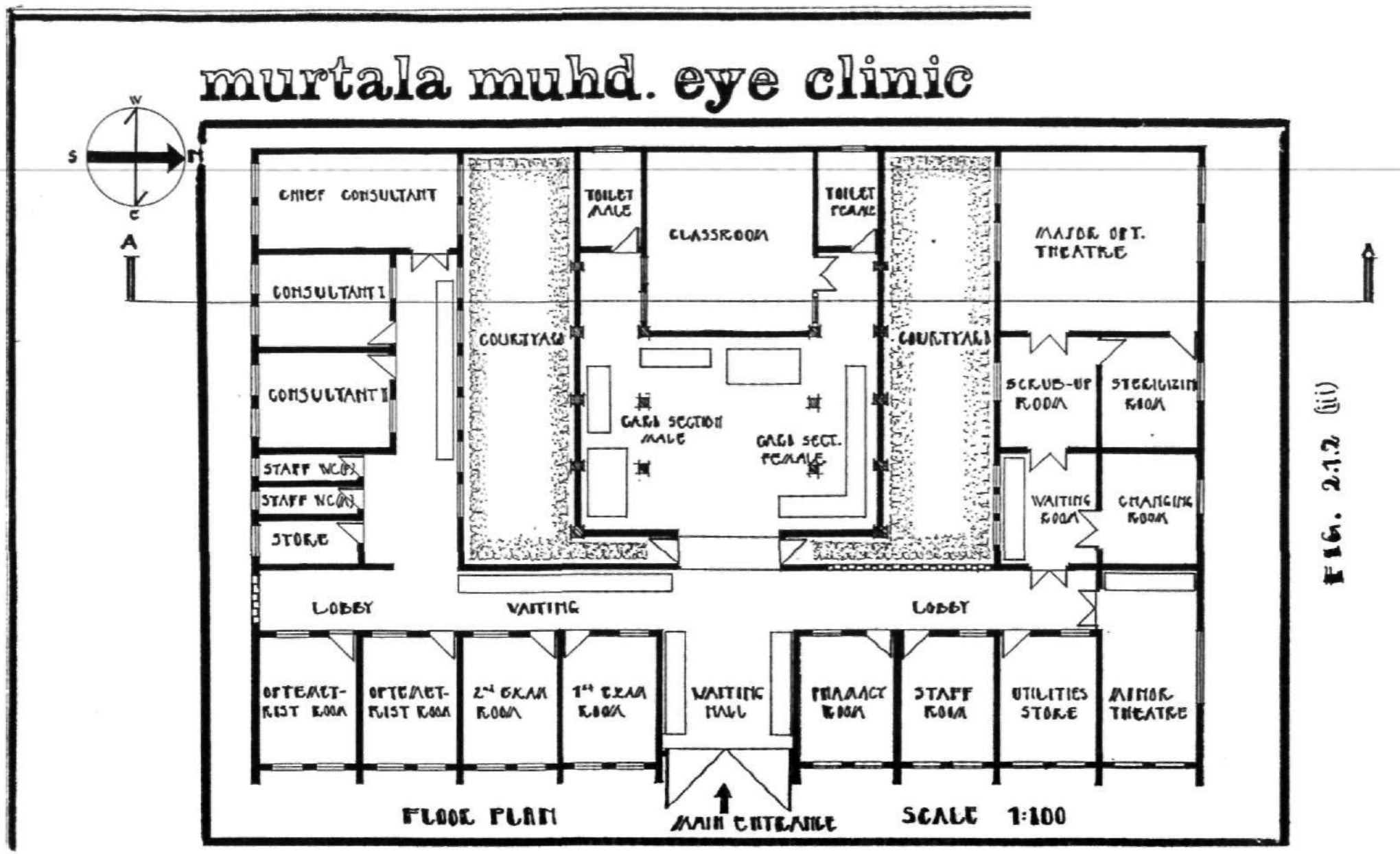

murtala muhd. eye clinic
W
S
N
E
A
CHIEF CONSULTANT
CONSULTANT I
CONSULTANT II
STAFF WC(M)
STAFF WC(F)
STORE
COURTYARD
TOILET MALE
TOILET FEMALE
CLASSROOM
CARD SECTION MALE
CARD SECT. FEMALE
LOBBY
WAITING
OPTOMET-RIST ROOM
OPTOMET-RIST ROOM
2nd EXAM ROOM
1st EXAM ROOM
WAITING HALL
COURTYARD
MAJOR OPT. THEATRE
SCRUB-UP ROOM
STERILIZIN ROOM
WAITING ROOM
CHANGING ROOM
LOBBY
PHARMACY ROOM
STAFF ROOM
UTILITIES STORE
MINOR THEATRE
FLOOR PLAN
MAIN ENTRANCE
SCALE 1:100

FIG. 2.1.2 (iii)

This is facilitated by having large windows on either sides of each room within the units. This also help to reduce the effect of glare in both units. In the Rotary ward, a modification of the Nightingale's ward is adopted, with the beds arranged in rows and the toilet at one exfreme end of the ward. The difference here is that the nursing station occupies the other extreme end, unlike the Nightingale's Ward which proposed a central location of the nursing station.

Present staff strength of the Eye Department

- Consulting opthalmologist - 1
- Senior medical officers - 2
- Medical officer (N.Y.S.C.) - 1
- Optometrists - 2
- Staff nurses - 7
- Student nurses - 8
- Cleaners - 8
- Typist - 1

Table 6: Record of attendance M.M. Eye Clinic 1983-87

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1983	5321	7159	9251	7711	11479	10677	9156	9934	9616	9508	9468	8931
1984	83065	11009	13664	10232	12326	9224	9633	12579	8913	9946	8817	7047
1985	14216	10802	97968	9410	9534	6410	9503	11964	11163	7424	12167	10231
1986	11313	6957	8374	12252	11239	13125	13127	15919	14461	6281	6565	10055
1987	9839	8450	9259	8826	6657	10698	9678	9746	12587	7843	12139	11234

The higher number of attendants at the M Murtala Muhammed Eye Clinic (M.M.E.C.) shows the prevalence of varions eye diseases in Kano state as discussed earlier in this text. It is equally noteworthy how the number keep on rising especially in 1986 when the highest number of attendance is recorded in the last five years. See table 7.

Table 7: Summary of O.P.D. and ward attendance at the M.M. Eye Clinic and the Eye wards.

Year	O.P.D. attendance	Major operations	Minor operations	Admissions	discharge	Death	Average length of stay	% bed occupancy
1983	110,511	6971	780	1262	1195	3	10	104
1984	197,455	4426	3049	742	699	9	12	84
1985	210,792	9002	1529	805	779	5	11	91
1986	229,668	13854	925	890	822	2	13	100
1987	1159, 83	11892	601	979	952	8	11	118

The table above shows a steady increase in the number of patients admitted especially for the last four years, that is 1984-1987, despite the obvious limitations of the nursing care facilities.

2.1.3 Conclusions

(i) The high % of bed occupancy shows the level of inadequacy of the wards to cope with the rising number of eye patients that are admitted into the wards. The % in most cases exceeded one hundred for the records taken for the last five years. See table /.

(ii) The problem of circulation is glaring here since the clinic and the wards are situated at different locations within the hospital.

(iii) Some basic architectural components of a standard eye hospital are lacking here. These include the optical workshop where glasses can be purchased after preseriptions. In a standard eye hospital, the length of the consulting rooms especially the optometrist rooms should be a minimum of six meters. This is because, to determine the visual acuity of the human eye, the minimum distance required is twenty feet (six meters). The consulting and the optometrist rooms in the M.M.E.C. are less than six meters in length.

(iv) Within the clinic, the planning has problems. Having only one entrance, that also serves as the outlet encourages congestion and poses a threat to the safety of the people inside, as no provision is made for emergency exit. A provision is also not made for a record store in the clinic hence difficulties arise in keeping proper records of attendance.

(v) Lack of well define route that links the clinic to the wards encourages glare. which is a serious hazard to the eye patients.

(vi) In the male ward, cross infection is encouraged since all the patients are put together in the same room irrespective of the type of eye disease.

For these and other reasons it is observed here that a new eye hospital is required in Kano that will meet the requirements of a standard hospital and at the same time respond to the rising number of eye patients in the state. This is in line with the Federal Government's (F.G.) target of health for all by the year 2000 A.D.

2.2 Nassarawa Hospital Kano

2.2.1 Historical background

This hospital was established to respond to the rising demand for the modern health care services in the state. At that time, Murtala Muhammad Hospital (M.M.H.) was not able to cope with the number of patients within Kano municipality. It was built in phases, and the present phase was declared open in November, 1973. It is located at the Government Reserve Area (G.R.A.) of Kano municipality known as Nassarawa quarters. Initially, the hospital catered for the elites and the well to-do in the state since some fees were charged before services were rendered. Later the fees were liberalised within the reach of most of the people.

2.2.2 Facilities

The hospital consists of the following facilities:

Ground floor

A. Pathology
B. Radiology
C. Consultation
D. Examination
E. Medical record
F. The Eye Clinic.

First floor

1. Maternity and gynaecology ward
2. Isolation ward
3. Surgical unit
4. Labour room complex
5. Central sterile supply department.

Second floor

A. Paediatric unit
B. Isolation section

Staff strength for the whole hospital

- Number of doctors	- 12
- Number of nurses and midwives	- 72
- Clinical assistants	- 13
- Pharmacists	- 3
- Laboratory technicians	- 10
- X-ray technicians	- 2
- Dental therapists	- 1

2.2.3 The Eye Clinic

The Eye Clinic is situated at the ground floor of the hospital. The clinic handles patients with eye diseases that require minor surgical operations only. Also there are no provisions for the nursing units, that is the words. Patients that require major surgical operations or nursing care services are referred to the M.M.H.

Staff strength for the clinic

- Consulting opthalmologist in-charge - 1
- Staff nurses - 2
- Optemotrist - 1
- Student nurse - 1
- Messenger - 1

Construction

As the clinic is constructed not long ago unlike M.M.E.C., the building still looks new and the planning compact. The design approach adopts to the climate of Kano particularly as regards orientation. The longer sides of the clinic are along the north-south axis with the shorter sides exposed to the east-west directions. Most of the windows are oriented along the north-south axis. Concrete hollow block were used in the construction works with corrugated zinc roofing sheets to reflect most of the heat radiation incident on the roofs.

Design appraisal

The clinic has sufficient waiting spaces for the patients, particularly the card section, and the consulting rooms. The consulting rooms have sufficient length to satisfy the minimum requirement of the six meters needed for the visual acuity. See figure 2.2.2.

nassarawa eye clinic kano

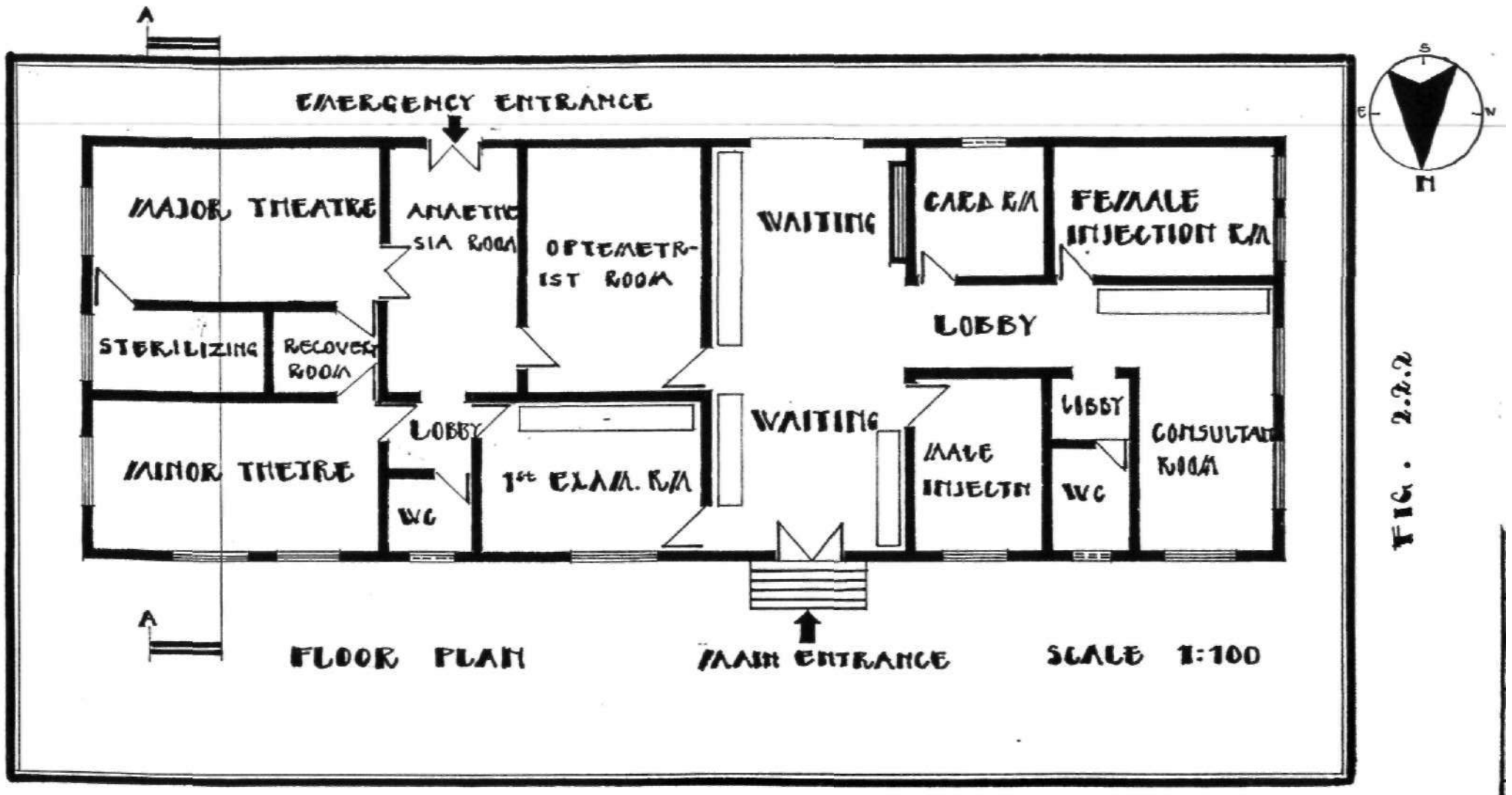


FIG. 2.2.2

Table 8: Record of attendance at the clinic and the minor operations performed from 1984-87

	1984		1985		1986		1987	
	Total attendance	Miner operations	Tital Attendance	Miner opts.	Total atton.	Miner opts.	Total attod.	Miner opts.
Jan.	708	20	656	20	1,116	40	930	44
Fab.	870	30	1,420	30	1,133	30	953	35
March	1,423	100	1,014	40	1,016	60	1,210	40
April	1,284	30	1,007	40	1,103	40	977	23
May	1,091	15	1,100	43	1,015	47	761	25
June	473	20	930	60	1,230	30	721	13
July	757	30	1,600	40	1,130	22	628	14
Aug.	891	20	1,913	-	2,420	15	-	15
Sept.	688	20	1,963	30	1,329	19	1,220	35
Oct.	758	40	1,850	30	1,[illegible]	37	927	38
Nov.	712	20	1,031	47	1,080	-	1,220	47
Dec.	492	15	1,081	30	926	28	786	35

Conclusions

- No clear separation in terms of circulation between the patients and the staff, hence congestion arises.
- Insufficient number of windows in the theatre and the female treatment room, hence cross ventilation is hampered.
- No defined waiting spaces for the male and females at the cards collection section and this arises because the entrance hall which serves as the waiting space is not big enough.

This and other reasons buttress the idea of having a new eye hospital.

2.3 E.C.W.A. Eye Hospital

2.3.1 Background

This hospital is established and run by a christian missionary orgainsation known as the Evangelical Churches of West Africa (E.C.W.A.). The hospital deals with eye problems only on humanitarian grounds, though fees are charged before the services are rendered to the patients. It provides nursing care facilities to the eye patients, and handles different types of eye diseases of various complexity. It is the only hospital of its kind in the whole of Kano State that offer wide range of services on eye problems like; out patient care services, surgical operations, nursing care facilities and optical care services. It exists separately as a unit entity and it is not affiliated to any of the general hospitals in Kano State under the government.

2.3.2 Facilities

The hospital consists of the following facilities in the O.P.D:

1. Three consulting rooms
2. X-ray Department
3. Optometrist room
4. Optician's room
5. Treatment room
6. Dispensing room
7. Cashier's cubicle

8. The administrative block, which comprises of the senior consultant's office and that of the Hospital Secretary and other staff.

9. The surgical suite, consisting of the major and the miner operation theatres.

In the nursing care unit, the following words exist:

- Male medical
- Male surgical
- female medical
- female surgical
- Isolation ward

Existing staff strength

a. Senior consulting opthalmologist	- 1
b. Medical officer	- 1
c. Optemetrists	- 4
d. Opthalmic nurses	- 2
e. Registered nurses	- 11
f. Hospital Secretary	- 1
g. Clinical assistants	- 8
h. Para-medicals	- 14
i. Ward aids	- 27
j. Laboratory technician	- 1
k. Optical dispensing assistants	- 3
l. Evangelists	- 4
m. Laundry men	- 5
n. Drivers	- 2
o. Laundry men	- 5
p. Labourers/guards	- 28
Total	112

Table 9 Summary of O.P.D. and ward attendance at the E.C.W.A. Eye Hospital from 1984-86.

Year	O.P.D. attendance	Major operations	Minor operations	Admissions	Discharge	Death	Average length of stay	% bed occupancy
1984	16,843	4,470	1,451	3,923	3,860	2	10,3	85.0
1985	22,655	3,940	1,292	4,177	3,379	1	11.6	95.5
1986	22,951	7,413	1,765	3,995	3,836	3	10.6	89.7

Conclusions

1. Making a comparison with the N.M.E.C. one notices a high number of attendance there at than the E.C.W.A. Eye Hospital. This could be attributed to two reasons. The first reason is to do with the fact that in the latter fees are charged before any services are rendered while in the former, being a government institution, services are offered free of charge. The second reason has to do with the belief that patients who attend the hospital run the risk of being converted into Christianity religion. Most of the people of Kano State being muslims, are very sensitive about this. The presence of some professional evangelists in the staff of the hospital buttress this point. This is a psychological feeling that does not always hold. However, any psychological fear entertained by a patient only help to aggravate his/her sufferings. Hence, a new eye hospital that is not under any religious organisation is essential to cater for the large number of eye patients in Kano State.

2. The high % of bed occupancy that reach close to a hundred shows the inadequacy of the nursing care services. This is inspite of the high number of admittence which is more than the number recorded in the M.M.E.C. for the last three years.

3. The gradual increase in the casuality figures shows the limitations of the health care facilities both in the O.P.D. and the nursing care units. A standard eye hospital is needed for a large human settlement like Kano State in order to bolster the health care delivery sytem in the state.

2.4 Maiduguri Eye Hospital

2.4.1 Historical background

Before the Maiduguri Eye Hospital (M.E.H.) was built, eye patients in the state were treated at the general hospitals or their affiliated clinics in the state. Those with complicated cases that required major surgical operations were refered to other hospitals outside the state where soplisticated diagnostic and therapeutic facilities in the field of opthalmology were available.

The contract for the design of a new eye hospital for Maiduguri was awarded by the Borno State Ministry of Health in 1975, to a Lagos based architectural firm known as Rajendram and Associates.

The hospital was opened in 1982. The hospital contains 80 beds, 40 each for male and female wards.

2.4.2 Facilities

The hospital consists of the following facilities:

1. Waiting hall
2. Administrative suite
3. Consultants suite
4. Treatment suite
5. Optical warkshop
6. Staff recreation rooms
7. Surgical suite
8. Male patients ward
9. Female patients ward
10. Visitors domitory
11. Kitchen and laundry
12. Staff garage
13. Mortuary
14. Generator room

2.4.3 Hierachy of staff

Professional medical staff

2 Consultant optnamologists
1 Principal optician
2 Surgical technicians
1 Anaesthesiologist
1 Staff phamacist

Nurses and technicians

7 Senior nursing staff
17 Staff nurses
2 Optical technicians
1 Laboratory assistant
3 Anaesthetic technicians

Non-professional staff

18 Administrative staff
2 Drivers
2 Dieticians
4 Cooks
2 Stewards
3 Washmen
11 Security guards
15 Maintenance assistants
12 Compound labourers.

Table 10: Summary of O.P.D. and ward attendance at the M.E.H. for the year 1987.

	Male	Female	Total
O.P.D. attendance	9,364	8,170	17,534
Major operations	473	330	803
Minor operations	355	495	850
Admissions	954	774	1,728
Discharge	954	774	1,728
Death	-	-	-

2.4.4 Layout Principle

The principle adopted in the layout is the pavillion type with courtyards. All the units mentioned above consists of rectangular offices arranged in a row with a corridor that runs parallel to them. In between two units there is a beautifully landscape courtyard to enhance cross ventilation and lighting. The units are linked together by a system of long corridors which are covered to protect the staff and the patients from direct sun rays.

The main hall for the hospital, which also serves as the main entrance and exit hall is located at the centre of the O.P.D. and is oriented along the north-south direction. To the west, the consultants and the treatment suites are located, parallet to each other and are separated by an open courtyard. The administrative suite and the optical workshop are on the east of the main waiting hall and, are arranged in the pattern as the consultants and the treatment suites. The surgical suite and the staff recreation rooms are on the either side of the corridor. So also are male and female wards.

The mertuary and the generater room are located at the farthest end of the hospital to the west while the kitchen and laundry, and the visitors domitary occupies the easternmost end of the hospital.

The generator is so located mainly because of the noise, while the kitchen's location is to minimise the chances of an accident of fire outbreak or any hazard therefrom, spreading to the other parts of the hospital see figure 2.4.3. (i) showing the overall layout of the hospital.

Circulation pattern

The circulation pattern used in the hospital is the long corridor type, otherwise known as the hospital street. Each hospital unit is linked to the other by a long, covered path. The linkage between the various units of the hospital are so defined that the courtyards are rarely used by people as short-cut routes. The circulation using the corridors is enhanced by having them covered. This protects the users from the seasonal hazards. That is the rain and the excessive sunrays that characterise the weather in Maiduguri. This is important in view of the fact that the direct sun rays are harmful especially to the eye patients.

Within the units of the hospital, the circulation pattern is same as above. Here all the functions within each unit are arranged in a row with the corridor running paralled to them. The corridor is covered in this case as well.

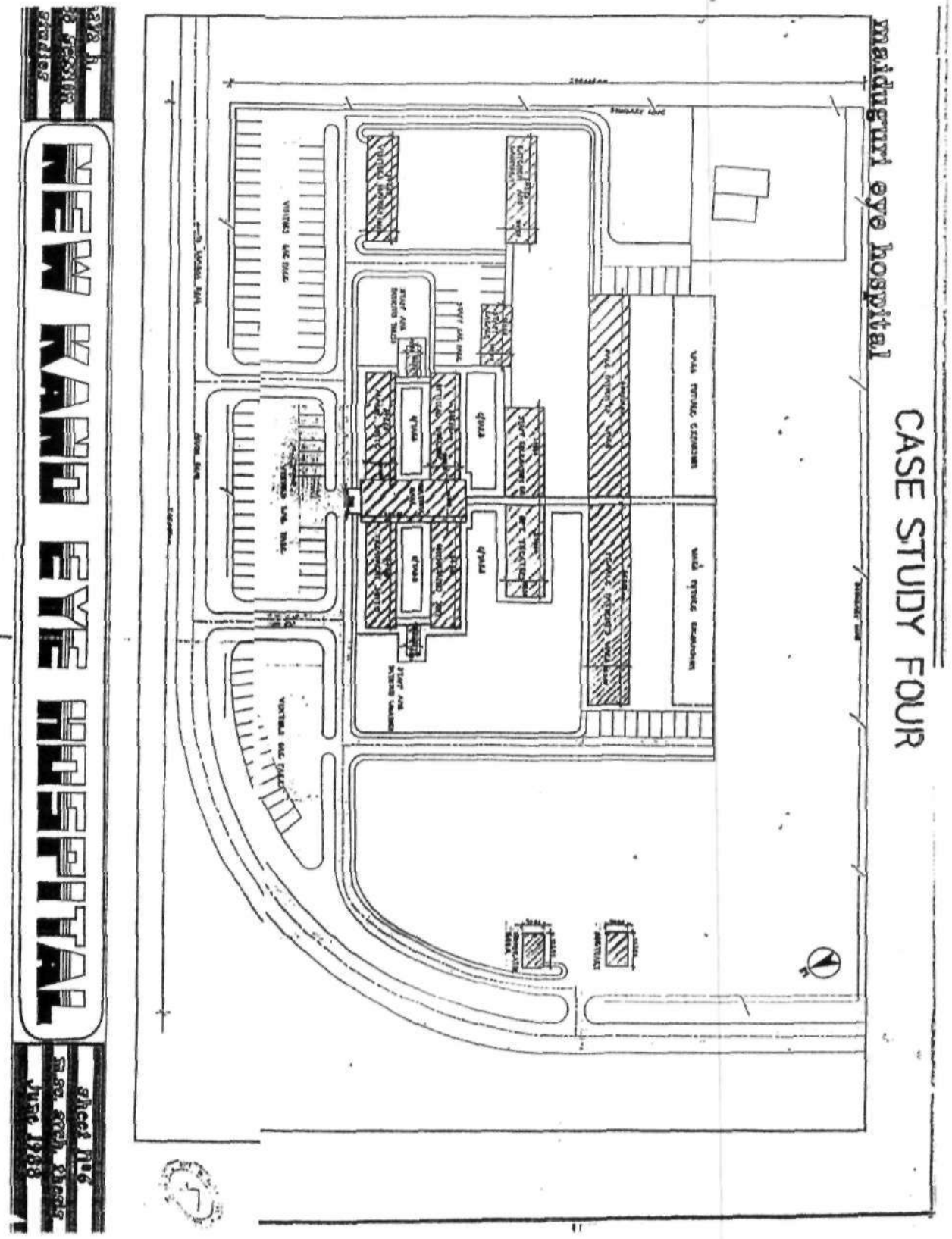

CASE STUDY FOUR
maiduguri eye hospital
NEW KANO EYE HOSPITAL

FIG. 2.4.3 (i)

Planning Problems

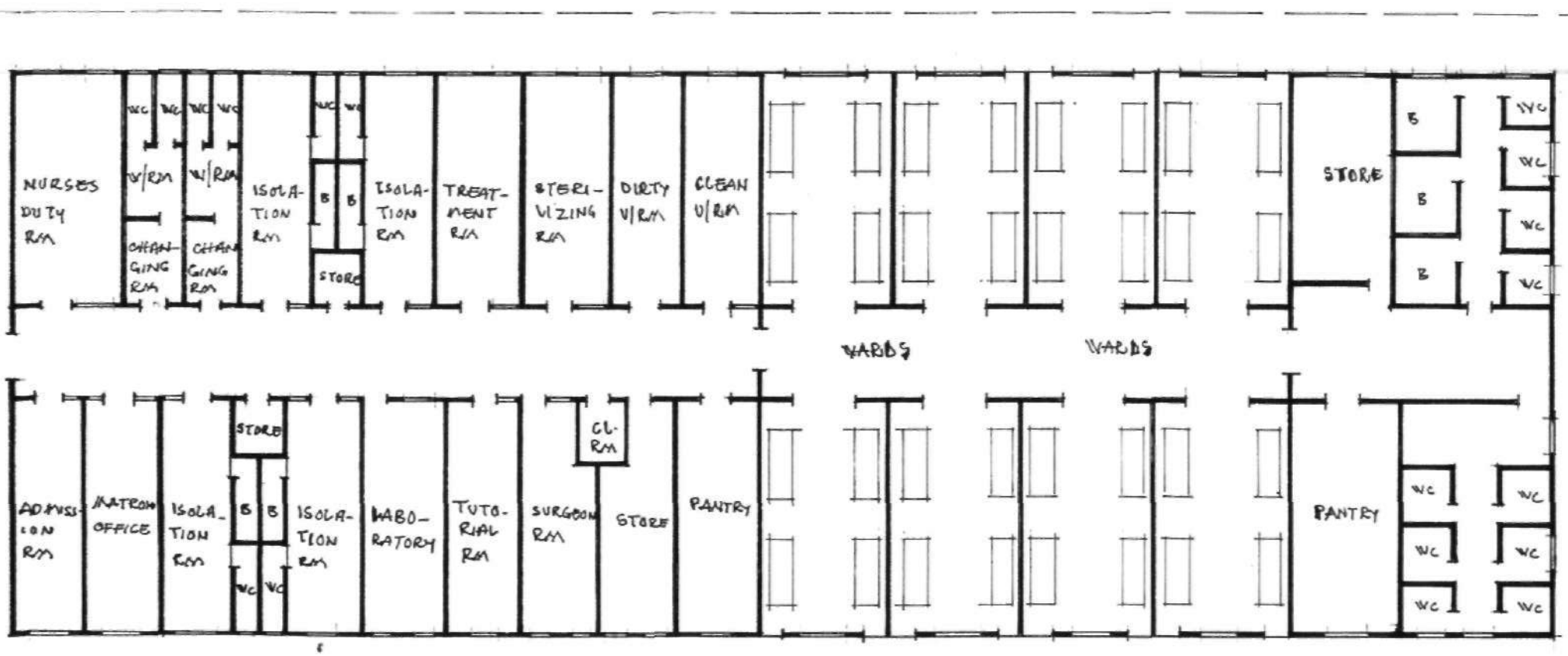
The major problems identified with the planning principle discussed above, and which is applied to the Maiduguri Eye Hospital are basically; the long circulation distances and the glare effect. In the first case, the long distances even within the various units are a source of fatigue to the staff and the ambulent patients. This affects the efficiency of the staff. The long distances within the units are as a result of the rectangular forms used in the design of the hospital units. This is because, the rectangular forms encourage the creation of the long straight paths that give the psychological impression of tiredness to the users. See figure 2.4.3 (iii), showing the plan of one of the wards. The distance between the nurses duty room and the main patient bed compartments is about 40m. This makes effective supervision and proper nursing care of the patients difficult.

The same situation also applies to the long corridors that links the various hospital units. A typical example is the distance between the kitchen and any. of the wards, which is about 200m.

The other major planning problem is the glare effect. This is a problem that is particularly important to the eye hospitals.

FEMALE EYE WARD OF THE MAIDUGURI EYE HOSPITAL

FIG. 2.4.3



Glare effect is created in designs when there are comparative differences between one place to another in terms of brightness. This is very uncomfortable to the eye patients. In the case of the Maiduguri Eye Hospital, the rectangular forms adopted in the design and covered on all sides, do not allow for even distribution of light to all the sides of a building unit. The contrast created in terms of brightness as a result of having the various hospital units and the corridors completely covered from top and the sides. This cause discomfort glare to the patients and the staff. If the sides were left partially covered, the level of brightness could have been improved and thus, the contrast between the covered corridors, the main hospital units and the open courtyards in terms of brightness could have been minimised. See plate II showing the covered corridor linking the kitches and laundray to the rest of the hospital.

2.4.4 Construction

All the hospital units are sirgle floors. In the construction, hollow concrete blocks with steel roof trusses were used. In the roof, long span aluminium roofing sheets were used throughout, with concrete parapets and 1.5 wide gutters. 225mm diameter asbestos pipes are used as rain water outlet from the gutters.

The drain water from the roof is sooked away in a pit constructed very close to the building foundations. See figure 2.4.3 (ii).

The type of foundation used throughout the hospital is the raft foundation type with downstand beams. Double bunking is used in the design of the two wards of the hospital.

Design Problems

The following observations are made in respect of the construction type used in the hospital:

1. The foundation type used is not suitable for the kind of soil at Maiduguri. Raft foundation with downstand beam is used for marshy areas like Lagos were the soil is loose and weak with a poor shearing strength. In such a case raft foundation is used to cover the entire area to avoid differential settlement. But in case of Maiduguri where a sufficient depth of strong sub-soil exists, a simple strip foundation should have been used. The use of raft foundation is highly uneconomical.

2. The use of a 225mm drain pipes is also uneconomical. This is because, a place like Maiduguri with re relatively low level of rainfall is not the ideal place for using such a big pipe.

It may be suitable for the southern part of the country where a high level of rainfall is obtained.

3. The 1.5m wide gutters are also big considering the climate of the site. It would have been suitable for areas that record heavy amount of rainfall. Thus it is uneconomical.

4. The use of double bunking is also not suitable for the type of weather that exist at Maiduguri, which is hot dry. This is particularly important, in view of the fact that, the double bunking is used in the wards, on the side where septic patients are accomodated. This may encourage cross-infection since free flow of air is restricted on this side of the ward.

Design appraisal

Inspite of the problems associated with the design as discussed above, some points of merits would be deduced from it. These include:

- Sufficient free flow of light and ventilation is generally allowed in the design. This is achieved by having the open courtyards in between the units.

- Sufficient number of facilities like the number of beds, waiting spaces and the rest are provided.
- The use of the concrete parapets is of importance to the roof as it helps in protecting the roof from strong winds prevailing at the site.
- There is flexibility in the design as expansion is possible and less difficult with the type of design form adopted for the design of the hospital.

Conclusions

The hospital design though serves its purpose in terms of sufficiency, has serious defects in respect of economy. Some of the specifications used as discussed under the design problems, are serious and lead one to conclude that the consultants who designed the hospital took the climatic conditions of the site where they are based into considerations rather than those of the design location. This is not encouraging as far as manitenance of the hospital is concerned. Another example is the location of the soak away pit for the rain water drainage very close to the building foundation. This threatens the durability of the foundation and hence, increases the maintenance cost.

CHAPTER THREE

BRIEF ACCOUNTS ON KANO STATE

Kano State was created in March 1967, from the former Northern Region. Kano State came into being when Nigeria officially assumed the status of a 12-state structure. It is situated on the northernmost side of the country bordering Borno State to the east, K Katisina State to the west, Bauchi State to the south-east and the Republic of Niger to the north. (See figure 3.0.).

Kano City is the capital of the state since its inception it lies on latitude 12°03' N and longitude 8° 32' it is a city state, that is, the state develops out of the gradual expansion of the capital town through absorption of the outlying territories and smaller settlements around it.

3.1 Historical Background of Kano City

Historical accounts attribute the founding of Kano largely to the legendary Bagauda, son of Bawo. Bagauda was indeed the first Habe king of Kano. However, recent scholarly investigations have claimed that an organised society had existed around the D ala Hill, the place where Kano was said to have started existing.

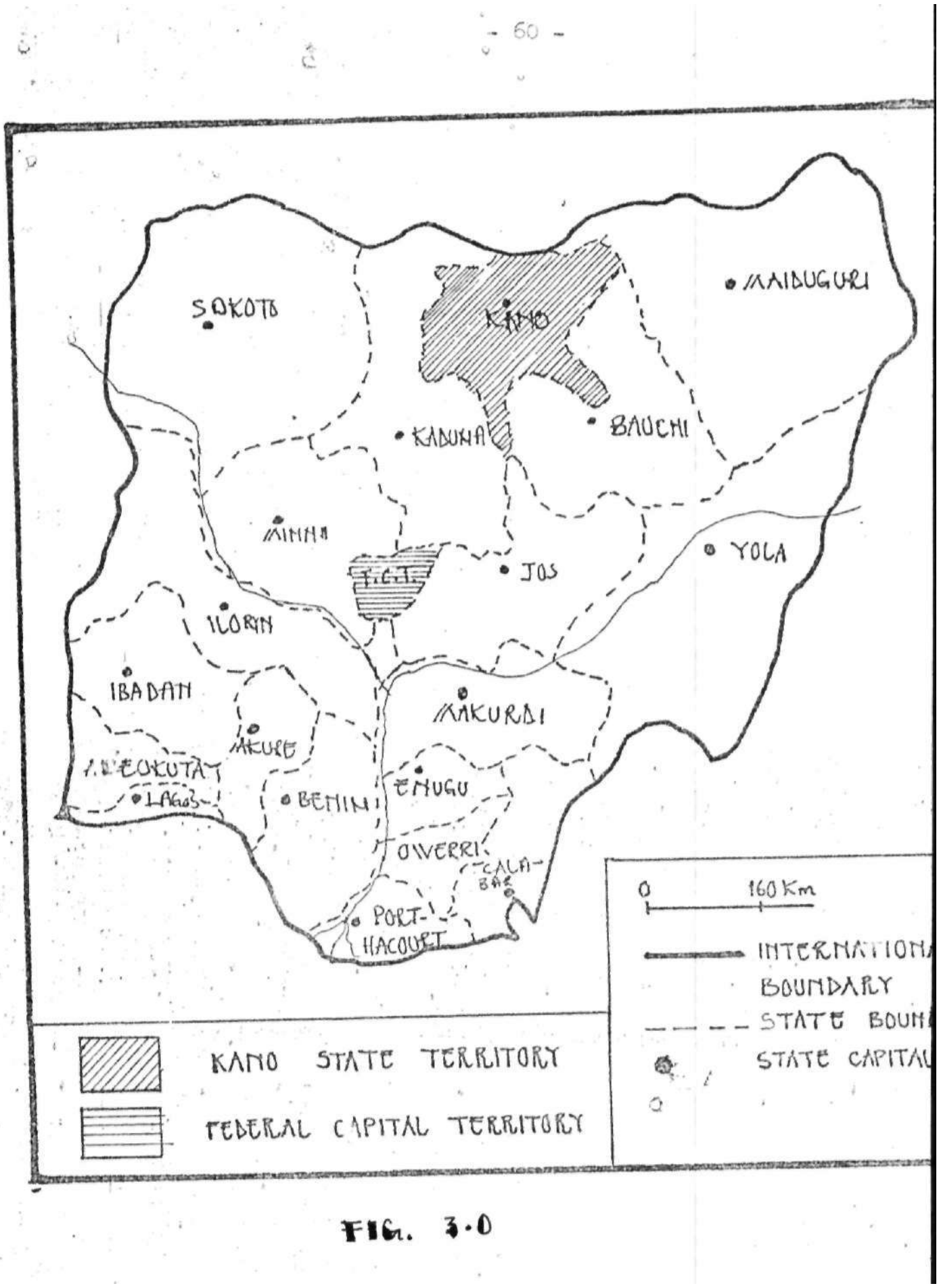

SOKOTO
KANO
MAIDUGURI
KADUNA
BAUCHI
MINNA
JOS
YOLA
ILORIN
IBADAN
MAKURDI
AKURE
ABEOKUTA
LAGOS
BENIN
ENUGU
OWERRI
CALA-
BAR
PORT-
HACOURT
0
160 Km
INTERNATIONA
BOUNDARY
STATE BOUN
STATE CAPITAL
KANO STATE TERRITORY
FEDERAL CAPITAL TERRITORY

FIG. 3.0

Kano first became known to the outside world largely after the visit of Leo Africanus, a Moroccan peripatetic scholar in 1513 A.D. Tradition has it that the earliest settlers found in the area were a group of people called the Abagayawa whose ancestor called Kano was said to have migrated from Gaya (presentaly a town close to Kano City), in such of iron-stone and charcoal, which were then found in abundance at the Dala Hill. Thus, Kano got its name from that person. The small community that settled at the Dala Hill later evolved some sort of leadership structure under a person called Barbushe, who was a hunter, a priest, an able leader and a man of enormous stature.

Barbushe was the high priest of the supreme deity called Tsumburbura, around whose worship the small community was built. The shrine of the deity was sited at a tree on the Dala Hill. (See figure 3.1).

The apparent tranquility pervading the fabrics of the Abagayawa community under the leadership of Barbushe impressed so many other neighbouring communities who begun to migrate and settle among them. It is strongly believed that a group led by Bagauda was one of them. This group quickly established its ascendency over the original inhabitants, and the latter's capitulation sealed their fate. The dynasty originally established by Kano thus, came to an end and the reins of power changed hands.

This ushered in a new era, that of the Habe Dynasty of which Bagauda was its first King. He was such a powerful warrior that it did not take him long to subjugate all the chiefs that had owed allegiance to the Abagayawa ruling house. He is credited with having put up the profile of what was to become Kano City. He reign for 64 years, (999-1063 A.D.)

3.2 Physical Features

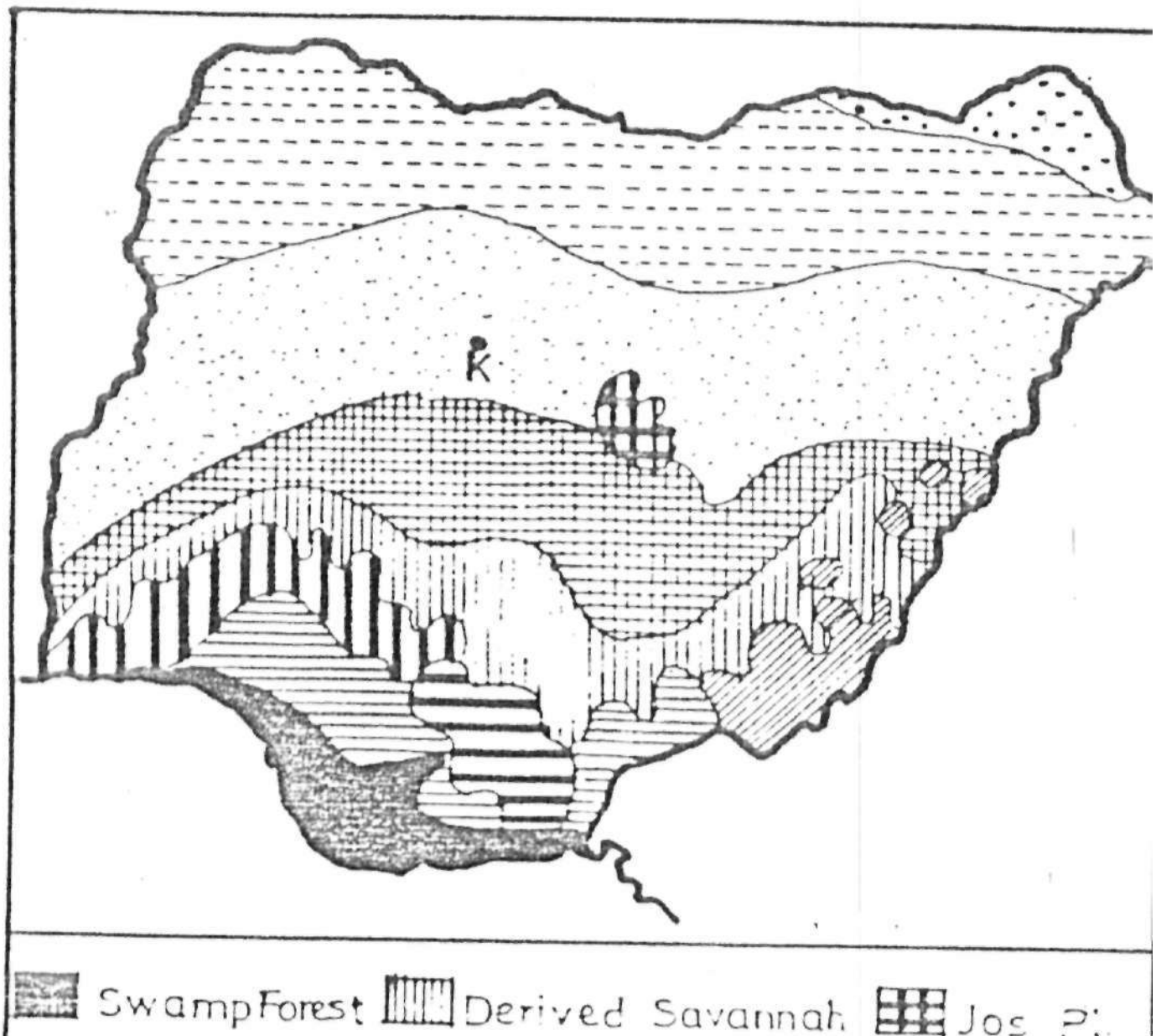
3.2.1 Vegetation

Except parts of the southern borders where guinea vegetation predominates, most of Kano State lies within the sudan vegetation Zone. Metropolitan Kano is about 840 kilometres from the edge of the Sahara. It is 472.45m above sea level. (See figure 3.2.1).

3.2.2 Soil Group

Kano state falls within the region characterised by the northern laterite sand. That is the top-soil is mainly laterite sand with little clay content. Knowledge of the soil type of a site is of importance in respect of foundation types to be used on a building and the materials to be used in the construction.(See figure 3.2.2).

VEGETATION ZONES



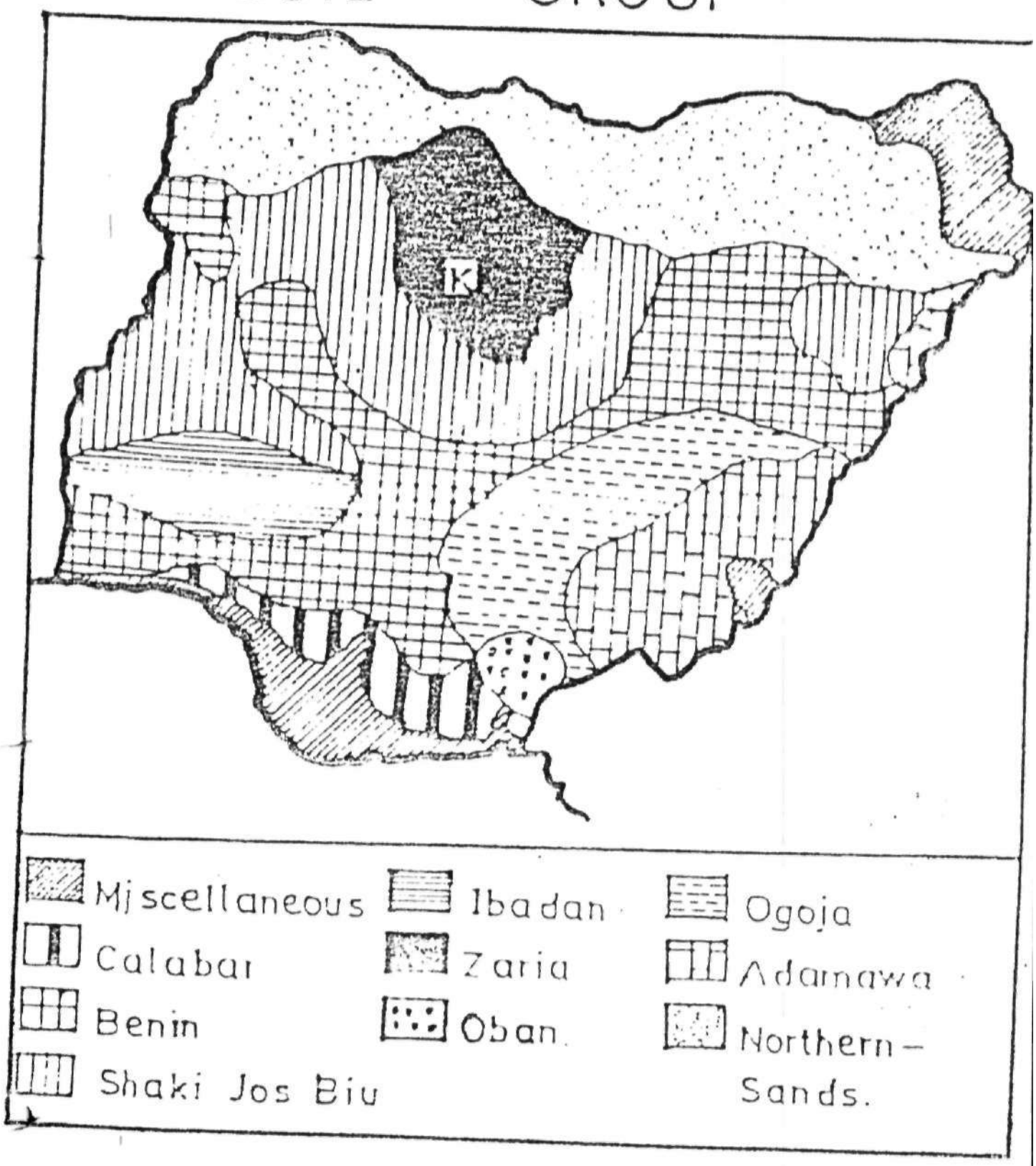

SOIL GROUP
K
Miscellaneous
Calabar
Benin
Shaki Jos Biu
Ibadan
Zaria
Oban
Ogoja
Adamawa
Northern – Sands.

FIG. 3.2.2

3.2.3. Relief and drainage

Kano is generally undulating, sloping to the north-east with physiographically uniform appearance. The urban area that is the metropolitan Kano, follows the same pattern with relief provided by two prominent hills known as Dala and Goron Dutse which rise to the height of 453.67m and 517.5m respectively above sea level.

Two large rivers (Hadejia 328km and Duduru 362.4km away from Kano city), rise in the central plateau to the south draining north-eastward into the lake Chad about 320km away. There are no rivers of any significance in th the norther part of the state. (See figure 3.2.3).

3.3 Climatic Conditions

Kano state has ardous climate with relatively wide and rapid changes in temprature and humidity.

3.3.1 Humidity

Humidity at times can rise up to about 100% in Kano City, an area which is characteristically considered dry. For human comfort, the relative humidity (R.H.) is within the range of 30-70%. The importance of the R.H. to the designer is in terms of ventilation. An area that is characteristically humid for most part of the year, requires a high degree of cross-ventilation.

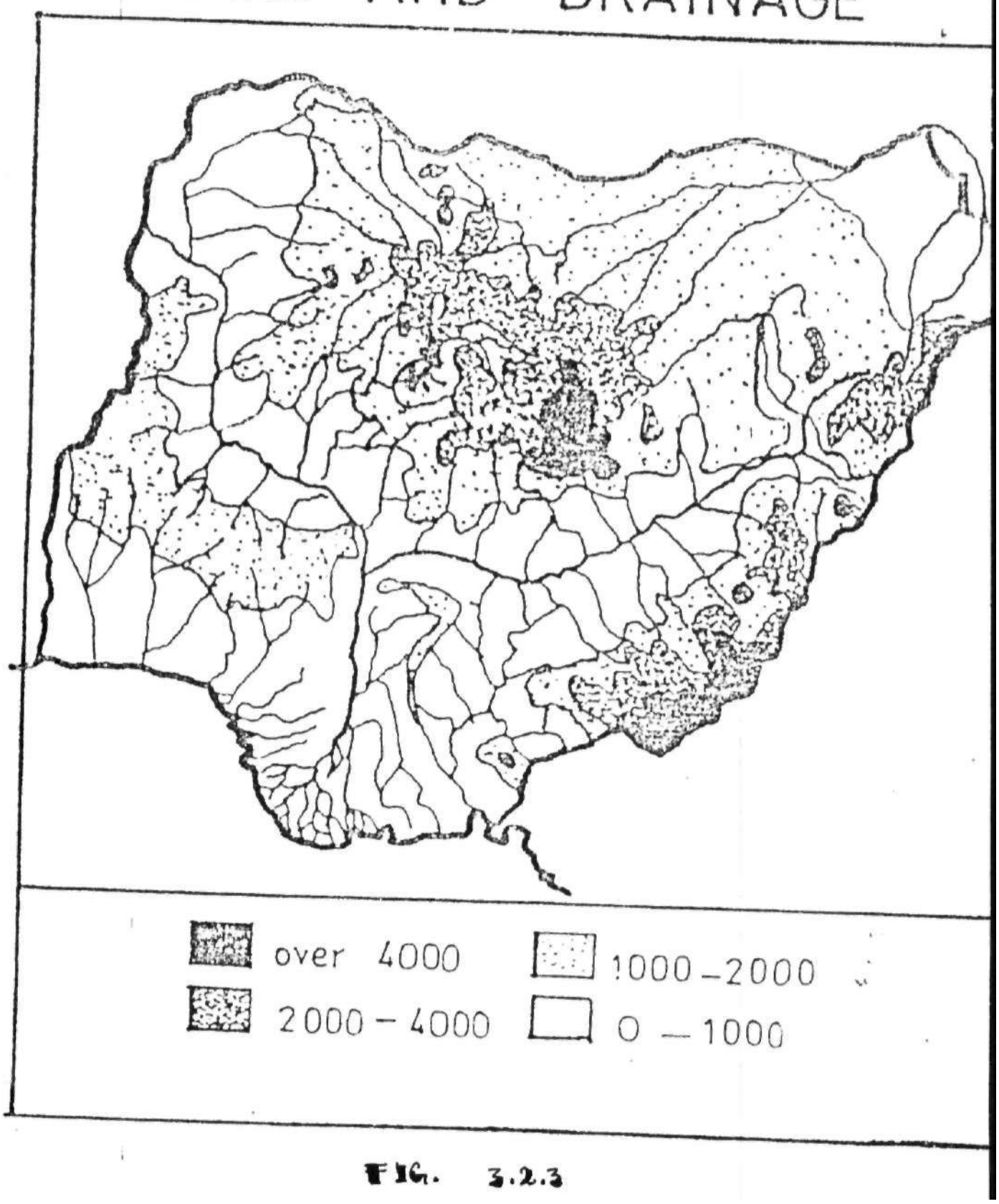


FIG. 3.2.3

For Kano City, the humidity is low for most part of the year, and the weather is refered to as mostly hot-dry. (See figure 3.3.1.).

The use of big open courtyards is essential in this type of weather as opposed to the use of double bunking in designs. This is particularly important in the design of hospitals where a lot of fresh air is needed by the patients to enhance their rate of recovery.

3.3.2. Temprature

The mean daily maximum and minimum tempratures are 33.1°C (91.6°F) and 15.85°C (60.6°F) respectively. The thermal comfort Zone for the people is 23 - 29°C. (See figure 3.3.2).

The importance of the temprature to the designer is mainly in the specification of the type of building materials to be used in the construction. This includes the type of roofing materials to cover the building. In a place like Kano, where the temprature rises above the thermal comfort Zone (29°C), there is need to use building materials whose degree of absorptivity of heat is low. This is particularly important in respect of the roofing materials used to cover a building.

3.3.3 Rainfall

In Kano State as in most parts of the areas within the tropical climatic Zone, the year is divided into two seasons; rainy and dry seasons.

RELATIVE HUMIDITY
FOR KANO CITY

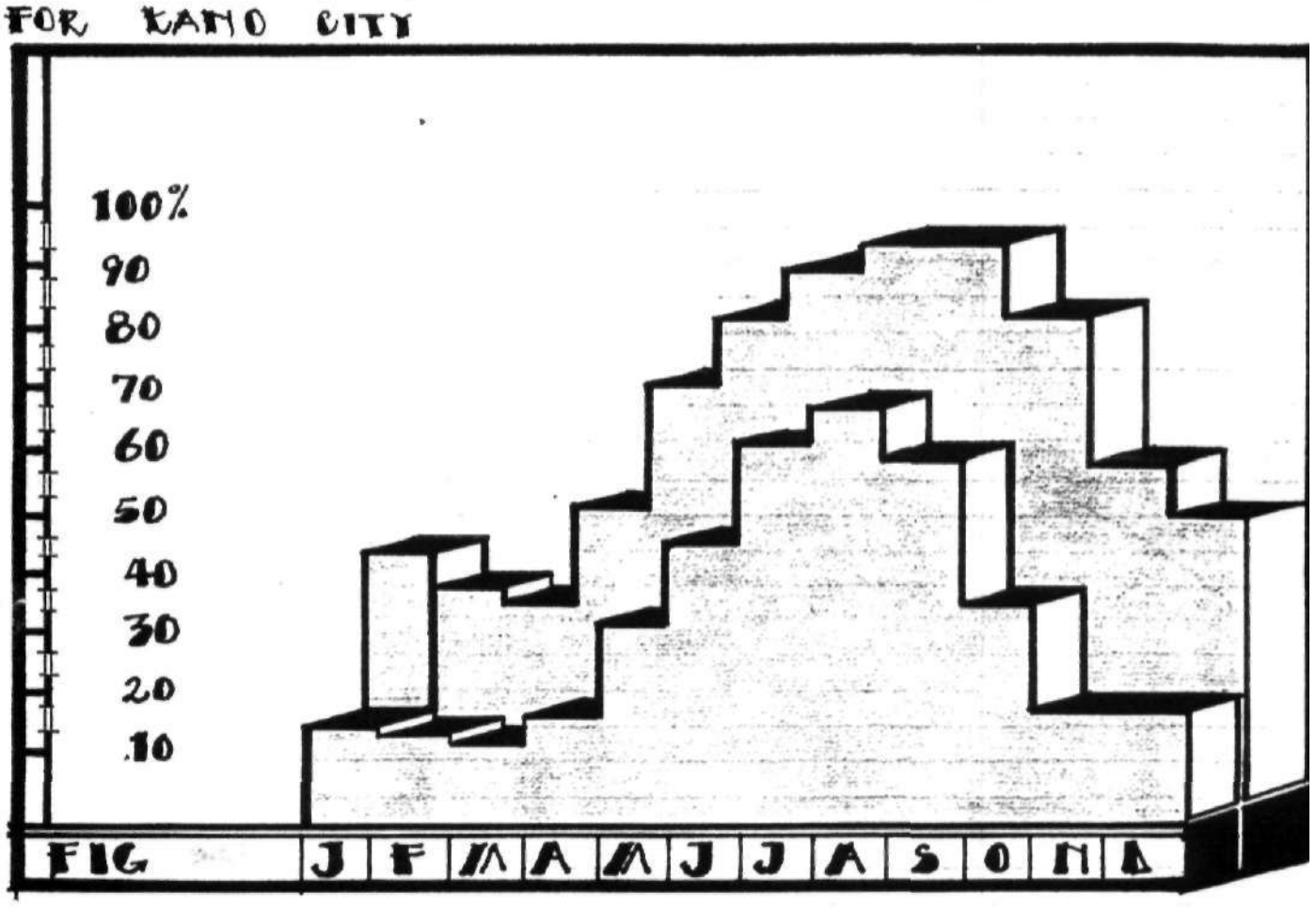


FIG. 3.3.1

TEMPRATURE RANGE
FOR KANO CITY

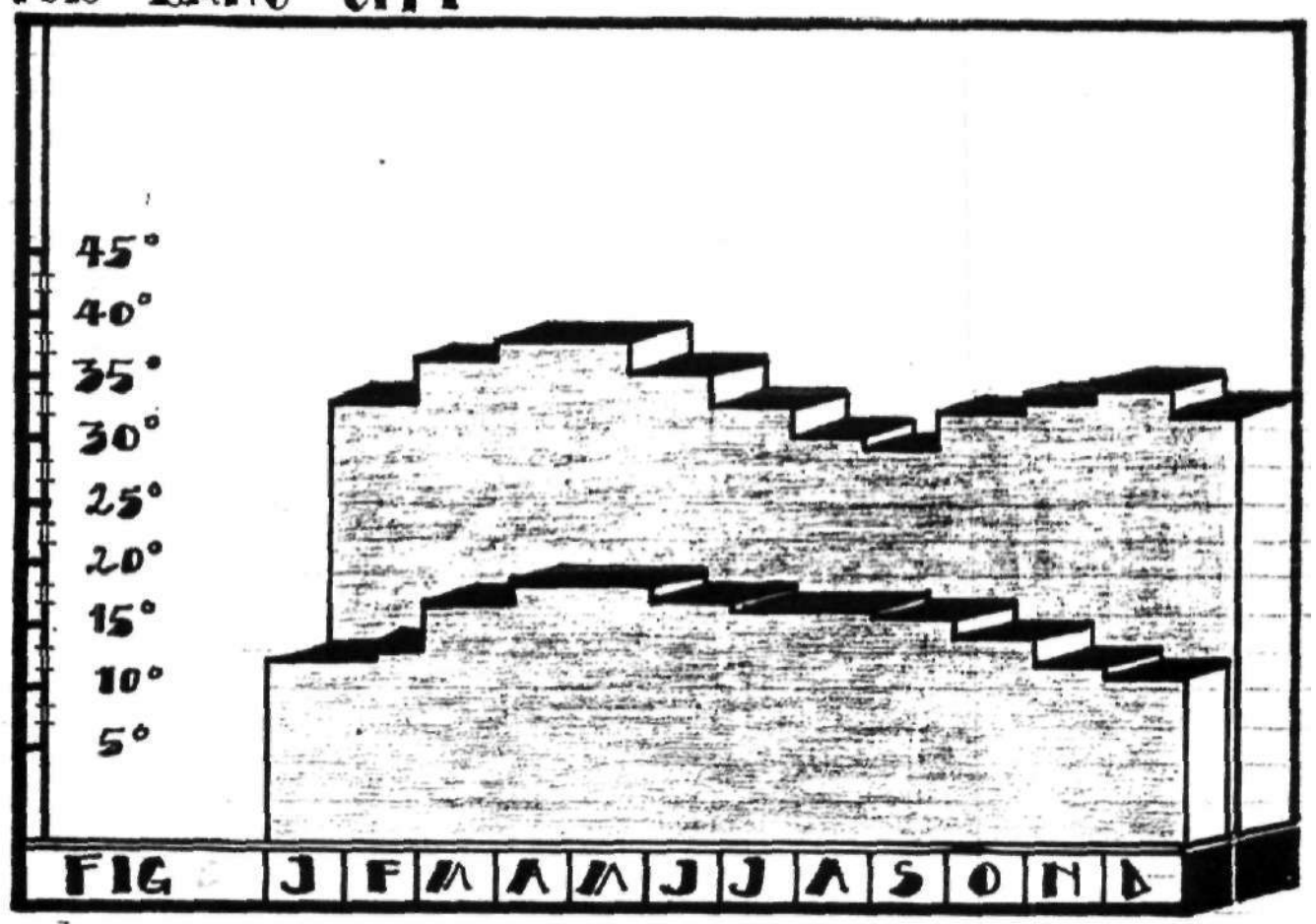


FIG. 3.3.2

The dry season lasts from October to May. During the months of December and January, the Harmattan is at its peak blowing thin dust over the state from the Sahara desert. At this time, the temprature can fall as low as 10°C (50°F). See figure 3.3.3).

The harmattan weather has another disadvantage in respect of health of the people. As the wind blows from the Sahara carrying a lot of dust partcles, air-borne bacterias are also spread which find their target mostly in the eyes of the people. It is noteworthy that, a particular type of eye disease known as 'Apollo' thrives more, during the Harmattan period.

From March to May, however, the dry cold air turns into dehumiditized searingly hot air with tempratures rising up to and above 32°C (90°F).

Rainfall is concentrated from June to September, and the rains are preceded by violent duststorms followed by tornadoes mainly during the month of May, and at the close of the rains in September and early October. The average annual rainfall is 870,2mm. About 58% of this falls in July and August. Rainfall, in the state, varies considerably from year to year ranging from 635.00-889.00 mm.

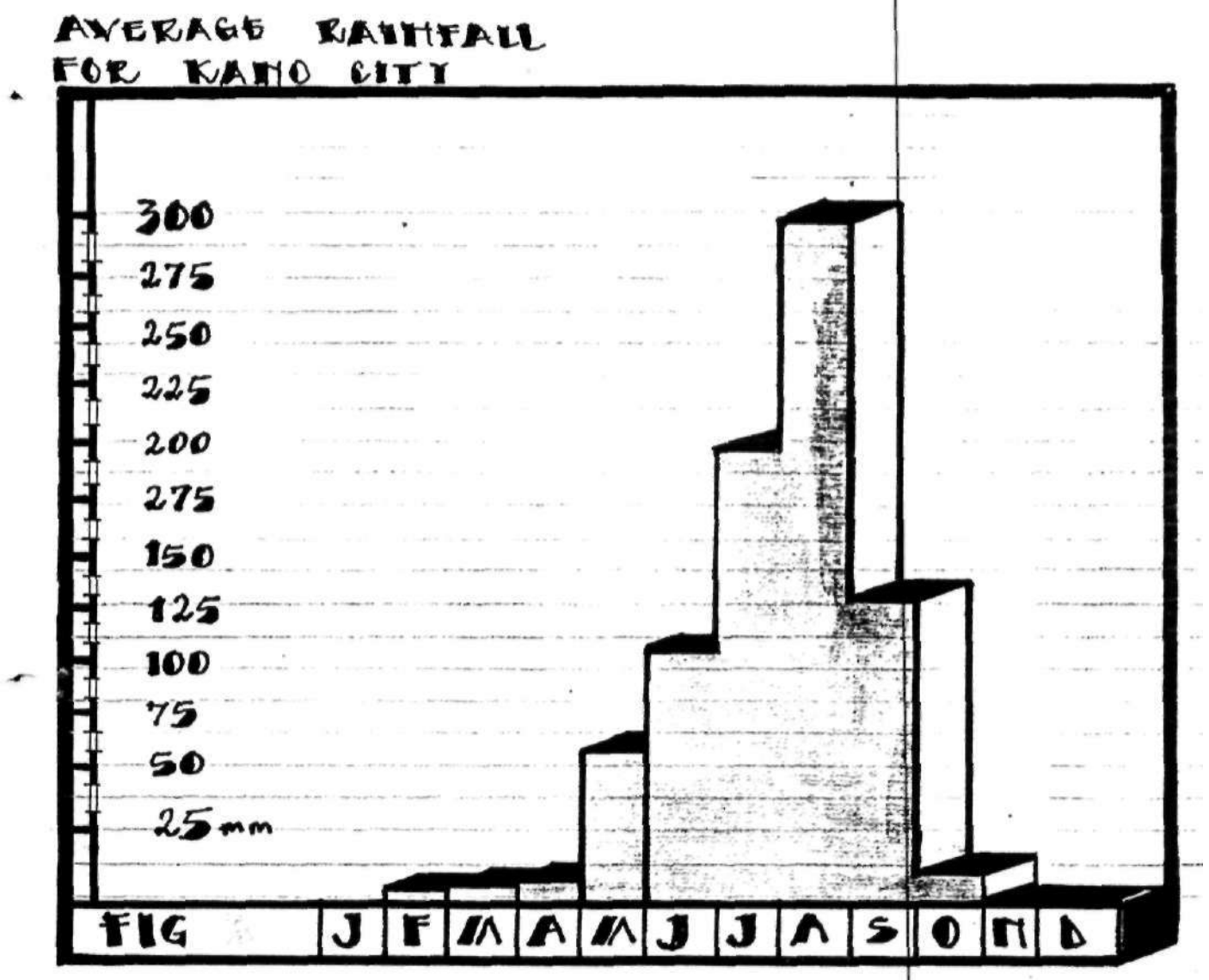

AVERAGE RAINFALL
FOR KANO CITY
300
275
250
225
200
275
150
125
100
75
50
25mm
FIG
J
F
M
A
M
J
J
A
S
O
N
D

FIG. 3.3.3

The knowledge of the amount of rainfall recieved on a site is important to the designer in view of the durability and maintenance of buildings. A building design that is constructed without paying due attention to the level of rainfall on a site run the risk of collapsing or developing serious structural defects, making the safety of the inhabitants of the building unsecured.

Another importance of the knowledge of the amount of rainfall on a site to the designer is in respect of the drainage. A poorly planned layout of a building can easily cause flooding during a heavy downpour. This could endanger the stability of buildings, since foundations, roofs and other vital components of a building are put in jeopardy.

3.4 Population Distribution and Culture

As the most populated state in Nigeria, Kano had a population density of 134 people per square kilomitre (Km^2), based on the 1963 official census figures, which put the population of the state at 5.77 million. The Federal Government's projections has predicted an estimated 8.91 million people by 1980. However, the commonly accepted figure for current use is 10 million people for the state. Although the rate in all other states of the federation had been put at 2.5% per annum,

that of Kano is placed at 5%, surpassing the 4% growth rate ascribed for Lagos state.

Within the state, the number of people per Km^2 varies, with local government areas near Kano City recording a density of some 400 persons per Km^2. In Kano City a density of 1,322 persons per Km^2 was projected for 1980 within the 550 Km^2. (See figure 3.4).

Kano is predominantly peopled by Hausa and Fulani ethnic groups whose history is closely linked with that of the region itself. During the last century, before the boundaries of the modern city was formed, the old city's population was bisected by the Jakara stream which runs from east to west, into sections of north and south. The south was mostly inhabited by the conquering Fulani, while the northern quarters, that form the bulk of the population, consisted of mainly Hausas. Other ethnic groups that inhabited the city since then were the Nupe, Kanuri and a good number of Arabs. At present, the ethnic differences between Hausa and Fulani are virtually non-existing, due to inter-marriages and cultural interminglings. The people of Kano therefore, refer to themselves as Hausa-Fulani, and the Hausa culture of the past has today been almost completely replaced by islamic traditions.

3.5 Existing Town Structure

The original settlement of Kano started around the Dala Hill, as stated earlier, with the formation of the market as the focus around which other land use developed. This pattern of development naturally generated the use of concentric pathways which later developed into roads within the city. This furthermore influenced the growth of Kano with the result, ring ring roads featured as the pattern of development. (S (See figure 3.1).

This trend of concentric development is characterised by uncontrolled growth in all directions around the ring roads, and the concentration of public services such as markets in the centre of the settlement. This, thus generates the problem of congestion of traffic and public services which proper town planning seeks to avoid.

3.5.1 Architecture

The architecture of Kano is highly influenced by cultural and climatic factors. On the cultural aspect, Kano being largely an Islamic City displays the pattern of design that is predominantly ascribed to the Islamic architecture. These include the use of arches and domes in public buildings, and the segregation of the residential houses into public, semi private and private Zones within the same building entity,

in conformity with the islamic injunction of privacy to the members of one's household. Some of the design features however, pre-dates the advent of Islam to the Hausa states. This include the use of circular and square forms in building designs.

On the climatic aspect the integration of the courtyard into the building designs in both public and residential buildings, is a factor that is largely brought about in response to the hot climate of the area. These courtyards in addition to serving as avenues to improve the microclimate of the settlements, are also used as alternative outdoor working and relaxation areas.

3.5.2 Building materials

The main building material for most of the traditional buildings is mud mixed with grasses to increase its shearing strength. For the roofs, Azara beams (branches of bamboo trees) are used along with the mud. The walls and the roofs are made very thick, 30-50 cm to be able to protect the inhabitants from the hot and chilly weather conditions of the area.

For the modern buildings, reinforced concrete (r.c.) hollow and sandcrete blocks are the main building materials.

For the roofs, r.c. slabs and the corrugated roofing sheets are the major types used.

The choice of a particular building material especially for the modern designs is governed mainly by its durability, degree of weather and fire resistance, cost and the techniques of its construction.

CHAPTER FOUR

PLANNING PRINCIPLES

A lot of literature exist, that discuss various planning principles and techniques, of the architecture of health care buildings. Most of these principles have a universal coverage but their application in the tropics have some limitations. This is because, most of the standard textbooks and journals on the architecture of health care buildings originate from Europe and the U.S.A., whose climatic conditions vary considerably with what obtains here in Africa, which falls within the tropical climatic Zone.

Hospital planning is described as "a sequence of definitive and creative actions beginning with recognition of the need and progressing to the completion of the project."[1] There are three main stages involved in hospital planning. These are: determination of the need, planning of the building and the construction. The planning itself involves two stages, as follows:

1. Functional planning, which determines what is required to meet the level of deficiency of health care needs in a particular area.
2. The architectural planning which is basically the translation of the functional plan into a building space, equipment and furnishings.

In the first case, among the factors to be considered include, the size of the population of the area to be served, geographical location, existing lines of communications and services, for easy accessibility and new trends in medicine. It is important that the first stage preceeds the second. "There is no more mistaken practice here than to start planning in physical terms, rather than develop the plans from principles, purposes and functions".[2]

In the second stage, which deals with the application of the functional plan into a building space, some important factors need to be taken into account. These include; the climatic conditions of the site, the type of building materials to be used, the cost and the technique of construction and the expected number of population to be served.

> It cannot be too strongly emphasised that a building is not an end in itself, since it is not designed as a feature of the landscape, and it is not a monument to the architect but a complex instrument to assist in the treatment of the sick. The building is not a hospital yet, until it is staffed and occupied by people.[3]

Hospitals consist basically of three departments. These are: the O.P.D., the in-patient care department and the supportive facilities department.

4.1 Out-Patient Department (O.P.D.)

The O.P.D. can be defined as "the department to which a patient can be refered for specialist consultation and for any investigation or treatment which dows not require his admission as an inpatient."[4]

Abdulkarim (1987) defined the O.P.D. as "the section of the hospital with alloted physical facilities, regularly scheduled hours and personnel in sufficient numbers assigned for the established hours to provide for care of patients who are not registered as in-patients, recieving dentist or allied services".

Considering the hospital as a single entity, there should be close relationship between the O.P.D. and the other hospital units like the wards. In this respect, the O.P.D. is viewed as an integral part of the hospital. Within the O.P.D. itself, there are various functions. These include the consulting suite and the treatment suite.

"There are broadly two ways in which the O.P.D. can be planned. All the various clinics can either be grouped together in a centralized department or they can be provided separately each in association with their corresponding wards-so-called linked departments".[5] The choice of any of the above two is governed by the amount of space available on the site and the degree of flexibility required. Of the two methods discussed above, the centrilized type of planning seems to be more flexible in terms of organisation.

The O.P.D., in a hospital setting, offers services that include the following:

- keeping patient out of bed by diagnosis of ailments and effecting a cure at an early stage,
- it is used for follow up treatment after discharge from the hospital,
- and handles public enlightenment campaigns on preventive aspects.

"In general, the O.P.D. should be located in such a way that it is easily and directly accessible to the patients. It is very necessary to define clear staff and patients circulation for easy accessibility of the patient and also for the efficiency of the staff".[6]

In an eye hospital, the O.P.D. consists basically of the following:

1. the consulting clinics and
2. the adjunct diagnostic and treatment facilities.

4.1.1 The consulting clinics

The following functions are included in the O.P.D. of an eye hospital:

a) records office, (b) records store, (c)main - waiting hall, (d) consulting rooms, (e) optical-display room, (f) optical store, (g) optical-workshop, (h) lecture rooms,(i) treatment room, j) staff rest room, (k) toilets for the staff and patients.

The Records Office

This should be large enough to contain the notes of all patients who are registered as attenders. It must be possible to obtain cards from here at any time of the day or night. Counters or reception windows should be conveniently located as to facilitate easy accessibility to the patients, so that they can collect their cards and confirm their return appointments without delay.

The records store

This is where the cards are stored so as to keep records of the patients attending the hospital and to help the statistics department of the hospital in preparing periodic reports on the hospital attenders. The records store room should be located close to the records office and may not necessarily be accessible to the public.

Main waiting hall

This should be large enough to accomodate all the patients who are expected to come to the hospital. There is no any standard criteria to determine a particular size of the main waiting hall. It is usually determined through estimation of the expected number of people that the hospital is going to serve, and its speciality, that is, whether it is a general to or a specialist hospital.

Consultin rooms

This is where the patients are diagnised by the doctors. The consulting rooms are the patients first contact with the processes of diagnosis and theraphy. Hence, it is desired that it should be located close to the card room where the patient is given an appointment to proceed and see the doctor.

In an eye hospital, the following categories of consulting rooms exist. These are:

1. The dark rooms: These are specially designed consulting rooms for diagnising eye patients. The dark rooms are painted black in the interior and are designed such that a minimum amount of natural light is allowed into the interior. However, windows are provided to effect a cross ventilation. They are to be located in close proximity to the card room and the other consulting rooms.

2. Orthoptic room: This is another consulting room dealing with patients suffering from muscle imbalances of the eye, otherwise known as squint. It is also located in relation to the other consulting rooms.

3. Optometrist's room: This is where patients with defects of vision are diagnised. The optometrists are not medical doctors. They can prescribe glasses or contact lenses but they cannot treat eye diseases.

4. Optician's room: This is located close to the optometrist's room. It is where the specialist who makes glasses in accordance with a doctor's prescription stays.

All the consulting rooms should be a minimum of six metre long.

Optical display room

This is where the glasses and frames are sold to the public. It should be located close to the optician's room who prescribe the glasses, and the optical workshop where the glasses are made. Provisions are to be made for a display counter, receptionist and the cashier's tables within the room.

Optical store

This is where the glasses are kept prior to displaying them on the counters for sale to the public. It is located close to the optical display room and the optical workshop.

Optical workshop

This is a technical room where the glasses are made. Cutting of the lenses to various shapes with different focal lengths also take place here. It may not necessarily be accessible to the public, but should be located close to the other optical services rooms discussed earlier.

It is a purely technical room and may not require interference from non-staff of the unit. A small store is provided close to it, to keep some of the finished glasses before they are being transfered to the optical store or the display room.

Lecture rooms

This is strictly for the staff of the hospital and should be located away from the patients circulation area, to avoid unnecessary noise and congestion. It is where some tutorials and demonstrations are conducted to keep the staff of the hospital abreast with the recent trends in modern medicine. It should be equipped with some instruments for the above purpose. Provision should be made for a bigger public enlightenment lecture hall located close to the staff lecture rooms.

Treatment room

This is where the patients are treated after being diagnised by the doctors, and some prescriptions are made in respect of their ailments. It is located closer to the pharmacy department for drugs and sterile supplies. It should contain clean and dirty utility areas.

Mukhtar (1987) states that:

> The National Health Service defines a laboratory as a place where "investigations are carried out in a routine manner to assist in the establishment of a diagnosis or to esses progress to control theraphy, secondly it is a place where tests can be performed to detect the spread of epidemic disease, particularly cross infection in a hospital, and thirdly, it provides an area where investigations of a reserch nature can be carried out, bearing in mind such investigation frequently becomes the routine tests of tomorrow".

The climical laboratory as pointed out earlier, is a big department comprising of various subdivisions. However, in a 180-Bed eye hospital, these different units can be grouped into a single laboratory with a few clinical assistants and a pathologist supervision.

Location of the laboratory

The location of the laboratory in relation to the other departments in a hospital is determined by some factors which are relevant to the functions of the laboratory in relation to the hospital as a unit entity.

The laboratory is suitably located such that it is accessible to most of the parts of the hospital, because of the services it offers to most of the departments within the hospital. It should preferably be located within the O.P.D., because, some out-patients attend only the laboratory at a particular time.

The laboratory analyses different speciments like blood, urine and stool. These are submitted in person by patients to either the pathologist, technicians or nurses. In case of in-patients or those undergoing surgical operations, their specimens are delivered to the laboratory by the nurses.

Administrative area

This is normally separated from the technical area or the main laboratory section where the analysis take place. This is the main collection point of specimens and hence provision should be made for a receptionist counter to attend to incoming specimens from the staff and the patients. A waiting space should also be provided for the ambulant and the out-patients to take their turn in submitting the specimens and to provide any relevant information helpful to the laboratory personnel.

Radiology

This department ranks with the clinical laboratories as a prime diagnostic aid and also offers radiation theraphy. The essential function of the diagnostic portion is to take shadow pictures of vital parts of the human body. (See figure 4.1.2.)

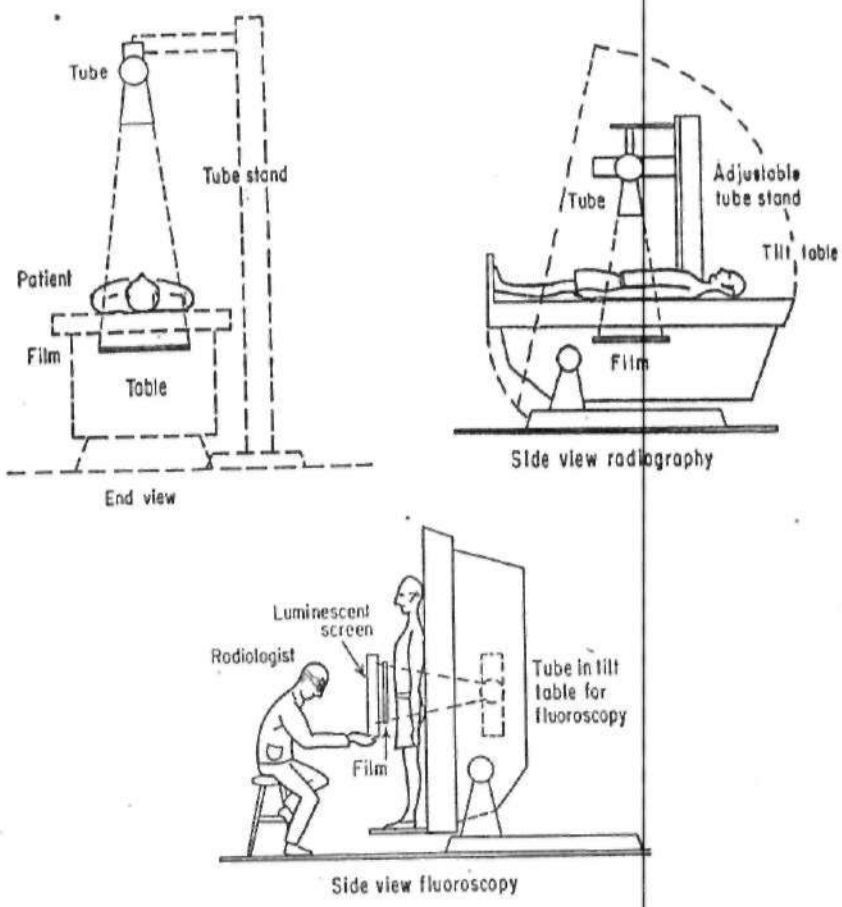


Fig 4.1.2 Diagnostic radiology.

The unit is planned such that provisions are made for the reception room together with a waiting area for ambulant patients and a trolley stand for the in-patients. The records area handles the clerical work, records keeping and film storage. The radio-diagnostic rooms contain the X-ray and fluoroscopic machines, film viewing room and the radiologist's room.

The number of radiographic rooms are determined, by taking into consideration the following factors:

- the total number of beds in the hospital,
- the estimated number of out-patients attending the X-ray unit,
- the speciality of the hospital. This is particularly important in view of the fact that, an othopaedic hospital for instance would require more X-ray services to the patients than an eye hospital.

Special precautions are essential particularly with X-ray machines to minimise the risks of irradiation to which the staff of the unit are exposed. The control to the X-ray tube are operated from behind a protective screen. The tube is normally capable of pointing vertically downwards or horizontally, as shown in figure 4.1.2.

The layout of the room depends partly on the equipment but basically, the tube should never point towards the control unit,

a door or the dark room if it is adjacent to the X-ray room.

The location of the department should be convenient for trolley access from the wards and at the same time close to the O.P.D.

Phamaceutical suite

The phamacy unit which is an important and at times indispensable to the doctor's care of the patients usually consists of the following:

- dispensing area with wash-hand facilities, editing or order review area,
- sterile products area,
- administration,
- storage area.

Functions

The essential functions of the phamacy department are:

(i) dispensing
(ii) compounding
(iii) manufacturing. This is usually done in bigger hospitals.

The pharmacy department serves the whole hospital. It stores pharmaceutical products brought to the hospital, such as drugs and dressings. In case of larger hospitals, some sterile and non-sterile products are manufactured in bulk and in addition, prescriptions are dispensed, sometimes direct to the out-patients. It supplies all wards and other departments, often on the basis of daily deliveries. For small hospitals, manufacture and dispensing may be done at a larger centre elsewhere and hence, the functions of the department may be restricted to storage and distribution.

For reasons of safety and security, manufactured goods are sometimes recieved direct by the department rather than via the hospital's main stores. The basic work flow in the department is as follows:

- reception of goods,
- unpacking and docking,
- storage.

The storage is usually in either a dressing store or drugs store, before dispensing and distribution. The reception point needs ample provision for disposable packaging and returnable empties.

Care has to be taken while handling some of the drugs and chemicals, as some are poisonous.

while others are inflammable and hence susceptible to explosion when ignited by either naked flame or electric spark. For this reasons, special precautionary measure are necessary to forestall any of the above accidents. In some cases, refrigerators are needed to store the drugs.

From the store, drugs pass to the dispensing section either directly or via a bulk preparation room. In the dispensary the bulk supply is broken down into required quantities, and distributed to the hospital or the out-patients. A waiting space is required here suitably located, close to the entrance, so that patients could easily pass out of the hospital building immidiately after collecting the drugs. It is usually located in the department closer to an access road for easy delivery.

4.2 In-Patient Care Division

4.2.1 Operation theatre suite

The operating theatre otherwise known as the surgical suite is a major component of the hospital. The basic requirements for the design of a surgical suite are as follows:

1. The surgical suite should be located in such a way that minimum amount of disturbance like through traffic is allowed through it. That is, it should be located in isolation to the rest of the hospital.

2. It should be located in close proximity to the accident and emergency department (A.E.D.). This is to facilitate easy transfer of accident or emergency patients to the operating threatre room.

3. It should be located close to the adjunct diagnostic facilities like X-ray department. In some cases particularly in larger hospitals, mobile X-ray facilities are provided within or close to the surgical suite, if the X-ray department happens to be far away.

It is desirable to have the pathology department close to the operating theatre suite, in case of emergency blood transfusion.

The surgical suite basically consists of the following functions; (a) operating theatre rooms, (b) anaesthesic room, (c) sterilizing room, (d) recovery room, (e) clean up room, (f) scrub-up room, (g) changing rooms.

Operation theatre rooms: These could be arranged in pairs with the two theatre rooms sharing common facilities. In some cases, the rooms could be planned independent of each other, with each room having its own facilities.

The choice of any of the above arrangements is determined by:-

- the size of the hospital,
- the expected workload in the O.P.D. and the nursing unit,
- the type of hospital speciality, that is, whether it is a general or specialist hospital.

However, the conventional way in a small hospital like an eye hospital in Nigeria is to have two operation theatre rooms, designated as major and minor theatres.

Within the theatre rooms, sufficient space is required for the operating table, instrument and dressing tables, anaesthesia apparatus stand, basin stands, stools, sponge rack, drum stand and container for soiled dressings.

Provisions should be made for sufficient artificial source of light, irrespective of the adequacy or otherwise of natural light in the theatre rooms. The wall areas in the room should have glazed tiles to a minimum height of about 1.5m.

Anaesthesia room: This is located close to the major operation theatre room, and it is the room where patients are anaesthesized before being moved to the theatre room. The following provisions should be made in the design of the room as a safety measure:

- precautionary measure to be made against gas leakage or explosion hazards in all areas where anaesthetic gases are used or stored and in adjacent corridors,
- a special fire proof room is required to store such inflammable gas as ether and other anaesthetic equipments,
- adequate ventilation is required in this room, In addition, explosion proof switches and equipments, including conductive flooring, are also required.

Sterilizing room: All the instruments used in the theatre rooms are sterilized here. Hence it should be located very close to the theatre rooms. A single sterilizing room is sufficient when the two theatre rooms are sharing facilities but in case of major and minor operation rooms, that is, two different theatre rooms, each should have its own sterilizing room.

The room should be large enough to accomodate the sterilizing instruments.

Recovery room: The recovery room is located very close to the major theatre room and serves the following functions in the surgical suite:

- facilitates prompt post-operative care and treatment of patients, before they are transfered to the wards,
- afford doctors the opportunity to closely observe the progress of the patient post-operatively.

The number of patients to be accomodated is determined by the number, type and duration of surgical operations performed. The recovery room should be planned such that patients could be observed simultaneously. An open ward type, with curtains to afford privacy when needed, has been found satisfactory. An area separated by a glass partition large enough to accommodate at least one patient is recommended. Sufficient area should be allowed to permit space for bulky equipments and to afford access of personnel on all sides of the bed.

Provision should be made for hot and cold water supplies, wash-hand basin and cleaning equipment. Conductive floors are not required here since inflammable anaesthetic gases are not used in the room. Acoustical treatment of the unit is important. Entrance door should be wide enough to allow for the passage of a stretcher, trolley, and other special apparatus.

Oxygen supply into the room for the use of the patients should be made, either through a hospital central supply system or using portable supply system.

Clean-up room: A clean-up room is desirable but not essential. One clean-up room for the whole surgical suite is sufficient. It is located close to the operation rooms. Furnishings include service sink, work counter, a small cabinet below counter for storage of cleaning materials, a double compartment, deep sink with drain-boards and a bulletin board.

Scrub-up room: This room is equipped with antibacterial facilities and located close to the entrance to the operation rooms. Doctors and nurses entering the operation rooms must pass through here and clean their hands as a precautionary measure against the spread of possible viral or bacterial infection into the operation rooms. Glass view windows between the scrub-up sink area and operating rooms are desirable.

Changing room: This is located close to the scrub-up room and it is where the surgeons, doctors and nurses change their shoes and gowns, before entering the major operation room. In case of the eye hospital and other smaller hosptals, the scrub-up and the changing rooms are required close to the major operation theatre only.

4.2.2 The nursing unit

This is where the patients are accomodated while undergoing intensive medical care in hospitals. The in-patients stay here from the moment they are admitted into a hospital, up to the time of their discharge.

It is the unit that determines the size of a hospital in terms of the number of patients a hospital can be able to cater for at a particular time. When patients are admitted into hospitals, they experience feelings of confinement. This is because, unlike in their respective houses where they feel free to do all their activities themselves, patients admitted to hospital nursing units find themselves under some restrictions, within the hospital environment. Hence it is important that the environment within the wards should be relaxing and comfortable to make the patients feel at home.

Some basic considerations for the design of a hospital ward are given below:

1. Medical needs

   (i) Sufficient space to examine and test a patient within a conducive hospital environment.

   (ii) adequate facilities for the treatment and comfort of the patients,

   (iii) easy passage and accessibility of essential services required in a hospital.

2. Nursing needs

   - there is need for easy supervision and observation of the patients from the nursing station,
   - availability of facilities to locate doctors on duty and other medical personnel in case of emergency.

3. Patient needs

(i) there is need for closer communication with the nuses on duty,

(ii) to have privacy during medical and nursing care in a hospital,

(iii) availability of washing and sterilizing facilities within or close to the ward,

(iv) ability to have a change of environment particularly for ambulant patients, in order to overcome monotony and boredome, due to staying in one place for long time,

(v) ability to see friends and relations during visiting periods. Here provisions should be for visitors waiting space.

General planning considerations

To achieve a successful nursing unit design, the following factors are to be considered:

1. the position of the nursing unit in relation to the other departments within the hospital,
2. orientation of the unit with respect to the prevailing wind direction, sunshine and externally generated noise,
3. the accessibility of the ward in relation to the outer space, which is important in case of emergency,

4. the main entrance should be clearly identifiable, with acutely ill patients located near the entrance,
5. the nursing division should be broken down into emaller units, to make it easier fer effective supervision of the patients. Experts recommend a total of 30-45 or even less number of patients in a werd. In case there are more than one floor in a nursing division, the given figures apply to a single floor only. The size of a nursing unit should be such that, the maximum travel distance for a nurse from the nursing station to the patients ward should not exceed 50 m, irrepective of the plan shape. The optimum distance from the nursing station to the patients room should be 25.5 m, to reduce the travel distance and hence increase the efficiency of the staff,
6. the type of corridor layout that may suit the hospital services. There are various types of corridor layouts. The choice of any one of them, depends upon its suitability to a particular hospital. The following are the corridor layout types.
   - single loaded corridor,
   - double " "
   - triple corridor
   - circular Corridor.

In the single loaded type, cross ventilation is achieved but its problem is that, it lengthens the ward.

The double loaded on the other hand, shortens the circulation distance but ventilation is not easily achieved. The triple corridor allows for the separation of staff and nurses routes but has the disadvantage of creating ventilation problem since the number of beds increase. In case of the circular corrider, the nursing station can be located centrally, but its problems include cost and lack of adequate ventilation due to increase in the number of beds.

Design components of the nursing unit

There are basically two types of ward designs in a nursing division. These are:

(i) the open ward or Nightingale's ward

(ii) the room ward or Nuffield ward.

In case of the first type, the following advantages could be pointed out:

- adequate light and ventilation can be obtained,
- provides for easy visual supervision of the patients by the nurses on duty, as the nurses station is located in the centre of the open ward,
- less difficult in terms of construction and hence, cheaper to utilize,
- provides comfort to the patient for not being isolated. Its limitations however, includes;

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(a) uncontrollable amount of noise in the ward,

(b) difficulty in controlling temprature and other climatic elements into the ward, (c) encourages cross infection of diseases within the ward,

(d) gives no privacy to the patients within the ward.

The room ward or Nuffield type has the following advantages:

- noise level is kept to a minimum,
- privacy exists, due to small number of people,
- cross infection is reduced,
- the nurses walking distance is substantially reduced.

The disadvantages of the room ward includes:

(i) cost more in terms of construction and maintenance,

(ii) service rooms may be inadequate, with limited amount of light and ventilation.

The patient bedrooms: This is were the patients stay for for the duration of his treatment in the hospital. It is a place that serves many purposes and hence, should be flexible in the approach of its design. Its main purposes include; treatment, resting, and so on.

Bedroom size: This is determined by the number of beds and other facilities in the room. In an attempt to achieve some measure of privacy in the ward, limited number of beds are proposed in the rooms, within a particular ward.

It also serves as a visitors control point as well as recieving and handling patients mails and other messages. It should be centrally located with considerations for its distance to the patients beds.

Its size depends on the number of beds in each room, the nature of the disease and the type of medication a patient gets, that is, whether medical, surgical or emergency patient.

Medication room: This is an important component of the wards because, it is here that medications are prepared and also acts as the sluice room. It is usually a small room with shelves for keeping medications and a worktop for preparing them prior to administering.

Sisters office: This is the head nurse's office, who acts as the head of the unit. Her functions are to supervise the nurses and the patients welfare. In some cases it also serves as the nurses conference room. Hence it should be located close to the nurses common room.

Examination and treatment room: This is where the patients are treated within the ward. This happens, when the patients cannot be treated on the bed side. It is estimated that a single treatment room can serve between 55-70 beds.

Utility room: A single room could be partitioned by either a partition wall or by cabinets which may not necessarily be full height, to act as the clean and soiled utilities room. Soiled linens and rubbish carts are stored on the soiled part of the room while clean linens and other supplies except food and drugs are kept on the clean side.

It is located close to the patients rooms and may not necessarily be attached to the bedrooms.

Pantry: This is where food brought from the kitchen is kept prior to distribution to the idividual patients. It serves as a mini kitchen, as well as the storage room of some of the kitchen utensils like dishes, plates and so on.

Toilets and bathrooms: These should be provided to each bedroom. They should be equipped with all facilities, like a water closet (W.C.), a shower and wash hand basin. The U.S.A. Public Health Service recommends one toilet and one shower for every four patients. Each shower room should be a minimum of 1.4m^2. Special attention should be given to providing hand rails and grab bars as aids to the faltering patients.

4.3 Service Departments

These departments like the adjunct diagnostic and treatment facilities, give secondary service to the patients.

These services are no less essential than the professional departments, discussed earlier, but they are usually considered separately because little of their activity involves medical supervision.

In general, these departments have a close relationship with the services of supply, embracing most of the heavy operations in processing and storing goods, and sometimes in delivering goods to the patient areas. Thus, in planning them, the flow of bulk goods such as food, linen, supplies, and equipment should be given thoughtful study. The service departments include the following.

- Kitchen (Dietry)
- Laundry
- Central sterile supply department (C.S.S.D.)
- Central general stores
- Maintenance and generator
- Mortuary.

4.3.1. Dietry

This department prepares and serves meal to the in-patients and the employees of a hospital. In some cases some out-patients are also being served depending upon the policy of a hospital.

The functional elements of food service include procurement, preparation, distribution and disposal, procurement is from the central general stores, preparation in the kitchen while distribution is effected through the nursing units and the staff canteen.

Distribution is probably the most controversial question in food services. The important consideration here is planning how best the food can be transported from the kitchen to the patients. The objective here is to serve palatable food, that is hot foods hot, cold foods cold, moist ones moist, dry ones dry, all of them attractive, flavoursome, colourful, crisp and economical. There are three ways of food distribution in hospitals as follows:

1. <u>The central tray service</u>

In this case, the food is distributed in dishes and plates, and are conveyed, to the individual patients on trays. The plates and the trays are then returned to the main kitchen for washing to make them ready for the next meal. Its advantages include:

- it increases the risk of serving cold food to the patients due to a long transportation distance to be covered after serving.

2. The decentralised service

Here hot food is directly sent from the main kitchen in bulk to the ward kitchen where it is served into plates and on trays to the individual patients. After meals, trays and plates are assembled and cleaned in the ward kitchen, before they are finally returned to the main kitchen, where they are stored for the next meal.

Its major advantage is that, is reduces the transportation time of the food after serving. Its disadvantages however includes:

- Longer total time of serving
- according to dieticians, three stage process of serving makes the food less palatable,
- poor utilisation of staff.

3. Bedside food service

This method uses the ward pantry for making up the plates. The empty plates are wheeled out and distributed among the patients. The food is brought in bulk, in insulated food cast from the main kitchen and served into the plates in front of the patients. This gives the patient an opportunity to select the kind of food he/she wants and the quantity desired.

Location

The main kitchen should be sited close to its source of supply and the area it serves. These areas are; the nursing units, the staff canteen and the central general stores. This is to facilitate an efficient working

condition and reduce the amount of fatigue for the staff of the unit. It should also be accessible from the service route to effect an easy supply of bulky equipments and foodstuffs.

Design components

These include the following functions:

(i) Kitchen stores for storing of foodstuffs and equipment;
- cold store for meat and fish
- vegetable cold store
- equipment store
- general store

(ii) preparation area for meat and fish, vegetables and special diets,
(iii) cooking and service area,
(iv) food trolleys washing and parking
(v) general wash up space
(vi) staff facilities;
- catering officers office
- dieticians office
- changing rooms
- toilets
- staff rest room

Size

"The number of meals to be served by the kitchen at any one time is the main determinant of the size of the kitchen. The United States Public Health Service recommends 144 m^2 for a 50 bed hospital, 233m^2 for 100 bed and 335m^2 for a 200 bed hospitals."[7]

4.3.2 Laundry

This is where the soiled linen cleaning takes place. It consists of eight major steps: collecting, sorting, washing, extracting, drying or ironing, folding, storing and distribution. Some take a side trip before storing, that is to be mended or discarded after inspection and some to the C.S.S.D., for sterilization.

The laundry consists of the following functions:

- collection and sorting place
- office space for supervisor and clerks,
- main washing area
- mending room
- dry work area for pressing and folding
- clean linen store
- general store
- distribution area.

The laundry is broadly divided into two main functional units. These are:

1. Dirty work area; this is where dirty items are collected and sorted out. A number of sorting compartments are needed here depending on the type of linen handled. The linen are then taken to the washing machines.

2. Clean work area; the washed materials are extracted from the washing machines and dried. Those requiring mending are passed to the tailors while those that require sterilization are sent to the C.S.S.D.

The rest are ironed, folded and stores for distribution.

Location

It is required that the laundry be sited close to the C.S.S.D., the central general stores and all the other hospital departments particularly the nursing units.

4.3.3 Central sterile supply department (C.S.S.D)

The roleofthis department is essential to the hospital services. It used to be part of the surgical suite but recent trends in health care services grouped it with the other service departments to establish control of the distribution of goods.

Hospitals consume a large quantity of new materials that need sterilization before use. It also processes other materials that has to be cleaned and sterilized before they can be used again.

Among the functions of the department include; recieving clean materials from a laundry and new materials from manufacturers and suppliers. Sterilizing of some soiled linen sent from the nursing units, are also undertaken here. It also acts as the main sterile store of the hospital. It also recieves, for re-use, dirty articles from within the hospital.

Location

In view of the fact that the services of the C.S.S.D are required by almost all the departments in a hospital, like the nursing units, the surgical suite, the accident and emergency, as well as the O.P.D., it is logical that it should be centrally located with respect to these departments. This is to minimise the circulation distance and hence improve upon the eficiency of the staff.

Size

One of the ways to estimate the size of the C.S.S.D. is to use the gross floor area units as a guide.

Mukhtar (1987) observed the following:

> The 'desirable area per bed of the C.S.S.D may vary from 0.63 m^2 (7 sq.ft) to 0.90m^2 (10 sq.ft) per bed depending upon the size of the hospital.' This gives a range of 90m^2 (1000 sq. ft) for a 100 bed hospital and 315m^2 (3500 sq.ft) for a 500 bed hospital. The American Sterile Company recommends the following dimensions of the total area;
> (i) workroom - 20%
> (ii) sterile store - 11%
> (iii) bulk store - 12%
> (iv) syringes and lust room - 30%.

Design considerations

1. flow of items is of utmost importance in this department
2. segregation of contaminated articles from sterilised ones is also important.

3. The supervisor's office should overlook the entire unit for effective supervision.

4.3.4 Central general stores

In a hospital, the main department that deals with the handling of goods is the central general stores (C.G.S.) It is here that the tasks of recieving, storing repair, inventory and distribution are carried out.

> The clerk incharge of C.G.S., is responsible for all goods from their reciept to the point of distribution, but after he has issued them, the goods become the responsibility of the department to which they are issued. As the hospital grows in size, C.G.S. becomes more the distribution and collection agency for sterile goods, special equipment, linens, and even drugs.[8]

The C.G.S. consists of the following main stores:

- phamacy main store with separate volatile store
- bulk food store for non-perishable foods
- funiture store
- equipment store.

Apart from the stores, other facilities are also included in the C.G.S. These are as follows:

- offices for clerks and supervisors
- recieving room with counters
- workspace for finished out-going goods.

Location

The C.G.S. should be located in a separate wing within a hospital away from the wards, because of the fact that some of the goods stored may have some affinity to fire, and hence poses a threat to the patients. It should also be away from the hospital kitchen for the same reasons. However, there should be easy accessibility and preferably less circulation distances from the C.G.S. to the other hospital departments, and the service road for the delivery of fresh supplies.

4.3.5 Housekeeping

Like in hotels or domitories, the standard of cleanliness in hospitals is supposed to be exceptionally high. This is in view of the fact that cleanliness prevents the spread of diseases.

The housekeeping department is charged with the duty of cleaning, "may make up the rooms if this is not done by nursing, gives maid service generally, and handles all the linen. It may or may not be responsible for the laundering."

The department is made up of basically two main functions. These are: the janitors and the refuse disposal.

Janitors: These are the people that perform the sweeping and mopping of floors in hospitals. Provisions should be made on each floor for at least one janitor's closet for the storage of the mop truck and fitted with a mopping sink.

Refuse disposal: This is also part of the functions of the housekeeping department. The job of collecting and disposing of the refuse is undertaken by maids who empties the waste receptacle into a can mounted on trucks operating on wheels. These are later emptied into a central disposal point where it is burnt or baled.

4.3.6. Maintenance and generater room

Irrespective of the size of a hospital, provisions m must be made for a number of offices, machinery, equipment, supplies and men necessary to keep the building in good functional and structural conditions. All repair works are handled by this department.

The works handled by this department are similar to the ones undertaken by the housekeeping department. The functions of the former are in fact an advancement over those of the latter. Table 12 gives a functional programme of activities and the amount of labour required, in a hospital.

	100 beds	200 beds
Chief engineer	1	1
Carpenters	-	1
Painters	1	2
Pipe fitters	1	1
Electricians	1	1
Masons	-	-
Labourers	2	3
Grounds men	1	2
Power plant men	3	3
Telephone operators	4	4
Watchmen	-	2
Ambulance drivers	-	-
Total	14	20

Table 11: Functional programme: Maintenance and operation.[10]

4.4 Fire Protection in Hospitals

The predominant fire risk in hospitals is to human life. In case of hospitals, the situation becomes complex in the sense that, the patients may not be able to save themselves from the fire. For this reason, it is essential in the design of hospitals, to make adequate provisions for easy evacuation of, particularly the non-ambulant patients from the buildings, in case of fire outbreaks. In this respect, "the staff and the firemen may have to make several journeys. Consequently, the time required to get all patients to safety is very much longer than for able-bodied persons.

The hospital has a severe handicap compared with other types of buildings in this race against time."[11] Hence, particular emphasis should be on preventing outbreaks of fire. This is ensured basically by safe storage and handling of combustibles and the proper installation and maintenance of equipments. It is equally important to ensure that any outbreak can be quickly detected and attacked at once, with first-aid extinguishing appliances, of which there must be both adequate provision and maintenance, together with training of staff in their use. At the same time, there must be efficient arrangements for summoning the fire brigade quickly and alerting the hospital staff in time.

> There is, however, the risk that a small outbreak may grow into a serious fire. The building must therefore be so constructed and planned that any such fire is prevented as far as possible from spreading through the building; this involves consideration of the fire resistance of the structure and the placing of certain doors of appropriate fire resistance. The provision and proper planning and construction of adequate means of escape from all parts of the building are also required.[12]

4.4.3 *Control of fire outbreaks in hospitals*

This could be achieved through planning, construction as well as the type of materials used in the hospital buildings.

Planning

The following points are to be considered in the planning of a hospital, in order to minimize the risks of fire outbreaks:

(i) areas with 'high fire-risks' should be separated from those with 'high life-risks'. Areas with high fire risk refers to those rooms or compartments where large number of combustible or inflammable materials are stored. While high life risk areas refers to any part of a with a high concentration of non-ambulant patients patients whose lives would be endangered by an outbreak of fire,

(ii) all areas of high fire-risk or high life-risk should be separated into different compartments on any one storey, to contain the possible spread of fire from one unit of a hospital to another,

(iii) although staircases are of particular importance as escape routes, but in most cases they are potential fire-carriers. To minimize this hazard, "each staircase should in effect form a separate compartment".[13]

(iv) the main stores are a likely place with a high fireload because of the fact that some of the drugs and chemicals stored there may be volatile and inflammble. Hence main stores of inflammable chemicals or drugs should be in a separate compartment, and so on.

(v) the boiler house, the kitchen and laundry, the laboratories, maintenance workshops should all be designed in different compartments, because of their high fire risk potentials.

Construction and materials

The degree of fire resistance needed in the various parts of any building to ensure that it performs its functions throughout the period of a fire outbreak, depends primarily on the fire load that the various rooms contain. "For hospitals, it is considered that, with the exception of single-storey buildings, the grade of fire resistance should generally be sufficient to enable the elements of structure to withstand, without collapse or penetration of fire, the full effects of any fire that may break out".[14]

The fire resistance capacity of load bearing walls, external walls, walls separating compartments, floors and structural frames should be 2 hours for any compartment consisting of main storage rooms, maintenance shops, main laboratories, garages, and boiler-houses, and 1 hour for all other parts of the hospital.

Door and roofing sheets to be used in hospital buildings should have a considerable degree of fire resisting capacities. Same applies to floor finishes, ceiling tiles, and so on.

4.5 Sound Control in Hospitals

Noise in hospitals present a serious problem to both patients and the staff. It is cheaper to plan against it than to try to check it by structural means. Mukhtar (1987) observed that, 'broadly sound insulation between rooms depends upon weight, the continuity and stiffness of the intervening partitions, but principally upon the first two of these factors. Sound insulation value rises with the weight of the intervening wall or walls and this is the principal determining factor,' in sound control within buildings in a hospital.

4.5.1 Factors to be considered in sound control

The first step to be considered here is to try to identify the main sources of noise in hospitals. This could be achieved by considering or categorising the hospital into areas with a high volume of human activities and those with less.

The next step is to try to isolate those areas with a high noise volume in the planning of the hospital. In areas like the nursing units and the surgical suite, excessive amount of noise is undesirable. Hence, they should be separated from the areas identified as the chief sources of noise in hospitals.

Investigations revealed that the following areas are identified as the main sources of noise in hospitals. These areas are:

(a) the hospital corridors,
(b) the vehicular roads,
(c) door openings
(d) sanitary fittings,
(e) the service departments, like;
- the main kitchen
- the laundry
- the C.S.S.D.
- maintenance workshop
- incinerator, boiler room, generator house, and so on.

Planning for sound control in hospitals

The major planning approach to sound control in hospitals, is by separating the high noise areas, like the service departments from the ones that do not require it, like the nursing units and the surgical suite. In addition, vehicular movements in those areas, should be minimized.

Sound is generally controlled by minimizing it at its source. This is achieved by isolation or muffling structure-borne vibrations caused by impact. This is done by providing sound reducing walls and floors between the noise sources and the patients, and by applying absorbents to surface in areas where noise is likely to occur.

In hospitals, most of the noise is generated as a result of the use of the hard hygienic surfaces. These are used because, most of the common sound-absorbing surface treatments are not popular with the medical profession as a result of their germ harbouring possibilities. Special treatments, however, such as thin non porous films over soft absorbent materials are now widely used to overcome this problem. The use of these materials is restricted to the corridors and other circulation spaces. They cannot be used in the wards because, they can increase the intelligibility here to an embarrassing degree.

Every item used in the finishings and fittings should be considered to see if some resilient material could be used to replace a hard one. Cork tiles which has a pleasant looking surface should be used along corridors and other circulation spaces to check the noise there. A carpet in the day ward where convalescent patients stay, further absorbs the noise.

Ceiling materials with noise absorbing capabilities should be used particularly in the wards. All doors should be fitted with silent closers. Swing doors are preferable in very busy rooms such as the treatment rooms. All doors should be provided with automatic closing devices.

In case of walls between rooms in general, except where noise protection is not required, the noise level should not exceed 40 dB. As for high noise rooms like ward kitchen occuring next to a room that require very quite conditions such as the intensive care rooms, the insulation should be at least 45 dB. Floors between wards should preferably have an overall insulation of 50 dB. Noisey service corridors should be separated from those of the medical staff in the nursing units.

Adequate provisions for proper landscaping with trees and other green areas should be made. This, in addition to controlling noise spread in hospitals, also help in improving the micro-climatic conditions of the environment.

Footnotes

1. RIBA Hospitals Course Handbook
2. Ibid
3. Ibid
4. Ibid
5. TODD WHEELER, E. Hospital Design and Function
6. Ibid
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8. TODD WHEELER, E. Hosptal Design and Function
9. Ibid
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14. Ibid.

CHAPTER FIVE

DESIGN REPORT

5.1 The Site

Hospitals as specialised institutions need specially chosen site locations, in an attempt to enhance the purposes for which they are established. These include; favourable environments for the speedy recovery of the patients, who are largely the inhabitants of the hospitals, as well as a nice working area for the medical staff. This could be achieved through a systematic planning of a hospital on a carefully chosen site, that has the potentials of satisfaying the above requirements.

5.1.1 Location

The proposed New Eye Hospital is designed to cater for the whole of Kano State and is to be located within Kano metropolitan. The choice of Kano as the site location of the proposed hospital is influenced by the following considerations:

(i) as the capital of the state, Kano is easily accessible from all parts of the state in terms of transportation and other means of communications,

(ii) due to the presence of various means of communications like the airport and telephone services, patients with complicated eye problems that require advance surgical operations can easily be refered to more sophisticated hospitals outside the state and abroad,

(iii) there is availability of basic social intrastructures like electricity, pipe-berne water, telephone services, and the rest in Kano,

(iv) Kano has the largest concentration of people in the state,

(v) prompt and easy supply of medical personnel, drugs and other facilities is ensured here.

5.1.2 Site selection

Within Kano metropolitan itself, the selection of a particular site for the proposed design is based upon the recommendations of the existing Kano master plan. Factors considered in the selection of the site are as follows:

(a) accessibility; as a public building, a hospital should be easily accessible and located not far away from an urban or rural settlement,

(b) location; the location of a hospital building should be away from industrial, commercial as well as any other noisy areas.

(c) topography; the site should be relatively flat to minimise the cost of construction,

(d) landscape; a good micro-climatic environment is desirable in any hospital design. Hence, a good site that has the potentials of achieving the above is essential,

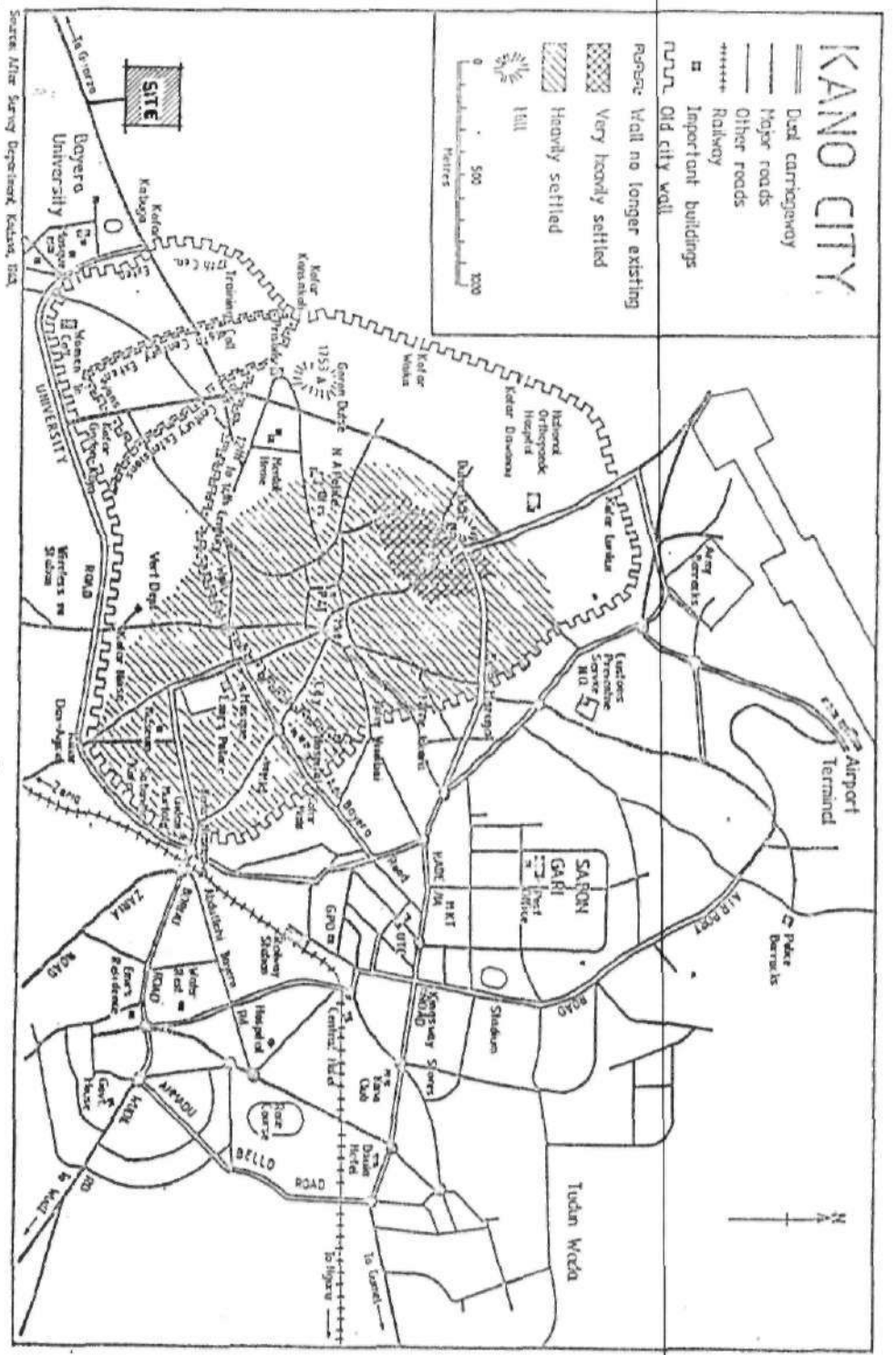
(e) size; sufficient undeveloped piece of land that can readily accomodate expansion is required for health care buildings,

(f) Orientation; the orientation of a site with respect to sunrays and ventilation is an important factor to be considered in hospital design. This is besides the desire to achieve a nice outlook for the building.

Site location

The selected site has satisfied the above requirements and hence, it is chosen as the ideal site for the proposed design. See figure 5.1.2.

The chosen site is located along Gwarzo Road of Kano metropolitan.


KANO CITY
Dual carriageway
Major roads
Other roads
Railway
Important buildings
Old city wall
Wall no longer existing
Very heavily settled
Heavily settled
Hill
0 500 1000
Metres
SITE
Bayero University
Kofar Kabuga
Kofar Kansakali
Kofar Wuska
Kofar Dandago
Kofar Mazugal
Kofar Ruwa
Kofar Nassarawa
Kofar Mata
Kofar Na'Isa
Kofar Gwauron Dutse
Kofar Ofishin Jakadancin
Kofar Gabas
Kofar Kwaru
Kofar Kwaru
Kofar Kwaru

It is a large virgin land situated in an area allocated to public buildings in the Kano master plan. The surrounding buildings are mostly residential units and thus, the area is free from excessive noise and other sources of environmental pollutions.

The site is located away from industrial and commercial areas, where noise and other environmental pollutions like, air and water pollutions occur. The only source of noise close to the site is the Gwarzo Road which is not always a busy road.

The site is a relatively flat piece of land, and it is large enough to accomodate any expansion in the future.

5.2 Site Planning

The planning aspect in a hospital design is the most important factor as far as satisfying the needs of the patients and the medical staff are concerned. The most important need of the medical staff is to have a hospital planned, such that, unnecessary interference or obstructions in terms of improper functional relationships between the various hospital departments, are eliminated. This could be achieved by grouping those departments, whose functions are relative to each other, under a single unit or located close to one another.

This helps to reduce travel distances between the departments and hence, reduces the workload of the staff. The major requirements of the patients on the other hand, are to have an environment free from unnecessary noise, disturbances and other external interference, so that a speedy process of diagnosis and treatment could be achieved.

5.2.1 Zoning

The hospital is zoned according to hierachies of activities of both, the patients and the staff. In this respect, the hospital is zoned into three categories according to the main functional units of hospitals. These are; the O.P.D., the in-patient and the service departments.

The O.P.D., which consists of the adjunct services, like the radiology, the X-ray, accident and emergency, clinical laboratories and the administrative blocks are all located in the front, so that, patients whose cases do not require any surgical operations or nursing care services may not go into the main hospital compound.

The nursing units are located within the hospital compound, away from the O.P.D., so that only patients who require nursing care services or the hospital staff, go there.

The service departments are located in another wing, where it is only accessible to the hospital staff or delivery vans.

This zoning is an attempt to define the activity areas of both the staff and the patients so as to minimize chances of obstructing the smooth flow of traffic within the hospital.

In the proposed design, the planning is evolved taking into consideration the relationship between the various departments and their orientation with respect to the prevailing wind directions and those of the sunrays. Most of the eye diseases that exist in this country are spread by air-borne bacterias. Hence, suitable orientation of the different hospital units with regard to the cardinal wind directions is important, in order to avoid cross-infection among the inhabitants of the hospital. In the planning proposal, the nursing units are located away from the noisy O.P.D., and the service departments. The laundry and the C.S.S.D., are located in the main service departments block. Some of the linens and other instruments that are treated in those units contain some germs and harmful bacteria, which may be spread to the patients by air. Locating them at different places with the nursing units on the site help to avoid this problem. The surgical suite is located away from the main traffic routes within the hospital to minimise disturbances there.

It is located close to the accident and emergency department and the C.S.S.D., to facilitate quick transfer of critically ill patients and to ensure easy delivery of sterile materials.

In the nursing units, the orientation is done such that, the longer sides which incidentally contain the patients wards, are along the north-south directions. This is to avoid exposing them to direct sunrays.

5.2.2. Fire/noise control

The cooking area for the kitchen is separated from the main service departments block and is located away from the nursing units, which incidentally is the high life risk. In the main service departments block, which comprises of the central general stores among others, some combustible materials may be found. Similarly in the mechanical workshop, a lot of petrol is used, which is inflammable. Hence, the kitchen, where naked flame is used, is located away from them.

As pointed out earlier, the main sources of noise are the corridors, the service departments, particularly the generator, the main O.P.D., block and the vehicular, traffic route. All these are located away from the nursing units. The only vehicular traffic route that passes close to the nursing units is the visitors road, which is used only during the visiting hours.

5.2.3 Traffic pattern

The hospital is accessible from the Gwarzo Road, where an access road is tapped. A single flow, in and out traffic is adopted for security and safety reasons. The emergency and service road is separated from that of the visitors to avoid unnecessary obstructions.

Appropriate parking spaces are provided for the staff and the visitors at different locations for convenience.

5.3 The Design Concept

Studies into the modern trends of the architecture of hospital buildings indicate that there are basically two types of design concepts. These are:

(i) The pavillion hospital

(ii) The vertical mono-block.

The pavillion hospital design concept has the following advantages:

- it allows for natural light and ventilation
- simple structural design is allowed and it is easy to expand horizontally,
- supply of materials from the ancillary departments is achieved easily.

It disadvantages however, includes the following:

(i) long travel distances, which effect the staff performance,

(ii) the long corridors are among the sources of noise,

(iii) large site is required for horizontal expansion. See figure 5.3 (i).

The vertical mono-block otherwise known as the American hospital, relies on mechanical means for its operation.. See figure 5.3 (ii). Its merits are:

- circulation distances are reduced,
- ensures effective utilization of site
- functions are more closely related.

Its demerits on the other hand includes the following:

(i) reliance on mechanical means of lighting, ventilation and vertical transport

(ii) expansion becomes difficult requiring technical ability,

(iii) long lift waiting periods for patients, staff and services,

(iv) noise problems, which is brought about by having noise sources close together.

5.3.1 The contiguity principle

In this principle, all closely related functions of the various hospital departments are brought together and tied in a horizontal contagious plane. In this way, long travel distances between related departments are reduced while vertical movements using staircases, elevators and others are eliminated.

5.3.2 The courtyard concept

In the proposed design, courtyard concept is adopted. This is in response to the climatic conditions of the site, that is Kano City, and the nature of hospital design as an institution, where sufficient amount of ventilation is required.

Form

The design form adopted here is the octagonal. The contiguity principle is applied, by having various departments whose functions are related to each other tied together in a horizontal plane. This is shown in the accident and emergency department (A.E.D.), where the A.E.D. unit, the X-ray and the clinical laboratory units are tied together in a horizontal plane. The choice of this form is governed by the following considerations.

- the long corridor effect within a department is reduced,
- the circulation space is minimised within a particular block,
- wider visual coverage is achieved in close proximity,
- large open space can be obtained as a courtyard to enhance the micro-climate.

In the surgical suite, mortuary and the generator room, rectangular forms are adopted.

5.4 The Design

In the proposed design, the planning of the hospital is evolved, as pointed out earlier, in accordance with the three basic functional divisions of a hospital. These are:

(i) The O.P.D.
(ii) The in-patient department
(iii). The service departments.

5.4.1 The out-patient department O.P.D

This is located at the front of the hospital and is directly accessible from the main hospital entrance. It is sub-divided into three blocks and are grouped according to the relationship of the various functions to avoid unnecessary congestion. The three blocks are; (i) the main O.P.D., (ii) A.E.D., and (iii) the administrative blocks.

(i) The main O.P.D. block consists of the following functions:

- consulting suite
- optical workshop
- phamacy
- staff and public educational facilities

(ii) The accident and emergency block comprises of the following:

- clinical laboratory
- radiology
- accident and emergency suites.

(iii) The administrative block is made up of offices for the administrative heads of the hospital, records and statistics offices, matrons and nursing staff and some non medical personnel offices.

Consulting suite

This is located in the main O.P.D. block and is directly accessible from the main hospital entrance. It consists of the following:

- five consulting rooms, including the dark room and the orthoptic room,
- two card rooms together with records store, one each for male and female patients,
- an inquiry office located at the entrance to the hospital,
- treatment room. All these are located on the ground floor of the main O.P.D. block.
- a set of toilets for staff and patients are also provided.

Optical workshop

This is made up of the main workshop room and the optical consulting unit. The latter which deals with the patients is located on the ground floor and comprises of the following:

- three consulting rooms, for the optometrist, optician and the glass receptionist offices, glasses display room and a store.

On the first floor, the main glasses workshop is located. Since it is purely a technical unit dealing with cutting glasses and frames, it is located on the upper floor where it is accessible to the staff only. It consists of the following functions:

- the workshop room
- glasses store
- equipments store
- a supervisor's office

Staff and public eductional and recreational facilities

This is located on the first floor of the main O.P.D. block, away from the patients, on the ground floor. It is made up of the following:

- a multi-purpose hall, for some lectures and seminars,
- a conference hall for staff matters,
- a staff library together with a store, a librarian and an attendants rooms,
- a staff common room and a coffee room,
- set of toilets for the staff

Phamacy

The main dispensing room and the chief phamacist office are located on the ground floor close to the treatment room, and are directly accessible from the main entrance. Some drug stores are provided on the ground and first floors for easy access without having to go to the central stores.

Adequate waiting spaces are also provided at the treatment and dispensing rooms for the out-patients.

Clinical laboratory

This is located in the A.E.D. block, away from the main O.P.D. block to reduce congestion in the latter. It is made up of the following units:

- collection and sorting room,
- the main laboratory and a synthesis room,
- specimen despatch room
- waiting areas
- a supervisory assistants office.

Radiology

This is located in the same block with the clinical laboratories, and consists of the following:

- reception room,
- radiologist office,
- patients changing room,
- an X-ray and control rooms,
- dark room,
- archieves and film collection rooms.

Accident and emergency

This contain the accident and emergency units. On the accident unit, provision is made for an ambulance stand. This has a direct access from the service road and is located away from the main patients entrance. A stretcher store is provided in the ambulance garage. The unit consists of the following:

- Nurses duty room, close to the ambulance stand,
- a doctor's duty room,
- treatment room together with a sterilizing room, a sterile store and a clean utility room,
- a day ward for male and female patients.

The emergency unit is made up of the following functions:

- An inquiry office,
- cards room,
- a consultants office,
- a treatment room together with a drugs store, sterilizing and clean utility rooms.

Administrative block

This is located as a separate block in order to decongest the main O.P.D. unit and to segregate between the medical and non medical administrative staff for easy works.

It consists of the offices of the administrative heads of the hospital, like the principal medical officer in charge of the hospital, the principal hospital secretary, and the rest. It also comprises of medical records and statisties section, staff recreation facilities and so on.

5.4.2 The in-patient department

This is basically made up of the following functions

(i) The surgical suite
(ii) The nursing units.

The surgical suite

This is located on a separate wing in the hospital to avoid interference with its work and is a bit closer to the A.E.D. and the C.S.S.D. It is provided with the following functions:

- two operation theatres; major and minor theatres,
- two sets of scrub-up rooms, sterilizing rooms and sterile stores, one each for the two theatres
- doctors and nurses changing rooms,
- anaesthesia and sink rooms,
- records room,
- sisters room,
- doctors and nurses rest rooms,
- a recovery room and waiting areas,
- equipments store.

The nursing unit

It is located on another separate wing in the hospital in order to isolate it from unnecessary interference and disturbances from the other hospital departments. It is segregated into male and female sections. Each section consists of 90 beds in two floors. The units are sub-divided into surgical, medical and isolation wards.

Medical wards: These are located on the ground and the first floors of the units. They consist of six wards on each floor making a total of 12 wards.

Each ward is made up of four beds, totalling 48 beds altogether in a nursing unit.

Surgical wards: They are located on the ground floor for easy conveyance of the non-ambulant surgical patients. There are six wards here with each ward consisting of four beds, making a total of 24 beds, in a nursing unit.

Isolation wards: These are placedon the first floor to reduce the chances of cross infection, since majority of staff and patients circulation takes place on the ground floor. Six wards are provided here with each ward having three beds, making a total of 18 beds, in a nursing unit.

The two nursing units, that is, the male and female units,consist of 90 beds each making a total of 180 beds altogether. The following functions are also provided in the nursin units. They are:

- admission room with a receptionist counter,
- sisters rooms and doctors duty rooms on each floor,
- kitchen preparation and service rooms in each unit,
- nurses changing rooms for male and female nurses,
- nurses duty rooms in between each two wards,
- washrooms and toilets for every two wards.

The nursing units are accessible from two main entrances, one each for staff and visitors. This is to facilitate smooth flow of services free from visitors interference for the staff. The sister's room is located close to the visitors entrance to check their movement especially during unauthorised hours, in addition to overseeing the nurses activities. On the ground floor, each nurses duty room is provided with an emergency exit, which could be used to evacuate patients in case of some accidents like fire outbreaks. They could also be used as staff entrances.

Staircases are provided at the main entrance to the units to facilitate easy movement for the staff. Ramps are also provided for easy vertical transportation and evacuation of the non-ambulant patients in case of emergency.

5.4.3 Services department

These are grouped into a single block except the mechanical workshop and the generator room, the mortuary and the cooking area for the kitchen. This is done to minimise chances of fire outbreak that are likely to occur when inflammable materials like petrol which is used in the machanical area is brought close to the kitchen where naked flame is used.

The main services block comprises of the following:

- central general stores,
- the C.S.S.D.
- the laundry
- kitchen stores
- offices for supervisory staff
- staff common rooms
- toilet facilities.

5.4.4 Space allocations

The number of operation theatres and the consulting rooms are estimated from case studies.

Operation theatres

In the proposed hospital, two theatre rooms are provided. This is determined from the analysis of the case studies conducted on the existing eye hospitals and the record of attendance of the operations performed in them. In all the two eye hospitals, that is E.C.W.A. Eye Hospital and the Maiduguri Eye Hospital as well as Murtala Muhammad Eye Clinic, where the case studies where conducted, two operation theatres are used, and that no inadequacy is observed.

Number of consultation rooms

This is also similarly determined. In the proposed design, a total of eight consulting rooms are provided which includes, five in the consulting suite and three in the optical workshop.

5.4.5 Construction

In the construction, hollow concrete blocks with reinforced conrete (r.c.) beams and columns are used. In the main O.P.D. block, a module of 5m is used. The consulting rooms are 6.5mx5m throughout to take care of the distance required for visual acuity which is a minimum of 6m in length. In the nursing units, a module of 4m is adopted. Steel roof trusses and long span aluminium are used in the roofing system.

Special factors considered

Covered walkways are provided for easy staff and patients movements within the hospital free from direct sunrays. The covered ones are those linking the surgical suite to the O.P.D. and the nursing units, as well as that linking the nursing unit to the O.P.D. They are provided with handrails to guide patients.

All doors in the wards are provided with lighweight automatic spring closing device. This is to avoid causing some injury to the patients who may be partially blind.

Central air-conditioning system is provided in the surgical suite particularly the major operation theatre, the recovery room, scrub up room, sterilizing and the staff changing rooms, to minimise the chances of the spread of some air-borne diseases.

The floor slabs in the nursing units especially in the wards and the nurses stations are treated with sound absorbing floor tiles to control noise.

Drainage and sewage system

The rain water that is collected in the various hospital blocks are drained through the gutters provided in each block, which are connected to the main drinage lines at the outside. The sewage system adopted involves the use of septic tanks which are located away from the building foundation lines. They are drained at certain intervals of time, depending upon the frequency of use.

Electricity and water supply

These are tapped from the main supply terminals which pass along the Gwarzo Road. Electricity transformers are suitably located close to the hospital to regulate the flow of electricity current.

In case of water supply, two elevated water tanks are provided. One supplies the nursing units and the O.P.D., while the other supplies the surgical suite and the services department.

CHAPTER SIX

SCHEDULE OF ACCOMMODATION

Out-Patient Department

Consulting suite

Space allocated	Number of rooms required	Area of each room(m^2)	Total area(m^2)
1. Inquiry office	1	30	30
2. Cards rooms	2	25	50
3. Records store	2	25	50
4. Consulting rooms	4	32.5	130
5. Orthopist room	1	38	38
6. Waiting spaces	8		108
7. Toilets	10		50
Total			456.0

Treatment Suite

1. Treatment room	1	31	31
2. Clean utilities room	1	15	15
3. Sterilizing room	1	15	15
4. Sterile store	1	12	12
5. Dispensing room	1	25	25
6. Drugs store	1	42	42
7. Waiting spaces	4		50
Total			190.0

Optical suite

Space allocated	Number of rooms required	Area of each room(m^2)	Total area (m^2)
A/Ground Floor			
1. Consulting rooms	3	32.5	97.5
2. Glasses display room	1	35.5	35.5
3. Optical store	1	36	36
4. Waiting spaces	2		25
5. Toilets	4		20
B/First Floor			
1. Supervisor's office	1	40	40
2. Optical workshop	1	81.5	81.5
3. Glasses store	1	32	32
4. Equipments store	1	57	
Total			302.5
Staff and public enlightenment unit			
1. Multi-purpose hall	1	80	80
2. Conference room		57	57
3. Staff offices	2	40	80
4. Store	1	36	36
5. Staff common room	1	67	67
6. Coffee room	1	20	20
7. Staff library	1	86	86
8. Librarian's office	1	30	30
9. Library store	1	36	36
10. Toilets	5		25
Total			492.0

Accident and emergency suite

Space allocated	Number of rooms required	Area of each room(m^2)	Total area(m
1. Inquiry office	1	24	24
2. Cards and records room	1	30	30
3. Consultants room	1	36	36
4. Treatment rooms	2	31	62
5. Clean utilities rooms	2	9	18
6. Sterilizing rooms	2	9	18
7. Sterile store	1	8	8
8. Drugs store	1	18	18
9. Day wards	2	30	60
10. Doctors duty room	1	15	15
11. Nurses duty rooms	2	12	24
12. Ambulance stand	1	26	26
13. Stretcher store	1	5	5
14. Waiting spaces	3	3	42
15. Toilets	6		36
Total			422.0

Administrative Suite

1.	Inquiry office	1	24	24
2.	Medical Officer's room	1	38	38
3.	Secretary's office	1	30	30
4.	Hospital secretaries offices	2	30	30
5.	Receptionist's office	1	20	20
6.	General office	1	40	40
7.	Conference room	1	58	58
8.	Staff common room	1	67	67
9.	Staff lounge	1	69	69
10.	Records and statistics offices	2	36	72
11.	Stores	2	25	50
12.	Senior nursing staffs	2	30	60
13.	Toilets	10		50
	Total			608

Adjunct diagnostic facilities

Phamacy

Space allocated	Number of rooms required	Area of each room(m^2)	Total area
A/Ground Floor			
1. Chief phamacist office	1	24	24
2. Toilet	1	3	3
B/First Floor			
1. Assistant phamacist office	1	24	24
2. Preparation room	1	31	31
3. Despatch room	1	20	20
4. Phamacy store	1	50	50
5. Bulk store	1	57	57
6. Main sterile store	1	40	40
7. Equipments store	1	32	32
Total			254.

Pathology

1. Supervisor's office	1	24	24
2. Collection room	1	31	31
3. Main laboratory room	1	60	60
4. Synthesis room	1	48	48
5. Despatch room	1	20	20
6. Waiting spaces	2	30	30
Total			223.

Radiology

Space allocated	Number of rooms required	Area of each room(m^2)	Total area
1. Reception room	1	20	20
2. Secretary's office	1	20	20
3. Radiologist's office	1	30	30
4. Patients changing room	1	12	12
5. Control room	1	12	12
6. X-ray room	1	36	36
7. Dark room	1	25	25
8. Archives store	1	18	18
9. Film collection room	1	18	18
10. Waiting space	1		18
11. Toilets	4		20
Total			189.0

In-Patient Department

Surgical Suite

Space allocated	Number of rooms required	Area of each room(m^2)	Total area(m^2)
1. Major theatre	1	80	80
2. Recovery room	1	42	42
3. Scrub-up room	1	30	30
4. Sterilizing room	1	30	30
5. Sink room	1	25	25
6. Doctors changing room	1	22.5	22.5
7. Nurses changing room	1	25	25
8. Minor theatre	1	70	70
9. Sterilizing room	1	28	28
10. Scrub-up room	1	25	25
11. Sterile store	1	28	28
12. General store	1	30	30
13. Anaesthesia room	1	25	25
14. Anaesthesia store	1	30	30
15. Patients waiting room	1	54	54
16. Doctors rest room	1	36	36
17. Nurses rest room	1	30	30
18. Sisters office	1	12	12
19. Reception room	1	12	12
20. Toilets	5		25
Total			559.5

Ward (Ancillary)

Space allocated	Number of room required	Area of each room(m^2)	Total area(m^2)
1. Nurses station	6	8	48
2. Treatment rooms	6	12	72
3. Sluice rooms	6	6	36
4. Washrooms	8	12	86
5. Admission room	1	32	32
6. Doctors duty room	1	32	32
7. Sisters room	1	32	32
8. Store	1	32	32
9. Pantry	1	68	68
10. Male nurses changing room	1		40
11. Female nurses changing room	1		68
12. Toilets	16		64
13. Bathrooms	12		48
Total			658

Services Department

L

Laundry

Space allocated	Number of room required	Area of each room(m^2)	Total area(m^2)
1. Supervisor's office	1	35	35
2. Collection room	1	48	48
3. Washing room	1	50	50
4. Ironing room	1	30	30
5. Tailors' room	1	48	48
6. Despatch room	1	20	20
7. Stores	2	28	56
Total			287

C.S.S.D.

1. Staff offices	2	28	56
2. Sterile store	1	38	38
3. Main workroom	1	50	50
4. Despatch room	1	25	25
5. Store	1	48	48
Total			217

Central general stores

1. Supervisor's office	1	35	35
2. Staff offices	2	21	42
3. Pharmacy stores	2	50	100
4. Equipments stores	2	54	108
5. Grains store	1	68	68
6. General store	1	40	40
Total			393

Kitchen

Space allocated	Number of room required	Area of each room(m^2)	Total area(m^2)
1. Dietician's offices	2	28	56
2. Staff changing rooms	2	45	90
3. Main kitchen room	1	80	80
4. Main store	1	60	60
5. Vegetables store	1	30	30
6. General stores	3	36	108
7. Staff rest room	1	64	64
8. Toilets	8		40
Total			488

Maintenance and generator room

A/Generator			
1. Generator stands	2	40	80
2. Meter room	1	24	24
3. Stores	2	20	40
B/Workshop			
1. Motor stands	3	28	84
2. Stores	3	12	36
3. Technicians rooms	3	20	60
4. Toilets	2		10
5. Bathrooms	2		10
Total			344

Mortuary

1. Attendants room	1	42	42
2. Store	1	24	24
3. Post-mortem room	1	72	72
4. Viewing room	1	30	30
5. Mortuary room	1	48	48
6. Ambulance stand	1	30	30
7. Waiting area	1	30	30
8. Toilet	1		8
Total			284

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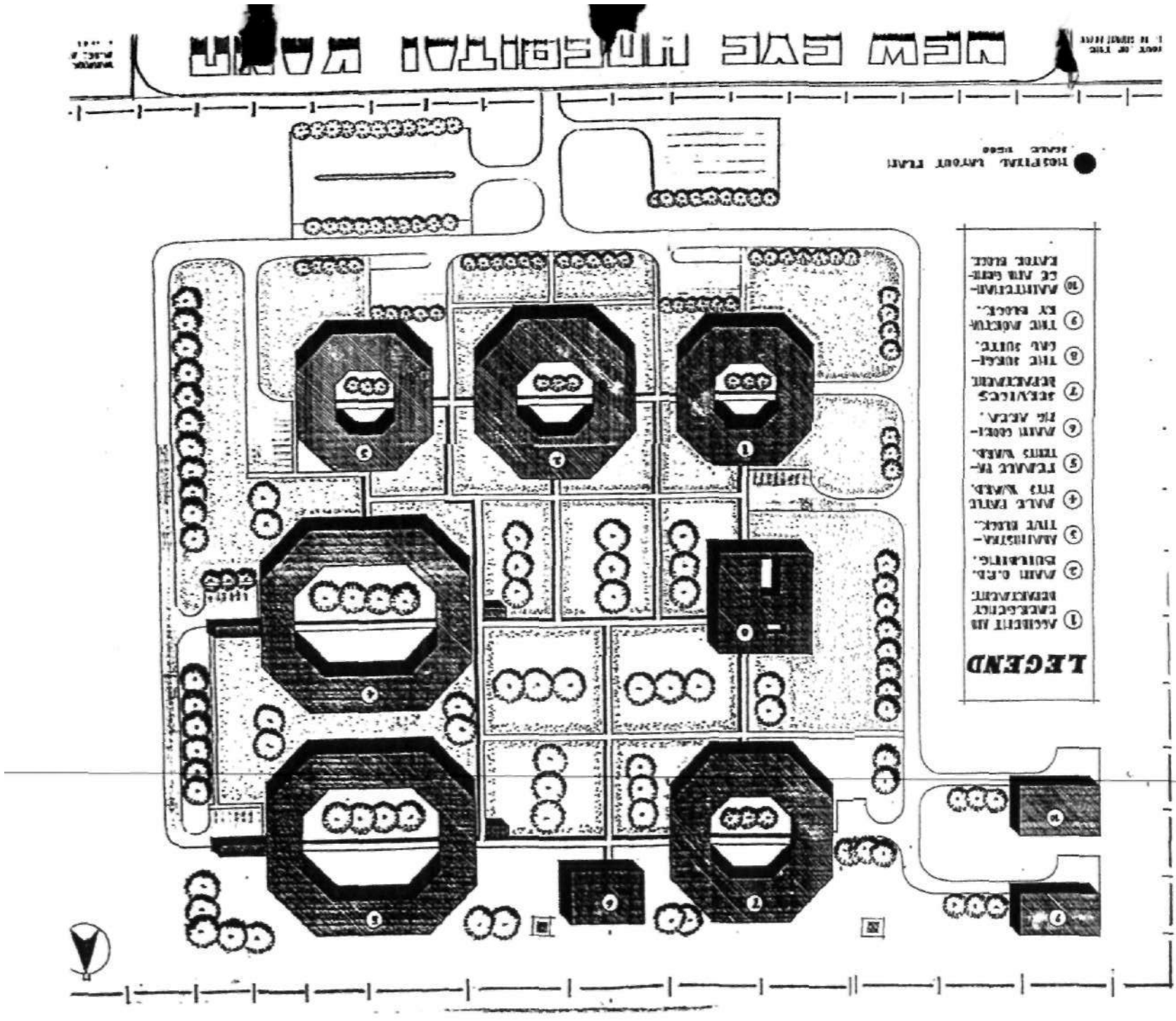
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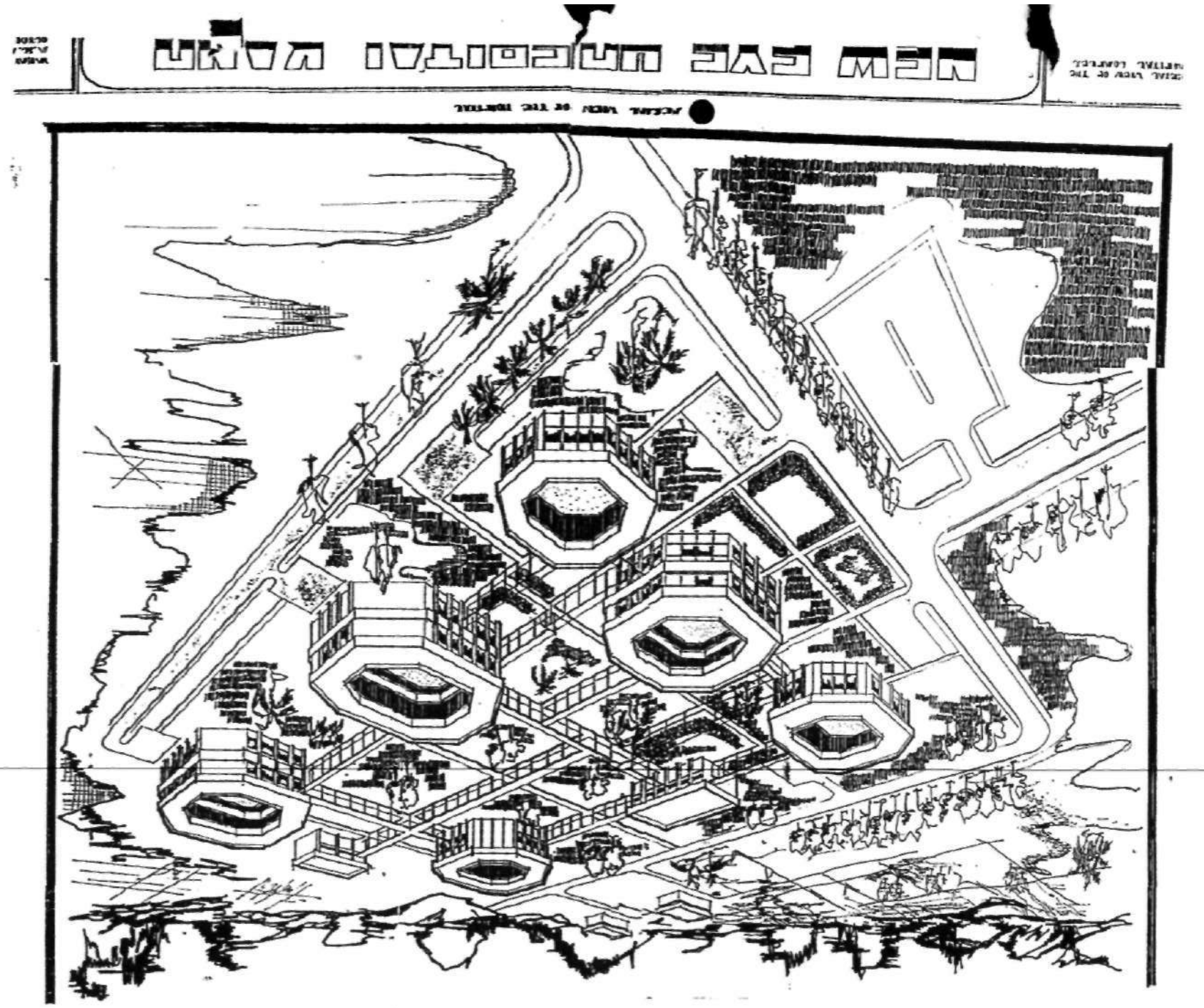
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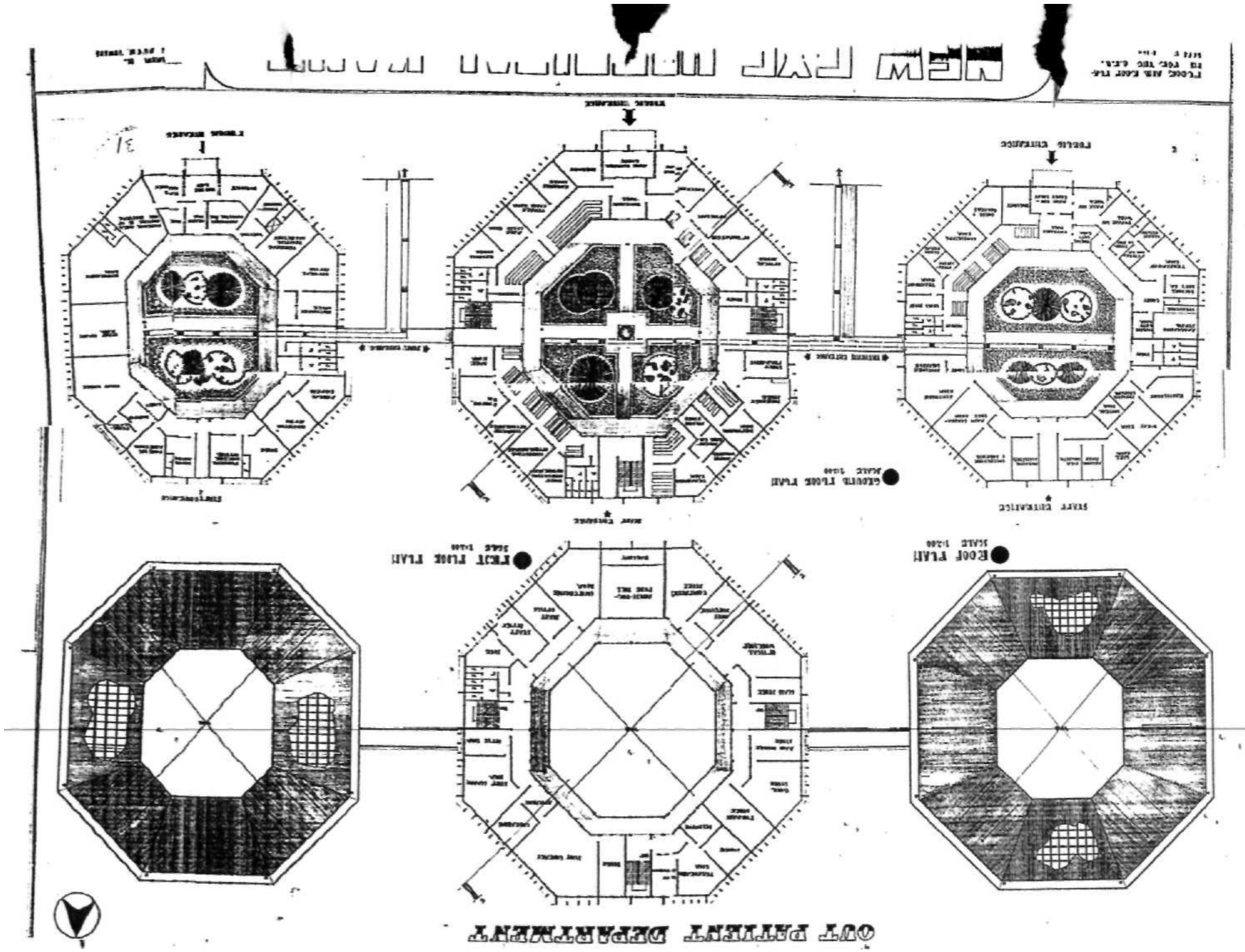
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NEW EYE HOSPITAL PARK
LEGEND
① ACCIDENT AND EMERGENCY DEPARTMENT.
② MAIN O.P.D. BUILDING.
③ ADMINISTRA- TIVE BLOCK.
④ MALE PATIENTS WARD.
⑤ FEMALE PA- TIENTS WARD.
⑥ MAIN CORRI- DOR AREA.
⑦ SERVICES DEPARTMENT
⑧ THE NURSES- QUARTERS.
⑨ THE DOCTOR- RY BLOCK.
⑩ MAINTENAN- CE AND GENE- RATOR BLOCK.


NEW EYE HOSPITAL PLAN

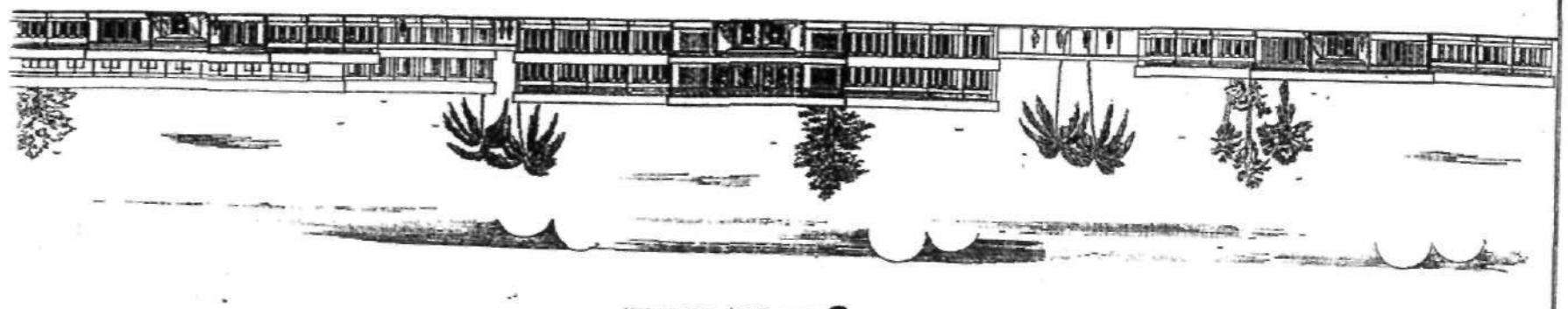


NEW EYE HOSPITAL KANO

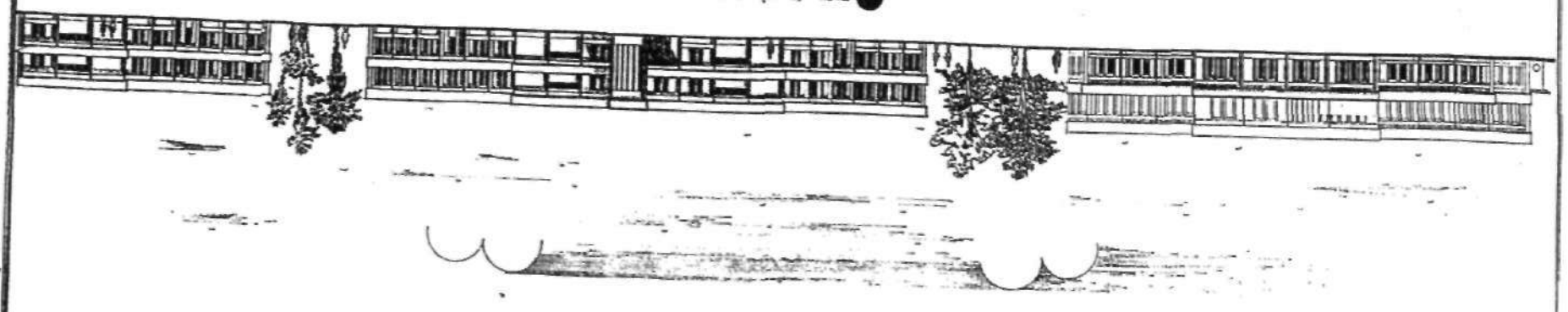
HOSPITAL ELEVATIONS
SCALE 1:200
DECEMBER, 1966.

YAHAYA H.
MSC. ARCHT.
ZARIA

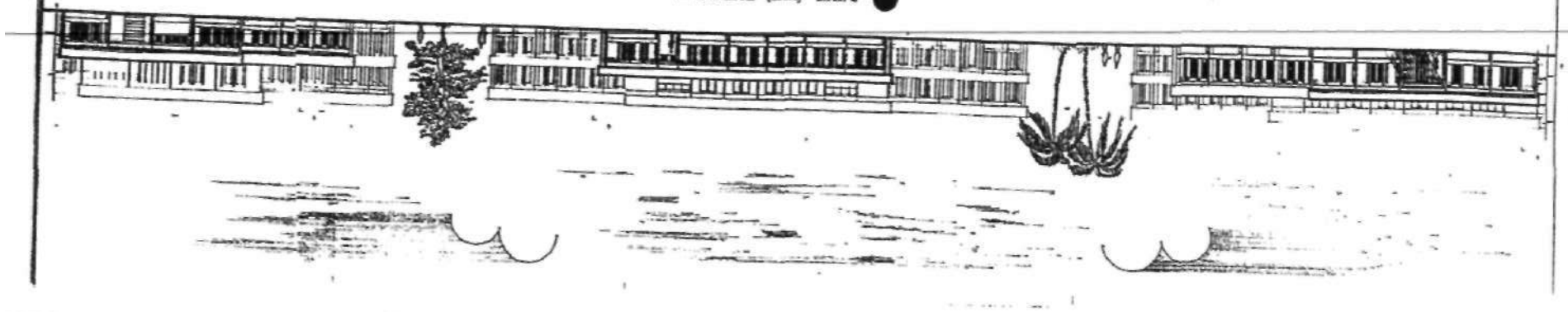
NORTH (FRONT) ELEVATION



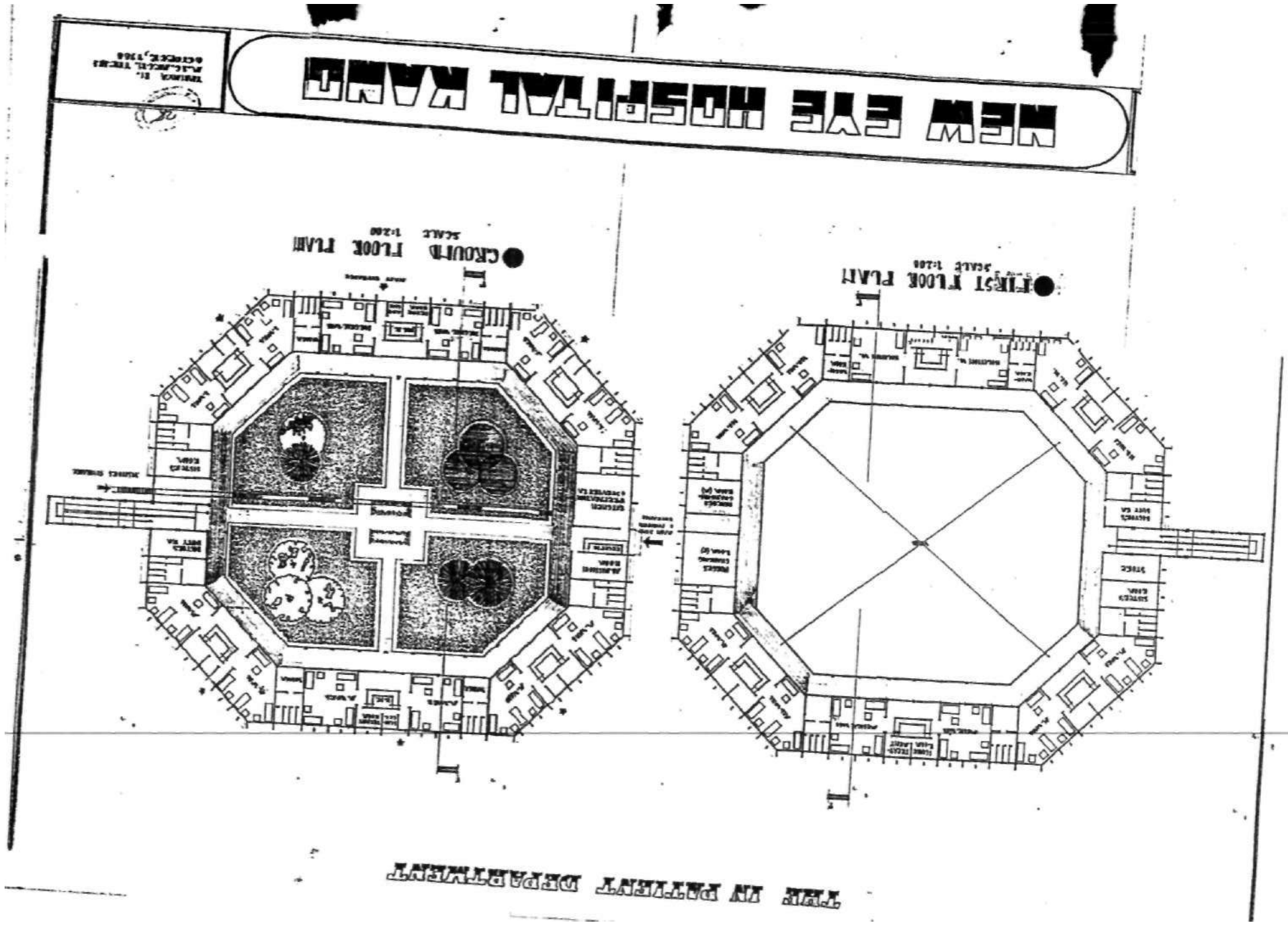
EAST (SIDE) ELEVATION



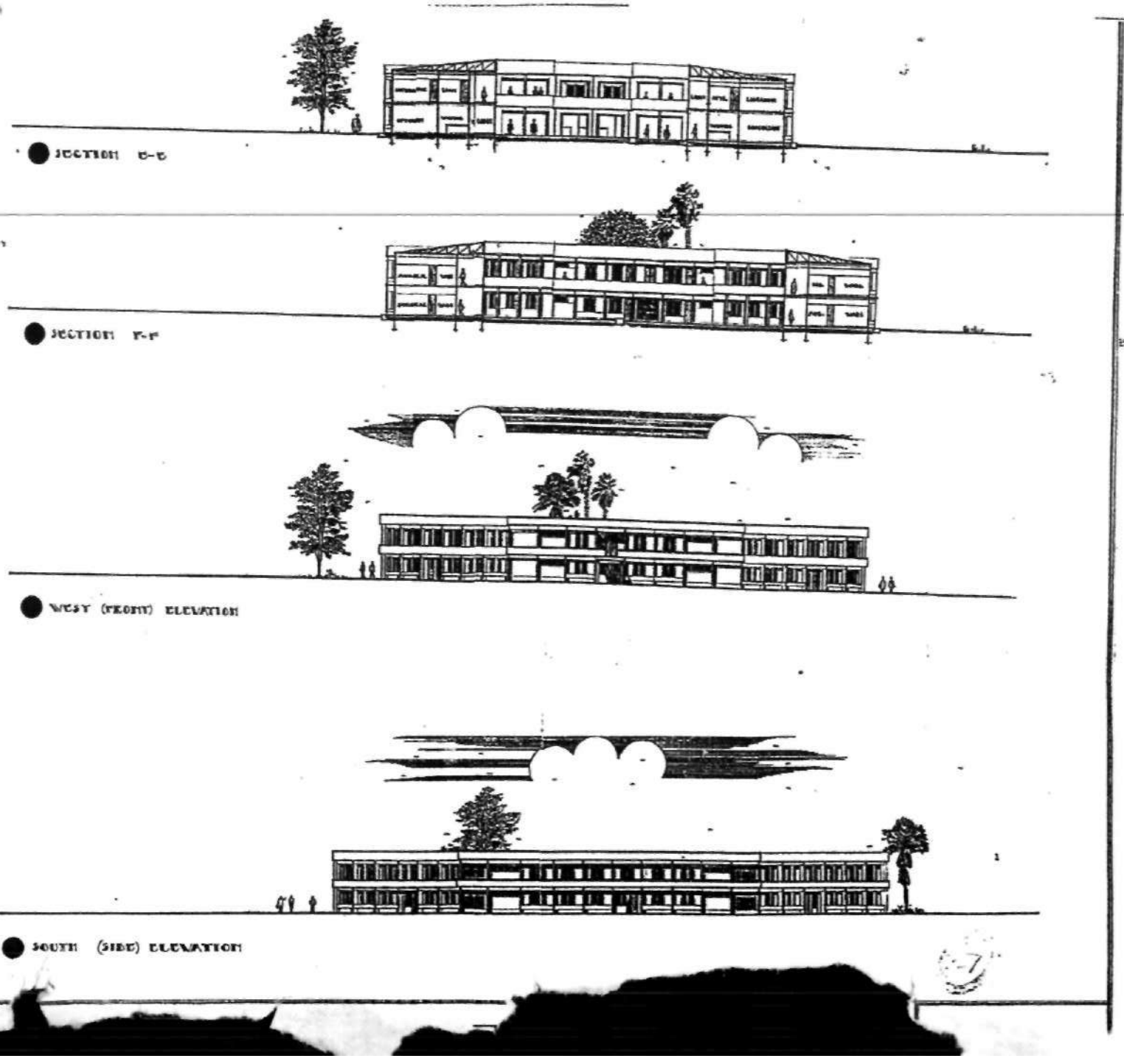
WEST (SIDE) ELEVATION



NEW EYE HOSPITAL MAND



YEAR IN PATIENT DEPARTMENT


SECTION B-B
SECTION F-F
WEST (FRONT) ELEVATION
SOUTH (SIDE) ELEVATION