A PROPOSED GENERAL HOSPITAL FOR DEBA GOMBE STATE

"IMPROVED SUPPORT SERVICES FOR BETTER PATIENT CARE"

Msc. ARCH THESIS

BY

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(Bsc Hons)

A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, AHMADU BELLO UNIVERSITY, ZARIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN ARCHITECTURE

Department of Architecture
Faculty of Environmental Design
Ahmadu Bello University, Zaria.

1999

CERTIFICATION

This thesis entitled A PROPOSED GENERAL HOSPITAL FOR DEBA, meets the regulation governing the award of a master of science degree in Architecture (Msc. Arch) of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

CHAIRMAN SUPERVISORY COMMITTEE	DATE 18/11/2000
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DECLARATION

I WALI USMAN MUKTAR hereby declare that this thesis report has been composed by me as a record of my research work and that no part of the contents has been presented in any scholarly or academic assessment. All quotation and sources of information are duely acknowledged by means of references.

---------- ----------

Sign Date

DEDICATION

This thesis work is dedicated to Dr. Bunu Wali Gombe, who provided me with all the necessary encouragement morally and financially without complains.

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ACKNOLEDGEMENTS

All praise and thanks to the almighty Allah, who in his infinite mercies bestowed on me the zeal, courage and ability to undertake this programme. Allah in His infinite wisdom guided me throughout the period I spent doing this research work in particular and my studies in general.

My sincere gratitude goes to my parents Alh. Muktar Sa'eed (Walin Gombe), Hajiya Amina (Inna) and Hajia Maryam (mama) for giving the necessary parental support, advice, encouragement and prayers throughout my life time and period of study. I also express my gratitude to my Brother Dr. Bunu Wali who always encouraged me, especially providing all the necessary funds to finance my education. Furthermore I express appreciation to my Brothers Umar Wali and his family, Yaya Wali and Sisters Zainab, Bobba and Hauwau, for their understanding and encouragement.

My profound and unreserved gratitude goes to my supervisor Arc. Masoud Abdulkareem, for his priceless assistance and advice, in form of guidance throughout the course of this study. Similar appreciation also goes to Professor E.A. Adeyemi, Arc. Adewolu, Engr. H.T. Kimeng and Dr. W.B. Quix who made us jazz up our plans and elevations so that the could meet the standards of the modern and post modern era.

The staff of the Data room especially Mr. Anto and Mallam Danjuma require special mention as they gave me limitless access to all the necessary material I needed in the course of this work. My regard also goes to all the members of staff of the

Department of Architecture, for their friendly assistance throughout my stay at the department.

To all those who helped me with information and relevant materials in the course of this research work, notably Alh. S. Kole the administrative secretary Specialist Hospital Gombe, Alh. Audi Chief Nursing Officer Specialist Hospital Gombe, Engr. Sanusi Director Engineering Federal Medical Centre Gombe, Alhaji Abubakar Alkali, also of the Federal Medical Centre Gombe, Alh. Yaya Kumo and all staff of the Land and Survey department and Ministry of Works and Housing Gombe. I say a big thank you and may God bless you all.

I express my gratitude to Dr. Sani Abba and his family for being good guardians to me and providing me with a place to stay throughout my stay while undertaking the programme. I am immensely indebted to you. I can not fail to mention Sa'ad (Maiuguwa Kawo), Yusuf Gidado and the entire members of the Block 32 B.Q.

Hajia Aishatu and Hajja Aishatu I have not forgotten all the cin-cin, cake, meatpies and Guzuri's whenever I am coming back to school or when the opportunity arises. The kids Ai, Ummi, Bangies, Walida, Sadiq and Haruna, we will all be having all the fun again. Hauwa, Nasiru, Inna Uwa, Aslam I have not forgotten you all.

How can I ever forget the class of 91 and 97 a bunch of hardworking easy going intellectuals who we pursued this programme together - The best class ever. I must not fail to mention all those friend of mine at school and at home who we faced the trial together these include, Eng. Bello Umar, Barister A. Musa, Jirgi, B. Gombe, U. Buba M. Ali, Balte, Arc. Imam, Arc. Ahmed, Marafa Liman, Danmaliki, Arc Aminu Za, Arc Wanigi and his wife, Arch Bala Shanu, Arc Adams Mugu, Wasa, Bala I.C.C., Habule,

Wanigi and his wife, Arch Bala Shanu, Arc Adams Mugu, Wasa, Bala I.C.C., Habule, Daku, Farouk, Arch Sagiru, Arch S.K, Danmasani, Engr Waziri, Arc Abba Dogo, Suleiman, Danasabe Commander, Aliyu, Babs, Sani Lafiya, M. Adamu Senior, Ahmed Benbela, Umar Abba, Yakubu Abba, Eng. Umar T., Arc. Dahiru S., Arc Usman, Umar Gani, Arc Munat, Arc Shitufa, Alh. Sani Barau and others too numerous to mention.

Finally, I wish to extend my thanks and appreciation to the staff of kwik computer services, especially Saidu who typed this work, Mr. John, Mr. Johnson, Hadiza and all those who in one way or the other were instrumental to the success of this work, and whom I could not mention. You are all important.

KASHIM

ABSTRACT

Man's needs for Healthcare can not be over emphasized. For man to be able to achieve his desired goals, he needs a sound and healthy body and mind. Economic, Social, Political and Cultural Progress of man moves hand in hand with his State of health. This made health care to be the right of every Individual irrespective of race, colour or religion.

Hospitals are institutions which provide Medical services to ensure or meet the health needs of a community. The professionals who work with the equipment found in hospitals try to restore health to sick and injured people, while at the same time preventing the out break of diseases.

Generally, Hospital buildings are permanent hence difficult to charge once they have been built. However, the methods of treating Nursing and looking after patients charge continuously due to increasing development in medical Science. Also, due to difficulty in securing enough Nurses and trained Medical personnel, the problem of Nursing relatives arose. These Nursing relatives are relatives of patients who stay in hospitals with a view to nursing their sick ones and meeting their daily needs, which include feeding, Washing patients' effects and keeping them company among others. This lead to the overcrowding of the hospitals, and the fact that there Relatives were not catered for in the design of hospitals, made them to gradually turn hospital corridors into their waiting areas, laundries, e.t.a. To this end this thesis looked at the factors responsible for causing the problem and put forth a design proposal, which was aimed at improving support services in a hospital.

The design, which has based on effective functional grouping of the various Units of the general hospital, took the Nursing relatives away from the hospital corridors. It provided for the relatives certain facilities, which could be used by them and their patients. Such as toilets, awaiting area and a sit out. The design is in form of a pavilion hospital with a radial concept to ensure maximum balance of the various buildings.

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CHAPTER ONE

INTRODUCTION:

1.0 INTRODUCTION

From early times, man has shown the desire for a healthy body and mind, this ranks high among his fundamental instincts, along with his desire for food, shelter and protection.

Health as defined by the World Health organization (WHO) is "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity".[1]

Health care is increasingly being giving special attention throughout the world, as the importance of preventive medicine and medical treatment is being realised gradually. The evidence for this can be seen in the rapidly falling death rates in many parts of the world. Adequate health care is today being considered as the right of every individual in any society, irrespective of colour, race, religion or tribe. Good health care is an important factor in stimulating economic growth and development. With good health care, man becomes more capable of improving his living conditions and his productivity rises - Health care could be achieved through health centres and hospitals which provide medical services both preventive and Curative to the people.

Hospitals are social institutions utilizing a complex combination of different scientific equipment and functions manned by a team of trained and skilled medical, paramedical and non-medical personnel. Hospitals are indispensable part of the

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[1] 1Ahmed A.Massoud 1965, The General Hospital as an Architectural Organism; The Catholic University of America Press Washington D.C

provisions that is made for health, because there will always be a preparation of patients who need particular skills and equipment that can be concentrated in them (the hospitals), and because they are essential centres for medical care health education and research. Another importance of hospitals is in providing places where the sick can be looked after and cared of their ailments. The General Hospital is one of such institutions which brings together in concentrated form, most specialized services otherwise performed by a number of separate (specialists) hospitals, with more limited functions and provides care for both out patients and inpatients.

When planning health care/medical facilities, it is essential for the Architect to consider Man's innermost needs the aspirations of people, social structures, values and attitudes towards life. It is important to integrate the various departments of the hospital care system and arrange them to compliment and support each other so that the work as one whole unit in order to provide effective healthcare to the people. It is also important to understand basically circulation patterns within the hospital.

Being a permanent building that is difficult to change once it has been constructed, the hospital has to be designed in order to adapt to the ever increasing development in the methods of treating, nursing and looking after of patients as is dictated by modern medical science. The progress of medical science is accompanied by an increase in the investment and operating cost of the hospitals. The difficulty also, of securing qualified and sufficient nursing and other staff to administer and care for patients as is demanded by modern treatment methods caused over congestion and overcrowding in hospitals.

Another factor is the issue of Nursing relatives; these are relatives of patients who stay with the patients in the hospital in order to cater for the daily needs of the patients. These needs include laundry services and feeding e.t.c. However, this constitute a nuisance as it has greatly affected hospital maintenance, gradually eroding the hospital neatness, function of available facilities and other sanitary conditions of the hospital.

This thesis will evaluate and study the issues relating to sanitation, space appropriation and Organisation as a result of overcongestion and overcrowding with a view to proffering solutions to these problems from the initial design stage, in order to enhance patient welfare. Architectural concepts and planning will be developed to address the affore mentioned problem in a graceful way. The design will reflect the health needs of the community for which the project is aimed at. Hospital departments will be determined by the health needs of the area / community, apart from other basic infrastructures required in hospital buildings. The thesis will also review available hospital literature to aid future designers and researchers alike.

The initial part of the thesis will discuss history, planning and general information concerning hospitals. A review of selected literature and the interrelationship between the various departments in a hospital Organisation. Over congestion and over crowding in hospitals will be discussed and in the later part of the thesis site conditions, methodology and concepts of design will be analysed and discussed. Conclusion arrived at, having design implication will be used as impute into design.

1.2 PROBLEM DEFINITION:

In the past, when you take patients to the hospital, you literary had then over to the staff who in turn will take adequate care of the patients, meeting their needs and helping them in whatever way the can. However, nowadays the reverse is the case, one has to remain behind in the hospital to take care of his own patient. This problem has greatly affected hospital maintenance, neatness and function. The hospital corridors have virtually been turned into laundries, kitchens and sleeping areas by the relatives of patients who have come to take care of them (the patients). The provision for this has not been made in previous hospital buildings/designs.

The General Hospital is to be designed to meet the immediate health needs of the Deba Local Community. At the same time incorporating within it modern requirements of hospitals in terms of technology, equipment and planning.

Emphasis will be laid on the organisational structure of the hospital. Taking into consideration the inter-relationship between the various hospital departments and space requirements. Also, the integration of environmental safety requirements in the design of hospitals.

1.3 ARCHITECTURAL SIGNIFICANCE:

This research work will bring to the notice of Architects and hospital planners alike, the problems - social and policy, presently encountered in hospitals, that past designers have not considered. It will also offer possible solutions and information, which it is hoped will help in future designs of hospitals.

Architectural concepts and planning will be used in addressing the problems observed in hospitals even though they are socially and policy oriented. However, Architects through their design can influence societal behavior and policy.

1.4 MOTIVATION

The general conditions of hospitals, which is deteriorating and unpleasant to look at and increasingly does not portray the original image of hospital building as health facilities. It also gives no room for possible integration of modern (changing) scientific equipment and methods of treatment; The lack of consideration for problems of over-crowding caused by patient relatives; And coming from a family of medical (Doctors and Nursing) and para-medical personnel who blame every problem other than management on hospital planners (Architects in particular), motivated me into working on the topic

1.5 AIM AND OBJECTIVES

The aim of this thesis is to evaluate and study the issues relating to sanitary, space appropriation and organisation as a result of over congestion and changing needs of medical sciences and making submissions that will help in addressing them. The aim will be achieved through the following objectives:

i. Developing a hospital, which could meet future development needs in terms of expansion and modernization.

ii. Developing a hospital, which could accommodate modern and traditional requirements of hospital.

iii. Committed to producing healthcare using scientific equipment and methods.

iv. Incorporating within the design context possible solution to congestion and space misappropriation with respect to nursing relatives etc.

v. Enhancing proper condition of the various departments and effectively co-ordinate the function of the various departments.

vi. Developing and integrating environmental and safety installation proposals to meet, constructional, layouts, legal and economic requirements.

vii. Providing organised support facilities to enhance patient welfare.

1.6 SCOPE AND LIMITATIONS OF STUDY.

The proposed hospital will comprise the out-patient and in-patient sections. The sections will integrate within them all the necessary departments and facilities that are required in hospital designs. The departments will be up to date in terms of planning, technology and equipment. The departments will include amongst others:

i. Diagnostic and treatment facilities

ii. Surgery

iii. Emergency

iv. Nursing Units or Wards.

v. Administrative and other support facilities.

The design will proffer possible solution to the earlier mentioned problems by integrating within it support facilities which will enhance patient welfare. The design proposal will also address space requirement and organisation, safety requirements, and circulation problems in hospital buildings. It is hoped that the design will be functional and achieve the purpose for which it was made.

The design will be limited by the provisions governing the design of hospital buildings and land development policies, guidelines and rules, and also by the healthcare needs of the Deba Local Community.

1.7 RESEARCH METHODOLOGY:

Research methods to be employed will include interviews and discussions with related professionals, hospital boards and other health administration officials at various levels. Interviews will be made with patients with respect to their condition and care they are getting or have obtained in various hospitals.

In-depth studies and review of past works and publications of health matters will also be made. These publications could take the form of journals, textbooks, research papers etc.

Case studies of existing hospitals will be made to analyse and study aspects of hospital planning and development; the problems and solutions, past designers have been able to achieve. Some of these case studies will be made at hospitals close to the local community and home environment in order to understand the local healthcare needs and problems of the community. Also, case studies will be carried out in special hospitals with up to date planning, equipment and facilities, and modern methods of medical treatment in order to include them in the proposed design.

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CHAPTER TWO

LITERATURE REVIEW

2.0 HISTORY OF HOSPITALS:

The word Hospital comes from the latin word 'Hospitalis' which means an "institution for guests". As early as 4000 B.C, temples of the ancient gods were used as houses of refuge for the sick and the infirm. A notable example is the temple of Aescalapius the Greek god of medicine.[2] History shows that the Buddhist in India had set up hospitals as early as the 3rd century B.C. The Egyptians were also known to have practiced the art of trephining i.e boring a hole in the head to reduce pressure exerted on the brain successfully.

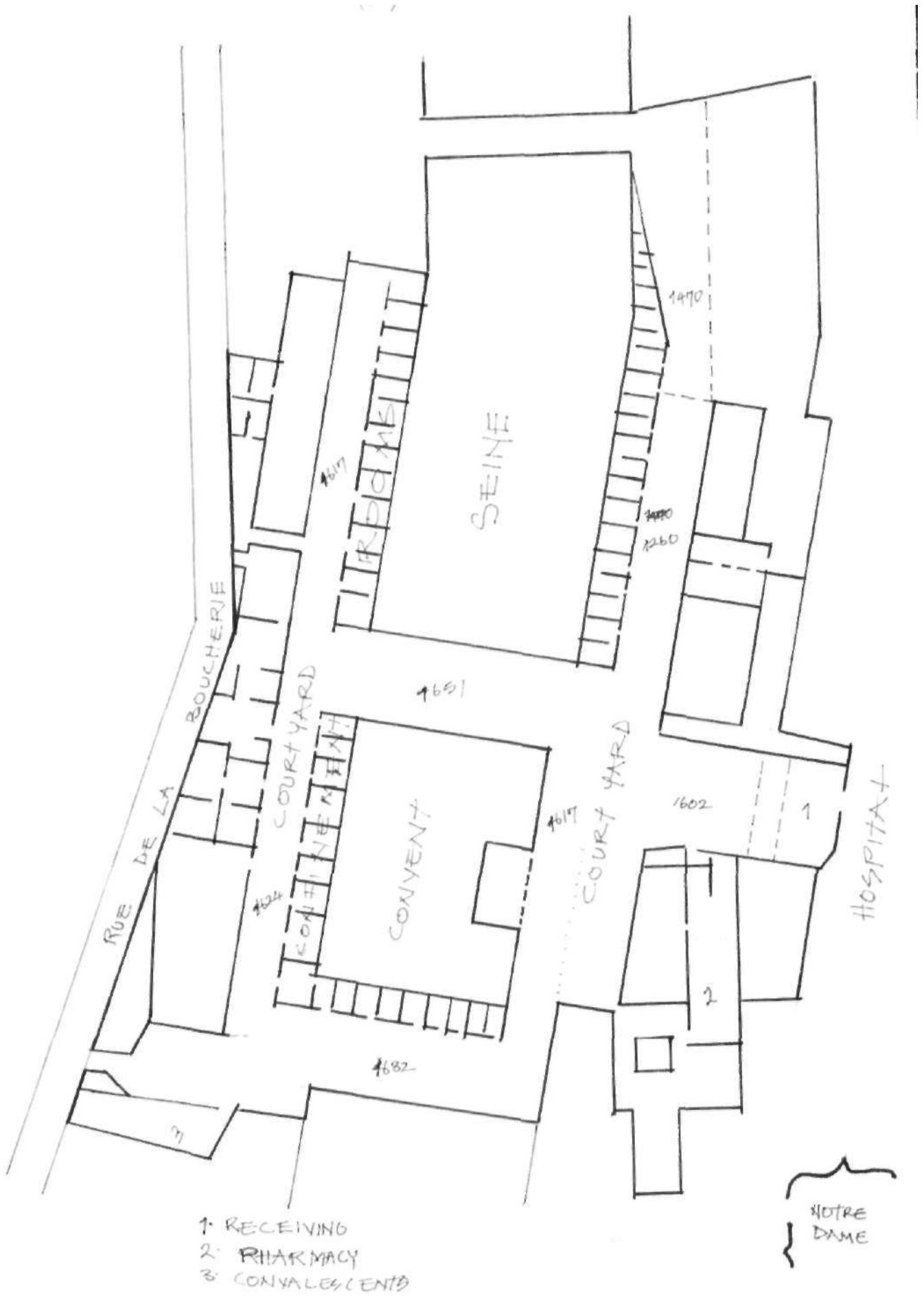
Medicine men were present in early primitive societies, and were believed to have supernatural powers of healing, given them by gods. It was then believed that illness was brought about by atrocities committed by man to the gods he worshiped, and that the medicine men were the link between man and his god(s).

The general growth of hospitals occurred during the Christian era, when hospitals were established for sick and weary travelers. Most early hospitals were operated by religious orders. The oldest hospital still in existence is the Hotel Dieu in Paris, established during the 600 A.D's by St. Laudry (Fig.1.1);[3] other hospitals were established in wealthy city states of Italy, Florence, Venice, Milan, Genoa, in the 1300's. Throughout the middle ages, the Renaissance, and even later hospitals were almost entirely run by religious groups.

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[2] The World Book Encyclopaedia Vol. 9 1992; World book Inc. Pg. 316

[3] The World Book Encyclopaedia Vol.9 1992; World Book Inc. Pg. 316.



HOTEL DIEU, PARIS, FRANCE · SITE PLAN

SOURCE: FUNCTIONAL PLANNING OF GENERAL HOSPITALS

Municipal Hospitals operated by civil authorities began at the beginning of the 18th century, particularly in England. In the United States, the first public hospital was the Pennsylvania Hospital in Philadelphia built in 1751, through the efforts of Benjamin Franklin and Thomas Bond.[4]

Medical discoveries in 1800's helped begin the improvement of hospitals. In the 1840's, Ether and Chloroform were first used as anaesthetics to reduce pain and shock of operations. In the later 1800's, Doctors began to observe the principle of antisepsis (Cleanliness to reduce infection). In 1865, Sir Joseph Lister began to use a spray of cabolic acid to kill germs in the air. Another feature of the late 1800's was the growth of hospital schools of Nursing and Medicine, which trained Nurses and Doctors.

From the middle of the 19th century, the number of hospitals greatly increased due to the discovery of new medicines, equipment and techniques in healthcare. In the 1960's, a number of hospitals became increasingly interested in serving the community. Hence they began to provide laboratory tests, X-rays, and various kinds of therapy for out patients.

Many scientific advances of the 19th century helped to improve patient care. For example, surgical and intensive care units now use electronic equipment to keep continuos record of patients blood pressure, heart rate, respiration and temperature. In the 1970s and 1980s, hospital technology made great advances with the introduction of ultra-sound, magnetic resonance imaging, and computerized tomography scanners for analysing patients.

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[4] Funk and Wagnals New Encyclopaedia Vol. 13; Funk and Wagnals Inc. New York.

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2.2 HOSPITAL PLANNING AND DEVELOPMENT

In early times, hospital forms closely resembled temples and shrines. This is because medicine and healing were linked to the gods. Gradually however, hospital forms achieved a character of their own as a result of growing rational process of thought. Functional groups and patterns emerged.

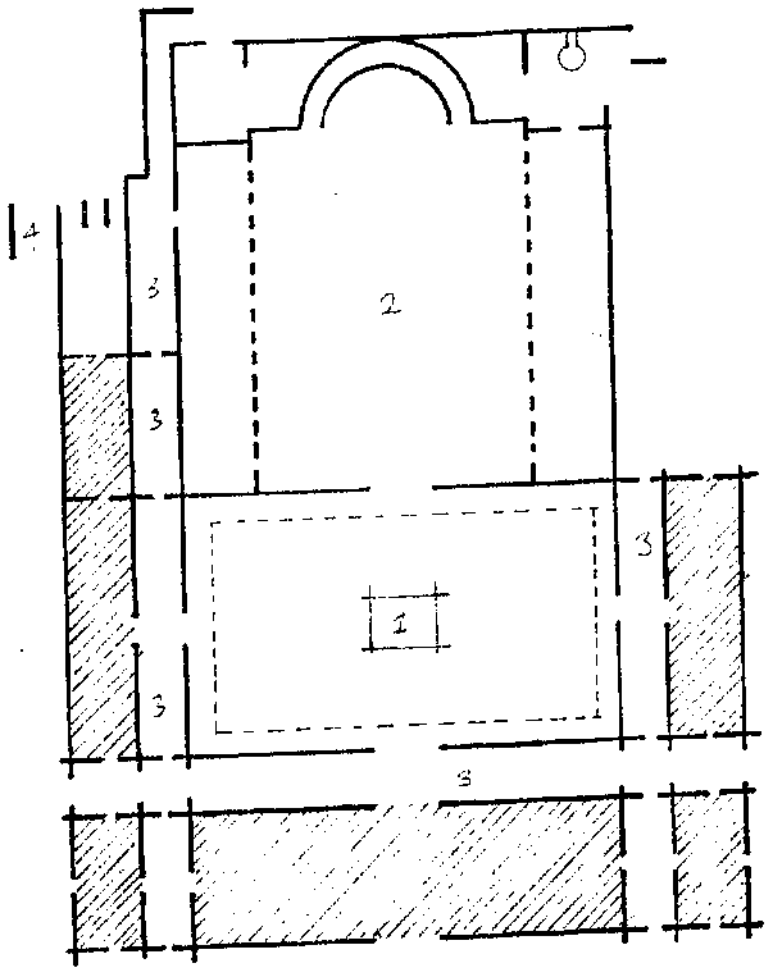
The sites for early hospitals/temples were usually along side mineral waters believed to be warm healing springs, and places of peaceful tranquil landscapes. Rooms for patients were constructed adjacent to these temples.[5]

A Romano Christian Xenodochium (hospital) believed to have been built in 398 C.E at Ostia, Italy was excavated in 1875. The Xenodochium had a form, which was Basillican in concept (fig.2.1). It had a definite sense of organisation, shown by several patients' rooms around a porticoes courtyard. The corridors showed a clear expression of the circulation pattern.[6]

The Bassillica which was the dominant element in the 6th century hospital Architecture, was removed by the designers of the hospital at Turnamin in central Syria, which served as a hospital for early pilgrims to the holy sepulchre. The hospital had a mobile asymmetrical layout, and its functional problem was solved in a graceful architectural expression.

The Architects of the Abbey hospital at St. Gallen, Switzerland (fig.2.2) built in 820 C.E, brilliantly solved the multi complex problem in hospital buildings. They set up a form, which could be supplemented at different times according to need and financial groupings. The hospital design showed a high degree of organisation, separating

[5] D.B Chuhwak 1986, Plateau Hospital Jos; Unpublished Msc Thesis. A. B. U. Zaria.



PATIENT AREAS

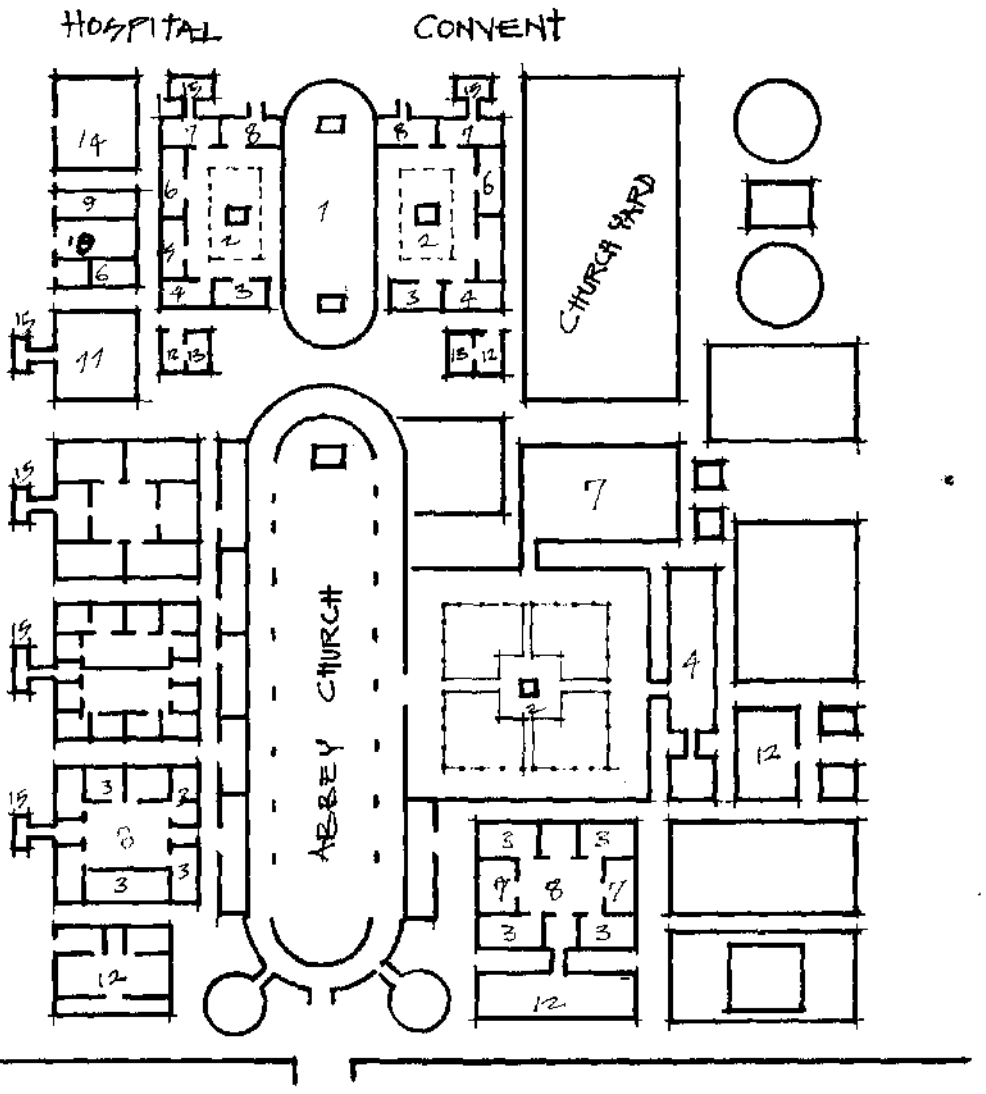
1. COURTYARD WITH WATER CISTERN
2. BASILLICA
3. TRAFFIC CORRIDORS WITH ADJOINING PATIENT ROOM
4. STREET.

ROMANO CHRISTIAN XENODOCHIUM AT OSTIA, ITALY.

SOURCE: FUNCTIONAL PLANNING OF GENERAL HOSPITALS. BY THE AMERICAN ASSOCIATION OF HOSPITAL CONSULTANTS.

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[6] D.B Chuhwak 1986, Plateau Hospital Jos; Unpublished Msc Thesis. A. B. U. Zaria.



1. CHAPEL
2. CLOISTER
3. ROOM
4. REFECTORY
5. SUPERVISOR'S DOCTOR
6. CRITICALLY ILL PATIENTS
7. PATIENTS WARDS
8. RECEIVING ROOM
9. PHYSICIANS QUARTERS
10. PHARMACY
11. SEPERATE BUILDING FOR SURGICAL AND TREATMENT
12. KITCHEN
13. BATHS
14. HERBAL GARDENS
15. SERVICES

THE ABBEY AT ST. GALLEN SWITZELAND

SOURCE: FUNCTIONAL PLANNING OF GENERAL HOSPITALS;
BY THE AMERICAN ASSOCIATION OF HOSPITAL CONSULTANTS.

buildings for surgery, patient care and the generally ill, paying due attention to ventilation, sanitation and the need to contain patients in small groups.[7]

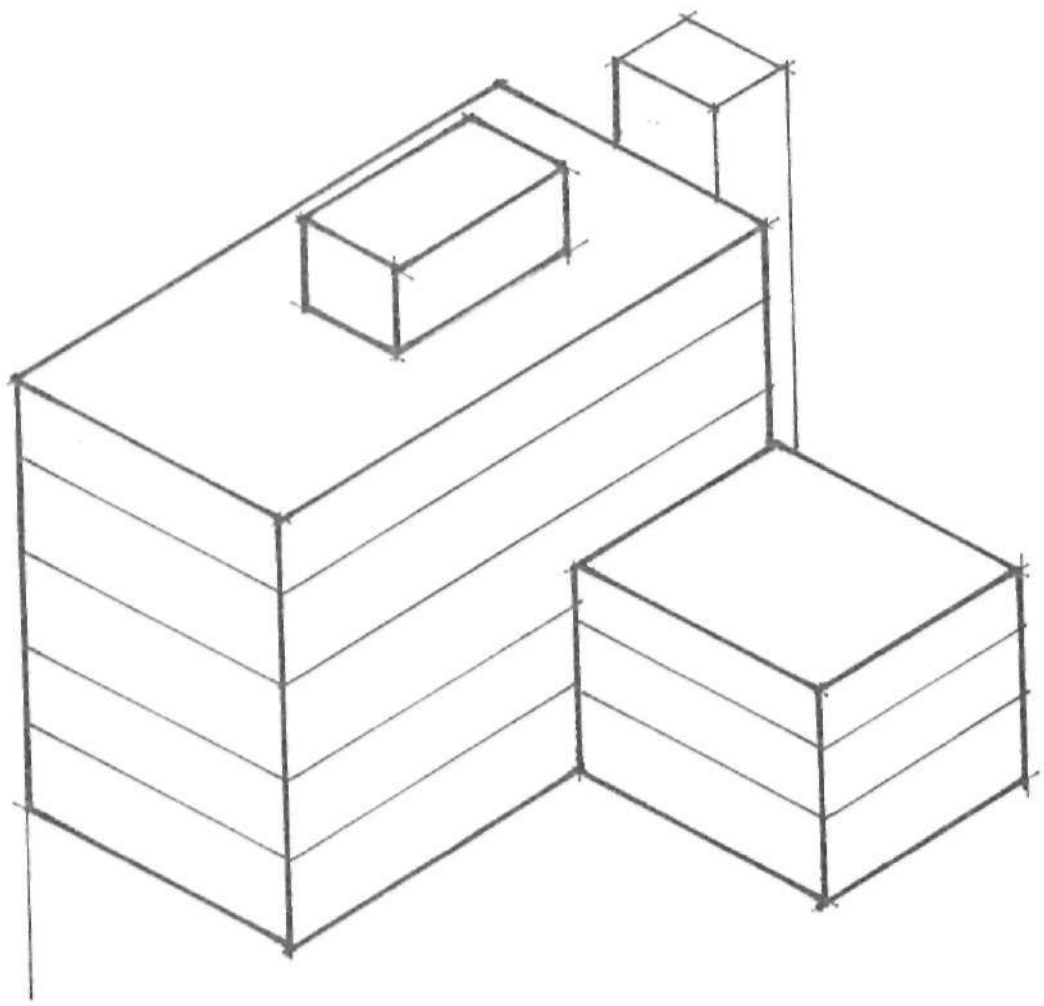
In 1859, Florence Nightingale, in her 'Notes on Hospitals' argued that defects in hospitals lay mainly in their inadequate standard of natural lighting, ventilation, and the crowding together into one building a great number of patients. Using the Lariboisire Hospital in Paris as an example, she laid down precise dimensions and areas for what is now called the "Nightingale Ward". These wards were long narrow rooms with beds against each wall, tall windows ensuring sunlight and good cross ventilation. She placed sanitary facilities at the far end of the wards, and the kitchen and linen rooms at the corridor end, positioning the Nursing sister in such a way that she can supervise some fourty patients from her position.

Today, there are basically two major types of hospital planning systems in existence; the pavilion system which has a horizontal layout and the mono block system which is vertical in a multi-storey context.

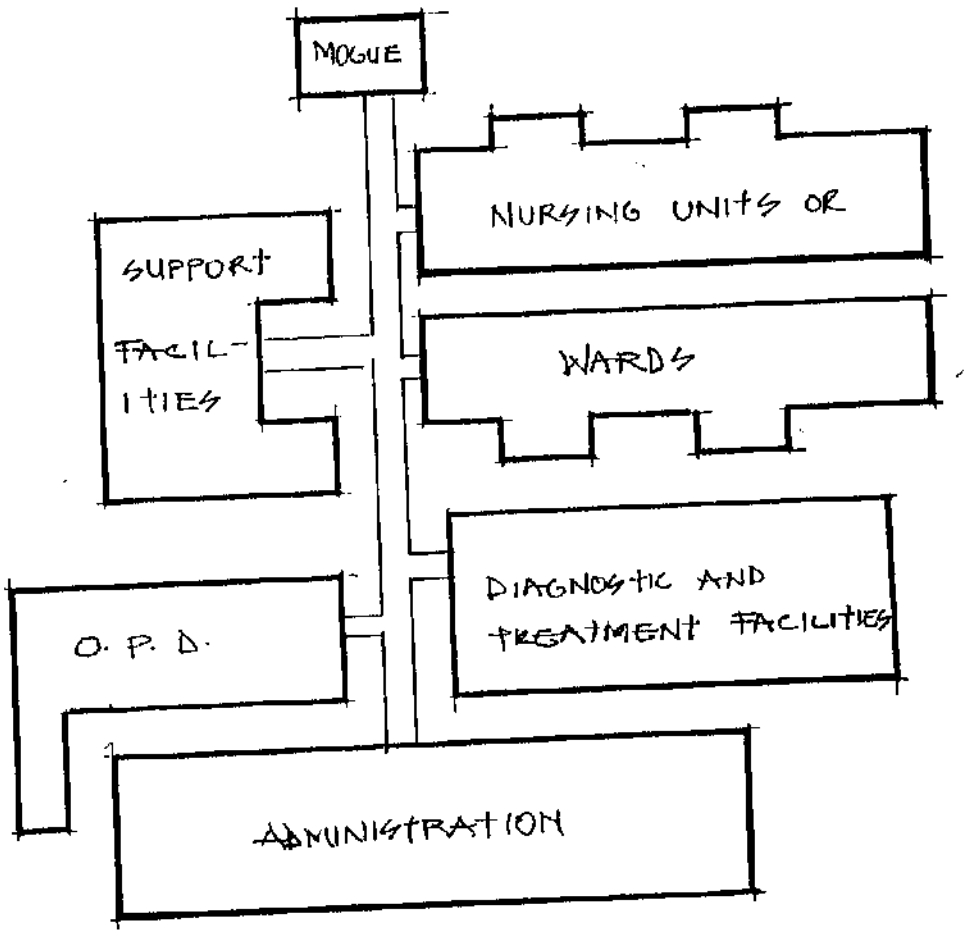
2.3 HEALTHCARE SYSTEM IN NIGERIA

Like every other nation in the world, Nigeria has an organised healthcare service. From the early times when medicine was linked to the gods, traditional medicine men; The "Wanzam" for the Hausas in the North; "Adahunse" for the Yoruba in the South West and "Dibia" for the Ibos in the South East; have existed providing primitive medical care to their various communities or societies. The root of medical care in Nigeria as we know it today can be traced to the Portuguese, who, history has shown, traded with and sent religious missions to Benin and Warri. These Portuguese settled

[7] O.B. Ehiojo 1988, General Hospital Abuja; Unpublished Msc Thesis. A. B. U. Zaria.



THE MONOBLOCK SYSTEM OF HOSPITAL PLANNING



THE PAVILLION SYSTEM OF HOSPITAL PLANNING

down towards the end of the first half of the fifteenth (15th) century, and it is believed that they brought with them some form of European Medical care.[8]

In Nigeria, a comprehensive healthcare service exists today in which both private organisation and individuals, and the government at all its three levels i.e Federal, State and Local, strive to enhance to provide good and efficient health care services to the teaming population. The local governments provide healthcare to the rural populace, through the provision of health centres and dispensaries. The State government provides healthcare for both Urban and rural areas, supplementing the efforts of the local governments by providing general hospitals and other secondary health facilities which require more resources than the local government can provide. The Federal government on its part runs an established network of tertiary healthcare facilities, which provide specialists healthcare and medical training institutions. It also regulates and guides the activities of state and local governments in the provision of healthcare, giving the necessary support financially and morally. Non-governmental organisations, corporate bodies, religious bodies and individuals have established health clinics and information dissemination centres either as non-profit making or profit oriented healthcare facilities to supplement government efforts.

Available statistics show that health establishment in Nigeria have been on the increase over the years. As at 1987, the number of health establishments in Nigeria was 12,613, however, this has increased to 13,964 by 1991, an increase of 1,351. The breakdown is shown in the table below:

TABLE 2.1 Health Establishments In Nigeria

Description	Number (1987)	Number (1991)
General Hospitals	763	897
Maternity Hospitals	3,090	3,349
Infectious Diseases.	30	48
Orthopedic Hospitals	3	3
Psychiatric Hospitals	13	16
Teaching Hospitals	14	14
Others	8,700	9,637

Source: Annual Abstract of statistics, 1995 edition; published by the Federal *Office of statistics Lagos Nigeria.*

The distribution by ownership of these health establishment in Nigeria is given as follows:

TABLE 2.2 Ownership Of Health Establishments

ESTABLISHMENTS	NUMBER 1987	NUMBER 1991
Federal Government	158	205
State Government	2,982	3,355
Local Government	6,760	7,267
Private	1,905	2,295
Others	808	842

Source: Annual Abstract of statistics, 1995 edition, published by the Federal Office of statistics Lagos Nigeria.

[8] Odumah B. E. 1988, General Hospital Abuja; Unpublished Msc Thesis A. B. U. Zaria

The type and number of health personnel working in Nigeria with various health organisations both private and government are given as;

TABLE 2.3 Health Personnel In Nigeria As At 1991

PERSONNEL	NUMBER
Medical Practitioners	7,760
Dentists	405
Dental Staff	965
Pharmacists	995
Pharmacy Staff	4,823
Nurses and Midwives	37,037
Community Health Workers	17,365
Health Education Officials	463
Health Managers	1,354
Sanitary/health Engineers	324
Environmental Health Officials	2,437
Medical Laboratory Staff	4,227
Radiology diagnostic staff	1,196
Medical records staff	4,138
Medical Social Workers	2,887
Medical Rehabilitation Staff	277
Opticians	473
Prostectists/Orthostists	24
General Maintenance Staff	37,827
Total	**145,105**

Source: Annual Abstract of statistic 1995; published by the Federal Office of statistics Lagos, Nigeria.

One finds from the above tables that these establishment are in adequate to serve Nigeria when compared to the current Nigerian population which is estimated to be over

a hundred and twenty (120 Million). Going by the standards adopted by the Nigerian Medical Association (NMA). After considering local problems of low technology and medical personnel, as well as peoples response and awareness to medical care, recommends the use of 2 beds per 1000 population, and 3 beds per 1000 population in rural and urban areas respectively.[9] The total bed capacity treated in 1991 as given by the federal office of statistics is 119,413. This figure is inadequate when compared to the 1991 population figures of 88,514,501 as shown by the population census conducted in that year. Using the recommended standards of 2 beds/1000 population the number of beds required as at 1991 is 177,029. Therefore, there is a short fall of 57,616 beds.

The present health condition of this country is unfortunately characterized by social apathy and lack of initiative to force the face of change, with a great part of the population living in slums and overcrowded environment. The incident deterioration of our environment caused by pollution as a result of our activities, which neglect the simple rule of basic hygiene practice willfully, has contributed immensely to the deterioration of health services in the country.

Nigeria in order to achieve its objective of providing health for all, must first recognize the importance of health services for its large population, and improve and implement health programs which should be targeted at the rural populace who constitute about 70 percent of the country's population. More resources, physical and financial must be channeled to areas promoting healthcare development.

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[9] Dalyop B.C. 1986,, Plateau Hospital Jos; Unpublished Msc. Thesis. A. B.U. Zaria. Pg.20.

2.4 HEALTHCARE IN GOMBE STATE

In Gombe State, health care is one of the primary concerns of the State Government, which expends a great deal of resources on healthcare provision. The State Government controls a number of health establishments', which includes Nursing Schools, Hospitals, Health Centres and dispensaries, apart from other health administration establishments. It works in line with policies formulated at its level and those formulated at the federal level in order to enhance effective and efficient healthcare delivery to its people. It sponsors and implement's policies such as the primary health care aimed at the lowest group of social organisation - the family. The government also carries out preventive health care programmes, which includes child immunization campaigns and public enlightenment campaigns on health matters.

Being a new state, which was carved out of the former Bauchi State on the 1st of October 1996, Gombe state has very few limited number of health establishment and facilities which it inherited from its parent state. Hence the need for the establishment of more of these facilities to cater for its population which is projected to be 1,820,330 as at 1998. [10] At present, the state has the following number of health establishments:

[10] National Population Commission Gombe State

Table 2.4. **Health Establishments In Gombe State (1998)**

DESCRIPTION	NUMBER
General Hospitals	4
Referral Hospitals	1
Health Centres & Dispensaries	23
Maternity Clinics	35
Private Clinics	79
School of Health Technology	1
Total	**85**

Source: Ministry of health Gombe State.

The realization of the fact that these facilities are inadequate to meet the health needs of its population, the state government proposed the establishment of more healthcare facilities. These include the construction of more general hospitals at designated places/towns and more health centres and maternity clinics as its resources Permit.[11]

2.5 TYPE OF HOSPITALS

Hospitals form a vital part of organised public health service. They vary widely both in size of the institution and the kind of services provided. Hospitals operate under one of the three types; They are either Voluntary, conducted as non-profit public enterprises under private management; Government supported and sponsored by Federal, State or Local agencies; Or proprietary profit making institution financed by investors.

[11] Gombe State Ministry of Health.

2.6 CLASSIFICATION OF HOSPITALS

Hospitals may be classified according to the kinds of services they offer or according to the length of stay of patients or patronizes of the hospitals.

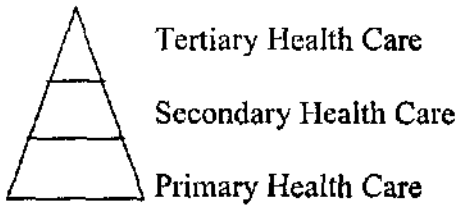
2.6.1 CLASSIFICATION ACCORDING TO LENGTH OF STAY

Hospitals are classified into two major types according to the length of stay, namely the short-term and long-term hospitals. Although, there is no sharp distinction between these two types of hospitals, the short term hospitals as defined by the American Hospital Association (AHA), "are those whose over half of the patients are admitted for less than 30 days". While, long term hospitals are those, whose patients are admitted for more than 30 days.[12]

2.6.1 CLASSIFICATION ACCORDING TO SERVICES

This is the most widely used mode of classifying hospitals. Hospitals are graded according to their degree of sophistication and specialization, and also according to level of care they can provide. This is represented in the health pyramid.

Fig. 5. **THE HEALTH PYRAMID.**



[12] Grolier Family Encyclopaedia; Grolier Inc. Danbury, Connecticut.

i. **PRIMARY HEALTH CARE**

At the lowest level of classification of hospitals according to services rendered, are hospitals that are small rural institutions serving a tiny local community. These hospitals usually do not have in-patient facilities, where however, there are provided they usually less than a 100 bed for short term stay. These hospitals offer general medical assistance with some limited specialist facilities in any. They usually offer first aid services only and refer the more acute cases to bigger general hospitals. Within this classification group also are the dispensaries, which serve as local centres for treatment of minor ailments or dispensing units. Maternity clinics belong to this group, and these clinics usually handle minor cases of Women and Children (Under 5) diseases.

i. **SECONDARY HEALTHCARE:**

This group comprises of more advanced and specialized health care facilities than the primary health care. It comprises of large hospitals, which serve a wide area and larger population centres such as towns and suburbs of major cities. They (Hospitals in this category) provide treatment for more acute ailments and medical cases, which can not be handled by primary health care facilities. It also accommodate referred cases from primary health centres and provide in patient services, with usually more than a hundred bed capacity, at times up to 5000. Besides general medical provision, these hospitals provide a wide range of specialist services and facilities. The general hospital belongs to this group, it offers more complex services and is larger and more equipped to cater for serious or chronic illnesses than health centres or dispensaries.

ii. **TERTIARY HEALTHCARE:**

This is the top level of hospital classification supplied by specialist hospitals and/or teaching hospitals. Teaching hospitals are associated with medical schools, providing practical training for medical students. They offer the most highly specialized services such as brain surgery, heart surgery etc. They also support facilities for medical research. Specialist hospitals on the other hand, are hospitals, which cater for specific types of patients. Examples are pediatric hospitals, which deals with children, Eye hospitals, which care for patients with sight difficulties.

REFERENCE:

1. A. A. Massoud 1965, The General Hospital as an Architectural Organism; the Catholic University of America Press, Washington D.C.
2. Annual Abstract of Statistics, 1995 Edition: published by Federal Office of Statistics Lagos, Nigeria.
3. D. B. Chuhwak 1986, Plateau Hospital Jos; Unpublished Msc. Thes... Ahmadu Bello University, Zaria.
4. Funk and Wagnals new Encyclopaedia vol. 13; Funk and Wagnals Inc. New York.
5. Grolier Family Encyclopaedia; Grolier Inc Danbury Connecticut.
6. O. B. Eluojo 1988, General Hospital Abuja; Unpublished MSc. Thesis. Ahmadu Bello University Zaria
7. The World Book Encyclopaedia Vol. 9 1998; World Book Inc.

CHAPTER THREE

PLANNING PRICIPLES

3.0 PLANNING OF HOSPITALS:

Each a specialist in his field, various professionals and non-professionals alike, work together as a team in a hospital. This team of specialists ensures that health is restored to patients by curing them off their ailments. Therefore the primary function of a professional planner is to design a hospital which will assist these professionals or specialists to make the most productive use of their time and talents for the benefit of the patients in particular and society in general.

Safety and comfort of both patients and staff are the primary necessities that the hospital planner should provide in his design. This is because all services in a hospital are geared towards serving the patient and those rendering service to him.

Hospital layouts should be such that patients can find their way through the various departments even on a first visit and cross infection should be borne in the mind of the planner while making his designs, so that it is minimized or where possible completely eradicated.[13]

A hospital is a complex institution, which is complicated when designing, hence it is important to (usually) assemble a design team, although "the most efficient means of accomplishing unity is through the mind of one man, a master planner."[14] The problem associated with hospital planning "almost always exceed one man's knowledge and experience. Thus it is necessary to assemble a design team". Wrote Mr. Todd Wheeler in his "Hospital Modernization and Expansion' (page 26).

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[13] A.A. Sani 1983, Kano General Hospital; Unpublished Msc. Thesis. ABU. Zaria.

The design team, which comprise of representatives of the hospital, Engineers and Consultants has the Architect as its leader. Members of the design team should be versed in the design process. The team also needs some assistance from medical staff in form of information during the design process.

In order to achieve a functional and effective workable plan. The hospital design team has to go through a design process in "which the planning team guides the project from the initial need through multiplicity of ideas into a realized building ready for patients", indicated Mr. Wheeler in another of his books, 'Hospital design and function' (page.19). He also showed that from his experience, "It is also wise to follow a logical course" while planning a hospital.

The hospital planning process involves an appraisal of community needs such as the size of the hospital, the population growth and geographic extent of the community, the calculated community resources for construction and operation and the need for future expansion.[15] A functional programme, is then drawn up including all design determinants such as the total number and subdivision of hospital beds required, the number and degree of sophistication of surgical operating suites, and estimate of the kinds and number of surgical operations to be performed annually. The programme should also include determining and identifying the various hospital departments necessary and their interrelationships with each other. It is also necessary to include the identification of necessary service departments such as administration, maintenance etc. while drawing up the programme.

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[14] E. T. Wheeler, Hospital Modernization and Expansion; Mcgraw Hill Book Co. (pp. 26)
[15] A.A. Sani 1983, Kano General Hospital; Unpublished Msc Thesis. ABU Zaria

An Architectural programme is also necessary, and should be drawn up by the Architect using everything that is known about the needs and desires of the users of the proposed building as a guide. The programme should "Outline the structure, interior and exterior finishes, mechanical and electrical systems, and site development". This programme should be drawn up quite early by the Architect in order to obtain the clients endorsement and approval, as it "effects the schematic planning and the relative size, quality and cost of many elements.

3.1 PATIENT CARE UNITS (WARDS)

Patient care units generally known as wards are places where patients admitted into a hospital are accommodated or housed. Patients stay within these units from the time of admission to the time of discharge undergoing treatment and medical care. The patients stay could be long or short depending on their illnesses and recovery time needed. Patient care units are considered as primary components that are very important in a general hospital after which, come adjunct diagnostic and treatment facilities. The general hospital care units or wards are divided into:

1. Medical Ward
2. Surgical Ward
3. Obstetrical Ward
4. Paediatric Ward
5. Psychiatric Ward(9)

These wards are further divided into male and female wards especially where the rooms contain more than one bed. Isolation rooms for patients with infection or communicable diseases are also a sub-division of these wards.

3.2 PROGRESSIVE PATIENT CARE:

This is the systematic grouping of patients according to the degree of illness and dependence on the nurse, rather than by classification of disease or sex. These are:

a) Intensive therapy (care)

b) Intermediate care

c) Continuos, long term or rehabilitation care

d) Care at home after discharge.

3.2.1 INTENSIVE CARE:

Within this group falls patients that are seriously ill and therefore require considerable amount of basic and technical assistance/nursing, and may require the use of piped medical gasses (oxygen, suction, intravenous fluids, drainage or traction). These patients require an environment conducive to rest, and early ambulation should be encouraged.

3.2.2 INTERMEDIATE CARE:

These are patients who require full bedside care and supervision but are able to help themselves to some extent by washing, bathing and making use of the W.C many of these will sit out of bed.

3.2.3 SELF CARE:

This group contain patients that are up at least 4 hours each day; are ambulatory, able to feed wash and go to the W.C by themselves. This group however does not contain patients whose ages are under 12 years and above 75.10

3.3 CONSIDERATIONS IN PLANNING WARDS OR NURSING UNITS:

Nursing units are usually broken down into small divisions, the sizes of which are determined by the nurses ability to effectively care for and observe each patient as well as the ability of the head nurse to effectively supervise the nurses working in the (each) unit. The United State Public Health Service Publication (USPHS) as extracted by A.A. Massoud in his "The General Hospital as an Architectural Organism"(pg29) states that "planning specialist puts the census of patients that can be accommodated in any ward at between 30 - 45 or less". This range as stressed by the USPHS is due to the following reasons:

i. When the number exceeds this, staff morale and quality of care decrease

ii. At a higher figure, the head Nurse looses are observation, concentration and fails to provide the kind of information desired by the physician.

iii. Relationship between the Medical and Nursing staff is trained when the volume of work is compounded by a large number of patients.

iv. The composure of new and temporary staff will be much difficult with a large number of patients due to increased 'business' of the division.

The reasons given by the USPHS obviously point to the fact that the larger the number of patients, the lower the quality of nursing services. However, Isadore Rosenfield in his 'Hospital Integrated Design' (pg 58) indicates that there are some professionals and nursing authorities who do not share the same view and they argue that the size of a nursing unit has nothing to do with the quality of nursing.

It is very important for the hospital planner to determine the size of each nursing unit division from the initial stage of his design. This much is indicated by Mr. Wheeler

when he wrote that "the decision as to the allocation of beds plays a large part in establishing the shape and character of the patient floor". He also recommends that the maximum distance between the nursing station and patient room door to be 30m.

3.4 PLAN SHAPES OF WARDS:

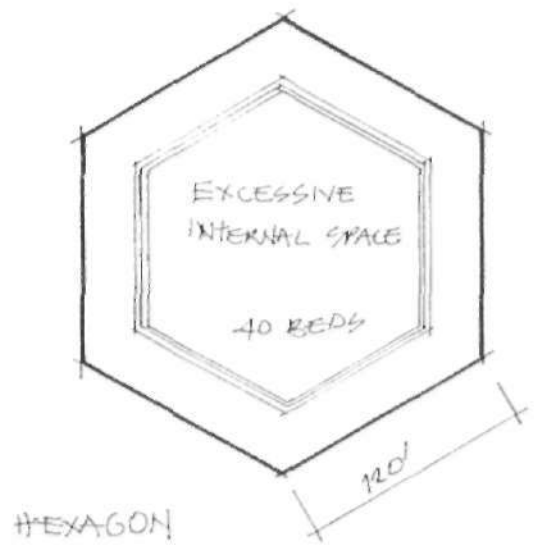
The shape of ward is very important, as it may affect the effeciency of nurses. The prime consideration for the shape is the distance between the nursing station and the most remote bed in the ward. After carrying out studies on the shape of wards, the Nuffield Provincial Hospital Trust (NPHT). Wrote in its publication that the hospital designer should "keep walking distance as close as possible for Nurses and ambulant patients" recommending a maximum distance between bed and W.C to be 12m, and the distance from Nurses' station to the remote bed to be 20m.

Various forms of plan shapes of nursing units (wards) have been tried tested or used. Each carefully studied before being adopted; The structures of Nursing Units are determined taking into consideration the following:-

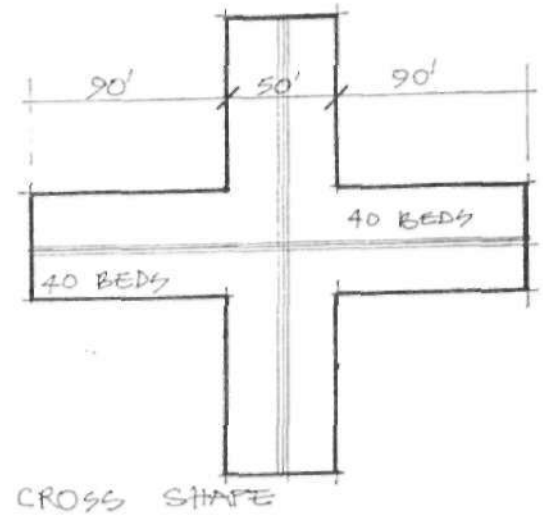
1. Climate
2. Cost of construction and maintenance
3. Architectural Aesthetics
4. Site topography.
5. Expansion possibilities.
6. Relationship with other departments.

3.5.0 LOCATION OF WARDS

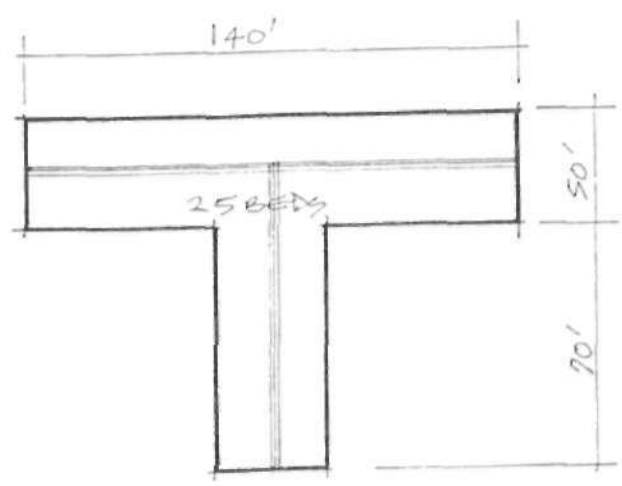
Wards, apart from the psychologically important function of providing a reassuring home for the patient that is capable of facilitating his/her recovery, the ward



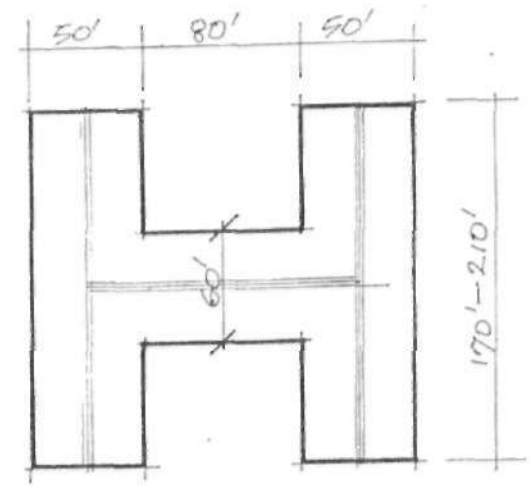
HEXAGON



CROSS SHAPE



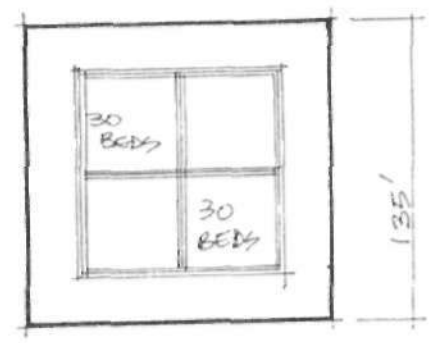
† - SHAPE



H - SHAPE



CIRCULAR SHAPE



SQUARE PLAN

PLAN SHAPES OF WARD

O. B. ELUOJE 1986, GENERAL HOSPITAL ABUJA;

combines clinical and house keeping facilities. Therefore, wards should have easy access to and from the hospitals main supply and disposal routes, convinient communication with diagnostic and treatment departments, specifically physiotherapy which are visited by ambulant in patients.

The should have simple and coherent routes that would prevent straying into other parts. The routes must not pass through sensitive areas, where the risk of cross infection is high. The wards, must be protected from excessive distractions and extraneous traffic. Wards should also not be used as principal access into each other.

3.6.0 DISTRIBUTION OF NURSING SERVICE UNITS (WARDS):

Distribution of wards within a general hospital is done with respect to its division by services. The World Health Organisation (WHO) recommends the following distribution of beds within the various wards in a general hospital.16

Medical Ward	24%
Surgical Ward	33%
Obstetrical Ward	15%
Pediatrics Ward	19%
Others	9%
Total	100%

3.6.1 MEDICAL WARD.

In most cases, patients admitted into these wards are admitted without a complete knowledge of their diseases. Hence, while they are on admission, tests and investigations are carried out to ascertain the nature of a patients' disease. Therefore these wards are located close to diagnostic and therapeutic facilities in order to reduce distance to travel for both patient and staff.

These wards accommodate patients with general medical cases such as cardiology, pulmonary metabolism, dermatology, dehydration etc.

As a result of the time required for tests to be carried out and examinations to be done, patients in this nursing unit usually stay for longer periods. Hence there is need for more medication space. Besides the normal beds required, there is a need for separate cases or infection diseases.

3.6.2 SURGICAL WARD:

This ward houses patients undergoing treatment as a result of surgery. Patients in this ward are diagnosed and the nature of their disease ascertained before admission. Thus, treatment commences immediately after admission.

Diagnosis of these patients reveal a functional disorder, such as a broken bone, abnormal growth, displaced or swollen nerve, paralysis, displaced organ, functional disability etc. Laboratory tests may be carried out, although a surgical operation is indicated fairly soon after admission and post operative time is usually kept as short as possible. This ward has a strong relationship with the surgical suite, emergency unit, C.S.S.D and diagnostic and therapeutic facilities.

This unit requires a surgical treatment room and a storage space for orthopedic frames in addition to other supporting services.

3.6.3 OBSTETRICAL WARD

This ward has a strong relationship with the obstetrical delivery suite, surgical operating suite and other diagnostic and treatment facilities, because it houses expecting mothers and new mothers with their new borne babies. The relationship between the obstetrical ward and the surgical operating suite depends on wether a caesarian section is done in the hospital. This, Mr. Wheeler wrote "is an important fact in planning".

The accommodation requirements of this ward vary from those of other wards because this is a maternity ward concerned with a natural rather than pathological event. It deals with a continuos process from pregnancy through delivery to after care for both mother and child.

Within this ward, there is a need for the provision of a nurse, which caters for infants who have diseases, or whose mothers are not well enough to return home, and premature babies. This is because it is one of the areas in the hospital where patients are most vulnerable to infection, the nursery should be planned to provide the best means for the care, safety, and welfare of the infants.

For this reason, the obstetrical or maternity ward/department should be separated from the area of the hospital, perhaps not geographically but certainly with its own entrance. It should also retain communication links with other hospital departments especially dietary and other service facilities.

The maternity or obstetrical department, irrespective of size is usually divided into two; the out patient clinic which is primarily ante-natal and the inpatient delivery

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and after care sections. The out patient ante-natal clinic has facilities that include undressing cubbies, lavatory, office space and records. It should have easy access to X-ray laboratory etc.

3.6.4 NURSERY

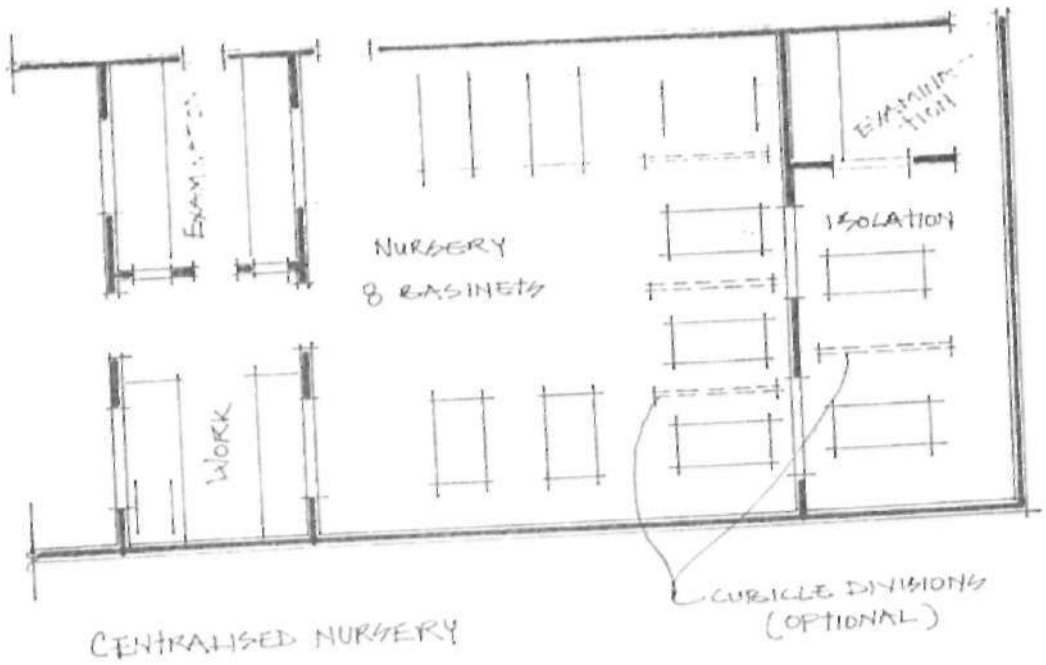
A nursery is where infants are accommodated. It is of two types; centralize nursery and decentralized nursery.

i. **Centralized Nursery:** All infants are accommodated in a central space away from their mothers. The infants are taken to their respective mother from time to time in their bassinets for feeding. Each nursery should contain no more than 8 - 10 with each having a space of between 2 - 3m2. This is inorder to discourage spread of infection and a Nurse can effectively care for only 8 infants.

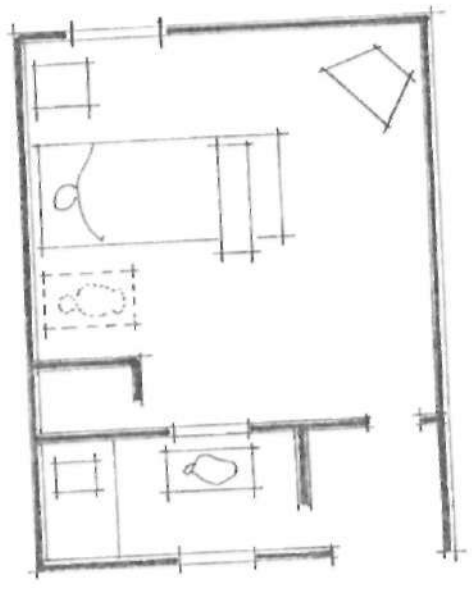
ii **Decentralized Nursery**: The nursery is broken up into smaller groups of infants whose services immediately adjoins the mothers. It has an advantage of infants not being carried great distances through corridors to their mothers. However, it is expensive to construct and maintain, increases risk of infection as visitors tend to enter the nurseries. Mother also have the babies longer than necessary, their by increasing risk of infection too.

3.6.5 PEDIATRIC WARD

This ward accommodates children whose ages are between 0 and 14 years, irrespective of wether they are medical or surgical cases. There is a variation in bed



CENTRALISED NURSERY



LUXURY PLAN · DECENTRALISED NURSERY

TYPES OF NURSERY

SOURCE: E. TODD WHEELER, HOSPITAL DESIGN AND FUNCTION; MCGRAW HILL BOOK CO.

size, because some patients sleep in bassinets, others and chips and some in adult sized beds. The recommended bed distribution for the pediatric ward is;

Bassinet	20%
Cribs	40%
Beds	40%
Total	100%

There is also the need in a pediatric ward to provide accommodation for mothers of sick children overnight, as the children require their parents' presence.

3.6.6 PLANNING PRINCIPLES OF A PEDIATRIC WARDS:

The following principles are recommended while designing a pediatric ward, according to Massoud A.A. in his "General Hospital as a Architectural Organism (pg49)

i. Pediatric wards should not be large as an adult ward, since cribs and bassinets out number adult sized beds.

ii. Beds should be partitioned to discourage spread of infection diseases.

iii. All partitions should be glazed.

iv. Play room and out door play area should be provided for convalescing children.

v. There should be an observation section to house new admission until fully diagnosed.

vi. Sufficient floor area given to each patient for togs, small tables chairs etc.

The pediatric ward also requires services of adjunct diagnostic and therapeutic facilities, as well as support facilities.

3.7.0 ELEMENTS OF A WARD

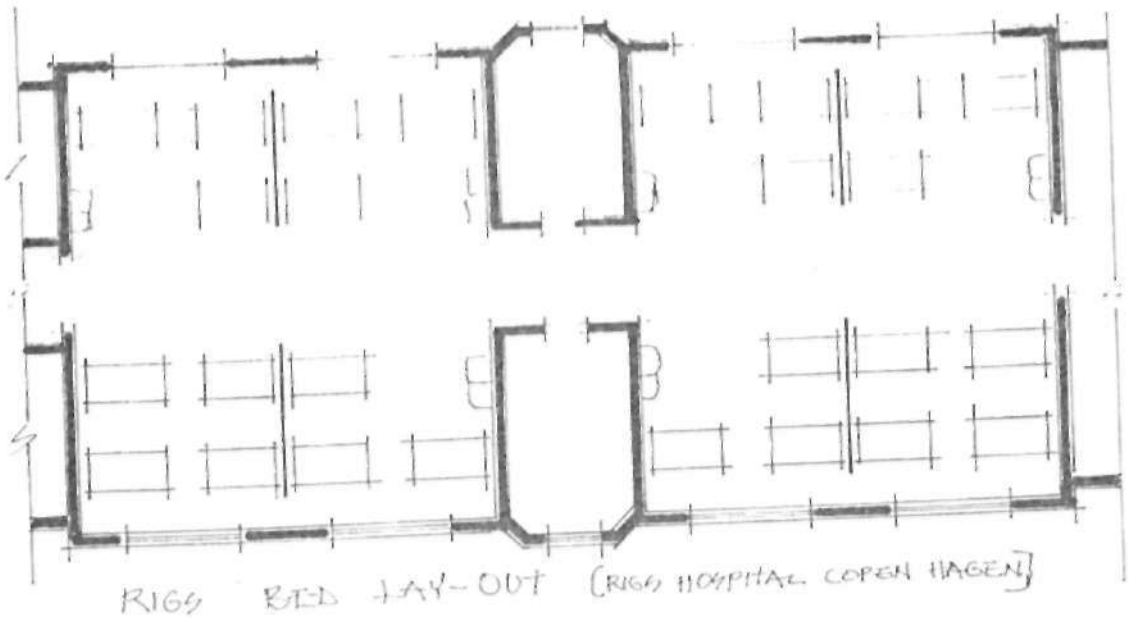
3.7.1 PATIENT BEDROOM:

When a patient is admitted, his/her room serves as the centre of his life. It serves as a sleeping space, dining space, television space, library, visitors reception space etc. It is a home away from home for the patient. Therefore, the patient bedroom should be designed "with comfort privacy, nursing aids and the designed environmental character". Mr. Ewojo wrote in his General Hospital Abuja, an unpublished Msc thesis A.B.U Zaria. (1998).

A bedrooms' size is determined by the number of beds it accommodates. One bedroom accommodates only one bed and is the most ideal among the various bedroom types, because there is absolute privacy, and no need to separate wards into male and female, also it has the advantage of control of spread of infection with no special room required for isolation. However, it has a disadvantage of high cost of construction and maintenance.

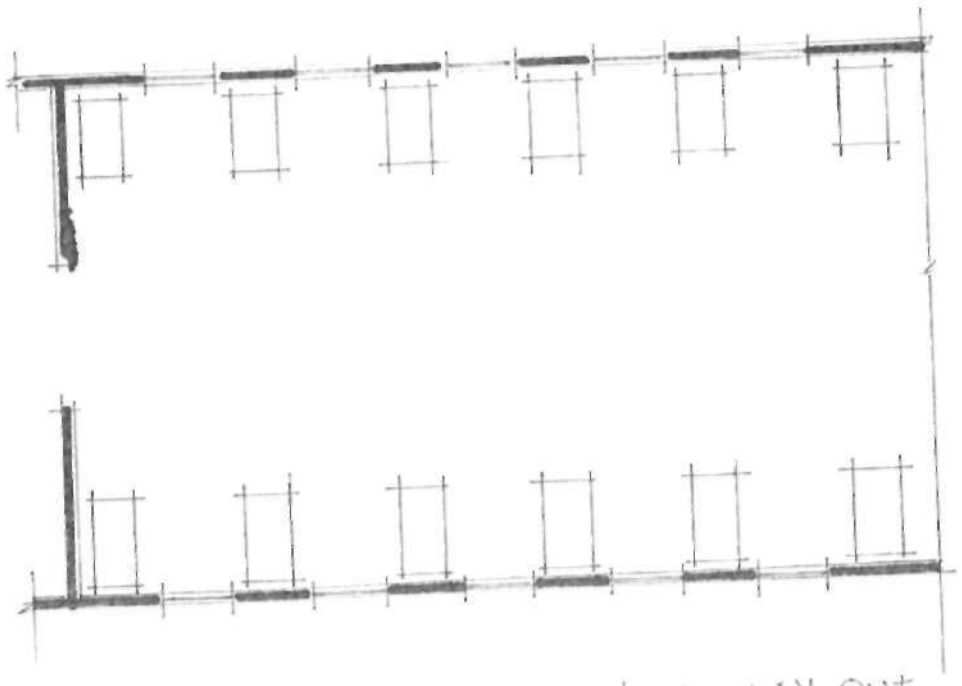
Other bedrooms are two bedrooms, four bedrooms, six bedrooms twelve bedrooms etc. These bedrooms each have their own short comings, among which include, the social factor of choosing a living partner. They also have advantages in terms of construction cost and maintenance.

The traditional popular open wards which, accommodates more than twelve beds are the most common in Nigeria. They have an advantage of ample visibility of patients from the nursing station, good cross ventilation, low cost of construction and maintenance, as well as more accommodation per floor area. However, it has disadvantage which include lack of privacy, high chances of cross infection, noise,



RIGS BED LAY-OUT (RIGS HOSPITAL COPENHAGEN)

SOURCE: E. TODD WHEELER, HOSPITAL DESIGN AND FUNCTION.



NIGHTINGALES OPEN WARD LAY-OUT

TYPES OF BED LAY-OUT

difficulty in controlling climatic conditions to suit all patients.

Bed distribution in wards depends on level of privacy required, provision for isolation need, flexibility, construction and running cost, and economy in space usage.

i **BED LAYOUT:**

The patient bed is an important unit in the patient bedroom, which is designed to support the patient in a sitting as well as reclining position. It also supports numbers devices attached it, such as side tails, frames, for suspension of arm or led in cast or for traction, a self at the to of for books and flowers etc.

a) **NIGHTINGALE'S OPEN WARD:**

Designed to accommodate 30 - 40 patients, with the beds arranged such that the patients' head is against the window wall. A window is provided for each patient, when he glances either side, he sees a window glaring at him. This is at times a means of discomfort. The Nightingale's open ward has an advantage of effective view from the nursing station of all patients within the ward.

b) **THE RIGS WARDS**

Named after the Rigs Hospital Copenhagen, Denmark where it was first used. Beds are placed such that the patient head is against position walls, subdividing the open words into bays. This arrangement allows the patients to turn his face away from the window at will.

ii **AREA OF PATIENT BEDROOM.**

Actual area/size of patient bedroom is obtained from the number of beds required. Standard sizes given by the Time Saver Standards are:

i. Single bedroom 15m2

ii Two bed room 19.5/m2

iii Four bed room 37.25m2

Maximum width of a double or single room should be 3.5m or less depending on furniture requirement. However, differences in length are found from inside of external wall to room side of corridor partition. The Time Saver Standards for building type (Second Edition) gives this dimensions as:

i. Single bed 4.40m

ii. Two bed 4.572m

iii. Four bed 6.604m

It is best, when determining the size of a bedroom, to make a schematic layout of the room with the various furniture required. Although, an acceptable bed area of 7.5m2 (per bed) can be used.

3.7.2 NURSES' STATION:

Medical records, control of visitors movements and handling of all patient correspondence while in a nursing unit is done at the Nurses station, hence, it is the working and control centre of the ward (unit). It should be centrally located near the main entrance for control of all public movement into the ward. It would be designed in such a way, to allow for easy nursing observation and access to the various patients' room. It contains facilities such as desks, nurses' lockers and toilet.

3.7.3 MEDICATION ROOM:

It is an integral part of the nurses' station, as the nurses frequently use it. It can be an alcove with shelves for keeping medication and counter for preparation of all medicines before taking to patients rooms.

SAGARI IBRAHIM

3.7.4 SISTERS OFFICE:

An office for the head nurse attached to the unit. She is to supervise all activities at the nursing station and ward in general. It could be used for small group conferences between staff members.

3.7.5 EXAMINATION ROOM:

This is necessary for procedures, which can not be done in the patients' room, such as surgical dressings. The room should accommodate a standard treatment table, a stool, two treatment trolleys, standard inspection lamp and lab basin. The room size should not be less than $7.0m^2$.

3.7.6 UTILITY ROOM:

This is where all bulky waste not taken care of in patients' toilet is disposed. It is divided into clean and soiled area. Soiled linen and rubbish carts are stored in the soiled area of the unit before they are taken out. Storage for clean linen and other supplies is done on shelves in the clean side, with the exception of food and medication. It should adjoin the examination and treatment room. Recommended space is $20m^2$.

3.7.7 FLOOR KITCHEN OR PANTRY:

This is a small kitchen usually attached to the ward. Food is received from the central kitchen in heated containers here, before it is further distributed to the patients on trays. Also, where a patients' food is cold, the food is heated in this kitchen either, coffee, tea etc. could be prepared here.

This unit/room is usually neglected in ward designs of most hospitals within the country, probably due to cost. However, the another believes that it is were incorporated in ward designs, the nuisance created by nursing relative who cook along hospital

corridors will be reduced or stopped. This kitchen if properly designed and situated can serve as a place where the relatives can cook for the patients.

3.7.8 TEST ROOM:

This room is used for carrying out minor investigations like urine and/or blood tests. However, because of its construction equipping and maintenance cost it is not incorporated within ward designs in most Nigerian Hospitals.

3.7.9 TOILETS AND BATHS:

Toilets and bathrooms equipped with W.C and shower, wash hand basin, should be provided for each patient bedroom. Minimum area should be 1.0m2. Hand rails and grab bars should be provided for faltering patients. Doors should swing out, should a patient faint and fall against it.

3.7.10 OTHERS:

Other facilities or spaces could be provided it the resources available permit. There can include a waiting room for visitors, day room for patients, storage for wheel chairs and stretchers, janitors closets etc.

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CHAPTER FOUR

PLANNING PRINCIPLES (CONTD)

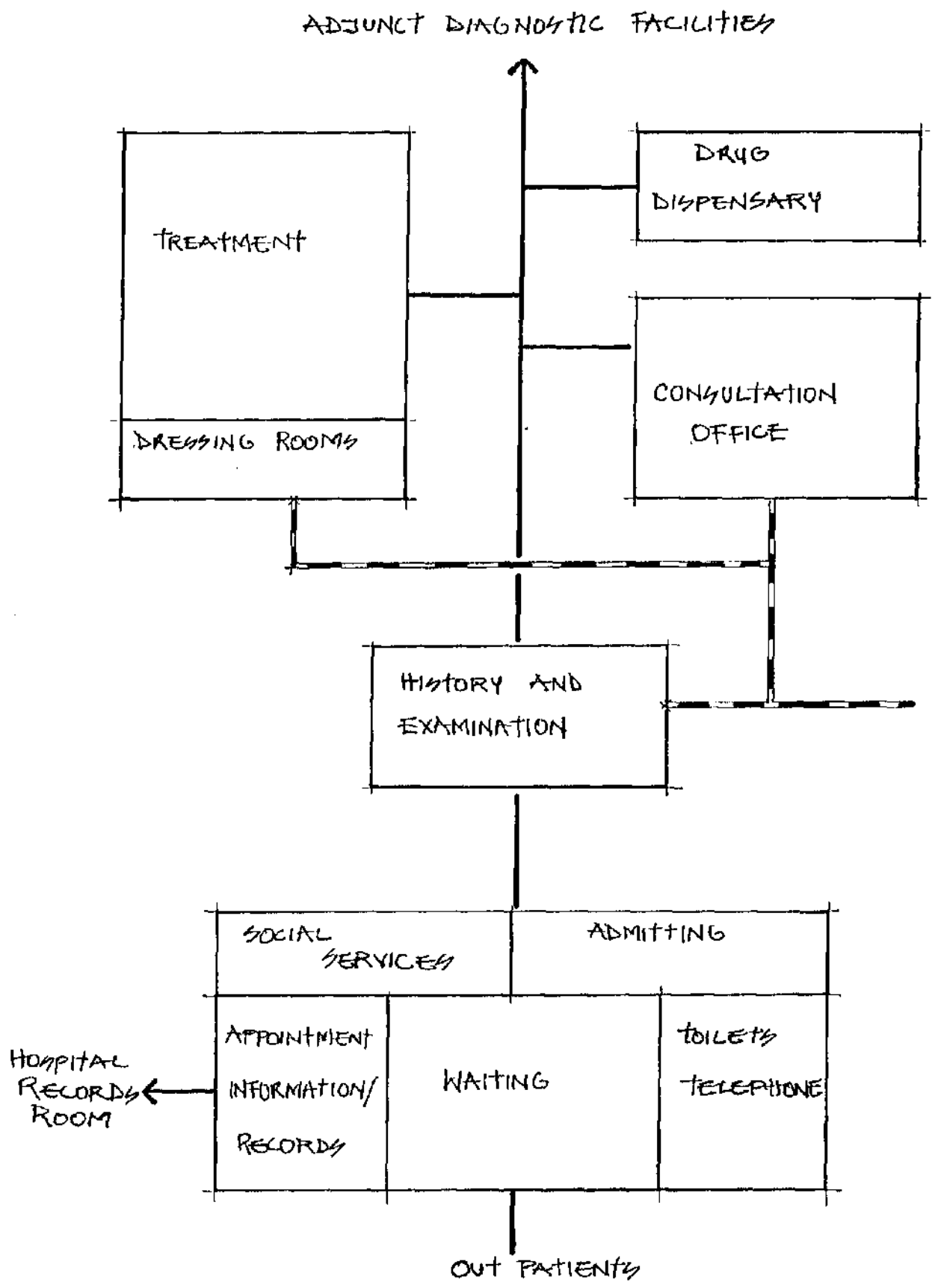
4.0 OUT PATIENT SERVICES DEPARTMENT.

Outpatient services are essential elements in hospitals, which contribute to the health of the community it serves. The function of the Out-patient department include educating the community on health matters, prevention of diseases, diagnosis and therapy and serves folio up patients who have been discharged from the hospital.

The Outpatient department is usually the first point of call by patients visiting a hospital. Registration is done in this department. A general medical clinic is provided, from where consultants direct the patient to the proper department that professionally deals with the patients' ailments.

Outpatient services could be divided into different clinics such as:

i. Surgical Clinic
ii. Dermatology and Venereal disease clinics
iii. Maternity clinics
iv. Pediatrics clinics
v. Eye clinics
vi. Ear, Nose and Throat (ENT) clinics
vii. Psychiatric clinic
viii. Gynaecology clinic
ix. Orthopedic clinic
x. Emergency clinic.



THE OUTPATIENT DEPARTMENT (FLOW)

SOURCE: HOSPITALS, CLINICS AND HEALTH CENTRES, AN ARCHITECTURAL RECORD BOOK; F. W. DODGE CORPORATION.

4.1 DIAGNOSTIC AND TREATMENT FACILITIES:

These facilities are both therapeutic and diagnostic in nature, helping the Doctor or Physician determine the type, intensity and nature of the disease or illness a patient is suffering from.

Professionals in various fields such as clinical laboratory, Radiology, Pharmacy etc, perform necessary tests on patients and advice the physician on their findings relating to the patients' ailment(s).

Diagnostic and treatment facilities are made accessible to both Out-patient and in-patients, especially those who are ambulant.

4.2.0 PATHOLOGY DEPARTMENT:

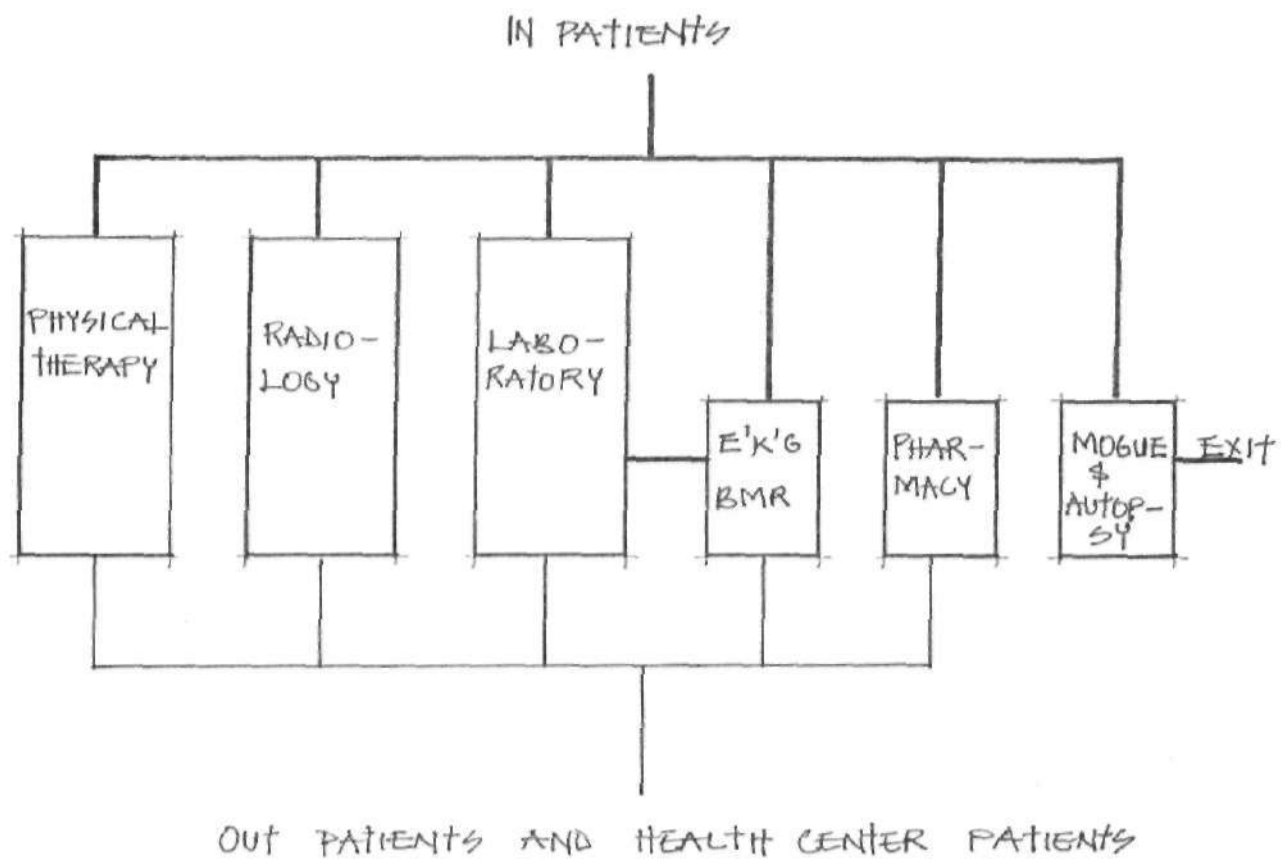
This department is probably the largest and busiest in a general hospital. It contains laboratories for conducting various tests to determine patient ailments. Tests carried out include:

4.2.1 CHEMICAL PATHOLOGY

This is a laboratory unit where chemical analysis of blood samples, urine samples, and other body elements are performed. The laboratory is equipped with facilities that include sinks, fumehood, centrifuge counters and other organic chemistry equipment.

4.2.2 BACTERIOLOGY:

Tests carried out are mostly done using microscopic instruments. Space is needed for preparing culture media. Bacteriologists sit on stools (75cm) while carrying out tests. The samples are placed on counters.



ADJUNCT DIAGNOSTIC FACILITIES (FLOW)

SOURCE: HOSPITALS, CLINICS AND HEALTH CENTRES, AN ARCHITECTURAL RECORDS BOOK; F. W. DODGE CORPORATION.

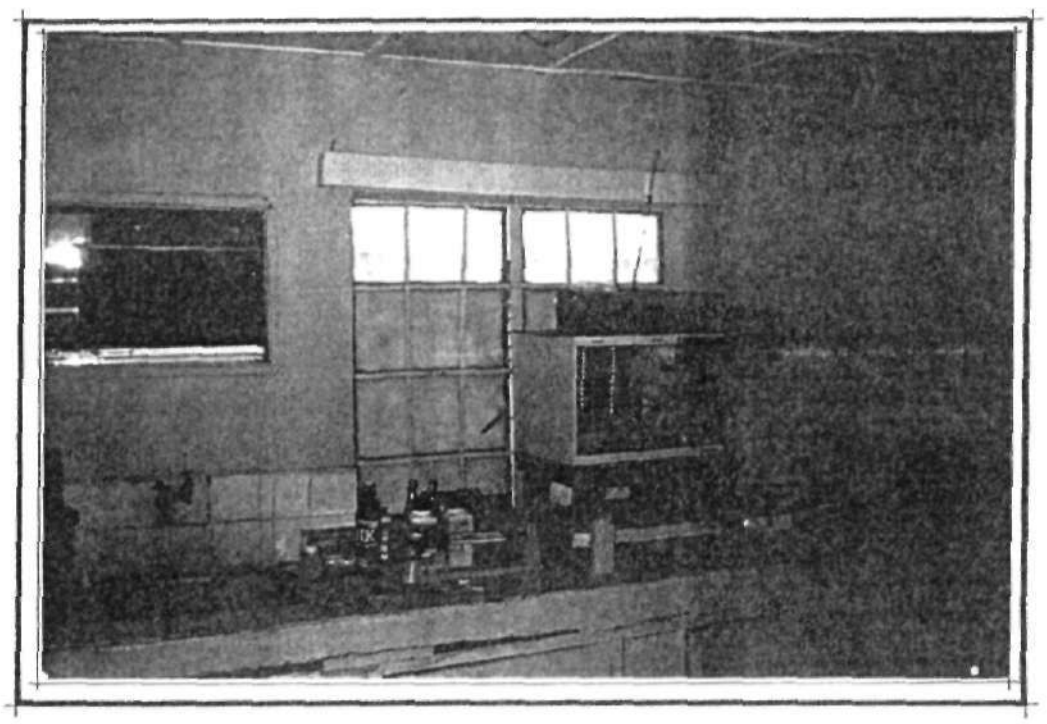


PLATE 1 HAEMATOLOGY LAB AT GEN. HOSP. GOMBE.

4.2.3 SEROLOGY:

This deals with chemical and microscopic investigations of blood and other body fluids as well as study of diseases and immunity to diseases.

4.2.4 HEMATOLOGY:

This involves the counting and investigation of red and white blood cells, as well as blood chemistry.

4.2.5 PARASITOLOGY:

Chemical and microscopic tests carried out to study effects of parasites commonly found in tropical diseases.

4.2.6 HISTOLOGY:

The microscopic examination of cellular patterns of diseased specimens. Smears of the specimens are placed on glass slides and examined under a microscope.

4.2.7 VIROLOGY:

This deals with tests that are carried out to study virus caused diseases.

4.2.8 PROTEIN BOUND IODINE:

Commonly known as PBI. It is a test carried out to determine the iodine content of blood.

4.2.9 ELECTRO CARDIOGRAPHY (EKG)

This is a test used in recording changes of electrical potential occurring during the heartbeat.

4.2.10 ELECTRO ENCEPHACOGRAPHY (EEG):

This test is for recording (graphically) the activities of the brain waves. These recordings are used in the diagnosis of epilepsy, trauma, tumor and other brain diseases.

4.3.0 BLOOD BANK:

This is a unit where blood taken from donors and stored for further transfusion to needing patients. It requires three treatment beds, cold storage facility for the blood, and should adjoin the Hematology laboratory for blood analysis and study.

4.4.0 RADIOLOGY DEPARTMENT:

This department serves both bed and ambulant patients. It also serves out-patients.

It is a prime diagnostic aid department, which offers radiation therapy. Radiologists attend to patients on the prescription of a physician, and advice the physician on the interpretation of diagnostic films.

Shadow pictures of vital the human body, are taken using X-rays that cast shadows on a photographic film. The outlines of bones and dense elements are shown, organs become visible and identifiable. To sharpen outlines of the gastro intestinal system, Barium fluid, which is opaque to the X-ray is fed in it.

Fluoroscopic screens, which grow under an X-ray are used to expose films for a permanent record. The Radiologists view the same shadow picture on a film holder when the fluoroscopic screen has been substituted for the film holder. Examination of shadow patterns, are done in an extremely dark room by Radiologist wearing protective glasses. The Radiologist moves the patient around until a clear and meaningful picture is evident.

Today, equipment serving the dual purpose of Radioscopy and fluoroscopy exist. Hence duplication of accommodation is done away with.

Radioisotopic processes are used to measure the gross functional status of certain organs and to provide different kinds of diagnostic information using equipment such as scalars and scanners respectively.

4.4.1 PLANNING CONSIDERATION OF RADIOLOGY DEPARTMENT

The Radiology department has inter-departmental relationship with out-patient department, Emergency department, Surgical Suite, Pathology/Laboratories and Wards. Hence, it should be placed at a position where it could be easily accessible to these departments.

4.4.2 ELEMENTS OF THE RADIOLOGY DEPARTMENT:

i. WAITING AND RECEPTION:

This should be adjacent to the main entrance of the unit, and should serve both in-patients and out-patients, with consideration given to stretchers.

ii. CHANGING ROOMS AND PREPARATION

Changing cubicles should be provided so that patients can undress or change into hospital garments as per Radiologist requirements. The cubicles should be large enough to accommodate patients on wheel chairs and stretchers.

iii. TOILETS:

Toilets should be provided (especially) for patients undergoing gastrointestinal investigation by use of Barium fluids.

vii. RADIO-DIAGNOSTIC ROOM:

This is where Radio-diagnostic procedures are performed, using Radio-active equipment including X-ray machines. The number of radio diagnostic rooms depends on the outpatients and in-patient load. The United State Public Health

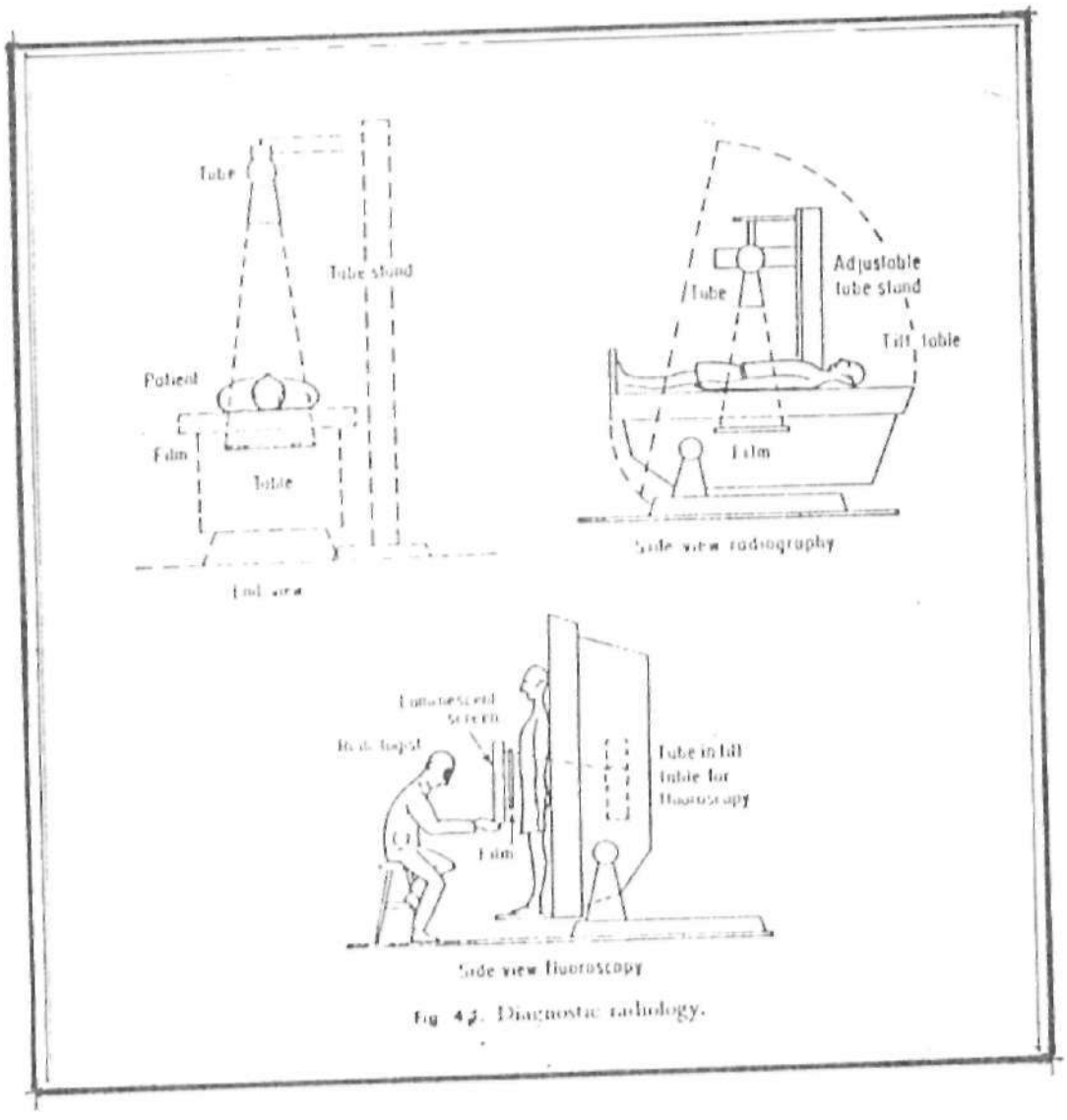


Fig 4-3. Diagnostic radiology.

FLUOROSCOPY EQUIPMENT

SOURCE: E. TODD WHEELER, HOSPITAL DESIGN AND FUNCTION; McGRAW HILL. BOOK CO.

Service recommends one room for a fifty (50) bed hospital and minimum of two room for a 150 bed and above hospital.

A formula for calculating the number of Radio-diagnostic room was put forth by Mr. Todd Wheeler in his 'Hospital Design and function'.

$$N = \frac{E}{WxHxRxD}$$

Where N =Number of rooms

W = Weeks per year in operations.

H = Hours per day in operation.

R = Determination per room per day.

D = Days per week in operation.

E = Total number of determination per annum.[16]

The average recommend room size of an X-ray room is 16 m^2 the room should also have a control both which should be placed in such a way that the operator can view the patient from it with out hindrances.

There is a need also, for a Barium kitchen to be provided near the X-ray room for the preparation of Barium fluids used in gastro-intestinal investigation.

4.4.3 LOCATION:

The Radiology department should be located at a place where traffic to other parts of the hospital will not disturb activities carried out within it. According to the United State Public Health Service Publication (1963) 'Diagnostic and X-ray suites for the General Hospital'.

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[16] M.S. Kumo 1985, General Hospital Bauchi; Unpublished Msc Thesis A.B.U. Zaria

"The functional requirements of the department are usually best satisfied by locating the X-ray rooms at the end of a wing".

4.4.4 SHIELDING:

Areas exposed to the useful X-ray beam, between the X-ray tubes and occupied areas, should be provided with primary barners. Provision of secondary barners on the other hand is also necessary on other room surfaces where protection is needed. Direct radiation or leakage radiation that passes through the tube housing, and scattered radiation emitted from other objects irradiated by either the useful beam or leakage beam should be considered in determining secondary banners.

TABLE 4.1

Type of Work	X-Ray Generated by peak voltage	Minimum equivalent thickness of lead.	Concrete equivalent thickness.
Fluoroscopy	75Kv	1.0mm	
Radiography	100Kv	1.5mm	120mm
Skin therapy	100Kv	1.5mm	120mm
Medium therapy	150Kv	2.5mm	
	175Kv	3.0mm	
Deep therapy	200Kv	4.0mm	220mm
	225Kv	5.0mm	
	300Kv	9.0mm	
	400Kv	15.0mm	260mm

SOURCE: Isadore Rosenfield, Hospital integrated Design. As extracted by Ahmed M. in his "Kano Township General Hospital" 1976. Pg. 63.

4.4.5 FILM PROCESSING AND VIEWING:

A dark room is used in processing exposed film, and when the room is properly situated, it can serve two or more X-ray rooms. Automatic processing machines are available, which are capable of developing up to 140 films per hour.

Viewing rooms are also needed. This is where films are sorted out before distribution to patients and departments. A film storage alcove should also be provided inorder to store fresh films and load them into cassettes before taking to X-ray rooms.

4.4.6 STAFF FACILITIES:

Offices for Radiographers and Radiologists should be provided in conjunction with their conveniences such as toilets, rest-rooms etc.

4.4.7 THERAPY SECTION:

A therapy section should be integrated within the radio-diagnostic department, in order to enhance the efficient use of common facilities and for better utilization of staff.

The therapy section is divided into:

i. Deep Therapy Room:- Where patients are exposed to treatment by means of high voltage X-ray equipment.

ii. Superficial Therapy Room:- Where less intensity of radioactive Radiation is used to treat patients.

4.5.0 SURGICAL OPERATING SUITE:

A team of professionals consisting of Surgeons, Anesthetists, Surgical Nurses etc. performs surgical operations. It is performed in the operating suite. Length of time and seriousness of operation to a large extent determine the number of surgical operating suites in a general hospital.

Pathologists and Radiologist with their equipment are called in occasionally for consultation. Drugs, intravenous solutions, dressing etc. will be called for, hence they most be readily available and sterile. Special instruments such as special pumps for oxygen and suction as well as electronic recording are and data analysis equipment or used in an operating suite, hence there is a need for the Architect to take this into consideration while designing the surgical operating suite.

4.5.1 **LOCATION:**

The surgical operating suite serves admitted surgical cases, emergency department, and makes use of services of the Radiologists and Pathologists, hence it should be located in a position where all these departments will be accessible to it. It should also be intimately tied to the surgical nursing ward. It should also be placed, as a dead end in order to cut off unnecessary traffic, due to the high degree of hygiene and sterility required within and without the surgical suite.

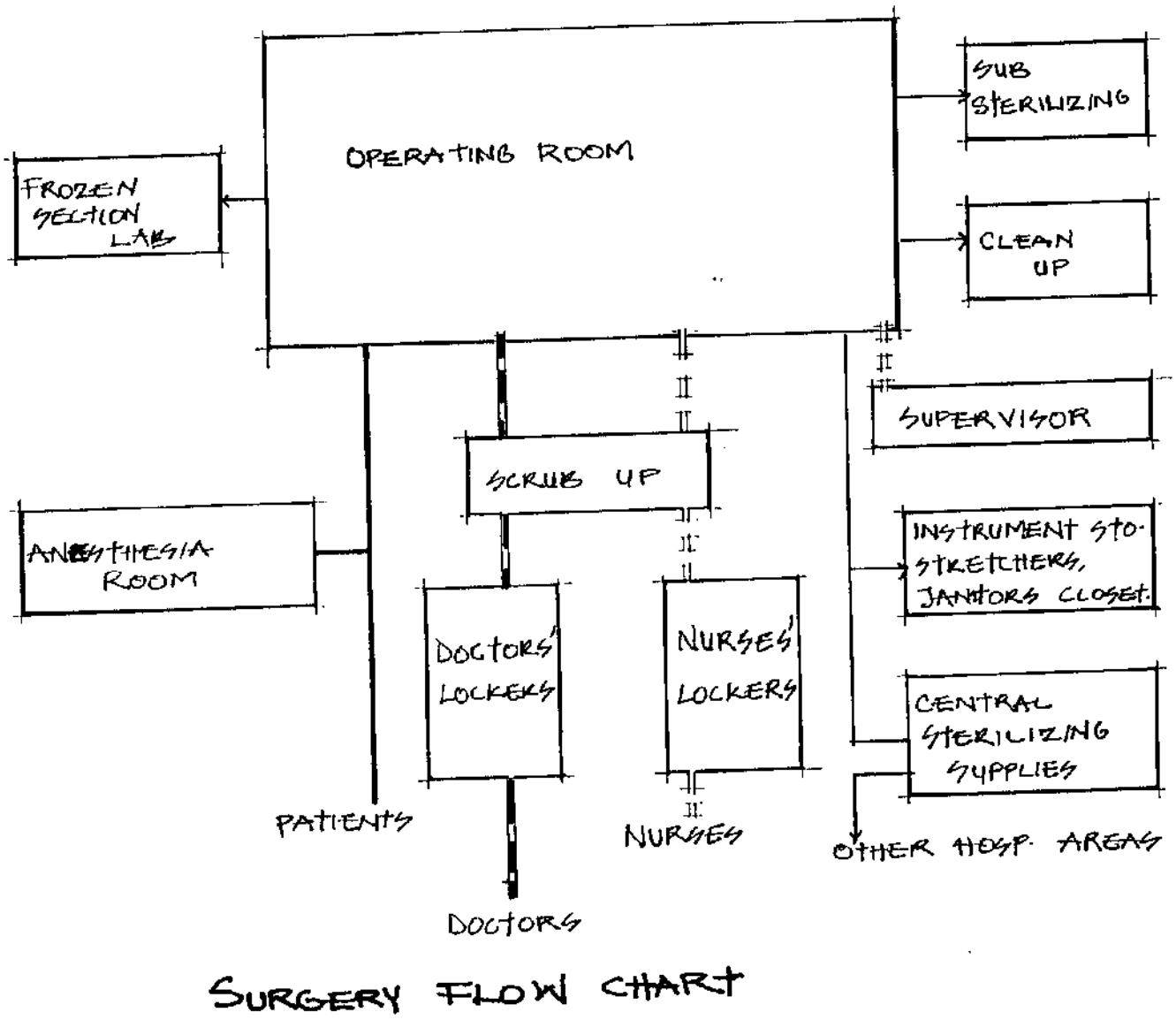
Although windows attached to theatres should be avoided inorder to minimize flow of air, which could be contaminated into the theatres, an external view has some psychological effect on the surgeons. It minimizes the technical and clinical environment obtained within the theatres.[17] Fixed windows and a highly mechanical system of ventilation are necessary for ventilating critical areas especially the operating theatre.

4.5.2 ***SIZE:***

The number, length of time and type of operations expected to be handled, determine the size of the surgical operating suite.

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[17] Ahmed M. 1976, Kano Township General hospital; Unpublished Msc. Thesis A.B.U. Zaria.



SURGERY FLOW CHART

SOURCE: HOSPITALS, CLINICS AND HEALTH CENTRES, AN ARCHITECTURAL RECORDS BOOK; F. W. DODGE CORPORATION.

Minor and major operations requiring the use of anesthesia are handled in a general hospital. These include Chest, Abdominal, Cranial and Orthopedic operations. Special operations such as gynecology, Cesarean sections, Cystoscopic operations and ENT (Ear,Nose and Throat) operations are also handled.

Cystoscopic operations require special equipment but a limited use of anesthesia. Cystoscopic cases are received from wards and OPD, and are performed by the Urologist. Where gynecology and caesarian sections will be performed, is determined quite early in the design stage. They could be performed either in the delivery suite or operating suite.

Surgical suites are divided into three basic zones, the outer, intermediate and inner zones.

i. **THE OUTER ZONE:**

This is a zone where all traffic to the surgical suite is received. It contains a reception space, waiting area and records, offices for staff, changing rooms, rest rooms and nonsterile store. It should be accessible to the wards both emergency and surgical,

ii. **INTERMEDIATE ZONE:**

This is essentially a delivery, work and storage zone, where outside personnel deliver service but do not penetrate the inner zone. The recovery room is contained within this zone and should ensure maximum observe ability. The zone also accommodates, a nurses' station and sterile storage.

iii. **INNER ZONE:**

This is the zone where the actual operations, are performed. Hence, it requires a high degree of aseptic condition and sterilization. It needs careful design in terms of patient and operating staff flow. Obtained within this zone are elements, which include scrubbing space, operating room, patient holding and induction area, workroom, as well as sterilization space.

4.5.3 **GENERAL SURGICAL:**

Many minor operations, chest, abdominal and cranial operations are usually done in the general surgery, which is a conventional operating room. Aseptic procedures are observed in all surgical procedures irrespective of whether they are minor or major.

4.5.4 **ORTHOPEDIC:**

This is where operations performed on the human frame (bones, veins, tissues etc.) are done. They usually require special and highly technical equipment.

4.5.5 **EAR, NOSE, AND THROAT (ENT):**

These are special operating rooms for Eye, Nose and Throat. They contain special equipment resembling a Dentists' chair. These operating rooms must be darkened. However, they should be as large as the general operating suite.

4.5.6 GYNECOLOGY:

This operating room handles both gynecology and cesarean sections, hence they could be placed adjoining delivery rooms. The decision to do this is taken by the Architect after consultation and advice from Obstetricians and Surgeons.

4.5.7 CYSTOSCOPIC:

These are operations carried out by the urologists, and they require specialized equipment and limited use of anesthesia. These operating rooms are usually located separate from the surgical suite, but they adjoin X-ray and emergency.

4.6.0 PHYSICAL MEDICINE:

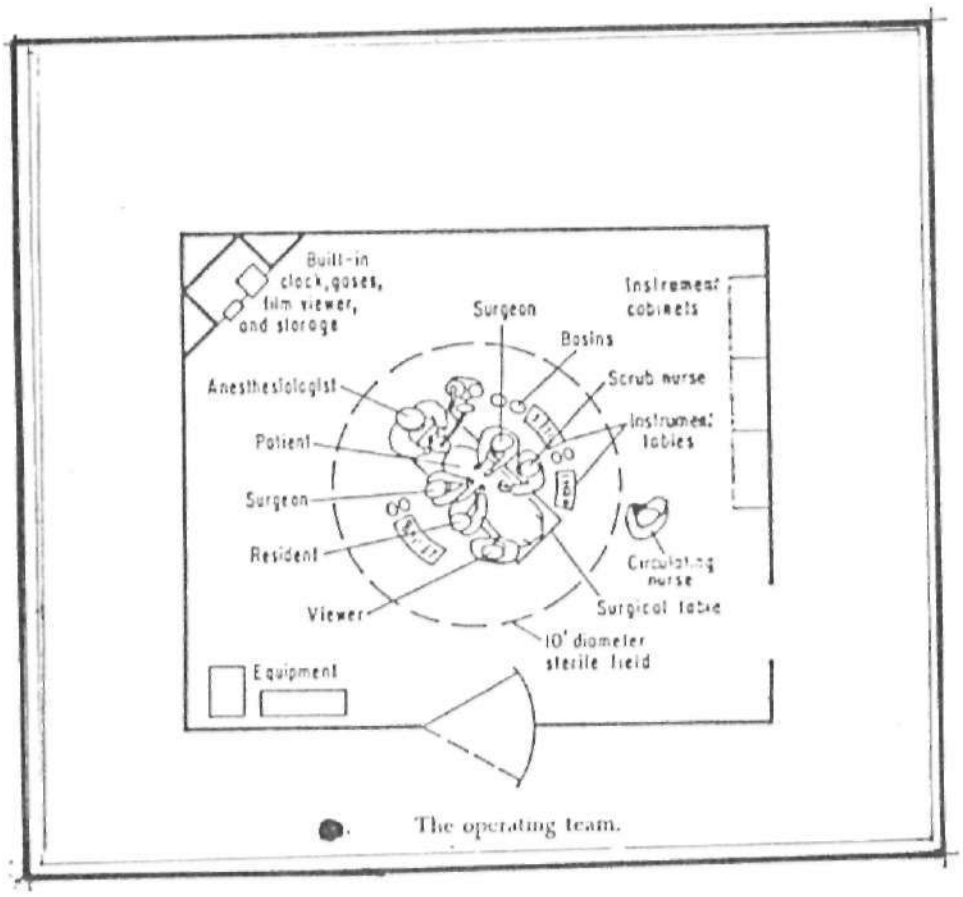
This department is purely a therapeutic facility containing both physical and occupational therapy equipment, and serves the duo of in-patient and outpatients. Physiotherapy treatment is in form of excersise, manipulation, massage, thermal treatment, hydrotherapy and electrotherapy. These utilize physical aids of heat, water and electricity. Due to the length of time necessary for treatment, the department handles only a small number of patents daily.

Occupational therapy assists patients in putting their required physical ability to some economic importance, while psychological therapy is done to arouse a patients interest in certain activities, thereby helping the patient to demonstrate that he still possesses the capabilities and abilities that he is thought to have lost. Physical therapy on the other hand, helps a patient to control a disabled member of his body.[18]

Speech therapy, functional training for paralytic and paraplegic (paralysis of the lower part of the body) patients, and also for physically handicapped patients, is accommodated by the physical medicine department when expanded.

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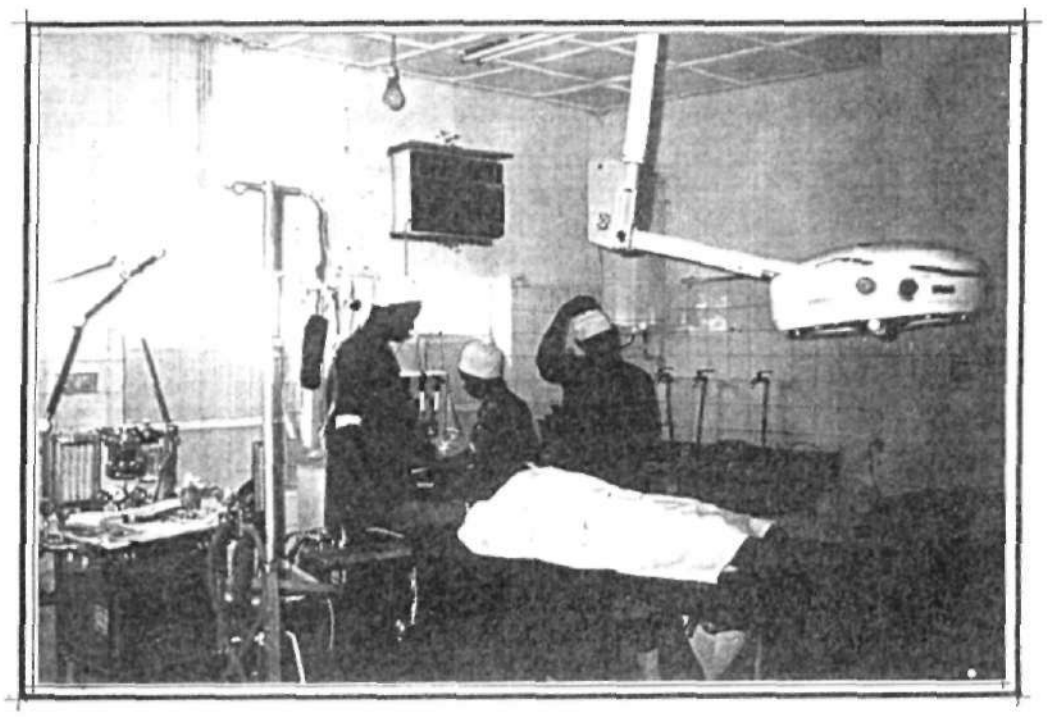
[18] E. T. Wheeler 1964 Hospital Design and Function; Mcgraw Hill Book Co. Page 173 -174



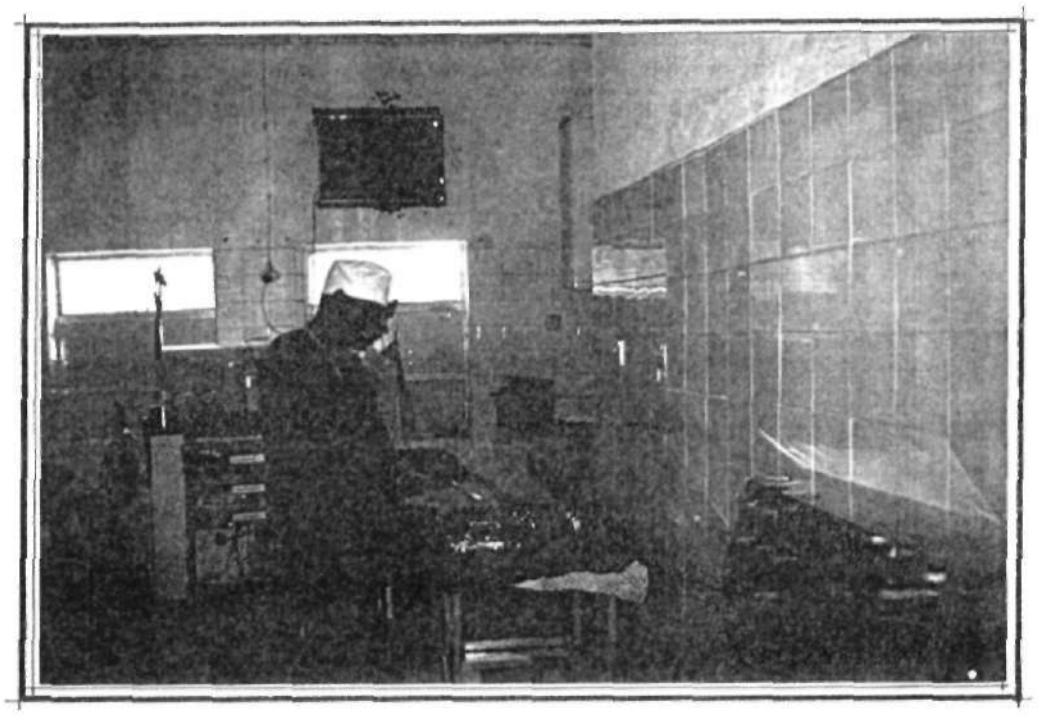
The operating team.

THE OPERATING TEAM

SOURCE: E. TODD WHEELER, HOSPITAL DESIGN AND FUNCTION; MCGRAW HILL BOOK CO.



OPERATING ROOM GEN. HOSP. GOMBE.



OPERATING ROOM GEN. HOSP. GOMBE.

4.6.1 LOCATION AND SIZE:

The department should be easily accessibly to patients needing its services and be close enough to the hospital entrance, in order to save steps for attending patients, who in most cases are disabled.

Space required for this department depends on the number of patients that can be attended to, daily, and the facilities that are provided. However, a $100m^2$ of floor space is recommended with half of the space used as an exercise area.

4.6.2 ELEMENTS OF THE PHYSICAL MEDICINE DEPARTMENT:

i.) RECEPTION SPACE:

A reception space should be provided where all records of attending patients will be kept. A waiting area and parking space for wheel chairs is also necessary. Recommend waiting space per patient is $1.5m^2$.

ii.) PASSIVE TREATMENT AREA:

Cubicles should be provided for massage, thermal and manipulation treatment. The cubicles should be large enough to accommodate wheel chairs and stretchers. Drapes rather than doors should cover its access for easy access of the attending patients.

Underwater excersise rooms for hydrotherapy should be provided. These should have ample space for underwater excersise and equipment, wheeled stretcher, treatment table etc.

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iii.) **CHANGING AREA:**

Changing rooms should be provided for both, male and female, as well as large adjoining excersise area which should be 7m x 15m x 4.6m high as is recommended by the British building Notes.[19]

iv.) **STAFF FACILITIES:**

These should include rest-room toilets, offices, interview and examination room, storage space for equipment and supplies.

4.7.0 OBSTETRICAL DELIVERY SUITE:

This department should be planed close to the emergency and Obstetrical Ward or Nursing Units, and near the hospital entrance for easy access by pregnant women. Its requirements are very much like the surgical operating suites. It should have access to the central sterile supply, pharmacy and Antenatal clinic. Where cesarean sections are performed, it should adjoin the operating suite.

4.7.1 ELEMENTS OF THE OBSTETRICAL DELIVERY SUITE

i) Admin and Reception:

This serves as a patient's reception and waiting area. Records are also kept of patients who visit this unit. Patients are taken from here to the labour room leaving behind accompanying relatives who wait in the waiting room.

ii) Staff Changing Facilities:

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[19] E .T. Wheeler 1964, Hospital Design and Function; Mcgraw Hill Book Co. Page 174

These are required for the Nurses and Doctors to change before and after attending to a patient. Resting facilities should also be provided. They should be placed close to the workroom and scrubbing spaces.

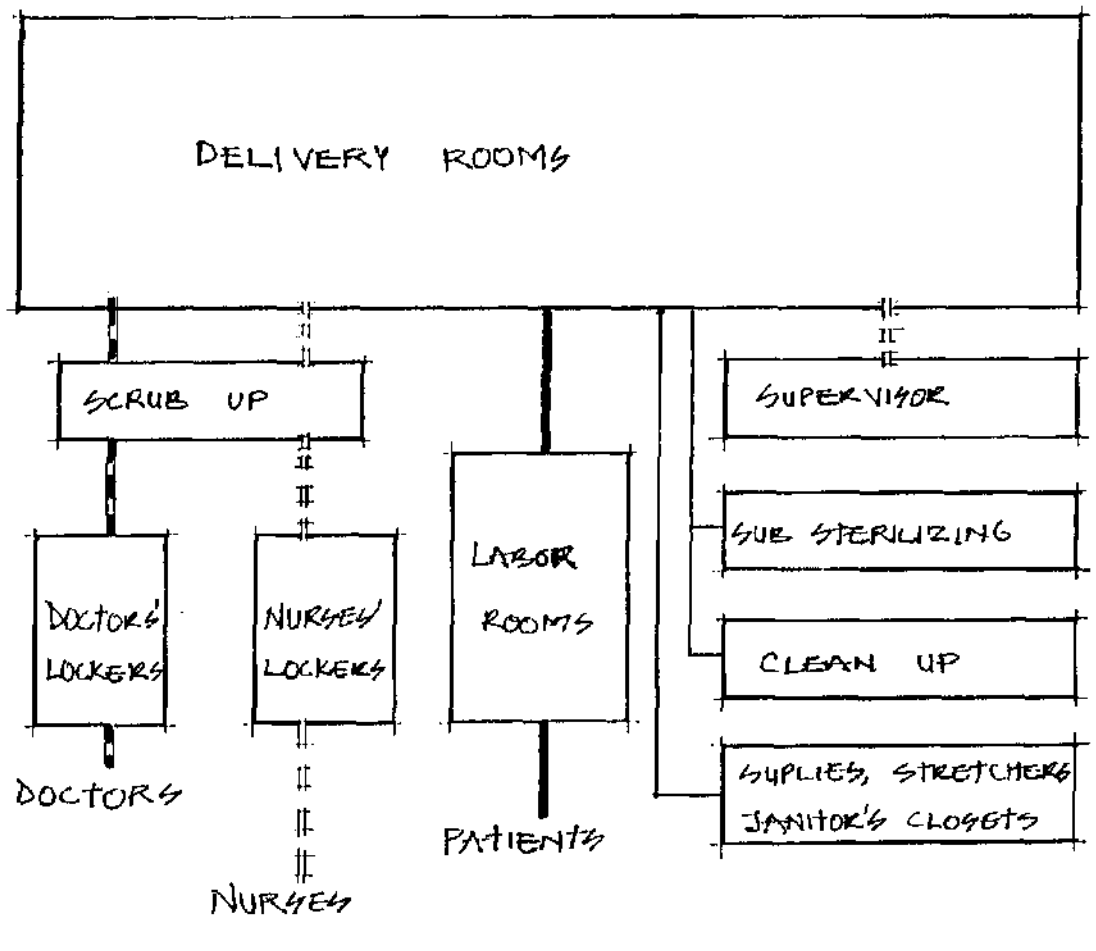
iii) Labour and Preparation:

This is a room where a woman in labour is brought to spend her labour period before onward transfer to the delivery room after being prepared for delivery. Labour rooms advisably should be single bedrooms each with its adjoining conveniences of toilet, shower, and wash basins. The number of such rooms is determined by the number of delivery rooms and expected daily deliveries.

iv) Delivery and Immediate Services:

Babies are delivered in this room. Hence it has similar requirements as the operating suite, although less people are involved here. This room should be placed away from traffic, because of the utmost privacy needed. The size should be at least $5m^2$ and it should adjoin the scrubbing space and central or decentralized workroom.

A nursing station should be conveniently placed between recovery beds (in the recovery room) and the labour room for effective supervision of patients and saving of steps for the nurses who are in constant visit to the labour room.



OBSTETRICS DEPARTMENT.

SOURCE: HOSPITALS, CLINICS AND HEALTH CENTRES, AN ARCHITECTURAL RECORDS BOOK, F. W. DODGE CORPORATION.

4.8.0 EMERGENCY DEPARTMENT

This department provides life saving services to patients who suddenly become ill or injured, beyond the capability of a first aid box. Patients are given immediate attention and reassurance before properly determining which department of the hospital should receive the patient.

Laboratory tests, x-rays and surgical interventions are sometimes required by emergency cases. Most patients admitted on emergency require intensive care. Therefore, the department should be close to the surgical suite, radiology and pathology departments, as well as admission office.

4.8.1 ELEMENTS OF EMERGENCY DEPARTMENT

(i) Ambulance Parking:

This is necessary for unloading the patient. It should be discrete and away from public view. Usually, a staff is placed by the ambulance parking to alert other staff about arrivals.

(ii) Reception and Waiting:

Ambulance parking should lead to patient waiting and reception, where records are taken and kept. It should also be screened from public view.

(iii) Consulting Rooms:

There should be provided adjacent to the workrooms, treatment room and a nurses' station. The physician consults the patient here. Hence it should have facilities for examining the patient.

(iv) Minor Operating Room:

Where minor operations are necessary, the minor operation room serves the purpose. However, if the operation is a major one, the patient is immediately transferred to the surgical suite. Having a general surgical suite in the emergency department amounts to duplication of equipment and staff.

(v) Post-treatment Observation Rooms:

These are provided so that patients' could be observed and supervised after they have undergone treatment. The room(s) should contain beds and a nurses' station. The patients are later transferred to intensive care unit or the appropriate departments within the hospital.

4.9.0 PHARMACY DEPARTMENT

The pharmacy department of a hospital is a place where all medications are supplied to the various wards after prescription by the Physician. It is a place where pharmaceuticals are manufactured in bulk, biological are stored and dispensed, injectable solutions are prepared and sterilized. Drugs are also sold to the public. The medical and other staff members find helpful consultative advice relative to current drug therapy.

The pharmacy department feeds all the various departments with its services. Although the wards and outpatient department takes up most of the solutions and anesthetics, it supplies the emergency department with drugs for emergency purposes. It supplies the laboratory with reagents; the x-ray

department with radiographic opaques. Dietary, housekeeping and blood bank depend on the department for various forms of chemicals and medication.[20]

The pharmacy is a dispensing unit that attracts the services of qualified pharmacists. Manufacturing drugs is restricted to large hospitals usually connected to schools of pharmacy.

4.9.1 LOCATION AND SIZE

The location of this department should be such that all departments in the hospital especially Wards, outpatient department and treatment departments have access to it. It should also be placed near the service entrance, easily reached from bulk stores for bringing in supplies.

The size of this department depends on the size of the hospital. The United States Public Health Service recommends 20 m^2 for a 50-bed hospital and 50 m^2 for a 100-bed hospital.[21]

4.9.2 ELEMENTS OF THE PHARMACY DEPARTMENT:

The pharmacy department consists of the following elements:

i) Waiting space for out-patients;

ii) Storage for pharmaceuticals to be dispensed;

iii) Distribution rooms for supply of hospital departments' request;

iv) Offices for pharmacists;

v) Bulk drug and chemical storage;

vi) Flammables storage;

vii) Narcotics stores;

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[20] M S. Kumo 1985, General Hospital Bauchi; Unpublished Msc. Thesis. A.B.U. Zaria.

viii) Compounding area;
} large hospitals and schools of pharmacy;
ix) Manufacturing unit;

x) Records office.

4.10.0 ADMINISTRATION DEPARTMENT OR FACILITIES

This is the department that deals with the normal day-to-day running of the affairs of the hospital. It deals with staff employment, welfare, organization and discipline. It is also responsible for purchasing and supply of hospital equipment and materials. The department is the governing centre of the hospital, overseeing and controlling the activities going on within the hospital. It support administrative facilities and offices. Such offices include:

i. chief medical officer's office

ii. principal and assistant administrative offices

iii. accounts and finance offices

iv. supplies and purchasing offices

v. general office

vi. public relations office

vii. medical and non-medical administration offices

viii. library

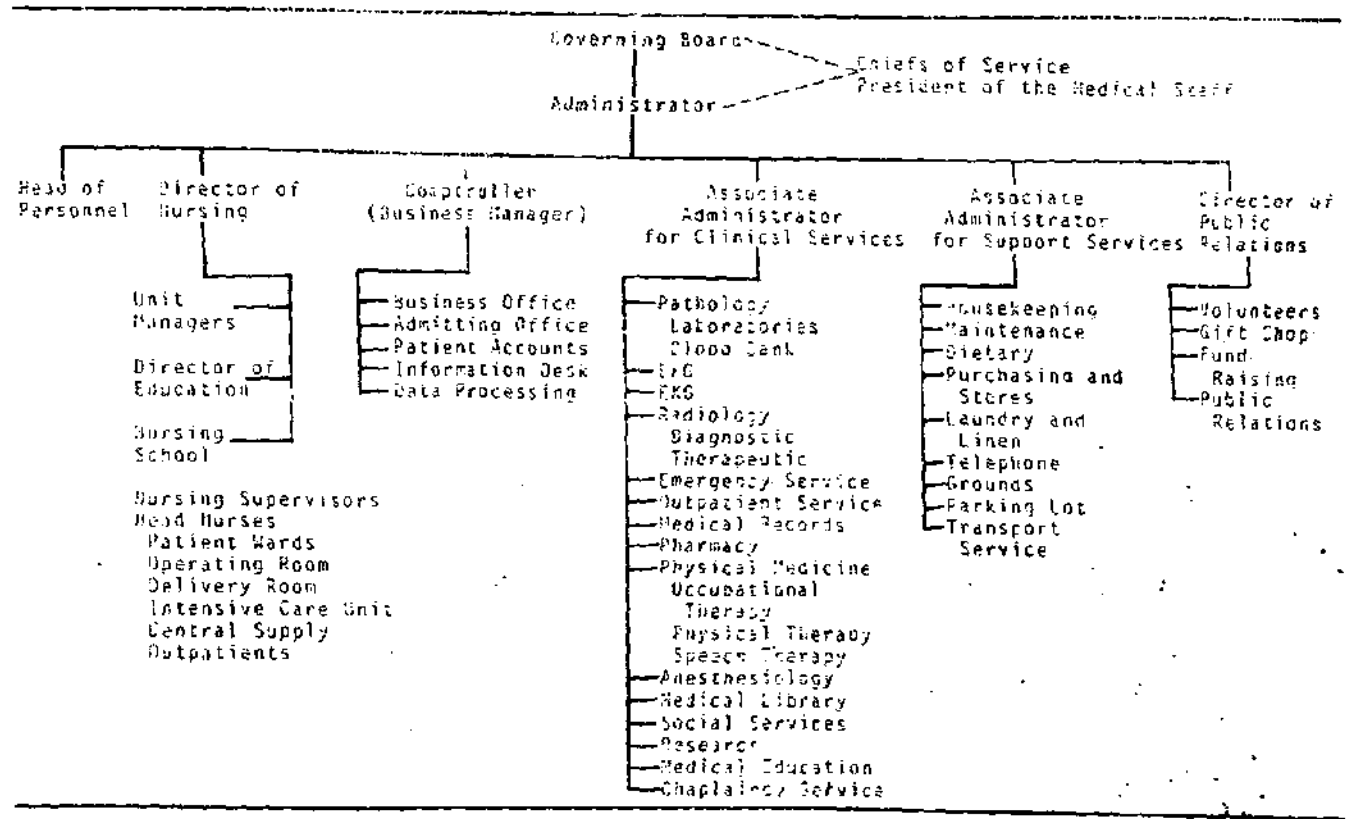
ix. conference rooms

x. conveniences such as toilets, restrooms, etc.

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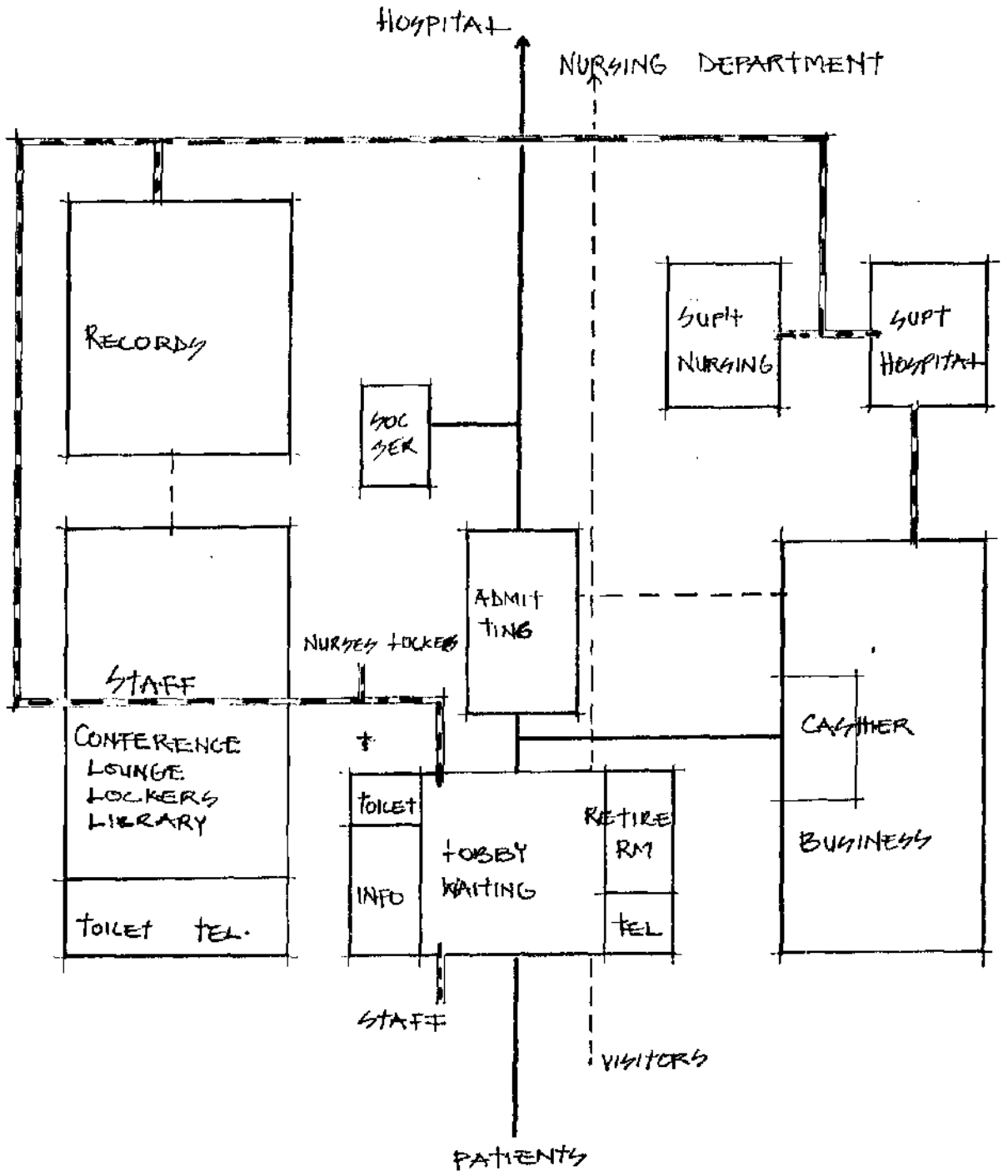
[21] E.T. Wheeler 1964, Hospital Design and Function; Mcgraw Hill Book Co.

Table 4.6 An Example of an Organization Chart for a Large Community General Hospital[a]



[a] The internal organization of the medical staff is not shown.

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ADMINISTRATION DEPARTMENT

SOURCE: HOSPITALS, CLINICS AND HEALTH CENTRES, AN ARCHITECTURAL RECORDS BOOK, F. W. DODGE CORPORATION.

4.10.1 ADMISSIONS

This is a unit or wing in the administrative set-up of a hospital that handles admissions and discharges of patients who visit the hospitals. Records of both in- and out-patients are kept within this unit, the size of which depends on the methods of filing, distribution and collection of records. The unit accommodates such spaces as:

i. office for admitting officer
ii. records offices
iii. medical screening and interview room
iv. night doctors' room
v. waiting speaces
vi. filing space
vii. equipment and supply stores

4.10.2 PUBLIC SPACES

These are spaces which are open to the general public, basically, they are waiting spaces within which patients wait before they are attended to by the doctor. These spaces are usually heavily loaded with visitors to the hospital, especially patients' relatives who accompany the patients to the hospital. Therefore, it is wise to assume a waiting load of at least 85% of the clinic's capacity while designing the hospital/clinic.[1]

The size of these spaces are influenced by the hospital visiting policy and medical care programme, as well as the visiting requirements of the various patient care divisions.

4.10.3 MEDICAL RECORDS

The medical record of a patient is a chart upon which all relevant personal information (such as age, sex, name, address, etc) about him are entered on his first visit

to the hospital. Also, explanation about his ailment and the treatment he receives are recorded on this chart. In a nutshell, it is the medical history of the patient.

Hospitals device means of storing these records using an elaborate filing system that allows for easy retrieval of the records when the need arises. Some hospitals after seven years destroy the bulky records after first filming it on microfilms.[2]

4.11.0 SUPPORT (ANCILLARY) FACILITIES

Support facilities in a hospital could be defined as those facilities or structures to enhance and aid patient welfare while on admission at the hospital. The facilities offer secondary services to both staff and patients in the hospital. They are as essential as the professional facilities, as they render supportive services required by the professional facilities. Although these facilities are separately treated in hospital designs, because activities carried out within them require less or no medical supervision.

Because these facilities are usually domestic or ancillary in nature, i.e. they provide domestic and house-keeping services, they aid patient recovery through enhancing his level of cleanliness and dieting. The facilities, when inadequate or poorly handled, turn hospitals into an eye sore, making the hospitals dirty, unkempt and provide a high risk of infection spread within the hospital.

4.11.1 DIETARY

These are facilities provided to cater for patient feeding. They include services that involve procurement, preparation, distribution and disposal of food. The facilities include stores, kitchens, canteens, dining rooms, and food distribution equipment to the wards, such as trays and trolleys.

i. Procurement: This is a process within which is the planning of menus, selecting, ordering and receiving food items. It also involves sorting, checking and storing of these items.

ii. Preparation: This includes processing the food items and cooking the cookables.

iii. Distribution: This involves the distribution of the prepared food to the various wards and individual patients. The objective of distribution of food is to serve palatable food, i.e. hot food hot and cold food.

Different methods are employed in distribution of food to patients. These include the central tray services which involves the complete assembly of trays in the main kitchen and distributing direct to the patients in the various wards; the decentralized tray services where hot food is distributed in bulk to smaller kitchenettes in the wards inside heated containers, before subsequently serving the patients on trays and plates.

The dietary department should be close to the central general stores, since food items will be received from there, before preparation and onward distribution to wards and staff canteens, which should also be close enough to minimize travel distance.

The dietary department should contain within it kitchen stores, cooking spaces, serving spaces, trolley washing and parking, general washing up space, staff facilities and conveniences, as well as refuse disposal facilities.

4.11.2 LAUNDRY

This is a unit in the hospital which handle hospital linen and clothes washing, mending, sterilization and distribution. Obtained within this unit are facilities that

include sorting rooms, washing and drying areas/rooms, sterilizing and boiling/steaming bags, tailoring and mending rooms, and ironing and distribution facilities. The laundry is functionally divided into:

i. Dirty Work Area, where dirty items from the wards and other parts of the hospital are brought and sorted out into those requiring mending, sterilization and those that are for outright disposal. This is also the place where the washing is carried out.

ii. Clean Work Area, where washed linen/materials are extracted, dried, ironed and stored for later distribution to the various parts of the hospital.

The laundry unit should be accessible to the central supply stores and should be placed near the main service corridor to shorten travel distance to be covered by staff.

4.11.3 HOUSE-KEEPING FACILITIES

These are facilities provided for house-keeping services such as cleaning the hospital, changing bed linen and other maid services. These facilities are important in maintaining a high standard of cleanliness and sterilization associated with hospitals. The facilities include floor cleaners' store, central workroom, supplies store, house-keepers' office and restroom for staff.

4.11.4 STERILIZING FACILITIES

These facilities take care of sterilizing equipment used in the various departments of the hospital. It has heating facilities to boil or steam hospital equipment and disinfecting facilities and fluids in order to kill germs and bacteria. These include the boiler rooms, sterilization stores, work rooms, rest rooms for staff, sorting areas and distribution areas.

The sterilizing facilities are collectively known as the central sterile supply department (CSSD). All necessary sterile equipment required by the medical and non-medical services departments are supplied from this department. Therefore, its location should be convenient for receiving and distribution of used and sterile items.

4.11.5 CENTRAL GENERAL STORES

This is the area for goods purchased in bulk only to be used in small quantities within the various departments and units of the hospital. The central general stores is the main receiving distribution and storage area of the hospital, accommodating within it the purchasing unit of the hospital.

The stores found in this department are:

- pharmaceuticals store
- bulk food stores (non-perishable items)
- furniture stores
- hospital equipment stores
- stationery and office materials stores

Other facilities obtained within the central general stores include store officers offices, receiving and inspection rooms, working space for finishing outgoing goods and rest rooms attached to staff conveniences such as toilets, showers and changing rooms.

4.11.6 MAINTENANCE DEPARTMENT

This department is responsible for handling of all maintenance works and equipment repairs within the hospital. It has workshops and facilities for repairs of furniture, general building maintenance, electrical fault repairs, plumbing and mechanical services repairs, etc. The department employs electricians, plumbers,

engineers, carpenters, etc. It accommodates offices, stores, workshops and staff facilities.

4.11.7 POWER HOUSE

The power house supplies electricity by means of generator plant(s) to augment its supply by NEPA. Most hospital equipment are electrically powered, hence there is a need to maintain its constant supply, especially when surgical operations are going on. The generator/power house should be located where the noise or pollution emanating from it will not disturb the patients. It should also have access to the central general stores for supplies ranging from fuel to spare parts. It should have strong ties with the maintenance section of the hospital to effectively and efficiently boost its function.

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KASHIM IBRAHIM

CHAPTER FIVE

IMPROVING SUPPORT FACILITIES FOR BETTER PATIENT CARE

5.0 INTRODUCTION

The hospital care of a patient has undergone an enormous change in emphasis, with nursing care taking a new dimension due to the influence of certain factors. These cumulative factors, gradually became resplended in the hospital care systems bringing with them a new form of patient care, where the relative rather than the Nurse is the principal attendant to patient needs. These needs range from the periodic washing of the patients effects, to taking care of his daily and hourly needs of feeding, bathing, taking him to toilet and keeping him company.

This change in nursing care has caused the gradual increase of burden on hospital structures and facilities provided for patient care. These facilities are gradually stretched beyond their limits to accommodate and serve the needs of both patients and relatives. Hence such facilities as toilets, baths, laundries etc. are over used and gradually their efficiency is reduced, subsequently they break down into a state of utmost disrepair, with the drain being blocked and the toilet over filling. The wards themselves are congested with patient beds and over crowded with patient relatives such that there is poor ventilation and the high risk of infection spread.

5.1 THE GENESIS OF THE PROBLEM

The problem of Nursing relatives started when a gradual increase in the number of patients visiting hospitals for treatment began to be recorded vis avis the gradual realisation of the superiority and importance of modern medical care over traditional or orthodox medical care. This fact was supplemented by the population increase and the

relative increase in the number of hospitals which was not matched by the number of trained medical personnel who are responsible for caring for the patient while an admission at a hospital.

This, necessitated relatives to start going to hospital and staying with their loved ones with a view to nursing them. These facts coupled with the gradually declining economy and efficiency in managing hospitals, encouraged the relatives to stay and subsequently become a part of the hospital nursing team. Although efforts where made to discourage this practice, but they were not effective as the practice of relatives nursing their sick ones has become more rampant and is gradually rooted into the culture of the society and to some extent, it is taking a religious dimension.

5.2 THE PROBLEM AND ITS EFFECT ON HOSPTIAL FACILITIES

As enumerated before, the problem is basically that of relatives who stay with their loved ones in hospitals, taking care of their daily needs i.e. bathing them, feeding them, keeping them company, doing their laundry, administering their medical and generally watching and reporting their progress or otherwise to the Doctors.

Because the Hospitals were designed to accommodate a certain number of patients, the facilities, which aid patient care, are only provided to cater for the immediate needs of the patient and the nurses responsible. Hence, the added burden on these facilities such as toilets baths and laundries have made the facilities to become over used, dirty, unsightly, blocked and in a general state of disrepair.

The fact that these relatives were not considered in the design of the hospitals also make it such that they tend to use the corridors as places where they rest, eat, sleep, wash and even cook or warm food for patients. This is a highly un-hygiene practice,

which helps in keeping the hospital environment dirty as opposed to its natural expectation of a clean, infection free and pleasant environment for the sick.

5.3 FACTORS RESPONSIBLE FOR CAUSING THE PROBLEM

A certain number of factors are responsible for causing the nursing relatives to virtually remain in our hospitals. These factors include:

i. ECONOMY

The poor economy of the country makes the financial standing of the various hospitals very low hence they can not be able employ and a relatively large staff workforce and adequately maintain the support services provided within the hospitals for better patient care.

ii. INADEQUATE STAFF

Most hospitals lack the proper well trained and skilled work force necessary to man its various units and effectively handle the maintenance of support facilities as well as provide adequate patient care. Nurses are equally very few, while caretakers are also in small numbers. The lack of proper attitude to work of the staff coupled with the ill organized support services make the relatives to stay behind.

iii. LACK OF PROPER MANAGEMENT

Lack of proper management of available resources, and effective supervision of the hospital staff, by the administrative body, in order to ensure efficiency in the discharge of hospital services. Has contributed to the decline of the hospitals generally, not only in the support services but also in other areas of hospital function.

iii. CULTURE

The general belief that nurses cannot adequately take care of patients, coupled with the fact that some nurses actually go about doing their own business rather than minding the patients they are employed to care for is another strong factor. It is widely believed that only the patient relative can actually be able to properly care for the patient while on admission. This fact is also supplemented by the argument that most patients had to confide more to their relatives than even the Doctors about their ailments. The patients feel more at home with the relative especially when it comes to certain personal care he requires such as bathing and using the toilet. The patient feels at ease with the relative and psychologically it helps in his quick response to treatment.

Another important fact is the general societal belief that if you do not stay and care for your loved one in hospital, then you actually don't like him / her.

iii. RELIGION

There is a general belief, that if a patient is on admission at the hospital, (although he is expected to be treated and discharged) and his time comes. And he has to answer the call of death, at the time he/she is about to die, there is a need for certain prayers to be said while he is battling between this world and the next. The Nurses may not be handy to actually say such prayers. However, with the relative around, such prayers can easily be said. This is particular with Muslims, the 'Shahadah' is repeated to the patient such that he is able to say it before he dies, one's signs of his demise are apparent. The Christians also

especially the Catholic use the rosary in prayer and at times the priest is called to administer prayers just as one is battling for his life.

This particular factor is very strongly rooted in the society such that where relatives are not allowed, patients are not even taken there except absolutely necessary where the relatives are left with no alternative.

5.4 EVALUATIONS

Having enumerated the factors that influence relatives of patient to stay in hospitals, the Architect is now left with a decision as to whether he should accommodate them or not. Two facts, which are very important although divergent emerge. These facts are:

1. Should the Architect work with an ideal situation? That is design a hospital which neglect the problem at hand and go ahead to design for an ideal situation where the patient is wholly taken care of by the Nurse and his relatives and friends only pay him visits, or
2. Should the Architect work with reality? i.e. he should work towards coming up with a design that will allow both Nursing relatives and Nurses to work hand in hand in caring for the patient.

In order to take a stance, it is necessary to look at the advantage and disadvantages of both situations.

5.4.1 THE IDEAL SITUATION

ADVANTAGES

1. The patient is taken care of at both acute and ambulant stage by qualified and trained Nurses.

2. The Nurses provide the patient with the companion he needs and together with their assistance other hospital staff, the daily needs of the patient are adequately taken care off.
3. Risk of infection spread between the patient and his Nursing Relative is eliminated.
4. Consistent disturbance by the relatives presence all the time is minimized and eliminated, hence the patient gets enough rest.

DISADVANTAGES

1. In a situation where the hospital is understaffed, the patient cannot be able to get the required attention of the Nurse, hence he suffers a certain degree of neglect.
2. The Nurse may not necessarily be of the same religion with him, hence there is the general fear that if the worst comes he will not be prayed upon, since due to their different religious the Nurse may not know what to say.
3. The nurses become gradually worn out where they are dealing with many patients especially, where a nagging patient is involved.

5.4.2 **REAL SITUATION**

ADVANTAGES

1. The patients find it easier to communicate with the relatives and ask for whatever assistance, they may not be able to request for from nurses.
2. The patient can be rest assured that his basic needs will be taken care of immediately.

3. The Doctor gets full information and progress report about the patient by the minute when he comes for his rounds and it aids him in making judgements about the patients' condition.
4. The relatives administer the patients' medication at the appropriate time.
5. The relative helps in washing the patients' effects and feeding him.
6. The patients' gets a companion in the nursing relative whom he discusses with and confides in.

DISADVANTAGES

1. there is high risk of infection spread from patient to relative
2. Facilities provided for patients only are used by the relatives also, leading to their over usage and subsequent spoilage.
3. Corridors and walkways are used by the relatives as sleeping areas, waiting areas and general washing /laundry areas, there by making them dirty and littering the environment.

When faced with the problem of in adequate staff and an increasing number of admitted patients in hospitals in Canada, Dr. Mackinon Phillips anticipating such a problems as the issue of Nursing Relatives conducted studies which were used as a scheme for design and construction of future hospitals. His studies showed that a large percentage of the patients in the general hospital are ambulant while a slightly larger figure where acute cases. The former could take care of themselves, while the later could not and need constant attention. He now forwarded the report of his studies to the Architects John B. Parkins and associates who came up with a design (The Greater Niagara General Hospital, Niagara Falls, Ontario, Canada) within which, the wards

were grouped into two, acute medical and surgical wards and ambulant medical and surgical wards. The acute medical and surgical wards were placed close to the diagnostic and treatment facilities and NGO's were used to supplement the efforts of the Nurses. While, the non acute ambulant patients were kept in wings far away from the hospital core. They were provided with facilities to aid self care.[22]

During the course of discussions with some Doctors and medical personnel from various hospitals, their opinions were divided as to whether nursing relatives should be allowed to play a role in the care of their patients. Although due to economic reasons and infection spread, this role should be limited such that their contact with patients is limited. To this end, some hospital allow the Nursing relatives, but vaccinated them against certain infection disease that they may likely contact. While in some hospitals the do not allow them completely except during visiting hours. In some they accommodate the relatives only during the day (7am-7pm e.g. Aminu kano teaching hosptial, kano).

However despite attempts at discouraging or stopping these relatives you still find them hanging around the hospital corridors and vicinity. In some cases they even refuse to take their patients to such hospital except when they can't help it.

5.5 RECOMMENDATION AND CONCLUSION

Considering the fact that the ill patient is apprehensive and anxious. The stress he is going through stimulates a deference mechanism and personalities change. Patients become irritable, suspicious and defensive. They long for security and companionship; in most people's minds, this means they need a known face to soothe and provide them

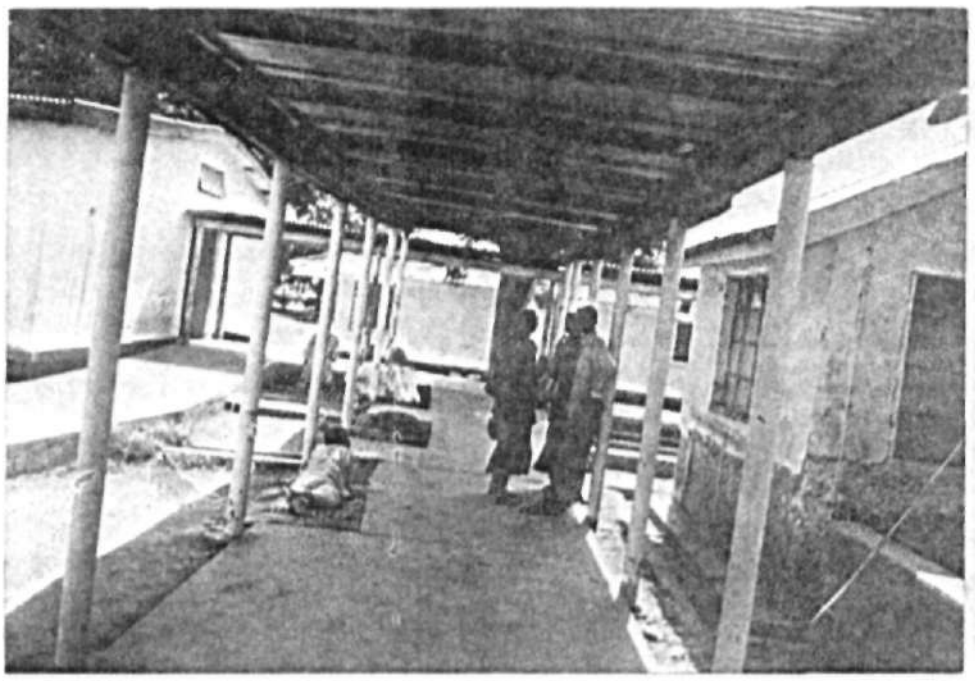
[22] Hospitals, Clinics and Health Centres. Mcgraw Hill Book Co. Page 56.

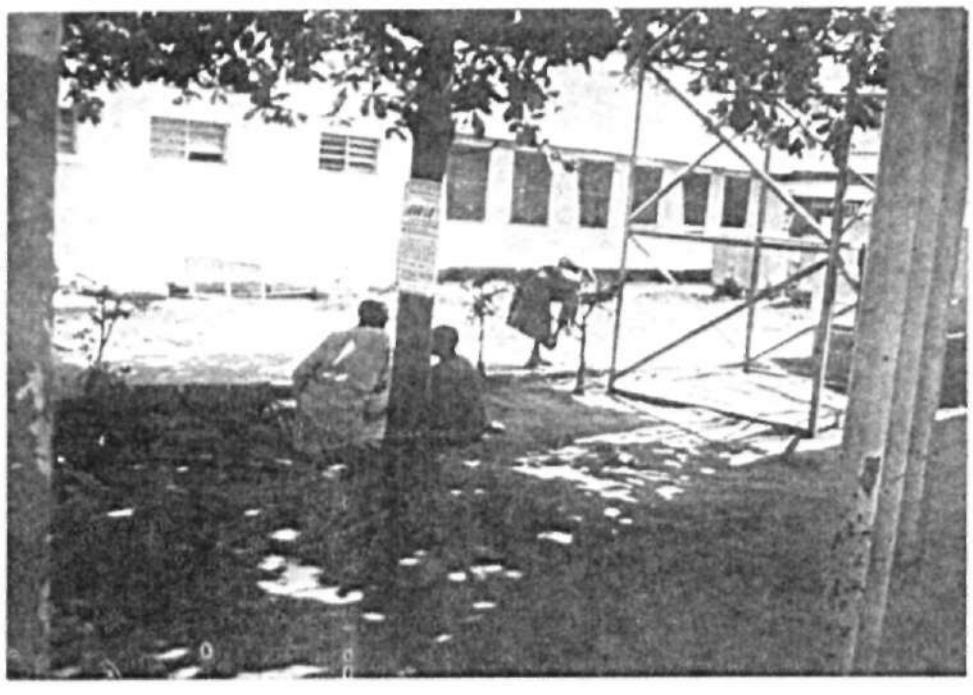
with companionship as well as take care of their daily demands. To this end, the author recommends that certain support facilities should be provided to be used relatives of patients. In as much as the practice should be discouraged due to its inherent infection harzards, but it is a situation that has to be accommodated subject to the time the larger society become aware of the need to leave patients care to the professionals. And until such a time when enough staff are trained and the economy improves to be able to withstand the increased demand for modern health care.

The author has decided to incorporate in his design of the nursing unit or ward, apart from the basics, a waiting area for the relatives. This will be close to the Nursing station such that they could serve as a check to the Nurses and vice versa. Toilets will also be provided for them such that they don't have to make use of the patient toilets. The patient wards will be subdivided into compartments, such that each compartment will accommodate a maximum of 4 patients and will be equipped with its own toilet and bath to encourage self care for ambulant patients, ensure privacy and reduce congestion due to Nursing relatives.

The facilities provided for the nursing relatives could easily be converted for other uses when such a problem ceases to exist. It should be noted however that these facilities provided are not to be made too comfortable such that the relative stay there permanently. The relative could be accommodated over the night as a watchdog only, hence during the daytime he could go home and sleep while another takes his place. Also, these relatives will be given periodic lessons in patient care and should be vaccinated against certain infectious diseases.







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CHAPTER SIX

CASE STUDY:

6.0 CASE STUDIES:

Case studies of some existing hospitals were carried out in the course of this research work. This is in order to look at how other hospital designers have been able to approach the complexities of hospital design. And also to have a practical knowledge of the workings of hospitals in order to propose an effective hospital design which conforms with requirements of hospital design.

6.1.0 GENERAL HOSPITAL GOMBE

General hospital Gombe was built in 1955 by the then Native Authority in conjunction with the regional government of the time. The hospital was originally planned to accommodate 116 beds with room for future expansions when the need arises. Currently, the hospital accommodates a bed capacity of 297 within its originally designed frame. Originally, it was planned to accommodate accident and emergency departments, out patient department, pharmacy, surgical suite, Nursing units (Medical, surgical pediatric and Obstetrical), isolation facilities administration and support services departments (dietary and laundry).

6.1.1 ACCESS:

The hospital is accessible from the south side. It is situated along the Jekadafari road, which is a major thoroughfare. An axis from which, other roads branch out. Hence, the hospital can be conveniently reached from all part of Gombe town.

6.1.2 THE SITE:

The site is a relatively flat land, which was formerly on the outskirts of Gombe Town but is presently part of the sprawling township, with growth and development making the hospital to be almost central in location. It borders on the East with the modestly clustered residential buildings of Jekadafari quarters, on the North with the Old Graveyard and on the West by Government Science Secondary School Gombe.

6.1.3 DIAGNOSTIC AND TREATMENT FACILITIES:

The out patient department which is the first point of call of all patients visiting the hospital is situated in a position where it can be easily identified even on a first visit to the hospital. It links with the pharmacy and consulting rooms. However, it was planned without waiting spaces and both staff and patients conveniences (toilets). Hence, the verandah, which is purely a circulation space that is linked to the network of corridors linking the hospital departments, is converted for this purpose. This has caused serious traffic and congestion problems along the length of the verandah.

The laboratories (Pathology department) are located behind the out patient department and linked by means of a corridor to the surgical suite. They also do not have a waiting space hence suffer high congestion along the corridor. The laboratories are also inadequate, hence the merging together of some of the units within.

The X-ray rooms, which are a new construction are also a stones throw from the surgical suite and nursing units, even though it does not accommodate an operating theatre and recovery rooms. This result in a relatively long travel distance between it and the surgical suite which is not appropriate considering the fact the some cases

require immediate operation. It is also within full public view from the out patients department.

6.1.4 ADMINISTRATION:

This department which handles all administrative function of the hospital is located at the pheriphery of the hospital close to the hospital gate. It is adequately located except for the fact that there are no enough offices, hence the merging together of some functions.

6.1.5 CIRCULATION:

Vehicular circulation is not clearly separated from pedestrian circulation especially around the OPD and administrative department. A chain of corridors organically interlocked, connect the various hospital departments.

6.1.6 SERVICES:

The service departments found in this hospital are essentially the dietary and laundry service departments. These two are organically connected to each other and located close to the patient care units. However, most laundry services, are carried out by patient relatives within available spaces close to the Wards their patients are housed and some times along the hospital corridors.

A bore hole sunk within the hospital premises supplement local water supply for the hospital. A generator house is also obtained in the hospital.

6.1.7 PATIENT CARE UNITS:

The patient care units are of the Nightingale plan type. The Nursing Units are medical, surgical pediatric, obstetrical/maternity, and psychiatric. The wards are overpopulated and accommodate beds even along the verandah, which runs the length of

the wards. Toilets serving these wards are placed at the end of the wards and separated from the wards by means of corridors, which are the principal circulation network. This is a poor plan as patients have to travel long distances to get to the toilets land showers. Apart from having to leave the wards completely. This has made the day space provided, to be used by the patients who cannot make it to the toilets as a place where they ease themselves. This is noticed in the surgical ward.

Isolation rooms are absent within the ward frame, except for the pediatric ward which is connected to two bedrooms. This is an in-efficient way of providing isolation, and does not reduce the risk of infection.

The pediatric ward is not attached to the maternity ward. The Nurses station is centrally placed within the ward, however, most facilities required such as treatment room etc are absent. And the Nurses station does not have an effective control over the traffic flow into and out the ward as the major entrances are not in anyway close to the nurses' station.

6.1.8 EXPANSION:

The hospital has space for expansion unidirectionally on the West. This is because it is bounded by the hospital wall on the East, and Staff housing on the North.

6.1.9 CONCLUSION:

The hospital organization (layout) general is quite workable and articulate. Also, the grouping of the various departments with related facilities is appreciable. However, individually, some of the departments are not well planned especially the Nursing Units.

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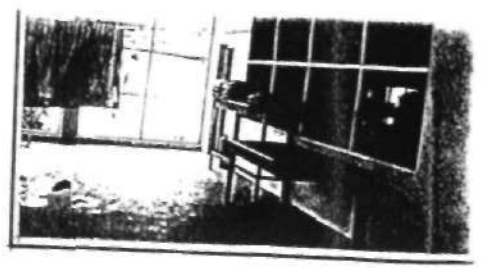
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- LIGHTING SPACES AND OTHER PUBLIC CONVINIENCES ARE NOT PROVIDED IN MOST DEPARTMENTS.
- UNDEFINED PEDESTRIAN AND VEHICULAR CIRCULATION.
- LAUNDRY FACILITIES FOR PATIENT USE NOT PROVIDED.
- TOILETS NOT PROPERLY POSITIONED, HENCE LONGER TRAVEL DISTANCE FOR PATIENTS.



● THE LAUNDRY



● INTENSIVE CARE PAEDIATRIC WARD



● THE OUT PATIENT



LAY-OUT OF GEN. HOSP. GOMBE

6.2.0 BAUCHI SPECIALIST HOSPITAL:

First built in 1955 by the then regional Government as a "country Hospital". As a result of growing demands of healthcare due to population growth and improvement of medical sciences, the hospital was expanded periodically since it was first constructed. It was transformed gradually into General Hospital Bauchi and later Specialist Hospital Bauchi. It currently has a total bed capacity of 450.

6.2.1 NURSING UNITS:

Originally designed to accommodate 30 beds by now accommodates between 40 and 45 beds per ward. Some beds are placed along the verandah adjoining the nursing units/wards. The nursing units take the shape of the Nightingale ward form. These wards have an East – West orientation, which does not allow for direct penetration of sunlight into the wards. It also has an adequate number of toilets (1 wc/shower to 8 patients). However, no proper ventilation within the wards due to over congestion and the small size windows. Infection spread is also not controlled and privacy not promoted as a result of bed arrangement. The toilets are also far from the remote beds, hence longer walking distance for patients.

When the need for expansion arose, a new ward design was adopted, which was much better than the former. It had more facilities and a better space organization. The ward is sub divided into four bed compartments, with isolation rooms at one end. The isolation rooms are single bedrooms with their own individual toilets. A better arrangement is obtained in the earlier wards. A relatively acceptable degree of privacy is established with the control of the number of beds per cubicle. A central nursing station is provided as well as treatment rooms, offices and a tutorial room, as the

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hospital supports a school of Nursing and Midwifery. However, the ward doe not accommodate laundry facilities and kitchen, which are important to patient welfare. Also, although centrally placed, the Nursing units is too far away from the isolation rooms and effective monitoring of traffic and supervision is not achieved fully.

The Nursing units include medical, surgical, maternity/obstetrical, pediatric and psychiatric units.

6.2.2 DIAGNOSTIC FACILITIES:

i) OUTPATIENT DEPARTMENT.

The O.P.D. is sandwiched between the old and new wards and easily accessible to both out patients and inpatients. It has a relatively small number of consulting rooms (5), when compared to its size and the population of the catchment area it serves. It has only one treatment room, which is also not adequate. No Waiting space is provided for visitors to this department. Hence the corridor is utilized for such purpose causing over congestion and over crowding. This is not a healthy development, as it increase risk of infection.

ii) PATHOLOGY:

The pathology lab basically consists of only four laboratories. The Hematology lab serves both as a laboratory, blood bank, blood collection centre from donors and blood samples to be examined. Waiting unit and specimen collection rooms are also not present.

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iii) **PHARMACY:**

This adjoins the consulting rooms and laboratories (a good arrangement). It is one of the busiest areas of the hospital, serving as a compounding and dispensing unit. Waiting space and staff facilities such as offices and toilets are not available.

iv) **SURGICAL SUITE:**

Situated amidst the nursing units, it contains two operating rooms major and minor theatres. Sterilizing facilities are absent. Hence this is done in the operating theatre (An unhealthy development which encourage infection spread). Anesthesia also takes place in the operating theatre due to the absence of such facilities as anesthesia rooms, supplies store and Anesthetist office. No recovery room and staff facilities are found within the surgical suite.

v) **EMERGENCY:**

It is located in an easily accessible position, and contains a minor operating theatre, a three bed recovery room, patient toilets. It's major draw back is that it is easily viewed by the general public.

vi) **RADIOLOGY:**

This is attached to the surgical suite and it contains an X-ray room, two changing cubicles. It does not offer therapeutic services and does not have fluoroscopic equipment.

6.2.3 SUPPORT FACILITIES/DEPARTMENTS:

I) KITCHEN

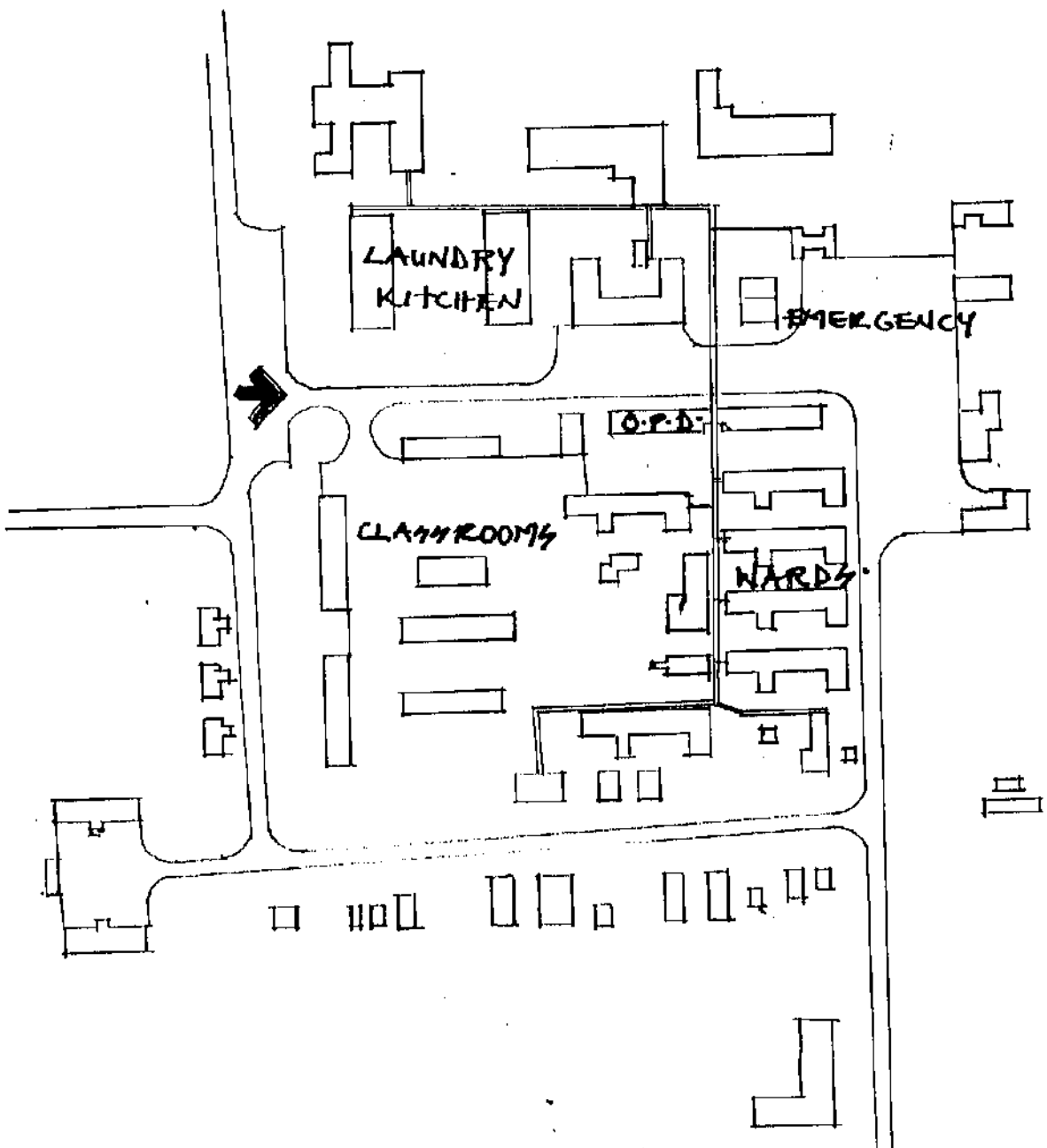
Located in the southern part of the hospital complex and uses firewood as a source of fuel. Although it is not functional, its mode of operation is not good for control of asepsis. Food is prepared and distributed using the centralized tray service, within the main kitchen as no separate distribution room is provided. Opened completely on both sides, the kitchen does not have dish washing facilities, hence this is done out side the kitchen in the open.

Food is not given to patients on a regular basis, hence they feed themselves through food brought to them by their relatives. Parts of the hospital are used by relatives, as cooking points to warm patient's food and/or cook for them.

ii) LAUNDRY:

The laundry is also organically attached to the kitchen. It handles all the hospital laundry services. It comprises of a washing area and ironing area. No storage facilities for both soiled and clean linen is provided. Due to the irregularity of the laundry services, patients wash their linen themselves or implore the help of their relatives. Hence, some of the hospital premises are converted into washing areas, especially around the Nursing Units.

Other support facilities such as general stores, maintenance shop, power house and administration departments are also obtained at the hospital. These however, are grossly inadequate when compared to the hospital size.



OF SPECIALIST HOSPITAL BAUCHI

6.3.0 SOUTH BAY HOSPITAL, REDONDO BEACH CALIFORNIA, USA.

The hospital was built in 1955 and it was designed t be constructed in two phases. The first phase was to construct a 149 bed hospital which, could be later expanded in the second phase into a 250 bed hospital.

6.3.1 THE SITE

The hospital is located on a 10 acre site overlooking the pacific ocean. The institution will serve a hospital district of approximately 40 square miles, which include the cities of Manhattan Beach, Hermosa Beach, and Redondo Beach. These cities occupy an area, which is the most densely populated in California. The site therefore, is near the geographical and population center of the hospital district.

6.3.2 PLANNING:

The hospital was planned taking into consideration not one but actually two projects. The hospital built now and the one it must grow into later.

The first phase of construction included most of the medical, surgical and auxiliary facilities that will be needed for the complete hospital and bed capacity of 149.

The overall scheme for the hospital includes four floors and a partial basement, within which all departments and facilities were to be located. A separate building houses the boilers and other equipment. The basement contains equipment rooms, laundry, Morgue, and physical therapy spaces.

The first floor is devoted to admission facilities, administration areas, dining and kitchen, central supply, and complete surgical facilities with all necessary auxiliary

spaces. The areas were zoned away from each other as much as possible, with related facilities conveniently placed near each other. All these areas are connected together by a system of interlocking hallways.

The second floor contains complete obstetrical facilities, including delivery suite, nurseries, nursing wings, and all auxiliary spaces required. The third and fourth floors are complete nursing units that are quite similar in plan except for a potion of the fourth floor, which is used for a separate the pediatric nursing unit.

6.3.3 EXPANSION:

The hospital was from its initial inception considered to be expandable, hence particular attention was given to its planning for such purpose. The size of the hospital was determined by a projection of the future requirements, and then pared down to a size that will be feasible at the present time. The hospital is a good example of a solution to a expansion problems which usually face Architects.

The expansion of the hospital would be in form of a 100 bed, nursing wing which will be attached to the existing structure. The need for expansion and other site problems resulted into the building being a multi-story structure.

6.3.4 ADVANTAGES:

i. Effective zoning of the various hospital components was achieved. This is denoted by the co-ordinated diagnostic and treatment facilities in the 1st floor of the hospital.

ii. The hospital, even though a multi-story structure, is quite simple and compact.

iii. It has a good traffic flow pattern, and a well planned flow of general services and vertical transportation.

iv. There was maximum utilization of site despite constraints.

v. Expansion problem especially in multi-story structure was gracefully solved.

6.3.5 **DISADVANTAGES:**

i. Ventilation is mostly mechanical as well as artificial lighting, especially of the corridors/hall ways.

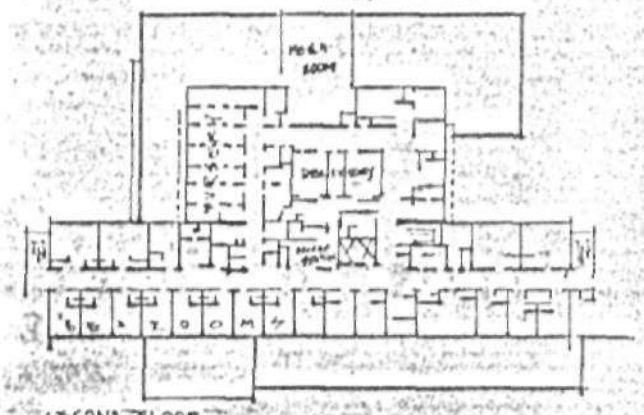
ii. The interconnecting hallways are relatively long and hence results in long travel distances.

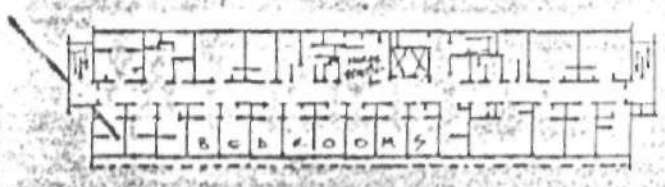
iii. Deep planning of the hospital makes it

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6.4.0 THE GREATER NIAGARA GENERAL HOSPITAL, NIAGARA FALLS ONTARIO

ARCHITECTS: JOHN B. PARKINS ASSOCIATES

HOSPITAL CONSULTANTS: AGNEW, PECKHAN & ASSOCIATES

6.4.1 APRAISAL

The scheme for this hospital was based on studies made by Dr. MacKinnon Phillips, which showed that a large percentage of the beds in a general hospital are occupied by non acute cases. Thus, patients were categorized into two i.e intensive care patients who can not care for themselves and ambulant or patients who can take care of themselves. Identifying these two categories of patients, the Architects (John B. Parkins Associates) placed in their design, nursing units for intensive care patients near the core of the building where diagnostic and treatment facilities are located. Patients requiring a minimum of care on the other hand are housed in a series of one storey nursing wings connected to the central core.

The central cone is a three storey structure consisting of all diagnostic and active treatment facilities on the main floor. The service departments are placed below this. On the third floor, over the centre of the core, the acute medical and surgical unit is located.

The delivery suite, is connected to the maternity nursing wing by the nursery. A separate entrance is provided for maternity patients, emergency a part of the main entrance. The nursing units contain 1 bed, 2 bed and 4 bed compartments.

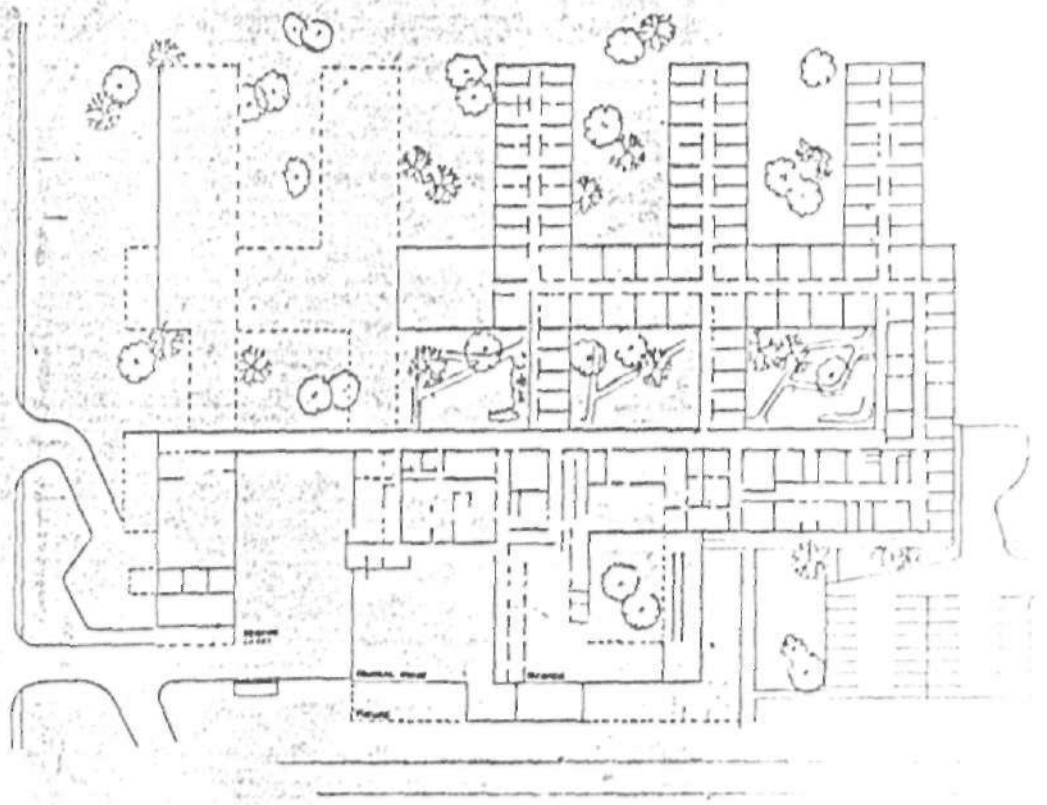
6.4.2 ADVANTAGES

1. Separation of the acute Nursing wing from the minimum care Nursing wing
2. Diagnostic and treatment facilities placed within the central core such that patients from different angles can easily reach them.'
3. The service departments also placed within the central core for easy delivery of equipment.
4. Space provided for future expansion of Nursing Wings and Laundry

6.4.3 DISADVANTAGES

1. Deep planning employed in the design this is not suitable for tropics
2. Mechanical transport, ventilation and lighting is used intensively, especially in lighting the long corridors and the hospital core.
3. No room for expansion of the central core.

RAL HOSPITAL, NIAGARA FALLS.



DISADVANTAGES

- DEEP PLANNING USED IN THE DESIG - THIS IS SUITABLE FOR THE TROPICS.
- MECHANICAL TRANSPORT, VENTILATION AND L/ EXTENSIVELY USED.
- CENTRAL CORE NOT EXPANDABLE.

6.5.0 HOLY CROSS HOSPITAL, SAN FERNADO, CALIFORNIA.

ARCHITECTS: GENE VERGE AND R.N. CLAT WORTHY

HOSPITAL CONSULTANT: GARDEN FRIESEN AND ASSOCIATES

6.5.1 APPRAISAL:

The guiding principles for the design of this hospital, was the provision of intensive personal nursing care for each patient. The cost of good nursing care and the extreme shortage of trained personnel were the watchwords in the design of this hospital.

The plan of the hospital utilizes extensive automated supply systems, which are similar to those employed in the production line of an industry. These systems include the pre packaging of sterile supplies and their distribution to the various parts of the hospital. Food from the kitchen and clean linen from the laundry are also dispatched to the various hospital units through the use of automatic tray conveyors. Dumb waiters are used on the various floors to received supplies from the conveyors.

Generally, the ground floor consists of diagnostic and treatment facilities, ancillary service facilities including kitchens, laundry and boiler room. The second floor on the other hand contains within its planning, the offices, and Doctors facilities e.t.c. The third floor provides the Nursing units in form of single and double bed room. Cupboards, which are divided into clean supplies and used supplies cupboard are attached to each patient bedroom.

In this way each patient can easily obtain the basic supplies through his clean supply cupboard and dispose of waste e.t.c., through the soiled cupboard. These are automatic and are connected organically to the main conveyor of the hospital.

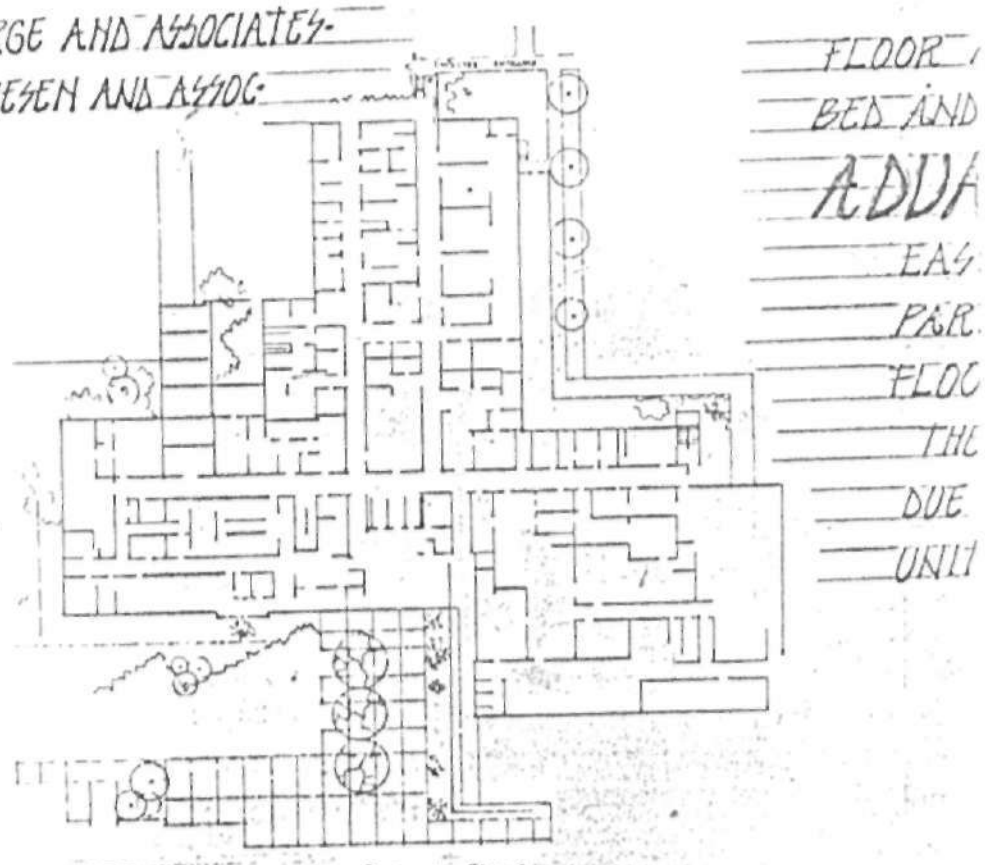
6.5.2 ADVANTAGE

1. Easy supply of materials to the various units of the hospital especially the Nursing floor.
2. There is a decrease in cross infection due to the compartmentalization of the Nursing unity

6.5.3 DISADVANTAGE

1. High cost of maintaining the mechanical transport systems
2. Deep planning employed and is not suitable for the tropics.

GENE VERGE AND ASSOCIATES-
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CHAPTER SEVEN

THE SITE

7.0 THE SITE

The site for the proposed hospital in located on the outskirts of Deba town, just before the town gate. The site, which has its major access on its northern side as it boarders with the major road that leads into the town i.e Gombe road. From the West side, it boarders with another road which has not been constructed yet i.e Alh. Shehu Usman Abubakar road which aligns with the Gombe Road.

The site was proposed for the project in 1994 after a survey report was submitted by the than surveyor general of Bauchi State. The site is in close proximity to necessary infrastructures, such as electricity lines and water supply (in form of bore holes to be dug on site).

The choice of the site was prompted by the development and growth trend of the town which is in the North Western and Western direction.

7.1 THE TERRITORY AND DISTRICT

Deba town is the local government headquarters of Yamaltu Deba local government. The local government has the second largest population in Gombe state. The people are predominantly muslims, who are of the Tera and Fulani ethnic groups. However, other ethnic groups such as Waja and Bere Bere or Kanuri are found within the geographical boundaries of the local government.

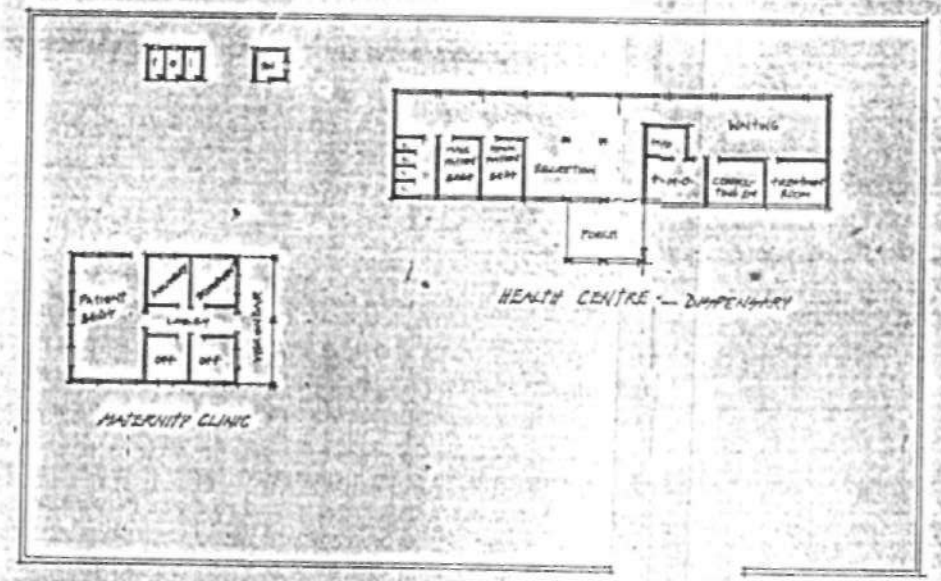
Deba local government lies some 50 km on the Eastern part of Gombe, the Gombe State Capital. It shares boarders with Konduga local government in Borno State



EXISTING MATERNITY CLINIC DEBA



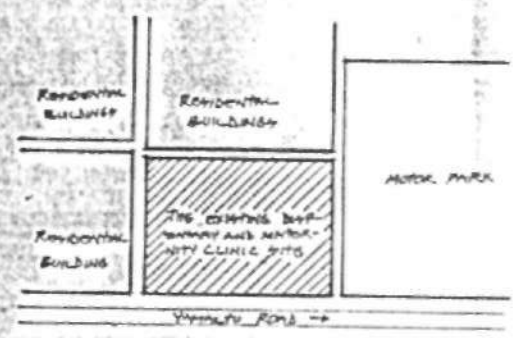
WAITING AREA OF THE DISPENSARY AT DEBA



HEALTH CENTRE — DISPENSARY

MATERNITY CLINIC

GROUND FLOOR PLAN



LOCATION OF THE MATERNITY CLINIC AND DISPENSARY DEBA.



EXISTING DISPENSARY DEBA



ELEVATION

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POPULATION OF THE LOCAL GOVERNMENT.

— THE LOCATION OF THE DISPENSARY VERY CLOSE TO
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AFFECTS THE PATIENTS COMFORT.

— THE SITE ON WHICH THE DISPENSARY/MATERNITY CL
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GENERAL HOSPITAL OR HEALTH CENTRE (COMPREHENSIV
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on the North East and Balanga Local Government of Gombe State on the South East. In the South and South West, it boarders with Kaltungo local government and Akko local governments of Gombe State. It is located between longitude 11^0.15'E and 11^0.45'E; and also between latitude $10^0$00'N and $10^0$30'N.

The economic activities of the Deba people include farming, livestock rearing and commercial i.e trading especially in farm produce and live stock. This is one of the factors that account for its relatively large population.

7.2 HEALTH FACILITIES IN DEBA AND CHOICE OF SITE

Irrespective of its large population, and economic potentials, Deba has very few health facilities and basic social amenities to cater for the welfare of its inhabitants. In fact within its total land area, it only has dispensaries and maternity clinics, which have a total capacity of 48 beds spread around the local government.

The realization of this, and the drive for the provision of adequate and affordable healthcare to the people, prompted the government of the former Bauchi State (from which Gombe State was carved) to propose the construction of a general hospital in Deba town in 1991. The catchment area of which will be the whole local government and also nearby Balanga Local Government. This is in order to reduce or stop patients from having to travel long distances from their homes to General Hospital Gombe for treatment. Another factor also that contributed to the choice of Deba for the construction of the hospital was the review of the Bauchi State Health Policy which based health care facility provision based on population.

However, the actual proposal for the project was not formally started until 1994 when the government of the day authorized a survey of the area, which led to choice of

the site for the project. As a result of logistics problems, the project was stalled until recently when it was brought up again after the African Development Bank agreed to co-finance the project.

The decision to embark on the project by the author was informed by the above facts.

7.3 TRAFFIC STUDIES AND ACCESS

As a result of its geographical position and political significance as the headquarters of Yamaltu Deba local government; there is generally a relatively high level of traffic going in and out of Deba town. This traffic is usually highest along the Gombe road, which is the major throughfare into the town. It is along this major road that the proposed site is located, hence it is easily accessible from within and outside Deba town.

Although the site is situated on the outskirts of Deba town, development trends show that future growth is most likely to occur along the busy Gombe road. This much is shown by constructions taking place along the road and close to the site. By projections, the area around the hospital site especially to the North and West will be heavily built up gradually.

7.4 SOIL

The soil is hard and clayey. It obviously retains moisture during the rainy season hence, it has tendencies of being water logged. However, during the dry season it becomes hard and flaked with visible cracks on its surface probably due to shrinking of the soil as a result of loss in water content.

The floor of the building will have to be raised considerably above the ground level, and damp proofing is necessary. There is also the need to properly design foundation of buildings to withstand the soil nature.

7.5 TOPOGRAPHY

The site is relatively flat with a slight but gentle slope not easily identifiable, towards the Southern end of the site. A sleep enbarnkment is seen at the Northern edge of the site due to the raised road level.

7.6 DRAINAGE

As a result of the slight and gradual inward slope, the site is naturally drained inwards towards the South.

Due to excessive rainfall and use of water in hospitals, there is a need to provide artificial supportive drainage, which however, will be aligned with the natural drainage direction of the site.

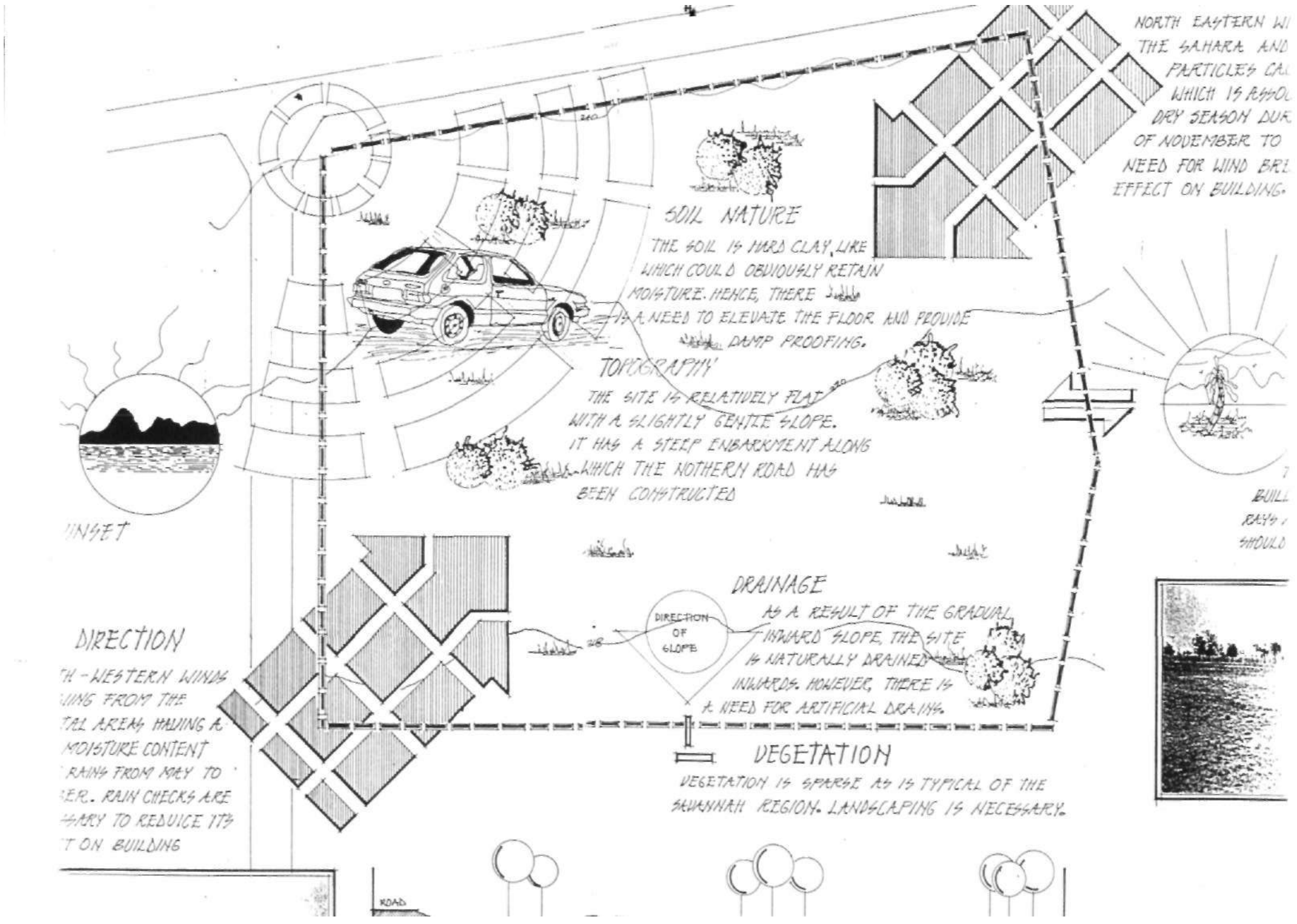
7.7 VEGETATION

The vegetation of the site is composed mainly of grasses and a few trees, as is characteristic of the Sudan Savannah region where the site is located.

There is a need to landscape the site especially with trees, in order to address the issue of the hot climate, which is a characteristic of the region.

7.8 CLIMATIC STUDIES

Architecture seeks to provide man with the desired comfort, which involves controlling and manipulating the physical environment. To achieve this, the Architect maximizes the use of the aspects of the environment, shaping them to stereotype the effect of climate in order to achieve his goal of providing a comfortable structure or environment.


NORTH EASTERN WI
THE SAHARA AND
PARTICLES CA
WHICH IS ASSOC
DRY SEASON DUR
OF NOVEMBER TO
NEED FOR WIND BRE
EFFECT ON BUILDING.
SOIL NATURE
THE SOIL IS HARD CLAY, LIKE
WHICH COULD OBVIOUSLY RETAIN
MOISTURE. HENCE, THERE
IS A NEED TO ELEVATE THE FLOOR AND PROVIDE
DAMP PROOFING.
TOPOGRAPHY
THE SITE IS RELATIVELY FLAT
WITH A SLIGHTLY GENTLE SLOPE.
IT HAS A STEEP EMBARKMENT ALONG
WHICH THE NOTHERN ROAD HAS
BEEN CONSTRUCTED
INSET
DIRECTION
TH - WESTERN WINDS
LING FROM THE
TAL AREAS HAVING A
MOISTURE CONTENT
RAINS FROM MAY TO
ER. RAIN CHECKS ARE
SARY TO REDUICE ITS
T ON BUILDING
DRAINAGE
AS A RESULT OF THE GRADUAL
INWARD SLOPE, THE SITE
IS NATURALLY DRAINED
INWARDS. HOWEVER, THERE IS
A NEED FOR ARTIFICIAL DRAINS.
DIRECTION OF SLOPE
VEGETATION
VEGETATION IS SPARSE AS IS TYPICAL OF THE
SAVANNAH REGION. LANDSCAPING IS NECESSARY.
ROAD
BUILL
RAYS
SHOULD

To effectively do this, there is a need to study the climate of the site in question (both micro and macro) to ascertain to what extend his design will be affected by or will affect the climate, to ensure a balanced and comfortable environment. As a result of this, the climate of the site is considered.

7.8.1 RAINFALL

The rainfall starts with a few drizzles towards the end of March and gradually increases in intensity, reaching its peak in August, before gradually declining through September and finally stopping in October. The mean monthly amount of rainfall shows that rain is concentrated mostly within the months of June, July, August and September within the site location under review (study).

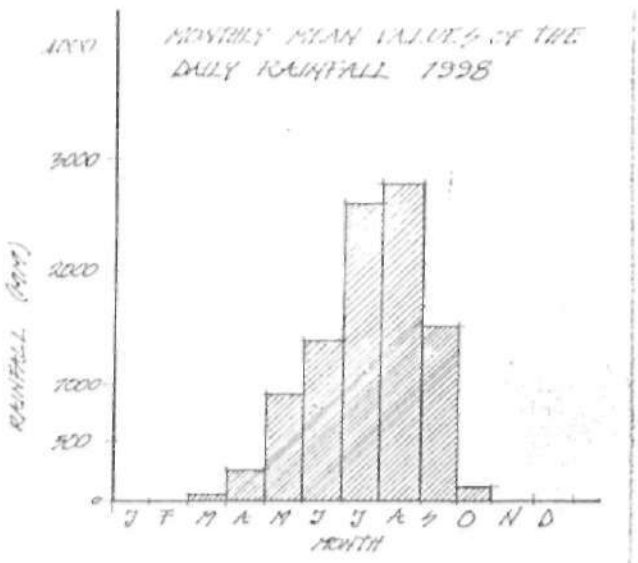
The concentration of the rains within a few months calls for an effective drainage system that can handle the huge amount of rainfall, and a roofing material and design, which can withstand the rain load and wind storms that usually accompany the rains.

7.8.2 TEMPERATURE

The highest temperatures are recorded within the months preceding the rainfall. This is the period when the heat is almost unbearable and causes general discomfort over the area in question. The minimum temperature gets as high as 27°C with the maximum temperature reaching an all time high of 40°C in some months. The hottest months are usually March, April and May.

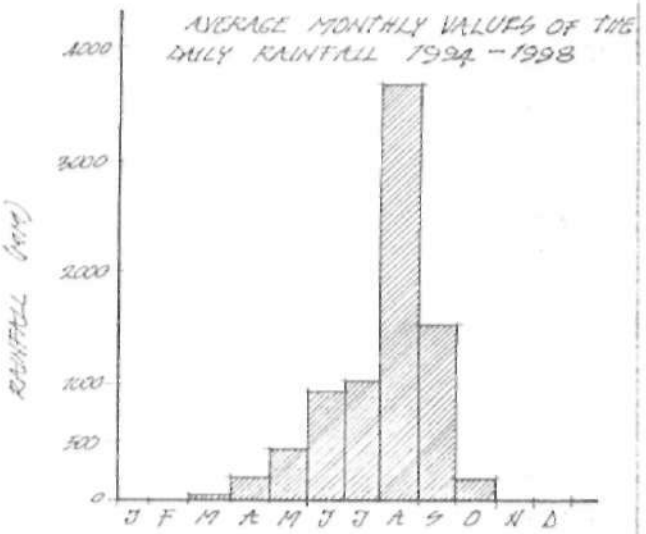
As a result of the high temperature of the locality, there is a need for the use of durable finishes for thermal comfort, and proper ventilation of the buildings.

MONTH	RAINFALL MM
JAN	—
FEB	—
MAR	50·0
APRIL	237·0
MAY	925·0
JUN	1430·9
JULY	2,688·0
AUG	2820·0
SEP	1560·0
OCT	130·0
NOV	—
DEC	—



1994 – 1998

MONTH	RAINFALL MM
JAN	—
FEB	—
MAR	40·0
APR	275·0
MAY	450·0
JUN	998·2
JUL	1020·9
AUG	3,790·0
SEP	1544·0
OCT	415·0
NOV	—
DEC	—

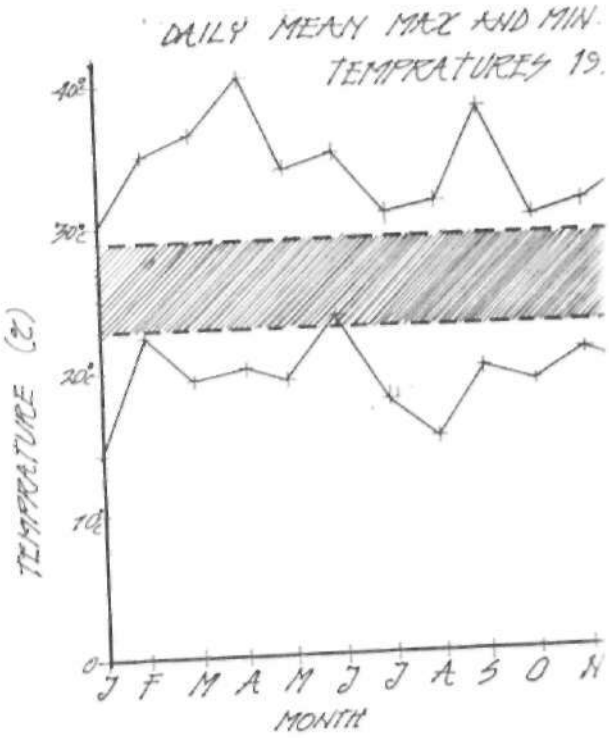


ESSENCE AT DESIGN STAGE

- DESIGN OF SITE AND ROOF DRAINAGE
- STRUCTURAL LOADING OF ROOF AND WALLS
- SOLUTION TO DECAY, CORROSSION AND BREAKDOWN OF BUILDING FINISHES.

1998

YTH	MAX °c	MIN °c
N.	30.0	14.0
B	35.0	22.7
AR	36.9	19.8
PR	40.5	20.2
AY	34.0	19.8
UN	35.0	24.0
UL	30.9	18.0
UG	31.7	15.0
EP	38.3	20.0
CT	30.0	19.0
OV	31.0	21.0
EC	38.8	19.9



1994 – 1998

MONTH	MAX °c	MIN °c
JAN	35.7	22.7
FEB	32.0	24.8
MAR	38.7	25.7
APR	40.8	26.8
MAY	38.6	25.9
JUN	33.7	24.0
JUL	33.7	23.8
AUG	32.0	22.0
SEP	30.9	21.5
OCT	33.6	24.0
NOV.	38.9	21.8
DEC	32.5	23.0

ESSENCE AT DESIGN STAGE

7.8.3 HUMIDITY

During the dry season, relative humidity is very low, with relatively high afternoon temperature and dusty winds. This accounts for the desiccation of the dry season. During the rainy season on the other hand, the temperature is slightly low and humidity is very high due to the high moisture content of the air. This creates a heat trap, which is uncomfortably hot.

Hence, there is a need for proper ventilation and landscaping elements such as plants to enhance the microclimate in order to achieve maximum or at least average comfort. Mechanical ventilation may be used.

7.8.4 WIND

Two major air masses, the tropical maritime air mass and the tropical continental air mass dominate the climate of the area where the site is located. The tropical maritime air mass is formed over the waters of the Atlantic Ocean in the South, and blows in usually a South Westerly and Southern directions inland, causing the rains. These winds are heavily moisture laden and predominantly occur within the months of April to October. The tropical continental air mass on the other hand, originates from the interior of the continent, usually developing over the Sahara desert and blow southwards in a predominantly North Easterly direction towards the sea coast. These winds generated, heavily contain dust particles and are overtly dry predominantly occurring during the months of November to March, and thus causing the dry Harmattan period/season, which reaches its peak in December and January. Mists or fog are

common features of the Harmattan season, reducing visibility at times as a result of dust particles within the air.

Proper orientation of buildings is necessary in order to avoid the extremes of these two seasons. Landscaping especially trees is necessary to reduce the effect of these winds and break their intensity, as well as the use of Sun shading devices.

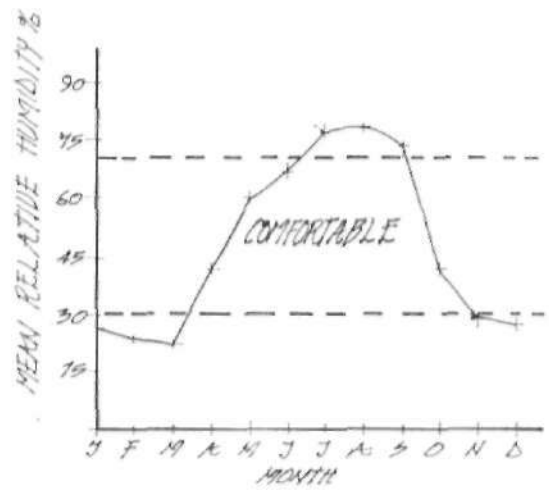
7.8.5 SUN AND CLOUD COVER

It is an established fact that the further away from the coast, the more the general increase in the number of sunshine hours and the intensity of the Sun on the earth surface. As a result of this, the number of the Sunshine hours is high around the location of the site especially during the dry season, which has little or no cloud cover. However, during the rainy season, the numbers of Sunshine hours gradually reduce. This reduction is accompanied by relative cloudiness of the Skies. The decline in Sunshine hours become intense as the rainy season progresses and reaches its peak in the month of August, thus the Sunshine hours is lowest in that month. This possibly causes a temperature inversion over the (site) area.

Therefore, there is a need for proper orientation of buildings to avoid the intense sun and the provision of Sun shading devices is extremely necessary.

RELATIVE HUMIDITY

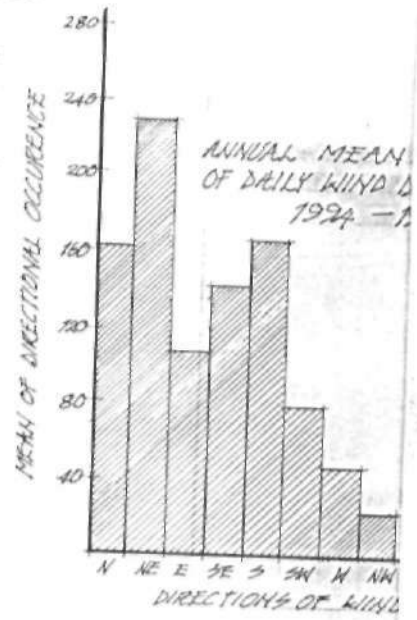
MONTH	MEAN %
JAN	27
FEB	24
MAR	23
APR	42
MAY	60
JUN	66
JUL	76
AUG	78
SEP	73
OCT	54
NOV	29
DEC	28



ESSENCE AT DESIGN STAGE

- REGULATION OF MOISTURE CONTENT OF POROUS MATERIALS FOR DESIGNED AMOUNT OF CONDUCTIVITY.
- DETERMINATION OF THERMAL INSULATION AND VENTILATION.

DIRECTIONS	TOTAL OCCURENCE	MEAN
N	1770	161
NE	2588	231
E	1124	102
SE	1481	136
S	1818	165
SW	863	79
W	520	47
NW	257	23



MONTH	OCCURENCE 1998							
	N	NE	E	SE	S	SW	W	NE
JAN	30	36	9	1	—	—	—	2
FEB	23	35	10	4	1	1	2	—
MAR	22	35	12	5	3	3	2	2
APR	15	6	11	11	10	8	6	4
MAY	5	4	6	20	29	15	7	6
JUN	4	2	4	19	49	18	3	2
JUL	2	2	5	24	4	16	8	2
AUG	5	2	5	16	31	14	7	5
SEP	6	5	9	16	26	10	4	1
OCT	8	19	14	14	11	5	3	2
NOV	18	35	15	3	1	1	—	2
DEC	24	40	8	1	—	—	—	—

ESSENCE AT DES

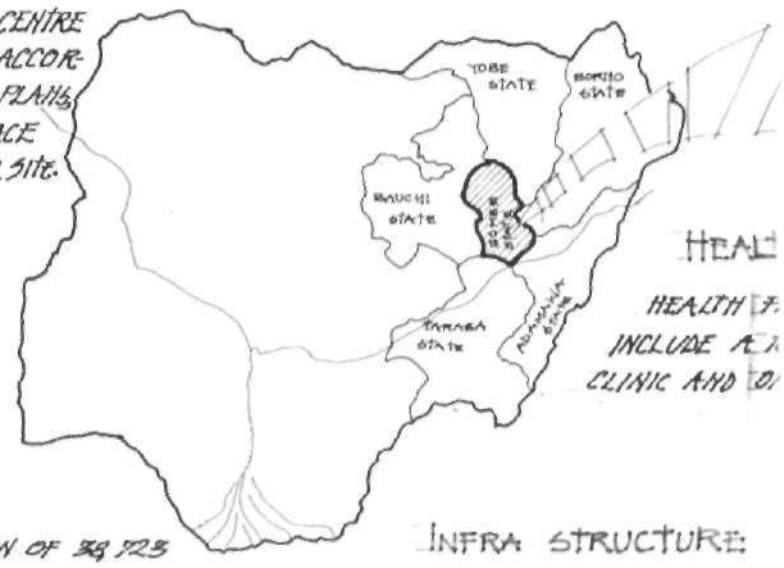
— PHYSICAL RESISTANCE
FINISHES ON EXTERI

— PROPER ORIENTATION
INGS.

— STRUCTURAL DESIGN
ELEMENTS.

— AIR EXCHANGE INFILTRATION THROUG

: SITE IS LOCATED ON THE OUTSKIRTS
SA TOWN. THIS IS BECAUSE ALL
WITHIN THE CLUSTERED CITY CENTRE
EEN BUILT UP. HOWEVER, ACCOR-
D FUTURE DEVELOPMENT PLANS,
: EXPANSION WILL TAKE PLACE
D THE PROPOSED HOSPITAL SITE.



HEALT

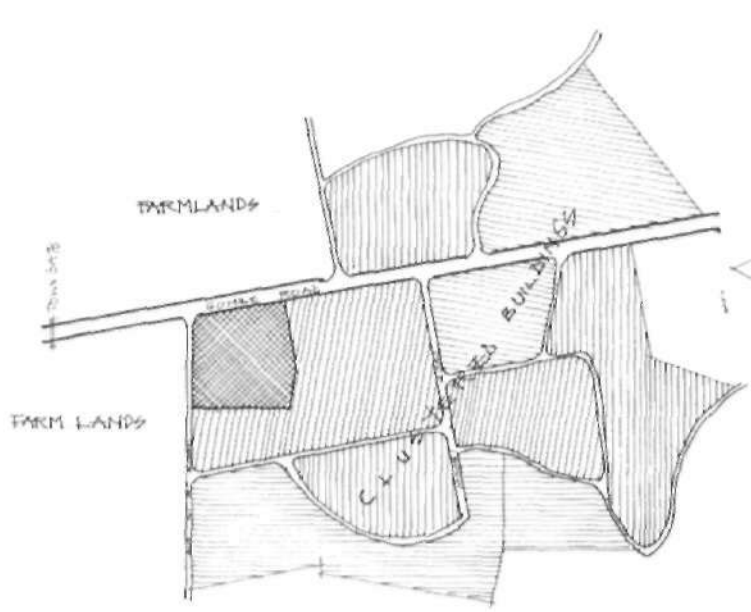
HEALTH F
INCLUDE A
CLINIC AND O

E PEOPLE:

BA TOWN HAS A POPULATION OF 38,723
HE GENERAL LOCAL GOVERNMENT POPULATION
T 1998 IS 271,176. THE PEOPLE ARE
OMINANTLY TERA AND FULANI BY TRIBE.
: MAIN OCCUPATION IS FARMING.

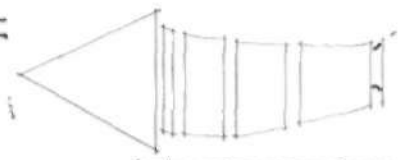
INFRA STRUCTURE:

THERE IS AN ESTABLISHED E
NETWORK AND WATER SUPPLI
NETWORK OF BORE HOLES.



DEBA TOWN LAYOUT







TH FACILITIES

FACILITIES FOUND AT DEBA TOWN
10 BED HEALTH CENTRE, A MATERNITY
ONE PRIVATE HOSPITAL.

ELECTRICITY
ED BY A

GOMBE STATE

YAMALTU-DEBA L.G.A.

DEBA TOWN

NAFADA

FUNA KAYE

DUKKU

KWAMI

GOMBE

YAMALTU DEBA

AKKO

BILLIRI

KALTUNGO

SHONGOM

N

SITE PICTURES





CHAPTER EIGHT

DESIGN PROPOSAL

8.0 SITE CONCEPT AND PLANNING

The site lay out was determined by site concepts which were arrived at after identifying the functional requirements of the hospital complex, and the site conditions, features and variables. The functional requirements of the hospital complex influenced the site concept in terms of traffic, expansion and positioning of the various hospital components, where they can easily relate to each other and enhance the function of the hospital. The grouping of the various hospital departments and section into zones classified as public areas, quite areas, low traffic areas, high traffic areas, out patient, in patient areas, and diagnostic areas, also helped in coming out with the site concept vis a vis the site structure. Another influencing feature is the fact that the hospital being the first of its type in the area, it is likely to experience large traffic, by virtue of the population of its catchment area.

The site features and condition on the other hand also played an important role in determining the position of the various hospital components. The highest likely noise source, the wind direction, vegetation, topography and access points into the site were also instrumental in the planning of the site.

Entrances into the site are from two major roads bounding the site i.e Gombe road on the North, Alh. Shehu Abubakar road from the West. The major entrance for visitors, out patients, Accident and Emergency etc. will be through the less busy Shehu Abubakar Road on the West, while the services entrance for supplies, maintenance

services etc will be through the busier Gombe road. This indicates a clear separation of the traffic.

Ancillary facilities i.e maintenance department, general stores, and supplies department, kitchen, laundry, generator house etc are placed between the major road on the North and the main hospital structure to act as a barrier for the noise which is highest on North along the major road bounding the site. The staff housing is placed on the eastern block while the site for the Nursing school is placed in wards in the South. The hospital complex is therefore centrally placed within these facilities.

Green areas or landscape areas have been provided, in order to break the monotony of a mass of buildings, and to enhance the microclimate and view. To serve as a buffer and break the intensity of storms, strong winds and provides shade.

The goals to be achieved by this site concept include: -

i. Economic and efficient supply operations especially to the bulk storage and distribution facilities.
ii. Efficient expansion scheme.
iii. Proper positioning and orientation of buildings to ensure user comfort.
iv. Clear separation of public traffic and services or traffic for supply operations.

8.1 DESIGN CONCEPTS

The design concept stem from the fact that diagnostic and treatment facilities are considered the most vital parts of a hospital structure, as they are patronized by both in patients and out patients, in order to ascertain the nature, extent and causes of their various illness. Hence, the diagnostic facilities are considered central. This predicates

the design concept to be such that the diagnostic facilities are placed centrally with other departments/facilities forming a ring round it. This is done using a radial concept, which expands radially from the central core. The location of the diagnostic facilities centrally will solve long travel distance and at the same time ensure a good relationship between it and the various hospital departments, functionally and in terms of supply operations.

The hospital is perceived purely as an industry from where raw materials are taken processed stored and later distributed. Hence the hospital is seen as an institution where sick patients are taken diagnosed, treated and later released into the society as healthy individuals once again. This influenced the progressive arrangement of the hospital facilities from the out patient services through diagnostic and treatment facilities, in patient facilities and later discharge.

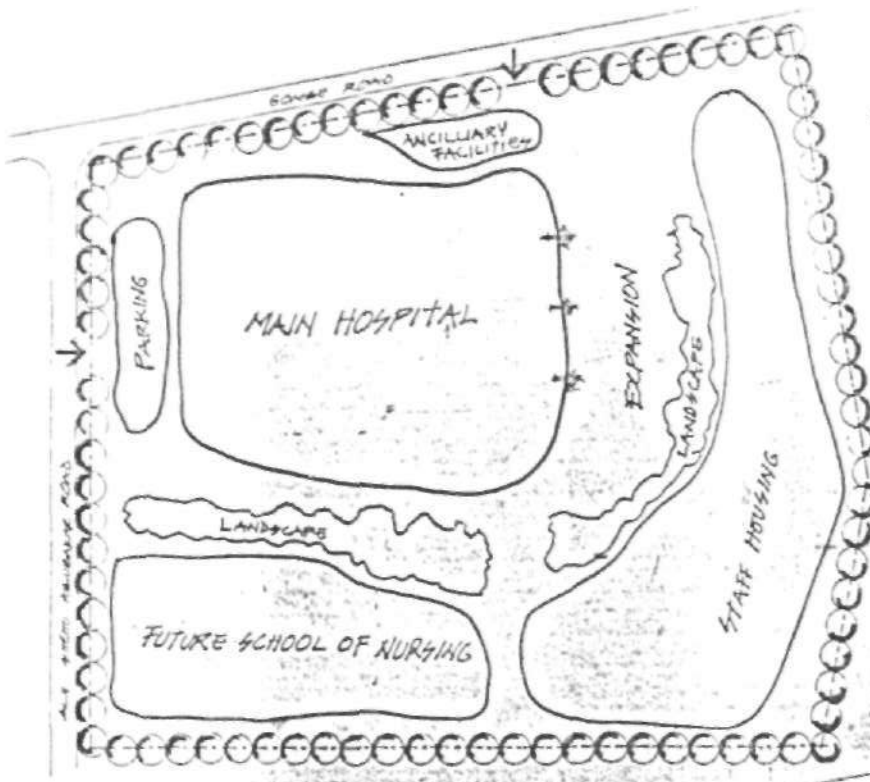
The design demarcates the in-patient areas from the out patient areas. It south also to reduce traffic within the hospital complex by introducing visitors entrances to the wards and administrative blocks such that they (the visitors) don't have to pass through the main hospital caucus. Patient traffic and services traffic is separated as much as possible yet they function together as a whole in ensuring the effective functioning of the hospital.

The design goals include:-

i. Ultimate balance in flow, from one part of the hospital to the other.

ii. Short travel distances between various functions with little traffic conflict.

iii. An environment which is relatively pleasant and comfortable for the users.



SITE LAY OUT CONCEPT

- FUTURE EXPANSION SPACE FOR THE HOSPITAL HAS BEEN PROVIDED.

- SPACE HAS ALSO BEEN PROVIDED FOR THE CONSTRUCTION OF A NURSING SCHOOL WITHIN THE HOSPITAL SITE.

- SPACE FOR THE CONSTRUCTION OF STAFF HOUSING HAS ALSO BEEN PROVIDED IN THE SITE ORGANIZATION STRUCTURE.

- SIMPLE CONSTRUCTION MATERIALS AND METHODS WILL BE EMPLOYED FOR EASY CONSTRUCTION.

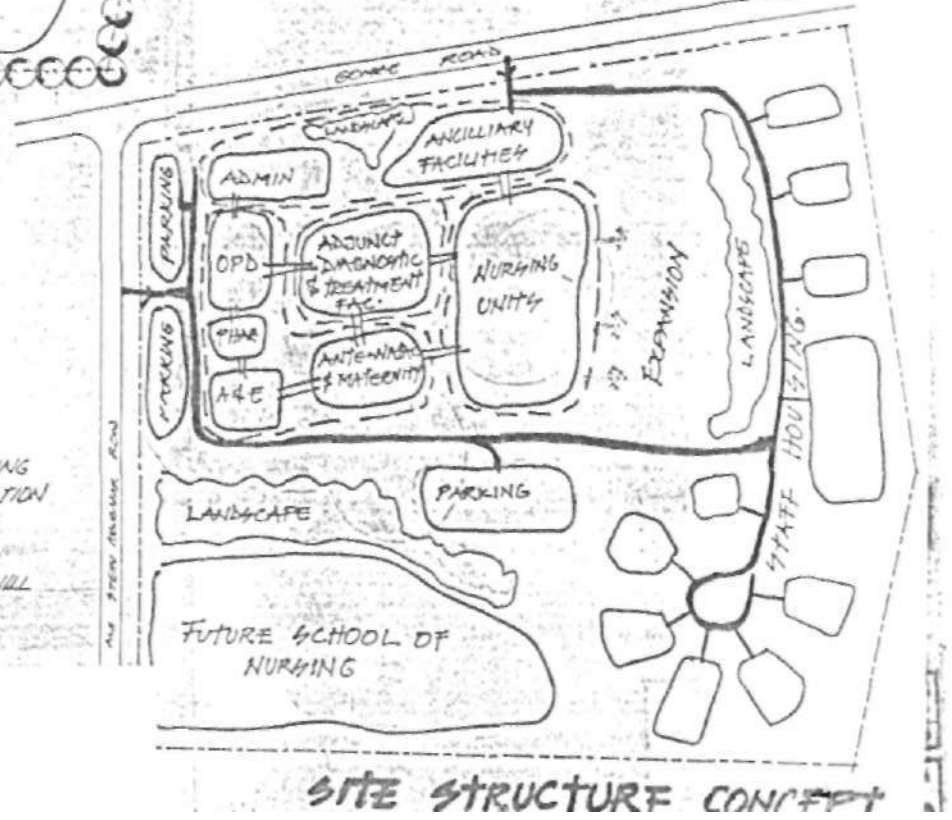
STRONG STORMS OF THE RAINY SEASONS.

- THE LANDSCAPE ELEMENTS WILL ALSO SERVE AS THERAPEUTIC AIDS TO THE PATIENTS.

- ORIENTATIO OF BUILDINGS WILL BE EAST - WEST IN ORDER TO AVOID EXCESSIDE HEAT AND SUN RAYS PENETRATION INTO THE INTERIOR, SUBSEQUENTLY AFFECTING COMFORT OF PATIENTS.

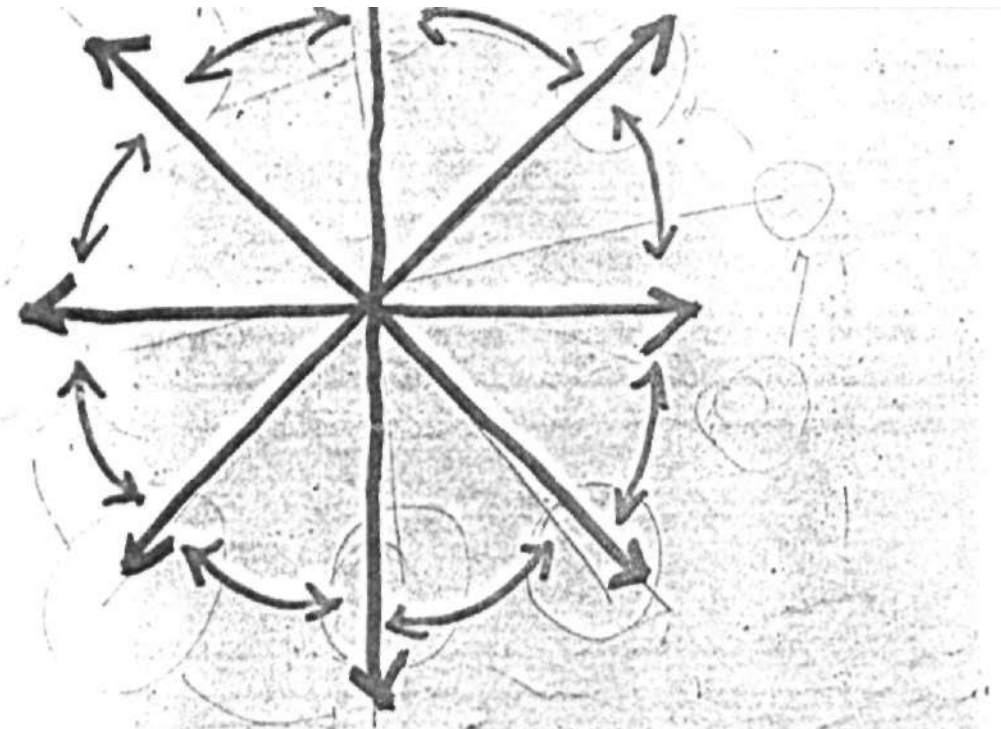
- OPEN SPACES WILL BE PROVIDED BETWEEN BUILDINGS TO ENHANCE PROPER VENTILATION AND LIGHTING.

- THE BUILDINGS WILL BE SPREAD HORIZONTALLY IN A LINEAR PATTERN. A PAVILION TYPE OF DESIGN CONCEPT.

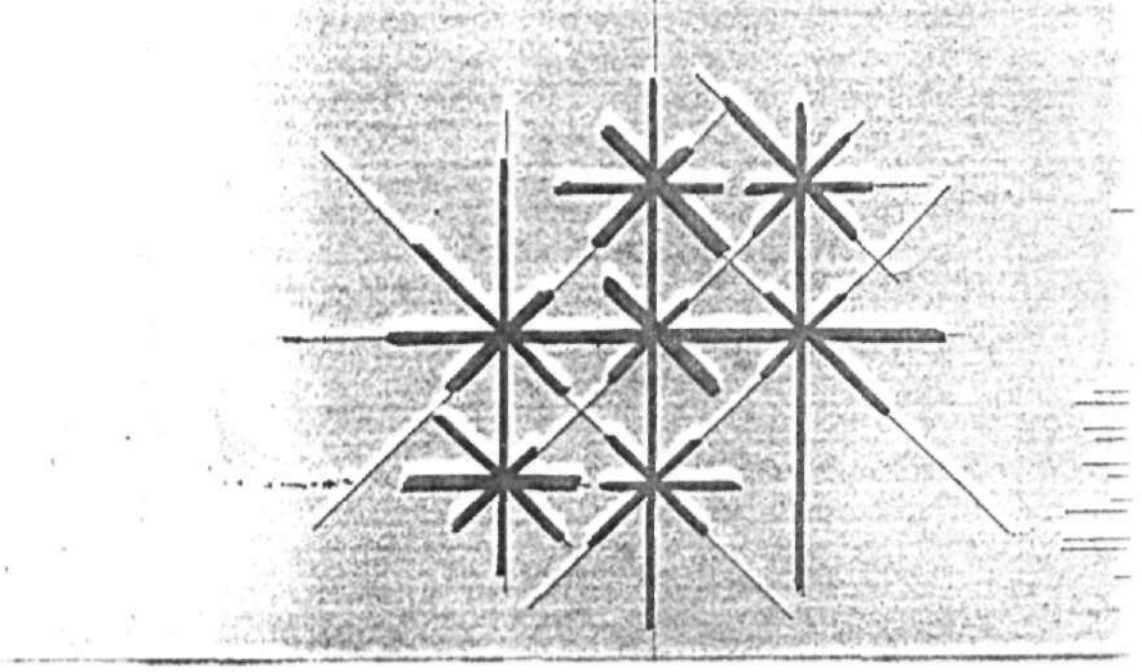


SITE STRUCTURE CONCEPT

ASSEN IBRAHIM LIBRARY



RADIAL FORM



RECTILINEAR BUILDINGS



- FORMAL
- STABLE
- BOLD
- STRONG
- ACTIVE

- BALANCE
- EQUIDISTANT
- DIRECTIONAL
- PROGRESSIVE
- EXPANDING
- DEVELOPING
- GROWING

iv. Infection control by separating work corridors from general circulation corridors.

v. Efficient scheme for future expansion

vi. Enhanced ventilation and lighting which is natural.

vii. Economic and efficient supply operations of equipment and facilities to the various parts of the hospital.

8.2 GROWTH AND EXPANSION

Ample space is provided for future expansion of the hospital especially around Nursing Units.

8.3 HOSPITAL BED NEED

In order to determine the bed need or capacity of the proposed hospital, the population of Deba Local Government was considered. The population of Deba as at 1991 was 221,836 and the projected population as at 1998 stood at 271,776. Going by the 3% per annum population growth rate given by the National Population Commission of Nigeria, the population of Deba in the next 10 years i.e 1998 – 2008 will be

3/100 x 271,776 x 10

271,176 + 81,352.8

352,528

The estimated total beds required for an acute general hospital at Deba, considering the 2 beds/thousand population approved by the Nigerian Medical Association (NMA) for rural areas (Deba is a semi urban setting) is given as follows:

	POPULATION	BED NUMBER
1997	221,836	442 beds
1998	271,176	542 beds
2008	352,528	704 beds

According to Ahmed S.S. 1983, the estimated number of beds to be provided by government is 65% of total bed need, while private organization account for 35% of the total bed need. Hence, the bed requirement as at 1998 for the Deba community to be provided by government agencies is

65/100 x 542 beds

= 352 beds

However, existing hospital beds obtained within the various dispensaries and maternity clinics spread through out the local government as at 1998, as given by the Gombe State Ministry of Health is 48 beds.

Therefore, the total bed need of the community as at 1998 is 354 – 48 = 305 beds.

However, due to limited resources, it is assumed that the government can at the moment only build a hospital that will meet 60% of the total bed requirement and will later be expended to meet both current and future needs.

Hence; 60/100 x 304 = 182.4 beds.

For convinience, this figure is rounded up to 200 beds.

The proposed hospital will therefore be designed to accommodate 200 beds and be expandable to 304 beds and subsequently 500 beds; when resources permit.

8.3.1 BED DISTRIBUTION

The bed distribution of the proposed general hospital is based on the world health organisation's (WHO) formula for bed distribution in acute general hospital based on division of the in-patient nursing units or wards by services:

Table 8.1:- **Bed Distribution**

	% DISTRIBUTION	NUMBER OF BEDS
Medical ward	24%	48
Surgical Ward	33%	66
Obstetrical Ward	15%	30
Pediatrics Ward	19%	38
Others (Amenity/Isolation)	9%	18
Total	100%	200 beds

The medical and surgical wards will be further subdivided into male and female wards.

8.4.0 THE OUT PATIENT DEPARTMENT

The out patient department (OPD) provides consultation, investigation, diagnosis and treatment for patients who require little or no recovery services after wards and are not admitted to acute wards. After consultations, patients are sent for further diagnosis and/or treatment to the diagnostic and treatment departments i.e surgery, laboratories and pathology, radiology etc as the case may be. Hence, the department needs to be

positioned such that it is easily accessible to these services as well as easily accessible to the patient who is on a first visit to the hospital. This is because it is the first point of call of all patients attending the hospital.

8.4.1 NUMBER OF CONSULTING ROOMS:

In order to determine the number of consulting rooms to be provided in the O.P.D. of the proposed general hospital; a formula given by E.T. Wheeler in his hospital design and function is used:

$Y = M \times T/S$ Where Y = Critical number of sessions

M = Average weekly attendance

T = Average consulting time in minutes

S = Total length of each session daily.

Assuming:-

i. An average weekly attendance of 2% of the total population : 2/100 x 271,176 = 5,423.5 = 5,424 (for convinience, figure is rounded up to 5,500)

ii. The average consulting time per patient is given as 5 minutes.

iii. The total length of each session is 7 hours or 420 minutes (8 .00am – 4.00pm – with an hour break)

The critical number of session Y is given as

$Y = 5,500 \times 5 / 420$

= 66 sessions

The number of consulting rooms C = Y/r

Where r = number of sessions held weekly, equivalent to 5. i.e Monday – Friday.

Therefore C = 66/7 = 73 consulting rooms

From the above, we denote that the critical number of consulting rooms, required in the whole hospital is 13

Two (2) treatment rooms are recommended per consulting room, as is shown by E.T. Wheeler. Therefore, for 13 consulting rooms the number of treatment room will be 26 i.e 13 x 2. However, due to cost of construction and equipping of the treatment rooms, and in order to avoid duplicity of function as much as possible, the designer has decided to adopt one treatment room per consulting room. Hence number of treatment room = 13.

The distribution of consulting and treatment rooms in the proposed hospital as adopted by the designer is as follows:

Table 8.2:- **Distribution of Consulting and Treatment Rooms**

	Number of Consulting Rooms	Number of Treatment Rooms
O.P.D.	9	9
ACCIDENT & EMERGENCY	2	2
ANTENATAL CLINIC	2	2
TOTAL	13	13

Table 8.3:- **Schedule Of Accommodation**

	Area M2	Number	Net Area M2
Public Health Waiting	220	1	220
Public Health Injection room	20	2	40
Public Health staff toilets	3	2	6
Public Health patient toilets	3.6	6	21.6
Reception counter	25	1	25
Cash office	20	2	40
Cleaners room	16	2	32
Records	25	1	25
Drug store	20	1	20
Card room	15	1	15
Office	15	1	15
General waiting area	320	1	320
Clinic waiting	128	5	640
Patient toilet (General Clinic)	3	16	48
Staff toilets	3	14	42
Consulting rooms	20	9	180
Treatment rooms	16	9	144
Janitors clossetts	3.36	2	6.72
	Total	=	1865.32

8.5 ACCIDENT AND EMERGENCY

This department provides 24 hours, 365 day/year service for accidents and medical emergencies occurring in home, at work, at sports or travelling. The department provides resuscitation, reception and first stage examination services. Patients are later discharged, sent to other parts of the hospital for further investigation and treatment or

admitted as in patients. The Accident and Emergency department is placed close to the O.P.D and has ambulance parking and is close enough to the main hospital entrance.

8.5.1 CASUALTY DEPARMENT

This department is linked to the Accident and Emergency. It provides 24 hour/365 day service for casual attendee's and patients referred. Patients arrive on foot or car usually accompanied by escort or relative. Usually patients come without appointments, hence they may have to wait before being examined and treated. Facilities/staff conveniences are shared between it and the Accident & Emergency.

8.5.2 OBERVATION BEDS

These are beds provided in the accident and emergency department where critically ill patients brought to the department are kept under surveillance and observation until their condition improves so that they can be moved. The general rule for providing observations beds as stated by Mr. Wheeler (Page 141) in his "Hospital Design and functions" is that, "there should be four beds in two rooms for separation of male and female, plus an additional two beds for each 100 hospital beds over the first 100 beds.

Going by this rule, the observation beds required in the Accident & Emergency department of the proposed hospital will be 4 critical observation beds for the 1st 100 beds. 2 critical observation beds for the next 100 beds.

The total number is therefore = 6 i.e. 4 + 2 and will be distributed equally in two rooms (male and female) i.e. 3 beds per room.

Table 8.4:- **Schedule Of Accommodation**

	Area M2	Number	Net Area M2
Waiting	108	1	108
Patient toilets	3.6	4	14.4
Reception	12	1	12
Records	12	1	12
Examination & Consultation room	33.6	1	33.6
Consultants toilets	4.8	1	4.8
Treatment room	22.6	2	51.2
Staff rest room	25.6	1	25.6
Staff toilet	3.4	2	6.8
Kitchenette	13.6	1	13.6
Nurses' station	12	1	12
Doctors room	16	1	16
Doctors' toilet	4.8	1	4.8
Minor theatre	38.4	1	38.4
Scrubbing	9.6	1	9.6
Anesthesia	16	1	16
Observation rooms	51.2	2	102.4
Toilets	10	2	20
Janitor	6.4	1	6.4
	Total	=	489.2

8.6 SURGICAL DEPARTMENT

This department is where patients are brought for procedures too complex to handle in the physician's office or treatment area. These procedures usually require that the patient be operated upon to remove the disease he/she is suffering from or ascertain its nature. Operating rooms are considered very highly sterile areas and require a high degree of neatness.

8.6.1 NUMBER OF OPERATING ROOMS

The following factors are considered fundamental in determining the number of operating rooms in a hospital, hence they were employed in calculating the number of operating rooms required in the proposed hospital:

i. The total number and type of surgical operations to be performed

ii. The schedule of operations by days and hours.

In a 200 bed hospital which has an estimated number of 66 surgical beds, a 5 day average stay and a 100% maximum occupancy, the estimated number of operations per annum will be:

$$\frac{66 \text{ beds} \times 100\% \text{ occupancy} \times 365 \text{ days}}{5 \text{ day average stay}}$$

= 4,818 operations per annum.

The total operations are sub-divided according to type and nature, using the WHO approved formula as follows;

Table 8.5:- **Types of Operations**

	% DISTRITUBTION	NO: OF OPERATION P/A
General Surgical	64	3084
Orthopedic	14	675
E.N.T. & EYE	70	481
Gynecologic	6	289
Cystoscopic	6	289
Total	100%	4818

Assuming a full days schedule i.e 7 hours of work, and a 5 day per week operations, the number of surgical operating suites required are:

i. **General Surgical case per year** = 3084, on a full day schedule (7 hours) for 5 days a week, will require: 3084/ 260days x 4 operations per day = 2.9 = 3 operating rooms.

ii. Orthopedic surgical cases = 675, on a full day schedule (7 hours) for 5 days a week, will require: 675/260x 4 0 .6

iii. Eye and E.N.T cases per year = 481, per full day schedule for 5 day a week, will require 481/260 x 4 = 0.46

iv. Gynecology cases per year = 289, per full day schedule for five days each week, will require 289/260 x 4 = 0.27

v. Cystoscopic cases per year = 289, per full day schedule for five days each week, will require 289/260 x 4 = 0.27

Therefore, total number of operating rooms required in the proposed hospital = 4.5 = 5. Four separate rooms have been provided.

Table 8.6:- **Schedule Of Accommodation**

	Area m2	Number	Net Area m2
Visitors waiting	40	1	40
Nurses resting	36	1	36
Changing & toilets	8	3	24
Surgeon rest	16	1	16
Cleaners room	12	1	12
Operating theatre	40	4	160
Anesthesia	20	2	40
Scrubbing room	12	2	24
Patient waiting	25	1	25
Anesthetist's office	*16*	1	*16*
	Total	=	393

8.7 RADIOLOGY DEPARTMENT

This department handles diagnostic radiology that provides internal images of patients either on film or on cathode ray tube. The department is used by both in-patient and out-patient for both routine examinations and emergencies. Therefore it is located in such away that it is related to the OPD, surgical suite, Emergency and in-patient wards. It is expected to perform simple x-rays to locate fractions and positions of catheter as well as complex procedures involving barium swallows.

8.7.1 NUMBER OF RADIO DIAGNOSTIC ROOMS

In his book 'Hospital Design and Function' Mr. Wheeler proposed the following formula to be used in calculating number of Radio diagnostic rooms.

$$N = \frac{D + Y}{DW \times WKS \times HD \times DTRH}$$

Where N = Number of Radiographic rooms

DTY = X – ray determinations per year

DW = Working days per week.

WKS = Weeks per year

HD = Hours in a day

DTRH = Determination per room per hour.

Maximum determinations per day = 50 [O.B. Eluojo 1991, General Hospital Abuja. Pg.227]. Hence per year = 50 x 5x 52 = 13,000

Length of determination = 15 minutes

Working days = 5 (Monday – Friday)

Hours per day = 7

Weeks per year = 52

Determination per room per hour = $\frac{\text{hour}}{\text{Length of determination}}$

= 60/15 = 4 determinations per hour.

$$\text{Therefore } N = \frac{13{,}000}{5 \times 52 \times 7 \times 4}$$

$$N = 2 \text{ radio diagnostic rooms.}$$

3 changing cubicles are assigned per radio diagnostic room. Hence the number of changing cubicles = 6 i.e 3 x 2. This figure is shared between male and female i.e 3 – 3 cubicles.

Table 8.7:- **Schedule Of Accommodation**

	AREA M2	NUMBER	NET AREA M2
Patient waiting	77	1	77
Patient toilets	4.5	4	18
Janitor	3	1	3
Reception	12	1	12
Records	12	1	12
Film viewing	24	1	24
Changing cubicles	3	6	18
Radiology lab	36	2	72
Dark room	12	1	12
Film store	12	1	12
Mobile x-ray store	6	1	6
Kitchen	12	1	12
Sub waiting	12	1	12
Radiologist office	24	1	24
Radiologist toilet	6	1	6
	Total	=	320

8.8 ANTE NATAL AND MATERNITY DEPARTMENT

This department usually handles cases relating to the natural occurrence of birth, hence it is patronized mostly by expectant mothers. The department comprises of the Antenatal clinic, baby follow up, family planning clinic and delivery rooms. Where caesarian section are performed, a mini theatre equipped for such purpose is provided within the department.

8.8.1 DELIVERY ROOMS

The number of expected deliveries for the 30 bed obstetric department/ward at

100% occupancy and an average 4 day stay is $\frac{\text{30 beds x 100\% occupancy}}{\text{4 days average}}$

$= 7.5 = 8$ deliveries per day.

Total annual deliveries = 365 x 8 = 2,920

With respect to the recommended average of 5 deliveries per room per day, the number of delivery rooms.

$$= \frac{\text{8 deliveries per day}}{\text{5 deliveries per room}} = 1.6 = 2 \text{ delivery rooms}$$

Caesarian section will take place in the surgical suite.

8.8.2 LABOUR ROOMS

Mr. Wheeler (Pg. 141) recommends 2 labor rooms per delivery room hence the number of labor rooms = 2 x 2 = 4

8.8.3 NURSERY

Newborn babies are kept in the nurseries until they are fit to return home or their mothers are fit to go back home after delivery.

8.8.4 NUMBER OF BASSINETS

It is given that an average of 6% of annual live births are premature (low birth weight), Odumah B.E Pg. 222. Hence in a hospital, which records 2,920 deliveries per annum, the number of the premature births will be:

$6/100 \times 2{,}920 = 175 = 2{,}745.$

The number of periods per annum resulting from an average 4 day stay =

$$365/4 = 91.25 = 91$$

$$\text{No: of bassinets} = \frac{\text{full term births}}{\text{Period of occurrence on an average 4 day stay}} = \frac{2{,}745}{91}$$

The number of periods resulting from an average 20 days stay by premature babies/births = 365/20 = 18.

The number of bassinets = premature birth

Periods per annum resulting from an average 20 days stay by

Premature births.

= 175/18 = 9.7 = 10 bassinets.

Total number of bassinets in the Nursery = 40 i.e 30 + 10.

Table 8.8:- **Schedule Of Accommodation**

	Area m2	Number	Net Area m2
Patient waiting	125.4	1	125.4
Patient toilets	3.12	4	12.48
Consulting room	24	2	48
Consultants toilet	5.2	1	5.2
Reception/records	13	1	13
Weighing	13.6	1	13.6
Labour rooms	16	4	64
Labour room toilets	4.8	4	19.2
Delivery room	32	2	64
Sterilizing space	4.5	2	9
Scrubbing room	12	1	12
Changing room	19.2	1	19.2
Recovery room	51.2	1	51.2
Toilet to recovery room	10	1	10
Nurses station	12	1	12
Doctors room	13.6	1	13.6
Work room	25.6	1	25.6
Nurses toilet	4.8	1	4.8
Janitors closet	2.4	2	4.8
Fathers room	70.4	1	70.4
Toilets fathers' room	2.4	4	9.6
Nursery	42	1	42
Eclectic room	12	1	12

8.9.0 ADMINISTRATION DEPARTMENT

The administration department provides offices where the general administration of the hospital is conducted. It oversees the general governance of the hospital as a whole. It is connected to the OPD although it has its own separate entrance, which serves visitors to the hospital strictly on administrative purposes.

Table 8.9:- **Schedule Of Accommodation**

	Area m2	Number	Net Area m2
Visitors waiting	128	1	128
Reception	12	1	12
Information Office	16	1	16
Visitors Toilets	3	4	12
General Office	64	1	64
Staff Toilets	3.6	6	21.6
Senior Nursing Office	16	1	16
Janitor	2.4	2	4.8
Accountant's Office	16	1	16
Accounts	32	1	32
Hospital Secretary Office	16	1	16
Deputy C.M.D.	16	1	16
C.M.D.	16	1	16
Personal Secretary	24	3	144
Board room	48	1	48
Archives	20	1	20
Office	20	1	20
Auditing office	20	1	20
General store	20	1	20
	Total	=	658.4

8.10.0 PATHOLOGY

The pathology department will handle all laboratory diagnostic activities and test. The tests carried out determine the nature, extent and cause of a disease. Hence it is very important in the hospital complex . It is placed centrally, so that it is easily accessible to both inpatients and out patients.

Table 8.10: **Schedule Of Accommodation**

	AREA M2	NUMBER	NET AREA M2
Waiting	48	1	48
Reception	12	1	12
Specimen collection	24	1	24
Patient toilets	3.75	4	15
Staff toilets	3.75	4	15
Staff rest room	24	1	24
Blood bank	24	1	24
Hematology lab	24	1	24
Biochem lab	24	1	24
Bacteriology lab	24	1	24
Urine analysis	24	1	24
Culture media	24	1	24
Cleaning room	4	1	4
Glass washing	24	1	24
Glass store	11.2	1	11.2
Pathologists' office	16	1	16
Pathologists' toilet	3.12	1	3.12
	Total	=	352.32

8.11.0 MAINTAINANCE DEPATMENT

This department handles the repairs and maintenance of all hospital equipment, furniture and buildings. It has workshops for mechanical repairs, woodwork, electrical repairs, and panting, plumbing and masons offices.

Table 8.11:- **Schedule Of Accommodation**

	AREA M2	NUMBER	NET AREA M2
WOOD WORKSHOP	56	1	56
ELECTRICAL WORKSHOP	28	1	28
MECHANICAL WORKSHOP	28	1	28
PLUMBERS OFFICE	28	1	28
PANTERS OFFICE	28	1	28
MASON'S OFFICE	28	1	28
HOM OFFICE	28	1	28
GENERAL OFFICE	28	1	28
PRE ROOM	28	1	28
JANITOR	5	1	5
TOILETS	2.5	5	12.5
	TOTAL	=	297.5

8.12.0 PHARMACY DEPARTMENT

The pharmacy is the department that handles all drugs and related materials to be used within the hospital. The department receives the drugs from suppliers and stores it, before onward distributions to the various departments. Apart from the receiving, storage and dispensing or distribution is a compounding space provided where the drugs are sorted out before distribution. A volatile liquid store is incorporated within the design, to handle liquids, which are volatile or otherwise flammable. Offices are provided for the pharmacists and a general office for other office works. It also supports staff conveniences such as rest room, changing room and toilets.

Table 8.12:- **Schedule of Accommodation**

	Area m2	Number	Net Area m2
Bulk Store	56	1	56
Volatile Liquid Store	28	1	28
Compounding Space	28	1	28
Dispensing Space	28	1	28
General Office	16	1	16
Pharmacists Office	16	1	16
Changing Room (Male)	13.5	1	13.5
Changing Room (Female)	13.5	1	13.5
Staff Rest Room	28	1	28
Toilets	2.5	6	15
Pharmacists Sec.	18	1	18
Trolley	12	1	12
Total	=	=	288

8.13.0 *CENTRAL STERILE STORES DEPARTMENT*

This department serves as a store for sterile goods and equipment. It also has workshops for repair of malfunctioning or spoil sterile equipment. Used sterile equipment are also sterilized here, hence the provision of a sterilizing room. Staff's resting facilities and offices are also provided. It is adjoined to the central general stores to enhance the flow of goods between the two departments and ensure efficient supply operations.

Table 8.13:- **Schedule of Accommodation**

	Area m2	Number of rooms	Net Area m2
Sterilizing room	28	1	28
Workshop	28	1	28
Changing Room	6.5	1	6.5
Staff Rest Room	28	1	28
Sterile Store	28	1	28
Toilets	2.5	5	12.5
Sorting	28	1	28
Janitor	5	1	5
Total	=	=	164.0

8.14.0 CENTRAL GENERAL STORES

This department provides storage for goods equipment and other materials needed to be used in the hospital. It generally stores bulk supplies before later distribution to stores obtained at the various departments of the hospital. This department contains stores for equipment used and new linen stores, stationery stores, general goods store, and office for the store officer. It is organically connected to the central sterile stores, which provides storage for sterile supplies. It has a separate parking for trucks, which bring in supplies.

Table 8.14:- **Schedule of Accommodation**

	Area m2	Number	Net Area m2
Store Officer	28	1	28
Equipment Store	56	1	56
General Store	28	1	28
Linen Store	28	1	28
General Office	28	1	28
Total			224

8.15.0 (KITCHEN) DIETARY DEPARTMENT

In patient feeding is handled in the department. Meals are cooked and distributed to the various in patient wards. The kitchen provides centralized tray service, although it is connected to the various other kitchenettes provided in the wards to serve as places where patient food can be kept if he/she is not ready to eat at the time the food

is served. Dietary department is situated close to the services departments and nursing units.

Table 8.15:- **Schedule of Accommodation**

	Area m2	Number of room	Net Area m2
Bulk Store	56	1	56
Meat Store	12	1	12
Vegetable Store	12	1	12
Vegetable Preparation	16	1	16
Main Cooking Area	144	1	144
Dish Washing	28	1	28
Serving Area	28	1	28
Trolley Parking	16	1	16
Dietaries Office	10	1	10
Staff Rest Room	28	1	28
Staff Toilets (Male)	5.2	1	5.2
Female	12	1	12
Trash	4	1	4
Janitor	5.2	1	5.2
Total	=	=	392.4m2

8.16.0 LAUNDRY

This provides laundry services to the hospital, especially to the inpatient section comprising of the Nursing units. Hospital linen is washed, ironed, sterilized, mended, stored, and also distributed within this department. It is placed close to the Nursing units who need its services most. It is easily accessible from the inpatient wards and it is connected to the supplies stores.

Table 8.16:- **Schedule of Accommodation**

	Area m2	Number of Room	Net Area m2
Sorting	28	1	28
General Store	28	1	28
Washing Space	56	1	56
Mending Space	28	1	28
Indoor Drying Space	80	1	80
Ironing Space	28	1	28
Office	28	1	28
Dirty line Store	28	1	28
Clean Linen Store	28	1	28
Staff Rest Room	28	1	28
Staff Changing/Toilet(Male)	12	1	12
Female	5.2	1	5.2
Trolley & receiving	28	1	28
Boiling/Sterilizing	16	1	16
Total			421.2

8.17.0 NURSING UNITS/WARDS

These are the inpatient wards, where patients are admitted while they receive treatment, until they are fit to go home. This section is divided into wards based on ailment groupings. These wards are further sub divided into compartments i.e. single bed rooms, 4 bed rooms for adults and 8 bassinets compartments, 5 cots compartments for babies and children. This compartmentalization is to ensure a certain degree of privacy and reduce infection spread.

Visitors waiting space is provided for patients visitors to wait while the Doctor is doing his rounds or attending to patients. The patients could also be encouraged to see their visitors within this space when they are mobile. The space also serves as a disengagement space to the problem of nursing relatives in hospitals, i.e if they are confined to such a place as the visitors waiting it is hoped that gradually the problem will be solved.

Another feature of the Nursing wards is the kitchenettes, even though the central kitchen prepares the food, there is every possibility that at the time the food is served the patient may not be willing to eat. Therefore his food is kept in the kitchenette and since it is expected to be palatable, (hot food hot or cold food cold) the kitchenette serves as a place where the patients food can be heated. Also relatives could use it under close monitoring by the Nurses to prepare food desired by patients.

Treatment and medication rooms provided, also serve as rooms where patients are brought for treatments or dressings that can not be performed in the patient bedroom

even with screens, such as removal of catheters, plaster, and dressing. Drugs are also prepared for patient medication in this room before they are administered to the patient.

The patient bedrooms are designed to be large enough such that the patients could use it as a day room as well where they are not ambulant or do not want to use the common day room. Also these patient rooms are large, due to the fact that there may be need to screen the patient while the Doctor is attending to him/her, or while the patient is receiving treatment.

The Nursing Units or Wards are as follows:-

	Number of Beds
Maternity Ward	-
Gynecology Ward	-
Pediatrics Ward	-
Male Surgical Ward	-
Female Surgical Ward	-
Male Medical Ward	-
Female Medical Ward	-
Amenity or Isolation Ward	-

Table 8.71:- **Schedule of Accommodation per Ward**

	Area m2	Number of Rooms	Net Area m2
1 bed room	16	4	64
4 bed rooms	51.2	5	256
Nurses Station	12	1	12
Kitchenette	16	1	16
Visitors Waiting	25.6	1	25.6
Nursing Sister Off.	16	1	16
Day Room	64	1	64
Janitors Closet	2.4	1	2.4
Clean linen Store	2.4	1	2.4
Dirty linen Store	2.4	1	2.4
Stretcher bay	4.8	1	4.8
Treatment/medication room	25.6	1	25.6
(4 bed)	10	5	50
Patient toilets	4.8	4	19.2
Staff toilets	4.8	2	9.6
Total	=	=	570

The gross area of all the wards combined total area per ward x No: of wards

= 570 x 7

= **3990**

8.18.0 PARKING

Parking spaces are provided for OPD and administrative, Accident & Emergency and Maternity as well as Services Departments (C.G.S. C.S.S.D etc). Parking is also provided to visitors to the wards, such that they don't have to pass through the O.P.D.

Table 8.18:- **Schedule of Accommodation**

	Area m2	Number	Net area m2
Admin/OPD parking	12.5	77	962.5
Accident/Emergency Parking	12.5	30	375
Visitors to Wards parking	12.5	28	350
Trucks/suppliers parking	40	5	200
Total	=	=	1,887.5

CHAPTER NINE

DESIGN REPORT AND CONCLUSION

9.0 FUNCTIONAL ANALYSIS OF THE DESIGN PROPOSAL

The proposed general hospital Deba is meant to serve the Deba local government community and other neighboring local governments. It is a rural hospital whose site is located on a farmland along the major road leading into Deba town. (The Gombe road). Another connecting road Shehu Abubakar road (proposed) collects traffic from the major Gombe road inland. Hence the two major entrances into the complex are situated along these roads. The service entrance is along the much busier Gombe road while the main entrance (public) is along the less busy Shehu Abubakar road.

Vehicular access into the hospital complex has been separated as much as possible from pedestrian access or traffic to avoid conflict. The pedestrian traffic is through the pedestrian gate, which leads straight into the OPD by means of a walkway, while the vehicles pass through the main gates to the parking lot of the OPD.

Entrances into the hospital are divided into four. The main OPD entrance for patients visiting the hospital, the administrative entrance for staff and visitors to the admin; The Accident and Emergency entrance for emergency cases and the Antenatal and maternity clinic entrance; the Services entrance and the inpatient (wards) entrance.

The Design proposal adopts the pavilion concepts and is spread out in the site, with the various buildings arranged in a radial form about the central core. Walk ways and covered corridors provide a circulation link between the hospital buildings. The

hospital is zoned into five radial groups. The zoning of each group was based on the following criteria.

i. Separation of quite and noisy areas/function

ii. Grouping of related functions together

iii. Separation of traffic and circulation patterns.

These groups are:

a. The out patient and administrative departments

b. The emergency, maternity department and related facilities

c. The Adjust Diagnostic and treatment facilities

d. The Services Departments

e. The Inpatient Nursing wings

The first point of contact with the hospital is through the entrance foyer of the out patients department. A drop off precedes this. The out patient department and all other buildings are raised above grade level slightly (600mm) to avoid water logging which is a characteristic of the soil.

Once inside the foyer, the reception desk directly faces the entrance hence, even on a first visit to the hospital one can easily find the registration and cards collection room that is beside the reception desk. A record office is also attached to the reception desk with the cash offices and dispensary close by. Also, a double volume large reception hall is provided. Within this space also are public Health Immunization booths and waiting. Clinics in the OPD are divided into four i.e

Clinic A --- for new comers to the hospital

Clinic B--- for male medical patients

Clinic C ---for Dental and Eye patients

Clinic D ---for Women and Children

The administration is easily accessible from the OPD and it contains offices for the administrative staff of the hospital. From the out patient building walk ways radiate leading to the various sections of the hospital, such that from this point one can easily view the whole hospital and determine his bearing without being directed. The main walkway leads to the hospital core and onwards to the Nursing wings. All walkways lead with hedges which direct traffic.

The central core of the hospital consists of the adjunct diagnostic and treatment facilities, these include the pathology department, sterilizing department, radiology department and surgical departments. All these departments are designed along and axis and have a simple functional flow.

Beyond the Hospital core are the Nursing wings, which are designed to accommodate inpatients in single bed and 4 bed compartments to ensure privacy and reduce rate of infection spread. The Nursing stations are centrally placed for easy monitoring of patients and reduced travel distance by staff. A waiting space is provided for visitors and relatives to patients who help in nursing them. Landscaped garden and sit outs are provided for recuperating patients and their visitors to relax. Laundry facilities and toilet facilities are provided for use by the Nursing relations.

Also, from the central core to the right connected by covered walkways are the accident and emergency, and maternity wing. This wing has access from the hospital main gate. These two departments are grouped together with the maternity & gynecology Nursing wings. To ensure easy access and functional relationship.

To the left of the central core are the service departments, which include maintenance, central stores, laundry, kitchens etc. This wing is also connected to all parts of the hospital.

The morgue, incinerator and boiler rooms are also placed close to the services departments. A generator house is also provided to supplement electricity supply.

Landscape elements are provided, especially to enhance the microclimate and act as buffers to excessive dry winds of the Harmattan. The landscaping elements are also placed at the points of radiation to enhance visual perception and psychologically reduce travel distance.

Finally, services circulation paths are, as much as possible separated from patient circulation paths.

9.1 SERVICES

Various categories of services have substantial impact in the development of the hospital design. These services include electricity supply, water supply telephone services, goods and equipment supply services, disposal services etc. The proposed hospital took all these into consideration, hence

i. A power plant was provided to supplement NEPA power supply.

ii. A network of boreholes sank on the site with water reservation tanks provide an effective water supply network using pipes.

iii. An incinerator has been provided to cater for the disposal of refuse

iv. Soak away pits provided will dispose the waste water into the soil

v. Drainage network has been provided to take care of surface water and run off from roofs as a result of rain.

vi. A road has been provided for easy access to the services departments through the services entrance gate.

9.2 FIRE PROTECTION

The risk of human life is greater in areas where patients are confined to beds and especially for some patients who would be incapable in the case of fire to move to a place of safety without assistance. Such areas are termed high life risk areas.

Ward areas are generally not susceptible to fire out breaks as they have 24 hours surveillance. However, the proposed design has incorporated within it compartmentalization of a various wards into 4 bed and 1 bed compartments which will reduce the fire spread in the event of its occurrence.

The risk of fire breaking out is much higher in other departments, which either store large quantities of flammable materials or cooking activities are carried out such departments include:

i. Kitchens

ii. Stores

iii. Laundries

iv. Boiler Houses

v. Works Department

vi. Pharmacy and Laboratories

For this reason, in the proposed design these departments have been grouped together in a module away from the other part of the hospital. And each of these departments is housed separately in a building of its own, and within each building are

compartments which are designed to prevent fire spread within these departments and other parts of the hospital. Fire escapes are provided in case of any fire out break.

The roof used is steel and Aluminium, which prevent the spread of fire within the buildings.

9.3 VENTILATION

Ventilation is very important in hospitals, especially in the Nursing wings where in-patients are housed. As much as possible, the use of artificial ventilation is minimized in the proposed hospital design, such that it is limited only to X-ray department and surgical suite.

Cross ventilation was adopted throughout the hospital, except where it is not easily achieved, the stack effect was used. Open courtyards were provided in between the buildings to facilitate ventilation and natural light.

9.4 CIRCULATION:

Circulation is of paramount importance in the design of hospital buildings, in that steps should be saved for both patients and staff. In the proposed hospital, circulation patterns where distinguished from each other. The general circulation was separated from the supplies or services circulation.

Circulation within the buildings were limited to corridors which run the length of each unit. Covered walkways were used to link the various functions of the hospital together.

9.5 CONTSTRUCTION METHODS

The construction methods to be employed for materials and finishes should be on site construction i.e. cast in situ, especially for walls and floors.

9.6.1 FOUNDATION

Foundations will be of the strip type with the footing being made of reinforced concrete 230 x 450 minimum. It should be continuos and placed above sand blinding of not less than 50mm. The foundation depth should not be less 1.2m to ensure structural stability and guide against the unstable bearing capacity of the soils of the area and differential settlement.

9.6.2 FLOORS:

These are constructed above grade (at least 600mm). They should be made of cast in site concrete and finished with terrazzo. The hardcore. The thickness of the floor slab should not be less than.

9.6.3 WALLS:

These should be constructed of sandcrete blocks 230mm external walls and 150mm internal partitions. The walls should be smoothly rendered with plaster and a suitable paint. However Radiology department x-ray room should be constructed of reinforced concrete 230mm thick and finished with mortar. Walls of surgical operating rooms should be finished with polished clay tiles. While wet areas such as kitchens, toilets baths laundries etc should be finished with ceramic wall and floor tiles as appropriate.

9.6.4 ROOFING

Roofing should be made of steel trusses treated with red oxide paint and covered with longspan Aluminium roofing sheets preferably Nigerite. Ceilings should be suspended on and iodized Aluminium frames by steel chains.

The roof shall be hipped with a relatively high pitch to ensure easy run off of rainwater. Vents should be provided in the roof to ventilate it and ensure thermal insulation by means of air exchange.

Courtyards will remain open but will be properly landscaped, surface drain in from of drainages will be provided to drain the courtyards and collect the rainwater from the roofs.

Walkways shall be covered with concrete roof, framed with layers of bituminous felt and drained through pipes.

9.7.0 BUILDING MATERIALS

The building materials to be used are normal sandcrete blocks for walls, concrete cast in situ floors, steel roof frames and aluminum roofing sheets. (Fig 10.1). The choice of these materials will be based on durability, quality, efficiency, construction techniques and wear and tear.

9.8.0 CONCLUSIONS:

The need for a general hospital for the Deba community can not be over emphasized due to the population and the yearning of the people towards a more improved provision of health care. The efficiency of the people of the area will be improved with its provision.

The thesis tried to stress the factors responsible for causing the problem of nursing relatives. Analyses its impact on hospital infrastructure and looked at the possibility of incorporating them into the hospital structure in order to enhance patient care by merely improving the support services and providing additional facilities where necessary.

The design proposed assumed a pavilion concept spread around the site to reflect the cultural setting of the area the design is proposed.

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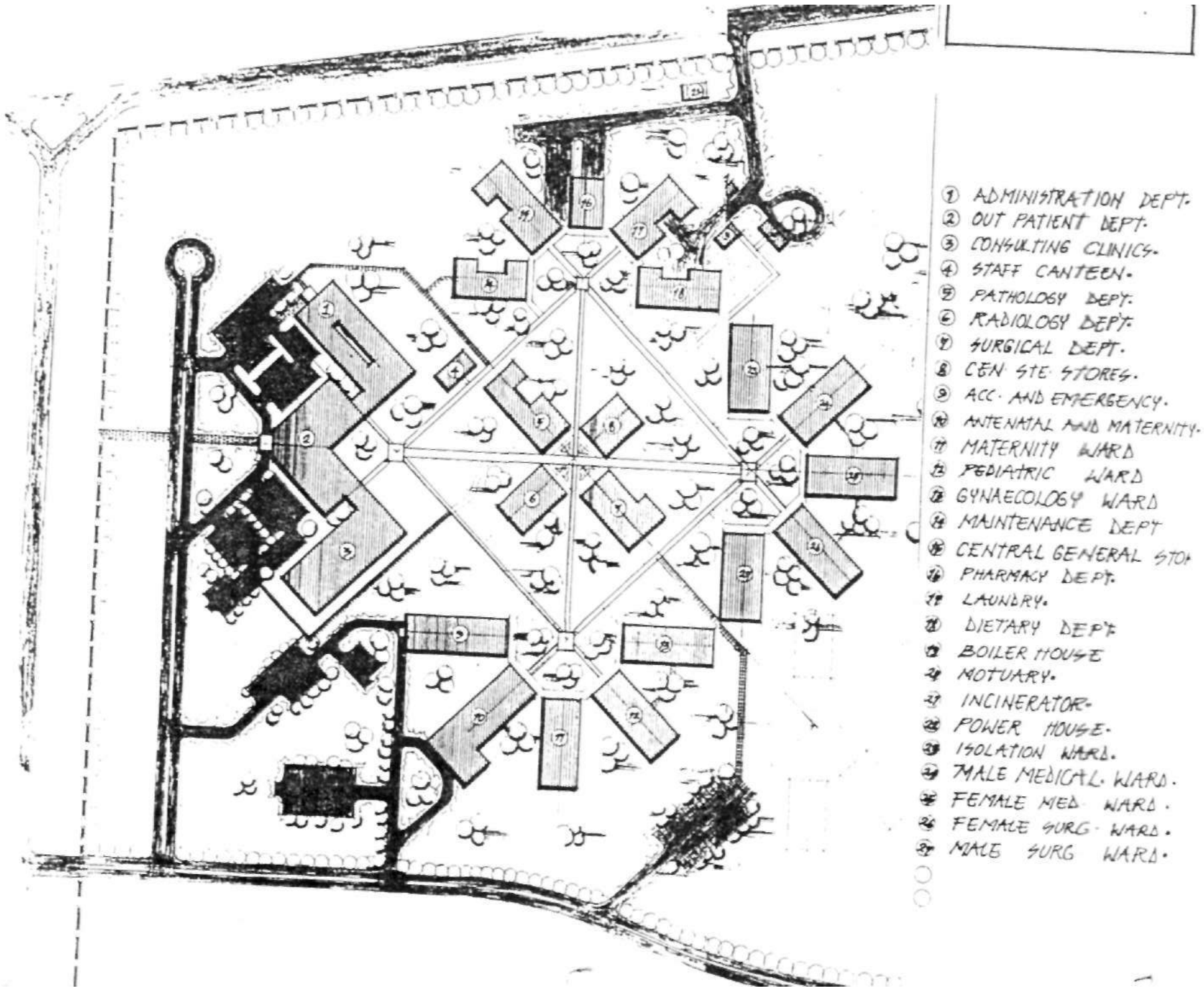
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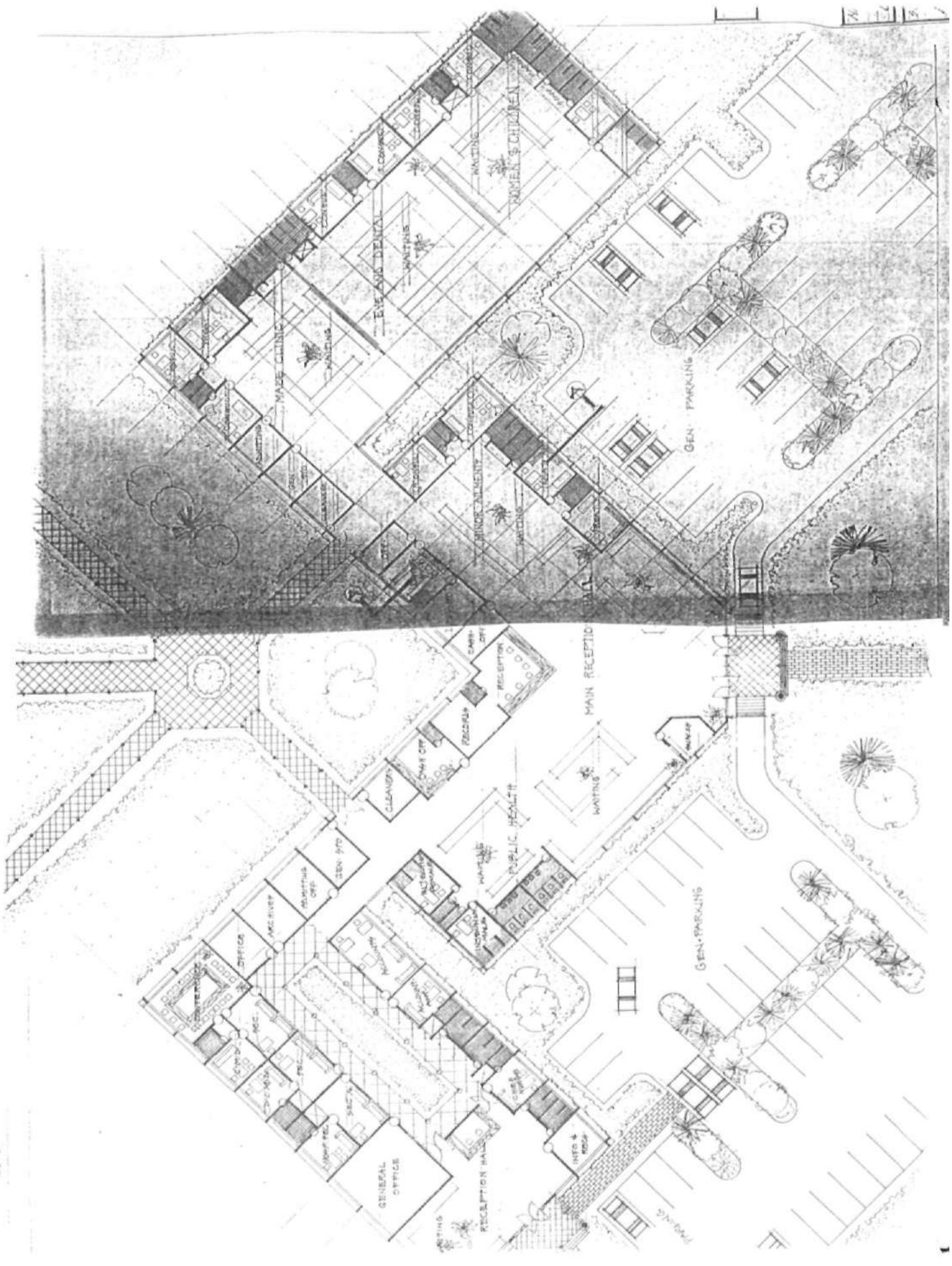
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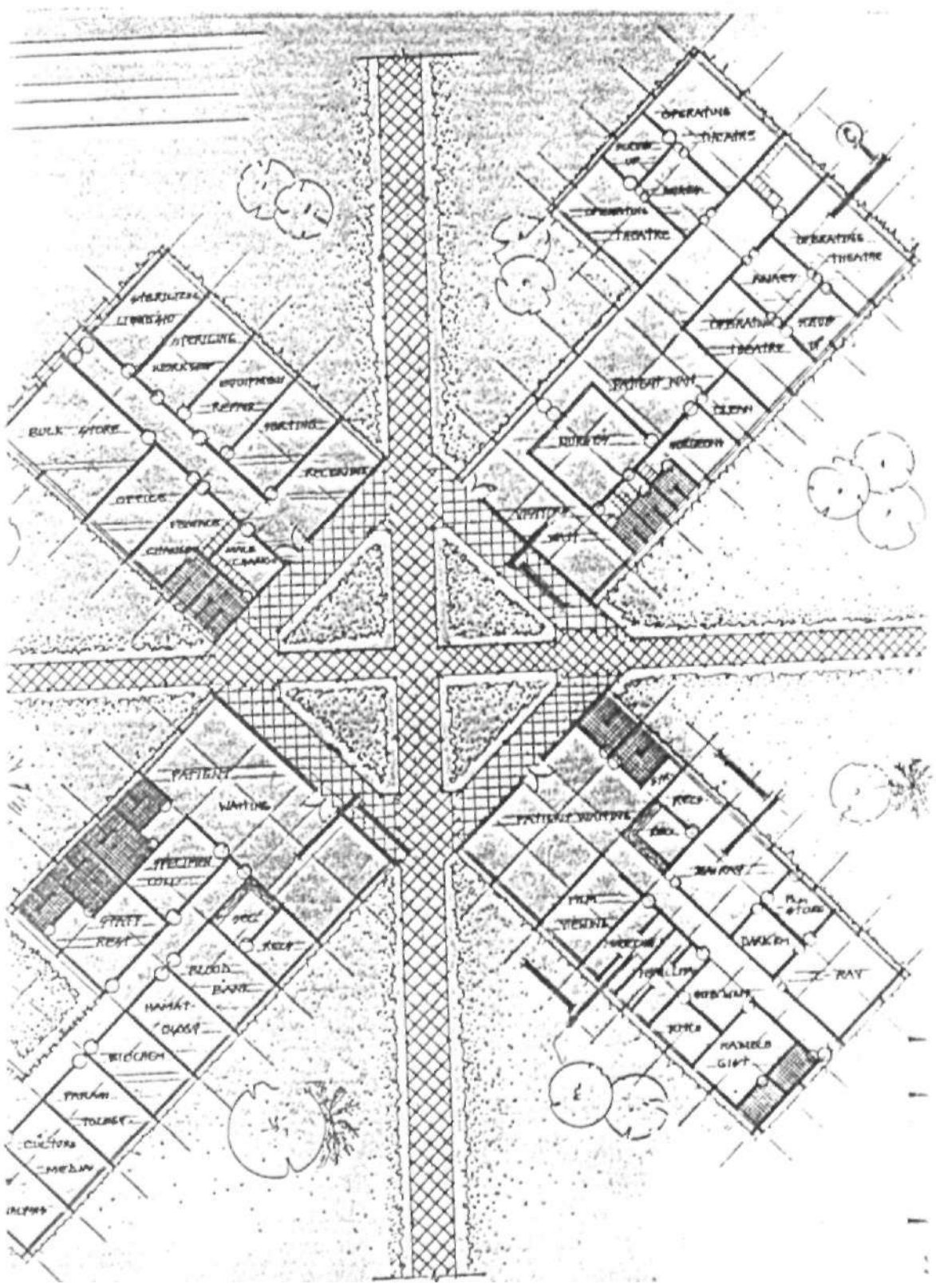
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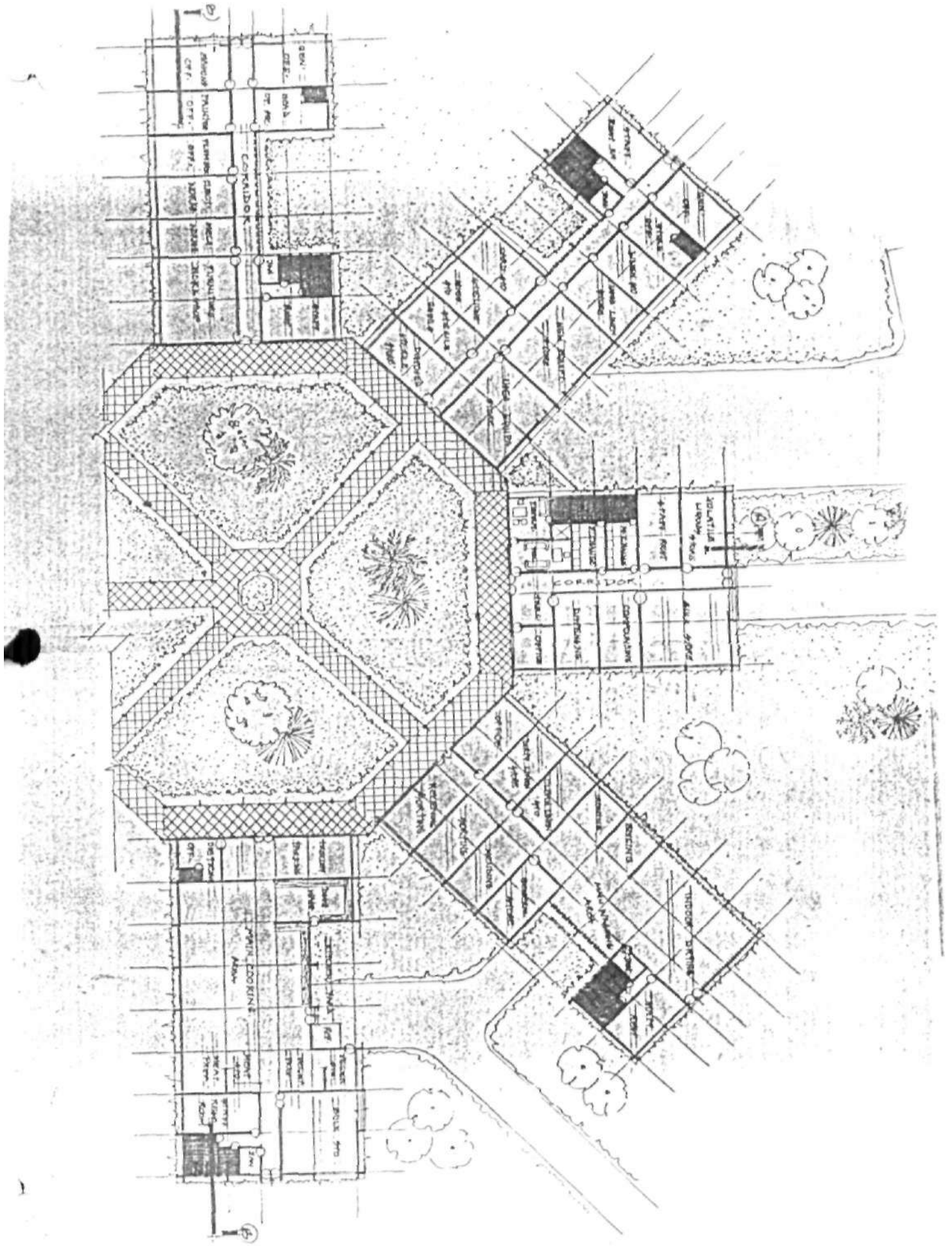
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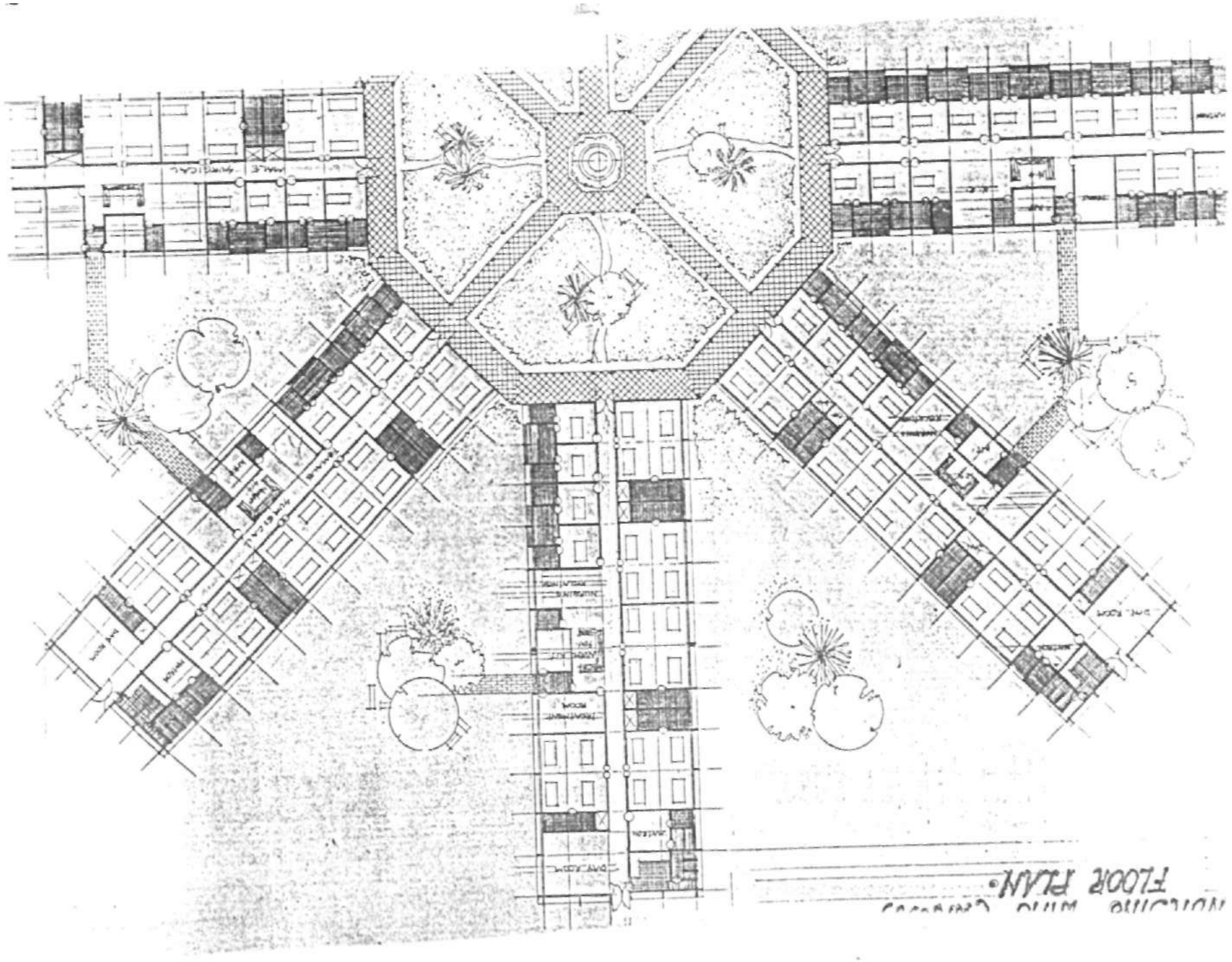


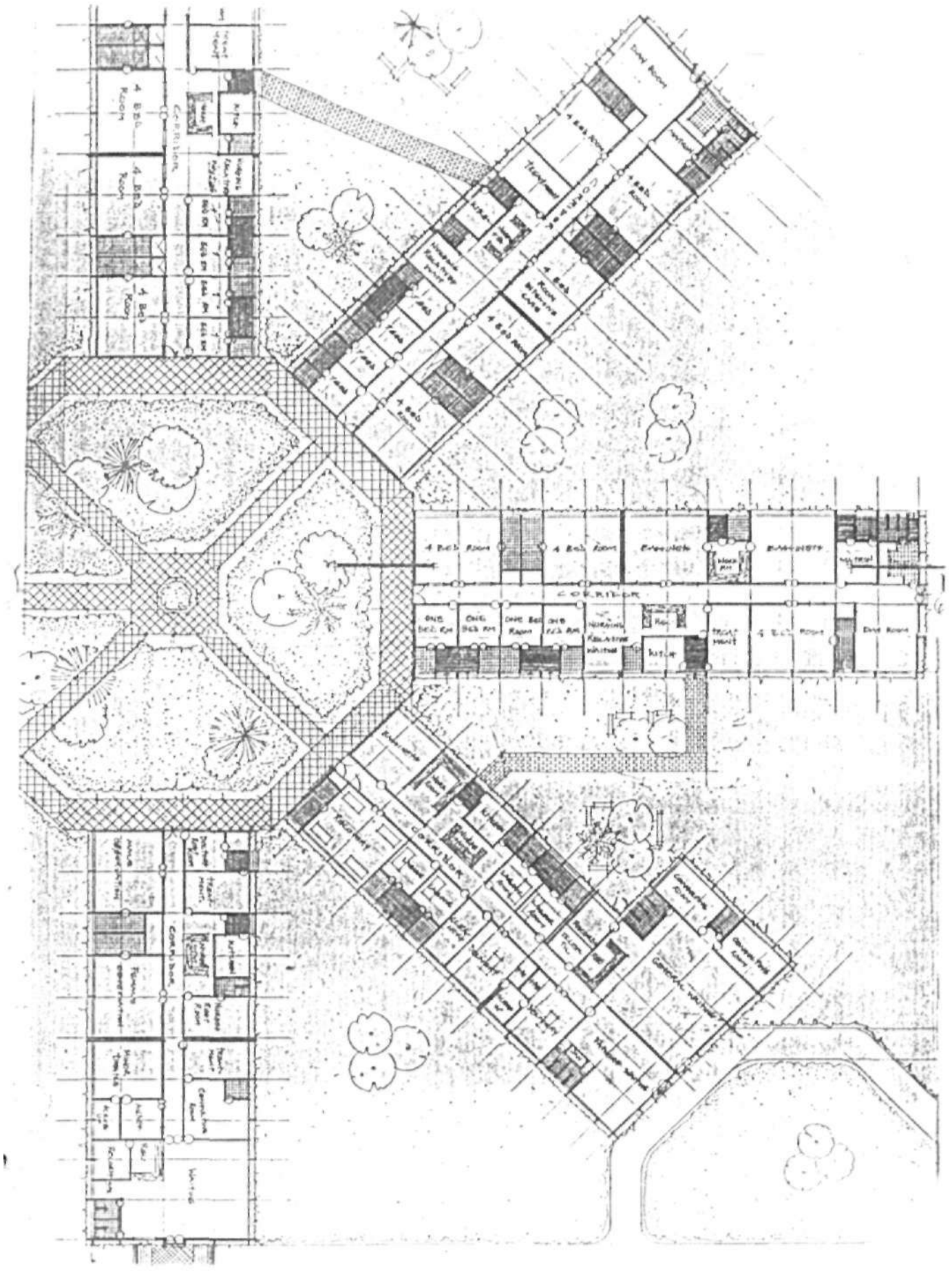
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② OUT PATIENT DEPT.
③ CONSULTING CLINICS.
④ STAFF CANTEEN.
⑤ PATHOLOGY DEPT.
⑥ RADIOLOGY DEPT.
⑦ SURGICAL DEPT.
⑧ CEN STE STORES.
⑨ ACC. AND EMERGENCY.
⑩ ANTENATAL AND MATERNITY.
⑪ MATERNITY WARD
⑫ PEDIATRIC WARD
⑬ GYNAECOLOGY WARD
⑭ MAINTENANCE DEPT
⑮ CENTRAL GENERAL STO
⑯ PHARMACY DEPT.
⑰ LAUNDRY.
⑱ DIETARY DEPT
⑲ BOILER HOUSE
⑳ MOTUARY.
㉑ INCINERATOR.
㉒ POWER HOUSE.
㉓ ISOLATION WARD.
㉔ MALE MEDICAL WARD.
㉕ FEMALE MED WARD.
㉖ FEMALE SURG WARD.
㉗ MALE SURG WARD.

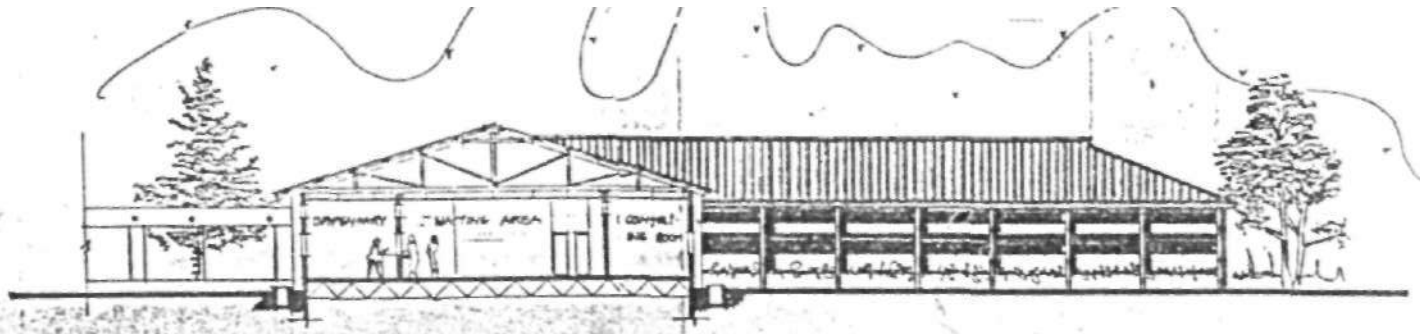

MAIN RECEPTION
GEN. PARKING
PUBLIC HEALTH
WAITING
GENERAL OFFICE
RECEPTION HALL
GEN. PARKING


OPERATING THEATRE
OPERATING THEATRE
BULK STORE
OFFICE
PATIENT WAITING
STAFF REST
BLOOD BANK
PATIENT WAITING
RAT

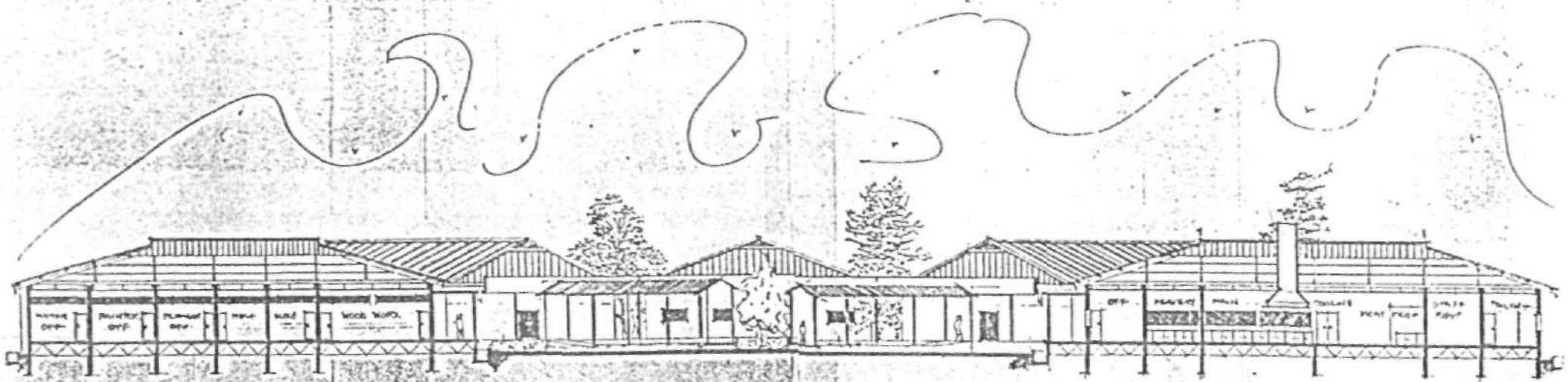

CORRIDOR
CORRIDOR
CORRIDOR







SECTION A-A



SECTION B-B



NORTH SIDE ELEVATION



[WEST] APPROACH ELEVATION



SOUTH SIDE ELEVATION.



EAST ELEVATION.