KOGI STATE GENERAL HOSPITAL LOKOJA, NIGERIA.

WITH EMPHASIS ON SANITATION

M. TECH. THESIS (ARCHITECTURE)

BY

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M.TECH/SET/1038/2003/2004

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CERTIFICATION

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DECLARATION

I hereby declare that the master of technology (MTECH) theses and research work on sanitation has no bearing whatsoever to any work done by person or group of individuals, which has been presented and accepted for the design by me and it is a record of my research work supervised by Arc. Tony Anunobi (MNIA).

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DEDICATION

This project is dedicated to my Beloved Husband- Arc. Samuel Obaje (MNIA).

ACKNOWLEDGEMENT

My profound gratitude goes to ALMIGHTY GOD who granted me the Grace and ability to carry out this project.

My unreserved appreciation goes to my supervisor Arc Tony Anunobi who gave himself completely in guiding me through this project God bless him.

Love to my parents Chief & Mrs. A.O.Igwe, my brothers Emeka, Chinedu, Uzor and Kelechi, sister's aunt Chika, Ngozi, Ugochi and Afiniki and my in-laws Mrs. D Obaje, Mrs. Victoria Musa and Mr. & Mrs. Kuram for their every support financial, moral and otherwise.

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ABSTRACT

Sanitation which is paramount and important in hospitals is to be treated with major concern so as to check/limit/prevent or eliminate totally the spread and contamination of diseases/infection by patient, the health care personnel or the inanimate environment and also enable quick recovery to patients.

The thesis firstly, introduced to us what relation a hospital has to sanitation, statement of problem study, the aim and objective of the design, method of research which are basically historical and descriptive, the limitation and scope of study, the architectural importance, the users and client and also important terms were defined.

It has also discussed history of hospital, Nigeria - history of modern medical services, types of hospitals, licensing and accrediting, organisation and staff, different hospital departments

The thesis defines, classify and outline healthcare (hospital) waste, their sources, generation, minimisation, safe reuse and recycling, handling, storage and transportation. The drainage system, the application of treatment, disposal method, collection and disposal of waste water, transmission from contamination to infection, the sources of infection, the routes of transmission and how these infections could be prevented.

Case studies were carried out; data about the area of location of site to be designed collected and the site analysed, the design proper talking about the design concept (zoning, functional flow, and site concept), materials and construction, space requirements and services to be provided.

Conclusion was drawn out and references made

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CHAPTER ONE

1.0 INTRODUCTION

"Health is wealth" which makes a hospital a very paramount place in the society and can directly or indirectly affect our economy, social and political situations. The hospital is an institution that provides a broad range of medical services to sick, injured, or pregnant patients. Hospitals employ medical, nursing, and support staff to provide inpatient care to people who require close medical monitoring and outpatient care to people who need treatment but not constant medical attention. Hospitals provide diagnosis and medical treatment of physical and mental health problems, surgery, rehabilitation, health education programme, and nursing and physician training. Many hospitals also serve as centres for innovative research and medical technology.

The world health organisation defines 'health' as a state of complete physical, mental and social well being not merely the absence of disease or infirmity. If it were desirable for no other reason, good health care plays an important role in stimulating economic development and increasing productivity within the society, therefore planners of medical facilities must consider man's inmost need, their aspirations, social structures, values and attitude towards life. Whatever the rate of development of any society, adequate health care is considered the right of every individual.

Hospital is a building type which is composed of complex components put together for the purpose of providing balance health facilities. The objectives of the medical care may vary in nature and extent and so needs to be identified accurately. Hospitals therefore differ in the number of specialist they support and the size of specialist departments and treatment facilities; in their provision of specialist curative medicine, preventive medicine (prophylactics) and after care (rehabilitation), examination (diagnostic) and treatment (therapy); in the intensive of care, the standard of accommodation and level of welfare, psychiatric care, training and research activity.

For this design a relative lesser facilities will be provided for – standard capacity for the people of Kogi state and environs. Design of which will tend toward having a residential atmosphere and impression of a modern hospital. This by research is found out to help the patient recover faster from their sick beds. Also provide an environment/atmosphere as much as possible free from infections, as a result of the sanitary measures to be put in place.

1.1 STATEMENT PROBLEM STUDY

So that a robust and meaningful comparative analysis of the options could be made the statement problem study were classified into four broad categories:

- **Practical:**

a. Location; site location, site orientation and selection.

b. Environment- has to conform to town planning and conservation restrictions; respect the ecological, archaeological, and historical and landscape attributes of the local

area; meet the needs of the present without compromising the ability of future generations to meet their needs.

- **Clinical:**

c. **Whole system:** enable appropriate collection, collation and distribution of information between healthcare providers and commissioners.

d. **Service model:** to enable implementation of new models of care and functional relationship; be capable of being operational at the earliest opportunity.

Minimise the level and range of disruption caused during the construction period particularly with respect to the level and quality of services.

1.2 AIM AND OBJECTIVES

AIM:

- The design of this hospital is aimed at providing healthy, clean and conducive environment/atmosphere for ill or injured people to aid in their quick recovery rather than battling with a rigid and dirty environment as is found in most hospitals.

OBJECTIVES:

- Provide a centre of excellence in patient care, which is affordable and effective.
- Contribute to the wider community's plans for regeneration of Kogi state.
- Create a focus for world-class teaching, training, education and research.
- Improve accessibility to services for patient and service users.
- Create a therapeutic and flexible environment from which high quality patient care can be provided.

- Work with all patient in and users of Kogi state whole health economy to provide an integrated model of care.
- Make the most effective use of resources.

1.3 METHODOLOGY DATA COLLECTION

The method used in carrying out the data collection is basically two namely Descriptive and Historical methods

- **Historical methods**: sources from books, magazines, pamphlets, official documents, pasts project write-ups, Internet and journals.
- **Descriptive methods**: Reviewing of existing and similar case studies and design relevant to the area of study are analyzed and used as main guidelines and interviews were conducted

1.4 SCOPE AND LIMITATION OF STUDY

SCOPE OF STUDY:

The design is to cover the following departments:

1. **ADMINISTRATION DEPARTMENT:** Waiting/enquire, WC, cashier, Admitting, Conference hall, Lounge, Library, offices, Records, Social Services, Nurses.
2. **EMERGENANCY DEPARTMENT:** Observation beds, Office, WC, operating room.
3. **DIAGNOSTIC DEPARTMENT:** Radiology, Laboratory, Pharmacy, Morgue and Autopsy.
4. **OBSTERTRICAL DEPARTMENT:** Delivery rooms, Labour rooms, Doctors office, Nurses, Supervisor, Sub-sterilising, Clean up, and Janitors/stretchers office.

5. **OUT-PATIENT DEPARTMENT:** Record room, Admitting rooms/wards, Social service, WC, History examination, Consultation office, Drug dispensary, Treatment, dressing room.
6. **SERVICES DEPARTMENT:** Entrance, Clerk offices, Bulk food storage, Central store, Kitchen, Dining, Laundry, Linen room, Maintenance, mechanical plant, Nurses Attendant office, Staff quarters for duty doctors, house officers and nurses

LIMITATION:

This project is not in anyway substituting an existing hospital but rather a new one with limitations such as

- 1. Due to strong security measures photograph of some interiors were not permitted which lead to assumptions or vague dissemination data.
- 2. Lack of cooperation of the medical personnel in interviews when case studies were carried out.

1.5 ARCHITECTURAL SIGNIFICANCE

While it is a truism that the designer needs to provide both a satisfactory working environment for staff that spend their working lives in the hospital and a pleasing, anxiety–reducing, perhaps healing environment for patient who are the real clients, it has to be recognized that these requirements have inherent conflicts. Typical examples are the difference air temperatures required by the working nurse and the passive patient; ward lighting levels at night for the sleeping patient and the working nurse; cross ventilation as a way of sanitation to avoid

infections. The resolution of such problems needs care analysis and designer ingenuity.

1.6 USERS\CLIENTS

The users of the hospital are the general public while the client is the Kogi State Government.

1.7 DEFINITION OF TERMS

HOSPITAL: An institution where people receive medical, surgical, or psychiatric treatment and nursing care; a charitable institution providing shelter, care, or education for orphaned children, senior citizens, or the homeless or destitute.

TREATMENT: The application of medical care to cure disease, heals injuries, or ease symptoms; A particular remedy, procedure, or technique for curing or alleviating a disease, injury, or condition.

NURSING: Is a profession or task of looking after people who are sick or injured.

PATIENT: Somebody who is being given medical treatment

DISEASE: A condition that results in medically significant symptoms in a human

INJURY: Physical damage to the body or a part of the body; a specific instance of physical damage to part of the body

SYMPTOMS: An indication of some disease or other disorder, especially one experienced by the patient; a sign or indication of the existence of something, especially something undesirable.

SANITATION: The study and maintenance of public health and hygiene, especially the water supplies and sewage systems; Conditions or procedures related to the collection and disposal of sewage and garbage.

HYGIENE: The science dealing with the preservation of health. It is the practice or principles of cleanliness.

(***Microsoft® Encarta® Encyclopaedia*** **(2002).)**

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 HISTORY OF HOSPITALS

The term hospital derives from the Latin word hospitalis, which relates to guests and their treatment. The word reflects the early use of these institutions not merely as places of healing but as havens for the poor or for weary travellers. Hospitals first appeared in Greece as aesculapia, named after the Greek god of medicine, Aesculapius. For many centuries they developed in association with religious institutions, such as the Hindu hospitals opened in Sri Lanka in the 5th century BC and the monastery-based European hospitals of the middle Ages (5th century to 15th century). The Hôtel Dieu in Paris, a monastic hospital founded in ad 660, is still in operation today.

2.1.1 GREECE:

The Greeks demonstrated a concept of enlightened medical unequalled even today in many parts of the world. As early as the 6th century BC, they have established medical schools, and in the 4th BC, Hippocratic of medical writings was begin complied. The temples of many deities proliferated the sites which were usually along side mineral waters or warm healing springs. In addition to the temples, there were "latreia" or medical clinics in which Greek physicians who

Greco-Roman Introduction

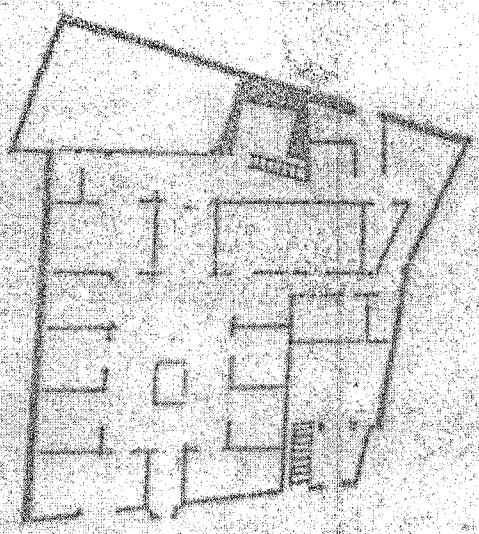
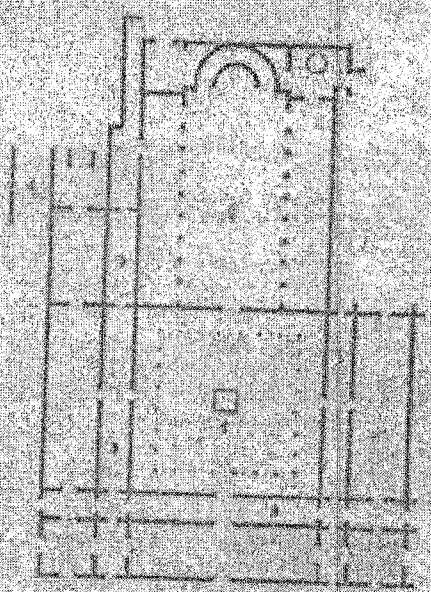


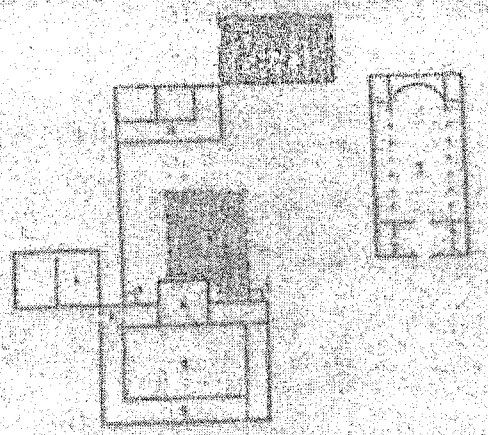
Fig. 2.1.1

Fig 2.1.3 Roman-Christian Xenodochium at Ostia, Italy



1. Entrance hall
2. Courtyard with a well in the centre
3. Basilica
4. Triclia (dormitories) or adjoining patient rooms
5. Garden

Figure [illegible] Sixth Century Xenodochium at [illegible], Syria.



1 Entrance
2 Hall for sick
3 Porticoes and corridor
4 Service building
5 Stairs
6 Sanctuary
7 Basilica
8 Cloister and stairway
9 Pure water cistern

Fig. 2.3.1

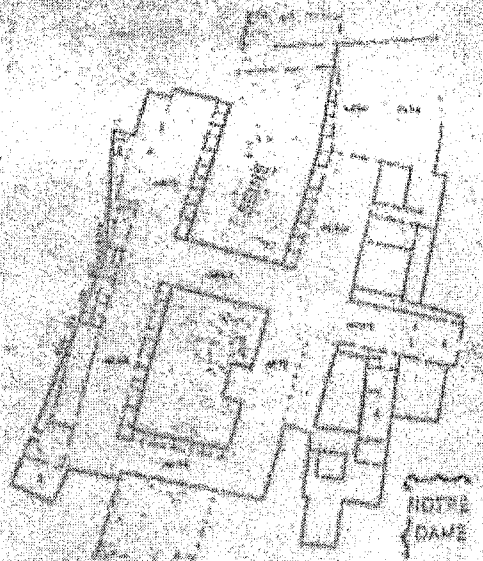
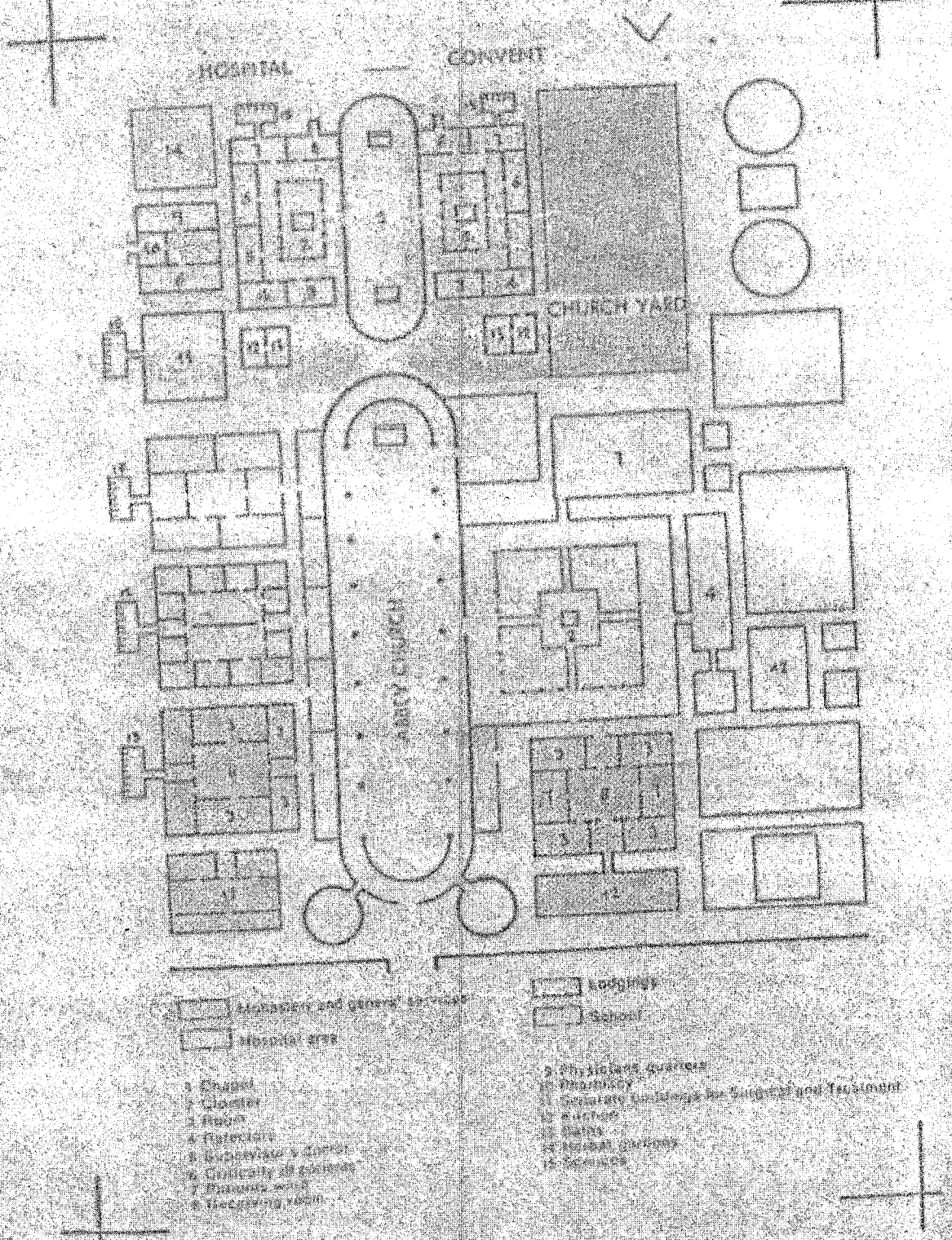


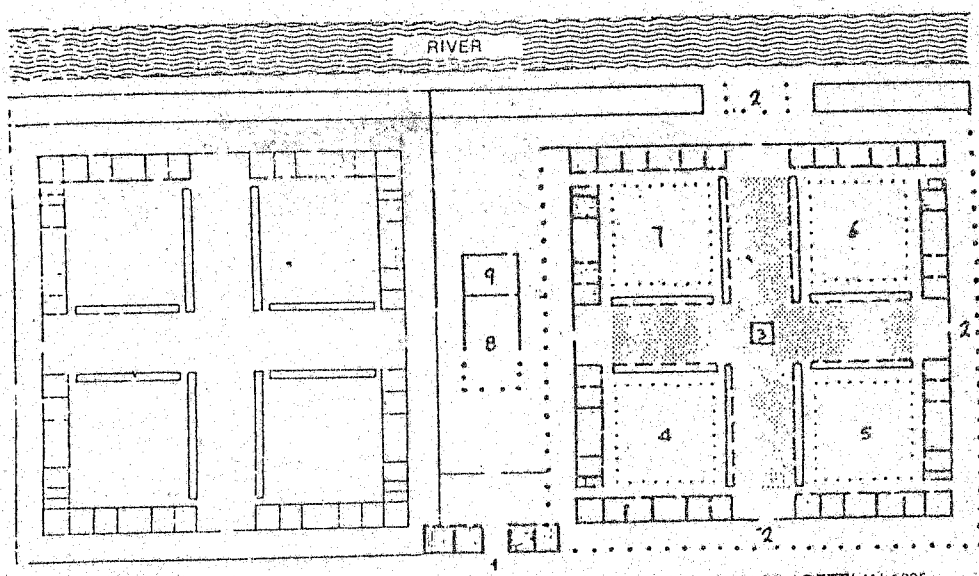
Figure 2.3.2 Hôtel Dieu, Paris, France, site plan.

Figure 2.3.3 Hôtel Dieu, Paris, France, patient ward.



Above: St. Gallen, Switzerland

FIG. 2.13.3c



Patient Areas

Treatment rooms, services, lodgings, and administration

1 Main entrance
2 Portico-secondary entrance
3 High Alter
4 Officials courtyard
5 Servants courtyard
6 Women's courtyard
7 Men's courtyard
8 Chapel of the Annunciation
9 Mortuary

FIG. 2-14

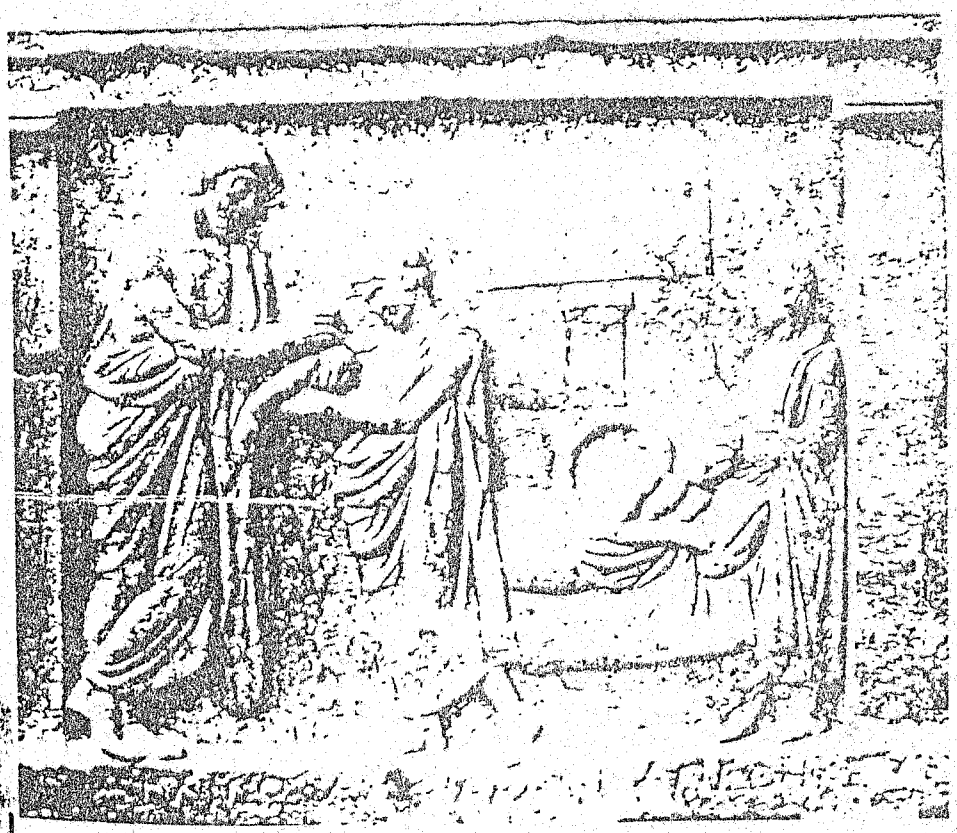


Figure 2-15 The priest Medical consultant of classical Greece.

were free citizens held consultations and created patients. Fig. 2.1.1 shows a 3rd century BC is Co-roman "latreia" excavated at Pompeii. The "latreia" were essentially private institution but the state financed similar institution to care for citizens recognised for dedicated services.

2.1.2 ROME:

Different institutions for the care and shelter of the sick first appeared in Rome. These were temples to Aesulapius and "latreia" for private physicians and their more wealthy patrician patients. The temple of Aesulapius was a small island in Tiber, located there as a divine portent sick man worn out and dying slaves were dispatched to this Island and left there. The Emperor Claudius, appealed by this vicious practice, decreed that all slaves who recovered were henceforth freemen. This resulted to the temple development into infirmary for the sick, poor and hence a forerunner in society of the hospital as it is known today. These infirmaries were termed "valetudinarian". Military valetudinarians were built for the use of imperial civil servants and the families stationed in provincial capitals. The valetudinarian took the form of a porticoes court into which opened rooms for the sick, and as such a distinct architectural form was beginning to emerge.

2.1.3 CHRISTIANITY:

As Christianity started spreading and getting a strong foothold in the minds of men, new concept of charity and care for the poor and sick asserted themselves in the community. The Roman Empire being more prosperous was more active in the founding of such charitable institutions such as, St Basil near Caesarea

and called "Basiliade" in his honour was constructed between 369and 372. Described as "a city in itself" it had pavilion for the sick, a hospice for pilgrims and travellers, an infirmary, a leper hospital and workshops for rehabilitating the disables and unemployed. Other example includes, Romano-Christian Xenodium-built in 2098 CCE at Ostia in 1875, fig. 2.1.3. Twimanin central Syrah, Fig. 2.2.3. Hotel Dieu Lyans (First in France); and Abbey at St. Gallen in Switzerland, fig 2.3.3.

2.1.4 THE RENAISSANCE:

The look of classical Greek and Roman though which the Renaissance re-established was reflected in the plan form of the hospital built in Italy in the 15th century. The most notable examples were Bunelleschi's Aspedale Innocnti, Florence, 1419; Ospedalle della scala, sienna, 1440; and Ospetale maggiori di milano designed by Filaretti (fig. 2.1.4) in 1456 and partially completed in 1465. Filaretti design reflects the rational mind of the Renaissance man, but it is overlaid by a dominating Christian belief. The plan is basically cruciform, with large wards in each of the far segments arranged so that each patient might have a view of he central alter. Subsidiary rooms contained services, facilities, treatment and administrative areas which form periphery of the square. The building is more of monument to Duke Stoza and to God than an efficient hospital.

The beginning of hospital planning based on scientific and functional relationship came up in the late 18th and early 19th century with the introduction of the

'pavilion' type plan was patients were segregated into smaller groups to ensure natural light and ventilation. There was orderliness and similarities in the plan with clear, simple street type pattern of circulation and functional grouping of elements. The philosophy of natural light and ventilation dominated the 19th century until the introduction of the theory of "MIASIA" in 1860 resulting from the spread of cross infection attributed to gases or 'miasmas' generated by organic filth hence attention was paid towards reviewing ventilation problem and distances between buildings.

2.1.5 HOSPITAL IN LATER YEARS:

In later years hospital revolutionised and developed into better levels for; industrialisation of hospital construction, which concerns not only the more important structures of the container but includes the whole of the hospital complex in all its parts. The concepts of progressive treatment and flexibility in design have brought transformation of the present ward and treatment systems by way of. There has being introduction and application of computers at all possible levels.

2.1.6 UNITIED STATES:

The first hospital established in the United States was Pennsylvania Hospital in Philadelphia, which was chartered in 1751 with the support of Benjamin Franklin. Although other U.S. hospitals were created in the 1700s, most people were treated for their illnesses by neighbours and friends in their homes well into the 1800s. Hospitals changed radically after the Civil War—in the early years of the

war no hospitals were available to treat the thousands of soldiers who were wounded or became ill, but by the war's end in 1865, 200 hospitals with more than 137,000 beds had opened in the northern states. In addition to the military hospitals that emerged during the Civil War, many voluntary and public hospitals appeared in the 1850s.

Throughout the 1850s and 1860s it was far more dangerous to receive care in a hospital than at home because of poor sanitation. About 25 percent of patients died after surgery as a result of overcrowding, poor ventilation, and inadequately cleaning-lack of sanitation. The introduction of antiseptic techniques by British surgeon Joseph Lister in 1865 marked a turning point in the safety of hospitalization.

Patient care also improved as a result of the formal training of nurses at the first U.S. nursing schools, which were founded independently in 1873 by Bellevue Hospital in New York, New Haven Hospital in Connecticut, and Boston's Massachusetts General Hospital and the development of x-rays and the clinical laboratory in the 1890s. It prompted the opening of many new hospitals, including religious hospitals and specialist hospitals. The number of for-profit hospitals owned by doctors also increased between 1890 and 1920.

1940s were witness to the greatest period of growth in U.S. hospitals as a result of federal legislation, funding and the increasing presence of health insurance, which began with the Blue Cross system in 1929, ensured that hospital services would be paid. Medicare and Medicaid were established in the 1960s.

The introduction of sulpha drugs in 1935 and penicillin in the early 1940s greatly reduced the post surgical infection rate. Advances in storing blood allowed for the ready availability of a blood transfusion. Diagnosis of medical conditions has been enhanced by ultrasound, computerized axial tomography (CAT, or CT) and positron emission tomography (PET) scans, magnetic resonance imaging (MRI), and the endoscopes, which doubles as a highly precise, less invasive surgical instrument. New medical equipment developed in the latter part of this century has revolutionized the treatment of organ transplants, kidney failure, and cancer. (Karen Sandrick)

2.2 NIGERIA - HISTORY OF MODERN MEDICAL SERVICES

Western medicine was not formally introduced into Nigeria until the 1860s, when Roman Catholic missionaries in Abeokuta established the Sacred Heart Hospital. Throughout the ensuing colonial period, the religious missions played a major role in the supply of modern health care facilities in Nigeria. The Roman Catholic missions predominated, accounting for about 40 percent of the total number of mission-based hospital beds by 1960. By that time, mission hospitals somewhat exceeded government hospitals in number: 118 mission hospitals, compared with 101 government hospitals.

Mission-based facilities were concentrated in certain areas, depending on the religious and other activities of the missions. Roman Catholic hospitals in particular were concentrated in the south-eastern and Midwestern areas. The next largest sponsors of mission hospitals were, respectively, the Sudan United Mission, which concentrated on middle belt areas, and the Sudan Interior

Mission, which worked in the Islamic north. Many of the mission hospitals remained important components of the health care network in the north in 1990. The missions also played an important role in medical training and education, providing training for nurses and paramedical personnel and sponsoring basic education as well as advanced medical training, often in Europe, for many of the first generation of Western-educated Nigerian doctors which, helped to lay the groundwork for a wider distribution and acceptance of modern medical care. The British colonial government began providing formal medical services with the construction of several clinics and hospitals in Lagos, Calabar, and other coastal trading centres in the 1870s. Unlike the missionary facilities, these were, at least initially, solely for the use of Europeans. Services were later extended to African employees of European concerns. Government hospitals and clinics expanded to other areas of the country as European activity increased there. The hospital in Jos, for example, was founded in 1912 after the initiation there of tin mining.

World War I had a strong detrimental effect on medical services in Nigeria because of the large number of medical personnel, both European and African, who were pulled out to serve in Europe. After the war, medical facilities were expanded substantially, and a number of government-sponsored schools for the training of Nigerian medical assistants were established. Nigerian physicians, even if trained in Europe, were, however, generally prohibited from practicing in government hospitals unless they were serving African patients. This practice led to protests and to frequent involvement by doctors and other medical personnel in the nationalist movements of the period.

After World War II, partly in response to nationalist agitation, the colonial government tried to extend modern health and education facilities to much of the Nigerian population. A ten-year health development plan was announced in 1946. The University of Ibadan was founded in 1948; it included the country's first full faculty of medicine and university hospital, still known as University College Hospital. A number of nursing schools were established, as were two schools of pharmacy; by 1960 there were sixty-five government nursing or midwifery training schools. The 1946 health plan established the Ministry of Health to coordinate health services throughout the country, including those provided by the government, by private companies, and by the missions. The plan also budgeted funds for hospitals and clinics, most of which were concentrated in the main cities; little funding was allocated for rural health centres. There was also a strong imbalance between the appropriations of facilities to southern areas, compared with those in the north.

By 1979 there were 562 general hospitals, supplemented by 16 maternity and/or paediatric hospitals, 11 armed forces hospitals, 6 teaching hospitals, and 3 prison hospitals. Altogether they accounted for about 44,600 hospital beds. In addition, general health centres were estimated to total slightly less than 600; general clinics 2,740; maternity homes 930; and maternal health centres 1,240.

Ownership of health establishments was divided among federal, state, and local Governments, and there was privately owned facilities. Whereas the great majority of health establishments were government owned, there were a growing number of private institutions through the 1980s. By 1985 there were 84 health

establishments owned by the federal government (accounting for 13 percent of hospital beds); 3,023 owned by state governments (47 percent of hospital beds); 6,331 owned by local governments (11 percent of hospital beds); and 1,436 privately owned establishments (providing 14 percent of hospital beds). The problems of geographic misdistribution of medical facilities among the regions and of the inadequacy of rural facilities persisted. By 1980 the ratios were an estimated 3,800 people per hospital bed in the north (Borno, Kaduna, Kano, Niger, and Sokoto states); 2,200 per bed in the middle belt (Bauchi, Benue, Gongola, Kwara, and Plateau states); 1,300 per bed in the southeast (Anambra, Cross River, Imo, and Rivers states); and 800 per bed in the southwest (Bendel, Lagos, Ogun,

Ondo, and Oyo states). There were also significant disparities within each of the regions. For example, in 1980 there were an estimated 2,600 people per physician in Lagos state, compared with 38,000 per physician in the much more rural Ondo state.

In a comparison of the distribution of hospitals between urban and rural areas in 1980, Dennis Ityavyar found that whereas approximately 80 percent of the population of those states lived in rural regions, only 42 percent of hospitals were located in those areas. The misdistribution of physicians was even more marked because few trained doctors who had a choice wanted to live in rural areas. Many of the doctors who did work in rural areas were there as part of there required service in the National Youth Service Corps, established in 1973. Few, however, remained in remote areas beyond their required term.

Hospitals were divided into general wards, which provided both outpatient and inpatient care for a small fee, and amenity wards, which charged higher fees but provided better conditions. The general wards were usually very crowded, long waits for registration and treatment. Patients frequently did not see a doctor, only a nurse or other practitioner. Lack of drugs; dispensed without containers, (patients had to provide their own. The inpatient wards were extremely crowded; beds were in corridors and even consisted of mattresses on floors. Food was free for very poor patients who had no one to provide for them. Most, however, had relatives or friends present, who prepared or brought food and often stayed in the hospital with the patient. By contrast, in the amenity wards available to wealthier or elite patients, food and better care were provided, and drug availability was greater. The highest level of the Nigerian elite frequently travelled abroad for medical care, particularly when a serious medical problem existed.

2.3 TYPES OF HOSPITALS

Hospitals are classified by the services they provide (general or specialized), the length of stay they offer patients (short stay or long-term care), and by their ownership (not-for-profit, proprietary, or government owned). Although most hospitals are classified as not-for-profit, any one hospital will fall into several of the above categories. For example, Methodist Hospital in Houston, Texas, with more than 300,000 sq m (3 million sq ft) of space, is one of the largest short-stay, not-for-profit, general hospitals in the United States.

A: Services Provided by Hospitals: General hospitals, regardless of their size, provide patients with a wide range of services, including emergency treatment, surgery, and medical and nursing care. Specialized hospitals, in contrast, may concentrate on a particular group of patients, such as children, or a disease, such as cancer. Some specialized hospitals combine treatment and research.

Some general and specialized hospitals also function as tertiary care centres, treating the most difficult and complex cases or the most seriously ill patients. These may include patients who need heart, lung, or liver transplants. Many hospitals that serve as teaching institutions train residents (medical school graduates who are doing postgraduate training) in general medicine or specialty areas. Teaching hospitals also train others interested in a health care career, including nurses and laboratory specialists. Although some of these hospitals are relatively small and train only a few doctors in teaching programs that are affiliated with medical schools, approximately 300 hospitals are university-based academic medical centres that offer both medical training and opportunities for medical research.

Academic medical centres are usually massive urban hospitals linked closely with major medical schools. Although academic medical centres represent only 6 percent of all U.S. hospitals, they care for about 20 percent of all patients nationwide because they serve as referral centres for specialized consultation or for advanced diagnostic and therapeutic procedures for patients in wide regional areas.

B: Length of Stay: The American Hospital Association (AHA), a national organization that promotes organizational and legislative issues of interest to hospitals, classifies hospitals by the length of stay they offer patients. AHA categorizes hospitals as short-stay or acute-care centres if their patients receive 30 days or less of inpatient treatment. In contrast, AHA classifies hospitals, as long-term care institutions if their patients require more than 30 days of treatment, as are available in rehabilitation facilities or nursing homes.

AHA makes the distinction between short-stay and long-term care facilities to reflect not only the difference in length of stay but also the scope and intensity of services provided by an institution. Short-stay hospitals are geared for quick intervention and constant monitoring of serious, often life-threatening illnesses. These hospitals provide immediate attention until a patient is stabilized enough to be treated at home or in a health care setting that can provide a longer stay. Long-term care institutions treat physical diseases or injuries that are debilitating and require prolonged medical intervention or physical therapy and regular skilled nursing care. Some long-term care facilities are psychiatric institutions for the mentally ill who cannot be cared for at home.

C: Ownership of Hospitals: Not-for-profit, or voluntary, hospitals, which represent about 84 percent of the hospitals in the United States, are charitable institutions that exist to serve the best interests of their communities. Although not-for-profit hospitals do not receive funding from tax dollars, they are exempt from local, state, and federal taxation. Many not-for-profit hospitals were founded and continue to be run by religious groups, such as members of the Catholic

Church, Presbyterian or Methodist ministries, or Jewish organizations. Individuals spearheaded a small number of private charitable hospitals. Probably the best known of these is the Mayo Clinic in Rochester, Minnesota, established by American physician William Mayo and his two physician sons. Most not-for-profit hospitals, however, were established by members of their local community and continue to be governed by community representatives.

Corporations and their shareholders own proprietary, or for-profit, hospitals. Although only about 770 U.S. hospitals are for-profit institutions, these hospitals are typically part of large investor-owned hospital chains. For instance, Hospital Corporation of America (HCA), the largest for-profit hospital chain in the United States, has more than 200 hospitals in its network. HCA is listed on the New York Stock Exchange, just as any other for-profit company; company executives seek to reward shareholders who invest in the company by applying standard corporate management techniques, likely to yield corporate profits, to hospital administration.

A health maintenance organization (HMO) pays for and provides medical care to enrolled patients. For a fixed payment, HMOs deliver health services by establishing panels of doctors and hospitals that provide all the treatment their members require. The first HMO in the country, not-for-profit Kaiser Permanente of Oakland, California, has operated ten hospitals in California since the late 1980s. Although some HMOs, like Kaiser, purchase the hospitals they use, other HMOs only contract with hospitals to treat HMO patients. When a hospital

contracts to meet the health care needs of an HMO's patients, it retains its ownership status.

Cities, counties, states, and the federal government also own hospitals. About 1,000 public hospitals are owned by their cities/counties and are supported by local tax dollars. The vast majority of city hospitals are in small or moderate-size communities, and they offer services that are similar to those provided in small, general, and not-for-profit hospitals. These large, urban, public institutions provide most of the care for the poor in their communities. They also often offer comprehensive, high-tech care for certain categories of gravely ill patients, such as trauma and burn victims, as well as intensive care for newborns who are premature or who have severe birth defects. In contrast to the many city and county hospitals in the United States, only state governments run a small number of hospitals, and most of these are long-term psychiatric or chronic care institutions.

Federal hospitals care for specific types of government program beneficiaries, such as the hospitals on reservations that care for Native Americans. Walter Reed Army Medical Centre, in Washington, D.C., and other military hospitals provide treatment for military personnel and high-ranking members of the government, including the president of the United States. Hospitals run by the Department of Veterans Affairs are located throughout the United States and treat illnesses of military veterans and their dependents.

2.4 LICENSING AND ACCREDITING HOSPITALS

Each hospital, regardless of its classification, must be licensed by the state in which it operates, a procedure that assesses a hospital's compliance with public health standards governing, for example, cleanliness and overcrowding. In addition to being licensed, hospitals seek accreditation from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), a private quality-measurement organization.

JCAHO sets 700 national standards for hospitals covering every area of their operation, such as clinical care, social services, administration, and financial services. Teams of inspectors evaluate a hospital's compliance with these standards once every three years. JCAHO has established several categories of accreditation, including full accreditation for institutions that meet the vast majority of its standards and provisional accreditation for institutions that must correct specific lapses before they can be accredited. Only about 5 percent of all hospitals surveyed by JCAHO are accredited with commendation for meeting top levels of achievement in all 28 areas of measurement. One such hospital is the University of Washington Medical Centre in Seattle, Washington, a 390-bed teaching hospital that also has specialty centres for research on Alzheimer's disease, women's health, and diabetes, and offers 80 outpatient clinics.

2.5 HOSPITAL ORGANIZATION AND STAFF

A hospital is a complex institution that coordinates the skills of doctors, nurses, and support care personnel to provide health services. A hospital also has administrative departments to ensure the efficient and financially sound operation

of the institution. Large not-for-profit general hospitals, the most common hospital type, have several levels of organization that include a board of trustees, chief administrative officer, chief of the medical staff, administrative and medical department heads, and a director of nursing.

A hospital's board of trustees oversees the operation of the hospital by evaluating its financial health and its strategic growth and development. One of the board's major responsibilities is to hire and assess the performance of the hospital's chief administrative officer; another is to approve the appointment and retention of the hospital's physicians. Board members also participate in fund-raising and other philanthropic activities and in community outreach activities that seek to improve the health of the community. Not-for-profit hospitals are charitable institutions that are expected to meet the needs of their communities and their boards of trustees are typically made up of representatives from local businesses and community groups.

The chief administrator of a not-for-profit general hospital is known as the chief executive officer, president, or administrator, depending on the size and complexity of the hospital's organization. As the hospital's top executive, the chief administrator plans for the ongoing financial health of the institution, considering such issues as whether the hospital should remain independent or merge with another institution; expand or reduce specific health services, such as high-cost trauma care; develop relationships with groups of physicians, HMOs, or clinics; or create satellite facilities in nearby cities or towns.

The chief of the medical staff is a physician appointed to direct the work of all the doctors who treat patients in the hospital and to supervise the procedures for adding doctors to the hospital staff. Also called privileges, these procedures define the qualifications needed by doctors and the specific treatments each doctor may perform in the hospital. The chief of the medical staff takes disciplinary action against doctors who do not follow the rules and regulations of the hospital, and reviews the work of committees of doctors who evaluate the quality of medical care in the hospital and the use of hospital resources.

Vice presidents, sometimes called directors, of administrative departments are responsible for the daily operation of a hospital. The vice president of finance directs the work of a hospital's admissions, budget, and cashier's offices, overseeing the general accounting and internal auditing of the hospital's finances. Although responsibilities vary in individual institutions, the vice president of materials management usually buys, stores, and maintains supplies, while the vice president of clinical engineering buys and maintains hospital equipment, including high-tech instruments and machines. The vice president of environmental services supervises the laundry, power plant, and the hospital at large and ensures the safety and security of all staff and patients.

A physician heads each of the many medical departments found within most not-for-profit general hospitals. Most hospitals have separate departments organized by medical specialties, including internal medicine, surgery, paediatrics, obstetrics and gynaecology, radiology and diagnostic testing, pathology, anaesthesiology, and sometimes psychiatry or neurology.

The director of nursing supervises the work of nurses, the hospital's largest group of health care providers, to ensure the quality and efficiency of the care they provide patients. Nurses provide round-the-clock care that includes giving patient's medication, monitoring health status, and maintaining personal hygiene. Nurses also care for hospital outpatients in the emergency department, ambulatory surgery centre, and clinics. They provide specialized services in intensive care units, surgical suites, and trauma units.

In addition to medical, surgical, and nursing care, a hospital also provides many other professional services, all of which have a department head who reports to the hospital's chief administrator. Dietary or nutrition staff ensures that hospitalized patients receive food or dietary supplements that maintain and improve health. The pharmacy dispenses the medications that are ordered by doctors and advises doctors on alternative drug regimens for individual patients. The social services department links patients with agencies and professionals inside and outside the hospital that can provide patients with financial help, counselling, long-term care, or assistance in the home. Educational outreach programs not only acquaint community members with the direct services offered by the hospital, they also teach individuals about disease prevention and health maintenance.

2.6 HOSPITAL DEPARTMENTS

Microsurgery Modern surgical suites are equipped with highly specialized equipment. Here, a surgeon uses an operative microscope to perform cataract

surgery. The microscope magnifies the field of view and allows the surgeon to use very precise instruments. Ken Sherman/Bruce Coleman, Inc.

Hospitals are typically organized into medical departments, or units, such as an emergency room, surgical suites, intensive care units (ICUs), paediatric and maternity wards, and departments of radiology, anaesthesiology, pathology, and rehabilitative medicine.

A hospital's emergency department is staffed 24 hours a day by doctors and nurses who have been trained to diagnose health problems quickly. These doctors and nurses perform medical or surgical treatments that stabilize a patient's condition so that the patient can be moved to another part of the hospital for additional care. When the emergency room is crowded with patients, emergency department staff identifies and respond immediately to the most seriously ill or injured patients, a medical approach called triage.

Childbirth; Many hospitals include a maternity ward where babies are delivered in safe, aseptic environments. Here, in the final stage of childbirth, an obstetrician cuts the umbilical cord while a nurse holds the newborn.

The surgical suites include the actual operating rooms, where surgical procedures are performed, and postoperative recovery rooms. All operating rooms have an operating table that can be adjusted to accommodate the surgical procedure and facilitate the use of sophisticated monitoring equipment. Instruments and equipment, such as lasers or television screens, are brought into the operating room as needed. After surgery, patients are taken to the

postoperative recovery room, adjacent to the operating room, so they can be monitored as they awaken from anaesthesia.

Many hospitals offer two types of ICUs—one for patients who have had surgery and one for patients with dangerous medical conditions, usually involving the heart. Some hospitals also have ICUs for newborns or burn patients. Intensive care units use monitoring equipment that transmits data on a patient's condition directly to the nurses' station. ICUs also have on hand technology and medications that are specific to the medical needs of the patients they serve. For example, newborn ICUs have equipment that is specifically designed to deliver oxygen to tiny babies, while burn units have special ventilation systems to reduce the chance that patients will be exposed to infection.

Infant Incubator: An infant incubator provides a controlled environment for newborns needing special care, such as those born prematurely or those unable to maintain a healthy body temperature. By placing an infant in an incubator, doctors and nurses can set and monitor different aspects of the child's environment in order to create ideal conditions for survival. In addition to regulating oxygen, temperature, and humidity levels, incubators protect infants from pollutants and infection. Portholes in the side of the glass-walled incubator box allow handling of the child, while smaller holes allow for monitoring cables and tubes, such as intravenous and respiratory tubing. Steve Grand/Photo Researchers, Inc.

The paediatric unit admits only children and is equipped with instruments and machines that are suitable for the small size of its patients. Hospitals often prepare children for a hospital stay by allowing them to visit before being admitted so that the surroundings will seem less frightening during their stay. Paediatric wards often have playrooms for their young patients and organize special activities such as parties to cheer children who are hospitalized during the holidays.

The maternity ward, offers homelike labour and delivery rooms where a pregnant woman and her family can gather for the birth of her baby. It also may have a separate surgical area for difficult deliveries requiring a caesarean section, sometimes needed when the baby is not in the normal head-down position or when there are multiple babies. Most maternity wards have a central area where newborns are kept.

Hospitals also have departments that assist in the treatment of patients but that are not involved in their day-to-day care. The department of radiology provides internal images of the body to diagnose and treat disease; the anaesthesiology department works with physicians to provide the safest type of anaesthesia for a patient during surgery and pain relief after surgery; and the pathology department examines body tissues in a laboratory to diagnose disease. The Rehabilitative medicine department of is often headed by a doctor and staffed by physical and occupational therapists. These professionals help patients regain normal physical function following surgery and relearn muscular control and coordination in resuming everyday

2.7 PLANNING CONSIDERATIONS FOR VARIOUS DEPARTMENT OF THE GENERAL HOSPITAL

BASIC WARD TYPES:

i. LINEAR WARD/NIGHTINGALE'S OPEN WARD LAYOUT:

In the linear ward/nightingale's open ward, the wards are designed to accommodate 30-40 patients, with the beds so arranged that the head of the patient is against the external window wall the construction method provides a window for each patient's bed. The patient when he glances suffers the effect of glare through the window because of the nature of the bed arrangement. The only way he can escape from this hardship is by lying on his stomach which he may not be able to do because of his nature. This linear ward type is supported by nurses working room at one end toilets and sluices at the other end, also a large work table at the ward. In this type of design, the ward are well ventilated and well lit, observation of patents is not a problem. However can, be modified in shape i.e. it's flexible.

ii. DEEP WARD OR RACE TRACK/ RIGS WARD LAYOUT:

This design concept was developed in the late 1950s. Here the patients stay in four bed wards, placed on outside walls and therefore naturally lit and ventilated. The nurse room however forms a central core and needs artificial light and mechanical ventilation. Many of the difficulties of the perimeter of nightingales ward are overcome by the rigs ward. It is named after the rigs hospital of Copenhagen Denmark where it was first built the beds are

arranged such that the beds of the patients are against partition walls sub-dividing the open ward into bays. In the original Rigs Hospital, beds were grouped of four enabling patient to turn head away from window at will.

iii. COURTYARD PLAN:

As suggested by the name, wards are arranged round a central courtyard. This design concept seeks to reduce internal working room and provide good patient observation. All wards will have some daylight but mechanical ventilation may be required due to the fact that most of the windows will be on one side.

AREA PER BEDROOM:

The actual sizes of the patient bedroom are obtained from the determined number of beds required. Time saver standard gives the sizes for the various types of bedrooms as:

- Single bedroom 10.87 – 15m2
- Double bedroom 14.19 – 19.51m2
- Four bedroom 28.61 – 37.25m2

Major differences are found depths from in inside of external wall to room side of corridor partition.

- Single bedroom 4.400m
- Double bedroom 4.472m
- Four bedroom 6.604m

The width of single and double rooms is 3.5max or less depending on furniture requirement.

CHAPTER THREE

3.0 AREA OF RESEARCH

SANITATION IN HOSPITAL ENVIRONMENT

INTRODUCTION

The waste produced in the course of hospital activities, from contaminated needles to radioactive isotopes, carries a greater potential for causing infection and injury than any other type of waste, and inadequate or inappropriate management is likely to have serious public health consequences and deleterious effects on the environment. This chapter - the result of extensive international consultation and collaboration - provides comprehensive guidance on safe, efficient, and environmentally sound methods for the handling and disposal of hospital wastes (sanitation).

The various categories of waste are clearly defined and the particular hazards that each poses are described. Considerable prominence is given to the careful planning that is essential for the success of waste management; workable means of minimizing waste production are outlined and the role of reuse and recycling of waste is discussed. Most of the text, however, is devoted to the collection, segregation, storage, transport, and disposal of wastes. Details of containers for each category of waste, labelling of waste packages, and storage conditions are provided, and the various technologies for treatment of waste and disposal of

final residues are discussed at length. Advice is given on occupational safety for all personnel involved with waste handling, and a separate paragraph is devoted to the closely related topic of hospital hygiene and infection control.

The chapter pays particular attention to basic processes and technologies that are not only safe-but also affordable, sustainable, and culturally appropriate. For health-care settings in which resources are severely limited there is a separate sub-topic on minimal programmes; this summarizes all the simplest and least costly techniques that can be employed for the safe management of hospital wastes.

Management of hospital waste is an integral part of hospital hygiene and infection control. Hospital waste should be considered as a reservoir of pathogenic micro organism, which can cause contamination and give rise to infection. If waste is inadequately managed these micro organisms can be transmitted by direct contact, in the air, or by a variety of vectors. Infectious waste contributes in this way to the risk of nosocomial infections, putting the health of hospital personnel, and patients, at risk.

This chapter outlines the basic principles of prevention and control of infections that may be acquired in hospital (but dose not address other aspects hospital hygiene such as pressure sores and the risk of falls). It should be stress here that other environmental health considerations, such as adequate water supply and sanitation facilities for patients, visitors, and health-care staff, are prime importance.

3.1 DEFINITIONS AND CHARACTERIZATION

3.1.1 Definitions

Sanitation: is defined as systems that protect people's health, especially those that dispose effectively of human waste. While, sanitary; of/concern with the removal of human waste and keeping places free from dirt, etc free from dirt or substance that may cause disease, clean; hygienic.

Also is the process of effecting healthful and hygienic conditions or measures.

Sanitary practices include: proper drainage, ventilation, good water supply and efficient collection and disposal or removal of waste (waste management).

Effect of poor sanitation

Poor sanitation could result in diseases through the contamination of food and drinking water, easy spread of diseases etc.

Importance of sanitation in hospital

Sanitation is very important in hospitals because it reduces the chance of getting contaminated and infected by other diseases and also aids in quick recovery of patients, addresses also maintenance of facilities, equipment and buildings within the hospital thereby reducing death rate.

3.1.1.1 For adequate sanitation the following are required:

a. GOOD WATER

b. FOOD

c. PROPER WASTE MANAGEMENT

d. GOOD DRAINAGE SYSTEM

e. FINISHES AND VENTILATION

WATER:

Water is essential for the active life of every living thing. It forms the large part of body weight, it is often classified along food nutrient and it is a utility needed in hospital for many purposes e.g. cooking, washing & laundry, cleaning etc. water is obtained natural and contains some form of impurities which needs to be treated and filtrated for use.

Water can be purified on any of the following method:

Boiling: water boils at a temperature 100C or 212F at these temperature most of the harmful of microbes are destroyed.

Filtration: by this process water is passed through a porous substance preventing dirt particles and some microbes from passing.

Chemical purification of water: chemicals such as chlorine, fluorine and iodine (halogen) may be added by water board to purify water and also act as food supplements to prevent diseases (goitre, tooth decay).

FOOD:

To prevent diseases associated with food item, the food must be:

1. Well balanced to meet the desired requirement of an individual
2. The food must be handled in under hygienic condition.
3. Must be well cooked to improve the texture, flavour and reduce the microbial count (load).

WASTE MANAGEMENT

3.1.1.2 Hospital waste: definition and classification

Definition: Hospital waste includes all the waste generated by hospitals. In addition, it includes the waste originating from "minor" or "scattered" sources—such as that produced in the course of health care undertaken in hospitals (dialysis, insulin injections etc.).

Between 75% and 90% of the waste produced by health-care providers is non-risk or "general" health-care waste, comparable to domestic waste.

It comes mostly from the administrative and housekeeping functions of (hospital) and may also include waste generated during maintenance of hospital premises.

The remaining 10–25% of hospital waste is regarded as hazardous and may create a variety of health risks. This chapter is concerned almost exclusively with hazardous hospital waste (also known as "hospital risk waste").

3.1.2.3 Classification of hazardous hospital waste

Infectious waste: suspected to contain pathogens (bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. This category includes:

- Cultures and stocks of infectious agents from laboratory work;
- Waste from surgery and autopsies on patients with infectious diseases
- Waste from infected patients in isolation wards
- Waste that has been in contact with infected patients undergoing haemodialysis
- Any other instruments or materials that have been in contact with infected persons.

Cultures and stocks referred to as **highly infectious waste**.

Pathological waste: **(anatomical waste)**.

Sharps: **highly hazardous health-care waste.**

Pharmaceutical waste:

Genotoxic waste:

Chemical waste: from health care may be hazardous **(Toxic; corrosive; flammable; reactive)** or nonhazardous **(Formaldehyde; Photographic chemical; Solvents; Organic chemicals; Inorganic chemicals)**

Wastes with high content of heavy metals, Pressurized containers, Radioactive

1.4.3 Sources of hospital waste: The sources of hospital waste can be classed as major or minor according to the quantities produced. The composition of wastes is often characteristic of the type of source. For example, the different units within a hospital would generate waste with the following characteristics:

- *Medical wards*: mainly infectious waste such as dressings, bandages, sticking plaster, gloves, disposable medical items, used hypodermic needles and intravenous sets, body fluids and excreta, contaminated packaging, and meal scraps.
- *Operating theatres and surgical wards*: mainly anatomical waste such as tissues, organs, foetuses, and body parts, other infectious waste, and sharps.
- *Other hospital units*: mostly general waste with a small percentage of infectious waste.
- *Laboratories*: mainly pathological (including some anatomical), highly infectious waste and sharps, plus some radioactive and chemical waste.
- *Pharmaceutical and chemical stores*: small quantities of pharmaceutical and chemical wastes, mainly packaging, and general waste.
- *Support units*: general waste only.
- *Health care provided by nurses*: mainly infectious waste and many sharps.

• *Physicians' offices*: mainly infectious waste and some sharps.

• *Dental clinics and dentists' offices*: mainly infectious waste and sharps, and wastes with high heavy-metal content.

• *Home health care* (e.g. dialysis, insulin injections): mainly infectious waste and sharps.

3.1.3.4 Hospital waste generation

Several surveys have provided an indication of typical hospital waste generation, which shows that generation of hospital wastes differs not only from country to country but also within a country? Waste generation depends on established waste management methods, type hospital specializations, proportion of reusable items employed in health care, and proportion of patients treated on a day-care basis. It has been found out that, in middle- and low-income countries, hospital waste generation is usually lower than in high-income countries. Chih-Shan L, Fu-Tien J (1993). ;Johannessen LM (1997). A case study was carried out to investigate a situation in Nigeria.

3.2 WASTE MINIMIZATION, RECYCLING, AND REUSE

3.2.1 Waste minimization

Significant reduction of the waste generated in hospital may be encouraged by the implementation of certain policies and practices, including the following:

• **Source reduction**:

• **Recyclable products**:

• **Good management and control practices**:

• **Waste segregation**:

Waste minimization usually benefits the waste producer: costs for both the purchase of goods and for waste treatment and disposal are reduced and the liabilities associated with the disposal of hazardous waste are lessened.

Suppliers of chemicals and pharmaceuticals can also become responsible partners in waste minimization programmes.

Reducing the toxicity of waste is also beneficial, by reducing the problems associated with its treatment or disposal.

3.2.2 Safe reuse and recycling

Medical and other equipment used in hospitals may be reused provided that it is designed for the purpose and will withstand the sterilization process. After use, these should be collected separately from nonreusable items, carefully washed and may then be sterilized. Long-term radionuclide may be reused after sterilization. Certain types of container may be reused provided that they are carefully washed and disinfected. Containers of pressurized gas, however, should generally be sent to specialized centres to be refilled. Recycling is usually not practised by hospitals, apart, perhaps, from the recovery of silver from fixing-baths used in processing X-ray films.

Examples of sterilization methods for reusable items

Thermal sterilization: Dry sterilization; Wet sterilization.

Chemical sterilization: Ethylene oxide; Glutaraldehyde:

3.3 HANDLING, STORAGE, AND TRANSPORTATION OF HOSPITAL WASTE

3.3.1 Waste segregation and packaging

The key to minimization and effective management of hospital waste is segregation (separation) and identification of the waste. Appropriate handling, treatment, and disposal of waste by type reduce costs and do much to protect public health. Segregation should always be the responsibility of the waste producer, should take place as close as possible to where the waste is generated, and should be maintained in storage areas and during transport.

The most appropriate way of identifying the categories of hospital waste is by sorting the waste into colour-coded plastic bags or containers.

3.3.2 On-site collection, transport, and storage of waste

3.3.2.1 Collection: Nursing and other clinical staff should ensure that waste bags are tightly closed or sealed when they are about three-quarters full. Light-gauge bags can be closed by tying the neck, but heavier-gauge bags probably require a plastic sealing tag of the self-locking type. Bags should *not* be closed by stapling. Sealed sharps containers should be placed in a labelled, yellow infectious hospital waste bag before removal from the hospital ward or department.

Wastes should not be allowed to accumulate at the point of production. A routine programme for their collection should be established as part of the hospital waste management plan.

3.3.*2.2 Storage:* A storage location for health-care waste should be designated inside hospital. The waste, in bags or containers, should be stored in a separate area, room, or building of a size appropriate to the quantities of waste produced and the frequency of collection.

Unless a refrigerated storage room is available, storage times for healthcare waste (i.e. the delay between production and treatment) should not exceed the following: 48 hours during the cool season 24 hours during the hot season *Cytotoxic waste* should be stored separately from other hospital waste in a designated secure location. *Radioactive waste* should be stored in containers that prevent dispersion, behind lead shielding.

3.3.2.3 On-site transport: Hospital waste should be transported within the hospital by means of wheeled trolleys, containers, or carts that are not used for any other purpose.

3.3.3 Off-site transportation of waste

3.3.3.1 Regulation and control system: The hospital waste producer is responsible for safe packaging and adequate labelling of waste to be transported off-site and for authorization of its destination. Packaging and labelling should comply with national regulations governing the transport of hazardous wastes and with international agreements if wastes are shipped abroad for treatment.

Anyone involved in the production, handling, or disposal of hospital waste has a general "duty of care", i.e. an obligation to ensure that waste handling and associated documentation comply with the national regulations.

3.3.3.2 Special packaging requirements for off-site transport: In general, the waste should be packaged in sealed bags or containers, to prevent spilling during handling and transportation. The bags or containers should be appropriately robust for their content (puncture-proof for sharps) and for normal conditions of handling and transportation, radioactive material should be packed in containers whose surfaces can be easily decontaminated. Before transportation of the waste, dispatch documents should be completed, all arrangements should be made between consignor, carrier, and

consignee, and, in case of exportation, the consignee should have confirmed with the relevant competent authorities that the waste can be legally imported and that no delays will be incurred in the delivery of the consignment to its destination.

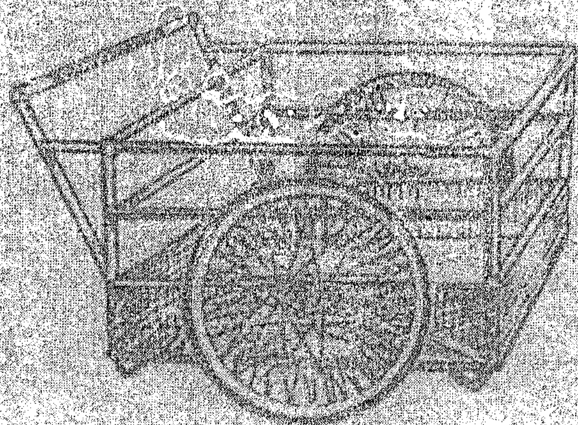
3.3.3.3 Transportation vehicles or containers: Waste bags may be placed directly into the transportation vehicle, but it is safer to place them in further containers. This has the advantage of reducing the handling of filled waste bags but results in higher disposal costs.

Vehicles or containers used for the transportation of hospital waste should not be used for the transportation of any other material. They should be kept locked at all times, except when loading and unloading.

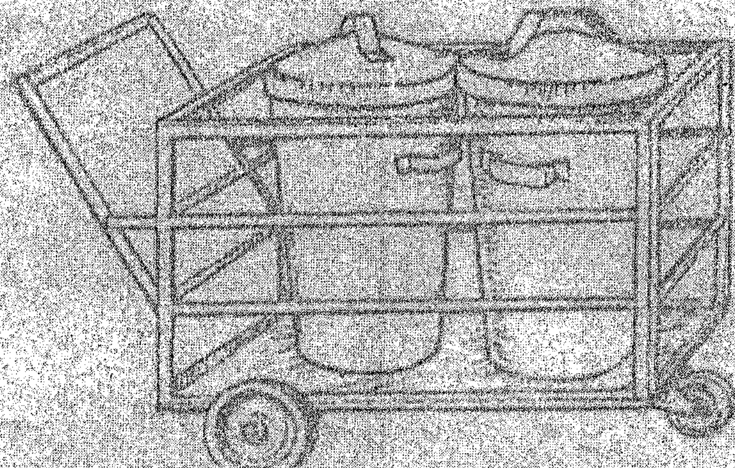
Articulated or demountable trailers are particularly suitable; other systems may be used, such as specially designed large containers or skips; except open-topped skips or containers. Where the use of a dedicated vehicle cannot be justified, a bulk container that can be lifted on to a vehicle chassis may be considered. The container may be used for storage at the hospital and replaced with an empty one when collected. The finish of these bulk containers should be smooth and impervious and permit easy cleansing or disinfection.

3.3.3.4 Routing: Hospital waste should be transported by the quickest possible route, which should be planned before the journey begins. After departure from the waste production point, every effort should be made to avoid further handling. If handling cannot be avoided, it should be pre-arranged and take place in adequately designed and authorized premises.

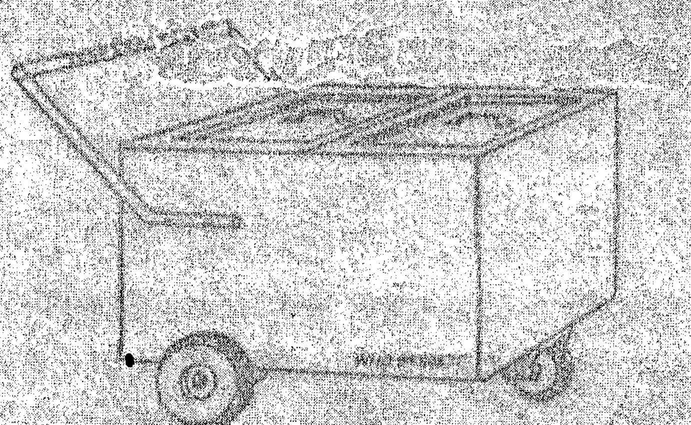
Fig 5.3 Wheeled vehicles used for transportation of health-care waste in small hospitals [illegible]



Waste vehicle with opaque lids and partly opaque sides



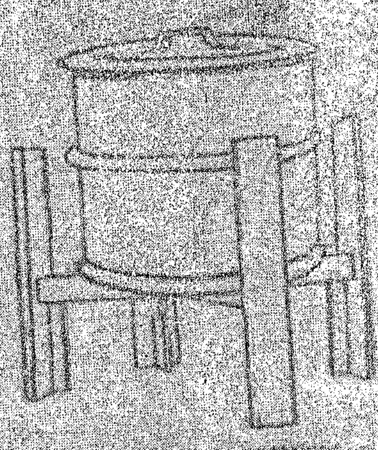
Waste vehicle that can be loaded with either containers or plastic bags



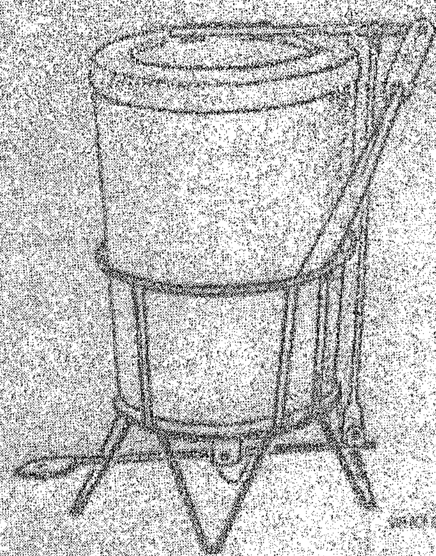
Waste vehicle with opaque sides and compartments to load waste or waste bags

Source: Ministry of Health (1995). *Handbook of hazardous healthcare waste management in 10-bed and 30-bed community hospitals*. Bangkok. Used with permission.

Fig. 3.3 Waste containers [illegible] for small hospitals [illegible]



Cylinder-type waste container made from oil drum cut in half

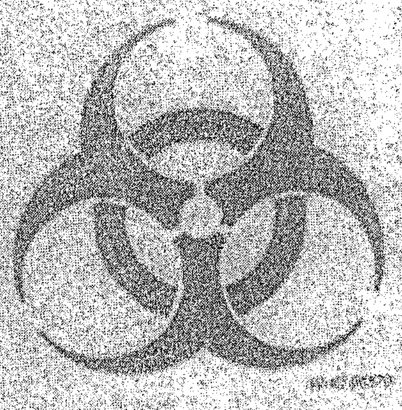


Cylinder-type plastic waste container with foot operated lid

Source: [illegible] (1995). *Handbook of hazardous healthcare waste management in 10-bed and 30-bed community hospitals.* Bangkok, [illegible] with permission

Fig.3.2.1. Collapsible cardboard sharps container

Fig.3.3.2. International infectious substance symbol



3.4 APPLICATION OF TREATMENT AND DISPOSAL METHODS TO HOSPITAL WASTE CATEGORIES

Suitable treatment and disposal methods for the different categories of hospital waste are summarized below

3.4.1 Infectious waste and sharps

Destroying infectious micro organisms is by heat, by chemical means, or by microwave irradiation. Highly infectious waste should be sterilized by wet thermal treatment (e.g. autoclaving) at the earliest stage possible. For other infectious hospital waste, disinfection is adequate.

Sharps should undergo incineration, encapsulation and then land filled, open trenches may also be envisaged.

Unless there is an adequate wastewater treatment plant, blood should be disinfected before discharge to a sewer; it may also be incinerated.

3.4.2 Pharmaceutical waste

Sound management of pharmaceutical products facilitates waste minimization and is of prime importance to better waste management in general. Disposal of small amounts of chemical or pharmaceutical waste is easy and relatively cheap; large amounts require the use of special treatment facilities.

Disposal of small quantities of pharmaceutical waste; The disposal options for small quantities of pharmaceutical waste include:

• *Landfill disposal,* Encapsulation, *Safe burial on hospital premises, Discharge to a sewer, Incineration*

Disposal of large quantities of pharmaceutical waste; • *Incineration, Encapsulation*

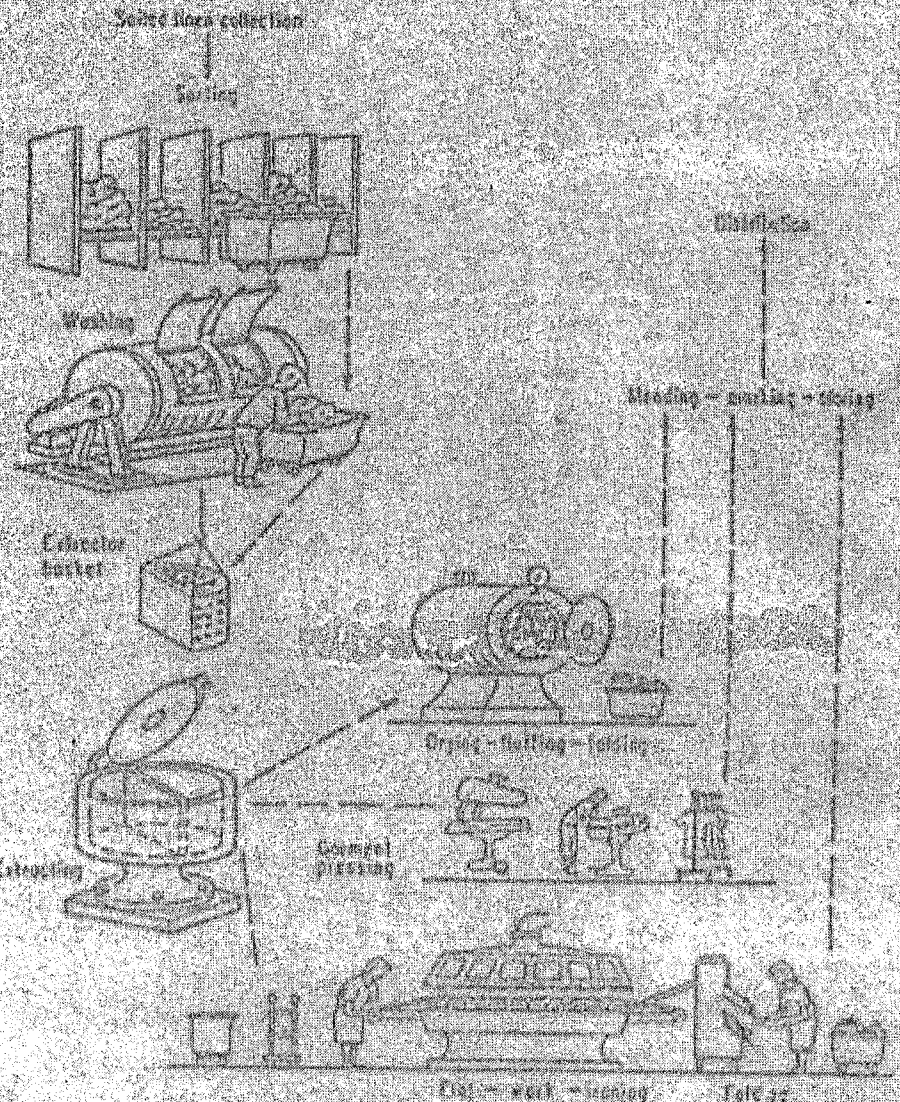


Fig. XIII. Processing hospital linen.

ILL. 3.1 WASTE COLLECTION VEHICLE

3.4.3 Cytotoxic waste

Cytotoxic waste is highly hazardous and should never be land filled or discharged into the sewerage system. Disposal options include the following:

• *Return to original supplier, Incineration at high temperatures, Chemical degradation*

3.4.4 Chemical waste

Disposal of general chemical waste; Disposed of with municipal waste or discharged into sewers.

Disposal of small quantities of hazardous chemical waste; Inside their packaging may be dealt with by pyrolytic incineration, encapsulation, or land filling.

Disposal of large quantities of hazardous chemical waste; The appropriate means of disposal is dictated by the nature of the hazard presented by the waste. May be incinerated, eliminated in a rotary kiln, treat them chemically, or store them in a safe disposal facility engineered for hazardous chemicals, or return to the original supplier.

3.4.5 Wastes with high heavy-metal content

Should never be burned or incinerated because of the risk of atmospheric pollution with toxic vapours, and never be disposed of in municipal landfills as they may pollute the groundwater. Or send back the waste to the suppliers of the original equipment, with a view to reprocessing or final disposal,

3.4.6 Pressurized containers

Incineration or burning is not a disposal option because of the risk of explosion. The best disposal options are recycling and reuse; most undamaged pressurized containers may be sent back to the gas suppliers for refilling.

• *Undamaged containers;* Containers should be returned to the supplier

• *Damaged containers;* Pressurized containers that have been damaged and are unsuitable for refilling may be crushed after being emptied completely; they can then be disposed of in any landfill.

• *Aerosol cans;* Small aerosol cans should be collected and disposed of with general waste in black waste bags, but *only* if this waste is not destined for burning or incineration.

3.4.7 Radioactive waste

Radioactive waste should be categorized and segregated on the basis of the available options for treatment, conditioning, storage, and disposal.

3.5 DRAINAGE SYSTEMS

Drainage systems can be described as systems of removing and disposing of liquid waste which include: blood and body fluids, ground pathological tissues, dialysate, and some laboratory fluids.

Sources of liquid waste: Bathroom, toilets, kitchen, laundry, laboratory, wards, and some rainwater collected by the drains and gutters.

The different types of drainage systems available are:

1. **Free drainage system:** is waste water simply poured on the ground outside and it absorbed, flows away, dries off or accumulates.

2. **Open drainage system:** special channels or gutters are provided for waste water to flow along. Either covered or opened gutters.

SEPTIC TANK AND SOAKAWAY PIT DRAINAGE DETAIL

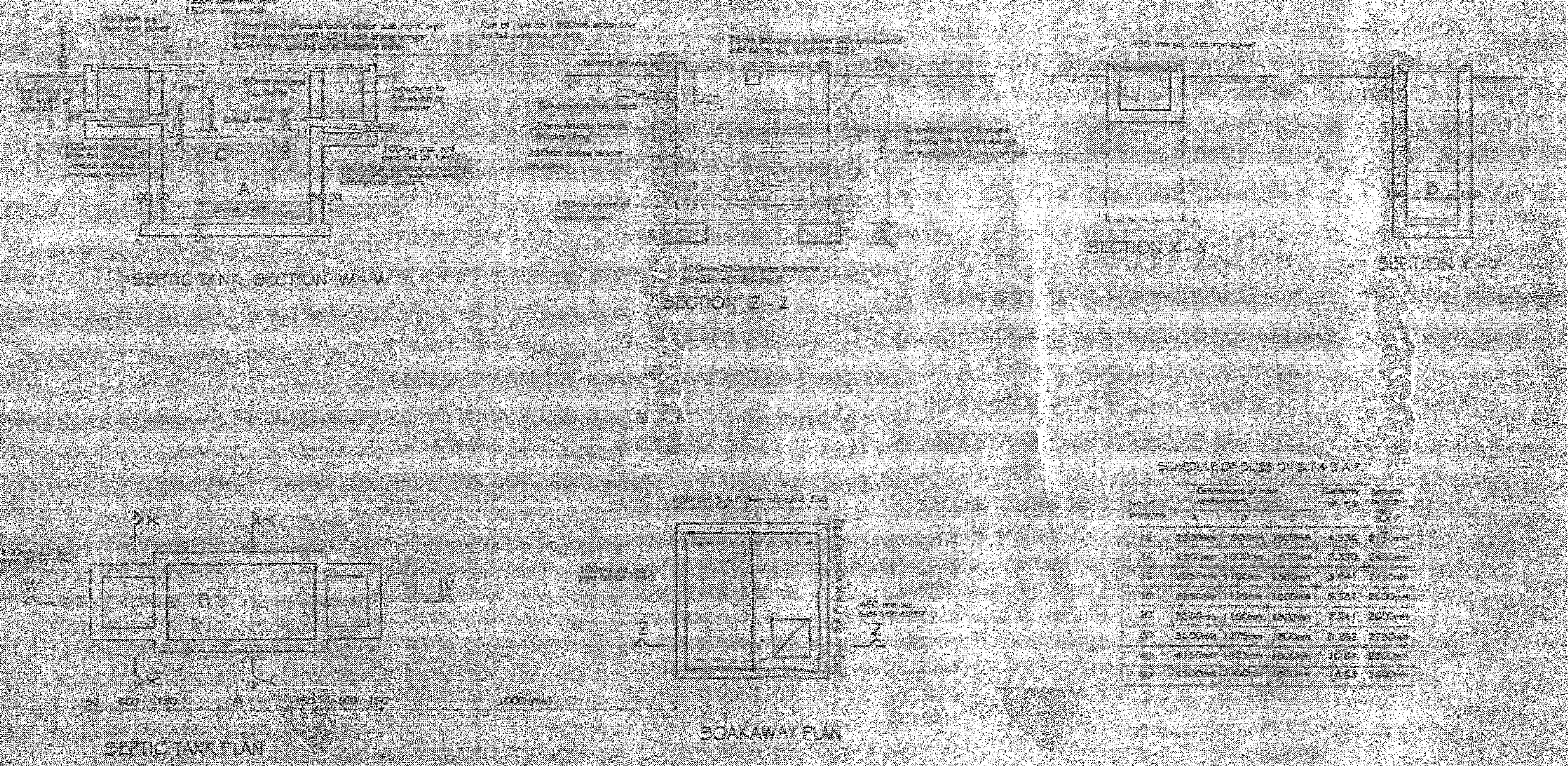


FIG 8.5

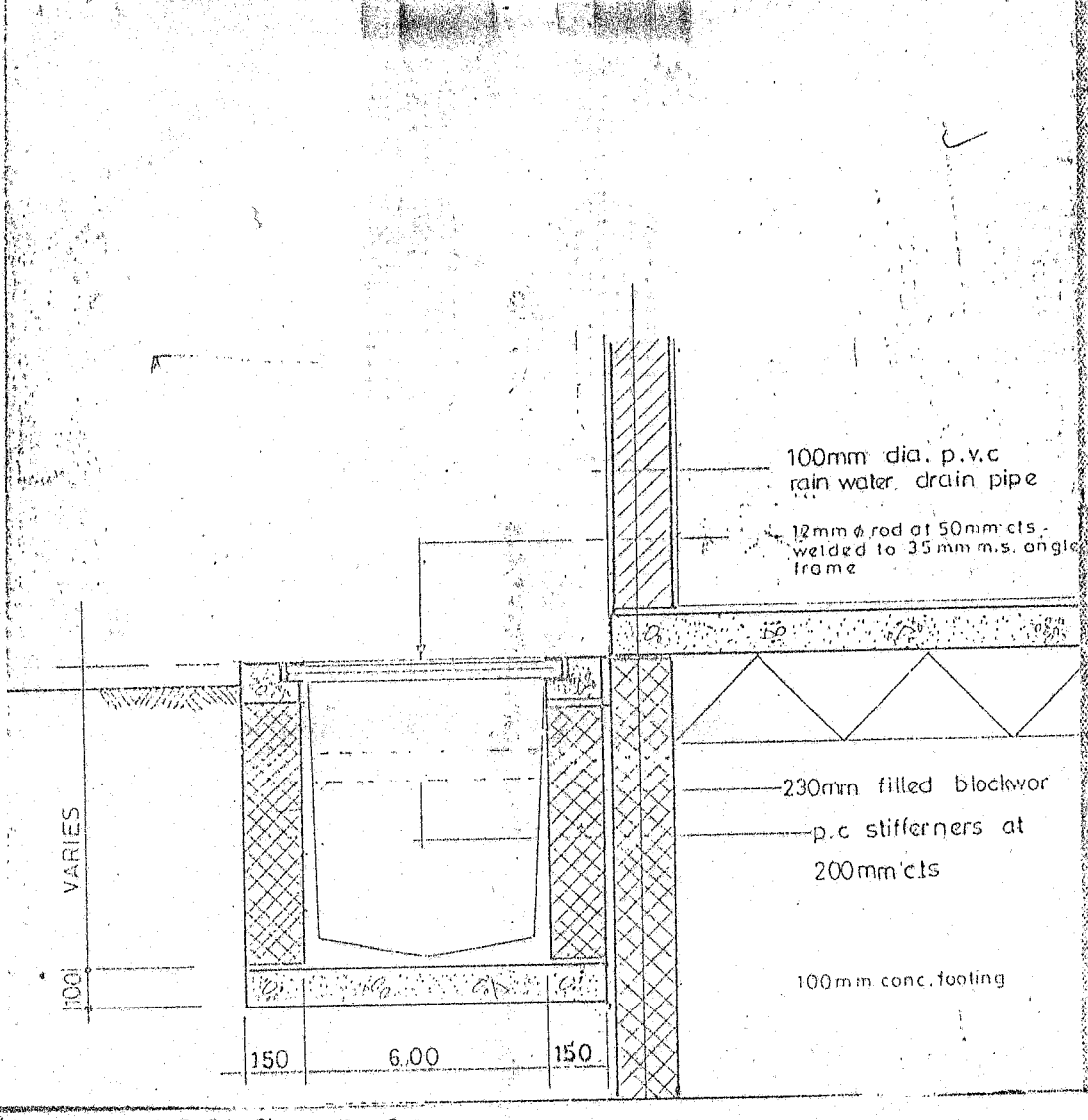


FIG 3.5.1 DRAINAGE DETAIL

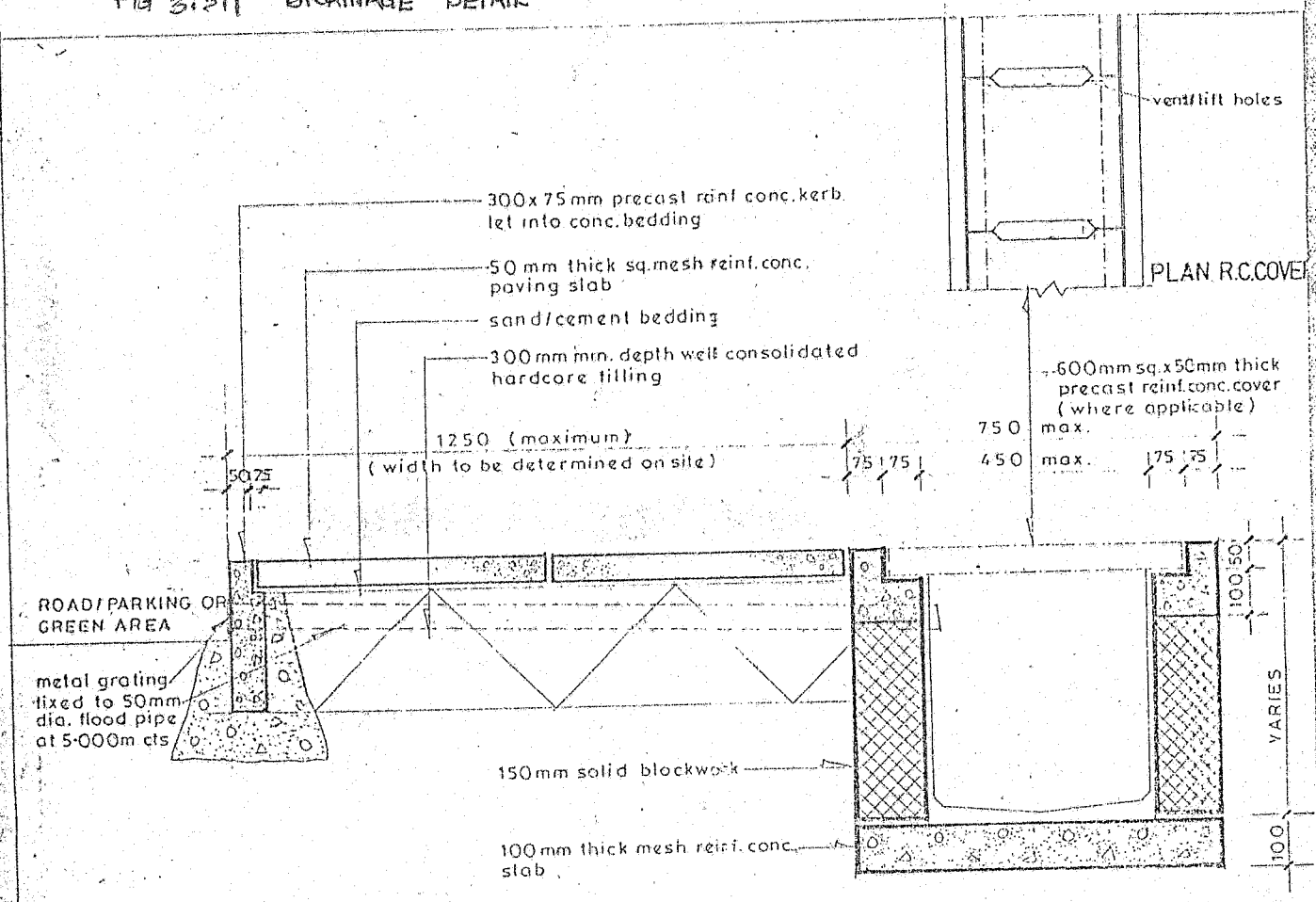


FIG 3.5.2 STORMWATER DRAINAGE WITH PAVED WALKWAY DETAIL

3. **Concealed drainage system:** With this type of drainage all the path through which the waste water flows are concealed using special drainage pipes which are laid round the hospital and connected to the main drainage pipes which carries the liquid waste to the place of disposal. The pipes are often buried underneath the ground.

CARE OF THE DRAINAGE SYSTEMS

1. **Free drainage system:** Sweep the area to remove dirt, pour dry sand when swampy or slippery and disinfect regularly.

2. **Open drainage system:** avoid throwing waste into gutters/drains, flush gutter regularly and through clean and disinfect once in a while.

3. **Concealed drainage system (septic tanks):** do *not* disinfect septic tanks it destroys useful bacterial in the tank, and avoid dropping soap or grease material.

4. **Sewage pipe or drainage pipe:** drains in laundry basins, bathtubs, kitchen sinks should be provided with sieves to catch materials that could cause blockage. Drains should be flushed after use with plenty of water. Hot water can be poured into the kitchen sink to keep the drains free from grease.

3.5.1 COLLECTION AND DISPOSAL OF WASTEWATER

3.5.1.1 Characteristics and hazards of wastewater from hospital

Wastewater from hospital is of a similar quality to urban wastewater, but may also contain various potentially hazardous components:

Microbiological pathogens

The principal area of concern is wastewater with a high content of enteric pathogens, which are easily transmitted through water. Contaminated wastewater is produced by wards treating patients with enteric diseases and is a particular problem during outbreaks of diarrhoeal disease.

Hazardous chemicals

Small amounts of chemicals from cleaning and disinfection operations are regularly discharged into sewers.

Pharmaceuticals

Small quantities of pharmaceuticals are usually discharged to the sewer from hospital pharmacies and from the various wards.

Radioactive isotopes

Small amounts of radioactive isotopes will be discharged into sewers by oncology departments.

Related hazards

3.5.2 Wastewater management

The basic principle underlying effective wastewater management is a strict limit on the discharge of hazardous liquids to sewers,

Connection to a municipal sewage treatment plant

In countries that do not experience epidemics of enteric disease and that are not endemic for intestinal helminthiasis, it is acceptable to discharge the sewage of hospital to municipal sewers without pre-treatment.

In normal circumstances, the usual secondary bacteriological treatment of sewage, properly applied, complemented by anaerobic digestion of sludge, can be considered as sufficient.

On-site treatment or pre-treatment of wastewater

Many hospitals, in particular those that are not connected to any municipal treatment plant, have their own sewage treatment plants.

3.5.3 Wastewater treatment

Efficient on-site treatment of hospital sewage should include the following operations:

- *Primary treatment, Secondary biological purification, Tertiary treatment, Chlorine disinfection.* Disinfection of the effluents is particularly important if they are discharged into coastal waters close to shellfish habitats.

3.5.4 Sludge treatment

The sludge from the sewage treatment plant requires anaerobic digestion to ensure thermal elimination of most pathogens. Alternatively, it may be dried in natural drying beds and then incinerated together with solid infectious health-care waste. The hospital should ideally be connected to a sewerage system. Where there are no sewerage systems, technically sound on-site sanitation should be provided.

3.6 EPIDEMIOLOGY OF NOSOCOMIAL INFECTIONS

Nosocomial infections-known also as hospital-acquired infections, hospital-associated infections, and hospital infections-are infections that are not present in the patient at the time of admission to hospital but develop during the course of stay in hospital. There two forms:

- **Endogenous infection, self-infection, auto-infection.**
- **Cross-contamination followed by cross-infection**

3.6.1 THE TRANSITION FROM CONTAMINATION TO INFECTION

Whether or not a tissue will develop an infection after contamination depends upon the interaction between the contaminating organisms and the host. Healthy individuals have a normal *general resistance* to infection. Patients with underlying disease, newborn babies, and the elderly have less resistance and will probably develop an infection after contamination. Health workers are thus less likely to get infected than patients.

3.6.2 THE SOURCES OF INFECTION

In hospitals, the sources of infection, and of the preceding contamination, may be the personnel, the patients, or the inanimate environment. The hospital may be contaminated by pathogens present in the food and cause an outbreak of disease just as they can in a community outside the hospital. Waterborne infections may develop; water cooling system of air conditioning equipment may become contaminated. Pharmaceuticals may become contaminated during production or preparation.

3.6.3 THE ROUTES OF TRANSMISSION

Micro organisms can be transmitted from their source to a new host through direct or indirect contact, in the air, or by vectors.

During general care and/or medical treatment, the hands of the hospital workers often come into close contact with patients. The hand of the clinical personnel are thus the

most frequently vehicles for nosocomial infections. Transmission by this route is much more common than vector borne or airborne transmission or other forms of direct or indirect contact.

3.6.4 THE PREVENTION OF NOSOCOMIAL INFECTION (a sanitary measure)

Principles: Two principles govern the main measures that should be taken in order to prevent the spread of nosocomial infections in hospitals:

- Separate the infection source from the rest of the hospital;
- Cut off any route of transmission.

3.6.4.1 ISOLATION OF INFECTED PATIENTS AND STANDARD PRECATIONS

The first essential measures in preventing the spread of nosocomial infections are *isolation* of infected patients. Isolation of any degree is expensive, labour-intensive and usually inconvenient or uncomfortable for both the patient and hospital personnel; its implementation should therefore be adapted to the severity of the disease and to the causative agent. Diseases specific precautions include details of all the measures (private room, wearing of masks or gowns, etc.) to be taken in the case of specific disease caused by a defined organism.

3.6.4.2 CLEANING: One of the basic measures for the maintenance of hygiene, and one that is particularly important in the hospital environment, is cleaning. The principal

aim of cleaning is to remove visible dirt. It is essentially a mechanical process: the dirt is dissolved by water, diluted until it's no longer visible, and rinsed off. Soaps and detergents acts as solubility-promoting agents. The microbiological effect of cleaning is also essentially mechanical: bacteria and other micro organisms are suspended in the cleaning fluid and removed from the surface. Thorough cleaning will remove more than 90% of micro organisms.

3.6.4.3 STERILIZATION: Self-evidently, an object should be sterile, i.e. free of micro organisms, after sterilisation. It is therefore important to minimise the level of contamination of the material to be sterilised. This is done by sterilising only objects that are clean (free of visible dirt) and applying the principles of good manufacturing practice.

Sterilisation can be achieved by both physical action of heat (autoclaving, dry or wet thermal sterilisation), on irradiation (y-irradiation), or on mechanical separation by filtration. Chemical means include gas sterilisation with ethylene oxide or others.

3.6.4.4 DISINFECTION: The term disinfection is difficult to define, as the activity of a disinfectant process can vary widely. Such as: **High-level disinfection, Intermediate disinfection, Low-level disinfection**

3.6.4.5 HAND HYIGENE: As the hand of hospital workers are the most frequent vehicle of nosocomial infections, hand hygiene –including both hand washing and hand disinfectant- is the primary preventive measure. Thorough hand washing with adequate quantities of water and soap removes more than 90% of the transient that is superficial, flora including all of the most contaminants. An antimicrobial soap will further reduce the

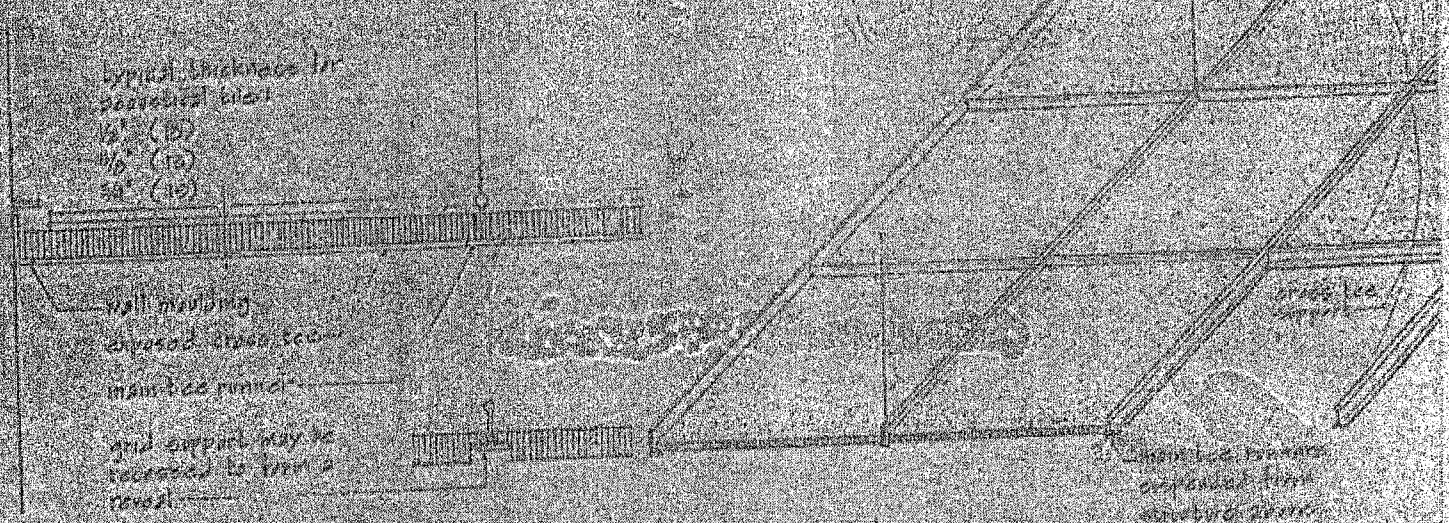
transient flora, but only if used for several minutes. Hand washing with (non-medicated) soap is essential when hands are dirty and should be routine after physical contact with a patient.

3.7 FINISHES: the finishes used are basically terrazzo and ceramic tiles for the general spaces and toilet floors respectively. The walls are to be painted with gloss paints and ceramic tiles for the toilet and kitchen walls. The ceilings are made of acoustical suspended ceiling boards.

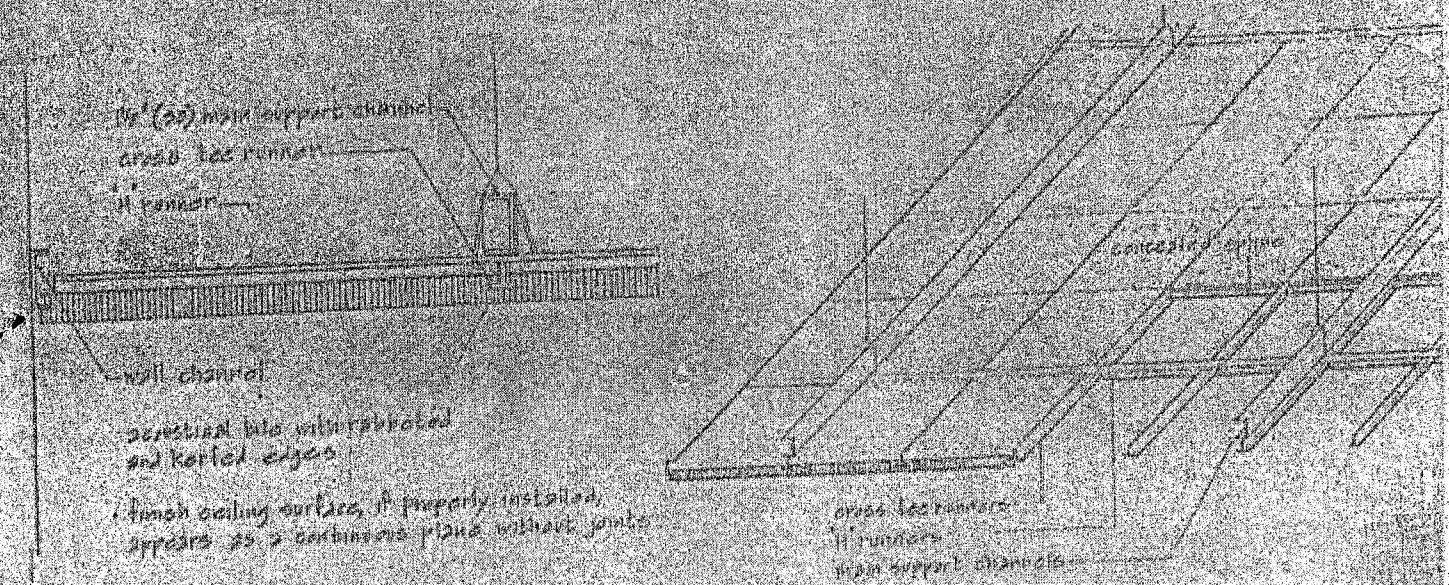
Terrazzo: ground and polished concrete topping consist of marble chips or other coloured coarse aggregate in a cement or relionous binder. It provides a dense, hardwearing, smooth surface whose mottled colouring is controlled by the colours of the aggregate binder.

Ceramic tiles: are relatively small surfacing units made of fired clay and other ceramic materials. It provides permanent, durable, water proof, or easily cleanable surface.

Suspended acoustical tile ceilings: provide a plenum space for mechanical ductwork, electrical conduit, plumbing, and recessed light fixtures. It is a ceiling system that integrates the functions of lighting, air distribution, fire protection and acoustical control.



EXPOSED GRID SUSPENSION SYSTEM



CONCEALED GRID SUSPENSION SYSTEM

FIG. 9.7 ACOUSTICAL SUSPENDED CEILING FINISHES

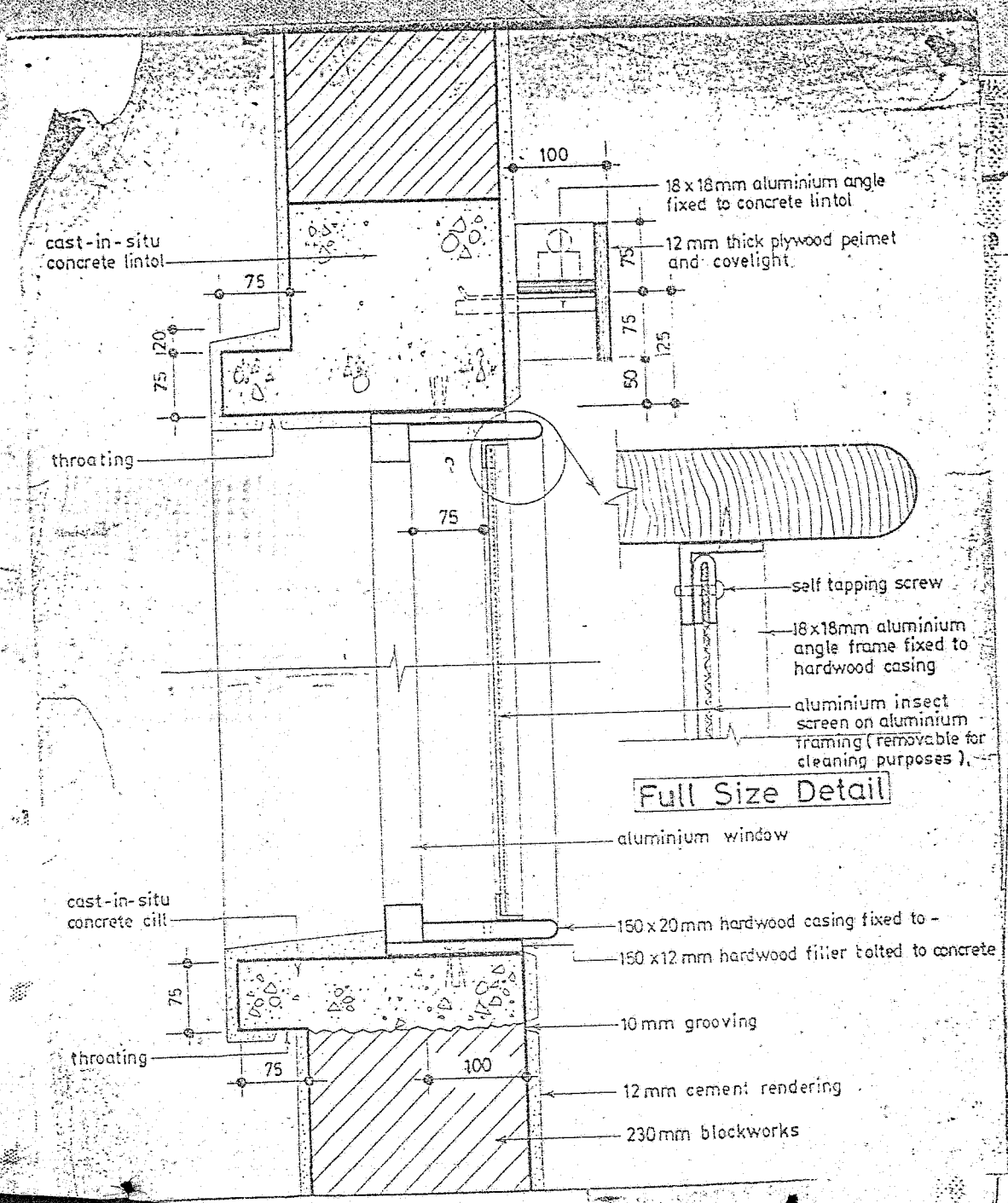


FIG 3.7.2

ALUMINIUM SUNLOUVRES

TYPE ALUMACO

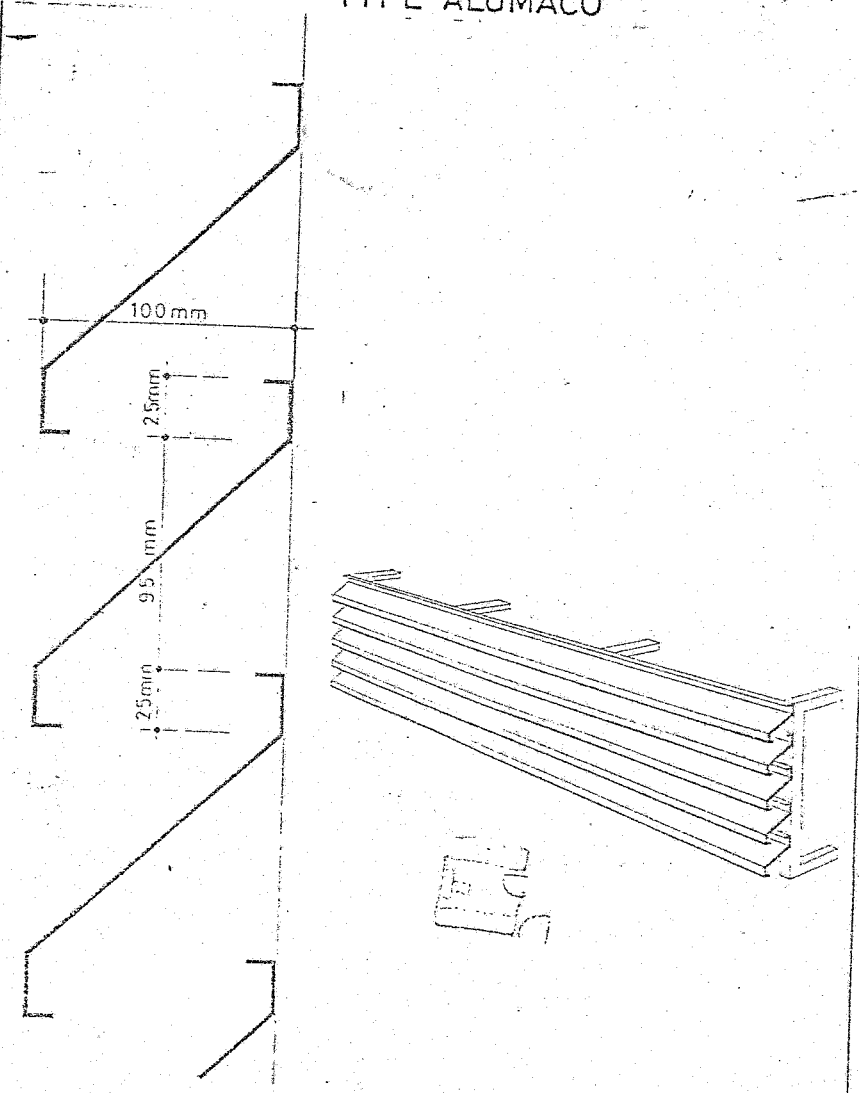


FIG 3.7.3

CHAPTER FOUR

CASE STUDIES

4.0 INTRODUCTION

Case studies carried out in relation to this project were adopted so as to have a focus on the basic design principles guiding a particular design; its functionality as it relates to different units within the whole and to the environment; the historical background, the reason behind the set-ups and its viability; its merits and demerits and its architectural significances towards meeting the cultural, recreational, artistic, social and economic needs of the people. For this project, it s aimed towards the realisation of the design in relation to its sanitation i.e. sanitary principles in hospital design. Used also as checks in cases of flows in design so as not to anticipate the same in the present design.

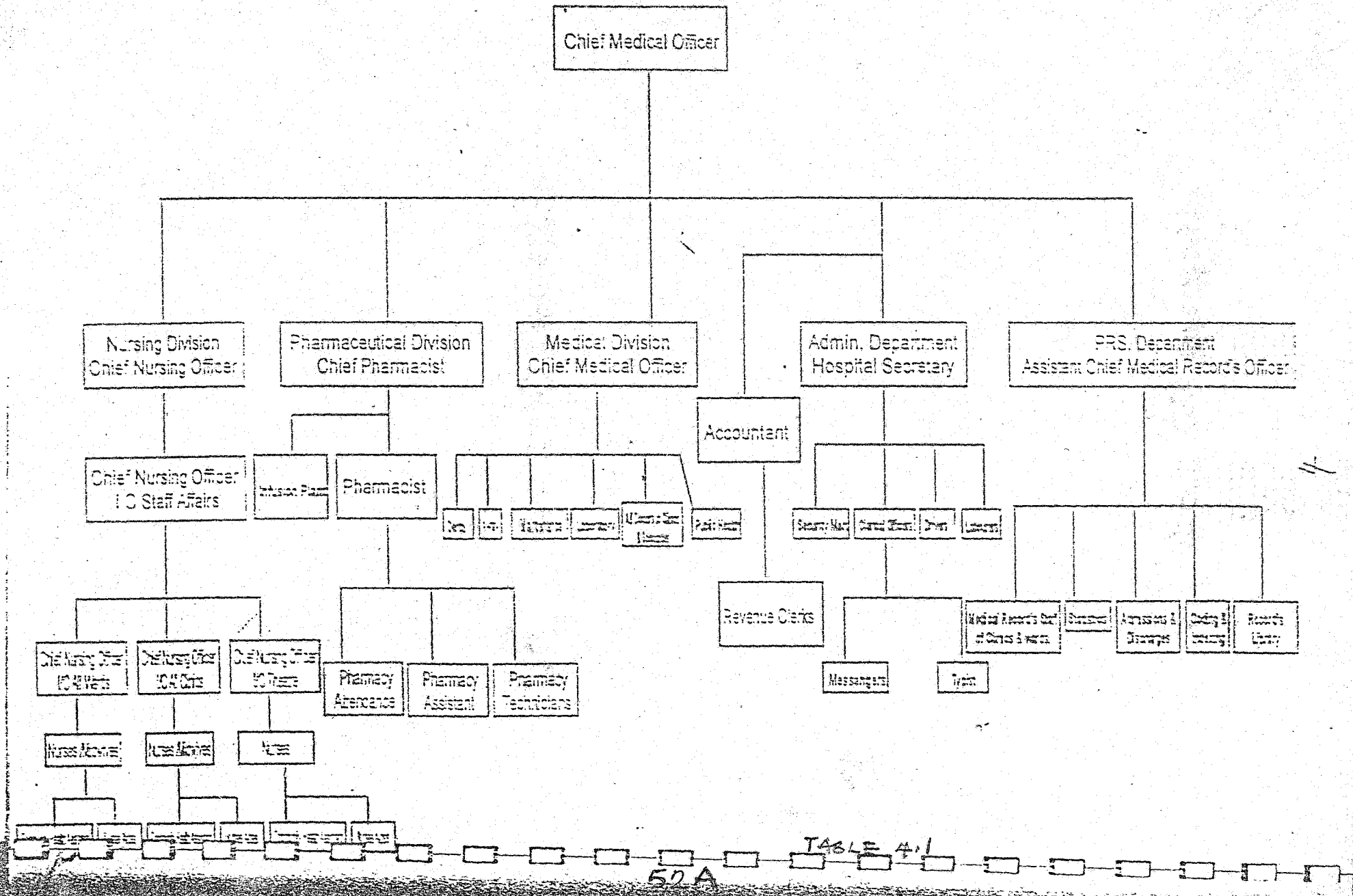
Therefore case studies of different hospitals were carried out to achieve the above-mentioned aim and objectives.

4.1 CASE STUDY ONE:

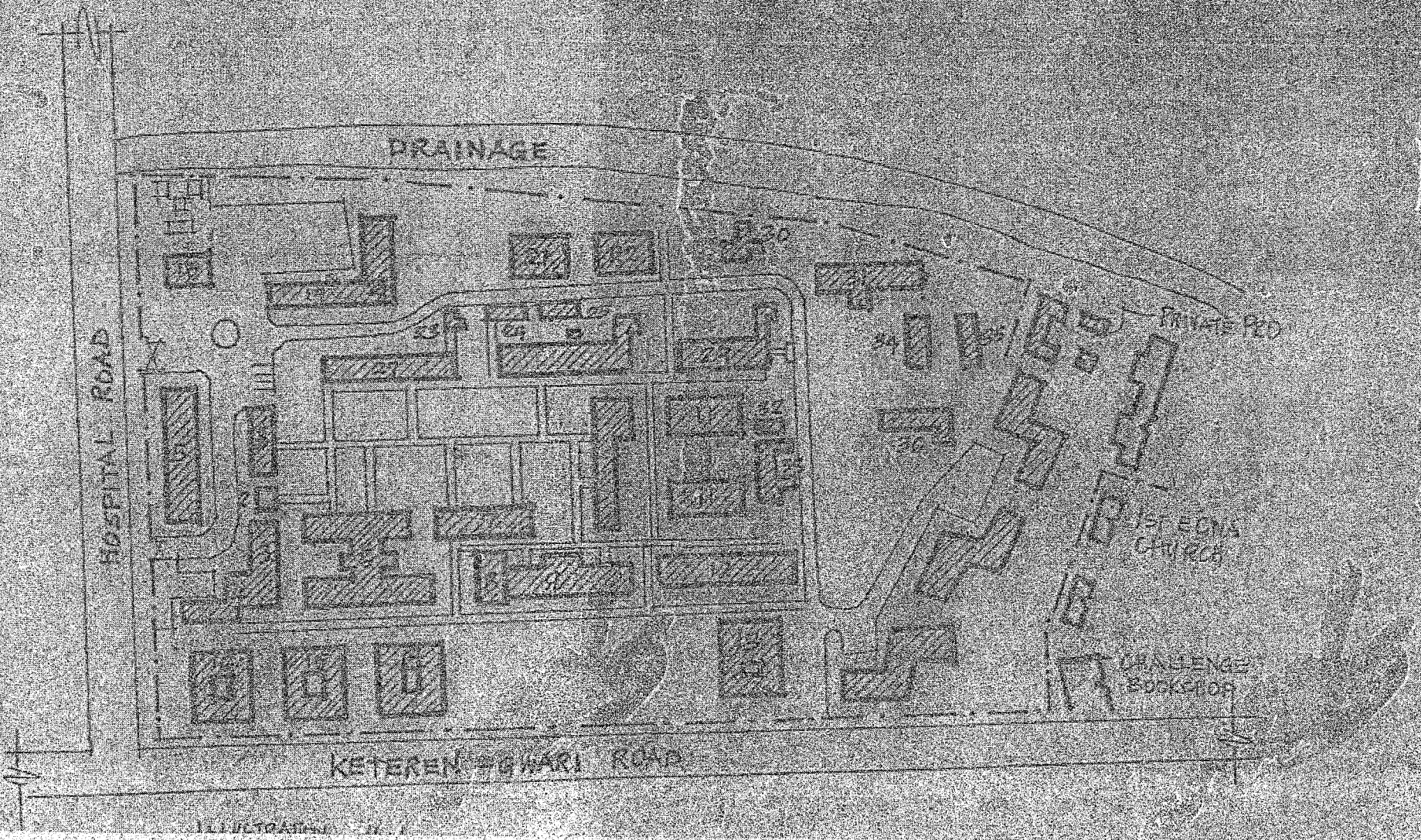
GENERAL HOSPITAL MINNA, NIGER STATE

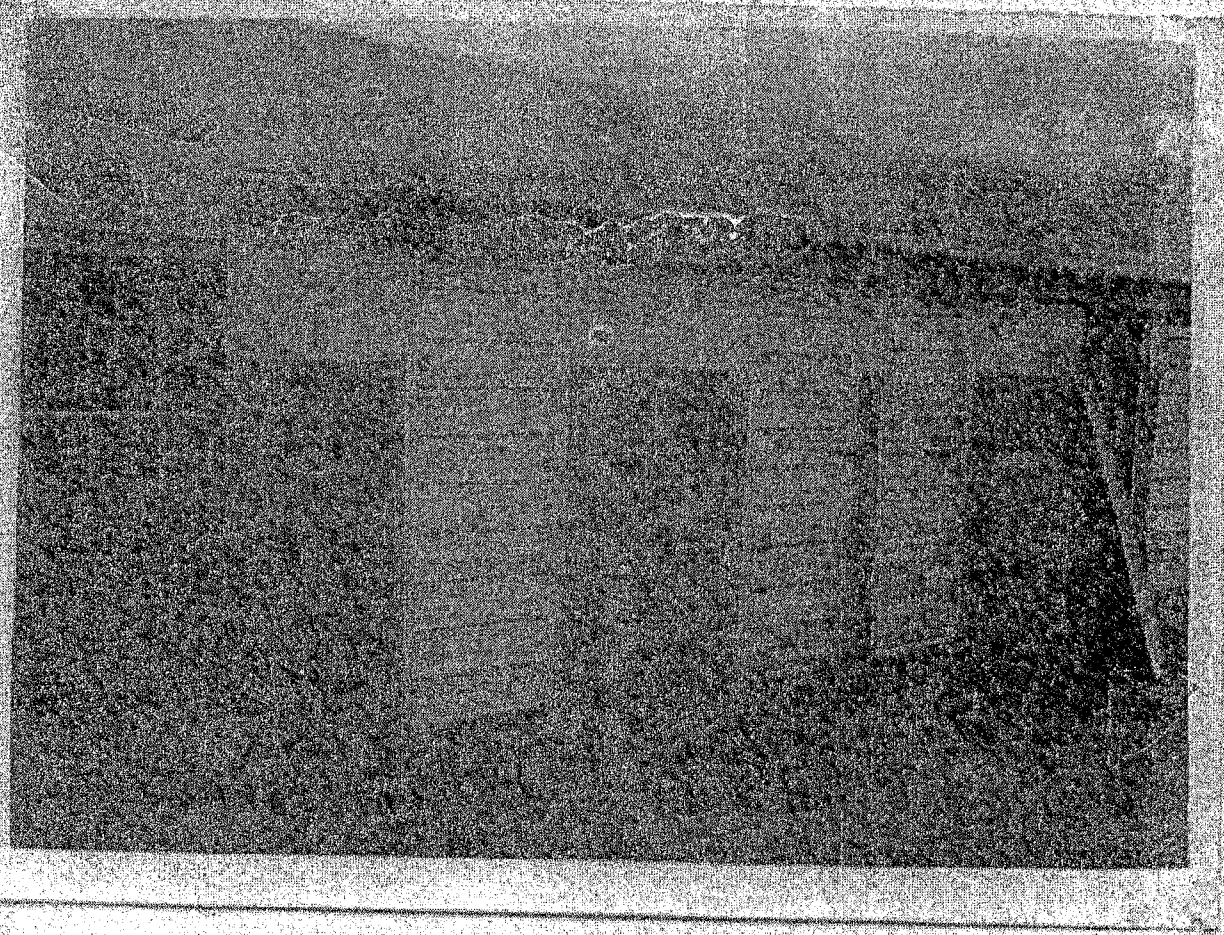
LOCATION: The hospital is located at hospital road off Keteren Gwari road by Mobil roundabout, Minna, Niger state.

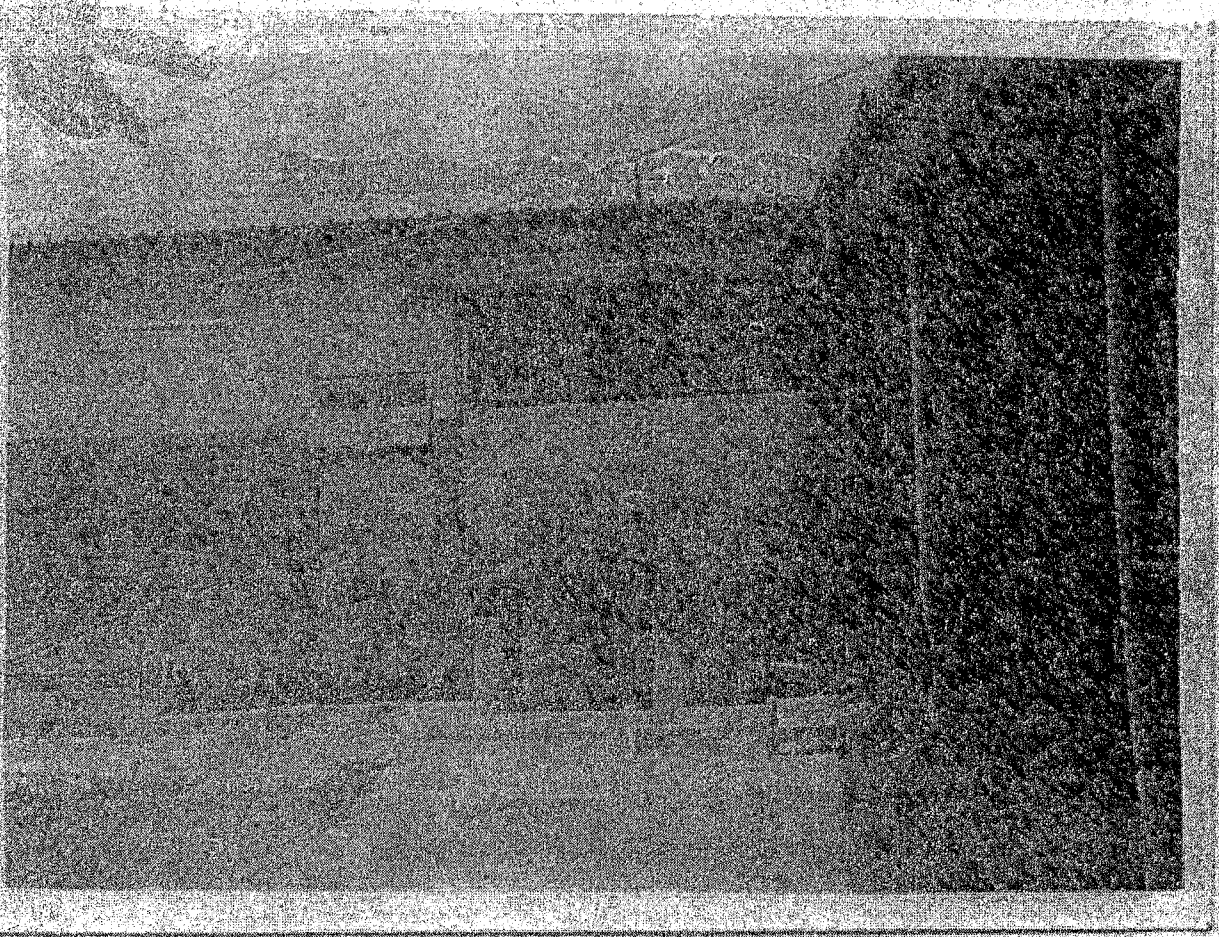
ORGANIZATIONAL CHART OF GENERAL HOSPITAL MINNA.



Asset Survey Map







BRIEF: The hospital was established in 1963 by then the colonial missionaries (British) government, with the administrative complex serving for both out-patient and in-patient departments. Since, then there have been additional buildings and some demolished ones. The original buildings were constructed with mud bricks which has not undergone any major renovation except re-plastering and painting. These include; Eye clinic, administrative block, `A` word {male medical} and gynaecology ward.

Additional building/structures came after the creation of Niger State, the ministry of works in conjugation with ministry of health replaced some of the original buildings. For instance, the operation suite and infusion plant were built in 1986 of polyurethane panels which are highly resistant to fire by the PTF.

Services: Services provide are medical, obstetrics, gynaecology, psychiatric, dentals, laboratory, ophthalmic and pharmaceutical services, functional theatre and a mortuary.

Capacity of the hospital: the general hospital Minna has bed capacity of two hundred and forty-eight (248) beds and total staff strength of six hundred and sixteen (616) staff.

The hospital is headed by the chief medical officer and made of the following departments: Surgical unit, medical, paediatric, gynaecology, dental, laboratory, ophthalmic pharmacy, nursing, medical records, maintenance, social welfare, x-ray, public health and administrative department. The hospital has thirteen (13) wards excluding the emergency unit.

THE SITE: the site is laid out in an open system with long circulation corridors flanking each department with a central spine corridor through the courtyard thereby allowing for visual perception as one walk through this spine. Accessibility to the site is through southern and western boundaries. The entrance is at the western which serves both general and emergency out-patient department.

THE STRUCTURE: the out-patient department, amenity ward, pathological and the emergency OPD are situated within the same perimeter with the administrative and medical record abutting the general OPD. Ancillary facilities such as the laundry have been placed at the east end away from the wards and consulting rooms, while the pharmacy and canteen are closely linked and placed along the street leading from the OPD to the surgical and medical consulting rooms.

APPRAISAL:

Merits: -

- The various units are well connected with covered walkways preventing the intense sunlight on patients, visitors and staff, for instance, the out patient department is linked directly to the pharmacy, pathology and radiology laboratories.
- Well ventilated spaces by the help of courtyards promoting the Niger State culture and also enhancing sanitation.
- Wards and nursing units are will lit naturally- by windows

Demerits: -

- Poor landscape or rather not well maintained
- Inadequate parking space and not well defined
- No privacy in the medical wards
- Poor maintenance services
- Poor Drainage
- The administrative block is not distinct

4.1 CASE STUDY TWO:

AHMADU BELLO UNI. TEACHING HOSPITAL KADUNA, KADUNA STATE

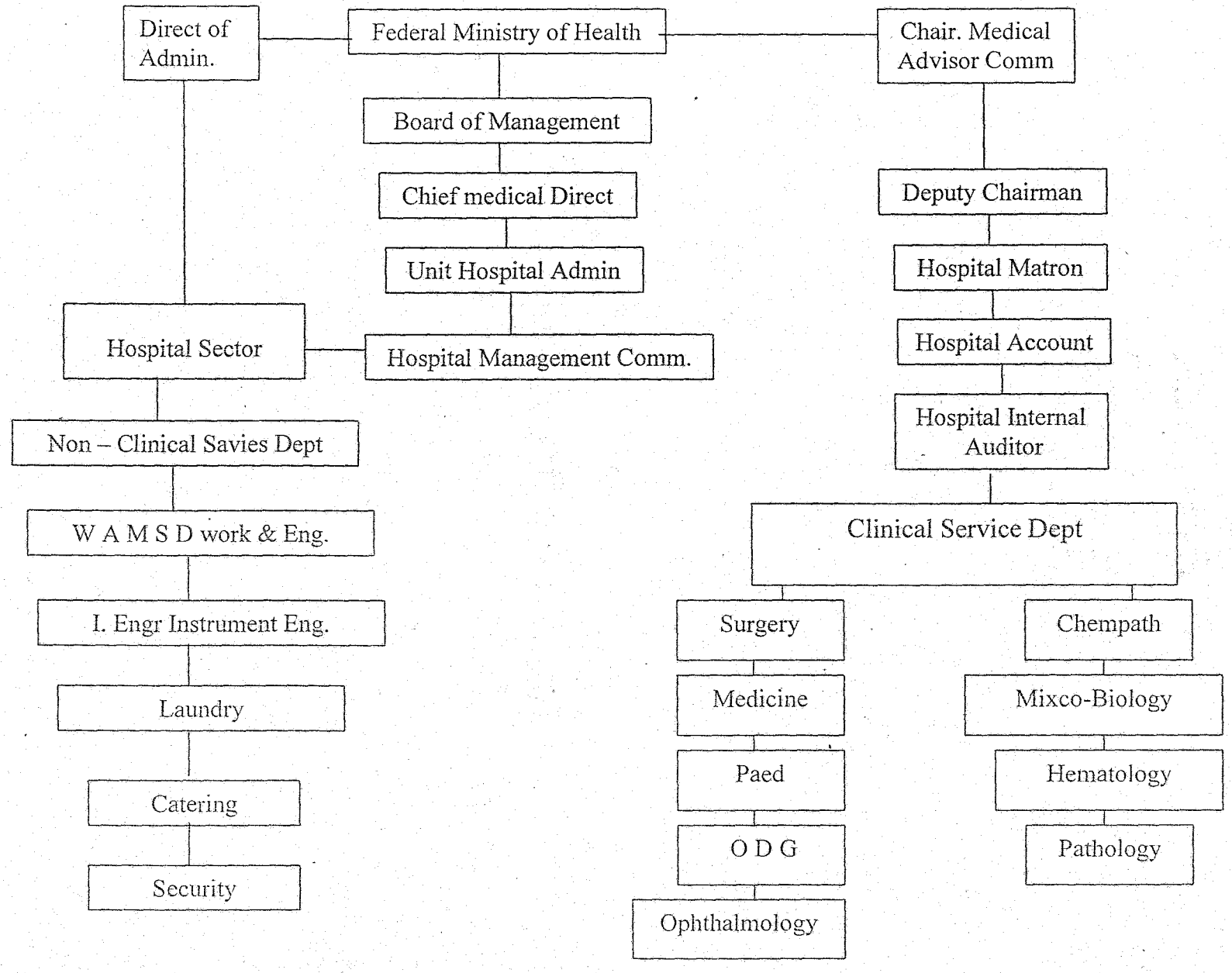
LOCATION: The hospital is located at Ungwa Rimi with one entrance along Marafa estate and the other Rimi drive.

BRIEF: The history started as Institute of Health in 1967 in accordance with status 15 of the university- ICSA Amendment services agency-common North service agency.

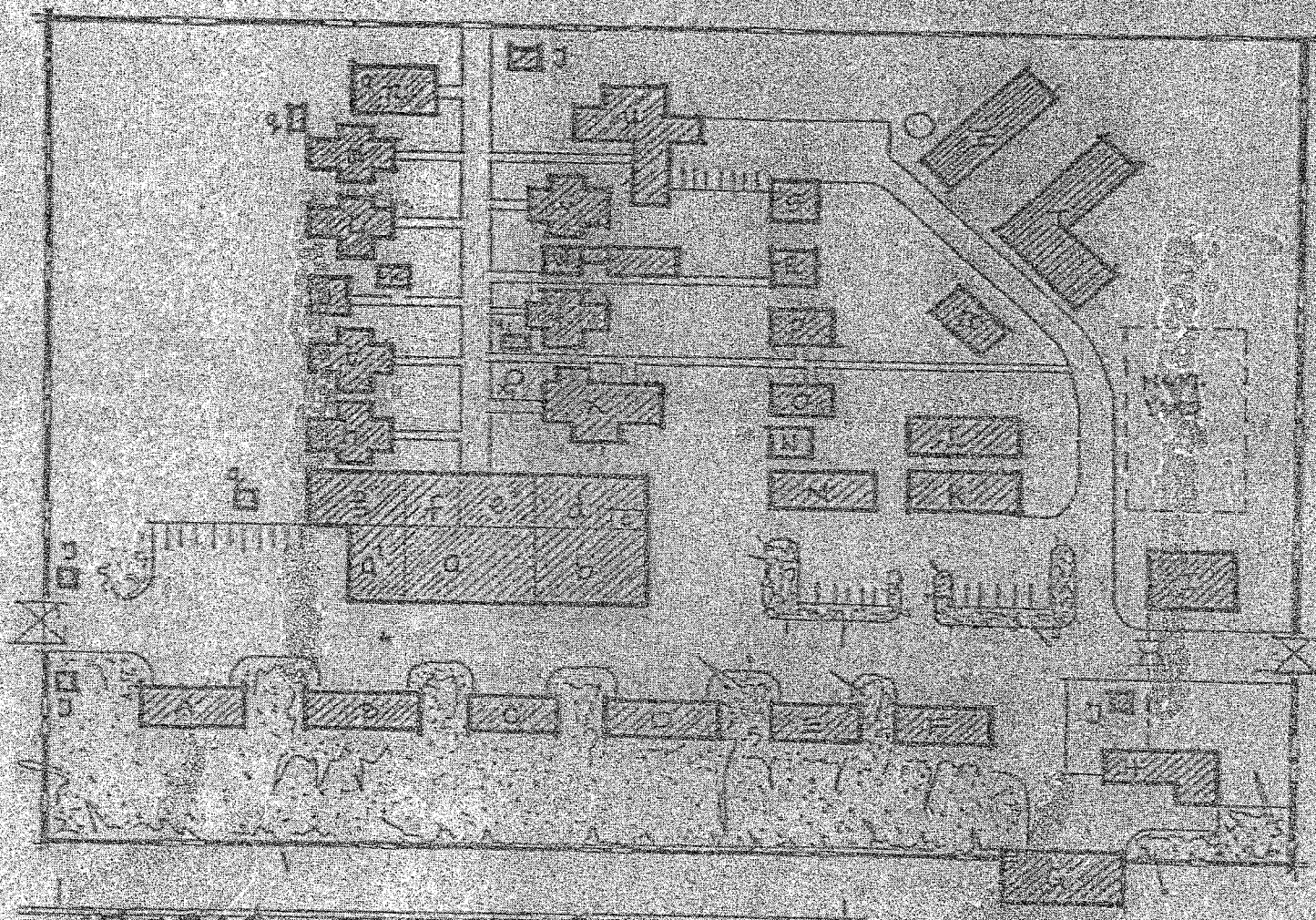
Objective

- Provide a board range of tertiary services to meet the health-care need of the people from the catchment area and the country at large.
- Provide facilities for the training of different cadres of health workers.
- Conduct relevant research into prevalent health's and health related problems.

ORGANISATION CHART

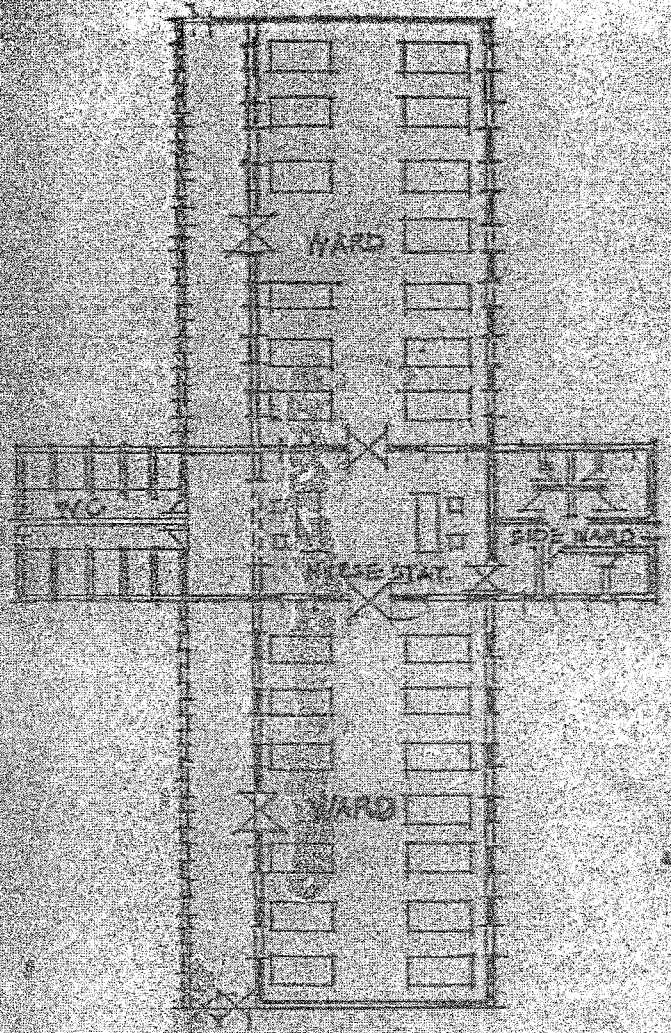


CASE STUDY ONE

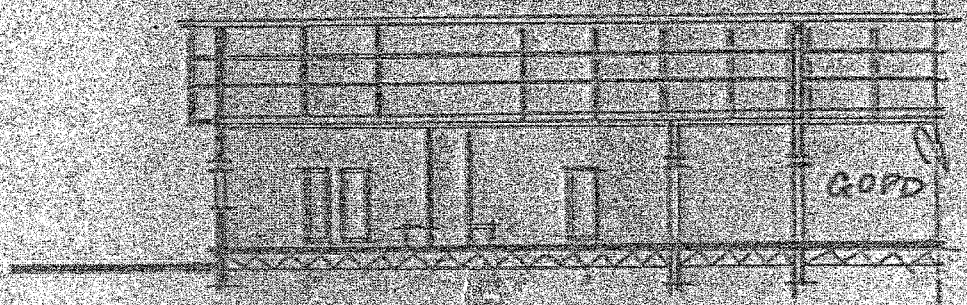


SITE LAYOUT

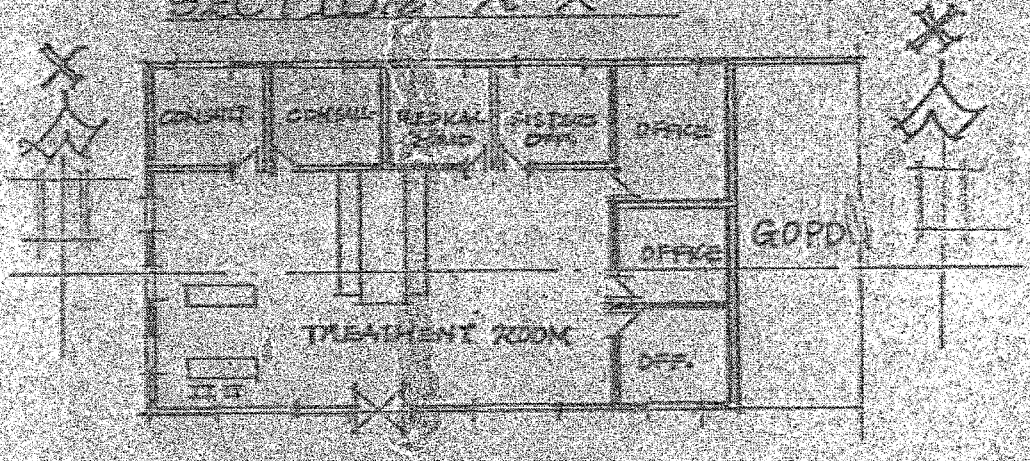
ILLUSTRATION 4.2



TYPICAL WARD PLAN



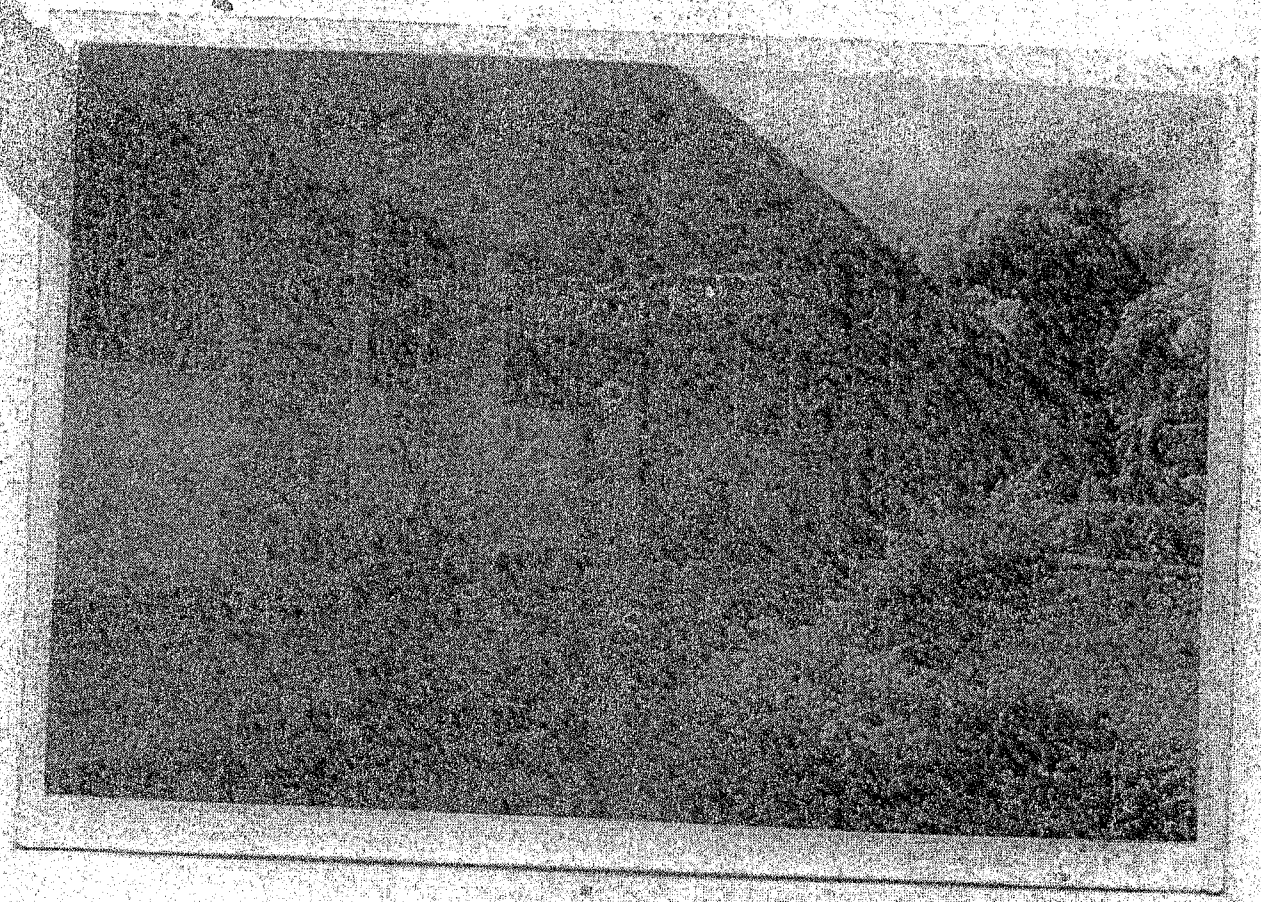
SECTION X-X



FLOOR PLAN

DRESSING ROOM

ILLUSTRATION 4.1.1



- In short ABUT was established to provide health-care services training and conduct research

When the then northern region government was dissolved on 1st April 1968 and the six (6) states were establish ABUT properly came into being with the following constituent institution.

1. ABUTH Zaria plus tuberculosis (TB) annex.
2. ABUTH Kaduna (old and new)
3. ABU Malumfashi
4. Optapeadic hospital Dala Kano.
5. Sub-urban and rural dispensaries in Zaria and Kaduna
6. School of nursing Zaria
7. School of midwifery Kaduna
8. School of hygiene Kano

Present Status Activities: The ABUTHS are spread out between Kaduna, Zaria in Kaduna state and Malumfashi in Katsina state. With distance of about 120 km radius round Zaria. The administrative headquarters located at Shika Zaria.

Services: The ABUTHS has a bed capacity of 1220 spread out as follows:

a. ABUT hospital Zaria – (513 beds)
b. ABUT hospital Kaduna – (577 beds)
c. ABUT hospital Malumfashi (130 beds)

They offer general outpatient services and 24hours accident and emergency services and in-patient care services. Furthermore, primary health-care is offered at the following location:

a. Comprehensive health-care Sabon Gari Zaria

b. Comprehensive health centre Yakawada Giwa L.G council

c. Health clinic Ruwa-sanyi malumifashi LG.

APPRAISAL:

Merits: -

- Good planning allowing for good circulation, lighting and ventilation.
- Use of grid systems allow for flexibility in construction, planning techniques and rapidity accommodating services.
- Even though a teaching hospital have more become a referral/general hospital.
- Good site drainage and orientation

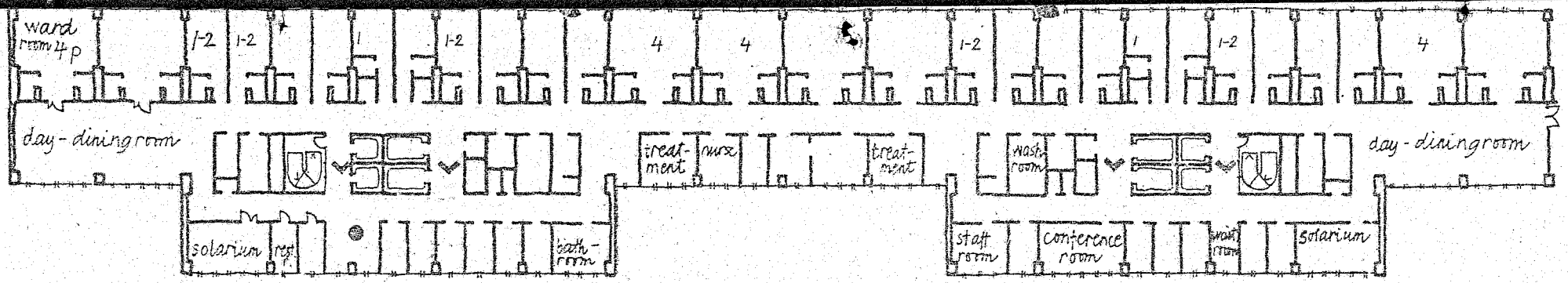
Demerits: -

- Building structures are dilapidated and requires refurbishing
- Circulation for both pedestrian and vehicular are not distinctive and define
- Poor management

CASE STUDY THREE:

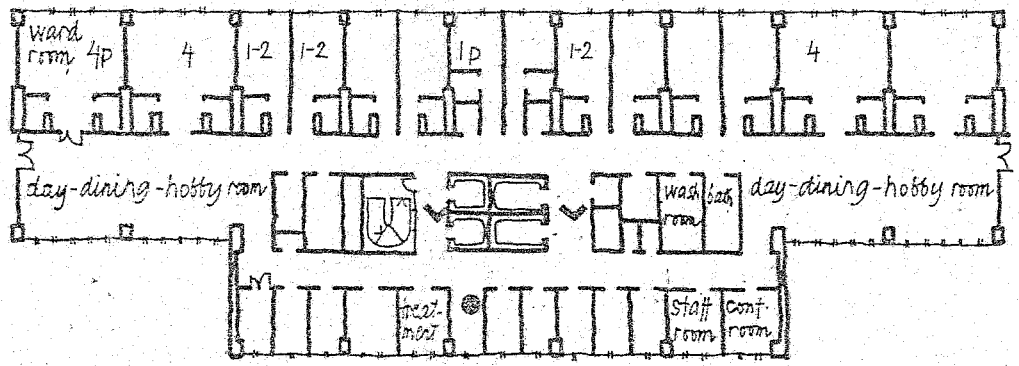
THE HOSPITAL AT VARBERG, SWEDEN.

LOCATION: The hospital has a central position in relation to both the town and the country, with the future main approach to the town -Nya Traslovsvagen- placed immediately to the north of the hospital.

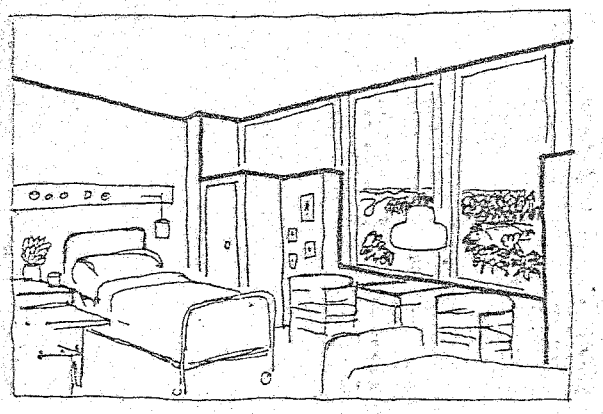


Ward department : 60 beds medical or surgical

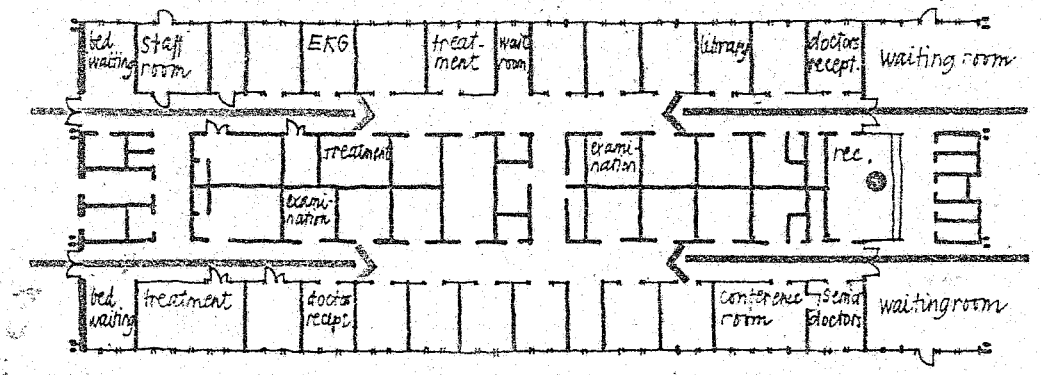
scale 1:500



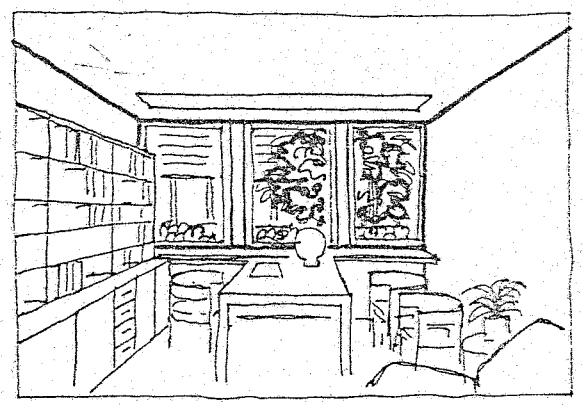
Ward department : 30 beds psychiatric



ward room



6 Reception : Long term care and medical



Doctors room

ILLUSTRATION 4.3.1

BRIEF: In 1964 after agreement with the state, Halland county council decided to build, new premises for Varberg hospital.

The main part of the building has been given a small scale concentrated design with direct contact with the countryside and the sea. By using red brick as the uniform material for the façade the different buildings are brought together and arranged in the landscape as a unity. On the east side of the area, space has been provided for sport and games. Footpaths invite one to take a walk in the hospital close surroundings and further to the outskirts of the area.

Building: The activities in the hospital buildings tend to change all the more quickly with growing demands on organization, space and standard. Framework and primary installations are parts of building with a long span. Though these parts are however difficult to alter or exchange, it is essential that they be made with universal application and as independent of the activities as possible.

This universal application has been reached through standard coordination between framework and installations. Because the installations have in this connection been corrected together in set cylinders, the rooms can be altered with little interference and without disturbing the primary installations. The components of the rooms and installations have been adapted to suit the demands of different activities.

The ward building's load-bearing framework is made of cast concrete with Kaiser Beams. The facades consist of elements of concrete with thermal insulation and covered with ½ stone facing bricks.

The low buildings are constructed with a load bearing column-beam system made of steel. The roofs are made of slabs of porous concrete with three layers of roofing felt. The façade consists of prefabricated wood panels with other masonry. Partition walls and ceilings are throughout made of plaster panels on steel cross-bars.

APPRAISAL:

Merits:

- The internal though ways, waiting rooms, areas for patients and staff are lit by daylight and have to a great extent direct contact with the courtyards.
- The patient's room and the day room for psychiatric care have been a home like character.
- Social therapy and space time activities take place on the bottom floor of the ward building and in the assembly hall. Here there are opportunities for theatre, courses, library, music, film etc.
- Drugstores with a wide selection of goods and services, post office, bank, a chemist, nursery serving the staff and visitors are also provided.

Demerits:

- Inadequate parking space and not well defined
- Poor maintenance services
- Poor Drainage

CHAPTER FIVE

DATA COLLECTION (Dr. Ajibade Ogunjumo)

5.1 CLIMATIC CONDITIONS

The state has an annual rainfall of between 1100mm and 1300mm. The rainy season lasts from April to October. The dry season which lasts from November to March is very dusty and cold as a result of the north-easterly winds which brings in harmattan.

5.2 TEMPERATURE

The temperature of the area is extreme during hot seasons but moderate when it gets cold. The hot period usually starts from February to May when the temperature readings is 27'C and above. From the months of June to October the temperature varies from 24'C to 26'C and it drops significantly low at months of November to January reading up to 16'C that is extremely cold.

5.3 HUMIDITY

This is the maximum of water vapour present in the air, which invariably results to rain. The heaviness of the relative humidity is between May and June which can best be described under two periods –afternoon and dawn period. In the months of November to April the humidity is low, forming about 10% in the afternoon and 30% at dawn, while between months of May to August; the humidity is between 70% in the afternoon and 95% at dawn.

5.4 SUNSHINE

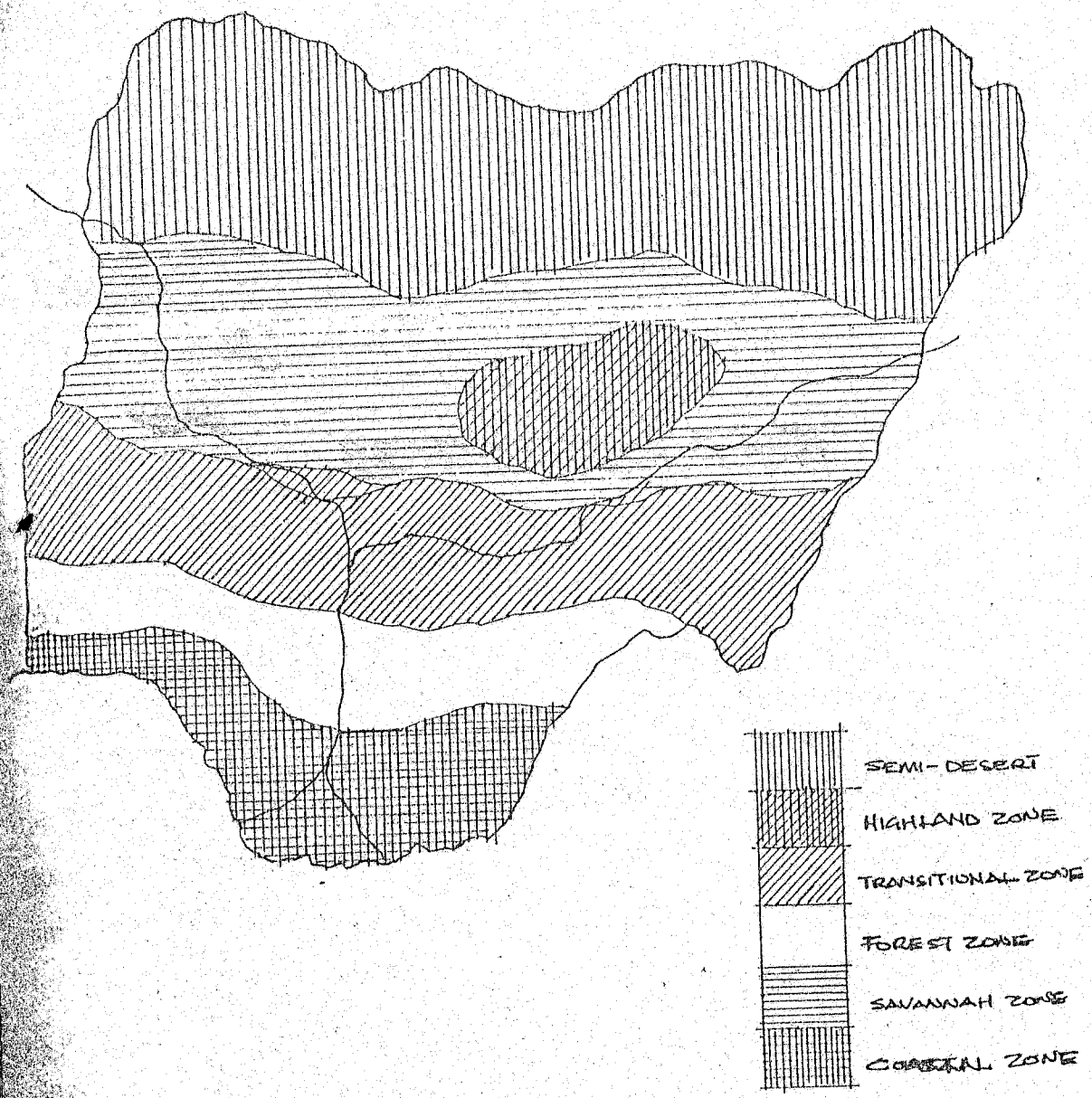


FIG. 5.0 CLIMATIC ZONES FOR ARCHITECTURAL DESIGN.

The sun is the source of solar radiation heat gain and also source of natural lighting. The sunrises from the East at about 6.45 a.m. and overhead at 12.00noon, therefore spaces to be used in the morning are to be avoided in this direction. While, sunsets in the west at about 6.45pm so spaces that are to be used in the evenings and night are to be avoided in this direction.

5.5 PHYSICAL SETTING

5.5.1 GEOLOGY

Kogi state has two main rock types namely; basement complex rocks of the Precambrian age in the western half of the state and extending slightly eastwards beyond the lower Niger valley and the older sedimentary rocks of the Cambrian-Maestrichtian type in the eastern half. The various sedimentary rocks group extend along the banks of rivers Niger and Benue and south-eastwards through Enugu and Anambra states, to join the Udi Plateau,

5.5.2 TOPOGRAPHY

The land rises from about 300 metres along the Niger-Benue valleys to the heights of between 300 and 900 metres above sea levels in the uplands. Agbaja Plateau, which ranges from 335 to 366 metres above sea level and Okoro-Agbo Mountain at Ogidi in Ijumu LGA are some of the predominant landforms of the state. The general terrain is undulating and is characterised by high hills, plateaus and numerous inselberges and elongated ridges.

5.5.3 SOIL

The flood plains of the Niger and Benue river valleys in Kogi state have the hydromorphic soils, which contains a mixture of coarse alluvial and colluvial

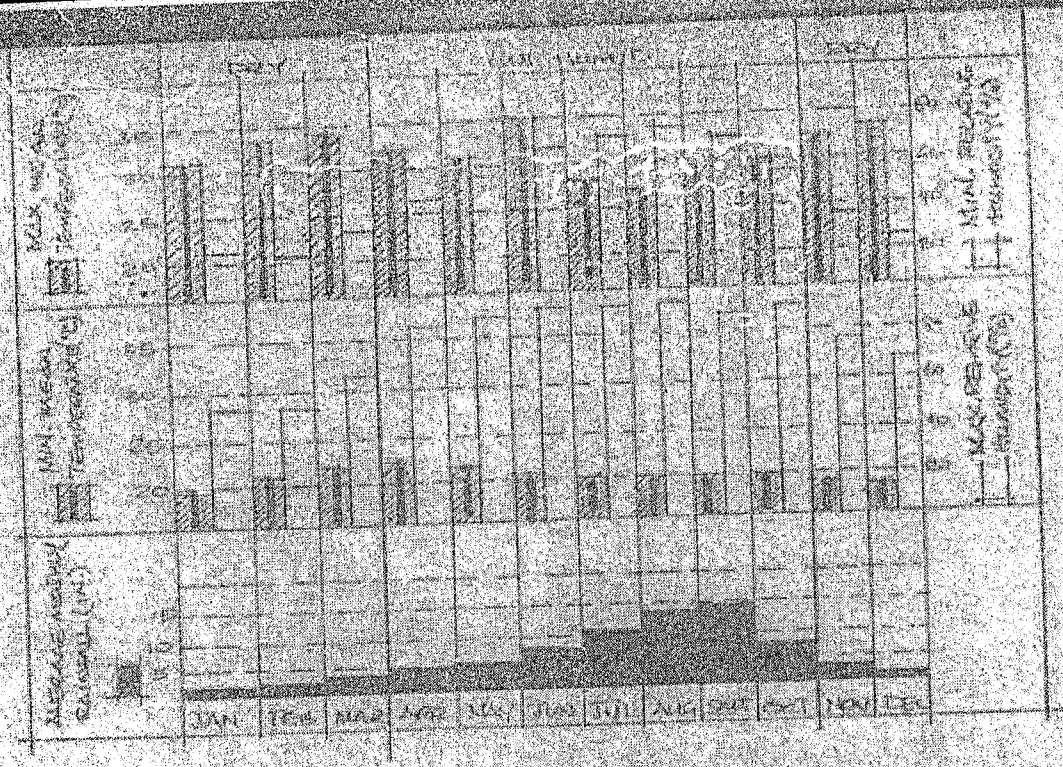
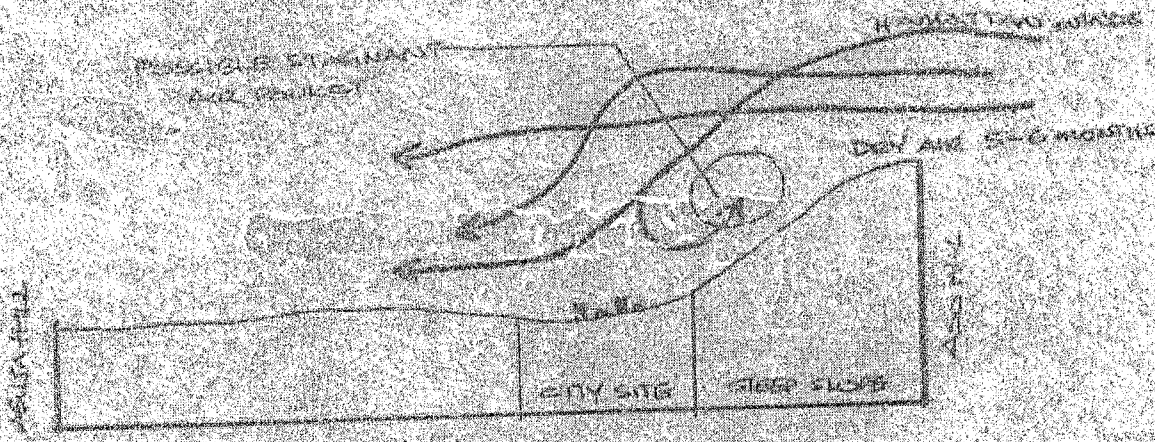
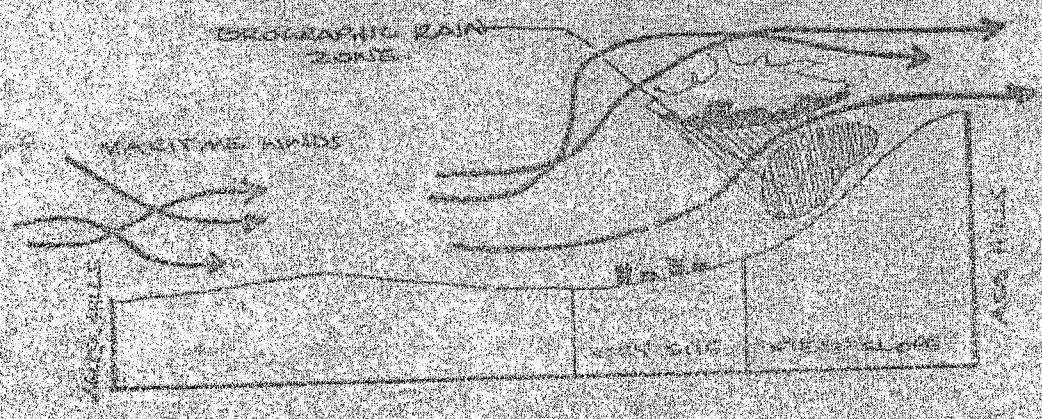


TABLE 5.1 MEAN MONTHLY TEMPERATURE, HUMIDITY AND RAINFALL



DRY SEASON 5-6 MONTHS

SEASONAL WIND PATTERN



WET SEASON 6-7 MONTHS

TABLE 5.2

deposits. The alluvial soils along the valley of the rivers are sandy light hued, while the adorning laterite soils are deeply corroded and grey or reddish in colour, sticky and impervious.

5.5.4 VEGETATION

The rain forest belt (salve type) covers Dekina, Ofu, Ankpa, Olamaboro, Idah and Bassa local government areas with rich deciduous and stunned trees including palms, iroko, mahogany, akee-apple and other towering trees.

Other local government areas are in the guinea savannah or parkland savannah belt with tall grasses and some trees. These are green in the rainy season with fresh leaves and tall grasses, but the land is bare during the dry season showing charred trees and the remains of burnt grasses. The trees, which grow in clusters, are up to six metres tall, interspersed with grasses, which grow to about three metres.

These trees include locust bean, shea butter, and oil bean and isoberlina trees. The different types of vegetation are, however, not in their original luxuriant states owing to the careless human use of the forest and the resultant derived deciduous and savannah

5.6 SOCIO-CULTURAL LIFE

5.6.1 HISTORICAL DEVELOPMENT

Kogi state, which was created out of the former Kwara and Benue, states on august 27, 1991 covers the area of former Kabba Province. The Province was spilt into two in 1976 with one part in Kwara state and the other in Benue state. The people who were thus put in separate states had lived together under the

same administrative structure for more than 75 years before their separation. The reunification of the former Kabba Province, now renamed Kogi State was therefore a restoration of old and cherished tiers in the local administration of the area. It has its boundary with Niger and Plateau states and the federal capital territory to the north, Benue and Enugu states to the east, while Edo, Ondo, and Kwara states are on the western side. (Prof. J. M. Baba)

5.6.2. ETHNICITY AND CULTURE

Most of the ethnic groups speak languages identified with their names. Igala people speak Kwa language, which is related to Yoruba and Idoma. Inikpi and Ogaganyi festivals are highly regarded among the Igala people. Inikpi with the associated shrine is a commemoration of the act of the heroine, Inikpi, who offered herself for sacrifice to save the Igala Kingdom during the pre-colonial slave, induced internecine wars. The Ogaganyi, Ogani masquerades, Ogbadu festival, Egungun (Egungwu) festival in Kogi and Oyi LGAs, Ekwueci in Okene LGA and other cultural festivals around the state are some of the important cultural activities.

5.7 ECONOMY AND COMMERCE

The state government has a blue print on economic development of Kogi state. Kogi investment Company has also set up a share capital of #10 million to provide adequate guide on funding for viable projects.

The state encourages investors to come to the state, and provision of the required infrastructure and other incentives is assured. The available water, mineral, agricultural resources and forestry, hydro power resources, availability of electricity at Ajaokuta and the higher education institutions in the state are potential sources of input of industrialization.

5.8 DEMOGRAPHIC DATA

The total population of Kogi state increased by 63.66percent over some 28 years, i.e. from 1,282,538 in 1963 to 2,099,046 in 1991.the spatial distribution of population by the local government areas which had the highest proportions of populations in 1963 are also the same ones with the highest population figure in 1991, though not in same order of ranking. Ajaokuta LGA recorded the most dramatic rate of increase, by return of immigrations of some Ebira people from the cocoa belt of south-western Nigeria to the state since the establishment of the Ajaokuta Steel Company and the associated Itakpe Iron Ore Mining Company. Ankpa had the lowest rate of population increase over this period. Recently, population is on the high side with more development measures in face.

5.9 TRANSPORTATION, TRAFFIC FLOW & COMMUNICATION

Most of the Federal, State and rural roads in the state were in poor condition before rehabilitation in 1992. Directorate of Food, Roads and Rural Infrastructure, DFRRI, has constructed 1,500 kilometres of rural roads in the state. Ayangba

Agricultural Development Project (AADP) constructed feeder roads from Alloma to Akpanya, Adoru, Avrugo and Ameke

5.10 EXISTING LAND USE AND FUTURE TRENDS

Kogi state's natural resources include land; water, mineral and forest resources include land, water, mineral and forest resources. The vast land area of the state provides adequate opportunity for the location of various types of industrial and other economic activities the water resources of Rivers Niger and their several tributes could provide ample water supply for people, animals and various industries when fully harnessed and fishery could be developed on a large-scale with allied fishery industries. The waterfalls at Osome and Ofejiji are potential sources of hydro-electricity. The water from the rivers could support large irrigation schemes for raising various crops including wheat. The forest provides wood for timber and fuel.

DEDUCTIONS

Kogi state could be called "Iron and Steel" state in view of the tremendous potential of these for the future industrialisation of the state and the country there is need to efficiently utilize the natural resources which abound in the state which should be an important task to both public and private sectors of the state

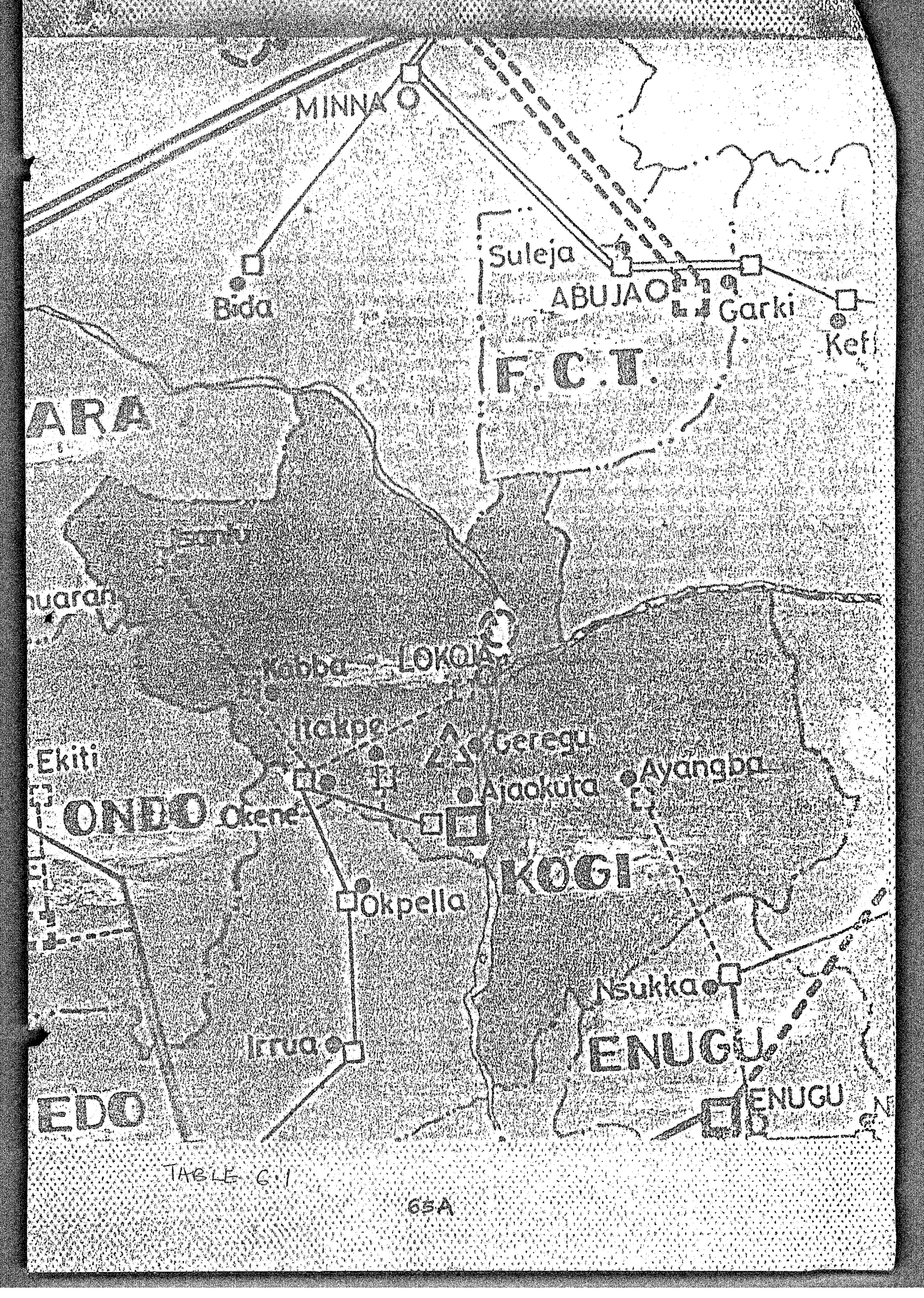

MINNA
Bida
Suleja
ABUJA
Garki
Kefi
F.C.T.
ARA
Kabba
LOKOJA
Ekiti
ONDO
Okene
Ajaokuta
Ayangba
KOGI
Okpella
Nsukka
ENUGU
Iffuo
EDO
ENUGU

TABLE 6.1

CHAPTER SIX

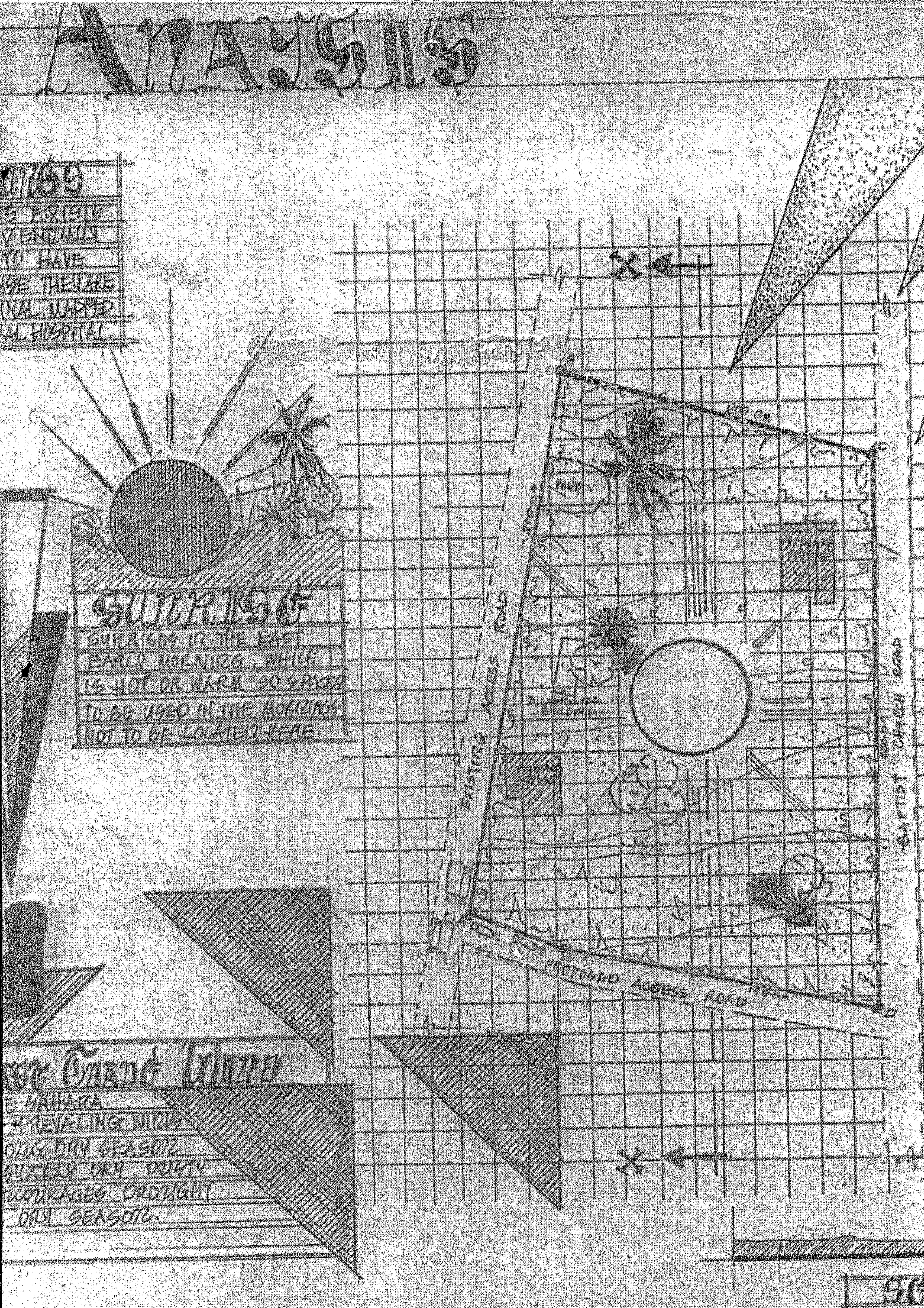
6.0 SITE ANALYSIS

Before the proper or physical site analysis an in depth study of the site in the land office was carried out by geographical and geophysical maps, which show the relief\topography of the site. After which a site visit to confirm the work and to take stock of the existing natural and artificial features of the site.

6.1 CRITERIA FOR SITE SELECTION

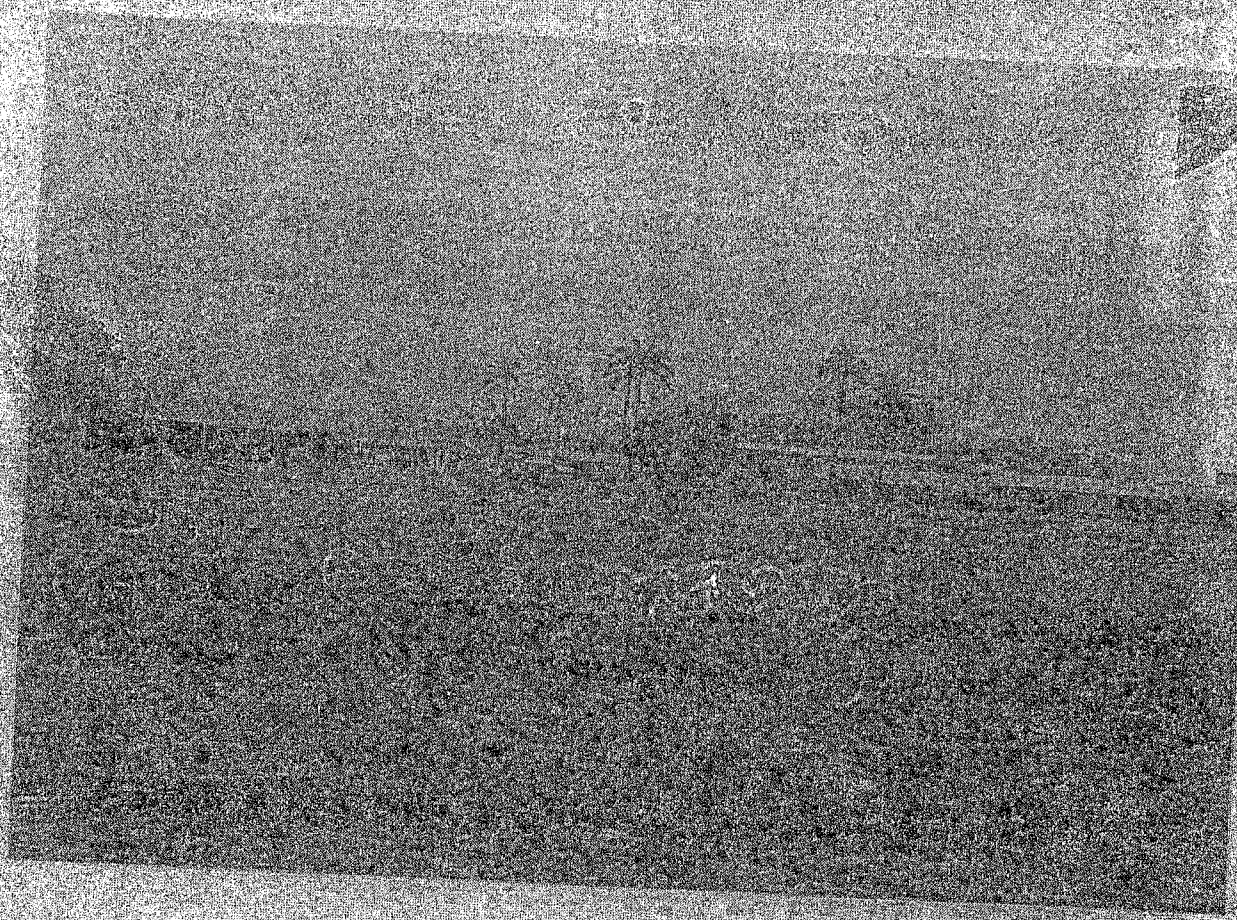
The environment of the proposed site has been to be feasible and viable in terms of environmental comfort ability and compatibility. The factors considered for the adoption of the site are:

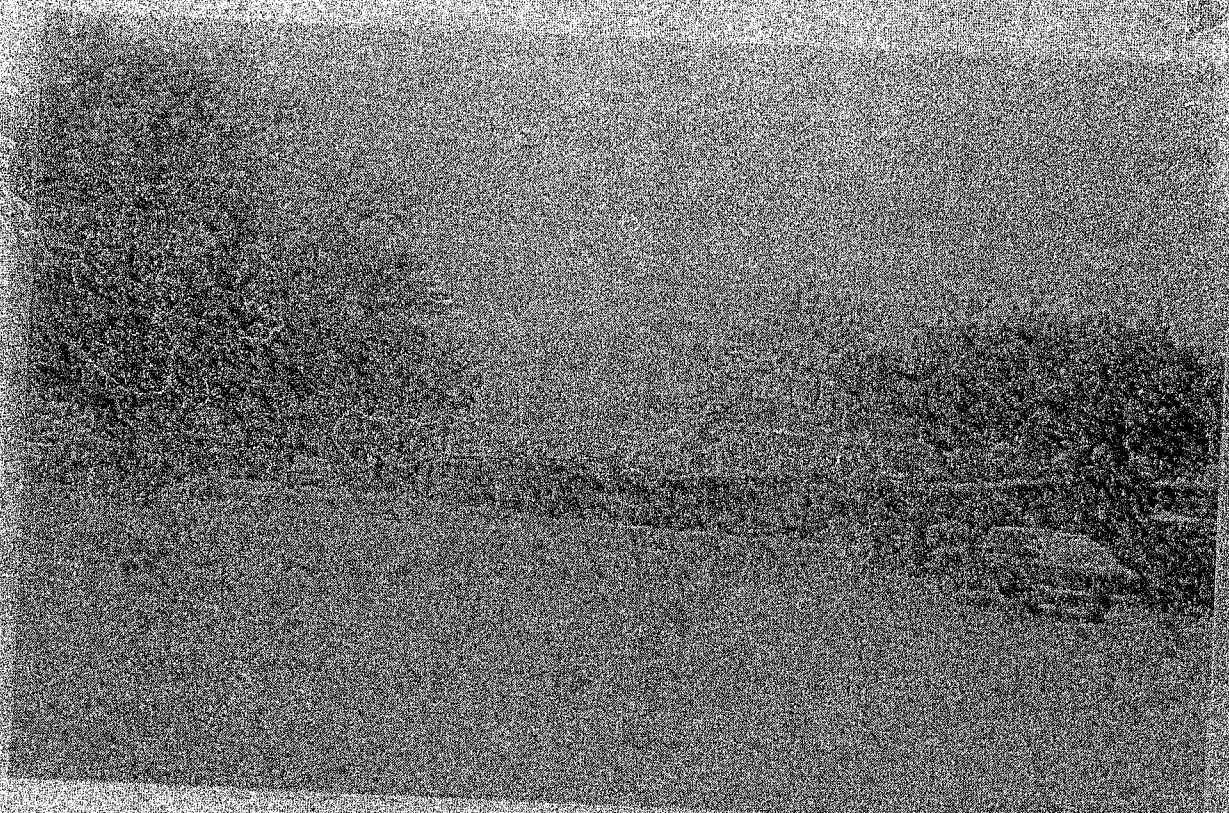
1. Availability of services. E.g. water network, sewage disposal, drainage, electrification and landscape.
2. Size of land
3. Historical importance and original plan for the site
4. Security & Safety
5. Relative accessibility. E.g. transportation, traffic network, proximity to nearest cites \towns.



DESIGN PROPOSAL FOR

PICTURES OF SITE





6.2 LOCATION OF SITE

The proposed site is located at the Sabon Gari area of the state capital.

6.3 SITE CHARACTERISTICS (INVENTORY)

SIZE: The site measures (179 * 120) msq with a large set back from the (access road).

OTHER FACTORS

a. **Accessibility:** the site can be accessed through two ways –the Baptist church road and the existing access road that branches off from Sabo Gari road.

b. **Topography\soil:** The land slopes gently down opposite the access road.

c. **Vegetation:** the proposed site has trees growing in it sparsely and around these trees are thin bush of grasses and grains. A portion of the land presently is used for farming.

d. **Solar data:** in the morning sunrises from the east with mild heat but intensify gradually during high radiation hours from 11am-2pm. The heat subsides during the later hours of the day till the sunsets to the west, sun-shading devices will be introduced to reduce glare.

e. **Climatic condition:** rainfall from the southwest following the direction of the prevailing wind pattern. Variation occur which results to rain falling in

the direction of northeast. Prevailing winds passes through the site from the southwest axis, which comes with cool breeze while, northeast wind axis comes with Harman tan and dust.

6.4 ACCESSES AND CIRCULATION

Access to the site from Abuja (FCT) is tarred and single lane way. To have relative two entrances from the existing access road and the Baptist church road will enhance proper circulation within the proposed design site.

6.5 UTILITIES

On site are quite a number of utilities such as electricity, telephone, water, drainage. On the opposite side of the road are electric poles supplying electricity to the area.

Telephone poles have been placed from the main access road through the site and along the street. Although tap water dose not regularly flow in the area, there have been water supply pipe laid also passing through the site. Good road network providing easy access to users.

6.6 SCENERY AND MAN-MADE FEATURES

The scenery is not too interesting, with new construction of buildings going on just before the site. Opposite the site also are plots of lands not constructed even though neat and have low occupancy in other words not very attractive.

Other man-made features observed on site apart from buildings are the drainage systems (gutters) provided fences and gates to other buildings around, road network etc.

6.7 ENVIRONMENTAL PROBLEMS (APPRAISAL)

Environment appraisal of the site includes all that can be seen and felt on the site. As it has been discussed earlier, the site is located at a service area, which makes it viable but could also have some disadvantages –difficulty in location in cases of emergency. Since the occupancy ratio is low is expected that there is going to be low disturbance but however, noise from the road as regards vehicles, tippers that frequently passes could be of disturbances.

DEDUCTION

The site location is very appropriate because of the existing features and structures located around; complimenting aesthetic, Nature of site; easy access and circulation from towns\cities, People around; security and high patronage, Availability of services; telecommunication, transportation and water supply.

CHAPTER SEVEN:

THE DESIGN

7.1 CONCEPT & DESIGN

7.1.1 ZONING CONCEPT

For effective zoning and physical control of traffic flow within the hospital, the space is to be grouped into three namely:

Public\Noisy Zone: This is an area that constitutes noise –public car park, public cars/vehicles parked in front of the reception.

Private Zone: This less noisy\no noisy area, strictly surgical theatres and wards.

Semi-Public Zone: The area is between the noisy and quite areas.

There are two gates along the Baptist church road at the front. One gate serves as the main access to the hospital area while the other serves as access to the staff quarters, maintenance yard, kitchen and laundry.

Along the existing access road at the back, there are two gates – one serves as an exit to the area while the other serves as exclusive access to the mortuary area.

7.1.2 DESIGN CONCEPT

In picking up a concept for this design, an actualization of the functionality of the design has to be considered. Also putting into knowledge that, the realization of the proposal was influenced by some factors such as nature of land, neighbouring land use etc.

Canonical Approach:

This approach is utilized in the planning of the site and individual functions within the layout. It will involve careful allocation of spaces for efficient circulation and utilization.

The design concept is to achieve an impressive but simple, functional and aesthetically pleasing general hospital that will serve the objective of a conducive environment for health facilities to the entire state.

7.1.3 SITE CONCEPT

The concept of the site is of **canonical approach** even through it is inter-woven with the analogical approach so as to creating a conducive, hospitable and relaxing environment. The site concept is to have a hospital complex with adequate fore- court parking for the public which leads into the reception and central concourse that distribute traffic into various departments and units.

7.2 MATERIALS AND CONSTRUCTION:

7.2.1 MATERIALS

Reinforced Concrete: Mixture of particles of stone bound together with cement. Major part of concrete is the stone and sand 'the aggregate' binding material is cement and solvent water. Wire gauze, and iron rods for reinforcement. The material concrete will be used in foundation laying, wall construction (block wall) and for roofing.

Block Wall: Block wall of 230mm and 150mm depending on thickness of wall required, made of concrete mix.

Brick Tiles: Clay bricks –burnt clay of such size that it can be conveniently held in one hand and it can be slightly longer than twice its width. The bricks will be used for facing such as windows alcoves.

Sheet Metal (Steel & Aluminium): Is used as roof covering, window frames and doorframes etc, because it gives excellent protection against wind and rain, its durable and lighter in weight than asphalt, tiles or slates.

Timber: Timber is wood, which has been cut for use in buildings. Has much advantage as a building material. It is a light weight material that is easy to cut, shape and join by relatively cheap and simple hand or power operated tools, in the production of either a single or a series of walls, floor and roof panels and frames, timber joist, stud, rafter and plate walls, floors and roof and windows, doors and joinery generally.

Glasses: For the windows and doors covering.

7.2.2 ARCHITECTURAL COMPOSITION /CONSTRUCTION

1. Foundation and walls, 2. Doors, 3; Windows, 4. Floor, 5.Roof, 6. Decorations & finishes

Foundation: The foundation will be designed to transmit the loads of building to the ground so that there is, at most, only a limited settlement of the building into the ground. For this project strip foundation has being chosen for use. The construction of concrete is carried out with at least slab thickness of 150mm, minimum depth of 450mm, which will vary though.

PROJECT:- PROPOSED NEW GENERAL HOSPITAL LOKOJA
TITLE:- SCHEDULE OF FINISHES
LEVEL:- GROUND AND FIRST FLOOR

S/NO	SPACE	FLOOR FINISHES			SKIRTING			WINDOW CILL		INTERNAL WALL				CEILING FINISHES				REMARKS
		Terrazzo	Ceramic tiles	PVC	Terrazzo	Ceramic tiles	Timber	Terrazzo	Ceramic tiles	Texture coating	Ceramic tiles	Emulsion	Gloss	Suspended	Mineral fibre	Polish board	Rendered slab	
A	Reception/Record	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height	Gloss to door height	Suspended ceiling				
1	Waiting																	
2	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height					Brilliant white emulsion on slab soffit	
B.	OUT PATIENT DEPT																	
1	All rooms except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height to ceiling	Gloss paint from skirting to door height					
2	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height					Brilliant white emulsion on slab soffit	
C	Antenatal; Obstetrics & Gynecology																	
1	All rooms, except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height	Gloss paint from skirting to door height	Suspended ceiling				
2	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				
D	Delivery Ward																	
1	All rooms except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height	Gloss paint from skirting to door height	Suspended ceiling				
2	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				

S/NO	SPACE	FLOOR FINISHES			SKIRTING			WINDOW CILL		INTERNAL WALL				CEILING FINISHES				REMARKS
		Terrazzo	Ceramic tiles	PVC	Terrazzo	Ceramic tiles	Timber	Terrazzo	Ceramic tiles	Texture coating	Ceramic tiles	Emulsion	Gloss	Suspended	Mineral fibre	Polish board	Rendered slab	
E	Eye, Dental & Ent.																	
1	All rooms, except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height	Gloss paint from skirting to door height	Suspended ceiling				
2	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				
F	Psychiatry																	
1	All rooms except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height	Gloss paint from skirting to door height	Suspended ceiling				
2.	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				
G.	Pathology, Imaging, Pharmacy & Physiotherapy																	
1	Pathology																	
	All rooms except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height to ceiling	Gloss paint from skirting to door height				Brilliant white	
2.	Imaging																	
	All rooms except fluoroscope and Bulky	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height to ceiling	Gloss paint from skirting to door height				Brilliant white	
	Fluoroscope and Bulky	Terrazzo (Jacura marble)			Terrazzo						Lead sheet				Lead sheet			
3.	Pharmacy																	
	All rooms except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height to ceiling	Gloss paint from skirting to door height				Brilliant white	

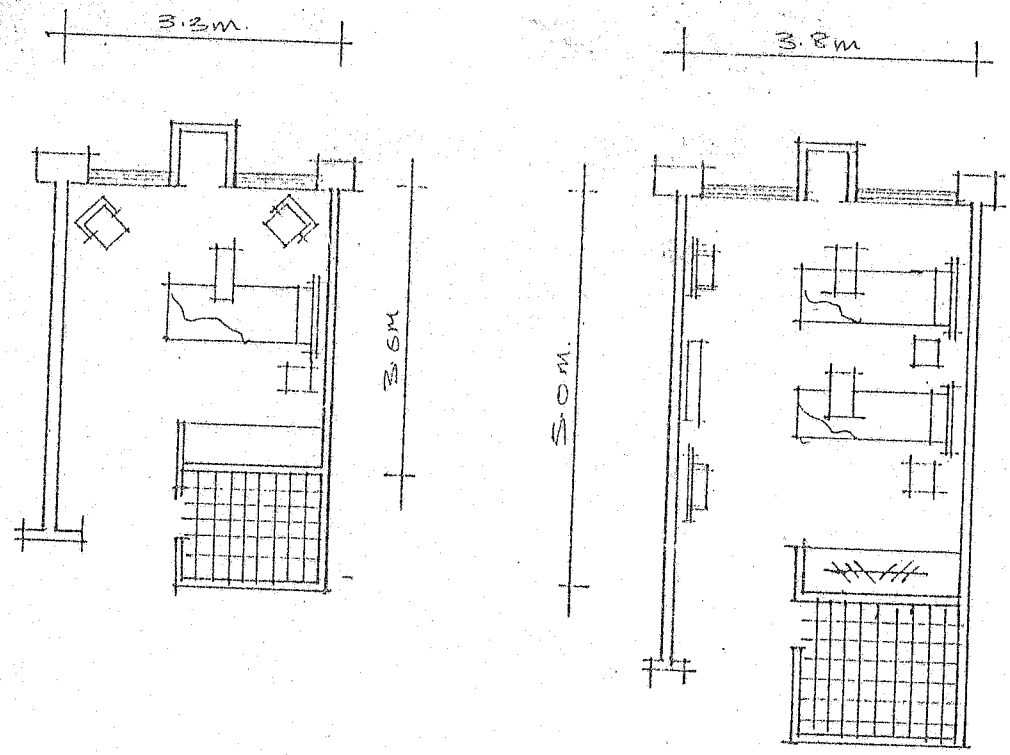
S/NO	SPACE	FLOOR FINISHES			SKIRTING			WINDOW CILL		INTERNAL WALL				CEILING FINISHES				REMARKS
		Terrazzo	Ceramic tiles	PVC	Terrazzo	Ceramic tiles	Timber	Terrazzo	Ceramic tiles	Texture coating	Ceramic tiles	Emulsion	Gloss	Suspended	Mineral fibre	Polish board	Rendered slab	
3	Kitchen,	Terrazzo									White glazed ceramic tiles to door height	Emulsion above door height	Gloss paint from skirting to door height	Suspended ceiling				
	All other rooms in kitchen	Terrazzo									" "	" "	" "	" "				
4	Laundry	Terrazzo									" "	" "	" "	" "				
5	(i) Workshop	Terrazzo									" "	" "	" "	" "				
	(ii) Mezzanine floor	Terrazzo									" "	" "	" "	" "				
6	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				
K	Admin – G/1st floor																	
1	Offices	Terrazzo			Terrazzo			Terrazzo				Emulsion above door height	Gloss paint from skirting to door height	Brilliant white				
2	Conference	"			" "			" "				" "	" "		Mineral fibre (Brilliant white			
3	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				
L	OPQ&T																	
1	All rooms, except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height	Gloss paint from skirting to door height	Suspended ceiling				
2	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				

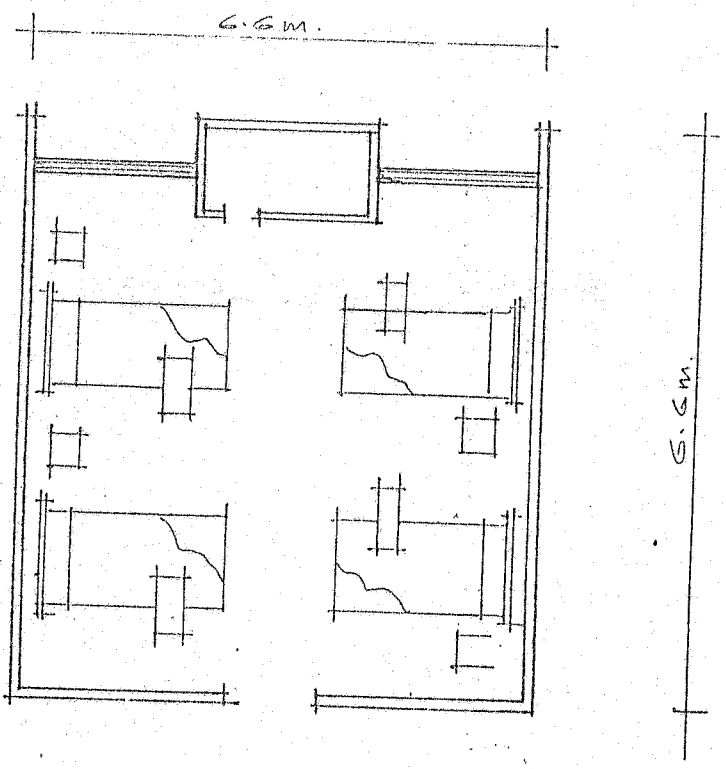
S/NO	SPACE	FLOOR FINISHES			SKIRTING			WINDOW CILL		INTERNAL WALL				CEILING FINISHES				REMARKS
		Terrazzo	Ceramic tiles	PVC	Terrazzo	Ceramic tiles	Timber	Terrazzo	Ceramic tiles	Texture coating	Ceramic tiles	Emulsion	Gloss	Suspended	Mineral fibre	Polish board	Rendered slab	
4	Pathology All rooms except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height to ceiling	Gloss paint from skirting to door height				Brilliant white	
H	Emergency/Casualty																	
1	All rooms, except toilets	Terrazzo (Jacura marble)			Terrazzo			Terrazzo				Emulsion above door height	Gloss paint from skirting to door height	Suspended ceiling				
2	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				
I	Mortuary																	
1	All rooms except toilets	Terrazzo			Terrazzo			Terrazzo				Emulsion above door height	Gloss paint from skirting to door height	Brilliant white				
2	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				
J	General Store, Canteen, Kitchen, Laundry & Workshop																	
1	General Store	Terrazzo										Emulsion above door height	Gloss paint from skirting to door height	Suspended ceiling				
2	Canteen	Terrazzo										" "	" "	" "				

S/NO	SPACE	FLOOR FINISHES			SKIRTING			WINDOW CILL		INTERNAL WALL				CEILING FINISHES				REMARKS
		Terrazzo	Ceramic tiles	PVC	Terrazzo	Ceramic tiles	Timber	Terrazzo	Ceramic tiles	Texture coating	Ceramic tiles	Emulsion	Gloss	Suspended	Mineral fibre	Polish board	Rendered slab	
M	Theaters																	
1	All rooms, except toilets	Terrazzo			Terrazzo			Terrazzo				Emulsion above door height	Gloss paint from skirting to door height		Suspended Mineral fibre ceiling			
2	Surgical suites	Perelli rubber floor tiles land on screed with preparatory glue										" "	" "		" "			
3	Toilets		Ceramic tiles			Ceramic tiles			Ceramic tiles		White glazed ceramic tiles to door height	Emulsion above door height		Suspended ceiling				

EXTERNAL FINISHES

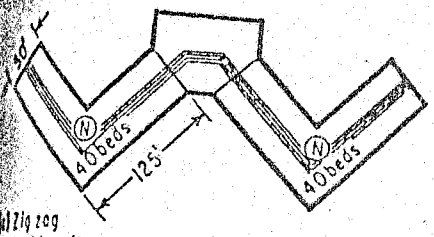
S/NO.	SPACE	EXTERNAL WALL	FLOOR
1	Admin	Textured Paints	
2.	All Buildings	Textured Paints	
3	Toilets	Brick facing	
4.	Central Corridors		Terrazzo



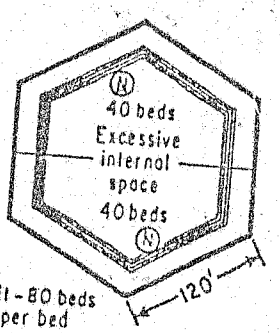


NURSING UNITS BEDROOMS.

FIG. 7.8

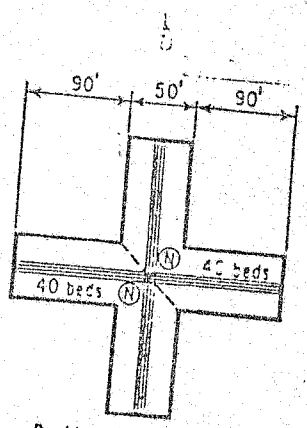


(a) Zig zag
Double unit – end to end 80 beds
320 SFG per bed – odd corners and angles cause some difficulties



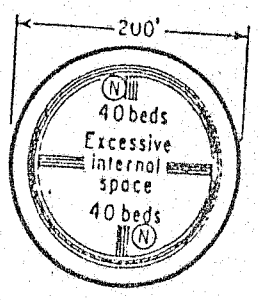
(b) Hexagon
Double unit – 80 beds
450 SFG per bed
Undesirable

Odd shapes.

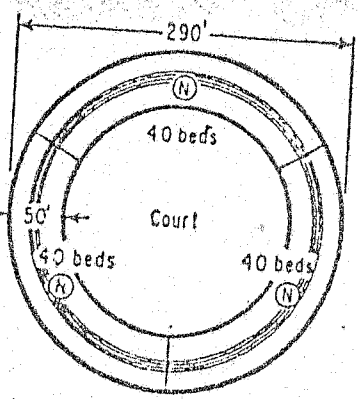


Double unit – 80 beds
256 SFG per bed
Economical to operate

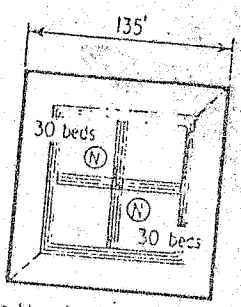
Single unit – 40 beds
310 SFG per bed



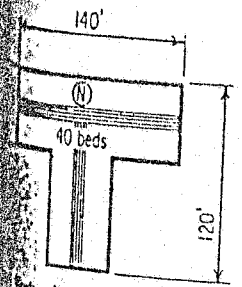
(b) Double unit – 80 beds
392 SFG per bed
direction of circulation is not always clear



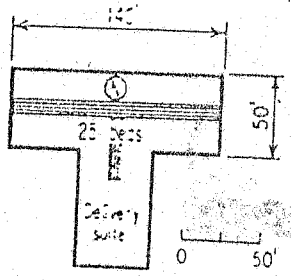
(c) Triple unit – Doughnut plan – 120 beds
311 SFG per bed – poor circulation



Double unit – 60 beds – 365 SFG per bed. Core satisfactory. The square plan is not easily expanded

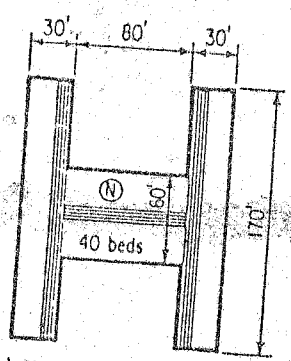


Single unit – 40 beds – 263 SFG per bed – circulation good

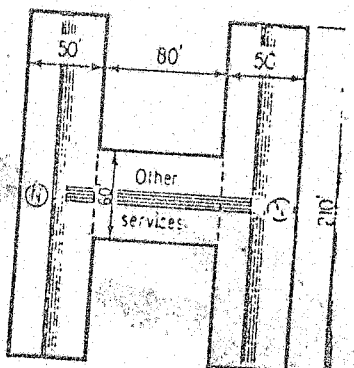


(b) Single unit – 25 beds plus delivery
280 SFG per bed

The T-shaped plan.



(a) Single unit – 40 beds – 375 SFG per bed. Uneconomical



(b) Double unit – 80 beds – 252 SFG per bed. Economical

PLAN SHAPES OF NURSING UNIT.

FIG. 7.6

Reinforced insitu concrete grade 20 in foundation, 300mm strip foundation over 450mm laterite hardcore filling, polythene damp proof membrane, and expansion joints in compressive materials.

Walls (both internal and external): Are continuous, usually vertical, solid structure of brick, stone, concrete, metal and timber, thin to its proportion and its length and height, which enclose and protects a building or serves to divide buildings into compartments or rooms.

The structure essentially is of framed reinforced concrete with network of beams and columns and reinforced concrete shear walls as appropriate with infill block wall for the exterior and some partitions.

Doors: To serve as a solid barrier to a doorway or opening, that can be opened for an access and closed to deny access, for privacy and security and serves as a thermal, acoustic and fire barrier as part of an external wall. So choice of doors must be such that fits into the above description no matter the make- metal, wooden or glass.

Windows: An opening formed in wall/roof to admit daylight through some transparent/ translucent material fixed in the opening. A window serves to exclude wind and rain, act as a barrier excessive transfer of heat, sound and spread of fire in much the same way as the surrounding wall/roof dose. The window type to be used will be aluminium frame, glass windows.

Floors: Reinforced floors will be used because of it's a better resistance to damage by fire and can greatly support greater super-imposed loads.

Reinforced concrete roofs (for flat roofs) built such as the reinforced concrete floors.

Aluminium roofs; one of the lightest metals with moderate mechanical strength and is malleable. It is resistance to normal weathering agents. On exposure to atmosphere a film of aluminium oxide forms which is dense and tenacious and prevents further corrosion.

FINISHES (external): generally, durable, low maintainable quality finishes with optimum value in cost-in-use are to be utilized.

External, aluminium windows combined with mosaic/brick facing/textured paints to walls have been selectively considered for use generally for cost and climatic reasons. Internally, wall finishes are combination of textured and emulsion paint. Suspended acoustic panels, where necessary shall be used for the ceiling. In addition granite, marble, ceramic and or mosaic tiles have being considered for internal walls and floor finishes and as appropriate. The driveways and car parks are to be finished in asphalt with concrete kerbs and walkways.

7.3 SPACE REQUIREMENTS

In the allocation of spaces in the propose hospital design some factors have to be put into consideration. Factors that determine the allocation of spaces include:

1. The equipment and furniture to be allocated

2. The establishment standards

3. The nature of activities to be carried out in each space.

THE PATIENTS CARE UNIT

The patient care unit, being the building where the hospitalised patient is accommodated from admission to discharge, considered as one of the most units in the hospital, seconded only by the diagnostic and therapeutic unit.

The general hospital patient care is divided by services the total bed requirement the hospital is divided into bed requirements for medical, surgical, obstetrics; paediatrics and rehabilitative patient care units. The World Health Organisation recommends the following distribution of beds.

Medical nursing unit	24%
Surgical nursing unit	33%
Obstetrical nursing unit	15%
Paediatric nursing unit	19%
Others	9%
	100%

Nursing Units (Wards) are further categorised into male and female wards and within each ward these are isolation rooms fore patients requiring special treatment.

NURSING UNIT DISTRIBUTION BY SERVICES:

MEDICAL NURSING UNIT: Medical nursing unit is where patients with cases of medical nature are accommodated. Medical cases include cardiology, pulmonary, metabolism, dermatology etc. medical patients use the diagnostic aids of laboratory, X-ray and therapeutic aids of physical medicine more often than the patient in other nursing units. The patient is often admitted without a complete knowledge of his disease because of his disease. The location of this unit near the diagnostic and therapeutic facilities is very important to reduce the long distances for staff and patients.

The patient stay is longer due to test and examinations that need to be carried out. Therefore, good medication space should be given within the unit.

SURGICAL NURSING UNIT

The unit admits patients that have undergone or are going to undergo surgery. This may be minor such as appendicitis or a major operation such as transplant. The pattern of traffic from this unit goes to the surgical suite, emergence department, central sterile supplies and the diagnostic and therapeutic facilities. Apart from basic supporting services rooms this unit requires.

- A surgical treatment room for surgical dressing and minor corrective work, this take the place of the examining room in this unit.
- A storage space for orthopaedic frames

MATERNITY AND OBSTERTRIC NURSING UNIT

Expecting mothers and new mothers with their new-born babies are accommodated in the nursing unit. The unit is most related to the obstetrical delivery suite, surgical operating suite, and other diagnostic and treatment

facilities. The units' relation to surgical suite depends on where caesarean sections are done.

Todd Wheeler 1984 wrote; "an important factor in planning is the policy as to whether caesarean sections are to be done in delivery room or surgery. Unlike most other departments of the hospital the maternity department is normally concerned with a natural rather than a pathological event. It is also dealing with a continuous process from pregnancy through delivery to after care of both mother and child. It is not principally concerned with curing a condition but fulfilling it. Thus not only are their accommodation requirements different from those of other wards but also is important that it should not be associated psychologically with illness.

For this reason and to avoid risks of infections to newly born babies, it is greatly preferred if the maternity can be so degree separated from the rest of the hospital, perhaps not geographically but certainly with its own entrance. It should retain also communication link with the hospital department which mothers may sometimes need access.

Whatever its size, the department has two main parts, the out patients clinic and accommodation for in-patient delivery and after care. The clinic which may be associated with the out patients department or may be separated, is primary antenatal.

Antenatal patients are usually seen at the time of booking, at about thirty six (36) weeks of pregnancy and then weekly until delivery. The clinic will preferable be approached separately from the departments ambulance entrance, and the

accommodation will comprise a writing space, rooms for history taking and examination with three or four undressing cubicles to each room, a urine testing rooms and lavatory, and space for office and records. Easy access to the X-ray department and to pathology is an advantage.

The in-patient accommodation falls into two closely related divisions, one concerned with labour and birth and the other with lying in-wards. The labour suite should be accessible without passing through the wards.

Two types of patients are accommodated in the nursing units namely, the mothers and the new born babies. It is due to this factor that some support services which are not required in the other nursing are required in this unit such services are.

PAEDIATRIC NURSING UNIT

The Nursing unit accommodates children with range of 0-21 years. Paediatric patterns follow both the medical and surgical pattern of care with an increasing number of surgical patients. Since some of the paediatric patients can sleep in cribs, some in bassinets, and some in adult size beds, it became imperative to adopt a flexible room design, in order to replace cribs for adult size beds in cases of need. The following bed distribution of the total is recommended for the paediatric-nursing unit.

1. Bassinet 20%; 2. Crib 40%; 3. Bed 40%.

The need to accommodate mothers' overnight in some cases should be given consideration since sick children require the presence of their patients.

7.4 SERVICES

7.4.1 ELECTRICITY & LIGHTING

Mains Supply/Distribution: The design is for the mains supply to connect the existing NEPA network at High Voltage (HT), which feed the indoor (medium voltage) through the transformer switch panels rated properly for the desired purpose. Lighting and small power distribution boards will be of MCB mixed capacity type. However, HRC switch fuses will be proposed as backup protection for loads below 100A rating and thereby providing means of dictating faults in outgoing final circuits.

In general, electricity distribution within the building shall have concealed conduit from the various distribution boards on the floors which shall be feed from room panels through ducts and where necessary cable trays.

Lighting: General illumination will be by florescent and incandescent luminaries in the offices, wards and corridors etc. Street lighting will be provided along the driveways and the car parking using aluminium columns and mercury vapour lamps. And the columns will be anchored on concrete bases.

7.4.2. HEATING, COOLING & VENTILATION

Heating by room heaters and stoves while, the cooling through use of room splits/blower units and air conditionals. Cross-ventilation is required for most spaces will be provided through openings in walls and roofs that are separate or linked to windows and doors. Mechanical ventilation will also be achieved through the split/blowers and air conditions.

7.4.3. WATER SUPPLY

Water supply for consumption, fire fighting, sanitation and gardening to the site will be tapped from the municipal supply system, which will be stored in overhead tanks of proportional capacities to be positioned on roof tops of buildings.

7.4.4. DRAINAGE & SEWAGE DISPOSAL

Drainage: an appropriate network of drainage channels follows the terracement and road pattern, the slopes of terrain allows natural flow of eventual discharge into the neighbouring drainage storm water system. The drainage channel would be incorporated into the pedestrian walkways.

Sewage disposal: a sewage disposal arrangement will be provided by the availability of septic tanks and soak away pits and making room for evacuating them when filled.

7.4.5. REFUSE DISPOSAL

In the disposition of refuse, dust bins will be provided at specific points for collection of individual refuse, emptied into large ones and then moved to a proposed chimney at an end of the site. At intervals the burnt waste is moved with trucks to designated areas

7.4.6. ACOUSTICS

Acoustic measures -external and internal sounds will be reduced by planting of trees and also by the use of sound –proof materials for walls, floors, roofs, doors and windows.

7.4.7. FIRE SERVICE (SAFETY)

Fire machines at roof tops would be provided, while, other fire fighting equipments including fire extinguishers, sand bucket, hose reels, fire alarms and smoke/heat detectors at strategic locations in the complex and fire hydrants at locations around the site.

7.4.8. SECURITY

For security measures, security personnel will man each of the distinct sections of the complex and streetlights provided. Security doors and windows with metal bars protection, reinforced glass and automatic remote jam controlled. Cameras will also be put in place.

7.4.9. TELEPHONE/TELECOMMUNICATION/SATELITE TV SYSTEM

a. An integrated central television/satellite system comprising of dish, boosters and decoders shall be provided for in the design.

b. It is also considered that provision is made for Telephone Private Automatic Branch Exchange (PABX) to cater for external calls and internal communication with digital modular switching systems.

c. Other modern communication modes to be considered include computer networking and radio links depending on the details to be confirmed by the client.

7.4.10 MAINTENANCE

The design proposal includes a maintenance section where maintenance and repairs: Of all buildings; Signs and marking; Mechanical and electrical fault; Roads, footways and gardens; Maintenance and control of all water supply system.

7.4.11. SOLAR CONTROL

In order to reduce sunlight and the effect of solar radiation- sunrays and glare trees are planted to serve as barriers and also protection from wind and erosion. Window hoods and filtrations and other sun shading devices will also be introduced.

7.15 ACCESS

There is going to be an easy access to the proposed hospital, which is both motor able and footpath linking the area.

Internal roads: The major internal roads include:

a. The main entrance access road, which will be tapped from the secondary road, it further supplies the parking lots.
b. The pedestrian walkways made of precast concrete slabs complete the road platters.

7.17 PARKING & LANDSCAPING

The design would provide for sufficient parking space for staff, patient and visitors. The parking space is centralized in such a way so as to have control traffic flow pattern and free movement of pedestrian from one point to another within the site. Intensive landscaping of external spaces around the parking lots and the buildings will be provided with reinforced concrete planter boxes. A combination of ornamental plants trees, shrubs, hedges, grasses, flowers and stone pitching will be blended to give maximum possible pleasant effect to the surroundings.

CONCLUSION

Hospital sanitation which basically deals with water supply, food intake, and waste produced, collected and disposed is to be handled with serious concern, since adequate sanitation is the foundation of development (Akhtar H. K. 1990). Sanitation facilities/equipments in hospitals should be maintained as often as possible.

All the necessary facilities/materials needed such as water, lighting, should be made readily available to keep the environment and hospital equipments clean. Management should strictly monitor the works of those keeping the surroundings clean, refuse dump be disinfected and like wise the hospital equipments and waste collected should be adequately disposed.

Finally, sanitation has a place in the design industry and most especially the hospital and even to the evolution of our cities therefore should be embraced at all times.

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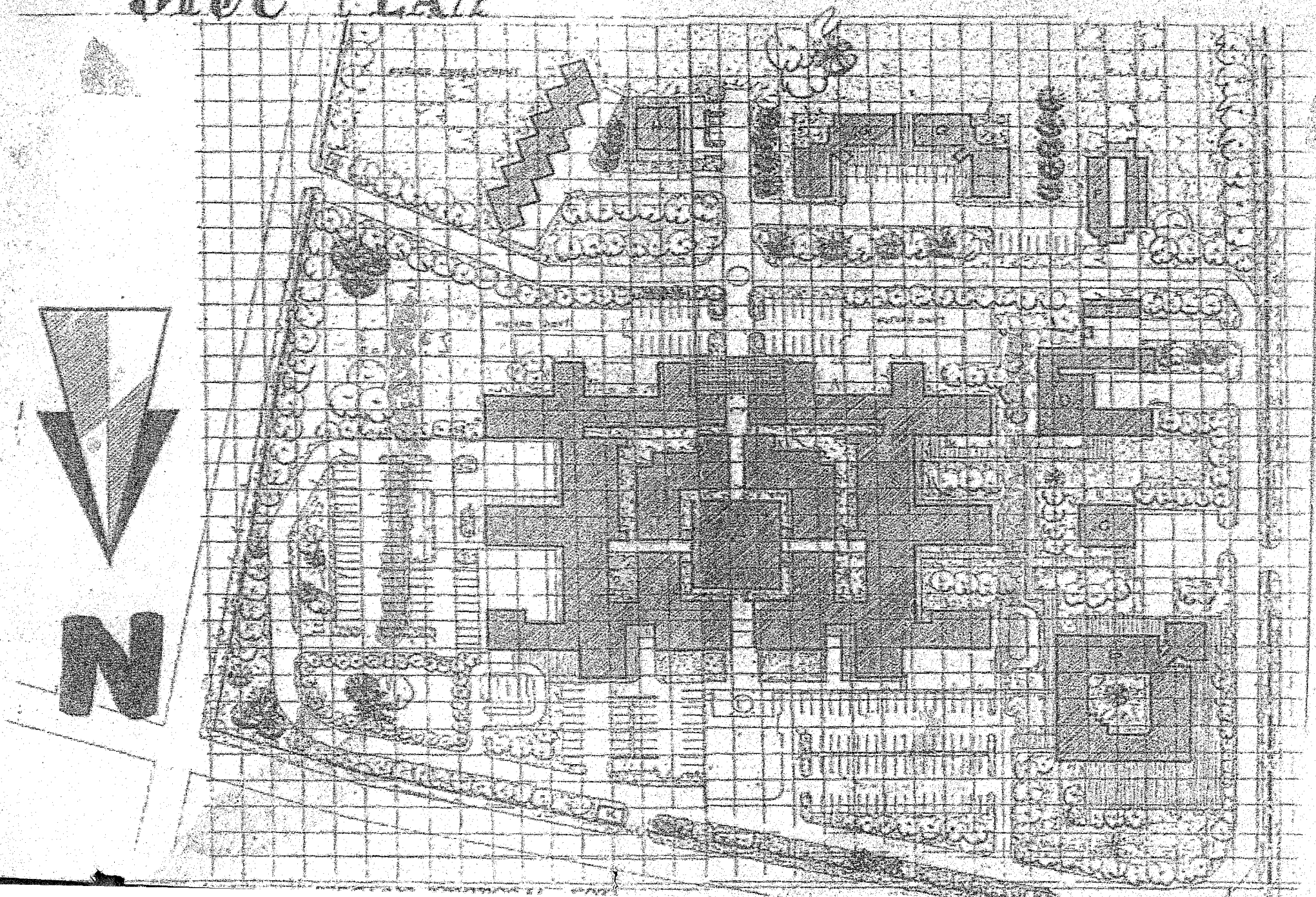
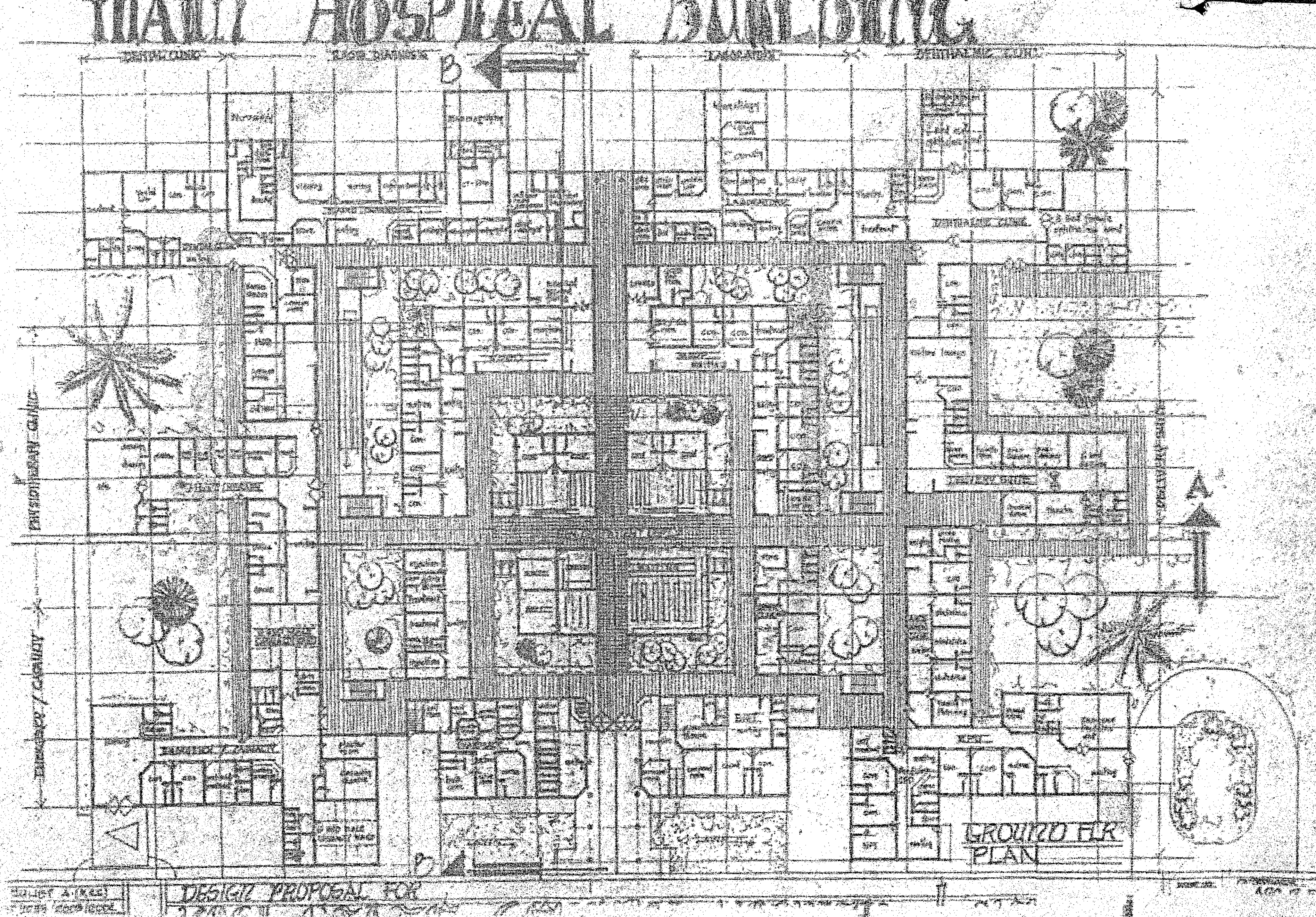
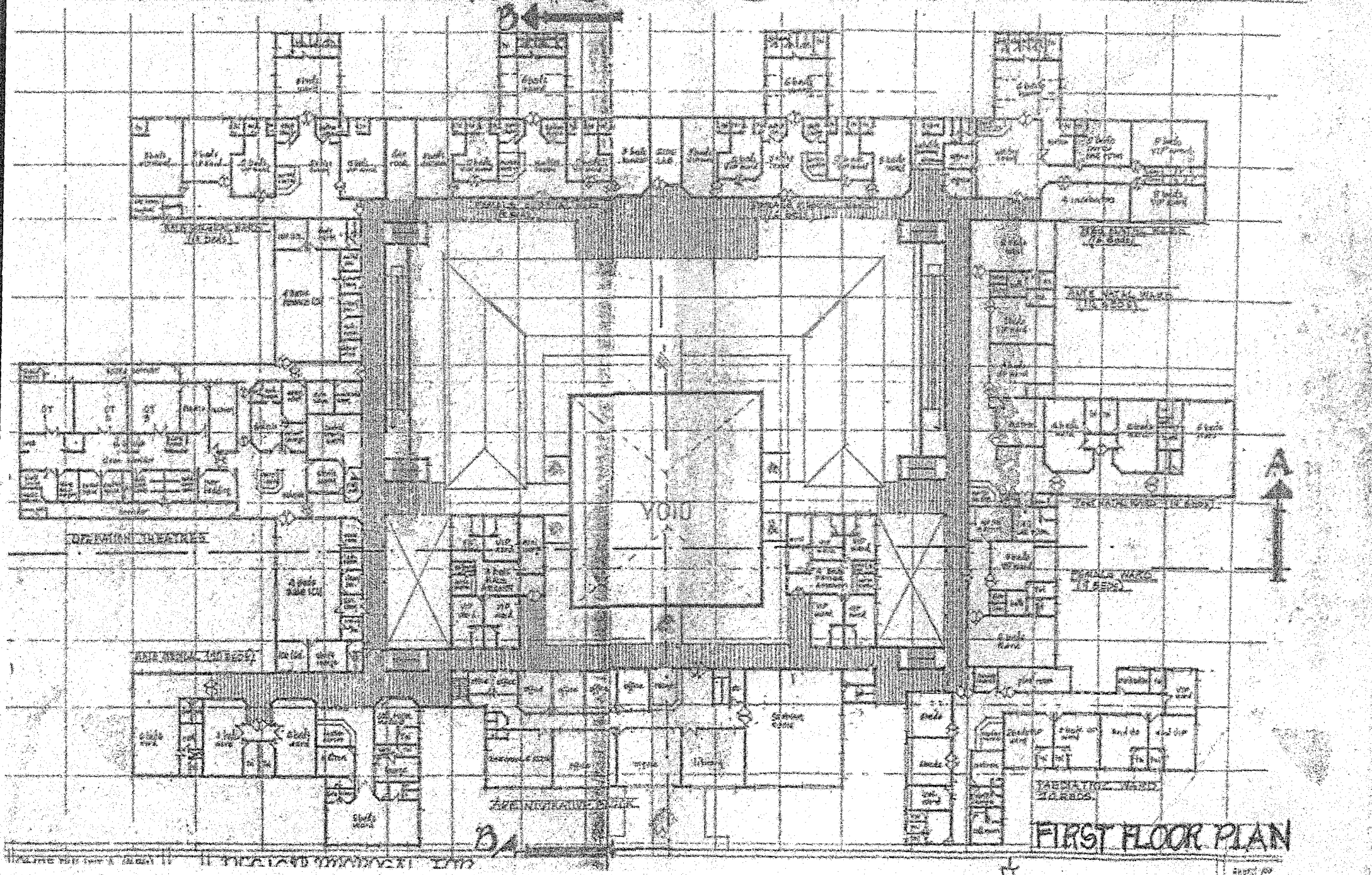
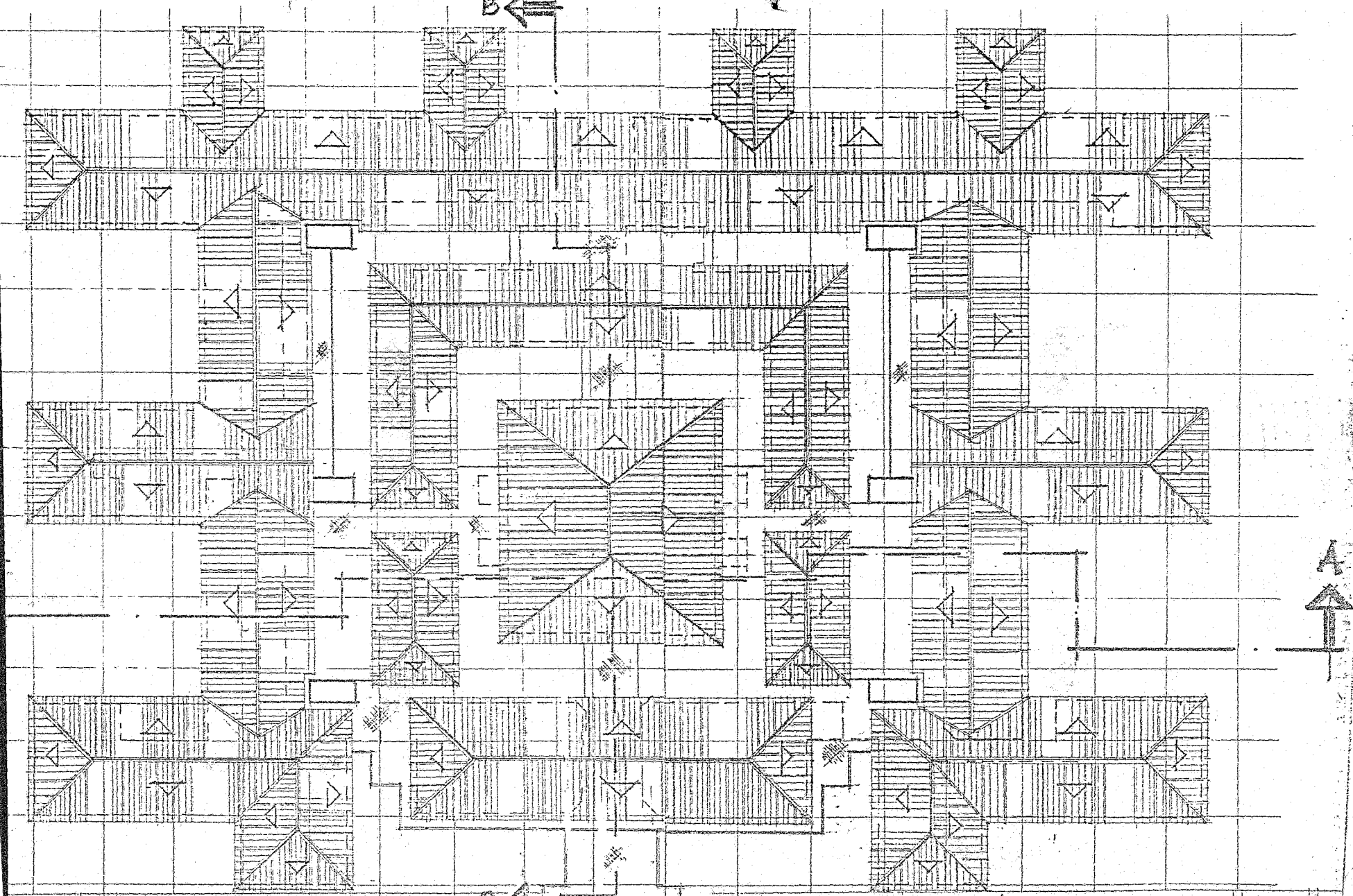
SITE PLAN




HOSPITAL BUILDING
GROUND FLR PLAN
DESIGN PROPOSAL FOR

HOSPITAL BUILDING





A. (M&S)
2003/2004

DESIGN PROPOSAL FOR
KOGI STATE GENERAL HOSPITAL, LOKOJA.
SITE PLAN, DRAINAGE AND SANITATION.

SHEET NO.
12

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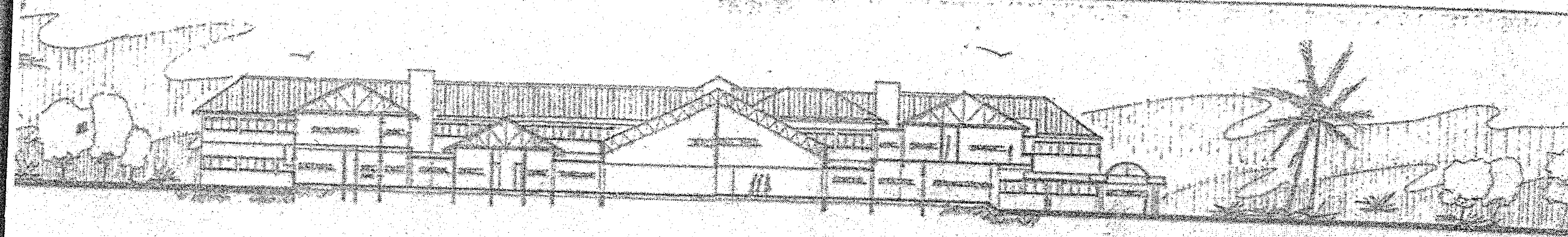

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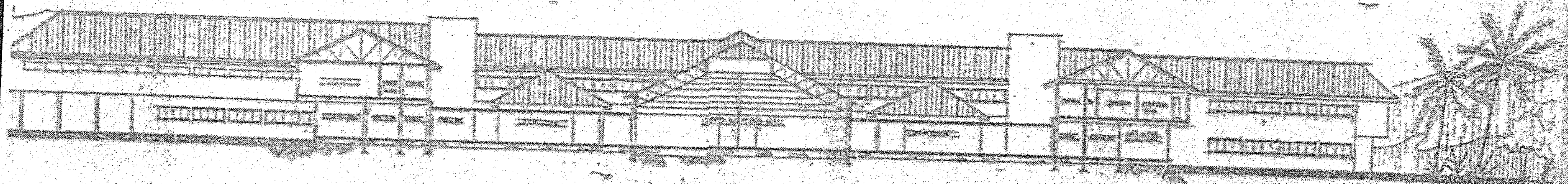

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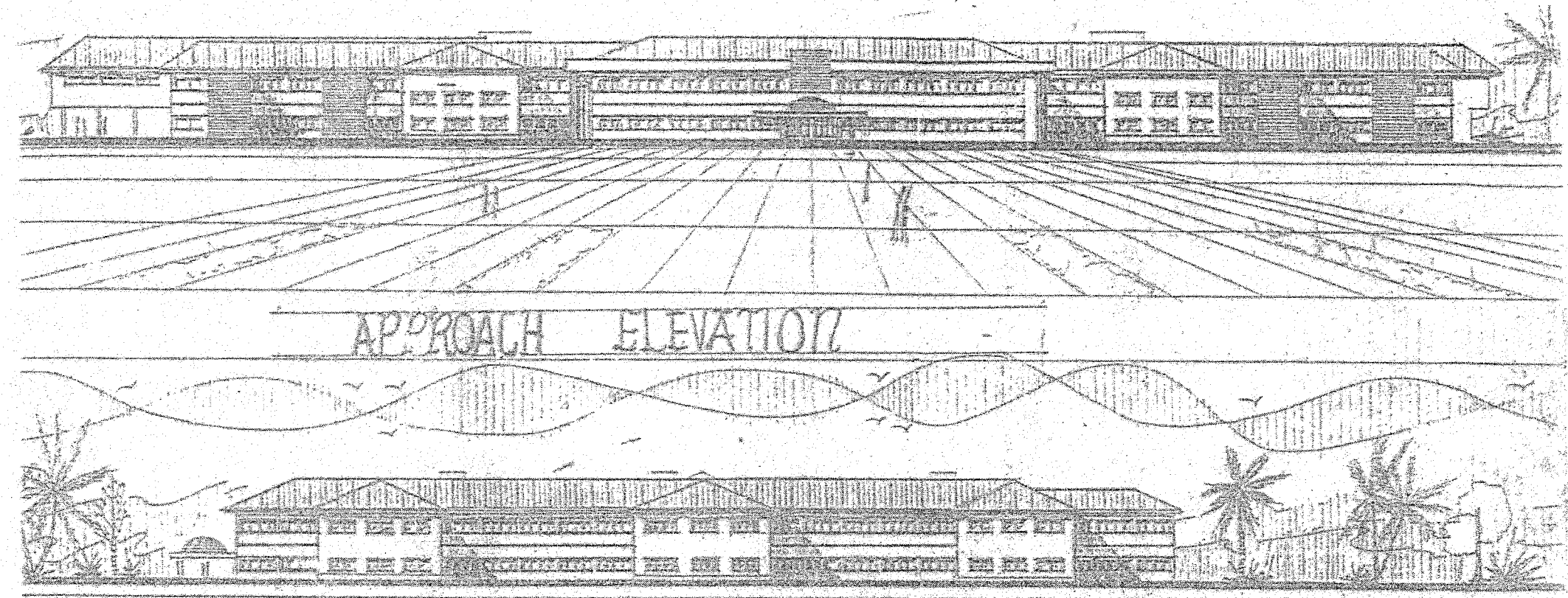
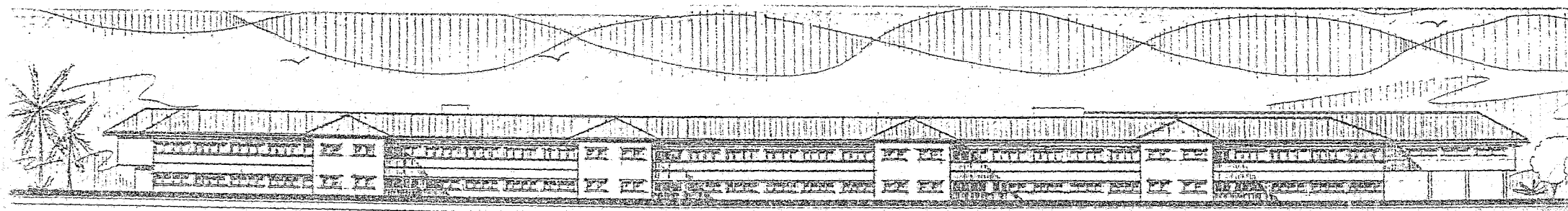
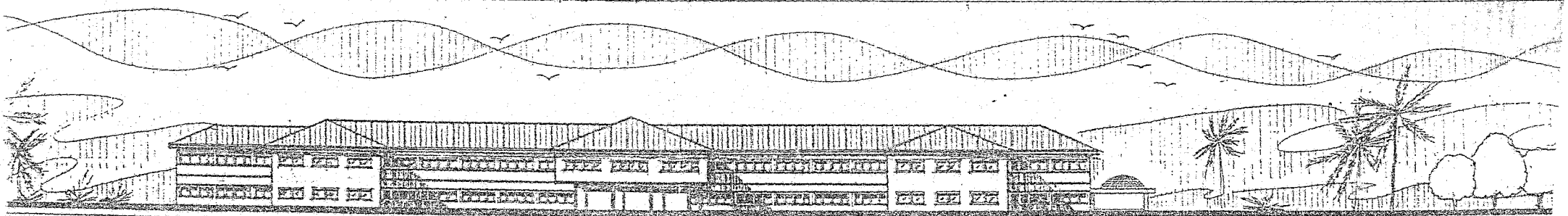


APPROACH ELEVATION

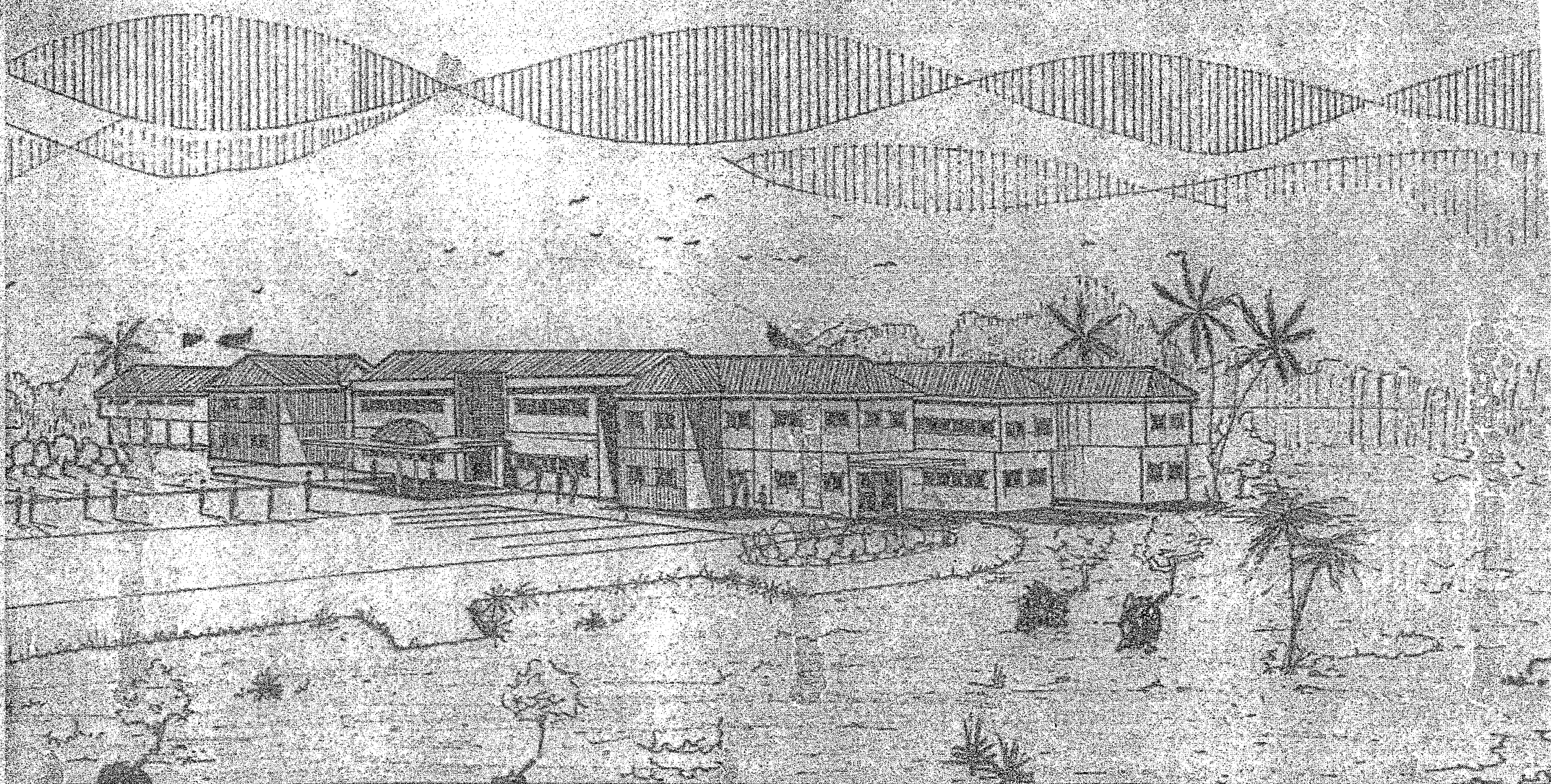
RIGHT - SIDE ELEVATION



REAR ELEVATION



RIGHT SIDE ELEVATION



MAIN HOSPITAL BUILDING