

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI.

COLLEGE OF ARCHITECTURE AND PLANNING

FACULTY OF ARCHITECTURE AND BUILDING TECHNOLOGY

DEPARTMENT OF ARCHITECTURE

TOPIC:

TEACHING HOSPITAL-TAMALE

**A DESIGN THESIS REPORT SUBMITTED TO THE DEPARTMENT OF
ARCHITECTURE, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE AWARD OF THE POST GRADUATE DIPLOMA CERTIFICATE IN
ARCHITECTURE.**

BY

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May, 2009**

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DECLARATION

I hereby declare that this Design Thesis Report, except in portions where references were made, has been entirely undertaken by me, duly supervised and submitted herein.

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SUPERVISOR'S DECLARATION

I hereby declare that the preparation of this Design Thesis Report was supervised in accordance with the guidance on supervision of Design Thesis laid down by the Kwame Nkrumah University of Science and Technology.

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DEDICATION

I dedicate this design thesis report to my lovely and wonderful mum, Miss Edith Esi Edem Ansah and also to my ever loving brother Dr Andrew Eyram Kemetse. Your love, support and prayers have been of tremendous help to me fulfilling this project. Thanks to you.



ACKNOWLEDGEMENTS

My appreciation goes to the almighty God for his strength, protection and guidance throughout my life. Thank you Lord

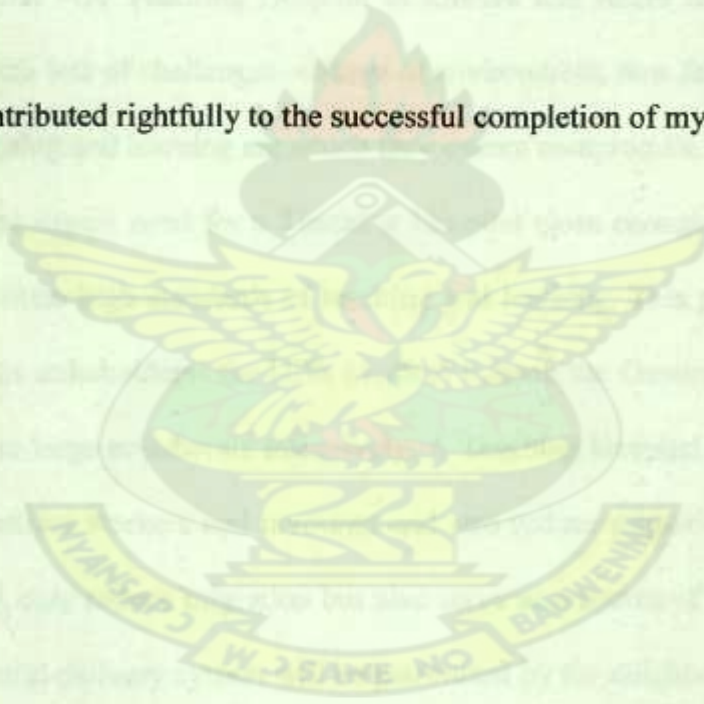
My mum for your ever watchful eyes all my life, love and support. I love you.

To my faithful and loving brother for your support and love. I love you.

To my supervisor, Prof .G.W.K. Intsiful and his family for their encouragement during the hard times.

To all those who contributed rightfully to the successful completion of my education.

Thank you.



ABSTRACT

A Teaching Hospital usually combines assistance to patients with teaching to medical students and this kind of hospital is often linked to a medical school. The University for Development School (UDS) which is situated in the Northern Region-Tamale has a Medical School which is not linked directly to any Teaching Hospital. As a result, they resort to sending the students to the south to study at the Okomfo Anokye Teaching Hospital and the Korle -Bu Teaching Hospital in Kumasi and Accra respectively. The students are faced with lots of challenges- change of environment, new faces to live with, new methods of teaching and learning etc which they cannot compromise.

There is therefore the urgent need for a Teaching Hospital close enough to the Medical School so as to facilitate high standards of teaching and learning. This project can only succeed if the various stakeholders- the UDS Medical School, the Government of Ghana and the community at large collaborate intensively. A Teaching Hospital in the Northern part of Ghana will attract workers and investors and also reduce migration to the south. This project will not only reduce migration but also serve as a source of revenue for the country since the health delivery system will be patronised by the neighbouring countries such as Burkina Faso, Niger, Mali for example.

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CHAPTER ONE

1.0 INTRODUCTION

A teaching hospital is a hospital that trains medical students: a hospital that provides supervised practical training for medical students, student nurses, or other healthcare professionals often in conjunction with a medical school¹. A Teaching Hospital usually houses all the various departments in medicine with the respective specialists. Students are given priority with the large numbers of lecture and rooms allocated to them. It must be noted that teaching hospitals are general or specialised hospitals that in addition to providing healthcare to patients also serve as teaching facilities to medical residents and other medical professionals. Hospitals were present during the middle Ages and they could serve other functions, such as almshouse for the poor, hostels for pilgrims, or hospital school².

1.1 PROBLEM STATEMENT.

The Northern Region is one of the largest regions in Ghana. The region can boast of its large quantities of agriculture produce. It is also one of Ghana's major tourism destinations with the Mole Game Park as a main attraction. It is however one of the most deprived regions of Ghana in terms of infrastructure, services and amenities.

The Tamale Government Hospital which is located in the Northern Region of Ghana is one of the many hospitals built to serve the health needs of people across the country. The hospital acts as a referral unit for the three northern regions-Northern, Upper East and Upper West in Ghana. The hospital was built in 1974 as a Regional Hospital and not as a Teaching Hospital. It is made up of a four storey unit which houses in-patients (wards) and other single unit blocks which act as the wards, Ear, Nose and Throat department, laboratories and Cardiovascular unit. Most of these single structures are additions to the old structure. The

first and second floor of the tower block has been abandoned due to cracks in the floor slab. The hospital lacks many other amenities that will propel it to a Teaching Hospital status. The staffing is very poor-29 medical doctors at post instead of the required number of 105, 210 nurses representing one-third of the requirement, 6 pharmacist and a 4 laboratory technicians whose numbers are woefully inadequate for effective health care delivery. A pilot study carried out revealed that people do not want to work in the north due to the following reasons:

- People consider working in the north as a punishment.
- The weather.
- The perception that the natives are unfriendly.
- No accommodation for workers.
- The poor infrastructure and services.
- The poor internal management and relationships between the people from the south and their Northern counterparts.

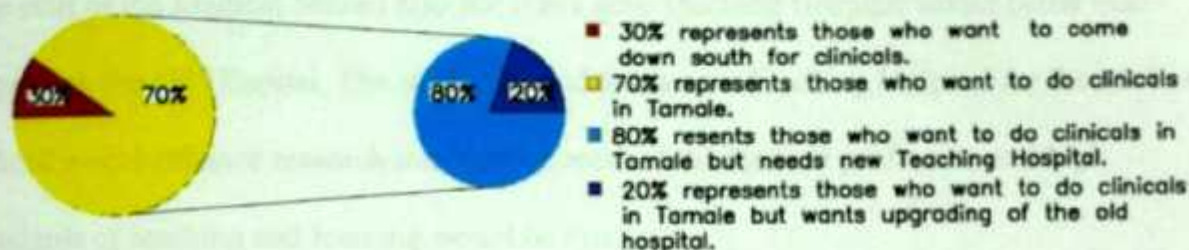
The hospital serves about 2000 people annually. However, more complex cases are transferred to the Komfo Anokye and the Korle-Bu Teaching Hospital in Kumasi and Accra respectively. There is great congestion at the labour and maternity wards. As a result, newly born babies and their mothers lie on rubber materials on the floor and in most cases are discharged within 24 hours of delivery. This affects the health of both mother and baby since the period for observation is reduced. The hospital boasts of 16 specialist doctors. The pilot study further revealed that a new Teaching Hospital should be constructed rather than upgrading the existing dilapidated hospital. Interviews with ten (10) staff members of the hospital indicated a preference for the old hospital to be renovated to serve as a regional hospital.

The main reasons cited for this preference were the high cost of adding to the existing structure and also the fact that the hospital has not seen any renovation or maintenance since its construction.

The University for Development Studies (UDS) was built in 1994 by the National Democratic Congress Government. The Medical School of the University of Development Studies was also commissioned in 1996. This was due to the need for medical practitioners to address the communicable diseases prevailing in the north since many medical practitioners in the south do not want to work in the north. The Medical School has not however been able to actualise this vision of training medical doctors because of lots of challenges including the paramount ones of inadequacy of staff and personnel and infrastructure for practical and clinical studies. As a result, the UDS medical students are sent to Korle-Bu Teaching Hospital and Okomfo Anokye Teaching Hospital in Accra and Kumasi respectively for their practical/clinical studies. This became a problem since the students felt inferior to their counterparts in these other schools. The student output became affected due to the change in the teaching methods used by their lecturers (from the problem based learning-PBR method to the normal teaching and learning method), new faces they had to cope with, change in environment etc. The vision of the school and all the other stakeholders-to have medical practitioners trained in the north and made to work in the north however failed since students who came down south for their clinical studies failed after the completion of their program to go back to the north. The situation worsened when the Okomfo Anokye and Korle-Bu Teaching Hospitals refused admission to the students from the UDS Medical School. The School had to resort to using the Tamale Hospital for their clinical studies which do not have adequate facilities which puts it in a Teaching Hospital status. The hospital does not facilitate comprehensive studies since the hospital has no lecture halls and rooms for the students who are on clinical rounds. The situation is alarming since studies to be done in a practical manner are done on the computer.

The pilot study carried out among the students proved that they are of different views about the situation in the school. The pie chart below further explains this occurrence.

150 students views on Teaching Hospital



1.11 ANALYSIS.

45 students representing 30% of 150 students wanted to come down south for their clinical studies. Interactions with them proved that they actually wanted to have their clinical in Komfo Anokye and Korle-Bu whether a teaching Hospital was provided in the north or not. This means that the south will have to accommodate 38 students or more students whether they have adequate facilities or not.

105 students were of the view that a Teaching Hospital would be the best and most appropriate solution to the current problem of the UDS medical school. They further stressed the fact that a Teaching Hospital close to the Medical School would enhance high standards of teaching and learning hence they would be willing to stay in the north to do their studies if adequate facilities were provided. Out of the 105 students who want to study fully in the north, 21 (20%) of them supported upgrading of the old hospital to a Teaching Hospital status. They said it would be easier in achieving the goal of a Teaching Hospital since there was already an existing facility and all that was needed were additions. The rest however argued against this thought because they felt that the old Hospital was almost dilapidated and

broken beyond repairs. Additions to this facility would just worsen the problem. They felt a new Teaching Hospital would be a better option to renovating and upgrading the old Hospital.

The staff of the Medical School also felt that a new Teaching Hospital would better than upgrading the old Hospital. The staff indicated that a new Teaching Hospital for the Medical School would enhance research into various areas of the medical profession and high standards of teaching and learning would be met.

1.2 SIGNIFICANCE AND PURPOSE OF STUDY

- To have adequate medical facilities the Northern Sector (ease of accessibility).
- To reduce medical expenses for people in the three northern regions.
- A new Teaching Hospital purposely built for the north would serve people from the neighbouring countries.
- A new Teaching Hospital would make the metropolis of Tamale more attractive to the medical profession and citizens of Ghana as a whole.
- Improved medical facilities would improve life expectancy rate and lower death rate
- An additional teaching hospital would boost the image of Ghana on the international scene.
- Presently, students of the University of Development Studies Medical School have an “inferiority complex” due to the fact that they are assigned to either Komfo Anokye Teaching Hospital or Korle-Bu Teaching Hospital as part of their clinical studies(medical training)

1.3 SCOPE OF STUDY

- The study would be divided into three main parts.
- The first part would deal with the research process for a new Teaching Hospital for the University of Development Studies Medical School.
- An overall master plan (layout) for the teaching hospital would be produced as part of the thesis but not all the facilities would be designed in detail.
- Recommendations and conclusions to be drawn from the thesis.

1.4 TARGET GROUP

This project is a national asset which is to be used by all Ghanaians and non- Ghanaians.

1.5 METHODOLOGICAL APPROACH

1. Questionnaires
2. Personal observation
3. Collection of available data from Metropolitan Assembly, the hospital etc.
4. Interviews.

1.6 LIMITATIONS

Even though the study will produce an overall site layout for the teaching hospital, it would be humanly impossible to design all the facilities which may be required for the upgrading. The focus of this design thesis therefore will be on the design of a new Teaching Hospital.

1.7 REFERENCES

1. www.wikipedia.com(November 8, 2008)
2. www.wikipedia.com(November 8, 2008)



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 HOSPITAL

A hospital is an institution for health care providing patient treatment by specialized staff and equipment, and often but not always providing for longer-term patient stays¹.

A hospital may be a single building or a cluster of various units(campus).Many hospitals with pre-20th-century origins began as one building and evolved into campuses due to the additions of new departments or expansion of old departments due to population increase. Some hospitals are affiliated with universities for medical research and the training of medical personnel. Worldwide, most hospitals are run on a non-profit basis by governments or charities².

Today, hospitals are usually funded by the state, health organizations (for profit or non-profit), health insurances or charities, including direct charitable donations³. Modern-day hospitals are largely staffed by professional physicians, surgeons and nurses, whereas throughout history, this work was usually done by the founding religious orders or by volunteers.

The first teaching hospital where students were authorized to methodically practice on patients under the supervision of physicians as part of their education, was the Academy of Gundishapur in the Persian Empire⁴. One expert has argued that "to a very large extent, the credit for the whole hospital system must be given to Persia".

2.2 History of Hospital design in Medieval Islam

Between the eighth and twelfth centuries CE Muslim hospitals developed a high standard of care. Hospitals built in Baghdad in the ninth and tenth centuries employed up to twenty-five staff physicians and had separate wards for different conditions. Wards were built for different condition. This situation had a great impact on the design of wards- adequately equipped with halls organised into waiting rooms, mosque and baths. Hospitals became the centres for medical education and learning Bagdad, Egypt and Persia. Facilities were built to accommodate the learning processes of staff.

2.3 Types of hospitals

Hospitals are usually distinguished from other types of medical facilities by their ability to admit and care for inpatients. An inpatient is a patient who is admitted to a hospital for few or longer-term stays. An outpatient is a patient who is administered healthcare and is allowed to go home within 24 hours.

2.31 General hospital

The best-known type of hospital is the general hospital, which is set up to deal with many kinds of disease and injury, and typically has an emergency department to deal with immediate threats to health and the capacity to dispatch emergency medical services⁵. A general hospital is typically the major health care facility in its region, with large numbers of beds for intensive care and long-term care; and specialized facilities for surgery, plastic surgery, childbirth, bioassay laboratories, and so forth. The size of these hospitals generally depends upon the population served.

2.32 Specialized hospitals

Types of specialized hospitals include trauma centres, rehabilitation hospitals, children's hospitals, seniors' hospitals, and hospitals for dealing with specific medical needs such as psychiatric problems (see psychiatric hospital), certain disease categories, and so forth.

2.33 Clinics

A medical facility smaller than a hospital is generally called a clinic, and is often run by a government agency for health services or a private partnership of physicians (in nations where private practice is allowed)⁶. Clinics generally provide only outpatient services

2.4 Teaching Hospitals

A teaching hospital which can also be called university hospital combines assistance to patients with teaching to medical students and is often linked to a medical school⁷. A teaching hospital is a hospital that in addition to delivering medical care to patients also provides clinical education and training to future and current doctors, nurses, and other health professionals. Teaching hospitals are generally affiliated with a school of medicine. Some teaching hospitals may be owned by a university or be part of an entire health system or network.

Some teaching hospitals also have a commitment to research and are centres for experimental, innovative and technically sophisticated services.

There is no official definition of a teaching hospital or external certification process to distinguish teaching from non-teaching hospitals. A hospital is typically determined to be a teaching hospital if it is a short-term, general, non-federal hospital and has one or more medical residents receive part of their training at their institution. If the hospital has a major

commitment to teaching (participation in multiple training programs and other health professional educational education) it is generally referred to as a “major” teaching hospital. A common definition of a major teaching hospital is that they have at least one full time medical resident for every four operating beds. Veterans Affairs medical centres, military specialty hospitals and children’s hospitals can also be teaching hospitals

2.5 Departments in a teaching Hospital

Hospitals may have any of the following departments or units:

- Behavioural Health Services
- Burn unit
- Cancer Centre
- Cardiology
- Coronary care unit
- Dentistry
 - Oral and Maxillofacial Surgery
- Dermatology
- Dispensary
- Emergency department
 - Trauma Centre
- Gastroenterology
- Intensive Care Unit
- Internal Medicine
 - Endocrinology
 - Epidemiology
 - Immunology

- Laboratory Services
- Neurology
- Nursing unit

- OB/GYN
 - Neonatal Intensive Care Unit

- Orthopaedic Services
- Outpatient department
- Pathology
- Paediatrics
- Pharmacy
- Plastic Surgery
- Psychiatric ward
- Rehabilitation Services
- Physical Therapy
- Post anaesthesia care unit
- Radiology
- Respiratory Therapy
- Surgery
- Urgent care
- Urology

Non-medical departments include:

- Medical records department

- Release of Information department

ONCOLOGY/CANCER CENTER

Oncology is the branch of medicine that studies, diagnoses, treats and prevents cancers.

Cancer (medical term: malignant neoplasm) is a class of diseases in which a group of cells display *uncontrolled growth* (division beyond the normal limits), *invasion* (intrusion on and destruction of adjacent tissues), and sometimes *metastasis* (spread to other locations in the body via lymph or blood)⁸. These three malignant properties of cancers differentiate them from benign tumours, which are self-limited, do not invade or metastasize. Most cancers form a tumour but some, like leukaemia, do not. Cancers affect people of all ages-foetuses and beyond. But it generally comes with age. 13% of all deaths are caused by cancer. Cancer affects animals too.

CARDIOLOGY

Cardiology is a subspecialty of internal medicine dealing with disorders of the heart and blood vessels. The field includes diagnosis and treatment of congenital heart defects, coronary artery disease, heart failure, valvular heart disease and electrophysiology⁹.

Physicians specializing in this field of medicine are called cardiologists. Cardiologists should not be confused with cardiac surgeons who are surgeons who perform cardiac surgery - operative procedures on the heart and great vessels.

CORONARY CARE UNIT

A coronary care unit (CCU) is a hospital ward specialized in the care of patients with heart attacks, unstable angina and (in practice) various other cardiac conditions that require continuous monitoring and treatment.

DENTISTRY

Dentistry is the evaluation, diagnosis, prevention, and treatment of diseases, disorders and conditions of the oral cavity, maxillofacial area and the adjacent and associated structures and their impact on the human body. Dentistry is widely considered necessary for complete oral health. Those in the practice of dentistry are known as dentists. Other professionals in oral health service include dental assistants, dental hygienists, dental technicians, and dental therapist.

DERMATOLOGY

Dermatology is the branch of medicine dealing with the skin and its diseases, a unique specialty with both medical and surgical aspects. A dermatologist takes care of diseases and cancers of the skin, scalp, hair, and nails.

DISPENSARY

A dispensary is an office in a school, hospital or other organization that dispenses medications and medical supplies. In a traditional dispensary set-up a pharmacist dispenses medication as per prescription or order form.

Electronic dispensaries are designed to ensure efficient and consistent dispensing of incipient and active materials in a secure data environment with full audit traceability. A standard dispensary system consists of a range of modules such as manual dispensing, supervisory, bulk dispensing, recipe management and interfacing with external systems

EMERGENCY DEPARTMENT/TRAUMA CENTRE

The emergency department (ED), sometimes termed the emergency room (ER), emergency ward (EW), accident & emergency (A&E) department or casualty department is a hospital or primary care department that provides initial treatment to patients with a broad spectrum of illnesses and injuries, some of which may be life-threatening and requiring immediate attention. Emergency departments developed during the 20th century in response to an increased need for rapid assessment and management of critical illnesses¹⁰. In some countries, emergency departments have become important entry points for those without other means of access to medical care. The abbreviation ER is generally used throughout the United States, while A&E is used in many Commonwealth nations. ED is preferred in Canada and Australia.

Upon arrival to the ER, people typically undergo a brief triage, or sorting, interview to help determine the nature and severity of their illness. Individuals with serious illnesses are then seen by a physician more rapidly than those with less severe symptoms or injuries. After initial assessment and treatment, patients are admitted to the hospital, stabilized and transferred to another hospital for various reasons, or discharged. The staff in emergency departments include not only doctors and nurses, but physician assistants (PAs) and nurse practitioners with specialized training in emergency medicine and in house Paramedics and/or emergency medical technicians, respiratory therapists, radiologic technologists, Healthcare Assistants (HCAs), medical scribes, volunteers, and other support staff who all

work as a team to treat emergency patients and provide support to anxious family members. The emergency departments of most hospitals operate around the clock, although staffing levels are usually much lower at night. Since a diagnosis must be made by an attending physician, the patient is initially assigned a chief complaint rather than a diagnosis. This is usually a symptom: headache, nausea, loss of consciousness. The chief complaint remains a primary fact until the attending physician eventually makes a diagnosis.

GASTROENTEROLOGY

Gastroenterology is the branch of medicine whereby the digestive system and its disorders are studied. This specialty concerns itself with diseases affecting the gastrointestinal tract, which includes the organs from mouth to anus, along the alimentary canal. Physicians practicing in this field of medicine are called gastroenterologists.

Herpetology, or hepatobiliary medicine, encompasses the study of the liver, pancreas, and biliary tree and is traditionally considered a sub-specialty¹¹.

INTENSIVE CARE UNIT

An intensive care unit (ICU), critical care unit (CCU), intensive therapy unit or intensive treatment unit (ITU) is a specialized department used in many countries' hospitals that provides intensive care medicine. Many hospitals also have designated intensive care areas for certain specialties of medicine, as dictated by the needs and available resources of each hospital. The naming is not rigidly standardized and varies depending on countries.

INTERNAL MEDICINE

Internal Medicine is the medical specialty concerned with the diagnosis, management and nonsurgical treatment of unusual or serious diseases. Specialists in internal medicine are commonly called internists and physicians in North America and the Commonwealth nations respectively. Internists do all or much of their work in hospitals due to the complicated nature of the ailment. Patients are often seriously ill or require complex investigations; internists do much of their work in hospitals. Formerly, many internists were not sub specialized and would see any complex nonsurgical problem; this style of practice has become much less common.

LABORATORY SERVICES

A laboratory is a facility that provides controlled conditions in which scientific research, experiments, and measurement may be performed. The title of *laboratory* is also used for certain other facilities where the processes or equipment used are similar to those in scientific laboratories. These notably include:

- the film laboratory or darkroom
- the computer lab
- the medical lab
- the clandestine lab for the production of illegal drugs¹²

Scientific laboratories can be found in schools and universities, in industry, in government or military facilities, and even aboard ships and spacecraft. The design of a laboratory usually depends on the purpose and also the people using the facility (population). A laboratory might offer work space for just one person or groups of people.

NEUROLOGY

Neurology is a medical specialty dealing with disorders of the nervous system. It deals with the diagnosis and treatment of all categories of disease involving the central, peripheral, and autonomic nervous systems, including their coverings, blood vessels, and all effectors tissue, such as muscle. Neurologists are physicians who specialize in neurology and are trained to investigate, or diagnose and treat, neurological disorders. Paediatric neurologists treat neurological disease in children. Neurologists may also be involved in clinical research, clinical trials, as well as basic research and translational research.

NURSING UNIT

A nursing unit is an area in a hospital or other health care delivery setting where patients with similar needs are grouped to facilitate the delivery of care by health care professionals trained in that specialty. A nurse manager or matron is in charge of the unit.

Types of nursing units

Inpatient units

- Bone marrow transplant
- Burn unit
- Geriatrics
- Hematology/Oncology
- Labor and Delivery

Outpatient clinics

- Burn treatment
- Diabetes
- Disabilities and developmental disorders
- Chemical dependency
- Dermatology
- Diagnostic Radiology

Intensive care units

- Cardiovascular intensive care unit (CCU)
- Medical intensive care unit (MICU)
- Neonatal intensive care unit (NICU)
- Paediatric intensive care unit (PICU)
- Step-down care units
- Surgical intensive care unit (SICU)

Surgical units

- Ambulatory surgery
- Main operating room
- Post-anaesthesia care

OBSTETRICS AND GYNAECOLOGY

Obstetrics and Gynaecology (often abbreviated to OB/GYN, O&G or Obs & Gynae) are the two surgical specialties dealing with the female reproductive organs, and as such are often combined to form a single medical speciality and postgraduate training program. This combined training prepares the practicing OB/GYN to be adept at the surgical management of the entire scope of clinical pathology involving female reproductive organs, and to provide care for both pregnant and non-pregnant patients. All obstetricians, therefore, are trained gynaecologists, although the reverse is not necessarily true.

ORTHOPEDIC SERVICES

Orthopaedic surgery or orthopaedics (also spelled orthopaedics) is the branch of surgery concerned with conditions involving the musculoskeletal system. Orthopaedic surgeons use both surgical and non-surgical means to treat musculoskeletal trauma, sports injuries, degenerative diseases, infections, tumours, and congenital conditions.

OUTPATIENTS DEPARTMENT

An outpatient is a patient who is not hospitalized overnight but who visits a hospital, clinic, or associated facility for diagnosis or treatment. Treatment provided in this fashion is called ambulatory care. Outpatient surgery eliminates inpatient hospital admission, reduces the amount of medication prescribed, and uses a doctor's time more efficiently. More procedures are now being performed in a surgeon's office, termed office-based surgery, rather than in an operating room. Outpatient surgery is suited best for healthy people undergoing minor or

intermediate procedures (limited urologic, ophthalmologic, or ear, nose, and throat procedures and procedures involving the extremities).

PATHOLOGY

Pathology is the study and diagnosis of disease through examination of organs, tissues, bodily fluids and whole bodies (Autopsy). The term also encompasses the related scientific study of disease processes, called General pathology.

PEDIATRICS

Paediatrics (also spelled paediatrics in the United Kingdom and Commonwealth) is the branch of medicine that deals with the medical care of infants, children, and adolescents. The upper age limit ranges from age 14 to 18, depending on the country¹³.

A medical practitioner who specializes in this area is known as a paediatrician (also spelled *paediatrician*).

Paediatrics differs from adult medicine in many respects. The obvious body size differences are paralleled by maturational changes. The smaller body of an infant or neonate is substantially different physiologically from that of an adult. Congenital defects, genetic variance, and developmental issues are of greater concern to paediatricians than they often are to adult physicians. Childhood is the period of greatest growth, development and maturation of the various organ systems in the body. Years of training and experience (above and beyond basic medical training) goes into recognizing the difference between normal variants and what is actually pathological.

Treating a child is not like treating a miniature adult. A major difference between paediatrics and adult medicine is that children are minors and, in most jurisdictions, cannot make decisions for themselves. The issues of guardianship, privacy, legal responsibility and informed consent must always be considered in every paediatric procedure. In a sense, paediatricians often have to treat the parents and sometimes, the family, rather than just the child. Adolescents are in their own legal class, having rights to their own health care decisions in certain circumstances only.

PHARMACY

Pharmacy is the health profession that links the health sciences with the chemical sciences, and it is charged with ensuring the safe and effective use of medication. The scope of pharmacy practice includes more traditional roles such as compounding and dispensing medications, and it also includes more modern services related to patient care, including clinical services, reviewing medications for safety and efficacy, and providing drug information. Pharmacists, therefore, are the experts on drug therapy and are the primary health professionals who optimize medication use to provide patients with positive health outcomes. The term is also applied to an establishment used for such purposes. The first pharmacy in Europe (still working) was opened in 1241 in Trier, Germany¹⁴.

PSYCHIATRIC WARD

A psychiatric hospital is a hospital specializing in the treatment of serious mental illness, usually for relatively long-term inpatients.

Two rules usually govern whether someone should be placed in a psychiatric hospital: if someone is an immediate threat to harm themselves, or to harm other people¹⁵. If neither of these two criteria is met, then the patient may benefit from outpatient care. If there is uncertainty as to the extent of a patient's danger to themselves or others, they are typically placed in a hospital for safety reasons.

NUCLEAR MEDICINE

Nuclear medicine imaging involves the administration into the patient of radiopharmaceuticals consisting of substances with affinity for certain body tissues labelled with radioactive tracer. The most commonly used tracers are Technetium-99m, Iodine-123, Iodine-131, Gallium-67 and Thallium-201¹⁶. The heart, lungs, thyroid, liver, gallbladder, and bones are commonly evaluated for particular conditions using these techniques. While anatomical detail is limited in these studies, nuclear medicine is useful in displaying physiological function. The excretory function of the kidneys, iodine concentrating ability of the thyroid, blood flow to heart muscle, etc. can be measured. The principal imaging device is the gamma camera which detects the radiation emitted by the tracer in the body and displays it as an image. With computer processing, the information can be displayed as axial, coronal and sagittal images (SPECT images). In the most modern devices Nuclear Medicine images can be fused with a CT scan taken quasi-simultaneously so that the physiological information can be overlaid or co-registered with the anatomical structures to improve diagnostic accuracy.

SURGERY

Surgery is a medical technology consisting of a physical intervention on tissues. As a general rule, a procedure is considered surgical when it involves cutting of a patient's tissues or closure of a previously sustained wound. Other procedures that do not necessarily fall under this rubric, such as angioplasty or endoscopy, may be considered surgery if they involve "common" surgical procedure or settings, such as use of a sterile environment, anaesthesia, antiseptic conditions, typical surgical instruments, and suturing or stapling. All forms of surgery are considered invasive procedures; so-called "non-invasive surgery" usually refers to an excision that does not penetrate the structure being excised (e.g. laser ablation of the cornea) or to a radio surgical procedure (e.g. irradiation of a tumour)¹⁷.

After completion of surgery, the patient is transferred to the post anaesthesia care unit and closely monitored. When the patient is judged to have recovered from the anaesthesia, he/she is either transferred to a surgical ward elsewhere in the hospital or discharged home. During the post-operative period, the patient's general function is assessed, the outcome of the procedure is assessed, and the surgical site is checked for signs of infection. If removable skin closures are used, they are removed after 7 to 10 days post-operatively, or after healing of the incision are well under way.

UROLOGY

Urology is the surgical specialty that focuses on the urinary tracts of males and females, and on the reproductive system of males. Medical professionals specializing in the field of urology are called urologists and are trained to diagnose, treat, and manage patients with urological disorders. The organs covered by urology include the kidneys, urethras, urinary

bladder, urethra, and the male reproductive organs (testes, epididymis, vas deferens, seminal vesicles, prostate and penis).

Urology is closely related to, and in some cases overlaps with, the medical fields of oncology, nephrology, gynaecology, paediatric surgery, plastic surgery, proctology, dermatology and endocrinology.

MEDICAL RECORDS

A medical records department is a department in a hospital or other health care facility that houses the records of patients who have been admitted to the hospital and subsequently have been discharged, transferred to ambulatory care services, left against medical advice, or expired¹⁸.

A medical record, health record, or medical chart is a systematic documentation of a patient's medical history and care. The term 'Medical record' is used both for the physical folder for each individual patient and for the body of information which comprises the total of each patient's health history. Medical records are intensely personal documents and there are many ethical and legal issues surrounding them such as the degree of third-party access and appropriate storage and disposal. Although medical records are traditionally compiled and stored by health care providers, personal health records maintained by individual patients have become more popular in recent years

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CHAPTER THREE

3.0 CASE STUDIES - PURPOSE OF STUDY

The purpose of the case studies is to identify both positive and negative aspects of design on space allocations, effect on patient care resulting from environmental variables, lighting, students space, lecture halls and auditorium etc in the development of Teaching Hospitals with the objectives to reach an environment that stimulates the senses, promote learning, teaching, healing and optimisation of operational aspects and well-being.

The case studies will focus on

1. Okomfo Anokye Teaching Hospital, Kumasi
2. Korle-Bu Teaching Hospital.

These are the facilities relevant in this study in terms, climatology requirement of tropical environment and tropical architecture.

3.1 CASE STUDY-KOMFO ANOKYE TEACHING HOSPITAL (KUMASI).

Visits were made to Komfo Anokye Teaching Hospital (KATH) in Kumasi since it had to adapt certain facilities to enhance its approach to training medical doctors based on its training philosophy. Similarly the UDS Teaching Hospital will be different, based on its own philosophical approach. Since the approach of the UDS is closer to those of Kath, it was necessary to study KATH in detail.



Figure 1. The Komfo Anokye Teaching Hospital massing (aerial view).

Source; Department of Architecture.

3.11 HISTORY

The Komfo Anokye Teaching Hospital (KATH) is the second-largest hospital in the country and the only tertiary health institution in the Ashanti Region. It is the main referral hospital for the Northern sector of Ghana- Ashanti, Brong Ahafo, Northern, Upper East and Upper West Regions. Source; KATH website

The hospital was built in 1949-1950 as the Kumasi Central Hospital for 169 beds. It was later named Komfo Anokye Hospital after Okomfo Anokye, a legendary fetish priest of the Ashanti. It consisted of semi-detached multi-storey medical blocks¹. In 1955, it was reconstructed and expanded into 950 bed capacity with Nursing School consisting of Surgical block, Administration and OPD. It was converted into a teaching hospital in 1975 and is affiliated to the medical school of the Kwame Nkrumah University of Science and Technology. The hospital also undertakes postgraduate training and is also accredited by the West African College of Surgeons in surgery, obstetrics and gynaecology²,

otorhinolaryngology, ophthalmology and radiology. The hospital currently has about 1000 beds, up from the initial 500 when first built.



Figure 2. The entrance to the wards, the Specialist Clinic, the Psychiatric clinic and the Administration.

Source; personal photography.

3.12 Medical Departments

- Anaesthesia and Intensive Care Unit (ICU)
- Child Health
- Dental, Eye, Ear, Nose and Throat (DEENT)
- Diagnostics
- Medicine
- Obstetrics & Gynaecology
- Oncology
- Polyclinic
- Surgery

Non- Medical Departments

- Domestic Services
- Security

- Supply Chain Management
- Technical Services

3.13 The Poly Clinic



Figure 3. The Poly Clinic which is the main OPD in this Hospital is the first point of call for all clients and patients. It has Consulting rooms, Minor Theatre units and Pharmacy. It is located right at the entrance to the Hospital.

Source; personal photography.



Figure 4. The main entrance to the Poly clinic with patients seated at the waiting area of the Records Department



Figure 5. Doctors on call with other health delivery personnel.

Source; personal photography.



Figure 6. Partitions in the consulting rooms to give privacy to patients being accessed by the doctor.

Source; personal photography.



Figure 8. Another type of patient's assessment room. A resuscitation equipment and oxygen equipment close to bed for consultation.

3.14 The Specialist Clinic



Figure 9. The main entrance to the Specialist Clinic. Cars usually alight patients right the entrance and then exit the hospital premises or park at the hospital car park. The Specialist Clinic houses Consultation in Medicine, Obstetrics and Gaenacology, Paediatrics and Surgery. It has its own Record Department and Pharmacy unit.

3.15 Mode of Circulation

The mode of circulation within the Hospital are;

Vertical means of circulation

- Stairs
- Lifts

Figure 12. A lift in a corridor helping doctors and patients transport themselves to higher floors vertically to warding units and other departments. Source; personal photography.

Horizontal means of circulation

- Covered walkways
- Tunnels

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Figure 10. A covered walkway linking the various blocks. And this form of linkage results in smooth operations of the hospital. Source; personal photography.



Figure 11. A tunnel. Dead bodies are usually transported from the ward to the Mortuary through this tunnel. Source; personal photography.



Figure 12. A lift in operation- helping doctors and patients transport themselves to higher floors vertically to Nursing units and other departments. Source; personal photography.

The Radiology Department



Figure 13. This is the main radiology department for the whole Hospital. Patients having consultation at either the Poly Clinic or the Specialist Clinic will have to come here for assessment when the need arises.

Source; personal photography.

Wards

The wards in the Teaching Hospital are under these various departments

- Medicine
- Paediatrics
- Obstetrics and Gaenecology
- surgery



Figure 14. The wards are open wards of the Nightingale type, which has multiple bed capacity. Nurses on duty at the Wards. This also serves as the consultation area for patients in the wards.

Source; personal photography.



Figure 15. Adequate lighting of the wards has been achieved through the use of natural and artificial light. The beds are aligned parallel to the windows to avoid glare. Patients in the Wards with their Visitors during Visitation hours.



Figure 16. Paediatric Ward with Doctors examining children.

Source; personal photography.



Figure 17. The pharmacy in the wards for quick delivery of drugs during emergencies.

Source; personal photography.

3.18 Services

Electricity was from the main Ghana electricity supply chain or national grid. Standby generators are used to support the power system of the hospital.

Water is from the water company and is stored in tanks.

Waste is collected and treated by the zoomlion company.

3.19 Parking

The hospital had enough parking area for both visitors and the hospital staff.

3.2 Landscape

The courtyards and the surrounding environment were landscaped with grass, shrubs and trees. This created a cool, serene and less noisy environment.

3.3 Analysis of the Komfo Anokye Teaching Hospital

Disadvantages of the Teaching Hospital

- The functional relationships of the various departments of the hospital have not been properly done. The buildings representing these have been scattered on the site without care for patient's ease of accessibility.
- 1. The Mortuary too close to the Wards.
- 2. The Radiology department is too far from the OPD areas.
- 3. The Specialist Clinic which is also an OPD is placed too close to the wards thus creating noise all the time.
- 4. The other consultation areas such as the Ear, Nose and Throat areas are located too far from the reach of patients.

Advantages of the Teaching Hospital

- The different Wards are linked properly on each floor thereby enhancing quality health delivery to patients by the Health Professionals.
- The other consultation areas such as the Diabetic Clinic, the Aids clinic have been properly zoned to encourage patients' consultation the Hospital.

3.4 CASE STUDY 2- THE KORLE-BU TEACHING HOSPITAL (THEATRES).

It is important to note that the operating theatre at Korle-Bu Hospital in Accra is 32.5m².

Many specialists are of the opinion that the surgical suite should be decentralised to improve accessibility and reducing the graphic of movement for patients, doctors and the staff to and from the surgical suite.

Now, many major Hospital department, have minor operating theatres, in this case becoming easily accessible to both patients and health workers. Within the surgical suite, each functional space requires optimum provision of high quality medical equipment and technology, differentiating series of technological processes- modular anaesthetic, sterilization of surgical equipment, preparation rooms, doctor gowning, recovery room etc.

Experts now suggest that the surgical suite should be planned to meet optimum changes in the future.

At Korle-Bu, the cardiothoracic centre is well equipped, having operating theatre, ICU and renal dialysis equipment.

The above shows that space requirement in any hospital set-up must reflect the functions of the processes that take place.

3.5 THE SURGICAL SUITES IN HOSPITALS

The size of the surgical suites in many hospitals averages about 30m^2 .

The size in the contemporary surgical suites which are well equipped and employ advanced methods of operation averages about 36m^2 .

Much research work had gone on to find the most optimum configuration of the surgical suite that led to theatres with dead ends. These researches resulted in a series of solutions to find the optimum configuration of the operating theatres which ignored the provision of thermal comfort in the surgical suites. It is noted that the absence of day lighting (natural lights) leads to weariness, and fatigue on users and stakeholders including staff.

Researchers are of the opinion that the best orientation for operating theatres is north-west orientation because by late afternoon, all operation would have been completed. Thanks to research studies in the area of bacteriology, radiology and anaesthesiology and other scientific studies today the surgical suite has become the centre of all hospital functional relationship matrixes.

The basic function of the surgical department is to provide an efficient, safe, and comfortable environment in which surgery can be carried out.

The location of the surgical suite in a hospital set-up is critical to hospital function. It is located such that graphic of movement of doctors, patients and staff is reduced for effective medical administration and hospital care. So also is the movement of sterilised materials and the provision of septic and aseptic space in the surgical suite.

3. 6 SIZES OF SOME SURGICAL SUITES IN GHANA.

- Korle-Bu Teaching Hospital.....32.5m².
- Regional Hospital – Sunyani.....41m²
- District Hospital – Sehwi Wiaso.....36.48m²
- District Hospital – Mampong.....30.0m²
- Kete krachi Hospital.....32.49m²
- Winneba District Hospital.....42.6m²
- Akim Oda Hospital.....32.0m²



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CHAPTER FOUR

4.0 THE TAMALE TEACHING HOSPITAL

Having established the need for a Teaching Hospital for the UDS medical school and its components, this chapter deals with the actual design. Various factors affecting the design will now be considered. These include the climate, site and its conditions, the clients brief and the design philosophy guiding the scheme.

4.1 SITE

The site is located in the Northern Region of Ghana- Tamale. The project is on the old Hospital site. The site is bounded by the second ring road and the Salaga road.

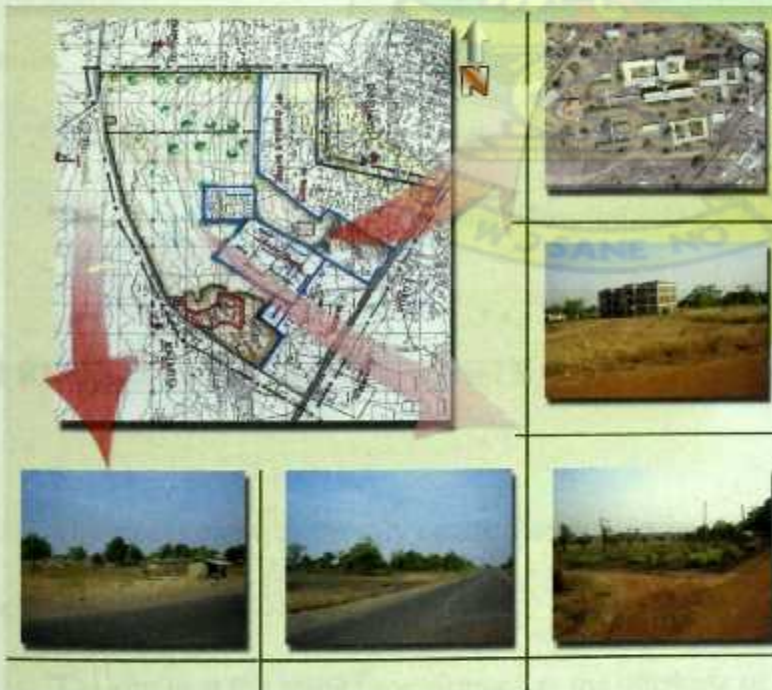


Figure 18. showing the Tamale Teaching Hospital site with its boundaries.

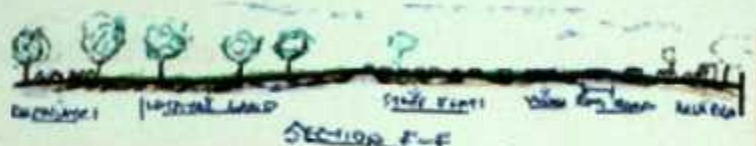
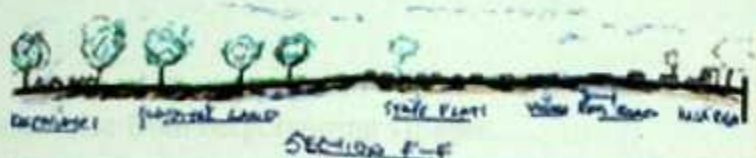


Figure 19. showing the sections through the site.



4.11 CONDITIONS ON SITE

- The site slopes gently down south.
- It has a fetish groove on the western part of the site.
- There is a cemetery on the Eastern side of the site.
- The site has the dilapidated staff buildings of single storey spread on the site.
- The site has services such as electricity, water and telephone at the developed portions.
- There is encroachment on the acquired portions of the site.
- The site currently has the regional Hospital and staff Bungalows on it.

4.12 REASONS FOR CHOOSING SITE ON A MACRO LEVEL

- The site is close to the city centre thereby easily accessible by people from all parts of the city.
- The site is at the same time situated at the outskirts of the city centre thereby eliminating noise and disturbances from the city centre and its associated noisy neighbouring.

- The site is easily accessible by students from the Medical School thus enhancing higher standards of learning.

4.13 REASONS FOR CHOOSING SITE ON MICRO LEVEL

- Less noise from neighbouring villages.
- Security is ensured.
- The site is quite bare with little encroachment.

4.14 SWOT ANALYSIS

Strength

- The site is quite sizeable.
- There is good drainage along the periphery of the southern portion.
- There are already present services such as electricity, water and telecommunication.

Weakness

- It has lots of encroachment at present.
- It has fairly bad landscaping. The southern parts are almost eroded by rain and wind.
- It is dusty on site.
- Most buildings are scattered on site therefore increasing the demolishing of buildings on site.
- The site has no security wall hence animals are found loitering on the site.

Opportunities

- The site is easily accessed.
- Taxi ranks for transportation. Of people from the Hospital.
- The site has food vendors and shops to offer services to clients who visit the hospital.
- Pollution from the surrounding neighbourhoods is totally eliminated.

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4.20 DESIGN PROCESS

4.21 CLIENTS

1. The government of Ghana.
2. The UDS Medical School.
3. The three northern regions.

4.22 CLIENTS BRIEF

- Accommodation for staff and students.
- Hospital facilities such as;
 - 1) Specialist clinics.
 - 2) Poly clinic.
 - 3) Radiology and Radiotherapy departments.
 - 4) Mortuary.
 - 5) Administration.
 - 6) Canteen.

- 7) Laundry.
- 8) Sterilization unit.
- 9) Trauma centre.
- 10) Wards.
- 11) Research units.

4.23 REFINED BRIEF

- Accommodation;

- 1) Junior staff- nurses and doctors.
- 2) Senior staff- nurses and doctors.
- 3) Executives of hospital.
- 4) Accommodation for students.

- Hospital facilities such as;

- 1) Specialist clinics.
- 2) Poly clinic.
- 3) Radiology and Radiotherapy departments.
- 4) Mortuary.
- 5) Administration.
- 6) Canteen.
- 7) Laundry.
- 8) Sterilization unit.
- 9) Trauma centre.
- 10) Wards.

- 11) Research units.
- 12) Sewage plant.
- 13) Mixed use facility.
- 14) Mosque.
- 15) Taxi rank.
- 16) General stores.
- 17) Car parks.

4.24 RESPONSE TO SITE

SITE PLANNING- THE STAFF AND STUDENTS ACCOMODATION AND THE TEACHING HOSPITAL ON SITE.

The planning of the various building blocks- residential, recreational, health and commercial just like any planning scheme was done with the major issues such as health, environment, convenience and beauty in consideration.

The object of convenience is in the form of various economic, social and recreational amenities to be given to the public. These amenities include cheap power and electricity, proper sites for industrial wastes, facilities to commercial units, etc. The recreational amenities include open spaces, parks, town halls, playgrounds, cinema houses, community centres, stadiums, etc¹. In the case of the Teaching Hospital, playgrounds, parks, open spaces, and staff halls or clubs have been incorporated in the design and planning of the whole area. There are also mixed use facilities as well as commercial units. The sewage treatment facility for the Teaching Hospital has also been properly zoned.

The object of beauty is achieved by taking the most possible advantages of the natural conditions surrounding the town and also by given architectural finishes to the various components of the town. It also includes the preservation of trees, natural greenery, and architectural control on public as well as semi-public buildings, temples, churches, mosques, and buildings of cultural and historical significance, etc². The predominant religion in the region is Islamic religion. The design and location of such a facility has been adequately planned for. The zoning of public areas (the Teaching Hospital) from the semi public areas (residential areas) has been greatly considered in the planning and design of the Teaching Hospital.

The object of environment is important in the sense that environment should be moulded in such a way that man can go about his normal activities with the least amount of strain. The complex problems of the modern society such as tiresome travel to work, long hours of work, limited time spent within the community, etc. Have gradually led towards serious mal-adjustments between the human being and the type of life he had to live³. These mal-adjustments have tended to destroy the vitality of urban living and the town planning is mainly concerned with bringing about a better relation between man and his environment. The planning and the location of the Teaching Hospital were done with the issue of easy accessibility by both staff and patients to the facility.

The object of health is accommodated in a town planning scheme by making right use of land for right purpose, by providing parks and playgrounds for the public, by maintaining the pollution of various forms to the lowest possible degree, etc⁴. It is achieved by dividing the land into zones such as residential, commercial, etc. and by avoiding the encroachment of one zone upon the smooth and orderly development of the town in future. The mortuary, the

sewage plant and the sterilization facility are all located close to the existing cemetery on site. The residential zones are all grouped together and the Teaching Hospital also on further zoned to areas units, such as public(medical consultation complex), semi- public areas(wards) and private areas such as the sterilization and laundry, canteen, sewage treatment facility and etc.

Option 1

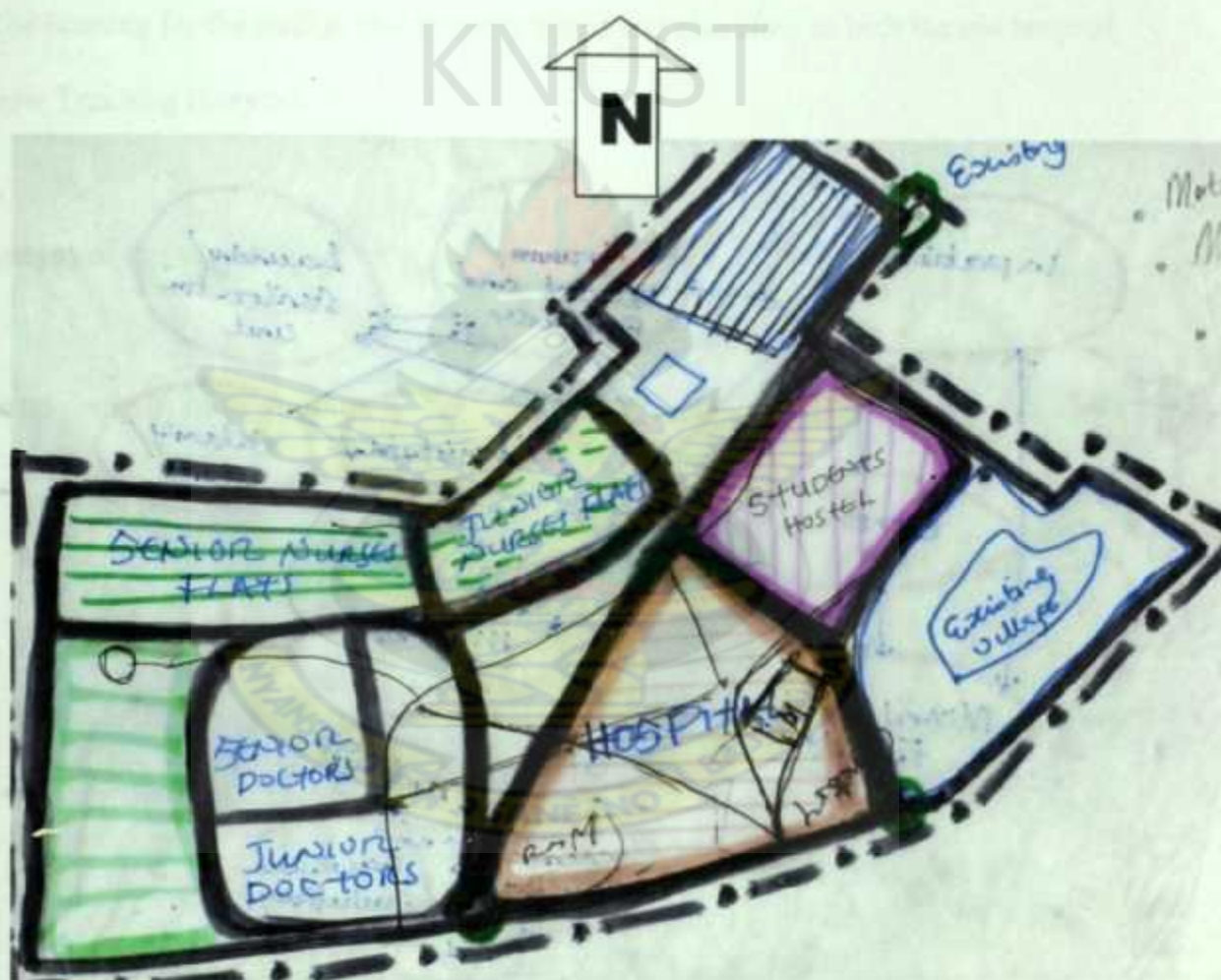


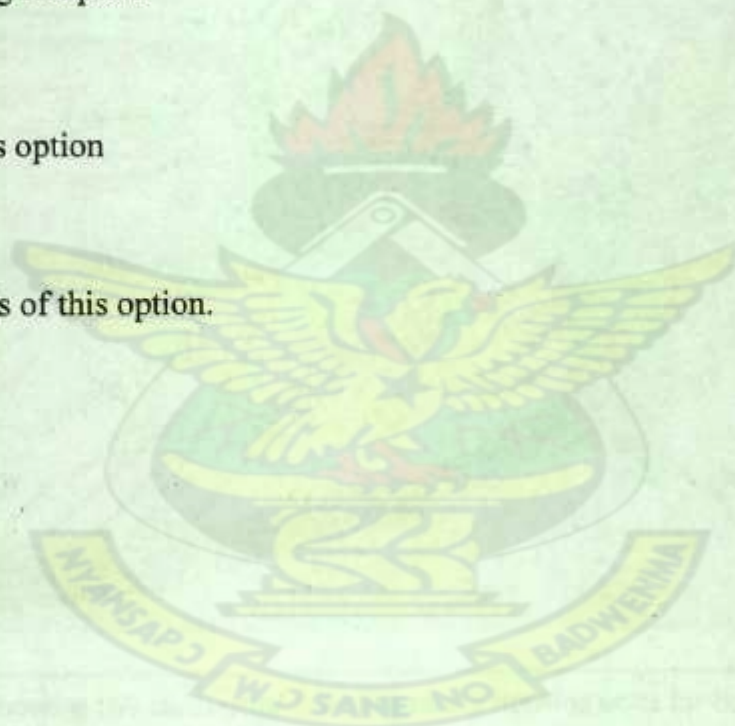
Figure 20. showing the conceptual planning of the housing units for hospital staff and students and the Teaching hospital.

Advantages of this option;

- Students are close to both the existing hospital and the new Teaching Hospital thus enhancing studies.
- The new Teaching Hospital is in good proximity with the old hospital.
- The existing village on the site can be maintained thus making the project more realistic.
- The housing for the staff is also properly zoned and also close to both the old hospital and the new Teaching Hospital.

Disadvantages of this option

There are no demerits of this option.



Option 2

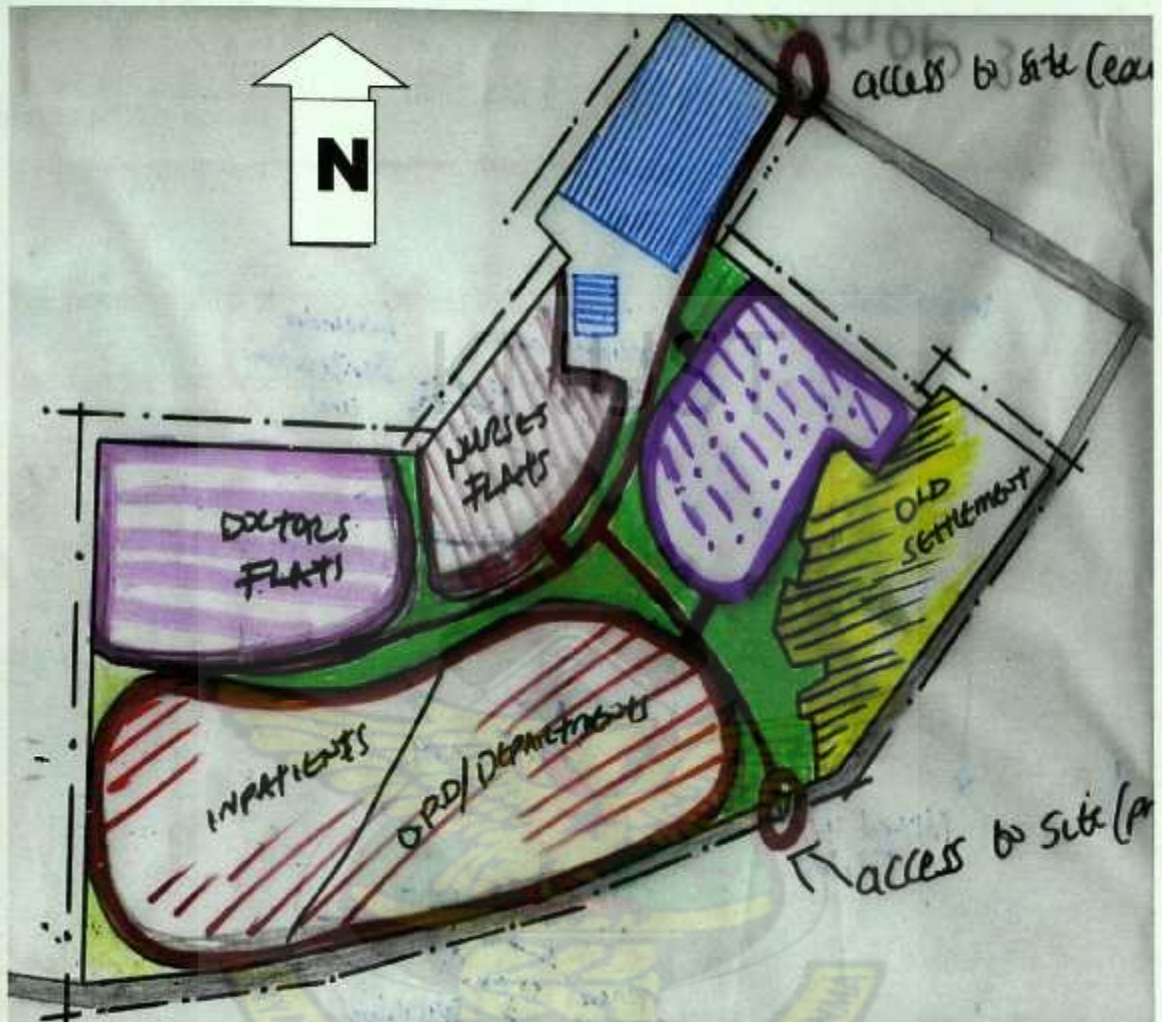


Figure 21. showing the conceptual planning of the housing units for hospital staff and students and the Teaching hospital.

Advantages of this option;

- Students are close to both the existing hospital and the new Teaching Hospital thus enhancing studies.
- The new Teaching Hospital is in good proximity with the old hospital.

- The existing village on the site can be maintained thus making the project more realistic.
- The housing for the staff are also properly zoned and also close to both the old hospital and the new Teaching Hospital.

Disadvantages of this option

- The housing units are too compact and the site is also very limited.
- The site for the Teaching Hospital is too large and is far from the old hospital.

Option 3

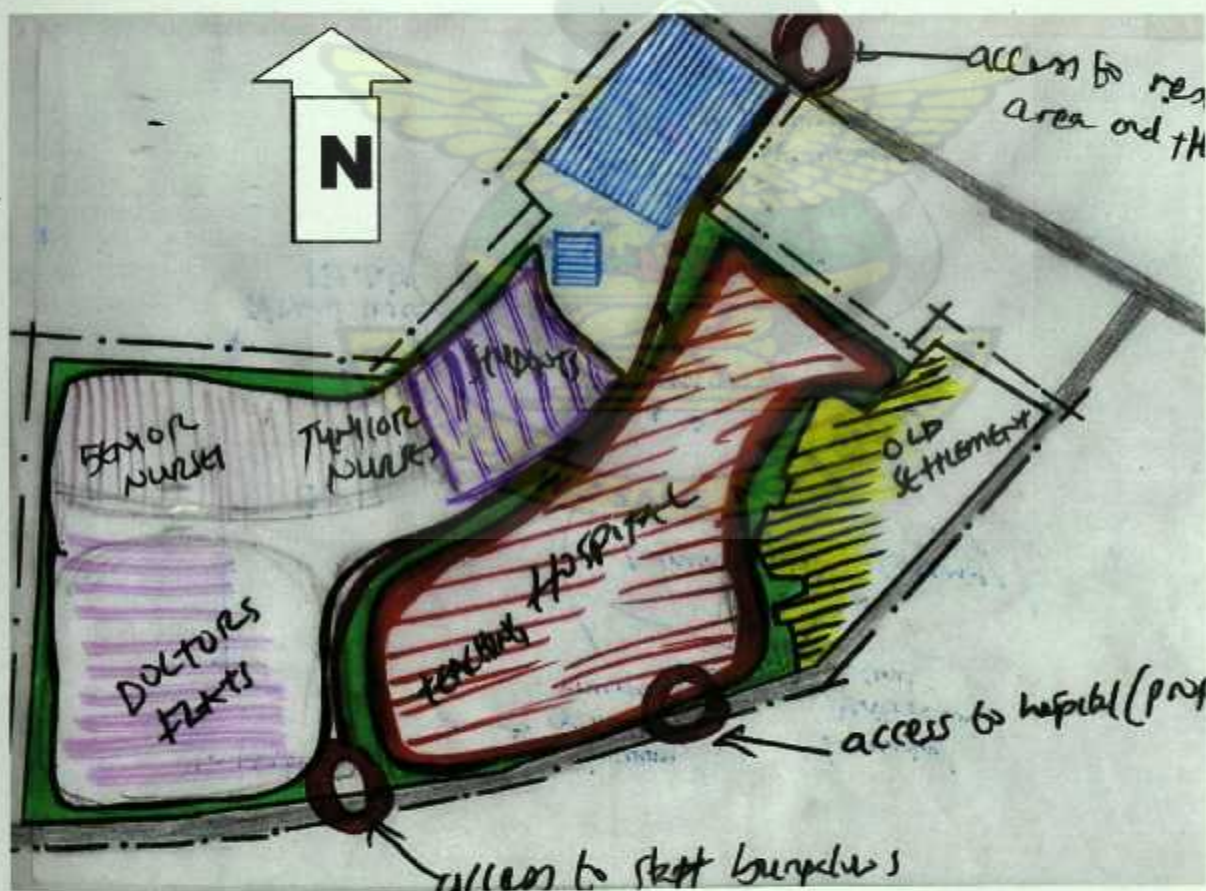


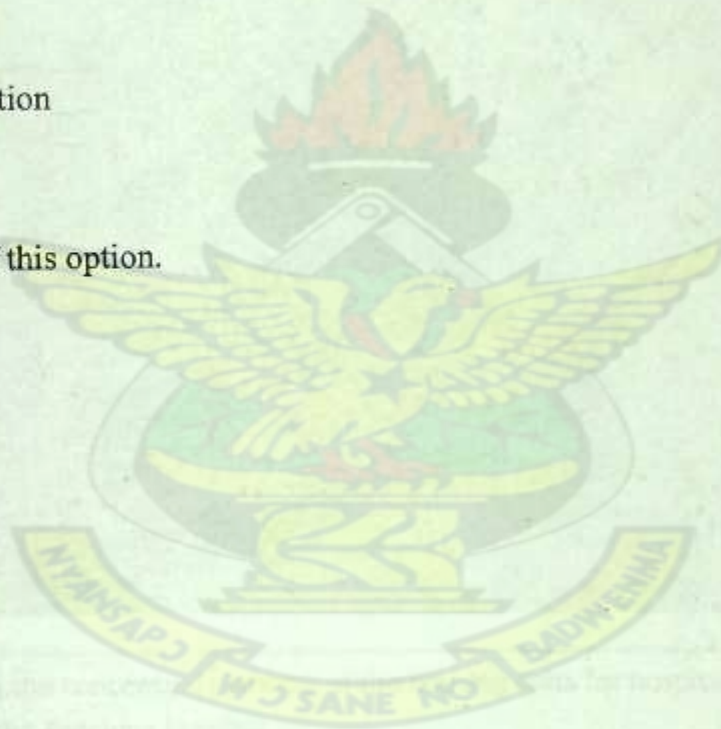
Figure 22. showing the conceptual planning of the housing units for hospital staff and students and the Teaching hospital.

Advantages of this option;

- Students are close to both the existing hospital and the new Teaching Hospital thus enhancing studies.
- The new Teaching Hospital is in good proximity with the old hospital.
- The existing village on the site can be maintained thus making the project more realistic.
- The housing for the staff is also properly zoned and also close to both the old hospital and the new Teaching Hospital.

Disadvantages of this option

There are no demerits of this option.



Option 4



Figure 23. showing the conceptual planning of the housing units for hospital staff and students and the Teaching hospital.

Advantages of this option;

- The new Teaching Hospital is in good proximity with the old hospital.
- The housing for the staff is also properly zoned and also close to both the old hospital and the new Teaching Hospital.

Disadvantages of this option

- The students are farther away from the old hospital.
- The existing village is relocated to a new site thus making the project very expensive and more unrealistic.

Option 5

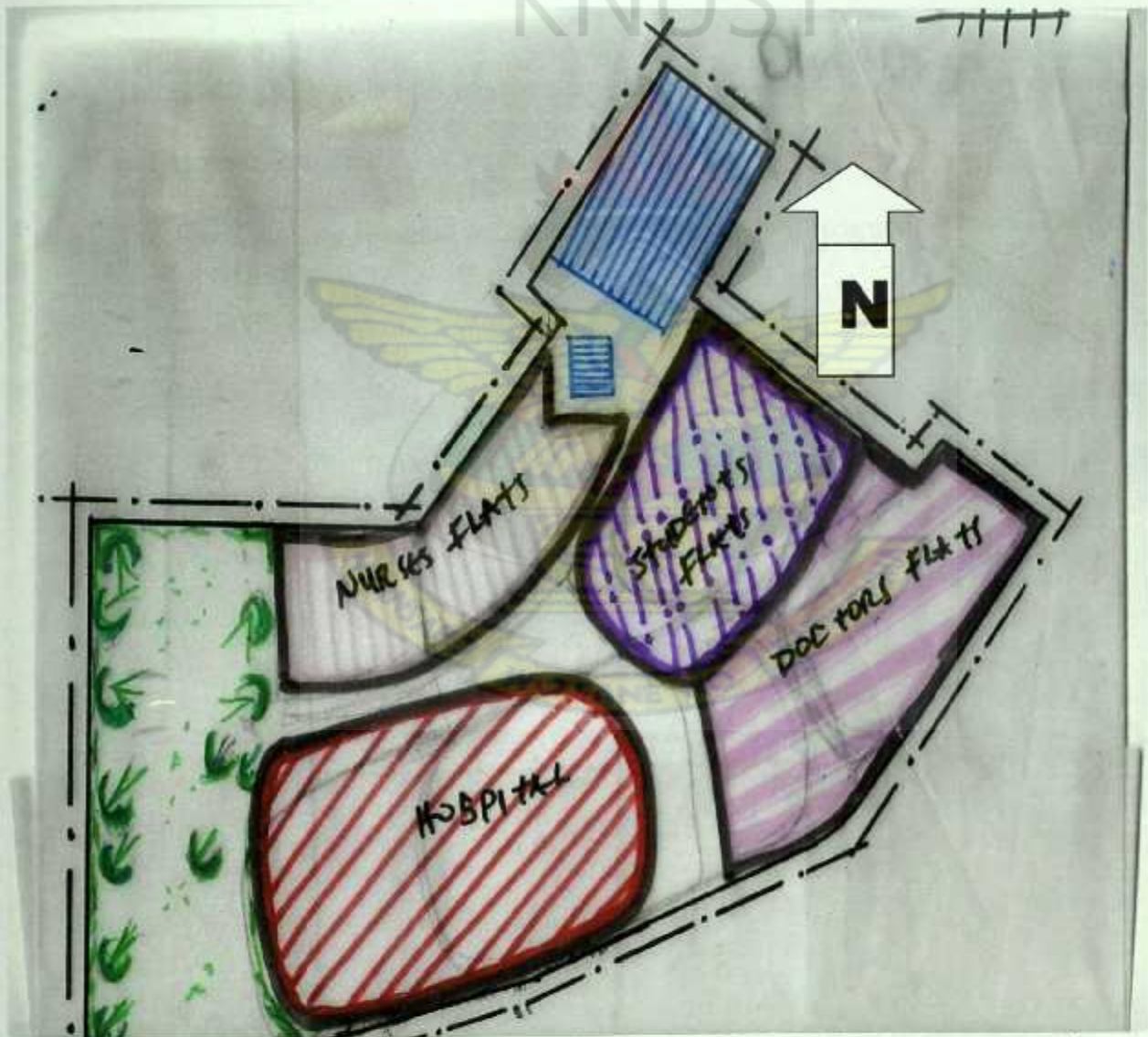


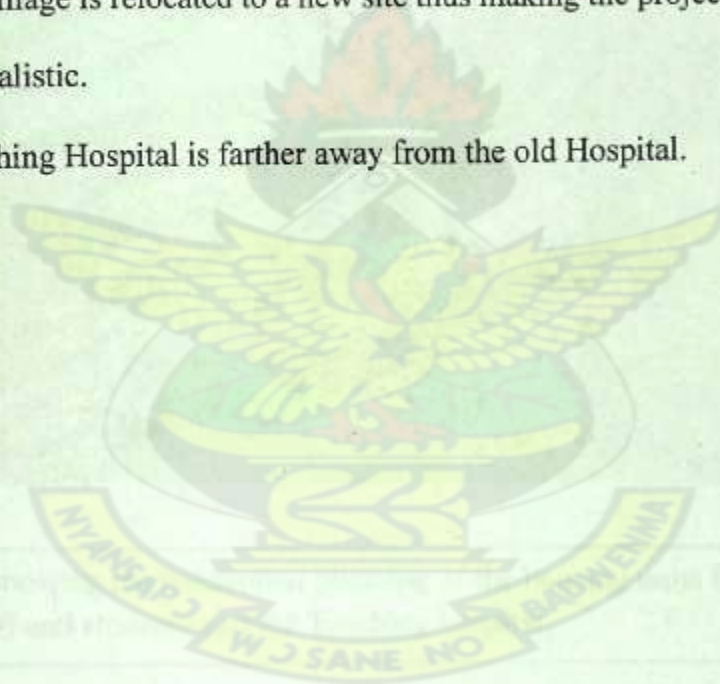
Figure 24. showing the conceptual planning of the housing units for hospital staff and students and the Teaching hospital.

Advantages of this option;

- The housing for the staff is also properly zoned and also close to both the old hospital and the new Teaching Hospital.
- The students housing facility is close to both the old Hospital and the new Teaching Hospital.

Disadvantages of this option

- The existing village is relocated to a new site thus making the project very expensive and more unrealistic.
- The new Teaching Hospital is farther away from the old Hospital.



Option 6

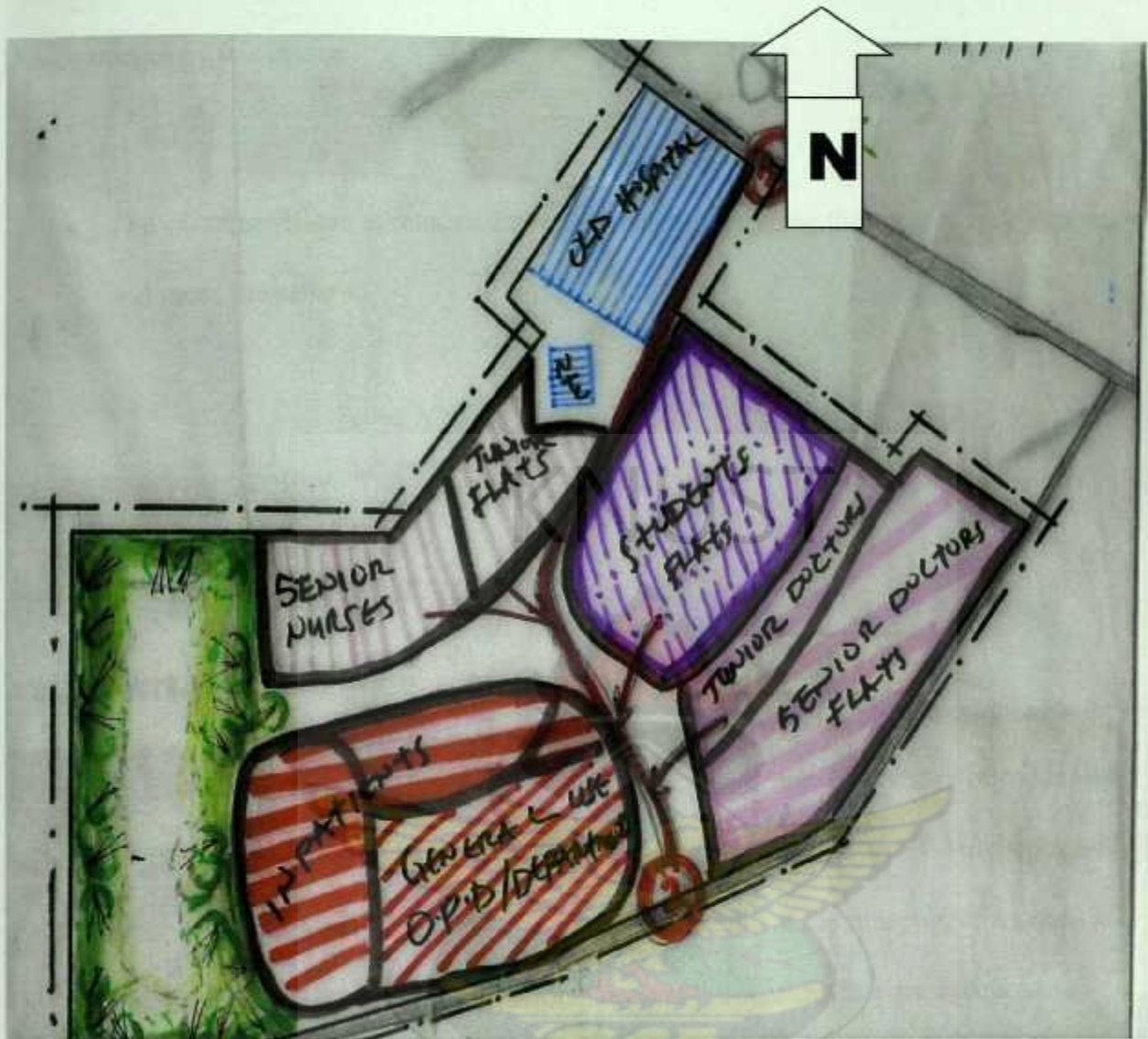


Figure 25. showing the conceptual planning of the housing units for hospital staff and students and the Teaching hospital.

Advantages of this option;

- The housing for the staff is also properly zoned and also close to both the old hospital and the new Teaching Hospital.
- The students housing facility is close to both the old Hospital and the new Teaching Hospital.

- The new Teaching Hospital is also close to the old Hospital.

Disadvantages of this option

- The existing village is relocated to a new site thus making the project very expensive and more unrealistic.

4.25 DESIGN PHILOSOPHY

Blending the old with the new-international style.

4.26 THE INTERNATIONAL STYLE

It is a style that emerged in the 1920s and 1930s during the formative decades of modernist architecture. This name came as a result of a book written by Henry-Russell Hitchcock and Phillip Johnson to document the exhibitions of the 1930s held at the museum of modern arts (MOMA) in New York⁵. This style was evident around the world when architects sort to integrate traditional precedents with new social demands and technological advances.

The ideals and forms of this style are- the expression of volume rather than mass, expulsion of applied ornament, the adoption of glass steel and concrete as preferred materials, balance rather than symmetry and the honest expression of structure⁶.

Great architects of this style are Ludwig Mies Van Der Rohe, le Corbusier, Walter Gropius, Frank Lloyd Wright, Louis Sullivan and Irving Gill.

MASSING; squares and rectangles extruded to various heights and made interesting either through additive of two or subtractive or both.



Figure 26. shows the massing units.

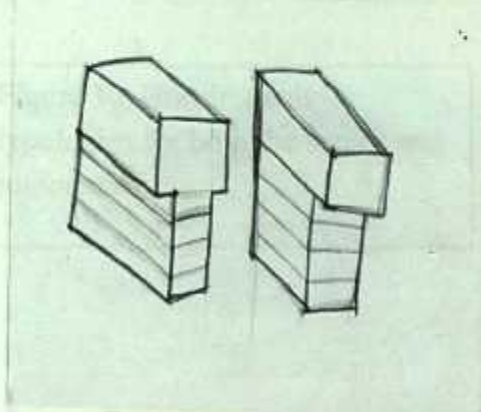


Figure 27. shows the massing units.

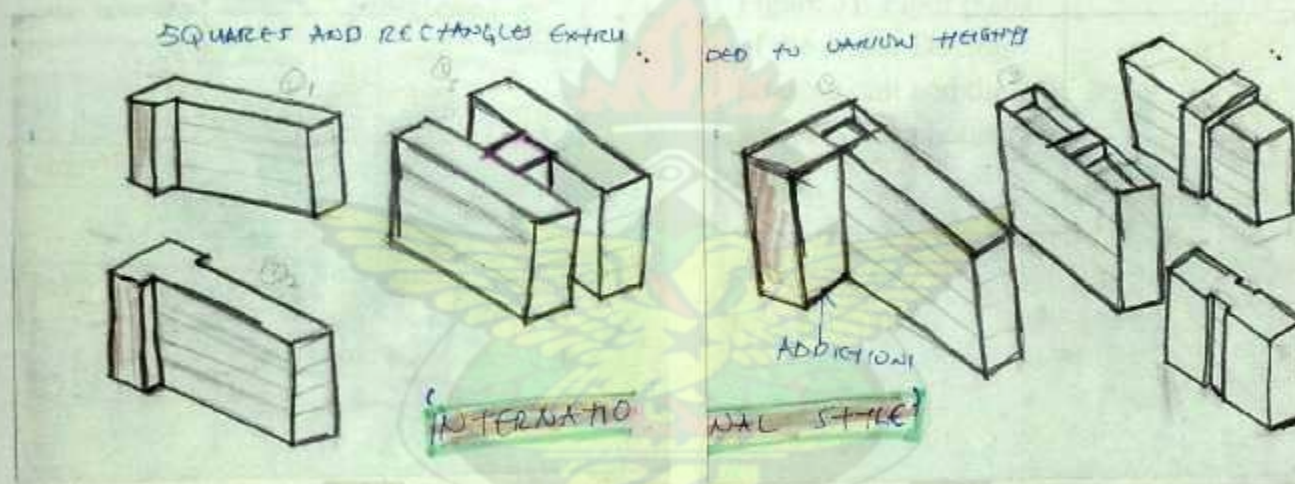


Figure 28. shows the massing units.

Figure 29. shows the massing units.

4.27 PLANNING OF THE HOUSING UNITS

The staff housing units

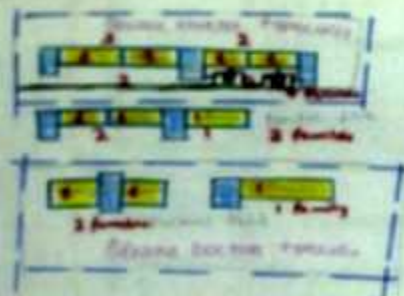


Figure 30. Housing unit typologies for both the senior and junior staff.

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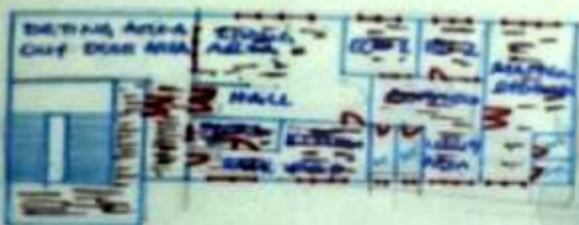


Figure 31. Floor plans of the senior Doctors housing unit and the senior Nurses housing unit.

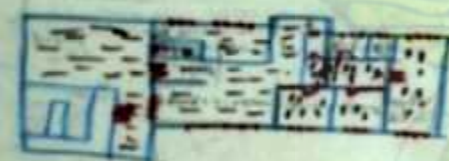


Figure 32. Initial plan of the senior Nurses housing unit.

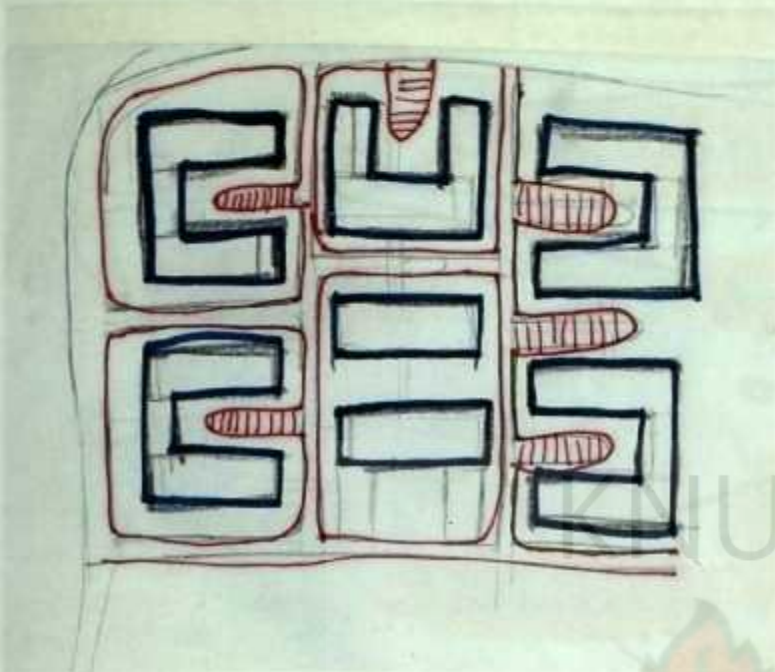


Figure 33. Students housing blocks in relation to one another.

4.28 THE TEACHING HOSPITAL



Figure 34. shows the functional relationship between medical departments.

REFINED FUNCTIONAL DIAGRAM?

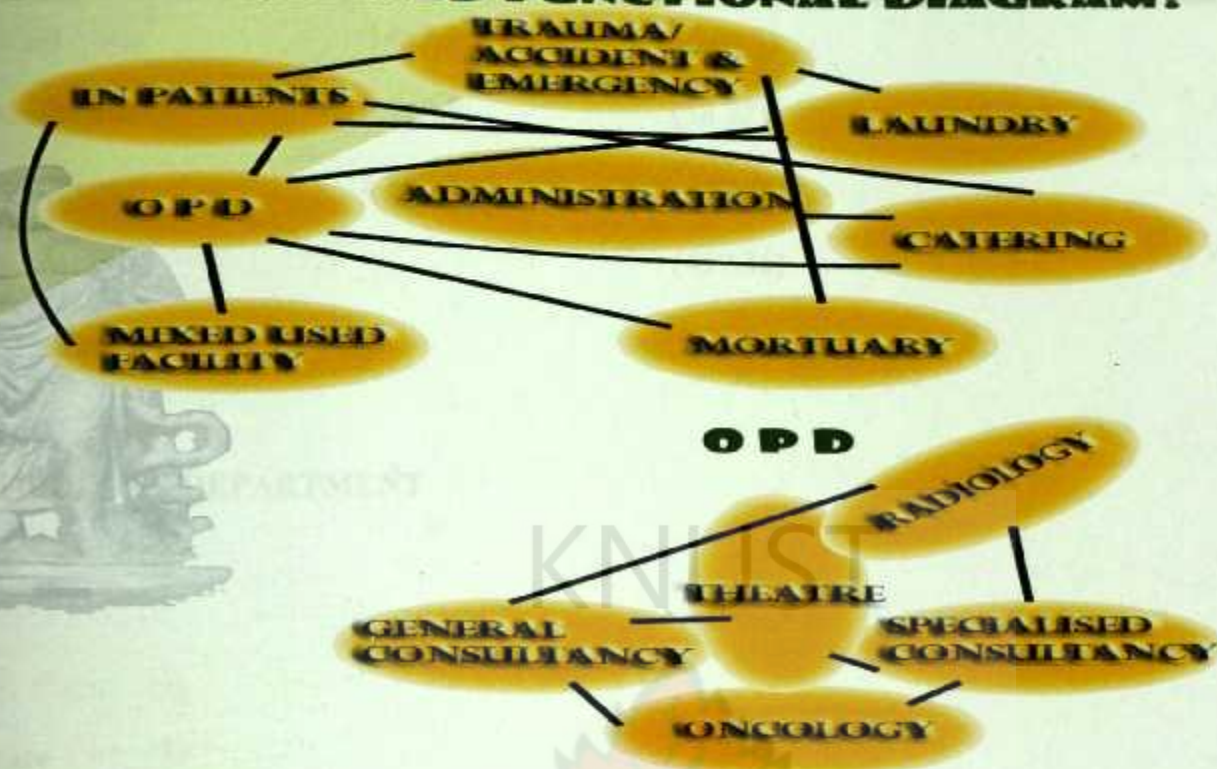


Figure 35. shows the functional relationship between the medical consultation complex and the other medical departments.

4.2.9 ACCOMODATION SCHEDULE

MINOR THEATRE UNIT

Space		Area
2 Recovery -	7.4 x 13.9	(205.72)
4 Theatre -	6.9x4.8	(132.48)
2 Washroom -	6.0x5.9	(70.8)
4 Clean room -	1.9x5.8	(44.08)
2 Anesthesia -	4.9x5.9	(57.82)
2 Changing room -	5.8x4.9	(57, 82)
6 Scrub up -	3.4x3.9	(79.54)
2 Changing -	2.9x4.6	(26.68)

Staff Common Room -	5.3x8.9	(47.17)
2 Ward -	14x7.3	(204.4)
2 Nurses Station -	4,9x3.9	(38.22)
2 Washroom -	2.8x7.3	(40.88)
Circulation -		(459.36)

RADIOLOGY DEPARTMENT

Space		Area
X ray room -	2(5.4x3.6)	(38.88)
Control room -	7.4x2.9	(21.46)
Dirty room -	5.5x2.9	(15.95)
Clean room -	5.5x2.9	(15.95)
Staff Changing room -	2.6x5.5	(14.3)
Patierts Changing room-	7.3x2.8	(20.44)
Inner waition room -	7.4x4.9	(36.26)
Data uint -	3.9x5.4	(21.06)
Office -	(8.3x5.8)+(73.58)	(90.74)
Kitchenette-	5.6x2	(11.2)
Staff common room -	7.4x7.9	(58.46)
Library -	8.5x7.9	(43.45)
Circulation -		(165.14)
Washroom -		(20.35)

LABORATORY DIAGNOSTIC UNIT

Space		Area
Data unit	(3.9x5.4)	(21.06)
2 Laboratory	(88.89)	
Store	(2.7x6.2)	(16.74)
Washroom	(2.6x2x5.5)	(28.6)
2 Office	(2x7.4x5.3)	(78.44)
Staff common room	(6.5x5.5)	(35.75)
Kitchenette	(6.9x1.7)	(11.73)
Circulation		(183.26)

RADIOTHERAPY DEPARTMENTS

Space		Area
Waiting area	5.6x 4.7	(57.62)
Consulting room	3.9x 3.9	(15.21)
Hot laboratory	3.9 x3.9	(15.21)
Injection room	5.5x 4.5	(24.75)
Camera room	3,9 x4.9	(38.22)
Store room	4.9 x1.9	(9.31)
Interview room	4.9 x3.9	(19.11)
Exercise room	4.9 x4.8	(23.52)
Offices	(7.9 x6x2)	(94.8)
Staff common room	(9x 7.9)	(71.1)
Staff outdoor seating area	6.4x 10.8	(69.12)
Circulation.		(157.34)

POLY CLINIC

Space		Area
18 Consulting room	6x4.5x18	[486]
4 Waiting area type	1 [4x8x4.5]	[144]
4 Waiting area type	2 [4x5x4.5]	[90]
2 Waiting area type	3 [206.5x19.5]	[760.5266175]
Dispensary	8x9.3	[74.4]
Paceds	9.85x7.85	[77.3]
Washroom -type	1 4.9x2x11	[107.8]
Washroom - type	2 5.7x5x2	[57]
Washroom - type-	3 5.9x4.3x4	[101.48]
Store room -	5.8x2.8	[16.24]
Triafe nurse-	3.8x3.0	[11.4]
Circulation -	905.4	

SPECIALIST CLINIC

Space		Area
18 Consulting room	6x4.5x18	[486]
4 Waiting area type	1 [4x8x4.5]	[144]
4 Waiting area type	2 [4x5x4.5]	[90]
2 Waiting area type	3 [206.5x19.5]	[760.5266175]
Dispensary	8x9.3	[74.4]
Paceds	9.85x7.85	[77.3]
Washroom -type	1 4.9x2x11	[107.8]
Washroom - type	2 5.7x5x2	[57]

Washroom – type-	3	5.9x4.3x4	[101.48]
Store room -		5.8x2.8	[16.24]
Triafe nurse-		3.8x3.0	[11.4]
Circulation -		905.4	

ADMINISTRATION

Space		Area	
• General office	6.9x9.9	(68.31)	
• Public relations office	6.9X 5.9	(40.71)	
• Research department.....	6.9x9.9	(68.31)	
• Estate office	6.9x9.9	(68.31)	
• Washroom type 1 (2).....	4.3x1.3	(11.18)	
• Washroom type 2 (3).....	4.9x6.9	(101.4)	
• Library	9x15.9	(142.1)	
• Conference room	9x19.9	(179.1)	
• Staff common room	6.9x9.9	(68.31)	
• Computer room	6.9x5.9	(40.71)	
• Center for curtaining education	6.9x9.9	(68.31)	
• Center for undergraduate studies	6.9x9.9	(68.31)	
• Chief executive officer	5.8x5.8	(33.64)	
• Secretary of C T O	5.8x3.9	(22.62)	
• Director of pharmacy... ..	4.5x6.9	(31.05)	
• Director of medicine	6.9x5.9	(40.71)	
• Director of nursing	4.5x 6.9	(31.05)	

Security 2.8x6.9 (19.32)

Circulation..... (613.18)

MORTUARY

Space		Area
Welting area	1 (4.7x5.1)	23.97
Circulation		362.57
Security	1(3.9x3)	11.7
Temporary body store	1(3.9x5)	19.5
Body store		446.04
Post matron laboratory		127.92
Store	1(4.9x6.2)	30.38
Wash room	3.9x3.9	15.21
Changing room	2(3.9x2.2)	17.16
Reception	1(2.9x3.8)	11.02
Waiting area	4.8x5.2	24.96
Library	1(4.9x)	30.38
Staff common room	1(6.4x)	31.36
Kitchenette	1(2.9x2.4)	6.96
Office	2(5.7x5)	28.5
Body wash	1(9.9x4.9)	48.51



Figure 38. Initial plans of the various departmental relationships on site.

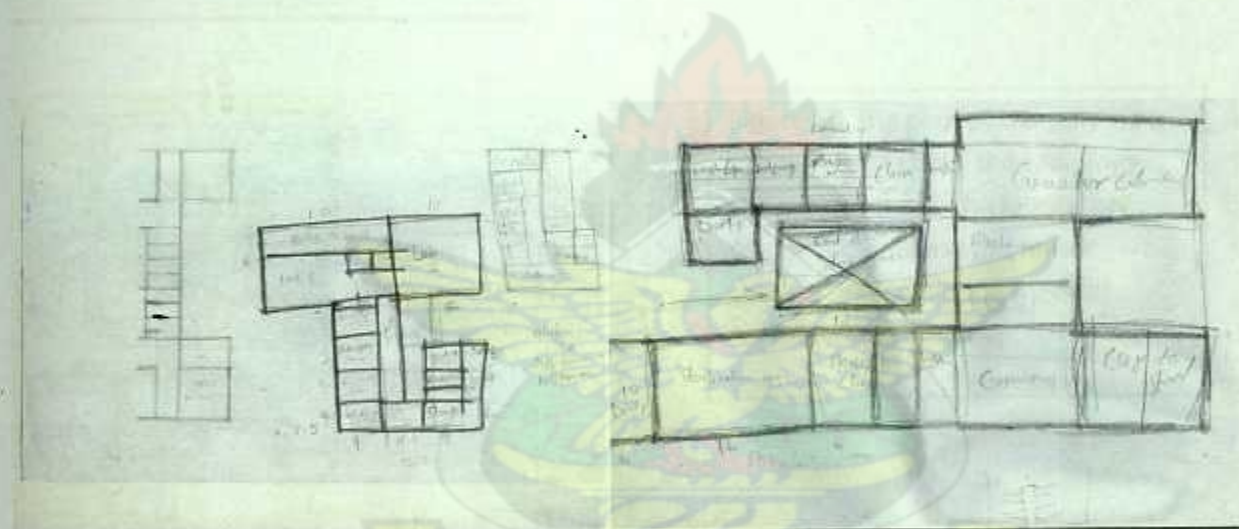


Figure 39. plans the mortuary



Figure 40. plan of the sterilization and laundry unit.

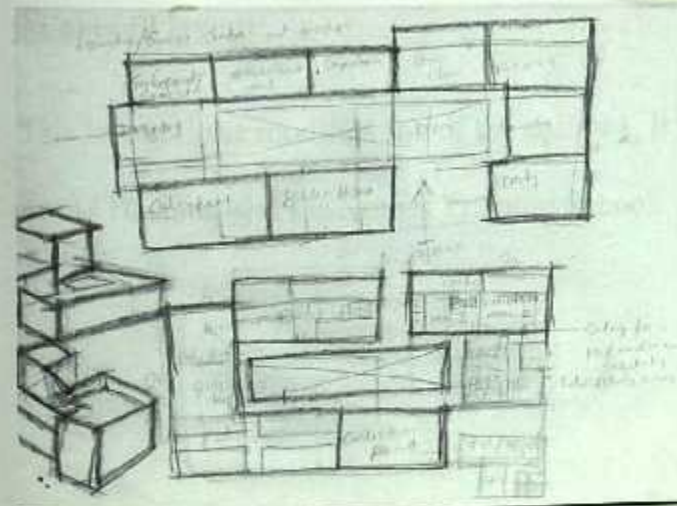


Figure 41. plan of the mortuary, laundry and sterilization unit as one.



Figure 42. the plan of the trauma centre.

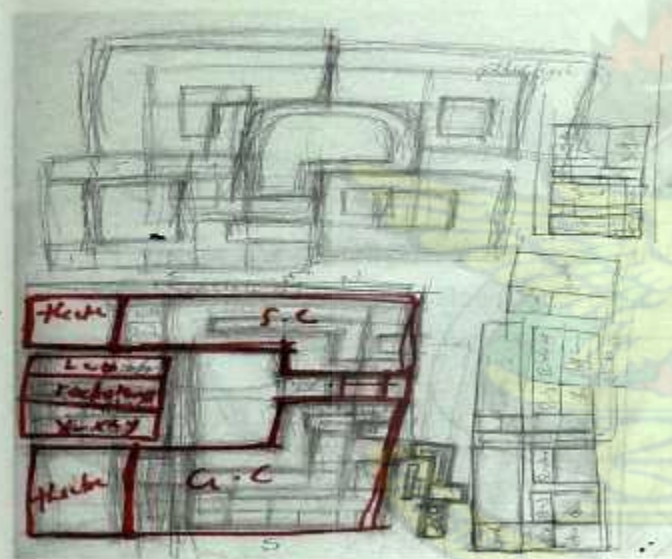


Figure 43. the plan of the poly clinic, the specialist clinic, the radiology, the radiotherapy, the laboratory diagnostic unit and the minor theatre unit called the medical consultation complex.

the overall layout;

This layout is the modification of the option 1. It includes the refined briefs, the old Village, the old Hospital and the Nurses Training School.

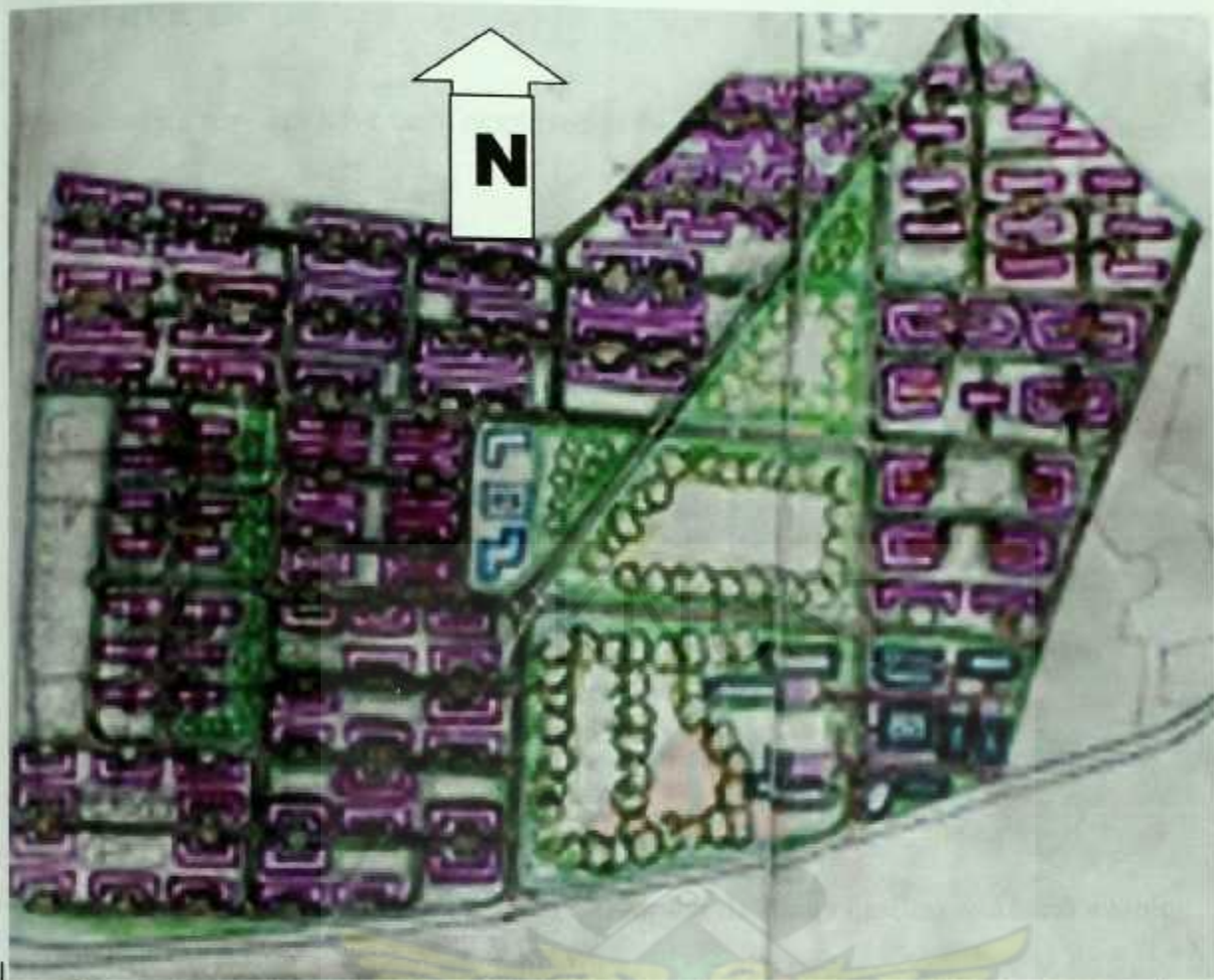


Figure 44. the overall plan of the housing unit and the Teaching Hospital Violets are for housing units and the blue for the facilities at the Teaching Hospital.

The overall layout includes;

- Accommodation for the staff- Doctors, Nurses and the Executives of the old Hospital and the New Teaching Hospital.
- Accommodation for the students.
- The Teaching Hospital.
- The old hospital.
- The existing village

4.3.0 SERVICES

The following services have been employed in the effective functioning of the facilities,

- Water supply
- Drainage/ sewerage treatment
- Electricity
- Security control
- landscaping

4.3.1 WATER SUPPLY

The Teaching Hospital will tap water from the Ghana water company. Rain water will also be harvested into underground tanks by rain gutters positioned along the eaves of the buildings. And this water will mainly be used for the flushing of toilets and hand washing. The rain water from the underground water tank would be treated by an onsite water treatment unit before it is pumped into the overhead tanks for usage. Both the direct and indirect systems shall be employed. As a safety measure, there would be the provision of filters which will be attached to all water outlets.

4.3.2 DRAINAGE

Drainage of soil and wastewater are channeled through pipes and gutters to septic tanks located at the sewerage treatment plant. This waste water would be treated at the onsite waste treatment plant and reused for irrigation of greenery and trees.

4.3.3 ELECTRICITY

There is an existing transformer on the tamale regional hospital site. Electricity would be tapped from this transformer.

Standby generator for the Teaching Hospital is also located close to the administration but centrally located on the hospital premises.

Switches and sockets

Switches and sockets will be of British standard. There will be 13amp sockets in offices, waiting areas, all administrative areas etc.

Lighting

Fluorescent lights of 1200mm x 36W will be placed in general areas. Sky lighting is also employed in circulation as well as waiting areas of the consulting rooms and administration

Outdoor lights have also been provided for car park and general lighting of the surroundings. Photoelectric cell/timer switches is provided to control the outdoor lights.

Power cables of adequate current carrying capacity have been laid and terminated in various equipment including the transformers, generators, change-over switches and distribution panel.

4.3.4 SECURITY CONTROL

Closed Circuit Television (CCTV) is employed in the design to ensure security especially within the wards, by means of security cameras located at vantage points and monitored by security personnel. Entry and exit routes are also secured by security personnel. The whole site has been designed to avoid encroachment by neighbouring communities.

4.3.5 LANDSCAPING

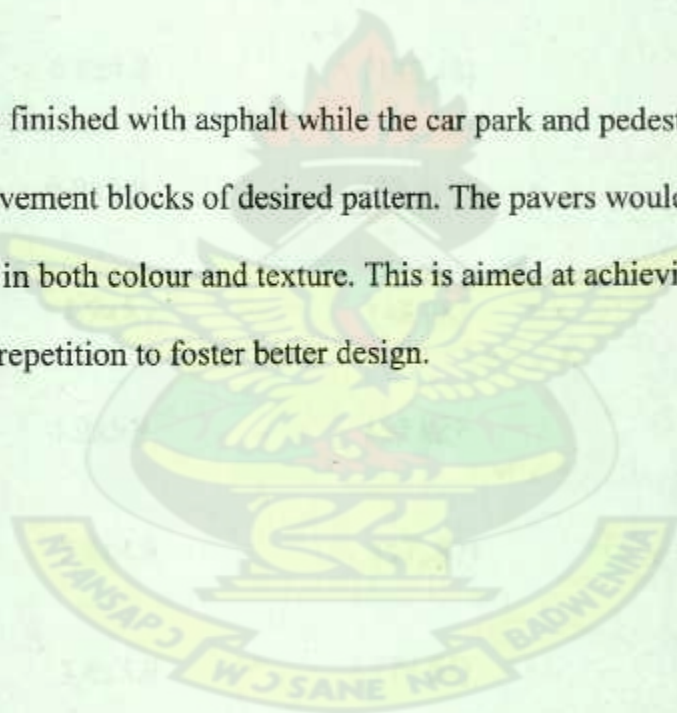
Both soft and hard landscaping techniques will be employed in the design of all spaces within the design.

Soft landscaping;

All courtyards in the facility would be soft landscaped to foster the needed beauty and to create a microclimate against the harsh weather conditions. Tall shady trees will be planted on all open spaces of the site. Open spaces will also be landscaped with lawns, Parking areas would be provided with shady trees. Potted plants would also be placed in the interiors of all spaces excluding washrooms, storerooms, theatres, clean corridors, and laboratories.

Hard landscaping;

The driveways would be finished with asphalt while the car park and pedestrian walkways shall be finished with pavement blocks of desired pattern. The pavers would be blended with the rest of the landscape in both colour and texture. This is aimed at achieving by the principle of rhythm and repetition to foster better design.



4.4 COSTING

It must be stated that the costing is done for the designed facilities-the administration, the mortuary and the medical consultation complex (the radiology department, the radiotherapy unit, the laboratory diagnostic unit, the poly clinic, the specialist clinic and the minor theatre unit).

4.4.1 MINOR THEATRE UNIT

Space	Area	Cost
2 Recovery - 72,002	7.4 x 13.9 (205.72)	GH¢
4 Theatre - GH¢46,368	6.9x4.8 (132.48)	
2 Washroom - 24,780	6.0x5.9 (70.8)	GH¢
4 Clean room - GH¢15,428	1.9x5.8 (44.08)	
2 Anesthesia - 20,237	4.9x5.9 (57.82)	GH¢
2 Changing room - 20,237	5.8x4.9 (57, 82)	GH¢
6 Scrub up - GH¢27,839	3.4x3.9 (79.54)	
2 Changing - 338	2.9x4.6 (26.68)	GH¢
Staff Common Room - GH¢16,509.5	5.3x8.9 (47.17)	
2 Ward - 540	14x7.3 (204.4)	GH¢71,
2 Nurses Station - 377	4,9x3.9 (38.22)	GH¢13,

2 Washroom	- TOTAL	2.8x7.3	(40.88)	
				GH¢14.308
Circulation	-		(459.36)	GH¢160,
776				

TOTAL - **GH¢ 512, 739.5**

4.4.2 RADIOLOGY DEPARTMENT

Space		Area	Cost
X ray room –	2(5.4x3.6)	(38.88)	GH¢13608
Control room -	7.4x2.9	(21.46)	GH¢7511
Dirty room –	5.5x2.9	(15.95)	GH¢5582.5
Clean room –	5.5x2.9	(15.95)	GH¢5582.5
Staff Changing room -	2.6x5.5	(14.3)	GH¢5582.5
Patierts Changing room-	7.3x2.8	(20.44)	GH¢5582.5
Inner waition room -	7.4x4.9	(36.26)	GH¢7, 154
Data uint -	3.9x5.4	(21.06)	GH¢7371
Office –	(8.3x5.8)+(73.58)	(90.74)	GH¢31,759
Kitchenette-	5.6x2	(11.2)	GH¢3, 920
Staff common room -	7.4x7.9	(58.46)	GH¢20, 461
Library -	8.5x7.9	(43.45)	GH¢15, 207.5
Circulation -		(165.14)	GH¢57, 799
Washroom -		(20.35)	GH¢7122.5

TOTAL-**GH¢ 200,774****4.4.3 LABORATORY DIAGNOSTIC UNIT**

Space		Area	Cost
Data unit	(3.9x5.4)	(21.06)	GH¢7, 371
2 Laboratory	(88.89)		GH¢31, 111.5
Store	(2.7x6.2)	(16.74)	GH¢5, 859
Washroom	(2.6x2x5.5)	(28.6)	GH¢10, 010
2 Office	(2x7.4x5.3)	(78.44)	GH¢27, 453
Staff common room	(6.5x5.5)	(35.75)	GH¢12, 512.5
Kitchenette	(6.9x1.7)	(11.73)	GH¢4105.5
Circulation		(183.26)	GH¢64, 141
TOTAL			GH¢ 162,564.5

4.4.4 RADIOTHERAPY DEPARTMENTS

Space		Area	Cost
Waiting area	5.6x 4.7	(57.62)	GH¢20167
Consulting room	3.9x 3.9	(15.21)	GH¢5325.5
Hot laboratory	3.9 x3.9	(15.21)	GH¢5325.5
Injection room	5.5x 4.5	(24.75)	GH¢8662.5
Camera room	3,9 x4.9	(38.22)	GH¢13,377
Store room	4.9 x1.9	(9.31)	GH¢3258.5
Interview room	4.9 x3.9	(19.11)	GH¢6, 688.5

Exercise room	4.9 x4.8	(23.52)	GH¢8232
Offices	(7.9 x6x2)	(94.8)	GH¢33, 180
Staff common room	(9x 7.9)	(71.1)	GH¢24, 885
Staff outdoor seating area	6.4x 10.8	(69.12)	GH¢24, 192
Circulation.		(157.34)	GH¢55069

TOTAL - GH¢ 208358.5

4.4.5 POLY CLINIC

Space		Area	Cost
18 Consulting room 170100	6x4.5x18	[486]	GH¢
4 Waiting area type 50400	1 [4x8x4.5]	[144]	GH¢
4 Waiting area type GH¢31500	2 [4x5x4.5]	[90]	GH¢
2 Waiting area type 266175	3 [206.5x19.5]	[760.5]	GH¢
Dispensary GH¢26040	8x9.3	[74.4]	
Paceds GH¢27090	9.85x7.85	[77.3]	
Washroom –type GH¢37730	1 4.9x2x11	[107.8]	
Washroom – type 19950	2 5.7x5x2	[57]	GH¢
Washroom – type- GH¢35518	3 5.9x4.3x4	[101.48]	
Store room - GH¢5684	5.8x2.8	[16.24]	

Triafe nurse- GH¢3990	3.8x3.0	[11.4]
Circulation -	905.4	

TOTAL - GH¢ 674177

4.4.6 SPECIALIST CLINIC

Space		Area	Cost
18 Consulting room 170100	6x4.5x18	[486]	GH¢
4 Waiting area type 50400	1 [4x8x4.5]	[144]	GH¢
4 Waiting area type GH¢31500	2 [4x5x4.5]	[90]	
2 Waiting area type 266175	3 [206.5x19.5]	[760.5]	GH¢
Dispensary GH¢26040	8x9.3	[74.4]	
Paceds GH¢27090	9.85x7.85	[77.3]	
Washroom –type GH¢37730	1 4.9x2x11	[107.8]	
Washroom – type 19950	2 5.7x5x2	[57]	GH¢
Washroom – type- GH¢35518	3 5.9x4.3x4	[101.48]	
Store room - GH¢5684	5.8x2.8	[16.24]	
Triafe nurse- GH¢3990	3.8x3.0	[11.4]	
Circulation -	905.4		

TOTAL - GH¢ 674177

4.4.7 ADMINISTRATION

Space		Area	Cost
• General office	6.9x9.9	(68.31)	GH¢23,908.5
• Public relations office	6.9X 5.9	(40.71)	GH¢14,248.5
• Research department.....	6.9x9.9	(68.31)	GH¢23,908.5
• Estate office	6.9x9.9	(68.31)	GH¢23,908.5
• Washroom type 1 (2).....	4.3x1.3	(11.18)	GH¢3,913
• Washroom type 2 (3).....	4.9x6.9	(101.4)	GH¢35,490
• Library	9x15.9	(142.1)	GH¢50,085
• Conference room	9x19.9	(179.1)	GH¢62,685
• Staff common room	6.9x9.9	(68.31)	GH¢23,908.5
• Computer room	6.9x5.9	(40.71)	GH¢14,248.5
• Center for curtaining education	6.9x9.9	(68.31)	GH¢23,908.5
• Center for undergraduate studies	6.9x9.9	(68.31)	GH¢23,908.5
• Chief executive officer	5.8x5.8	(33.64)	GH¢11,774
• Secretary of C T O	5.8x3.9	(22.62)	GH¢7917
• Director of pharmacy... ..	4.5x6.9	(31.05)	GH¢10,867.5
• Director of medicine	6.9x5.9	(40.71)	GH¢14,248.5
• Director of nursing	4.5x 6.9	(31.05)	GH¢10,867.5
Security	2.8x6.9	(19.32)	GH¢1, 6762

Circulation..... (613.18) GH¢214, 613

TOTAL - GH¢577, 261.5

4.4.8 MORTUARY

Space		Area	Cost
Welting area	1 (4.7x5.1)	23.97	GH¢8389.5
Circulation		362.57	GH¢126,
899.5			
Security	1(3.9x3)	11.7	GH¢4,095
Temporary body store	1(3.9x5)	19.5	GH¢6,825
Body store		446.04	
GH¢156,114			
Post matron laboratory		127.92	GH¢44,772
Store	1(4.9x6.2)	30.38	
GH¢10,633			
Wash room	3.9x3.9	15.21	
GH¢5,323.5			
Changing room	2(3.9x2.2)	17.16	GH¢6.006
Reception	1(2.9x3.8)	11.02	GH¢3,857
Waiting area	4.8x5.2	24.96	GH¢8,736
Library	1(4.9x)	30.38	
GH¢10,633			
Staff common room	1(6.4x)	31.36	
GH¢10,976			
Kitchenette	1(2.9x2.4)	6.96	GH¢2,436
Office	2(5.7x5)	28.5	GH¢9,975
Body wash	1(9.9x4.9)	48.51	GH¢
16,978.5			

3.5 REFERENCES

TOTAL - GH¢432,649

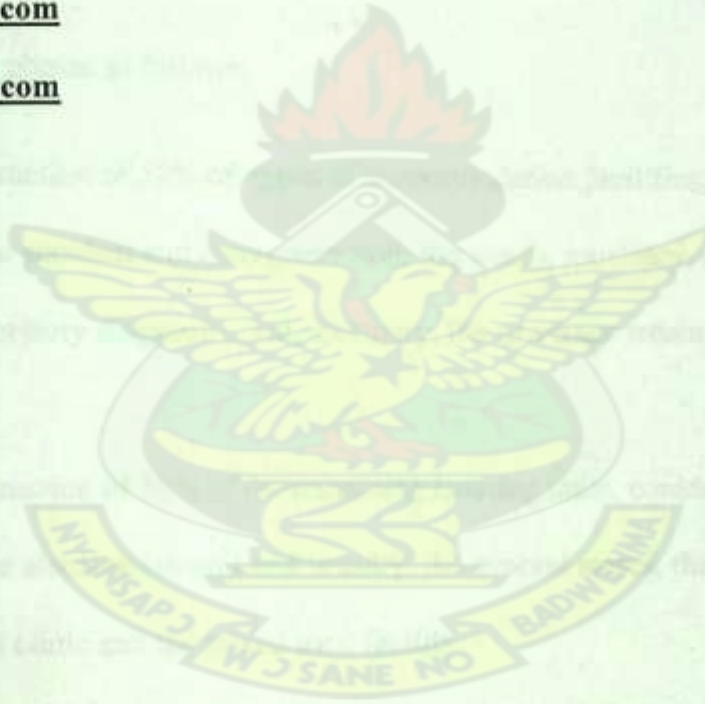
GRAND TOTAL - GH¢ 3,442 701

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CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMENDATIONS

5.1 CONCLUSIONS

This project is a necessity for the people of the medical school and the three northern regions of Ghana as a whole. This project is huge and would require a streamlined project management procedure for it to be built and constructed within a short possible time. It is there appropriate to plan the project in phases so as to give relief to the client and all who would contribute financially to the project.

The project is planned in phases as follows;

- **Phase one;** construction of 50% of types of accommodation facilities, construction of the poly clinic, the accident and emergency unit, the wards, mortuary, radiology, radiotherapy, laboratory diagnostic unit, mortuary, the sewerage treatment unit and canteen.
- **Phase two;** construction of 50% of the remaining housing units, construction of the administration, the sterilization unit and laundry, the general stores, the minor theatre unit, the specialist clinic and the mixed used facility.
- **Phase three;** this involves the construction of the recreational facilities for the staff, the crèche, the research facilities, and the construction of the remaining 50% of the housing facilities.

5.2 SUMMARY

This project would yield the following results if completed on time

- Increase in productivity level of citizens of the north.
- Attraction of investors to the north.
- Reduction of mortality in women and children.
- Quality and effective health delivery by doctors and health personnel.

5.3 RECOMMENDATIONS

The site for the project is quite large and therefore planning for the future is necessary. The Development Control Planning (DCP) of this project has been done as part of the design.

This should be adhered to so as to maintain the natural growth of the hospital without causing conflicts between the functional relationships of the various units or departments of the hospital.



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UNIVERSITY FOR DEVELOPMENT STUDIES MEDICAL SCHOOL LECTURERS
QUESTIONNAIRE.

This questionnaire is part of series of surveys that have to be carried out to establish the fact that there needs to be a Teaching Hospital in Tamale. Your help is greatly needed.

- 1) What is your name?.....
- 2) Are you a staff of the school ?.....
- 3) How long have you been working here?.....
- 4) How are your courses structured?.....
.....
.....
.....
- 5) Where do you do your practical studies now?.....
- 6) Do you think your students have enough medical cases to prepare them for the medical profession now?
Yes
No
- 7) Are you aware that every Medical School has a Teaching Hospital?
Yes
No
- 8) Do you think the UDS needs a Teaching Hospital for its Medical School?
- 9) What in your opinion is a Teaching Hospital?.....
.....
.....
.....
- 10) What are the components of a Teaching Hospital?.....
.....
.....
.....

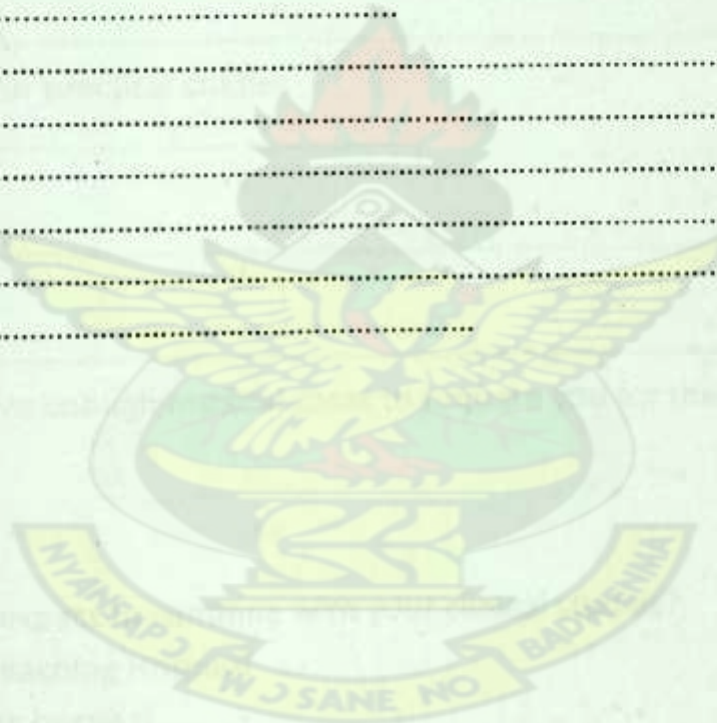
.....
.....
11) Do you think the Regional Hospital should be upgraded into a Teaching Hospital or a completely new hospital should be built for the UDS?

Yes

No

12) Which departments should the Tamale Teaching Hospital have based on the medical history of the patients at the Government Hospital?.....

.....
.....
.....
.....
.....
.....



UNIVERSITY FOR DEVELOPMENT STUDIES MEDICAL STUDENTS
QUESTIONNAIRE.

This questionnaire is part of series of surveys that have to be carried out to establish the fact that there needs to be a Teaching Hospital in Tamale. Your help is greatly needed.

- 1) What is your name?(optional).....
- 2) Which year are you in?.....
- 3) Where do you do your practical studies now?.....
- 4) Do you like it?.....
- 5) If no why?.....
- 6) Do you think you have enough medical cases to prepare you for the medical profession now?
Yes
No
- 7) If no, where do you expect to continue with your clinical studies?
A. Komfo Anokye Teaching Hospital
B. Korle Bu Teaching hospital
- 8) Would you prefer your own Teaching Hospital at Tamale?
Yes
No
- 9) If yes, should it be located close to the UDS Medical School?
Yes
No
- 10) Why?.....
.....
.....
.....
- 11) Would you like to have Hostel facilities close to the Teaching Hospital?
Yes
No
- 12) Why?.....
.....
.....
.....

.....

.....

The questionnaire is part of series of surveys that have to be carried out to establish the
that the  needs to be a Teaching Hospital in Kenya. Your help is genuinely
appreciated.

KNUST

- 1) What is your
name?
- 2) Are you a staff of the
hospital?
- 3) If yes which Department
are?
- 4) How long have you been
here?
- 5) How many Departments
they?



TAMALE GOVERNMENT HOSPITAL QUESTIONNAIRE

This questionnaire is part of series of surveys that have to be carried out to establish the fact that there needs to be a Teaching Hospital in Tamale. Your help is genuinely appreciated.

- 1) What is your
name?.....
- 2) Are you a staff of the
hospital?.....
- 3) If yes which Department or
area.....
- 4) How long have you been working
here?.....
- 5) How many Departments are in this hospital and what are
they?.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
- 6) Do you have adequate staff if not what are the numbers you think will be
adequate?
.....
.....
.....
.....
- 7) What prevents you from achieving these
numbers?.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

8) How many patients do you attend to or see in a day?

Peak

hours.....

Low

hours.....

TEACHING HOSPITAL

9) Do you know about the existence of the Medical School at the UDS?

Yes

No

10) Do you think the UDS needs a Teaching Hospital for its Medical School?

11) Are you aware that every Medical School has a Teaching Hospital?

Yes

No

12) What in your opinion is a Teaching Hospital?.....

13) What are the components of a Teaching Hospital?.....

14) Do you think the Regional Hospital should be upgraded into a Teaching Hospital or a completely new hospital should be built for the UDS?

Yes

No

15) Which departments should the Tamale Teaching Hospital have based on the medical history of the patients at the Government Hospital?.....

16) Would you like to live close to the Teaching Hospital?

Yes

No

17) What is your family

size?.....

18) Do you own a vehicle?

Yes

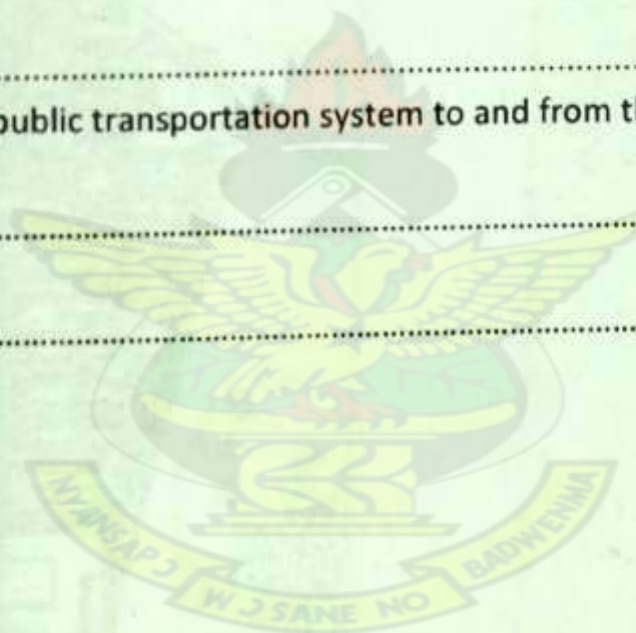
No

19) If yes, how

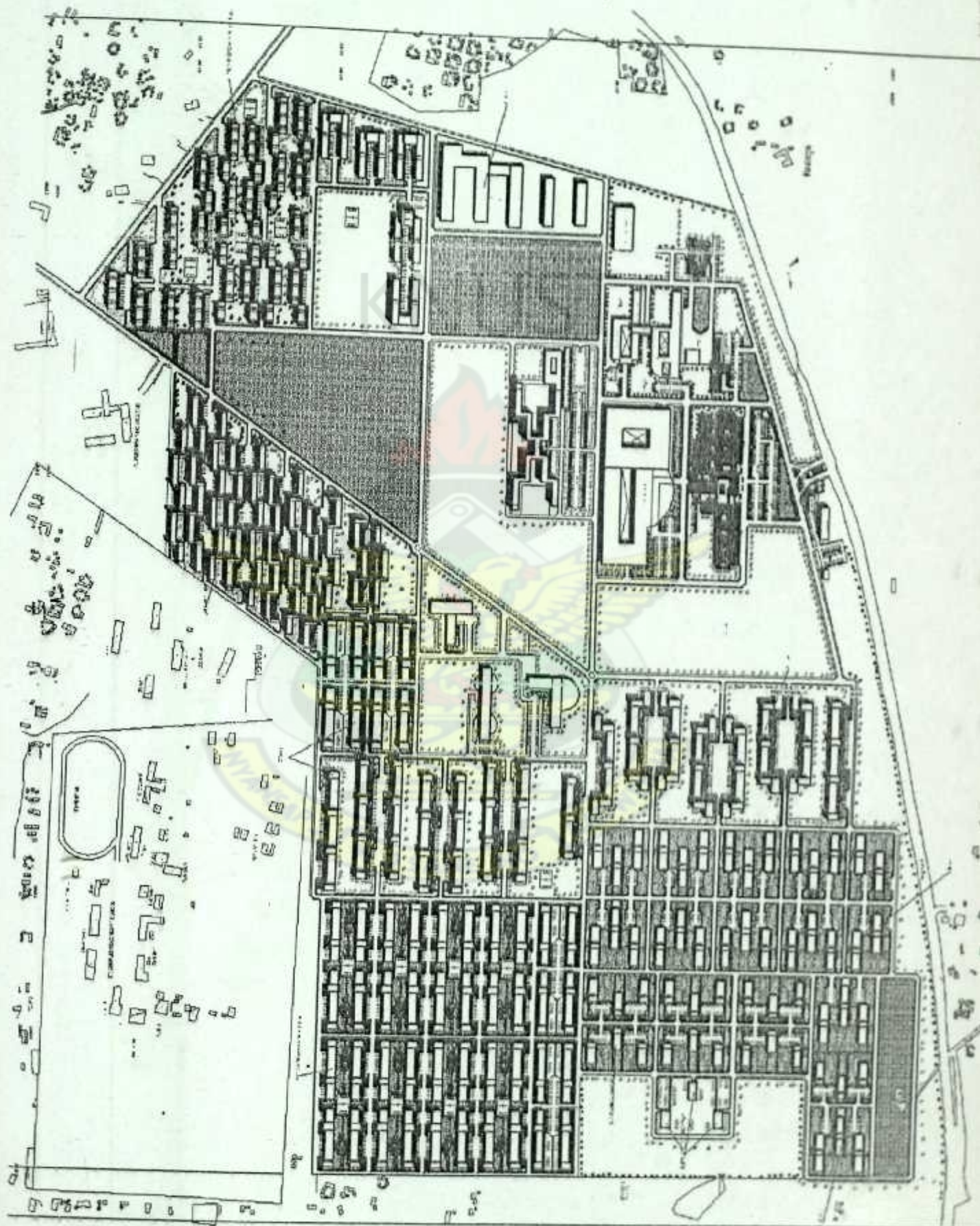
many?.....

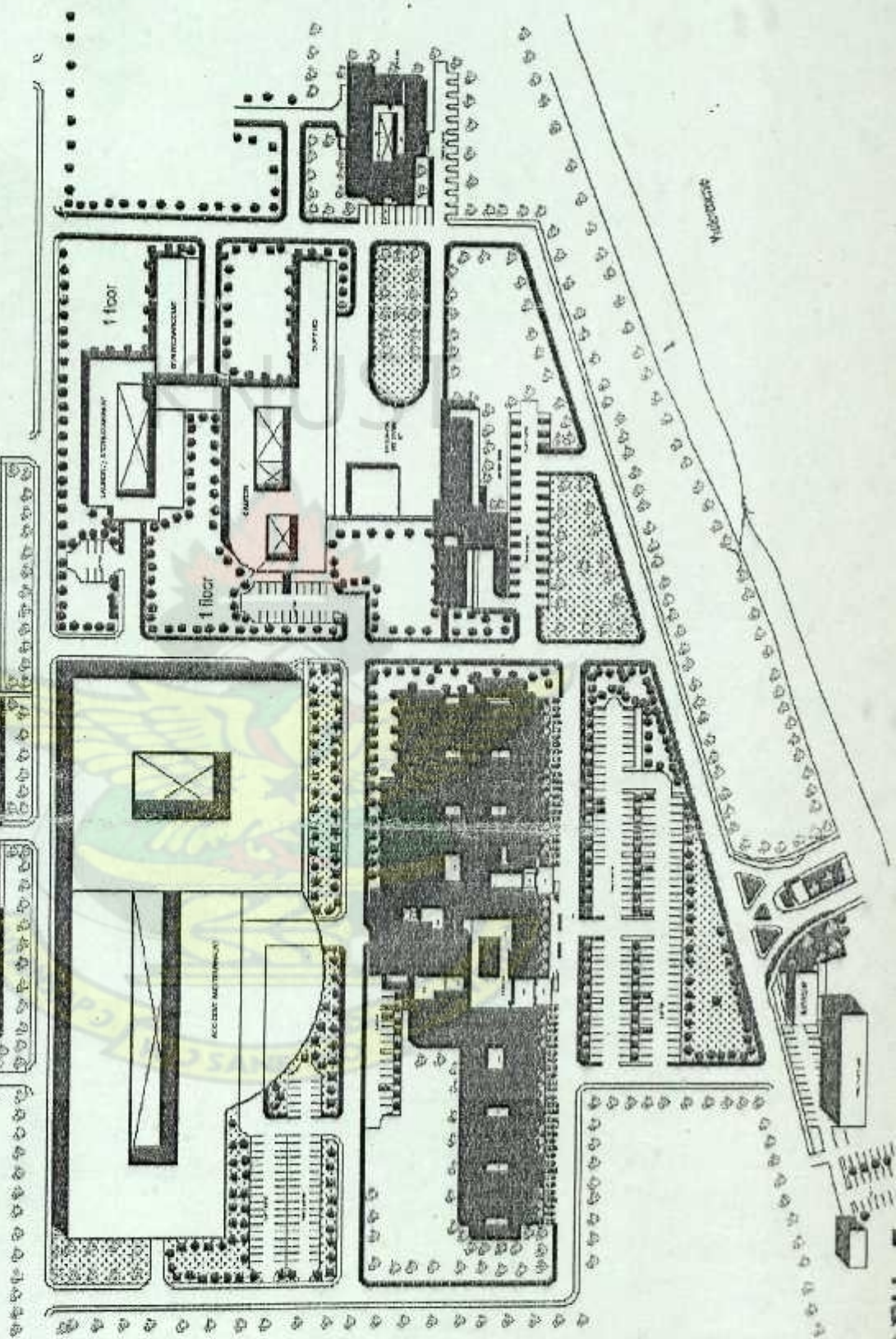
20) Would you prefer public transportation system to and from the Teaching
Hospital?.....

.....
.....
.....
.....

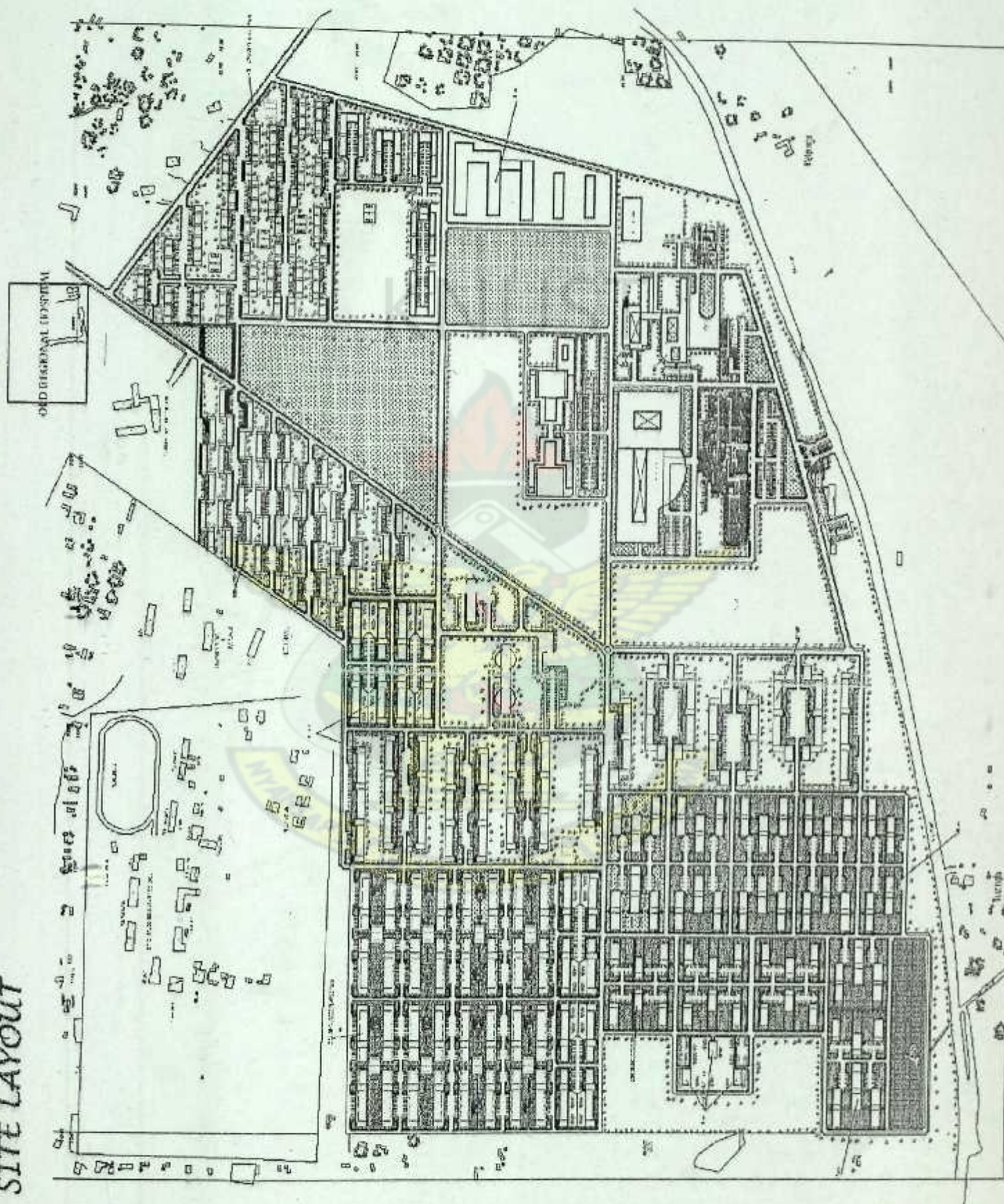


BLOCK PLAN

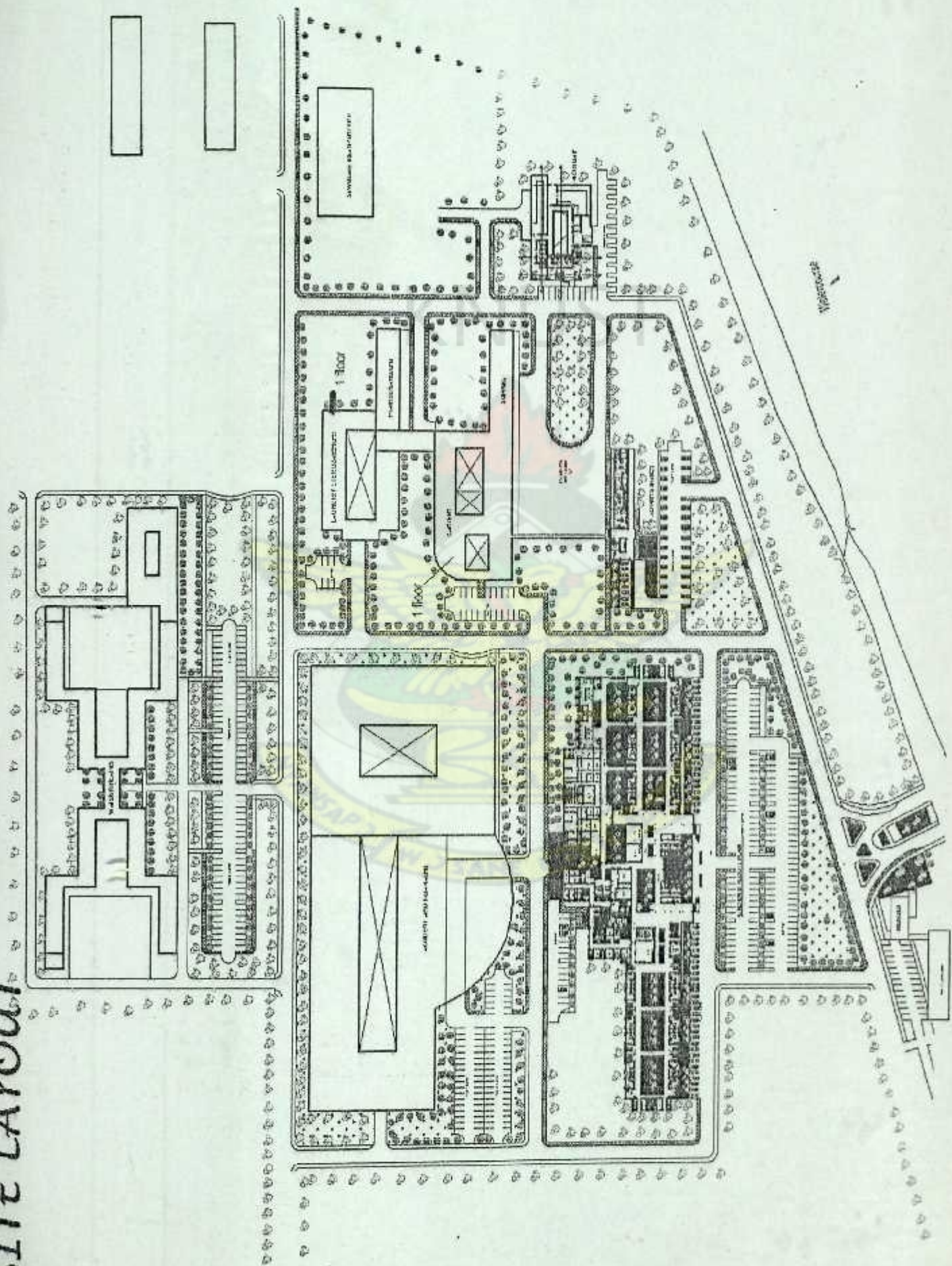




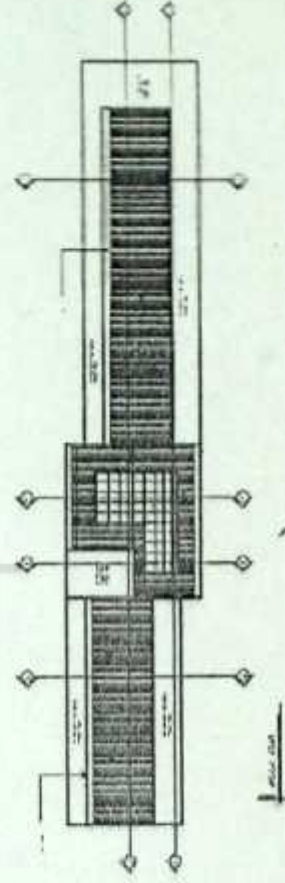
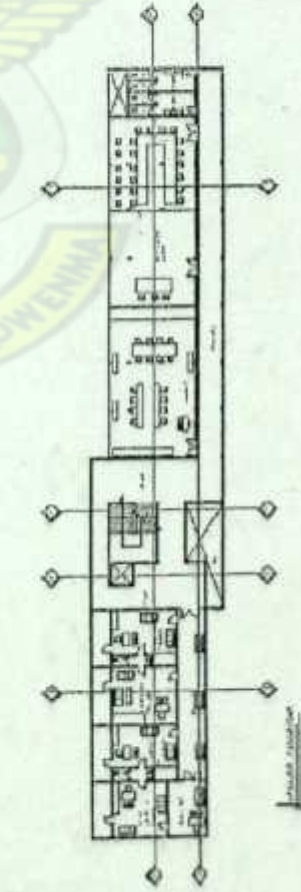
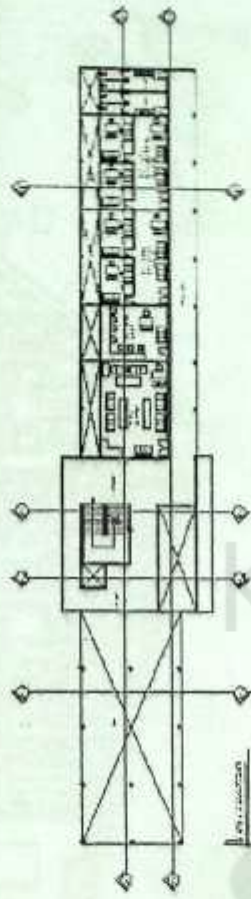
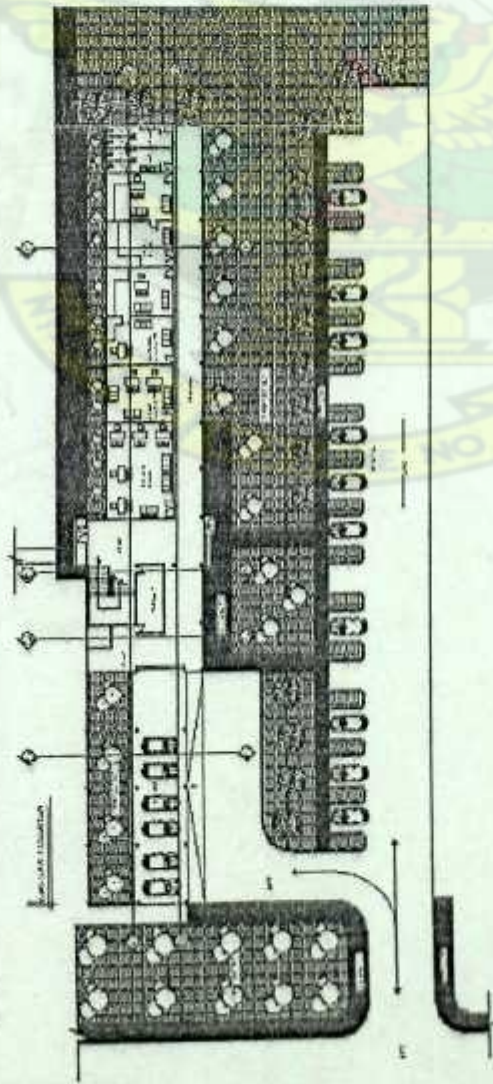
SITE LAYOUT



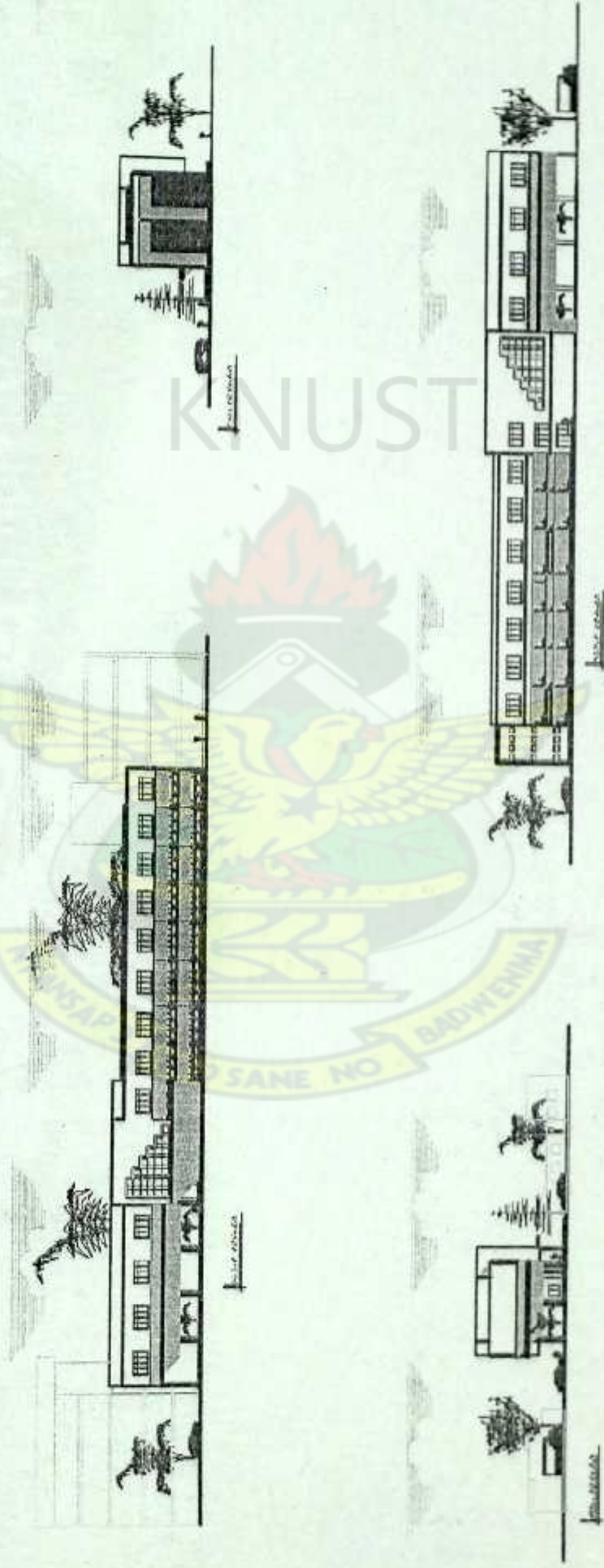
SITE LAYOUT



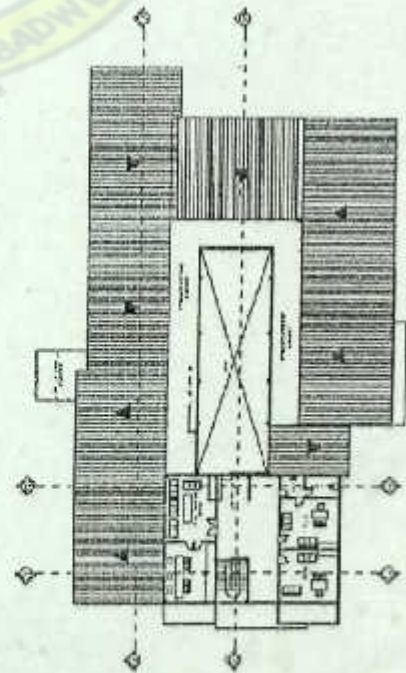
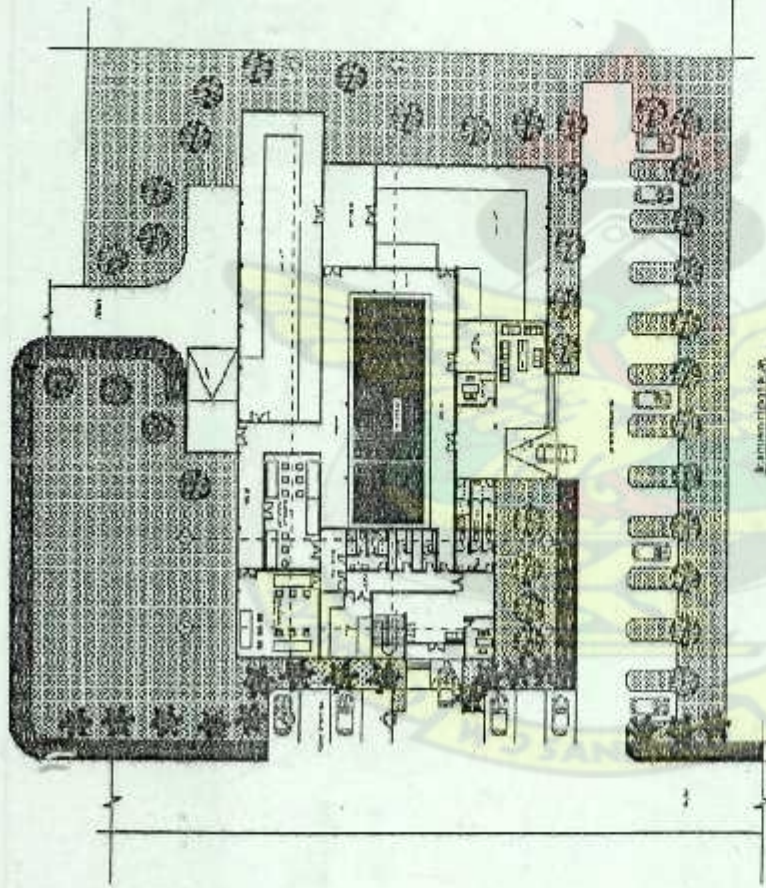
ADMINISTRATION BLOCK



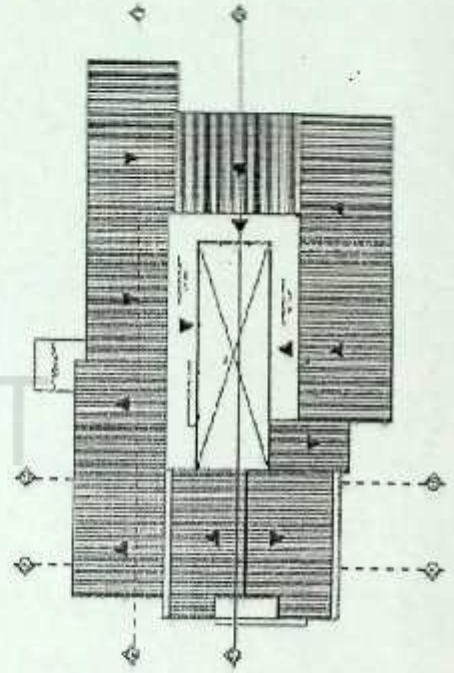
ADMINISTRATION BLOCK



MORTUARY BLOCK



PLAN SECTION

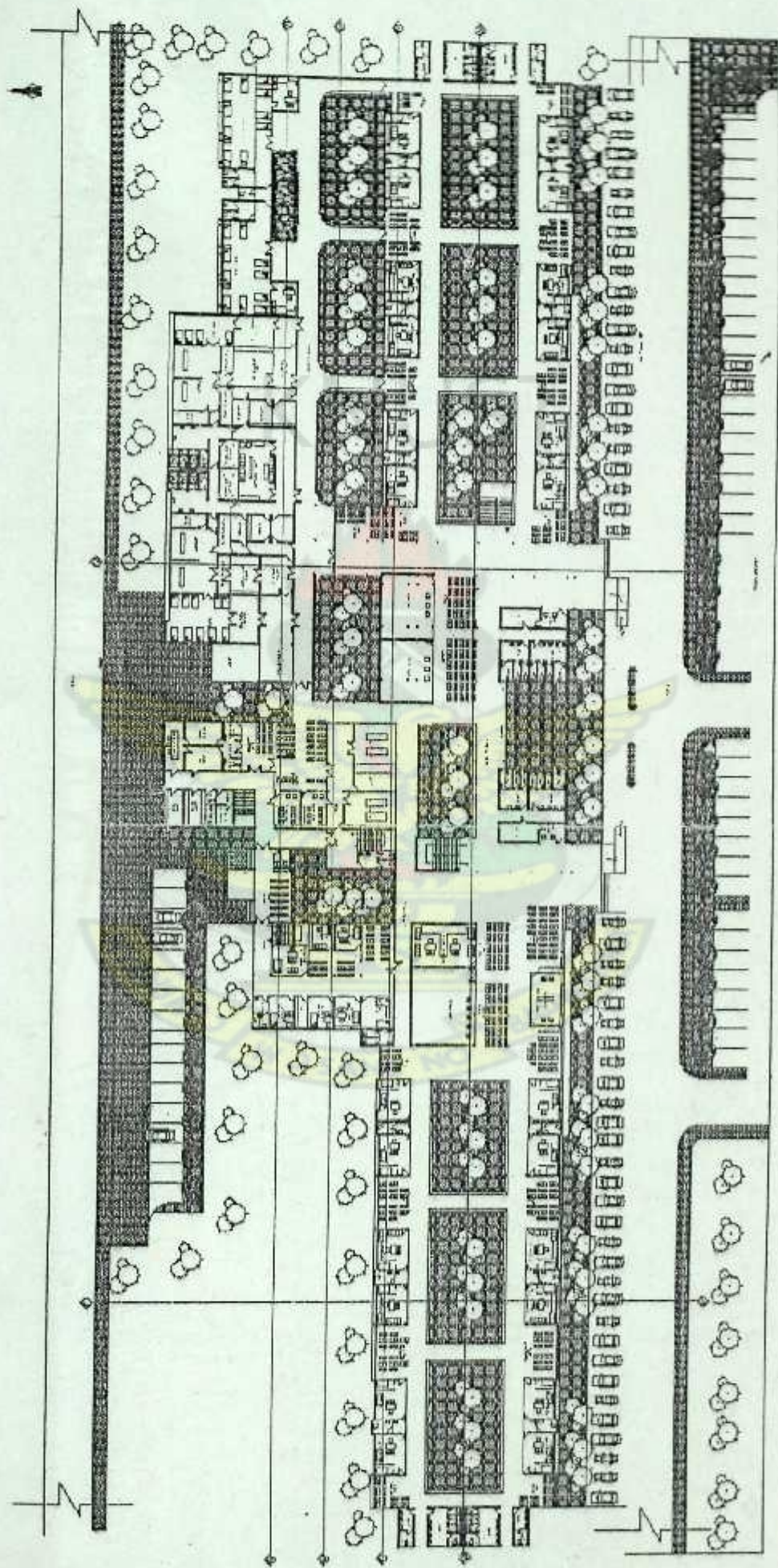


FLOOR PLAN

MORTUARY BLOCK



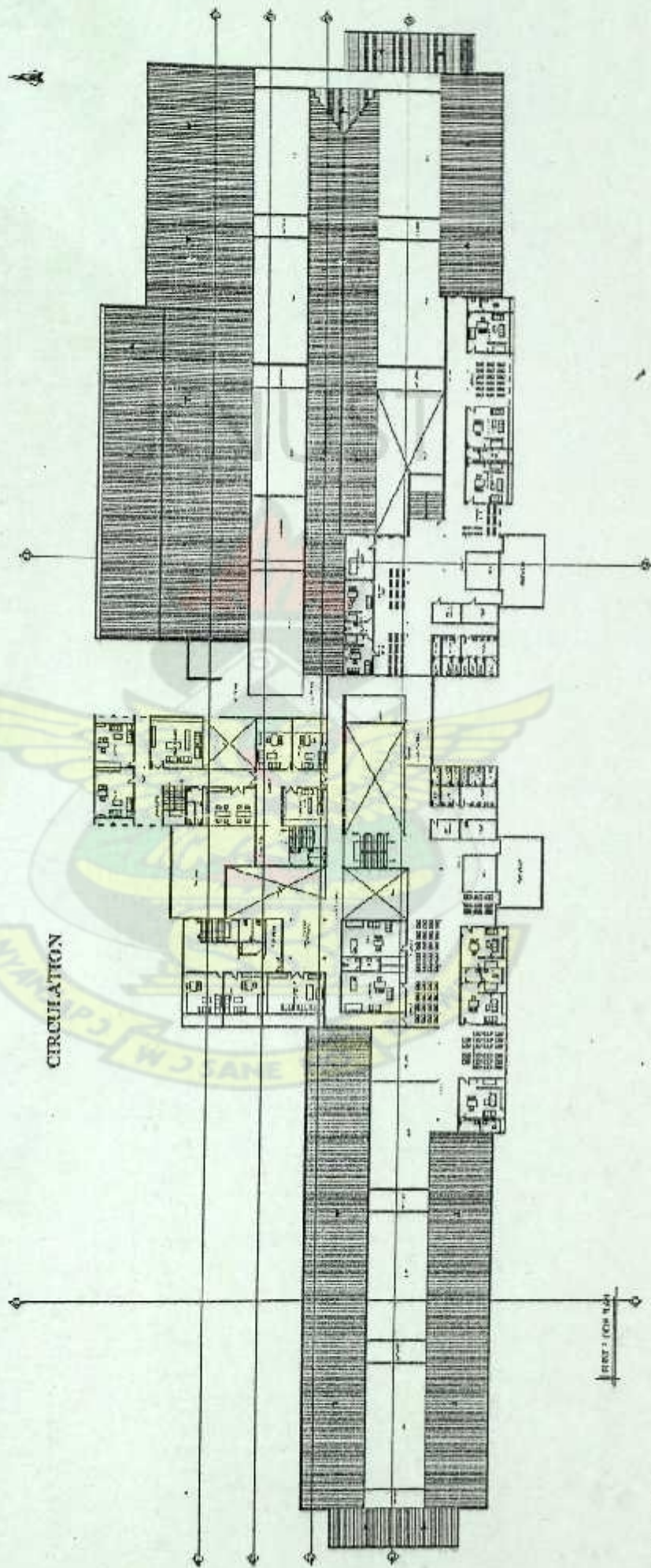
MEDICAL CONSULTATION COMPLEX



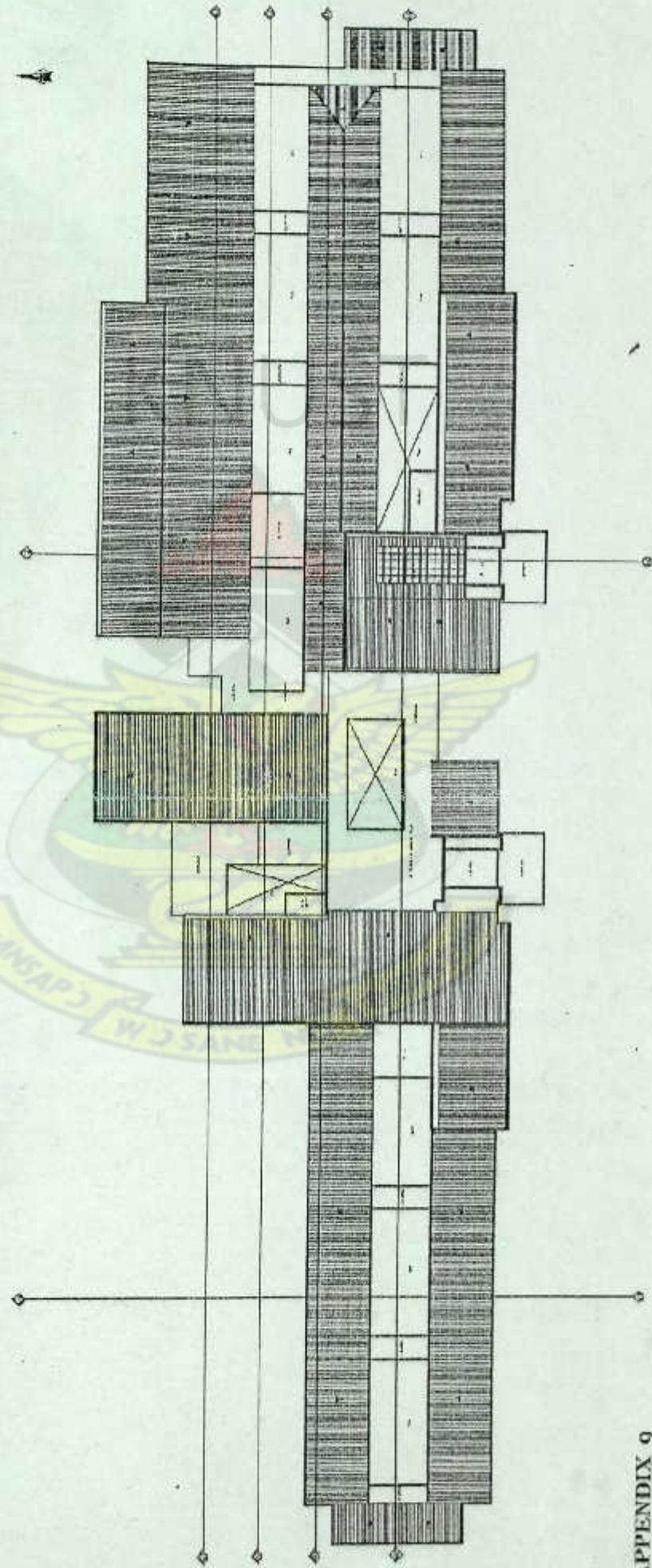
100' SCALE

MEDICAL CONSULTATION COMPLEX

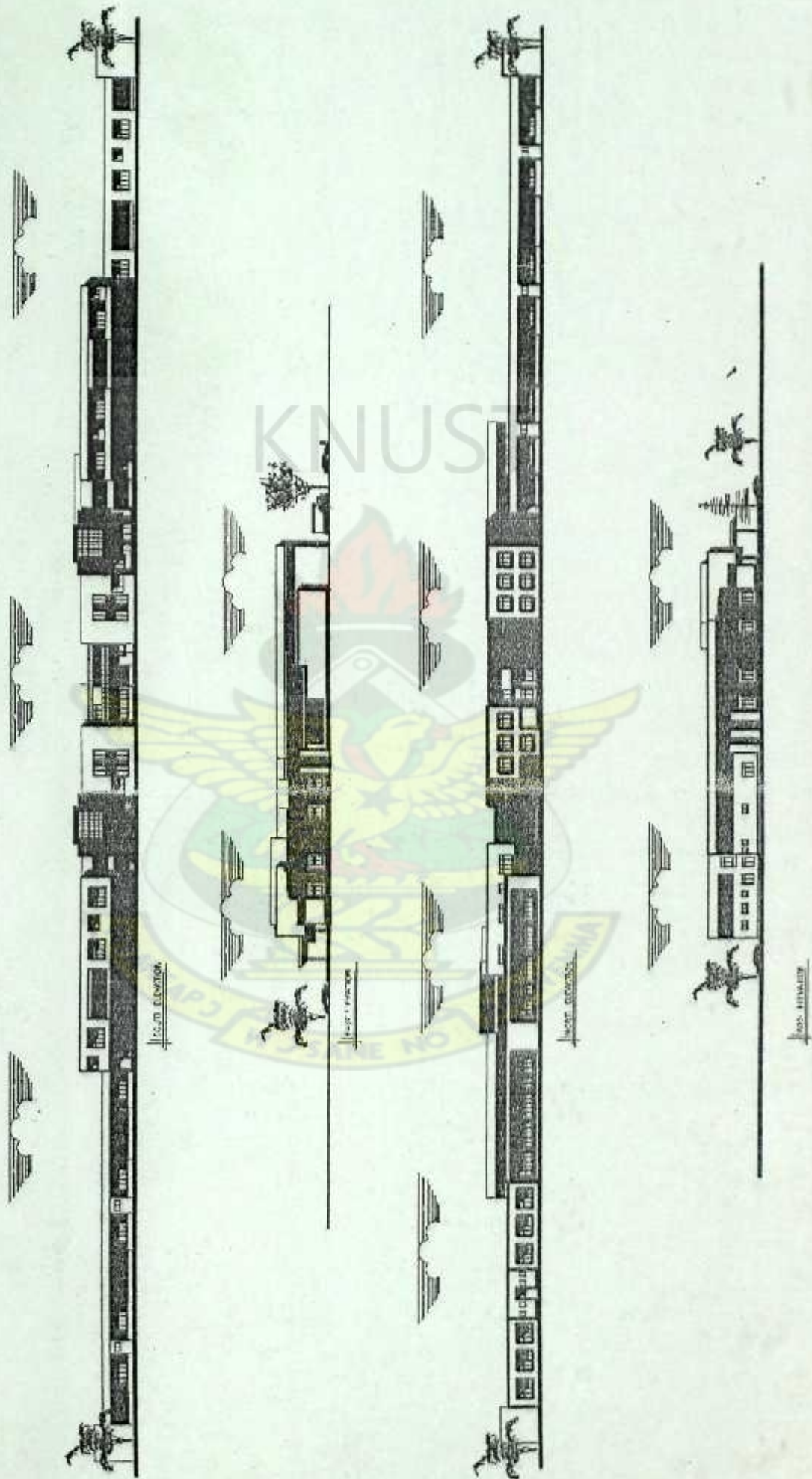
CIRCULATION



MEDICAL CONSULTATION COMPLEX



MEDICAL CONSULTATION COMPLEX



APPENDIX 13



EAST ELEVATION (ADMINISTRATION BLOCK)

Figure 44. the east elevation of the administration of the Teaching Hospital

APPENDIX 14



SOUTH ELEVATION (ADMINISTRATION BLOCK)

Figure 45. the south elevation of the administration of the Teaching Hospital

APPENDIX 15



WEST ELEVATION (ADMINISTRATION BLOCK)

Figure 46. the west elevation of the administration of the Teaching Hospital

APPENDIX 16



NORTH ELEVATION (ADMINISTRATION BLOCK)

Figure 47. the north elevation of the administration of the Teaching Hospital

APPENDIX 17



(NORTHEASTERN VIEW OF ADMINISTRATION BLOCK)

Figure 48. the north-eastern facade of the administration of the Teaching Hospital

APPENDIX 18



(SOUTHEASTERN VIEW OF ADMINISTRATION BLOCK)

Figure 49. the south-eastern facade of the administration of the Teaching Hospital



SOUTHWESTERN VIEW OF ADMINISTRATION BLOCK

Figure 50. the south-western facade of the administration of the Teaching Hospital

APPENDIX 20



AERIAL VIEW OF ADMINISTRATION BLOCK

Figure 51. the aerial view of the administration of the Teaching Hospital



INTERIOR OF CICULATION AREA- ADMINISTRATION

Figure 52. the aerial view of the administration of the Teaching Hospital.

APPENDIX 22



SOUTH ELEVATION (MORTUARY BLOCK)

Figure 53. the south elevation of the mortuary of the Teaching Hospital.

APPENDIX 23



WEST ELEVATION (MORTUARY BLOCK)

Figure 54. the west elevation of the mortuary of the Teaching Hospital.

APPENDIX 24

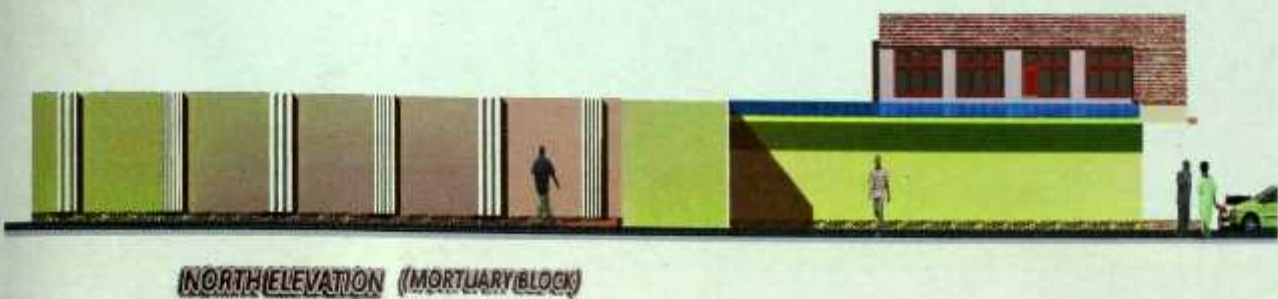


Figure 55. the north elevation of the mortuary of the Teaching Hospital.

APPENDIX 25



Figure 56. the east elevation of the mortuary of the Teaching Hospital.

APPENDIX 26



Figure 57. the south-western view of the mortuary of the Teaching Hospital.

APPENDIX 27



NORTHWESTERN VIEW OF MORTUARY BLOCK

Figure 58. the north-western view of the mortuary of the Teaching Hospital.

APPENDIX 28



Figure 59. the south-western view of the mortuary of the Teaching Hospital.

APPENDIX 29



Figure 60. aerial view of the mortuary of the Teaching Hospital.

APPENDIX 30



Figure 61. the south elevation of the medical consultation complex of the Teaching Hospital.

APPENDIX 31



Figure 62. the south elevation of the medical consultation complex of the Teaching Hospital

APPENDIX 32



Figure 63. the north elevation of the medical consultation complex of the Teaching Hospital

APPENDIX 33



Figure 64. the east elevation of the medical consultation complex of the Teaching Hospital



Figure 65. the aerial view of the medical consultation complex of the Teaching Hospital



Figure 66. view of the medical consultation complex of the Teaching Hospital

APPENDIX 36



Figure 67. view of the medical consultation complex of the Teaching Hospital

APPENDIX 37



Figure 68. view of the medical consultation complex of the Teaching Hospital

APPENDIX 38



INTERIOR OF CONSULTING ROOM

Figure 69. interior view of the consulting room.

APPENDIX 39



INTERIOR OF CONSULTING ROOM

Figure 70. interior view of the consulting room.



INTERIOR OF WAITING AREAS

Figure 71. interior view of the waiting area room.



RECORDS WAITING AREA- SPECIALISED CLINIC

Figure 72. interior view of the waiting area room.

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Figure 70. interior view of the consulting room.

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