



GHS STANDARD HOSPITALS

Estate Management Department, GHS

Concept of GHS Standard Hospital based on modular template and suitable for easy expansion. The document provides information on departments, general building arrangements and cost estimates.

Estate Management Department
Ghana Health Service
No. 2 Secretarial Road, Accra

GHS STANDARD HOSPITAL

STANDARD MODULAR DESIGN CONCEPT

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" A functional design can promote skill, economy, conveniences, and comforts; a non-functional design can impede activities of all types, detract from quality care, and raise costs to intolerable levels"

Hardy and Lammers

1. INTRODUCTION

- 1.1. Hospitals are one of the most complex of building types. A hospital comprises of a wide range of services and functional units. These include diagnostic and treatment functions, such as clinical laboratories, imaging, emergency rooms, and surgery; hospitality functions, such as food service and housekeeping; and the fundamental inpatient care or bed-related function.
- 1.2. This diversity is reflected in the extensive requirements for building specifications that impact on the hospital construction and operations. Each of the wide-ranging and constantly evolving functions of a hospital, including highly complicated mechanical, electrical, and telecommunications systems, requires specialized knowledge and expertise.
- 1.3. The functional units within the hospital can have competing needs and priorities. Idealized scenarios and strongly held individual preferences must be balanced against mandatory requirements, actual functional needs (internal traffic and relationship to other departments).
- 1.4. In addition to the wide range of services that must be accommodated, hospitals must serve and support many different users and stakeholders. The design process of evolving standard modular design for various categories of health facilities has incorporated direct input from the Ghana Health Service and from other key stakeholders early on in the process.
- 1.5. The consultant in his discussions and review has also involved other stakeholders like patients, visitors, support staff, volunteers and suppliers who do not generally have direct input into the design. Good hospital design integrates functional requirements with the human needs of its varied users.
- 1.6. The work of the consultant is to develop a design report clearly describing the architectural design parameters, guidelines, and concepts for standardized designs based on modular systems, submitted to the EMU/GHS/MOH in accordance with briefs and comments raised by the Estate Management Unit, GHS. This report covers various categories of health facilities and has been presented under the following sectional headings listed below.
 - Chapter One: District Hospital
 - Chapter Two: Polyclinic
 - Chapter Three: Health Centre
 - Chapter Four: Clinic
- 1.7. The design report shall take into consideration the conceptual analysis of the scheme, general climatic and architectural influences, spatial layout of basic functional units, and specification for all materials to be used in construction.
- 1.8. Design considerations relating to anthropometric studies and spatial planning related to movement of human traffic, equipment and supplies in the hospital environment will be highlighted. Steps taken to ensure that the design lends itself to easy upgrades by simple additions to the basic unit (i.e. clinic, health centre, polyclinic and district hospital) will be highlighted. It will also describe how these additions can be done and the various technical

considerations that have been made in this regard.

2. THE NEED FOR STANDARD MODULAR DESIGNS

- 2.1. One of the main policy thrusts of the Health sector is to increase geographical and financial access to Health Care and improve quality of care in all health facilities. As part of efforts to realize the global aim, the Ministry of Health (MOH) has undergone considerable restructuring within the last five years. One of the important results of the reform was the establishment of the Estate Management Unit (EMU) of the GHS.
- 2.2. Following the setting up of the EMU, it has become imperative to develop policy and guidelines for the planning, procurement and management of capital investments of the Ghana Health Service (GHS), Ministry of Health.
- 2.3. One major task of this unit amongst others is to **develop a standard modular design system that will facilitate conversions and upgrading of health facilities to the next level.**
- 2.4. In this regard, the GHANA HEALTH SERVICE (GHS) through the Estate Management Unit engaged the services of an architect to respond to a defined Terms of Reference on this assignment.
- 2.5. The Terms of Reference for the process of **Developing a Standard Modular Design System**, was redefined to take into consideration the comments and discussions of previous works. The outcome of the assignment was achieved through a collaborative work approach with the EMU in particular and other departments and stakeholders of the MOH as well.
- 2.6. One of the key objectives of the programme, in line with the overall goals of the Health Sector Reform Programme (HSRP), was to develop an improved style and standard of building with cost efficiency as the overriding factor. The new standard designs also aim at evolving construction detailing and design solutions that reduce maintenance and other operational costs.

3. DESIGN BRIEF

- 3.1. The work of the consultant was to crystallize the concepts of standardized designs based on modular systems, discussed with the EMU-GHS and MOH. The programme was carried out thoroughly to cover various categories of health institutions as defined and listed below.
- 3.2. Definition of Health Institutions by category
 - **Clinic (approx 160m² - 240m²)** – not providing full range of services. Usually Reproductive Child Health (RCH) or basic curative services.
 - **Health Centre (approx 450m² - 600m²)** – Providing full range of basic primary healthcare (PHC) services (Clinical, Public Health and Maternity Services).
 - **Polyclinic (approx 2500m² - 3600m²)** – Providing an expanded range of PHC services much higher than a Health Centre but in terms of capacity less than a District Hospital.

- **District Hospital (approx 4600m² - 6500m²)** – Providing a full range PHC services of a general hospital under the management of at least 2 general duty doctors.
- 3.3. The standard design was to take into consideration spatial layout of basic functional units, specification for all materials to be used in construction, service installations and list of appropriate equipment and furniture.
- 3.4. The designs were also to lend themselves to easy upgrades by simple additions to the basic unit and from clinic to health centre and to district hospital.

4. CLINIC

4.1. The Clinic would provide Mother and child Healthcare services. It should be designed to provide only curative care and screening for referrals to the health Centre/ District Hospital. It would be a one-man station usually – community nurse. The clinic shall therefore have two services mother and child health as well as curative services.

4.2. Functional Units (3 – 4 rooms)

- Consulting room – 1
- Waiting area + Records room
- Injection/ Dressing room/Dispensary/Store
- Shed for MCH activities (CWC, nutrition demonstrations etc if this service is provided)
- Office, Family Planning area with a store
- Provision should be made for an incinerator (preferably locally built brick incinerator)

4.3. All clinics must have water. Provision of a borehole is recommended. (Rain water collection system considered as a minimum requirement); staff accommodation for 1 or 2 medical staff, toilet facilities for staff and patients. Infected waste disposal will be incinerated.

*Residential accommodation is recommended. Type: 2 – bedroom duplex (2 – bedroom, kitchen, wc, sh., living room + 1 other room.)

5. HEALTH CENTRE

5.1. Functional Units.

- Consulting rooms –(2) for MA and Midwife
- Waiting area/ Registration/ Revenue/ Records
- Dressing/ Injection
- Observation ward (2 – 4 beds)
- Laboratory
- Dispensary
- Store
- 1 – administrative office
- Public Health area (for CWC, antenatal etc)
- Maternity
 - Lying ward – 4
 - Labour ward – 2 partitioned
 - Nurses station + Stores

Shower for patients/ clients

- 5.2. Furniture (standard list to be determined), safe/ cabinet, vaccine refrigerator should be considered basic equipment.
- 5.3. Where there is no electricity, Gas or Solar power options should be explored for the storage of vaccines and drugs. Provision of water is a basic requirement. Provision of a mechanised borehole is recommended. (Rainwater collection system considered as a minimum requirement). Toilet for staff and patients should be provided.
- 5.4. Radio communication link to the District Hospital and DHMT office will be encouraged.
 - Office space for Disease Control Unit/ Nutrition Officer.
 - Dressing and injection rooms should be separate. The space for these should be clearly partitioned with a solid screen. The dressing room should have adequate space for sterilization of instruments.
 - Accommodation should be 4 no. semidetached facilities – 2 bedroom each)
 - Waste Disposal – use of an incinerator (preferably locally built brick incinerator).

6. POLYCLINIC

- 6.1. These are usually sited in urban/ cosmopolitan areas to ease the congestion in teaching and regional hospitals and serve as large health centres to ensure that Primary care services are evenly distributed and provide a range of services that are higher than a HC. Polyclinics must be planned with excess capacity for future expansion and development as district hospitals. These facilities will provide 24 hr services.

6.2. Functional Units.

- Waiting area/ Reception/ Registration/Revenue
- Records Office
- Consulting rooms (4 – 6)
- Casualty ward 10 beds (detain for not more than 24 hours
- Paediatric Emergency 10 beds, Female –5, Male – 5.
- Dressing room
- Injection room
- Psychiatric Consulting room with History taking area
- Optician – Eye clinic, CR only
- Dental Unit
- Laboratory (Haematology, Microbiology/ Parasitology)
- X- ray
- Casualty theatre –2 suites for clean and septic cases
- Pharmacy
- Maternity Unit Wing (same as for rural HC except that will be more beds (5-10) for labour/ lying in and an additional 5 beds for antenatal emergencies for observation and initial treatment).
- Public Health Area:
 - Open area for immunization, growth monitoring, antenatal waiting area etc Family Planning (2 rooms) + waiting area/ Counselling room – HIV etc Public Health Office and store.
 - Antenatal examination rooms – (2)

- Nutrition rehabilitation (feeding) area
 - Administration (Medical Administration, General Administration, Matron, accounts, general office)
 - Maintenance unit – small workshop with tools
- 6.3. Furniture (standard list to be determined), safe/ cabinets, computer, telephone communication should be provided.
- 6.4. Running water, waste disposal system for infected material, toilets for staff and patients should be considered basic requirements of a polyclinic.
- 6.5. A snacks/canteen area must be designated to prevent scattered food vendors littering the facility.
- 6.6. Medical Equipment (standard list as developed by the Bio-medical Engineering Unit
- 6.7. Provision shall be made for a small laundry, CSSD, Body cold room.
- 6.8. Polyclinics are taking up more responsibilities in service delivery. A general theatre is recommended to be the standard as that for a district hospital.
- Accommodation should be 1 no. 3 – bedroom bungalow for the resident doctor + 5no. semidetached facilities – 2 bedroom each)
 - Waste Disposal – use of an incinerator (preferably locally built brick incinerator).

7. DISTRICT HOSPITALS

- 7.1. The standard designs should consider a pavilion model (single storey units linked by corridors and walkways), which is largely preferred for flexibility and comparative cost advantages. Wards should have rest/ changing room for nurses.
- 7.2. District hospitals provide general hospital care and will usually be managed by 1 or 2 general duty doctors.
- 7.3. Functional Units

Out – Patient Clinic

- Waiting area/ Reception/ Registration/ Revenue
- Records Office (three rooms – Bio-statisticians office, active records, archives – must be computerised)
- Consulting rooms (4 – 6)
- 6 – Bed Observation Ward
- Public Health/ MCH
- Dressing room
- Injection room
- Dental Unit
- Laboratory (Haematology, Microbiology/ Parasitology)

- Blood Bank
- Casualty reception and treatment rooms (Treatment room should be big enough to be eventually equipped to the level of an operating theatre.)
- Pharmacy/ Dispensary (location should consider service to all patients and the general public.)

Other Departments

- Radiology
- Theatre – 2 suites: one each for clean and septic cases.
- Wards:
 - Male (medical/ surgical)
 - Female (medical/ surgical)
 - Paediatric (male/ female)
 - Maternity Ward: with 10 lying in beds and at least 2 delivery beds

- Ancillary Services:
 - Kitchen/canteen
 - Laundry/CSSD
 - Hospital stores
 - Mortuary [capacity to be specified, consult with BEU/ CEU]
 - Maintenance unit/ workshop
 - Physiotherapy Unit
 - Administration:
 - Hospital Superintendent
 - Health Administrator
 - Nursing Administrator (Matron)
 - General office/ reception
 - Accounts (Space for accountant and clerical support staff)
 - Doctor's restroom
 - Communication (radio, telephone)
 - Records (both active and archives)
 - Library

- Accommodation provision to be made for core staff – (5-10units)
- Provision should be made for staff changing rooms.
- Waste Disposal – use of an incinerator (preferably locally built brick incinerator)
- Use of anaerobic sewerage treatment with dual possibility of biogas production is recommended.

Chapter 1 - DISTRICT HOSPITAL

1. FUNCTIONAL ORGANIZATION

1.1. District Hospitals form an important link within the general Health Care Delivery system in the country in its primary role of providing health services for the sub urban populations of the district capital, as well as act as a referral centre for complicated health problems from the various health centres in the district. The proposed design for a District Hospital has been developed as a result of extensive consultations with the user agencies of the Ministry of Health, Ghana. The design is for capacity of **74 beds**, distributed as follows:-

▪ Male Surgical Ward	-	11 beds
▪ Female Surgical Ward	-	11 beds
▪ Paediatric Ward	-	11 beds
▪ Maternity Ward (labour)	-	8 beds
▪ Male Medical Ward	-	11 beds
▪ Female Medical Ward	-	11 beds
▪ Obstetrics and Gynaecology Ward	-	11 beds

1.2. This capacity does not include bed provision for observation, recovery, delivery, treatment and nursery beds. The general arrangement is based on the pavilion type concept of single storey buildings. However, due to the rapid population growth and its expanding health needs, **standard bed capacity for GHS District Hospitals range from 60-120beds**. The district hospital is to be developed under the following general areas:-

- Clinical Services
- Ambulatory Care Services
- Adjunct Clinical Services
- Para clinical Services
- Social Services
- Hospital Equipment and Ancillaries
- External Services.

1.3. SITE CONDITIONS

1.3.1. Site Conditions Considering the fact that the SMD is a modular design, it has been assumed that this will be built on a site that is fairly flat. However this assumption may not always be feasible. Where variations occur, this will have to be taken in to account when spot levels and contour lines have been clearly established. This will dictate the gradient from building to building and the spacing. Gradients to be established should allow for the use of trolleys, beds and other moving equipment within a comfortable range.

1.3.2. Ground and Subsoil Conditions. Ground and subsoil investigations should be conducted prior to the design to establish load-bearing capacity of the soil, level and location of ground water.

1.3.3. Recommended Foundation Type and Founding Stratum. The subsoil condition is such that the new blocks could be supported with a combination of strips and isolated footings foundation system. The foundation should be placed into the hardpan especially along the slope and crest of the hill. The foundation of the blocks within the valley should be placed

into the clayey sand silt layer.

2. DEVELOPMENT PLAN

- 2.1. The SMD District Hospital is designed to cater for seventy-four (74) in-patients and to provide other health care facilities for the people in the District. Its functions will include supervision of health centres and clinics in the District and limited specialised duties. The SMD contains proposals aimed at achieving a layout of buildings including roads and services network that are most economical, functional and convenient. The site required for the district hospital including support services will cover an area of about 22 acres (9 hectares). This however excludes any area required for residential accommodation for staff.
- 2.2. The design is based on the pavilion hospital concept. The individual buildings are interconnected by both covered and uncovered walkways. The main public car park is located at the main entrance, within the hospital boundary. There is a main parking area located at the front of the complex. There are sub parking areas at the stores, the laundry, kitchen, the plant maintenance/transport area and the mortuary. The hospital is surrounded by a proposed road to provide individual blocks with vehicular access.
- 2.3. Landscape The general landscape principles developed for enhancing the landscape include:
 - tree planting along major roads to form avenues;
 - minor roads are to have hedges to define them properly;
 - all open pedestrian walkways are to be paved and planted along the edges with short hedges to define circulation areas.
- 2.4. Parking areas will be planted with rows of shade trees to protect vehicles from excessive heat and the prevention of solar radiation from large tarred/ paved surfaces. Landscape and vehicular traffic areas will be carefully considered to ensure that:
 - accesses to parking areas allow for the requisite sight lines.
 - screening and planting within car park is very desirable as cars in their mass may constitute an unsympathetic element in the hospital environment.
 - Squares, court yards and quadrangles created by buildings and covered walkways will be grassed and planted with flower shrubs to beautify them as well as reduce heat gain from open areas.
- 2.5. Due to the nature of the hospital environment, the landscaping will be developed to create a favourable micro-climate and to ensure protection against undesirable wind, noise or fumes, to screen special views to provide privacy, as a visual ecological link with the surrounding landscape and to enhance a focal points, provide shade and create links with both visually and physically between patients, staff and the environment.
- 2.6. Plant material within the confines of the hospital are to be of the ornamental tree types and flowering shrubs as well as some evergreens and those outside the immediate boundaries of buildings i.e. 3 -5 meters from the edge of the buildings are proposed to be a mixture of ornamental, shade and fruit trees.
- 2.7. In addition amenity lighting will be provided for both visual and security purposes.

3. THE DESIGN

3.1. General Description

3.1.1. The proposed 74 bed SMD district hospital will offer direct healthcare services at the district level, confining the scope to three basic requirements.

- Provision of facilities necessary for general and non-specialised medical services;
- A compact and simple development to be realised from materials obtained locally;
- A self supporting and easy to expand facility.

3.1.2. The proposal considers a hospital with a capacity for approximately 74 in-patients in the areas of internal medicine, surgery, orthopaedics, paediatric and gynaecology. In addition there is a 2 bed Recovery Ward at the theatre and a 4 bed Triage ward at the Accident and Emergency Department. The Outpatient Department is capable of handling about 300 patients.

3.2. The Concept. The basic form of a hospital is ideally, based on its functions:

- bed- related inpatient functions
- outpatient related functions
- diagnostic and treatment functions
- administrative functions
- service functions (food, supply etc)

3.2.1. Physical relationships between these functions determine the configuration of the hospital. Certain relationships between the various functions are required taking in to consideration the movement and communication of people, materials, and waste. Thus the physical configuration of a hospital and its transportation and logistic systems are inextricably intertwined. The transportation systems are influenced by the building configuration, and the configuration is heavily dependent on the transportation systems. The hospital configuration is also influenced by site restraints and opportunities, climate, surrounding facilities, budget, and available technology.

3.2.2. These flow diagrams show the movement and communication of people, materials, and waste. Thus the physical configuration of a hospital and its transportation and logistic systems are inextricably intertwined. The transportation systems are influenced by the building configuration, and the configuration is heavily dependent on the transportation systems. The hospital configuration is also influenced by site restraints and opportunities, climate, surrounding facilities, budget, and available technology.

3.2.3. The building form and massing is dictated by the need to develop simple architectural forms, which are easy to construct in any part of the country and are low maintenance. They also allow for expansion and alterations without substantial structural changes.

3.2.4. The architectural form is based on the single storey pavilion type building with a predominant rectangular form, a double pitch roof with extended eaves. This form lends itself to easy expansion on either side of the building. Expansion is envisaged along the horizontal grid lines in standard bay sizes.

3.2.5. The buildings have been designed in modular units along standardized grids in both the

horizontal and vertical direction. Each building has been designed as a stand alone unit linked to other buildings through a series of walkways, landscaped courtyards and concourses.

- 3.2.6. **Grid spacing** has been optimized at **9600mm x 4800mm** to allow for easy cross ventilation and allow for natural day lighting.
- 3.2.7. Emphasis has also been placed on the design of the concourses, which act as focal points in the movement of staff, patients and goods. This feature is accentuated in the architectural form and massing creates a central and transitional point for various activities. Open to all sides, this area is very well ventilated and allows for day lighting.
- 3.2.8. Flow and Circulation. The various blocks have been composed into a component unit connected by a system of covered walkways and pavements to relate to each other functionally and reduce conflicts in circulation. The out-patient and emergency departments are therefore located near the entrance. The radiology and laboratories are in the next block and are positioned such that they are easily accessible from the Wards and the Surgical Suite on one hand and the out-patients department on the other, so that they can effectively serve both in-patients and out patients. The Wards, the Surgical Suite, the kitchen and laundry blocks are grouped further away from the entrance. The Mortuary is located away from the main hospital cluster to reduce possibilities of cross infection and noise pollution. Patients' car park is at the main car park at the entrance. The hospital has a ring road around it to ensure each building accessible by vehicle.
- 3.2.9. Security. To enhance security, the hospital compound will have to be fenced. The only entrance will be through the main gate for security reasons. Enquiries are to be made at the gate house where visitors are directed to the various departments.

3.3. THE LAYOUT

- 3.3.1. The hospital has been developed to the pavilion type concept of single storey units. This provides sufficient flexibility to accept different managerial and operational organizations, thus achieving a very good overall functional utility value. The buildings have been arranged to allow for:
 - Open spaces to meet the minimum distances between rows of buildings and adequate space for landscaping;
 - Future expansion;
 - Air movement through the hospital;
 - Movement of personnel, equipment and vehicles in the most efficient manner. (Fig. 1 shows the proposed layout of the hospital).
- 3.3.2. The general orientation of most buildings is East-West ensuring that window openings are north and south facing to avoid excess heat gain through openings and building fabric as well as take maximum advantage of prevailing SW-NE wind direction to achieve cross ventilation. Ambulatory care services and adjunct clinical services are provided in the building complex which forms the OPD. This is the main building on approach to the site and for organisational purposes; the movement of most patients and visitors are limited to this area. Subsequently, the buildings are grouped such as to limit public access to sensitive areas like the surgical and maternity suites.
- 3.3.3. The disposition and location of other buildings within the hospital premises has been

dictated by the organisational philosophy underlying the development of the hospital layout and to a large extent this has been fashioned by the policy guidelines of the Ministry of Health, which cover management practices as well as operational policies and procedures of Hospitals in general and District Hospitals in particular. The following sections described in detail, the various facilities and services in each building unit which have been functionally determined according to their various technical requirements. In addition, all medical, surgical, logistics and administrative services which are necessary to ensure the comprehensive delivery of preventive and curative health care are discussed. These are addressed with a brief description and indication of the capacity and location of the facility.

3.4. CLINICAL SERVICES

- 3.4.1. Clinical Services consist of facilities for medical and surgical observation, examination and treatment, provided to both in-patients and out patients. Patients here may be on referral basis from other Primary Health Care facilities.
- 3.4.2. This is based on the pavilion type concept which allows in principle for free uninterrupted space within. This ensures maximum flexibility. However, the surgical and maternity suites have specific space configurations dictated by specific technical requirements and functional needs.
- 3.4.3. Typical Wards. The design layout for the general wards including male and female medical and surgical wards are similar and are based on the concept of having core facilities for nursing care grouped in a central area for easy management of patient bays on either side. Facilities provided here are designed to meet the nursing needs of both medical and surgical patients. There are a total of 11 beds including single bed occupancy wards which offer the possibility of organizing medical sub-disciplines through the optimization of nursing care. These may also be used as VIP wards or Isolation rooms, and their location at the wings of the ward block, allows for maximum privacy and preferential care. In addition the landscaping between buildings will be designed to enable recuperating patients enjoy the outside environment.
 - Capacity. The total capacity of the typical wards is 66 beds, covering 6 blocks of 11 beds each. At an average occupancy rate of 80% this provides for over 19,000 patient days per year. Taking an average length of stay 5 days per admission, it allows for over 3,800 admissions per year.
 - Location. The typical wards are the group of buildings after OPD complex in the northwards direction.
- 3.4.4. Surgical Suite. This is one of the most important departments in the hospital and can provide for general surgery as well as surgery in obstetrics and gynaecology, orthopaedic, plastic surgery, ENT and selected eye procedures. However, the level of equipment provided will not cater for speciality surgery such as vascular, cardiac, kidney and such surgical interventions. Such cases may be referred to the Teaching Hospitals for specialist intervention.
- 3.4.5. The proposal recommends that there shall be a distinction between aseptic and septic surgery. Furthermore, to maintain the highest standards required for the operation of the surgical suite, one out of the two recommended theatres will be dedicated to infected cases. For reasons of sterility, patient stretchers will be used for transporting patients while

internal transportation within the surgical suite will be on dedicated surgical suite stretchers.

- Capacity. At an average capacity of 4 procedures per day per room and 300 days of operation the surgical suite has a capacity of 2,400 procedures per year.
- Location. The surgical suite is located close to departments that may benefit directly from its services and away from the flow of out-patients and visitors. Access is restricted to personnel of the department only.

3.4.6. Maternity/Delivery Suite: Normal deliveries will be done here. Complicated deliveries and C-sections and other potential surgical interventions will be done at the surgical suite.

- Capacity. There will be two labour/delivery beds in one delivery room with 2 potential delivery stations. This facility is combined with an 8-bed maternity ward.
- Location. Next to the surgical suite.

3.5. AMBULATORY CARE SERVICES

3.5.1. The out-patient clinic will provide services in the field of medical and surgical specialities and will include internal medicine, dental rooms, surgery, obstetrics gynaecology, paediatrics, ophthalmology, ENT, preventive medicine and family planning. These facilities will all be housed in the 2-building complex.

3.5.2. In addition the accident and emergency clinic will provide facilities for resuscitation, first aid, observation before admission or discharge minor surgery for procedures under local anaesthesia and a plaster room. There will be a clear distinction between medical and surgical cases.

3.5.3. Functional areas and operating procedures shall be such as to indicate this distinction. In addition provision is made for a 4-bed triage ward for which may also be used for overnight cases, where required.

3.6. ADJUNCT CLINICAL SERVICES

3.6.1. Clinical Laboratories Clinical laboratory services shall be provided for both in-patients and out-patients.

- Capacity. The laboratory is expected to process about 150 specimens per day for both out-patients and in-patients.
- Location. The laboratory is located within the Adjunct Clinical Services Block.

3.6.2. The following facilities shall be provided:

- Haematology (including blood storage in fridges);
- Microbiology;
- Chemistry/Biochemistry;
- Pathology;
- Stores.

3.6.3. Mortuary. Refrigerated body stores are to be provided in the mortuary. Other facilities provided are a small pathology laboratory for the pathologists for histopathology.

- Capacity. Since the Mortuary would be a major reference point in view of the absence of mortuary facilities in other parts of the District, it is recommended the capacity is a 24-body storage unit.

- Location. The mortuary is located separate from all other clinical and Para clinical services at the hospital and has been provided with parking spaces for large groups of mourners in line with our sociological norms. It is a potential noise source.
- 3.6.4. Pharmacy. The pharmacy will be responsible for the storage and distribution of all pharmaceutical supplies to all user departments including the out-patients clinics. Disposables fall under the responsibility of the pharmacy as well.
 - Capacity. The proposal makes provision for the pharmacy to produce only fluid additive procedures and the compounding of non speciality minor pharmaceutical recipes. However, provision will be made for the preparation of IV solutions as well as mixtures ointments and other wet products. Storage capacity guarantees an overlapping one month stock.
 - Location. The department is located within the out-patient clinic area for easy access to out-patients as well as in-patient care units.
- 3.6.5. Medical Records. Medical records are to be centralized for both in-patients and out-patients. Functions provided in the department are:-
 - Out-patient Reception. Registration of out-patients identification, establishing of out-patient records and collection of money.
 - In-patient Admission. Registration of in-patients establishing of in-patients records, opening of administrative (billing and invoicing records) filing and retrieval of records, results of examinations and diagnostic reports.
 - General Statistics. Collection and treatment of all data pertaining to hospital utilization, mortality and morbidity statistics, issuing of statistical reports to the hospital administration and the medical staff, secretarial services related to the management of medial records department including transmission of reports to the authorities and other health care facilities.
- 3.6.6. Diagnostic Radiology. The department is designed to provide diagnostic radiology to both in-patients and out-patients. Plain as well as contrast examinations will be conducted. Two x-ray rooms are provided and equipped to perform both fluoroscopy and radiology.

3.7. PARACLINICAL SERVICES

- 3.7.1. Central Sterile Supply Department (CSSD). This department is responsible for all sterile supplies used in the hospital including surgical and delivery suites. Facilities are provided for:
 - Receiving, cleaning, washing;
 - Pack preparation;
 - Sterilization;
 - Cart wash;
 - Issuing;
 - Storage of sterile and clean supplies.
- 3.7.2. The use of disposable gloves syringes and needles is taken into consideration. The department provides for formaldehyde sterilization procedures. The sterile materials will be supplied by dedicated trolleys which use the exchange box/cart system.
 - Location. The CSSD is located in the same building as the laundry since the two have shared operations. It is also not too far from the surgical suite which is a heavy

user of sterile supplies.

3.8. LOGISTIC SERVICES

- 3.8.1. Catering Services. Catering services are responsible for the order, storage, preparation and distribution of food and dietary prescriptions to patients. Staff dining facilities are also provided for both junior and senior staff. In addition, provision is to be made for outdoor cooking and it is recommended that all cooking be done on LPG gas.
- 3.8.2. Laundry and Linen. The laundry will provide facilities to collect, receive and treat (including disinfection of infected linen) repair and distribute all hospital linen including staff uniforms and distribute to the various users of linen in the hospital. The laundry will be able to treat 4kg of dry linen per bed per day.
- Location. The laundry is located in the same building as the CSSD.
- 3.8.3. Materials and Stores. The basic functions of the stores are the management of all hospital supplies including:-
- the receiving of all goods and supplies coming into the hospital.
 - the storage of these goods until they are needed.
 - the inventory of all used goods.
 - the distribution of these goods to the appropriate department.
- 3.8.4. Staffing requirements range from 4-6 employees with one of this number acting as the clerk. He would be responsible for all the goods from receipt up to the point of distribution. Storage is provided for the following:
- Equipment;
 - Pharmaceuticals;
 - Linen and Beddings and;
 - Instruments.
- 3.8.5. Plant Engineering and Maintenance. This department will cater for the maintenance needs of not only the District Hospital, but also other surrounding government clinics and health centres. Preventive and first-line maintenance will be the responsibility of the department while for more sophisticated equipment service contracts with competent firms could be organised. Hence offices are provided for the Hospital Engineer and his assistant and adequate space for the various sections e.g. carpentry, electricians, vehicle mechanics etc. to enable them supervise effectively the activities of the District Hospital.
- Location. The department is located to allow for direct access from outside and within the general services area.

3.9. ADMINISTRATIVE SERVICES.

- 3.9.1. Facilities are provided for the general management of the hospital, based on a frame work approved by the Ministry of Health.
- Location. The administrative services are located near the OPD block near the main entrance to the hospital.
- 3.9.2. The facilities took into consideration the various staffing requirements of the various

departments such as:

- Administration, accounting, invoicing and billing, communications, personnel and public relations.
- General management of the medical practice in the hospital.
- Nursing administration for the management of nursing care.

3.10. INFRASTRUCTURE SERVICES

3.10.1. Water Supply. The supply will be taken from the nearest existing GWSC main water line. Water storage facilities will be provided using a combination of underground and elevated overhead tanks.

3.10.2. LPG. Because of the proposed use of LPG for cooking etc. in the hospital, an LPG tank is to be provided near the kitchen. Special care will be taken to provide adequate ventilation around it as well as the necessary fire prevention measures.

3.10.3. Roads. It is proposed that all road surfaces be gravelled and tarred. About 2km - 4km of road network including car parks should be considered. This caters for also access to the hospital site.

3.10.4. Sewerage Treatment Plant. A non mechanical sewerage treatment plant with a disposal field of about 50m x 50m will be provided. This is to be located towards the leeward side of the hospital site.

3.10.5. Electrical Reticulation. General electrical reticulation will be provided for the hospital. This would include the provision of stand by generators, HT and LT switch gear, transformers and underground cabling etc.

3.10.6. Communication Equipment. A nurse call system in the wards for the use of patients who require the services of a nurse in emergency situations will be provided. In addition, telephones and telecommunication equipment would be installed as may be required.

3.11. BUILDING STRUCTURE AND ELEMENTS

3.11.1. Foundation. Adequate measures are to be taken in the structural design of the foundation to safely resist earthquake effect or seismic forces in accordance to the relevant provisions of the British Standard Code of Practice or the equivalent Ghana Standards.

3.11.2. Super Structure. The super structure is of frame type design consisting of reinforced concrete columns, portal frame, beams and slabs. Shear walls and reinforced stairwells are to be provided to ensure stability and additional protection against seismic forces. External walls shall be 150mm thick block work whilst internal walls are of 150mm thick block work.

3.11.3. Roof. Roofing material for the buildings will be in green anodized aluminium roofing sheets reflecting the traditional colours of the health service.

3.11.4. FINISHES

- 3.11.5. Doors. Entrance doors and all external doors will be 40mm thick solid core hardwood panel doors with 6mm wired clear glass viewing ports where necessary. Internal doors will be 40mm thick glass fibre reinforced polyester moulded around non-organic hi-density core.
- 3.11.6. Windows. Aluminium frame carriers with deluxe naco louvered windows generally except for theatres, laboratory, CSSD, Xray and mortuary where aluminium framed sheet glass will be used for better control of air quality.
- 3.11.7. Floors. Generally all floors are resin coated terrazzo. Anti-slip ceramic floor tiles for wet areas and wash rooms and theatres. Washed terrazzo finishes are to be applied to external walkways and building aprons while driveways will be paved with 75mm thick concrete block pavers.
- 3.11.8. Walls. All internal walls will be painted in emulsion or gloss where appropriate. However, wet areas such as toilets, and wash rooms will be tiled up to door height with ceramic tiles and the rest painted in gloss. External walls, columns, beams and fascia on the main longitudinal facades will be painted in weather resistant acrylic paint. Theatre wall surfaces will be
- 3.11.9. Ceiling. Suspended ceilings using smooth drywall panels or PVC tongue and groove panels which will incorporate light fixtures and air conditioning where necessary will be used in most areas including the eaves. Special rooms requiring high level of humidity control and infection control e.g. theatres, will be fitted with gypsum board.

3.12. SOCIAL SERVICES

- 3.12.1. Provision has been made for a public transport terminal for taxis and buses as well as a mini market for food vendors. This is necessary to satisfy a social need of the users since such facilities have evolved in almost all the hospitals in Ghana.
- Location. This is to be located on a site close to the main entrance of the hospital and special dedicated pedestrian paths have been provided to link it to the OPD building.

SUMMARY OF GROSS SPACE PROGRAM/ ACCOMMODATION SCHEDULE

DEPARTMENT DESCRIPTION	SUB-TOTAL	TOTAL	GRAND TOTAL
CLINICAL SERVICES			
INPATIENT SERVICES		2603	
▪ INPATIENT CARE UNITS (TYPICAL WARDS)	1680		
▪ MATERNITY	550		
▪ SURGICAL SUITE	373		
OUTPATIENT CLINIC		1040	
ADJUNCT CLINICAL SERVICES		738	
▪ CLINICAL LABORATORIES	208		
▪ DIAGNOSTIC X-RAY	146		
▪ PHARMACY	172		
▪ ACCIDENT AND EMERGENCY	212		
PARACLINICAL SERVICES		337	
▪ LAUNDRY AND CENTRAL STERILE SUPPLY DEPT.	337		
LOGISTICS SERVICES		659	
▪ KITCHEN AND STAFF DINING	376		
▪ PLANT ENG. & MAINTENANCE AND MEDICAL STORES	283		
ADMINISTRATION SERVICES		2543	
▪ ADMINISTRATION/RECORDS	305		
▪ MORTUARY	283		
▪ OTHERS: CONCOURSE AND COVERED WALKWAYS, INCINERATOR	1955		
NET FLOOR AREA			7920
NTDG FACTOR		1.45	
GROSS FLOOR AREA			11,484
ADD FOR 10 UNITS OF STAFF ACCOMMODATION			1000
TOTAL GROSS FLOOR AREA OF HOSPITAL			12,484

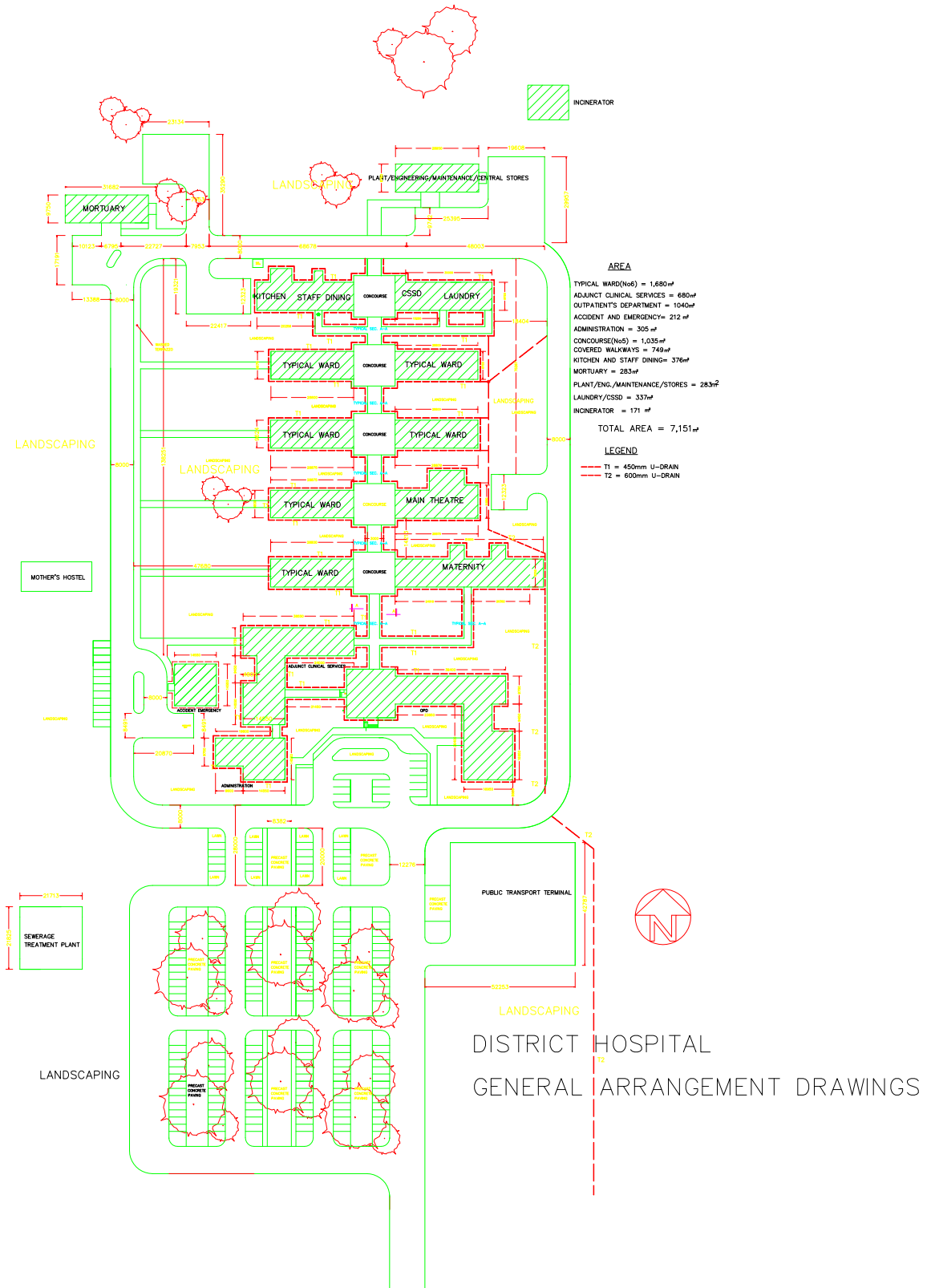


Figure 1. District Hospital - general arrangement of departments

3.13. PROVISIONAL COST ESTIMATES

- 3.13.1. Provisional cost estimates have been prepared by applying a unit rate, that is, cost per Gross Floor Area (cost/m² G.F.A.) of the buildings. The applicable unit rate is \$1200 for civil works.
- 3.13.2. With respect to equipment and furniture, the estimate has been based on prevailing percentage ratios on similar healthcare projects undertaken in the country. Allowances have been made to cover Bank Charges, Administrative Overheads, and Transport to site and Installation costs.
- 3.13.3. The costs of roads, water supply, sewerage works and electrical distribution have been estimated based on provision of new facilities as most sites is expected to be completely new and also on the assumption that the sites are generally flat and lie within one kilometre of available services and access roads.
- 3.13.4. **The estimated total cost of a District Hospital is \$32.0 million (Thirty-Two Million US Dollars).** The total cost is obtained by adding the Base Cost to allowances made to cover price and physical contingencies. The estimated cost is given in foreign exchange (F.E). The foreign exchange auction rate in Ghana as at the time of preparing these cost estimates was **GH¢1.45 = US\$1 (30th May, 2010)**. Below is a breakdown of the component costs.

▪ Buildings	10,000,000
▪ Site Preparation, Roads etc.	1,600,000
▪ Covered Walkways	250,000
▪ Fencing and Gates (Chain link)	250,000
▪ Paved Areas/Landscaping	400,000
▪ Plumbing & Electro-mechanical	2,250,000
▪ Electrical Services	2,750,000
▪ Hospital Equipment	6,500,000
▪ Hospital Furniture	1,000,000
▪ Sub-Total	25,000,000
▪	
▪ Contingency Sum 10%: (5% price + 5% physical)	2,500,000
▪ Consultancy Fees 18% (local consultancy + Client P.M)	4,500,000
▪ Grand Total	32,000,000

3.14. CONCLUSION

- 3.14.1. This report outlines the design concepts, functional programme, organisational philosophy and operational capacities as captured during workshop briefing with various representatives of end users. The report also provides an estimate of construction, equipping and furnishing costs of a new District Hospital.

- 3.14.2. **These estimates are only indicative and should be used as guides only.** Hence it is advised that for each specific site, detail costing based on site investigation reports and detail design including possible re-alignment of buildings due to varying topography and accesses are obtained.
- 3.14.3. Furthermore, the outline brief, accommodation schedule and standard design guidance will normally be provided to guide detailing of architectural and engineering designs of the district hospitals.
- 3.14.4. It is hoped that this will form a good basis for further discussion on the development of standard features of new District Hospitals in Ghana and ultimately lead to improved standards of building and healthcare delivery.

