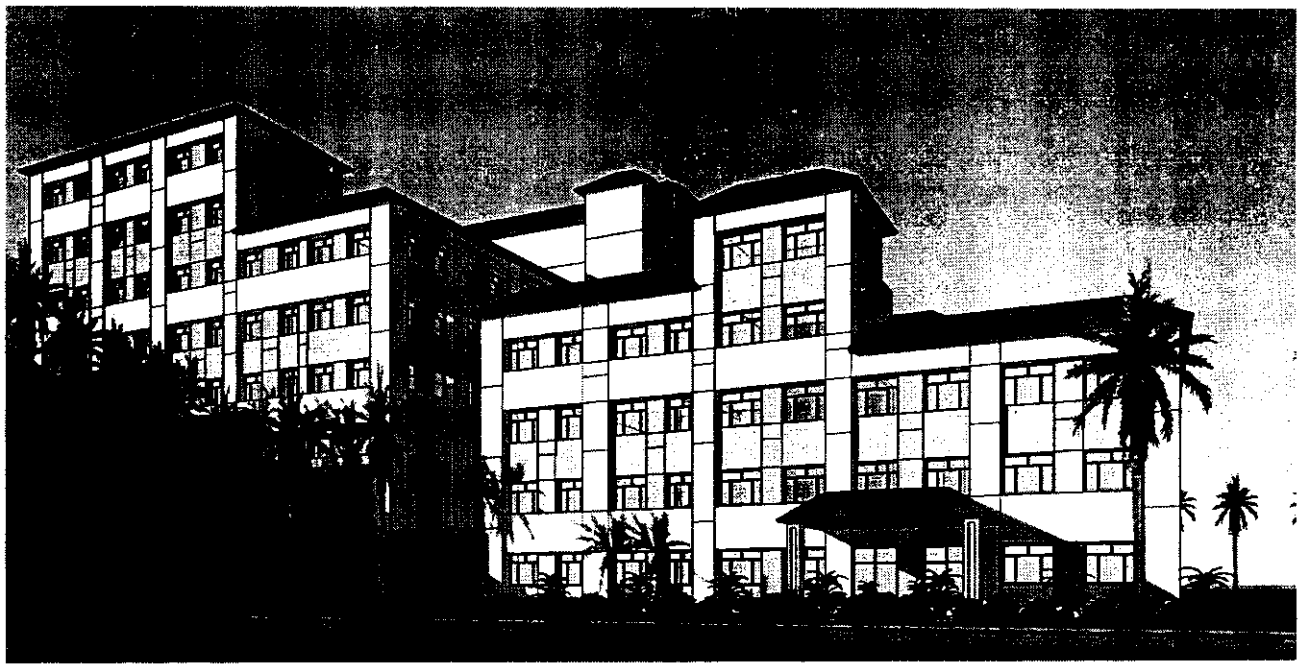
# പതിനാലാം കേരള നിയമസഭ
## പതിനെട്ടാം സമ്മേളനം

നക്ഷത്രചിഹ്നമിടാത്ത ചോദ്യം നമ്പർ.2490 — 12/02/2020-ൽ മറുപടിക്ക്

### ചിത്തിരപുരം സി.എച്ച്.സി.യിൽ കെ.എസ്.ഇ.ബി. യുമായി ബന്ധപ്പെട്ട പ്രവൃത്തികൾ

| | ചോദ്യം<br>**ശ്രീ.എസ്.രാജേന്ദ്രൻ** | | മറുപടി<br>ശ്രീ. എം.എം.മണി<br>(വൈദ്യുതി വകുപ്പ് മന്ത്രി) |
|---|---|---|---|
| (എ) | കിഫ്ബി മുഖേന കെ.എസ്.ഇ.ബി ക്ക് കീഴിൽ നിർമ്മാണ പ്രവൃത്തികൾ ഏറ്റെടുക്കുന്ന ഏജൻസിയെ എസ്. പി.വി. ആക്കിക്കൊണ്ട് അനുവദിക്കപ്പെട്ടിട്ടുള്ള, ദേവികുളം നിയോജക മണ്ഡലത്തിലെ ചിത്തിരപുരം സി.എച്ച്.സി.യുമായി ബന്ധപ്പെട്ട പ്രവൃത്തികൾ നിലവിൽ ഏതുഘട്ടത്തിലാണെന്ന് വ്യക്തമാക്കാമോ; | (എ) | പ്രസ്തുത പദ്ധതിയുടെ നിർമ്മാണത്തിനുള്ള ഡി.പി.ആർ സർക്കാരിൽ സമർപ്പിച്ചതിൻ പ്രകാരം G.O (Rt) No.1280/2019/H&FWD dated 28.05.2019 ആയി ₹55,33,78,145/- രൂപ (അൻപത്തിയഞ്ചു കോടി മുപ്പത്തിമൂന്ന് ലക്ഷത്തി എഴുപത്തിയെണ്ണായിരത്തി ഒരുനൂറ്റി നാല്പത്തിയഞ്ച് രൂപ മാത്രം) യുടെ ഭരണാനുമതി ലഭിച്ചിട്ടുണ്ട്. കിഫ്ബിയിൽ നിന്നും അനുമതി ലഭിക്കുന്നതിനായി പ്രസ്തുത നിർമ്മാണത്തിന്റെ വിശദമായ ഡി.പി.ആർ ഓൺലൈനായി സമർപ്പിച്ചിട്ടുണ്ട്. |
| (ബി) | ചിത്തിരപുരം സി.എച്ച്.സി യുമായി ബന്ധപ്പെട്ട് കെ.എസ്.ഇ.ബിക്ക് കീഴിലെ പ്രസ്തുത ഏജൻസി തയ്യാറാക്കിയിട്ടുള്ള മുഴുവൻ രേഖകളുടെയും പകർപ്പ് ലഭ്യമാക്കാമോ? | (ബി) | പ്രസ്തുത പദ്ധതിയുടെ ഭരണാനുമതി ലഭിച്ച പ്രോജക്ട് റിപ്പോർട്ടിന്റെ പകർപ്പ് അനുബന്ധമായി ചേർക്കുന്നു. |

സെക്ഷൻ ഓഫീസർ



# DETAILED PROJECT REPORT FOR

# DEVELOPMENT OF TALUK LEVEL HOSPITAL AT COMMUNITY HEALTH CENTRE - CHITHIRAPURAM

**SUBMITTED BY**

KSEB

കേരളത്തിന്റെ ഉൗർജ്ജം

## PREFACE

The Project Report has been prepared towards **Construction of Taluk Level Hospital at Community Health Centre, Chithirapuram**, as per the requirement of the Health and Family Welfare Department.

For preparing the report, reconnaissance study as well as detailed discussions with end users has been done at the existing "Community Health Centre, Chithirapuram". The blend of learning and knowledge of the specific requirements acquired during our site visits and discussions are reflected in the final design. The rationale behind the site study and data collection has been to identify and upgrade the existing healthcare environment through a sustainable and eco-friendly construction.

Being a Project, which requires multiple domain knowledge and expertise, the services of experienced consultants have been utilized so as to have a state of the art facilities at par with the International Standards. Very frequent client visits have also been made to assess the specific requirements of the Hospital Authorities, who are the end users.

The consultancy wing of KSEBL is happy to associate with this ambitious Project aimed at transforming the Healthcare system offered in the Government sector to International Standards through a much awaited paradigm shift.

## TABLE OF CONTENTS

## 1. SALIENT FEATURES

| | | |
|---|---|---|
| 1 | Title of project | Construction of Taluk Level Hospital at Community Health Centre, Chithirapuram |
| 2 | Details of project location | |
| | i. District | Idukki |
| | ii. Taluk | Devikulam |
| | iii. Corporation / Panchayath / Panchayath | Adimali |
| | iv. Legislative Assembly constituency | Devikulam |
| 3 | Implementing agency / SPV | KSEBL |
| 4 | DPR prepared by | KSEBL, the SPV for Health & Family Welfare Dept. |
| 5 | Project outlay | INR 62 Crores plus GST at applicable rates extra |
| 6 | Budget provision | Funded through KIIFB - For Healthcare improvement 1800 crores have been set aside for up gradation of Government Hospitals |
| 7 | Budget speech reference | 2016-17 / 2017-18 |
| 8 | Administrative sanction | To be released |
| 9 | Nature of project (New building / Renovation of existing building) | New Buildings |
| 10 | Present status of existing building, if | The following blocks are available in the |

| | | |
|---|---|---|
| | any | campus:<br><br>• OP Block<br>• ICTC Block<br>• Office<br>• Laboratory<br>• Dental Unit<br>• Gynaecology Block<br>• X – Ray Unit<br>• IP Unit<br>• Store<br>• Quarters – 4 Blocks<br>Among the above the following blocks to be demolished<br><br>• ICTC Block<br>• Office<br>• Laboratory<br>• Dental Unit<br>• Gynaecology Block<br>• X – Ray Unit<br>• Quarters – 1 Block |
| 11 | Need for the project | The proposed Construction of Taluk Level Hospital at Community Health Centre, Chithirapuram to upgrade the Facilities and Enhance the Bed strength which is the need of the hour.<br><br>1. Government vision of FREE High-Quality Healthcare for all.<br>2. Need to upgrade the facilities of CHC Hospital to International standards capable of serving the population of Chithirapuram and surrounding areas of this region for the next 50 years without any further major modification.<br>3. Being very close to the Bypass road, development of this Hospital will certainly prove life saving for all such cases.<br>4. Absence of specialty care in this hospital forces patients to other hospitals or Private Medical College hospitals. This causes great difficulty and loss of life in many cases to poor patients.<br>5. Trust in Government Healthcare shall be regained by APL members of society.<br>6. Hospital can consider possibility of charging a fee for services rendered to |

| | | |
|---|---|---|
| | | APL healthcare seekers, by providing the proposed state of the art facilities –there by opening up a Revenue Stream for the better maintenance of the facilities of the Project, which will eventually be of help to the BPL patients |
| 12 | Details of proposed building | |
| | i. No of blocks proposed | 2 blocks<br>• Hospital Block<br>• Utility |
| 0 | ii. No. of storey's of main building | 8 Levels |
| | iii. Total area of each block | Hospital Block – 11,226 **SQM**<br>Substation & Mortuary Blocks – 387 **SQM**<br>**Total Area: 11,613 SQM** |
| | iv. Other details of building | |
| 13 | Details of investigations / survey conducted | Total station Survey has been conducted for the entire plot. The land is having an extent of 7.68 Acres, having contours varying from EL +100.0m to EL +140.0m. The Main access Road is from Munnar Bypass road. |
| 14 | Total estimated cost with item wise cost break up and details of schedule of rates | The total cost of the Project including medical equipment comes to Rs.62 Crores plus GST at applicable rates extra. The detailed cost breakup is shown in Chapter 12. For most of the items estimate has been prepared using PRICE Software. For items not covered in PRICE rates as per observed data based on market rates have been followed. |
| | Whether detailed estimate attached | Yes |
| | Whether technical specifications of medical equipment attached if any | Yes |
| 15 | Details of revenue streams | Yes |
| 16 | Details of cost benefit analysis | Yes |

| | | |
|---|---|---|
| 17 | Details of project risks | Yes |
| 18 | Details of project management organization strategy | No |
| 19 | Details of project implementation schedule (PIS) & work break down (WBS) – Proposed duration to complete the project | No |
| 20 | Details of statutory clearances | Yes |
| 21 | Operation & maintenance (O&M) arrangements of the project after completion | Yes |
| 22 | Details of attached drawings | Detailed Drawings attached as Annexure |
| 23 | Other attachments | Detailed Estimate attached as Annexure |

## 2. EXECUTIVE SUMMARY

The proposed hospital, which is envisaged to function as a Taluk Level Hospital is to be established in an area having an extent of 7.68 Acres in the existing CHC & Hospital, belonging to the Health and Family Welfare Department at Chithirapuram. The existing CHC & Hospital which primarily caters to the people of Chithirapuram, has an average daily footfall of more than 200 patients. Since the existing facilities are limited, there is an urgent need for the expansion of hospital, not only to provide state of art health care facilities to the patients but also to cater to an enhanced population both in the BPL & APL categories, in line with the current policy of the Government.

The project comprises of the Development of the Hospital block having a built-up area of 11,613 SQM. H&FWD envisages to construct a Taluk Level Hospital in CHC with the following disciplines:

- General Medicine
- General Surgery with minor OT/Procedure room
- OBG
- Paediatrics
- Dermatology
- Orthopaedics along with Plaster and dressing rooms
- Physiotherapy
- ENT with Audiometry room
- Ophthalmology with refraction and dressing rooms
- Dental with dental lab
- Psychiatry
- Anaesthesiology

The proposal is to accommodate around 127 beds in the following blocks

- Hospital Block
- Utility block

The proposed Project is having a total estimated cost of Rs.62 Crores plus GST at applicable rates extra. for a total built up area of 11,613 SQM which will include state of the art construction, providing MEP (Mechanical, Electrical & Plumbing) facilities which includes Air Conditioning, Lifts, Water supply & Sanitation, medical equipment, etc. among other things. Also, the site development, landscaping works, various fitments, signage, etc., are also proposed to be executed as per this project proposal.

This Project Report which has been prepared in conformity with the guidelines of KIIFB, is being submitted to the Administrative Department for issuance of Administrative Sanction. For most of the items, estimate has been prepared using the PRICE Software. For items not covered in PRICE, observed data has been used based on Market Discovery.

The Buildings and services have been designed based on the leading principles of energy efficiency and sustainability. Basic emphasis was given while developing the Master plan to design a hassle free environment for healing in which, nature & environment has an important role to play

without compromising on safety and convenience of the patients. Great care has been taken to retain the existing landscape wherever possible as well as to follow the contour to minimize cutting and filling.

As with any other project, maintenance is of utmost importance – especially so with a Hospital Project frequented by general public. Hence a Standard Operating Procedure (SOP) is also insisted upon, in the interest of safety of the people, to ensure cleanliness and long life to various equipment. By construction of the state-of-the-art Hospital, Utility, and Housing Blocks at the existing CHC, a paradigm shift can definitely be brought out in the way Government Hospitals are assessed and utilized by the general public.

## 3. INTRODUCTION

This Project proposal is for the Construction of Taluk Level Hospital at Chithirapuram. The existing Hospital now caters to more than 200 patients per day – but does not have the required facilities for offering the latest in medical care. The available infrastructure is highly insufficient and the buildings are pretty old incurring high Maintenance Cost. Also, the facilities are spread out in the campus with poor connectivity.

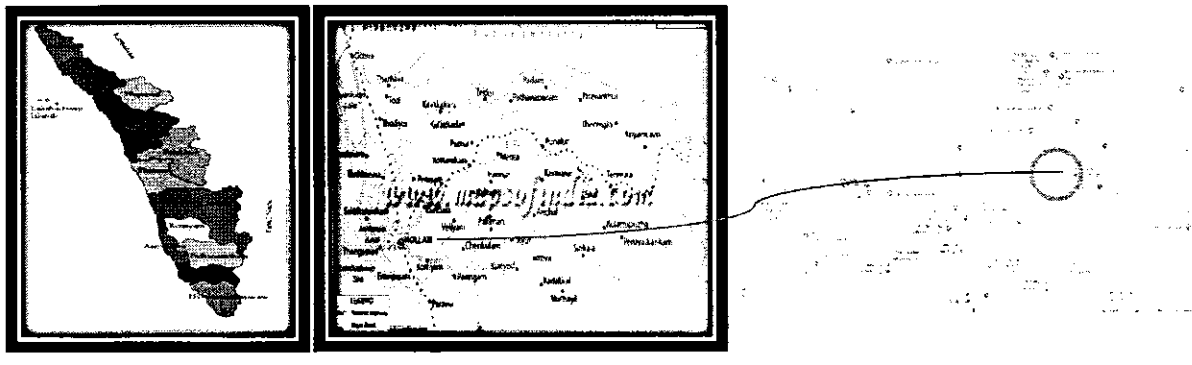
The initiative has been taken by the Department of Health & family Affairs to utilize the land which is available in the campus having an extent of 7.68 acres, for developing the existing CHC to International Standards, capable of serving the region for the next 50 years without any further major modification in line with the Government's vision of FREE High-Quality Healthcare for all.

Absence of specialty clinical care for patients in the region causes huge hardships to the patients of the region. Being nearer to the National Highway, development of this Hospital as a High end Trauma Care Centre will certainly prove life saving for all such cases and cases that are referred to other hospitals.

The Trust in Government Healthcare shall be regained by APL members of society and the Government can consider possibility of charging a fee for services rendered to APL healthcare seekers, by providing the proposed state of art facilities thereby opening up a Revenue Stream for better maintenance of the facilities of the Project which will eventually be of help to the BPL patients.

Well-designed, supportive health care environments can not only prevent harm and injury but also provide psychological support and aid the healing process. It has now become imperative to rethink facility design as a critical element in bringing about change in the way health care is provided and experienced in health care settings. By linking the design of the physical environment with an organization's patient safety and quality improvement agenda, we can definitely bring out a Paradigm shift in the way GovernmentHospitals are assessed and utilized by the population.

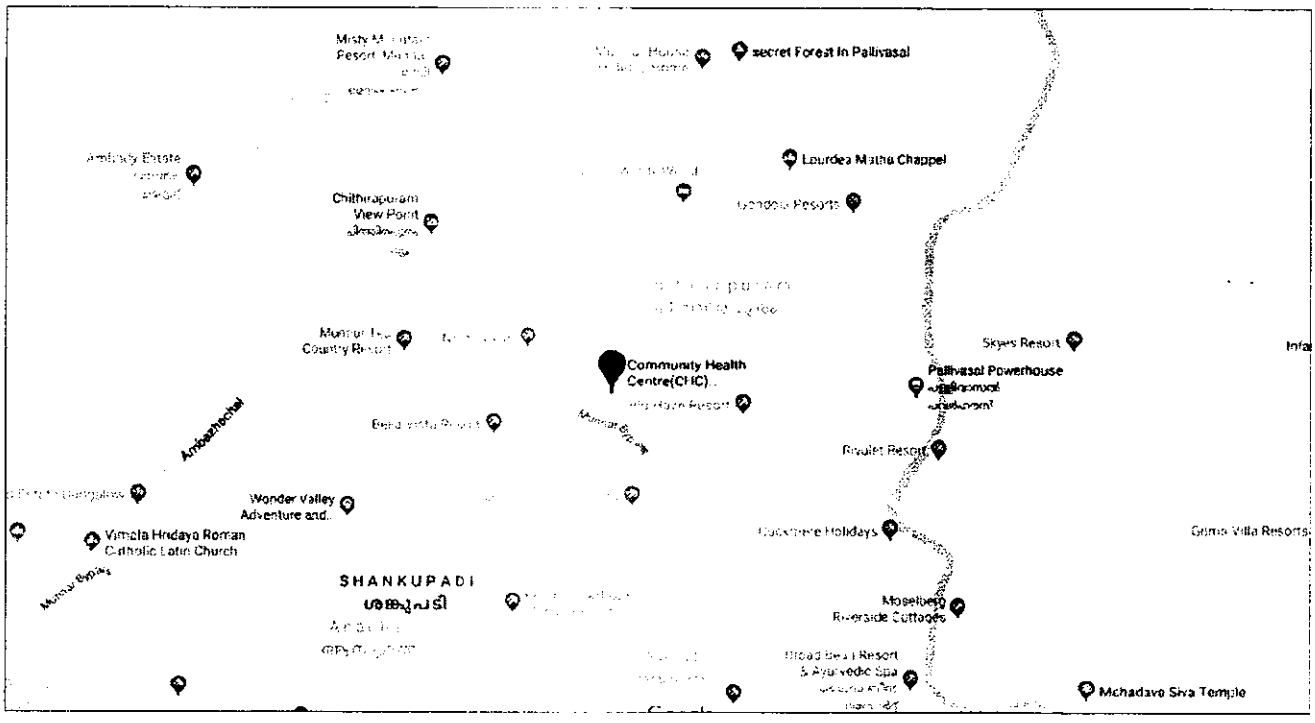
**Location of the Project: CHC** is on Munnar Bypass road, Chithirapuram,



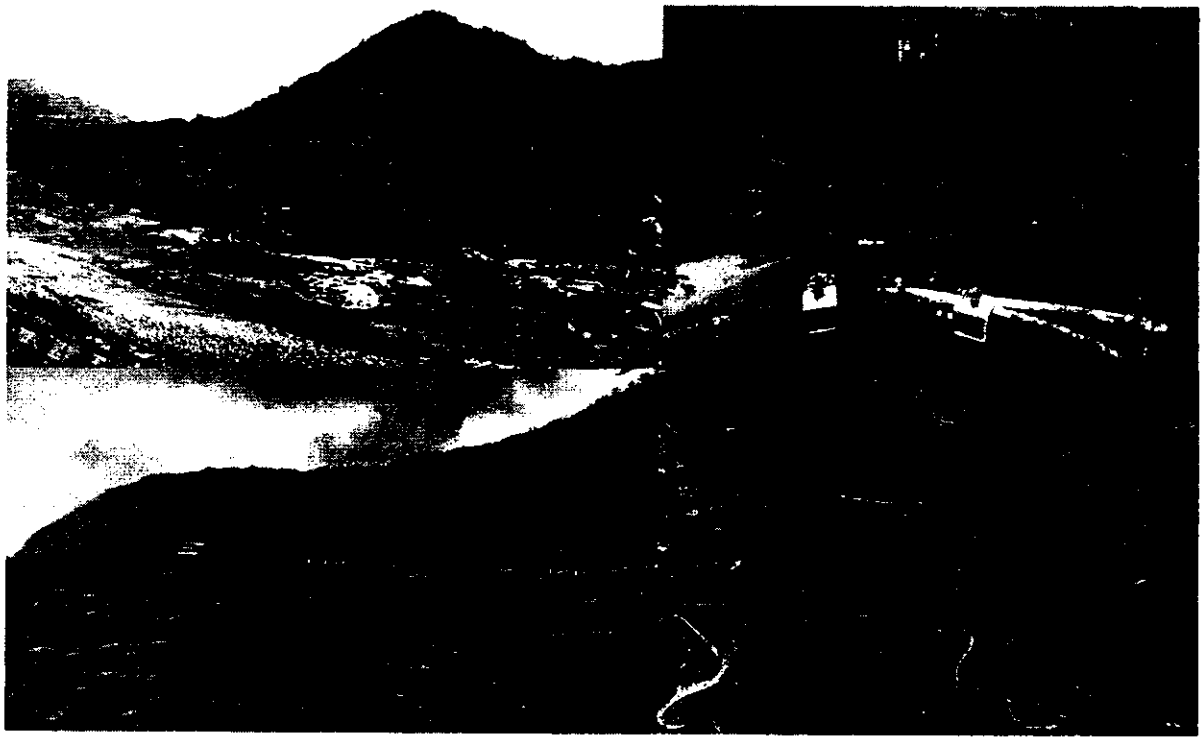
**Location Map**

A quaint hill town located around 13 km from Munnar; Chithirapuram is renowned for its picturesque tea plantations. Home of the Pallivasal Hydel Power Project, it is a veritable haven for those seeking a serene and secluded getaway.

The region in and around Munnar varies in height from 1,450 meters (4,760 ft) to 2,695 meters (8,842 ft) above mean sea level. The temperature ranges between 5 °C (41 °F) and 25 °C (77 °F) in winter and 15 °C (59 °F) and 25 °C (77 °F) in summer.[10] Temperatures as low as −4 °C (25 °F) have been recorded in the Sevenmallay region of Munnar




## Nearby landmarks



CHC is one of the primary level hospitals in Chithirapuram, Idukki District, serving thousands of people for all walks of life. Being a district with high density of population especially plantation labours, the CHC promotes preventive and curative health improvement initiatives for their welfare. CHC, Chithirapuram is one of the oldest hospitals established in Idukki District. Since the Government hospital is meant to give proper health care facilities for the poor and the needy, developing and modernising the CHC, Chithirapuram is imperative for the General health care of the surrounding demographic region.

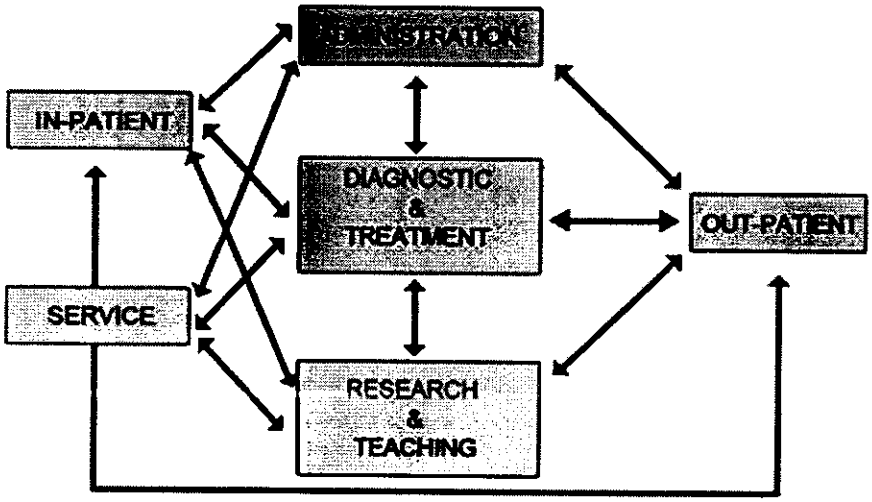
## 4. PROJECT DEFINITION, CONCEPT AND SCOPE

The main objective of the Project is Construction of Taluk Level Hospital at Community Health Centre, Chithirapuram by effective master planning.

Major constraints of the existing Hospital which have been borne in mind while performing this task have been the following: -Lack properly designed Infrastructure for the In-Patients and Out-patients

1. Lack of availability of medical infrastructure
2. Absence of state-of-the-art facilities aimed at the healing of patients
3. Lack of space for facilities
4. Haphazard construction of blocks in the available land.
5. Absence of any proper canteen facility
6. Absence of proper staff quarters and rest rooms
7. No proper sewage treatment plants
8. No proper fire fighting facilities.
9. Lack of Public addressing system and information

The integration between the functions of the various components based on the hospital's requirement is of paramount importance




HOSPITAL RELATIONSHIPS

A carefully drafted design of the various components, ensuring that the integration facilitates smooth flow of patients without congestion and without creating any sort of confusion will shape configuration of the hospital.

**Preliminary and basic requirements identified are:**

- Hospital with 127 bedded facility.
- Diagnostics and treatment services
- Inpatient wards

- Outpatient clinics
- Occupational facilities
- Operational support services

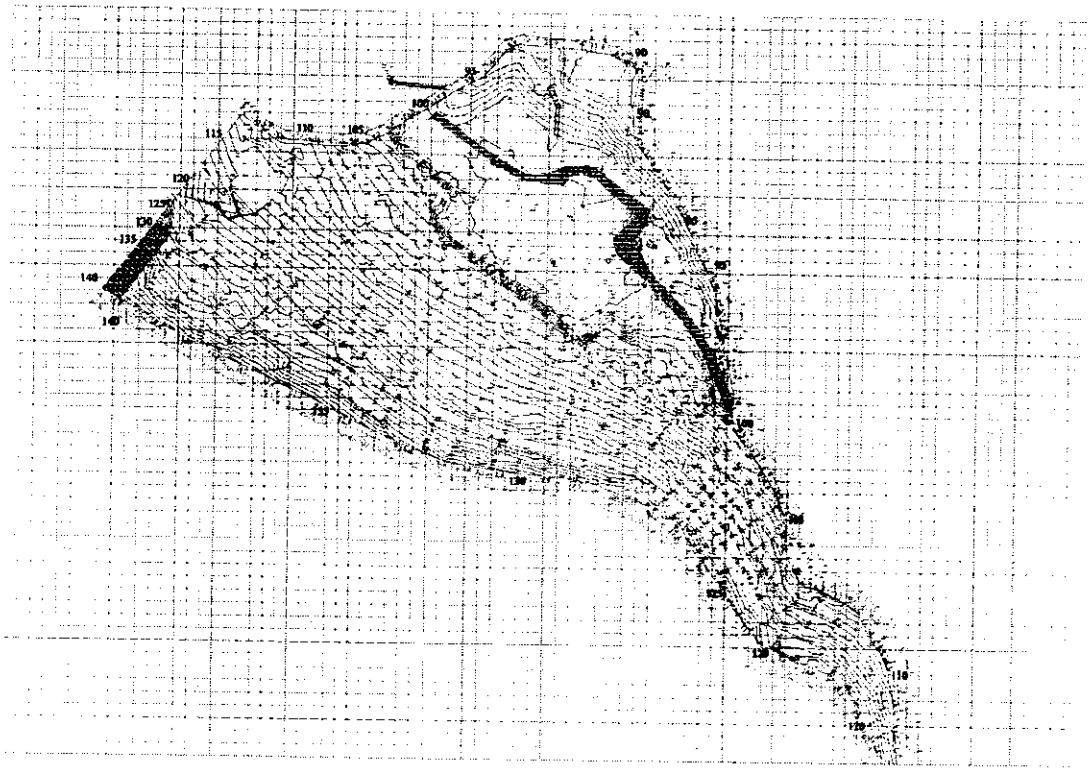
## 4. PROJECT BACKGROUND

Community Health Centers are designed to provide referral health care for cases from PHC and those in need of specialist health care approaching the CHC directly. 4 PHCs are included under each CHC thus catering approximately 80,000 populations in tribal/hilly areas and 1,20,000 populations for plain areas. CHC is a 30 bedded hospital providing specialist care in Medicine, Obstetrics and Gynaecology, Surgery and Paediatrics.

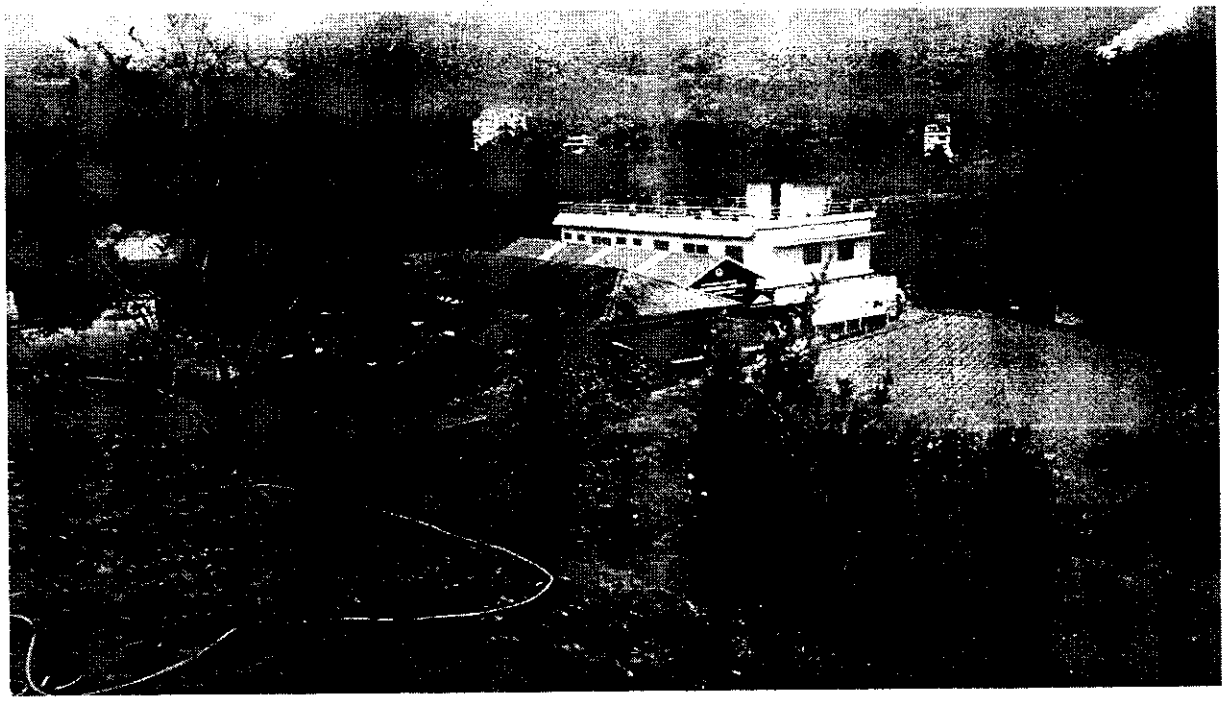
The existing condition of the hospital is with insufficient infrastructure with regard to both in-patient and out-patient facilities, to cater to 200 patients visiting the hospital on a daily basis. The hospital is also lacking in proportionate state of the art diagnostic facilities, lack of operational support services and lack of proper occupational facilities for the doctors, nursing and paramedical staff. The total site area of the proposed site is 7.68Acres.The existing building blocks are:

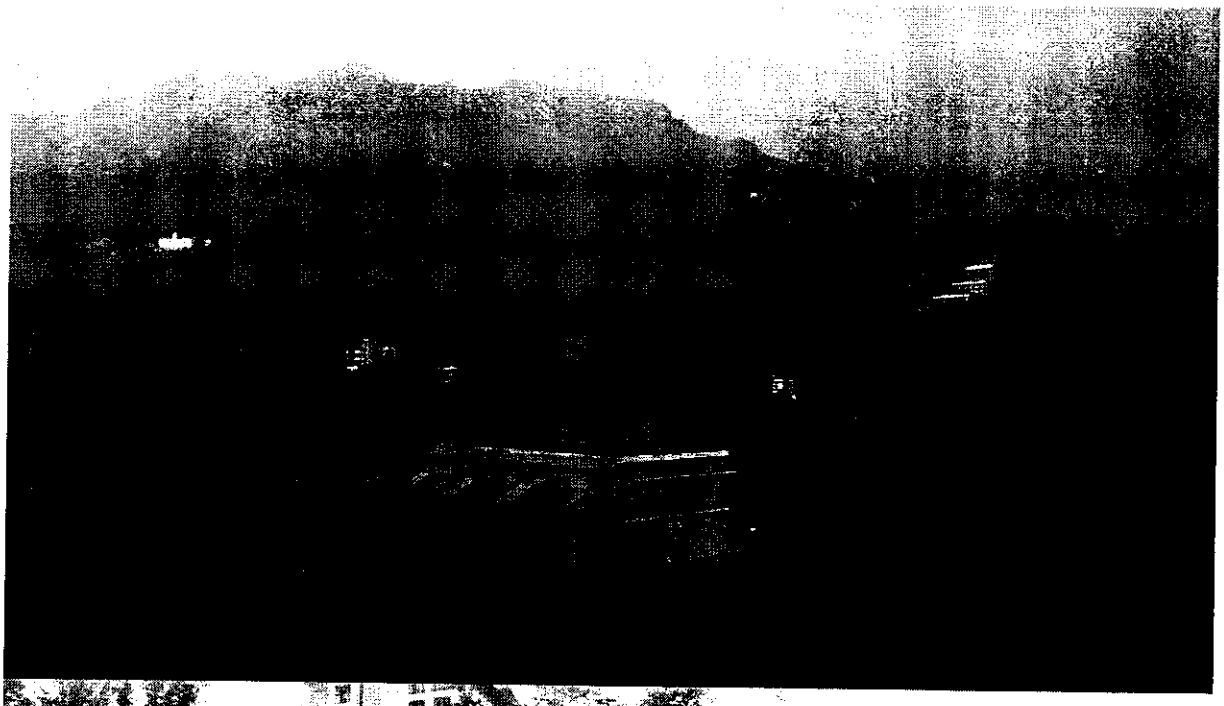
- OP Block
- Admin Block
- Laboratory
- Dental Unit
- Gynaecology Block
- X – Ray Unit
- IP Unit
- Store
- Quarters – 2 Blocks

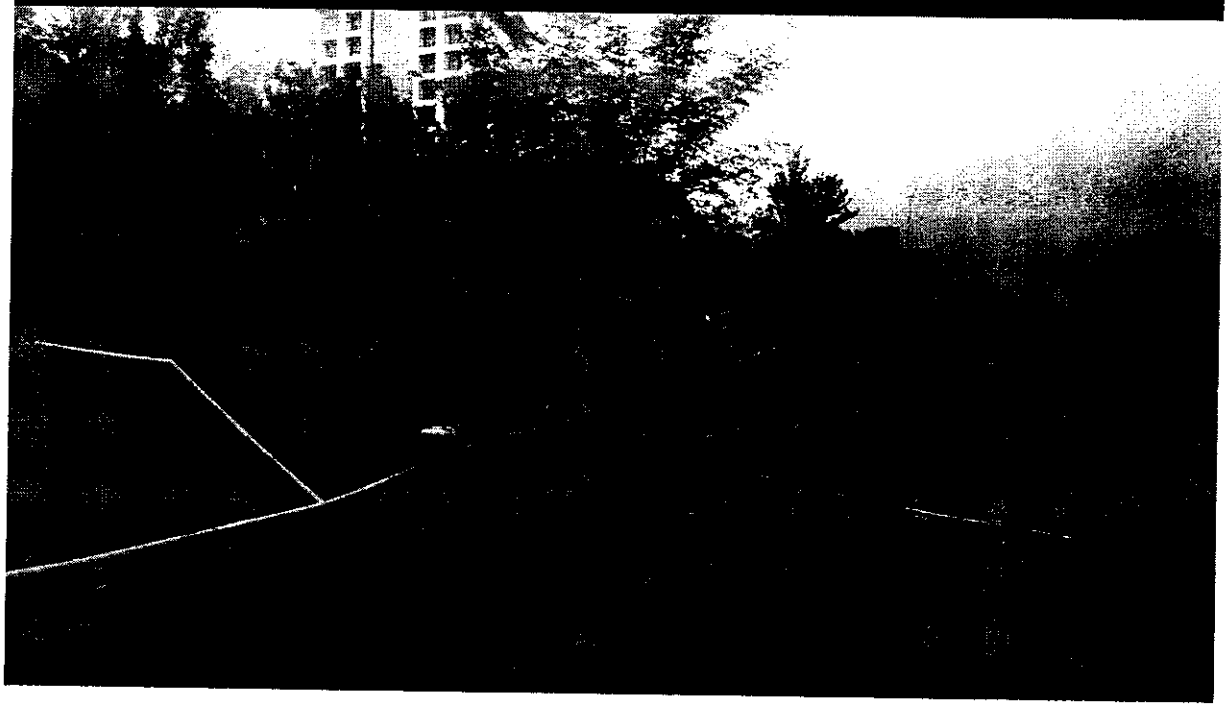
## SITE – EXISTING LAYOUT

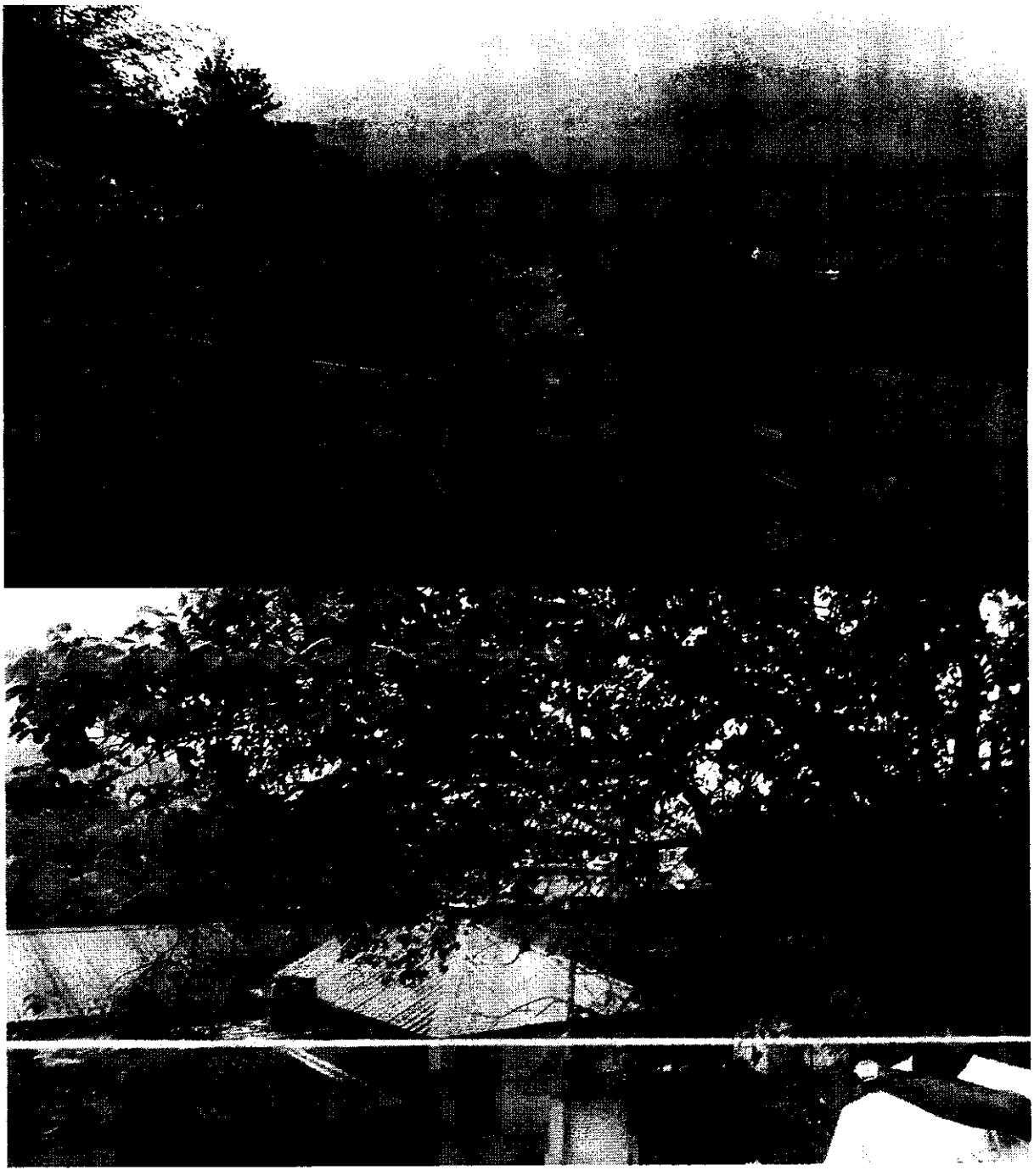


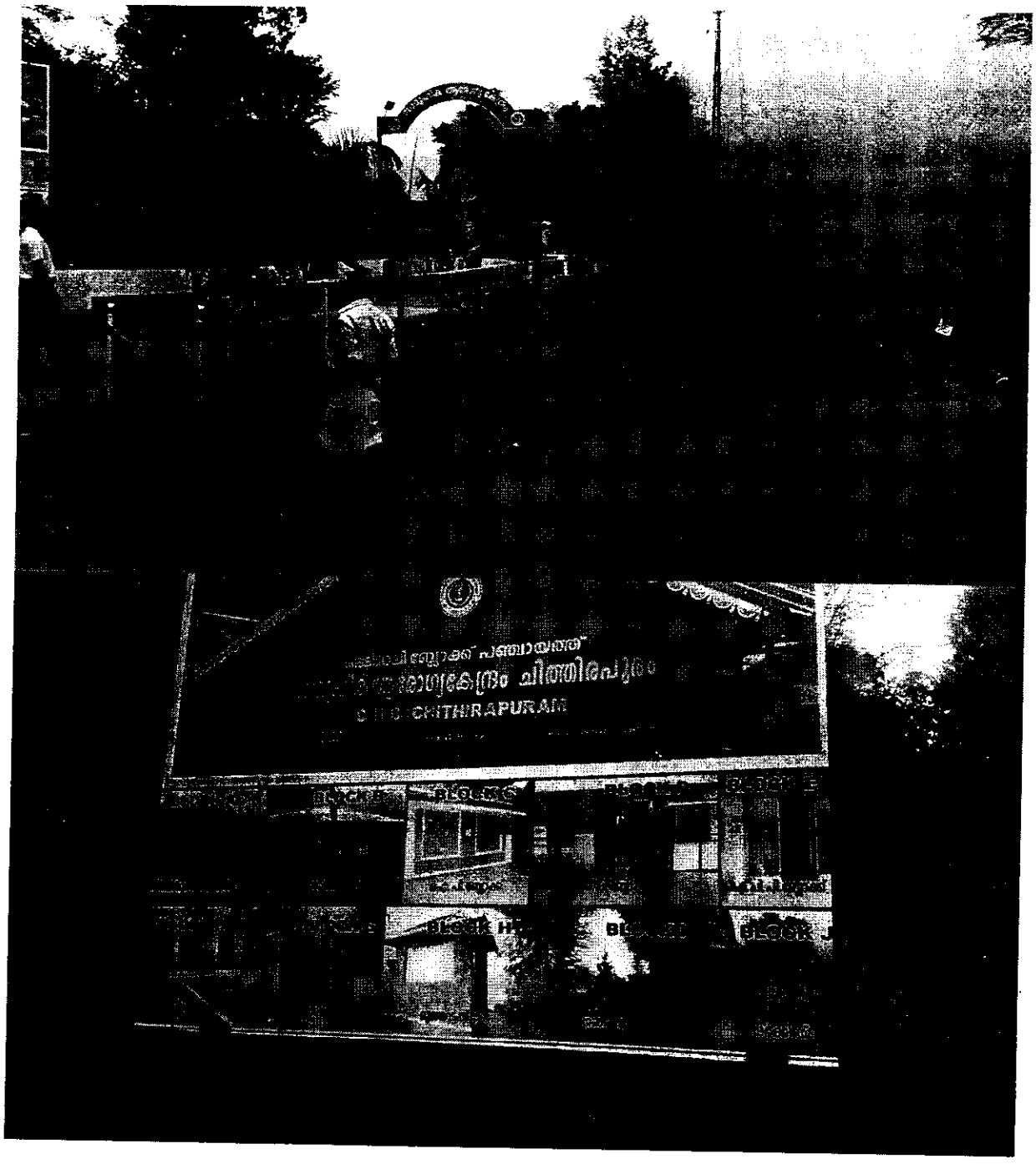
# VIEW OF THE EXISTING BUILDINGS IN THE COMPLEX







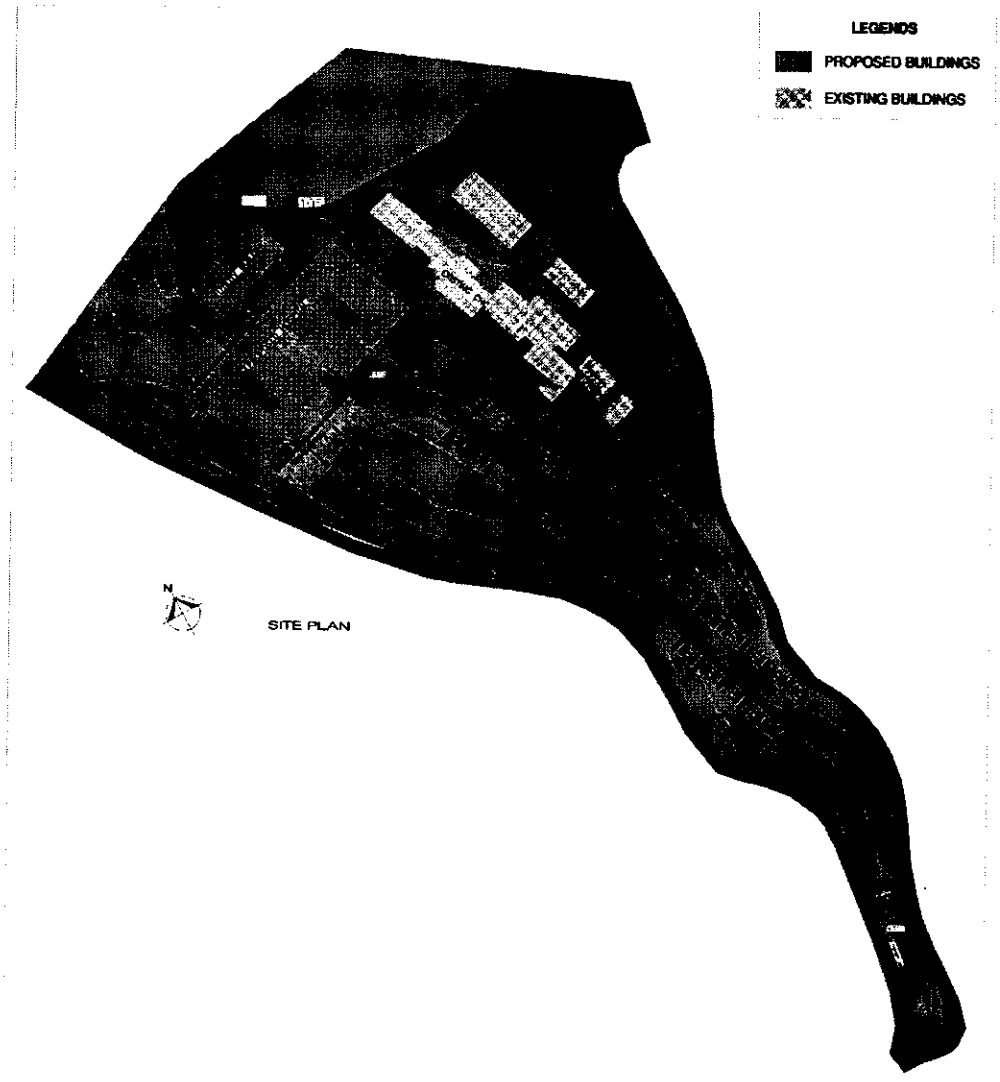



CHITHIRAPURAM

**Existing Site – Google Image**

The existing hospital has a current bed strength of 38.

# MASTER PLAN




Also, the demand for hospital parking grows as the population serviced by it increases and with a consequent increase in hospital staff. There is no doubt that Parking spaces are very important for any hospital. Parking lot and managing limited space using security services are challenging matters that hospitals face. While planning a hospital campus and its parking space, we should consider its harmony with surrounding roadways and nature of its traffic. When putting into function, lack of sufficient parking in the hospital shall not pose a threat to the general traffic in major public roads.

**Parking allotted currently at the hospital**

Currently, the parking facility is inadequate at the hospital. For access to the hospital there is a main road in the front side and narrow road by the side.

**Quarters:** Presently 2 Quarters are available in the existing complex which is in a dilapidated state. The surroundings of the quarters are also unhygienic and thefacilities, inadequate.

Further, any healing environment should provide patients and bystanders with a sense of control over stressful situations and should allow for comfortable rest and recovery. Healing environment, for healthcare buildings describes a physical setting and organizational culture that supports patients and families through the stresses imposed by illness, hospitalization, medical visits, the process of healing, and sometimes, bereavement. Here, the unplanned layout prevents the maximum usage of the plot area. The location and the distribution of buildings hinder further development in the rear side of the plot. Relaxation and breathing out spaces are also now not provided.

**Sewage Treatment & Waste Disposal Mechanisms: Hospital** sewage is a wastewater generated relatively in larger quantities from all units of the hospital such as emergency and first aid, operation theaters, drug treatment, ICU, chemical and biological laboratories, radiology, canteen and laundry activities etc. Since, hospital sewage/wastewater consists of various potentially hazardous components, it will cause many risks on humans and environment by polluting surface and ground water. Hence, in hospitals Sewage Treatment Plants (STPs) are mandatory. The major objective of hospital wastewater treatment plant is to treat the influent (untreated wastewater) generated by the hospitals before its direct release into natural environment. Hospital wastewater may have an adverse impact on environment and human health. Therefore, proper waste water management in each and every hospital is essential. Here there are no STPs and the Sewer lines are open at many places and manholes are not shut properly in other places. Even though the hospital is having thousands of people including patients, bystanders and staff, there is no adequate facility for safe disposal of sewage waste. The Sewage Treatment Plan is also conspicuous by its absence. Properly designed sewage treatment plants for waste disposal are of paramount importance.

**Water Supply:**

The water requirement of a Hospital for its daily operation is comparatively very high compared to other establishments for obvious reasons. Hospitals are among the facilities with the highest water use intensity, with about 450 L of water per bed per day on average, which is more than water use at schools and offices, but less than at hotels and senior care facilities. Hospitals use water in different amounts for both core and non-core functions, such as washing and personal hygiene, therapeutic treatments, central sterile operations, water-treatment systems for laboratory or kidney dialysis.

At present a water tank tower is provided at the site. Water is being supplied from OHTs for the entire hospital. But this water is not enough for the proper functioning of the hospital in the hygienic way as per standards. Hence it is very imperative that proper water sources are identified and sufficient storing system by way of Sumps and Overhead Tanks has to be provided at the hospital.

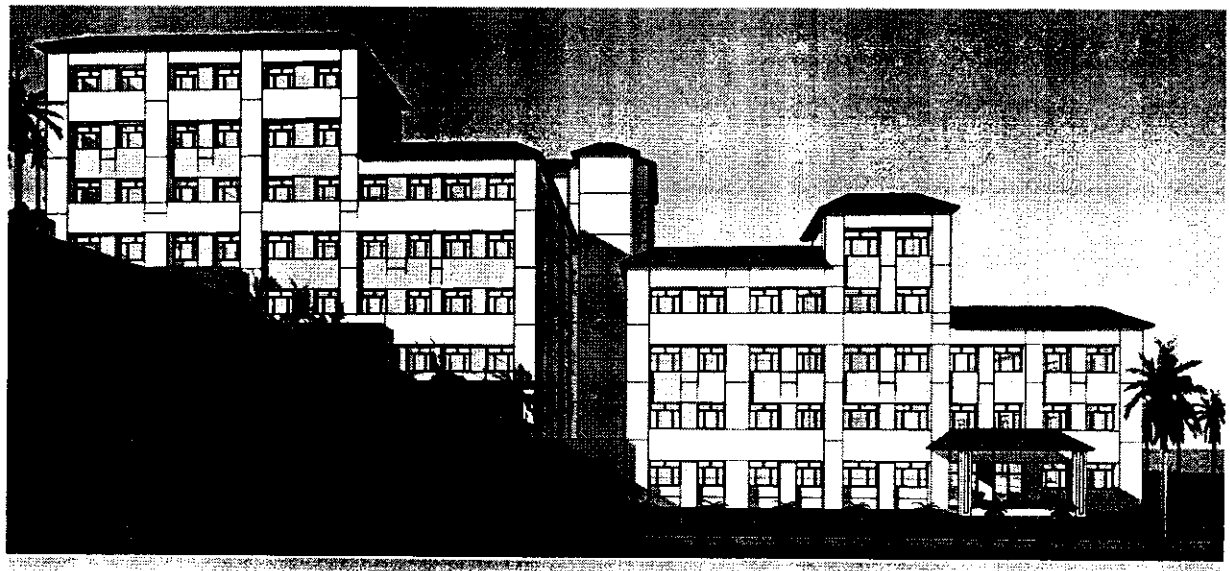
## 6. PROJECT DETAILS

The project comprises of the Development of the Hospital Block, and Utility & Housing Block having a total built-up area of 11,613 SQM. The proposal is to accommodate around 127 beds in the following blocks:

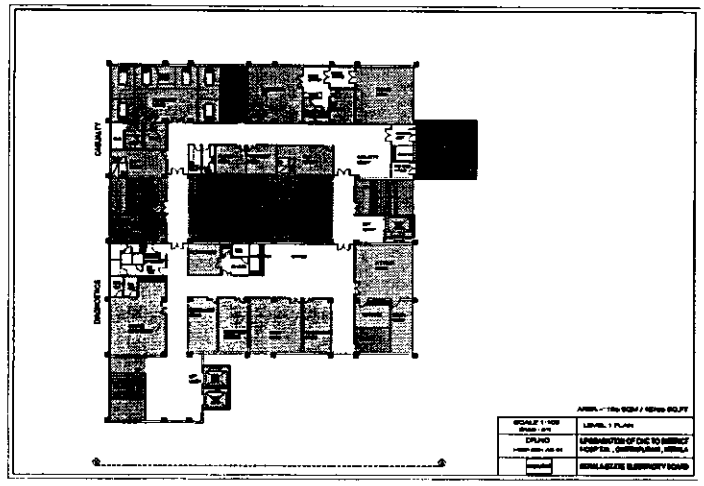
- Hospital Block
- Sub-station & Mortuary Block

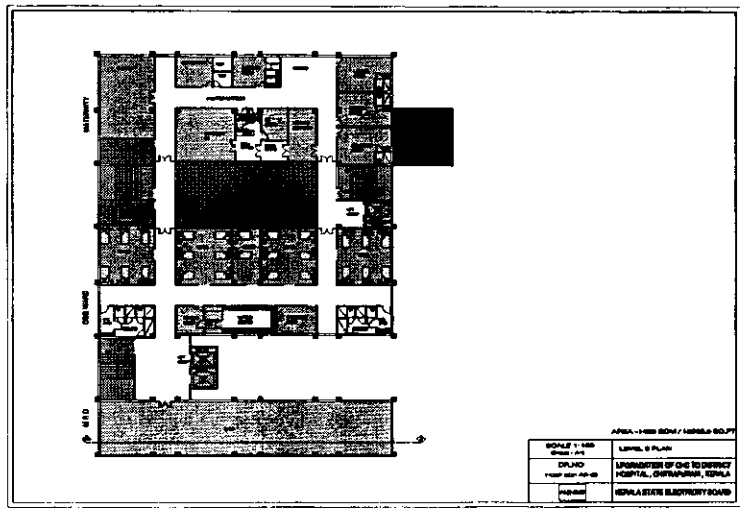
The proposed Project is having a total estimated cost of Rs.62 Crores plus GST at applicable rates extra. which will include state of the art construction, providing MEP (Mechanical, Electrical & Plumbing) facilities which includes Air Conditioning, Lifts, Water supply & Sanitation, Medial Equipment etc. among other things. Also, the site development, landscaping works, various fitments, signage, etc., are also proposed to be executed as per this project proposal.

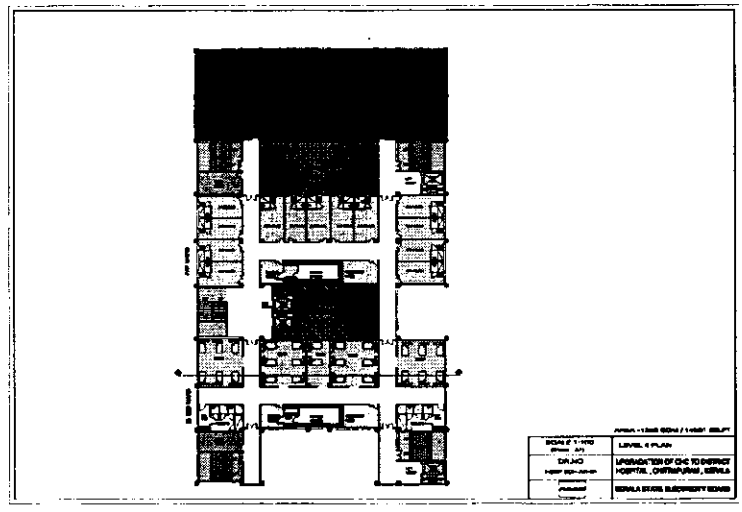
The schematic views are as follows:

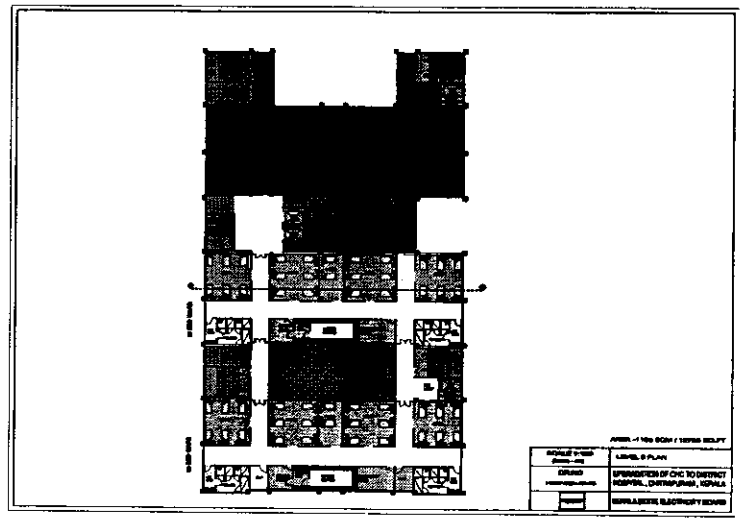


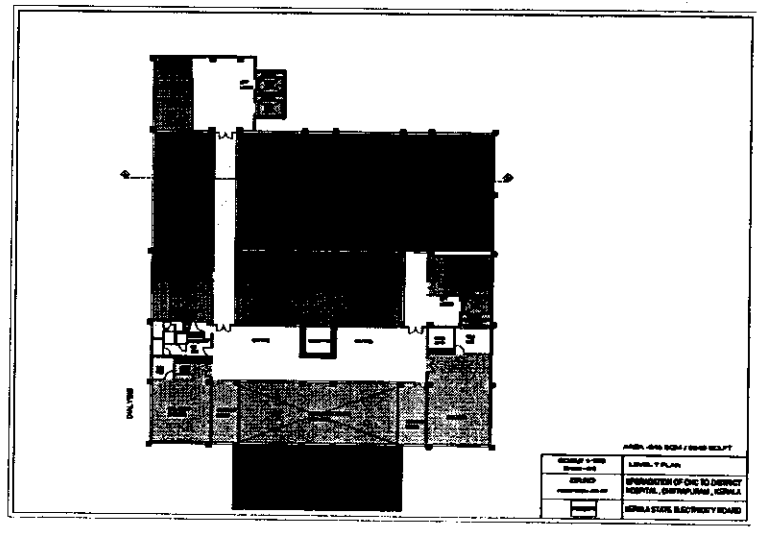
## FLOOR PLANS (Detailed Floor Plans are attached as Annexure)

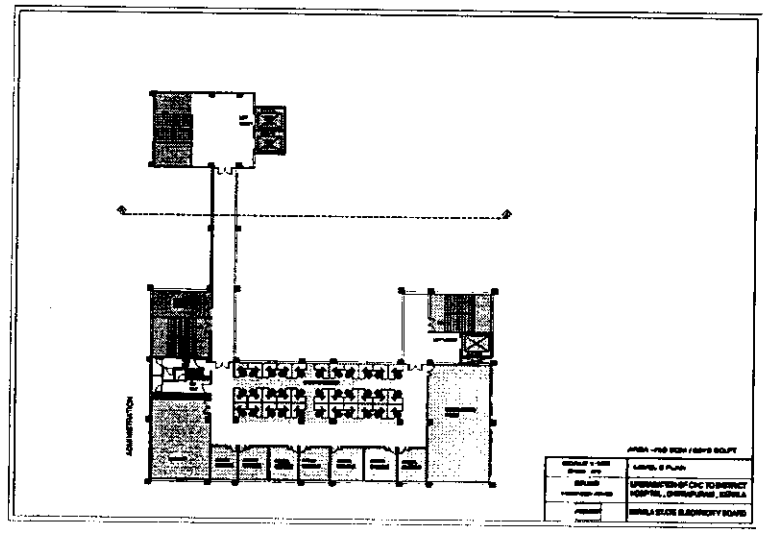


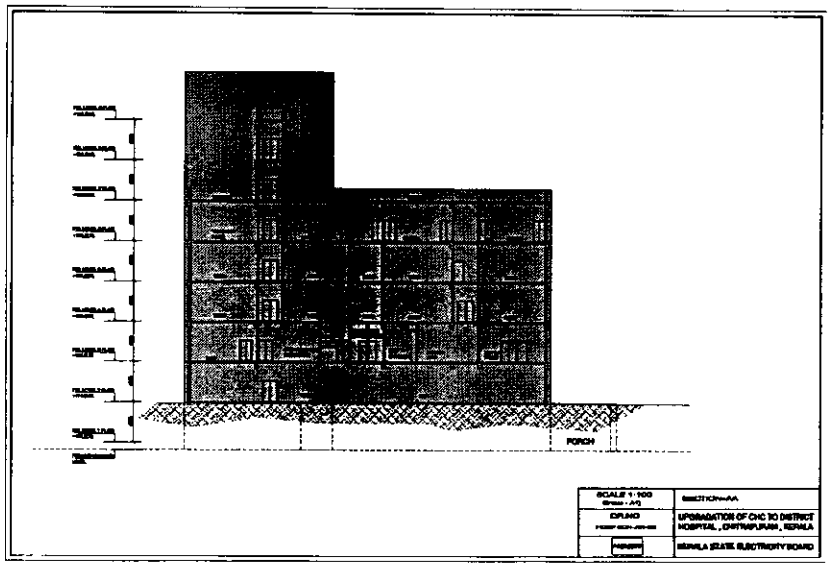













The land is having an extent of 7.68 Acres, having contours varying from EL +100.0m to EL +140.0m..

Hospital buildings are classified under group C occupancy as per Kerala Panchayath Building Rules (KPBR). As per the existing layout of building block in the premises, the hospital building has coverage of 24%. As per KPBR, coverage of 40% is permitted for a hospital building, but here unplanned development prevents from achieving effective coverage.

## 7. OBJECTIVE AND SCOPE OF THE WORK

Design wise, Hospital are one of the most complexes of all types of buildings, comprising of a wide range of complex services and functional units. These include diagnostic and treatment units, such as clinical laboratories, imaging, emergency room, and surgery; hospitality functions, such as food service and housekeeping; and the fundamental inpatient care or bed-related functions. This diversity is reflected in the specificity of regulations, codes, and international standards that govern hospital functionality 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. No one person can reasonably have complete knowledge, which is why specialized consultants play an important role in hospital planning and design.

The basic design parameters of a hospital are, ideally based on its functions:

- Outpatient-related functions
- Diagnostic and treatment functions
- Administrative functions
- Service functions (food, laundry etc.)
- Bed-related inpatient functions
- Pharmacy related functions
- Research and teaching functions

As stated earlier, currently the condition of the hospital is one with insufficient infrastructure with regard to both in-patient and out-patient facilities, to cater to 200 patients visiting the hospital on a daily basis. The hospital is also lacking in proportionate state of the art diagnostic facilities, lack of operational support service and lack of proper occupational facilities for the doctors, nursing and paramedical staff. The total site area of the proposed site is 7.68 Acres. The existing building blocks are

- OP Block
- Admin Block
- Laboratory
- Dental Unit
- Gynaecology Block
- X – Ray Unit
- IP Unit
- Store
- Conference
- Quarters – 2 Blocks

The patents wait for long hours to meet doctors, get diagnostic services and eventually to get the medicines due to system limitations and staff shortage. There is also shortage for the diagnostic and radiology infrastructure and equipment. The buildings within the hospital premises are not

interconnected. Also, the canteen facility which is a very vital component of health care for patients is conspicuous by its absence, thereby forcing the patients to consume outside hotel food.

The functions served by the demolished buildings will be shifted to the newly constructed blocks. The Hospital Block comprises of 8 levels based on the site profile. The infrastructure included in the block is Master planned for Convenience and better connectivity, and giving due consideration to the contour levels.

The proposed departments for the Hospital Blocks are:

- Casualty Department
- Radiology Department
- Laboratories
- Inpatient Care Services
- Outpatient Care Services
- Clinical Support Services
- Operational Support Services
- General Support Services

**The basic requirements taken into consideration are:**

- 2 Operation Theatres
- Surgical ICU
- MIC
- NBCU
- Casualty
- Pediatric wards
- Gynecology Wards
- Pay Wards
- Lab – Pathology and Micro biology, Bio chemistry.
- All diagnosis equipment

**Allotment of Beds**

| | |
|---|---|
| General Ward | 87 beds |
| Casualty | 6 beds |
| SICU | 12 beds |
| MICU | 10 beds |
| Pay Ward | 12 beds |
| Total | 127 beds |

**Basic Supporting Services to be provided:**

- Lounge and eating spaces for bystander.
- Space for a canteen.
- Mortuary is required with space for two bodies and for augmented capacity, we can use mortuary stacker.
- Medical record room is also provided.
- All lifts will be bed lifts.
- Bio medical waste it is collected by IMAGE.
- GENERAL WASTE can be collected by Kudumbasree.
- STP and WTP
- Separate water source can be identified.
- RMO Quarters
- Utility block for Engineering services

## 8. STATUS FEASIBILITY STUDY

No previous feasibility study has been done earlier. However, the following are the various parameters pointing to the feasibility of the Project:

- The new proposal of developing a hospital in Govt. sector will give a well sustained growth in urban sector. It will completely satisfy the needs of a community as well as the future development of the society, also to cater the floating population.
- The hospital development will largely satisfy the demand generated by the on-site population for daily conveniences.
- Create local employment opportunities for other sector with outsourcing areas like canteen & labs.

## 9. REQUIREMENT / DEMAND ANALYSIS

The up-gradation project is an unavoidable requirement for the Chithirapuram Region considering the following points:-

1. Government vision of FREE High-Quality Healthcare for all.
2. Need to decentralize, and upgrade CHC at International standards, capable of serving the region for the next 50 years without any further modification.
3. Absence of medical facilities and Trauma Care in CHC causes a large number of mortalities annually, from Road Traffic Accidents.
4. Absence of specialty care in this hospital forces patients to travel longer distance in heavy traffic to reach either Private Medical Colleges or other public sector hospitals. This causes grave difficulty to poor patients.

As stated earlier, currently the hospital suffers from insufficient infrastructure and facilities to serve both the in-patients and out-patients. And it is a fact that the patient turnout in the hospital is 200 per day. If proper facilities are provided, the patient turn out will increase many

folds, since most of the patients now directly go to major hospitals in the Headquarters where tertiary health care facilities are available.

The hospital at present serves to the primary healthcare needs of the public. And to some extent, it also serves to the secondary health care needs of the patients. The main beneficiaries of the Hospital are people in nearby areas, in the low-income group, not having a fixed income or salary. They mainly depend on health care facilities provided by Government Hospitals. Patients who deserve to have the best medical care prefer other hospitals in faraway towns, which have more facilities. The hospital also lacks proportionate number of state of the art diagnostic facilities, operational support service, and proper occupational facilities for the doctors, nursing and paramedical staff. The total site area of the proposed site is 7.68 Acres. The existing building blocks are

- OP Block
- Admin block
- Laboratory
- Gynaecology Block
- X – Ray Unit
- IP Unit
- Store
- Quarters – 2 Blocks

The existing blocks are mostly single storied structures except one block, which is a two storied one with delivery facilities, which is not in use. OT block is not working now due to limitations in infrastructure and insufficient facilities. The patents wait for long hours to meet doctors, get diagnostic services and eventually to get the medicines due to system limitations and staff shortage. There is also shortage for the diagnostic and radiology infrastructure and equipment. The buildings within the hospital premises are not interconnected. Also, the canteen facility which is a very vital component of health care for patients is conspicuous by its absence, thereby forcing the patients to consume outside hotel food.

Also, the canteen facility which is a very vital component of health care for patients is conspicuous by its absence, thereby forcing the patients to consume outside hotel food. In the interest of providing state of the art health care facilities to patients, the up gradation of CHC is imperative and will serve as a fore runner in this regard.

## Existing Condition of the Hospital

Even though there is insufficiency in infrastructure & facilities, the demand for healthcare facilities in the Government sector is increasing day by day, due to the high quality professional services offered by the experienced doctors. Hence it is essential that the physical infrastructure of the Hospital is to be upgraded, with spacious waiting areas, increase in number of beds for in-patients, more consultation rooms, better laboratory & diagnostic services, well designed pharmacy with token system, hygienic wash rooms with augmented support facilities like STP, parking facilities etc., are offered.

Hence in line with futuristic plan of the Government, in offering quality medical care facilities to all, the project for up gradation of CHC is proposed to be implemented. Hence a Hospital with the following basic features & requirements is proposed to be developed, which duly considers the area requirements for the amenities and support services also.

**HOSPITAL BLOCK - AREA STATEMENT**

| Floor | Area in SQM |
|---|---|
| Basement Floor | 1133 |
| Level 1 | 1196 |
| Level 2 | 1398 |
| Level 3 | 1646 |
| Level 4 | 1165 |
| Level 5 | 1456 |
| Level 6 | 1300 |
| Level 7 | 1241 |
| Level 8 | 691 |
| **Total floor area** | **11,226 SqM** |

| OTHER MINOR BLOCKS | |
|---|---|
| 1. Sub-Station Building | 250 Sq.M |
| 2. Mortuary Block | 137 Sq.M |

**Grand Total Built up Area : 11,613 Sq.M**

| FLOORWISE BED DISTRIBUTION: | | |
|---|---|---|
| **Floors** | **No. of Beds** | **Beds** |
| Level 1 | 6 | Casualty |
| Level 2 | 22 | Ward |
| Level 3 | 22 | SICU &MICU |
| Level 4 | 24 | Ward& Pay Ward |
| Level 5 | 53 | Ward |
| Level 6 | - | - |
| Level 7 | - | - |
| Level 8 | - | - |
| **Total No. of Beds** | 127 | |

## 8. STATUS FEASIBILITY STUDY

No previous feasibility study has been done. However, the following are the various parameters pointing to the feasibility of the Project:

- The new proposal of developing a hospital in Govt sector will give a well sustained growth in urban sector. It will completely satisfy the needs of a community as well as the future development of the society, also to cater the floating population.
- The hospital development will largely satisfy the demand generated by the on-site population for daily conveniences.
- Create local employment opportunities for other sector with outsourcing areas like canteen & Labs.

## 9. REQUIREMENT / DEMAND ANALYSIS

The up-gradation project is an unavoidable requirement for the Chithirapuram region considering the following points: -

1. Government vision of FREE High-Quality Healthcare for all.
2. Need to decentralize, and upgrade Specialty Hospitals to International standards capable of serving the region for the next 50 years without any further modification.
3. Absence of specialty care for women & children in this entire region forces patients to travel a long distance in heavy traffic to either Private Medical Colleges or any other public sector hospitals. This causes grave difficulty to poor patients.

As stated earlier, currently the condition of the hospital is one with insufficient infrastructure with regard to both in-patient and out-patient facilities, to cater to 200 patients visiting the hospital on a daily basis. If proper facilities are provided, the foot falls will increase many folds, since most of the patients now directly go to major hospitals in the Headquarters where tertiary health care facilities are available.

The hospital at present caters to, mostly primary healthcare for the general public. The main beneficiaries of the Hospital are people in nearby areas, in the low-income group, not having a fixed income or salary. They mainly depend on health care facilities provided by Government Hospitals. Patients who deserve to have the best medical care prefer other hospitals in faraway towns, which have more basic infrastructure. The hospital is also lacking in proportionate state of the art diagnostic facilities, lack of operational support service and lack of proper occupational facilities for the doctors, nursing and paramedical staff.

Unplanned development with scattered single storied and two storied buildings eating up a lot of ground space. Most Buildings are 20 years or older, resulting in high maintenance cost. Only the Main building is a relatively new building. Facilities spread out in the campus with poor connectivity.

Also, the canteen facility which is a very vital component of health care for patients is conspicuous by its absence, thereby forcing the patients to consume outside hotel food. The pharmacy and pharmacy store are also not working effectively due to lack of many of the essential medicines and lack of infrastructure to store them as per standards. The patients are forced to depend on external pharmacy stores for getting the medicine.

In the interest of providing state of the art health care facilities to the common people, the up gradation of the CHC is imperative and will serve as a fore runner in this regard.
The existing condition of the CHC is not at all conforming to modern day health care systems and in no way assisting the healing process.

## 10. FUNCTIONAL DESIGN

The basic input needed to arrive at the functional design of the Hospital is to be assessed by studying the requirements and demand for development, based on the present situation and scope. For this, firstly reconnaissance study of the site was made, and subsequently discussions were made with the Doctors and staff of the Hospital. The functional design has been evolved based on the requirement analysis. Also, the various international standards and guidelines were also taken into consideration while developing the functional design. The main design concept of the project is **"Providing a Healing Environment through Sustainable Design".**

Healing and Sustainability are evident goals in the healthcare component design. **Sustainable Design** encompasses the wide ambit of design concepts and tools aimed at proportioning the various component spaces to contribute to healing, maintainability, and which seeks to minimize the negative environmental impact of buildings by bringing in efficiency and moderation in the use of materials, energy, consumption of space and the ecosystem at large. Sustainable design also uses a conscious approach to energy and ecological conservation in the design of the built environment. The following objectives are identified for the Construction of Taluk Level Hospital at CHC, Chithirapuram:

The proposed departments for the Hospital Blocks are:

- Casualty Department
- Radiology Department
- Laboratories
- Inpatient Care Services
- Outpatient Care Services
- Clinical Support Services
- Operational Support Services
- General Support Services

In order to meet the above Objectives, the functional design of the Project has been done based on the following design concepts and parameters:

- The proposed hospital building is designed such that existing buildings are undisturbed and the existing contour levels are used efficiently & effectively for parking and other usable spaces.
- The concept is to create new functional spaces without duplicating the existing ones.
- Our concept is to make the hospital functionally active and aesthetically appealing.
- The functional design of the project incorporates NBC, KPBR, BIS, Indian Public Health Standards etc.
- The building is designed keeping in mind the site conditions, site terrain, etc.
- We achieved the basic requirements of the hospital based on continuous workshops, client discussions and field study and surveys.
- The area calculation is derived based on Schedule of Accommodation.
- We have created multiple entries according to site terrains & uses.
- Munnar bypass road is the only access available for the proposed hospital.
- Our master plan and demolition plan are worked out keeping in mind the patient's safety.

- To get the most economical design, we have planned the master plan in grid structure pattern.
- Parking zones as required are planned
- Heavy and medical equipment are kept at lower levels for ease of maintenance without disturbing the patients.
- The master plan is designed considering the statutory norms of Bureau of Indian standards, (BIS), Medical Council of India, Ministry of Health and Family Welfare (Indian Public Health standards).
- On keeping in mind, the directions of future growth, we have developed the master plan to accommodate this future developments & needs, also interconnecting existing and proposed functional spaces

**Functional Integration of Spaces**

Based on the above, upmost care has been given to integrate the various functional components so that the Patients who are the end users are bestowed with an ambience having better healing experience, devoid of confusion, congestion and inconveniences, which are kept at the lowest possible limits. Also, efforts were made to ensure that the Doctors, nurses and para medical staff are provided with the best working atmosphere so as to minimize occupational stress and fatigue. Also, the best utilization of built space has been made ergonomically, so as to maximize energy efficiency and use of natural ventilation and lighting.

As per the Master plan, the proposal comprises of the Development of the Hospital block and two minor blocks with a built-up area of 11,613 Sqm. H&FWD wanted to develop a Taluk Hospital at CHC (Construction of Taluk Level Hospital at CHC, Chithirapuram). The proposal is to accommodate around 127 beds in the Hospital blocks

The Hospital Block comprises of 8 Levels based on the site profile. The infrastructure included in the hospital are master planned for convenience and better connectivity, by giving due consideration to the contour levels.

The proposed departments for the Hospital Blocks are:

- Casualty Department
- Radiology Department
- Laboratories
- Inpatient Care Services
- Outpatient Care Services
- Clinical Support Services
- Operational Support Services
- General Support Services

The project is envisaged to be developed with KIIFB funding. Another key aspect considered during the functional design of the Hospital is the ease for maintenance and the maintenance plan. For ensuring sustainability of cleanliness and functionality, utmost care has been taken in the design process so as to ensure that the Hospital continues to maintain the above standards during its operational phase. Also, a well laid out operational plan and an SOP shall also be stipulated so

that the future administrators can enforce them, thereby ensuring the sustainability of cleanliness and functionality of the Hospital.

Also, care has been taken to evolve a design based on green building concepts and to ensure proper ventilation and best use of available sunlight during the day time, while ensuring the comfort of the end users. To ensure that the systems and equipment installed as per this project continue to function in the years to come, it shall be stipulated in the tender that the supplying agency shall carry out the AMC for at least 5 more years after the warranty period, ensuring that the consumables and critical parts are made available for such a period. Also provision for training the concerned staff will also be stipulated, in the tenders to be invited for such items.

## 11. ENGINEERING DESIGN

The state-of-the-art Engineering design has been evolved by integrating the following components, each of the which has been optimally designed for functionality, cost-effectiveness, energy efficiency, sustainability & maintainability while ensuring the ultimate goal of providing a healing environment for the patients:

**Site Development, internal Roads, Landscaping & Boundary walls:**

The site development and planning has been carefully done based on the site contour. An Internal road connecting the two side roads have been provided for ensuring utilization of both the roads for effective traffic management. The ambience of the Hospital shall be enhanced by a well-designed, easily maintainable, landscape and hardscape.

**Soil Investigation & Foundation design:**

As per the soil report available on the land parcel. pile foundation is recommended with an approximate depth of 30m, where reasonable hard rock is reported to be available. Foundation design and estimation has been done based on the above. Rotary Piling is recommended considering the safety of the adjacent Buildings including the currently operating Hospital Building.

**Ergonomic Building design based on sustainability & energy efficiency:**

Framed RCC construction has been adopted for the 6 storied building.

**Structural design ensures safety in adverse conditions like wind and earthquake.**

The Building has been designed for Zone III for Seismic loads as per provisions in IS Code: 1893. Design for Wind load as per code provisions in IS Code: 875 Part III has also been provided. The detailed drawings showing various floor plans, sections and elevations of the proposed Hospital Block are attached separately as Annexure II.

**MEP Systems:**

i) **HVAC: Air-conditioning & Heating systems:** The details are attached separately.
ii) **Water Supply Systems:** The details are attached separately.
iii) **Fire Fighting Systems:** Standard firefighting equipment like sprinkler systems, fire extinguishers, sand buckets etc. shall be provided as per statutory requirement.
iv) **Sewerage & Sullage treatment / recycling system:** A standard STP unit capable of handling all the liquid wastes and converting them to usable recycled water has designed. The recycled water can be used for toilet flushing and for irrigating the landscape vegetation in the ratio 70:30.
v) **Electrical Systems & Substation:** Effective use of power supply from KSEBL is ensured through a well-designed power system having a unitized substation along with generator back up and UPS backing in critical areas like ICU & OTs. Also, an on grid solar power system has also been designed for utilizing the renewable source of power, thereby saving the cost of Electricity
vi) **Lightning Arrestors:** Lightning arrestors have been provided as per standards.

**Parking Facilities:** Apart from covered parking, outside vacant areas shall be developed to ensure maximum parking facility, over and above those stipulated as per KPBR for the convenience of the patients, hospital staff and visitors.

**Solid Waste Management:**
Solid waste emanating from the Hospital consists of bio-degradable & non-biodegradable types and managing the above waste is of upmost importance vis a' vis ensuring the quality & standards of health and sanitation. Systems designed to ensure source segregation, dedicated work force for its retrieval and sustainable methodologies for its disposal are of paramount importance in this regard.

**Bio Medical Waste Management:** Biomedical waste emanating from the Hospital consists of wide variety including solid waste mentioned above, liquid wastes, laboratory waste, metallic wastes like surgical knives, needles etc. which are hazardous and may cause infections to those who handle it. All the Bio-medical wastes are proposed to be disposed off through IMAGE.

**Water Proofing & Termite Control Measures:** Proper Water proofing and Termite Control Measures shall be done for the various elements wherever necessary.

**Rainwater Harvesting & flood water disposal:** Systems for effective Rainwater harvesting have been designed having a capacity of 3 Lakh Liters. Any flood water coming in excess shall be discharged through the natural drain available in the campus.

**Internet, Public Address & Communication System:** These are provided as per requirement under ELV.

**Signage and Display Boards:**
Proper and efficient signage boards shall be provided, indicating access to various departments and direction Boards to internal utilities inside the building. Areas housing Emergency aids, Casualty, Ambulance path, Caution Boards, Hazardous areas etc. shall also be demarcated using separate distinguishable colour codes.

Display Boards helping the patients get essential information, token number etc., shall also be provided separately.

Fire exists shall also be marked as per prevailing standards stipulated by the fire & safety department.

## ELECTRICAL

## DESIGN CRITERIA

The intent of this document is to define the requirements for the design, and engineering of electrical works, viz. power supply system, lighting, earthing, cabling, etc.

### 1.0 CODES AND STANDARDS

The design will be prepared in accordance with established codes. Latest versions of the following standards are followed.

- IS 732 Code of practice for electrical wiring installations
- IS1255 Code of practice for installation & maintenance of power cables up to & including33kV rating.
- IS 1944 Code of practice for lighting of public thorough fares.
- IS 2309 Code of practice for the Protection of buildings and allied structures against lightning.
- I IS 3043 Code of practice for Earthing. Application guide for Insulation coordination
- IS 3646 Code of practice for Interior illumination.
- IS 3961 Recommended current ratings for cables.
- IS 7689Guideforcontrol of undesirable static electricity
- IS 7752 Guide for improvement of power factor–consumer installations.
- IS 8478 Application guide for on load tap changers.
- IS9676 Reference Ambient Temperature for Electrical Equipments.
- IS 10028Code of practice for selection, Installation and maintenance of transformers.
- IS10118 Code of practice for selection, installation and maintenance of switchgear and control gear

- IS 12360 Voltage bands for electrical installation including preferred voltages and frequencies.
- IS 12459Code of Practices for Fire Protection of Cable runs.
- IS20261962 Power transformers
- IS 1886-1967 Installation and maintenance of transformers
- IS11171-1985 Dry type power transformer.

## 2. 0 ELECTRICAL DESIGN DATA

**SYSTEM DESIGN PHILOSOPHY-** The electrical system is to be designed to provide safety to personnel and equipment during both operation and maintenance.

**2.1 Reliability of Service -** The design should minimal fire risk, ease of maintenance and convenience of operation. Automatic protection of all electrical equipment through selective relaying system will be considered. Electrical supply to equipment and machinery shall be within the design operating limits. Adequate provision for future extension and modification shall be provided.

### 2.2 Capacity of Electrical Plant

All the components of the electrical system are to be sized to suit the maximum load under the most severe operating conditions. Accordingly, the maximum simultaneous consumption of power required by continuously operating loads are considered and an additional margin is taken into account for intermittent service loads. The amount of electrical power consumed by each area shall be calculated for its operation at the design capacity. The size of the transformer planned is 500 KVA indoor type cast resin based on the load calculations. The transformer is capable of handling the total load and 15% additional (future loads) without over loadings.

### 2.3 Voltage Drop

The maximum voltage drops considered in various sections of the electrical system shall be within the limits and is stated as below.

A. Cable between generator, transformer and MSB 0.5%

B. Cable between MSB and Other Sub switch boards 0.5%to 2%

C. Circuit between lighting panels and lighting points 2%

D. UPS Outgoing circuits 3%

E. At us Bars of worst affected LV Switch Board during start up of large LV motor with other loads 4%

The design of panel boards serving the heavy motors (chillers) & low HP motors, consideration has to be made for the voltage available at the motor terminals to be not be less than 80%of the rated value during start-up.

## 2.4 System Earthing

**2.4.1** System earthing for incoming supply and primary/secondary LV distribution system should be confirming toIS3043/1987. As per the design the Transformers, Generators, MSBs the 415V system neutral shall be solidly earthed with copper plates. As per the fault current calculations the Sub panel board shall be earthed with copper plate. All the non current carrying metals parts required to be solidly bonded and double earthed using pipe earth electrode in all electrical rooms.

### 2.4.2 For resistance earthed systems

The resistance values will be chosen to limit the earth fault current to a value which is sufficient for selective and reliable operation for earth fault protection system, ensuring minimum equipment damage during an earth fault However, the value of limited earth fault current shall not exceed50%of transformer or generator full load current.

### 2.4.3 Short Circuit Capacities

Each short circuit interrupting device shall be designed to have rated service breaking capacity (Ics) equal to or higher than the maximum value of short circuit current calculated, at its location. The related switchgear shall withstand the above maximum available fault current for a minimum period of one second. The sizing of high voltage cables shall be based on the short circuit withstand capacity for a minimum time period as dictated by the protection system in addition to the maximum anticipated load current. For cables connected in parallel, each cable of the circuit shall be designed to withstand the short circuit current for the given duration.

### 2.4.4 Insulation System

The insulation of electrical facilities shall be designed considering the system voltage, the system neutral earthing and the over voltages resulting due to system fault, switching or lightning surges. The insulation coordination between the electrical equipment and the protective devices shall be done in line with IS: 3716. Lightning arrestors and surge absorbers shall be provided where necessary.

### 2.5 Protection Schemes

### 2.5.1 The protection system shall be selected and coordinated to ensure the following:

a)Protection of equipment against damage which can occur due to Internal or external short circuits or atmospheric discharge.

b)Uninterrupted operation of those parts of the system which are not affected by the fault.

c)Personnel and plant safety.

### 2.6 Metering Scheme

All meters shall be digital communicable type. The metering requirements of UPS, DC systems, rectifiers, shall be as per the respective equipment specs. Any other metering equipment, necessary to meet system requirement shall be provided as per requirement.

## 3. Emergency Power Supply

Operating Philosophy for Emergency Power Supply System.

### 3.1 Diesel Generators

The emergency Power supply from DG set has to be designed to cater for the total power demand during a power outage which includes OT/ICU UPS Panels, Chillers, Chillers Pumps, and all medical Equipment with battery backup, Lighting Panels, UPS load, Pump Panels, STP. The Generator capacity designed is for 380 KVA and is provided with stand by provision also with equivalent capacity.

On supply failure the Emergency DG set shall automatically switched on through AMF.

### 3.2 Uninterrupted Power Supply (UPS)

Uninterrupted power supply system shall be provided for meeting critical loads and other loads that cannot withstand a momentary interruption in voltage.

The OT UPS shall be Double Conversion Online of Three phases Input and Three phases out with 30 minutes backup and redundant battery bank with required number of External Sealed Maintenance Free Batteries in battery racks. The capacity planned is for 40 KVA for three numbers major OT and one number Emergency OT.

The UPS serving the Emergency Lighting, Computers and other non critical patient care areas shall be stand alone redundant type, Double Conversion Online of Three phases Input and Three phases out with15 minutes backup, put with required number External Sealed Maintenance Free Battery with battery rack. The capacity planned for the general purpose critical loads are 30 KVA with parallel redundancy. Required KVA UPSs shall be provided for MRI and CT as per manufacturer requirement.

## 4.0 SUBSTATION (MAINS/S,SMALLS/S)DESIGN

- Communication cables shall be routed well away from power cables, on a suitably sized GI tray for distribution.
- Sub-station wall adjacent to the transformer bays shall be 355 mm thick in case of brick construction.
- Sub-station will be designed considering fire-fighting equipment and other safety equipment as per statutory requirements. Mats of required voltage rating shall be provided in front of switchboards.
- The substation building has to be sized to take care of present and future needs and shall maintain adequate clearances between equipment for ease of maintenance.

**The minimum clearances around various equipments to be maintained are mentioned below:**

- Front clearance for Main switchboards 2000 mm.
- Front clearance for all other switchboards/panels 1000 mm.
- Rear clearance for panels having maintenance access from front only shall be > 200mm or < 750mm .
- Rear clearance for panels requiring maintenance from rear shall be 1500 mm (For HV) & 1000 mm (For MV).
- All around clearance for transformers shall be 1000 mm
- Battery rack to wall clearance for Single row, Single/double tier 100 mm
    - Double row, single tier

- 100 mm Double row, double tier
- 750mm Battery rack to rack clearance
- 750mm Front clearance for wall mounted equipment

- Exhaust of diesel engine shall be kept away from the main building and diesel day tanks shall be located outside the DG room.
- Suitable ventilation system shall be provided to avoid heat accumulation in the DG room if required.
- Stacks shall be provided for the exhaust/flue gases as per the statuary norms.

## 5. POWER and LIGHTING

### Interior Lighting

The design has been made to maintain proper lighting levels, satisfactory lux level is calculated Confirming to NBC and Lighting Power Density limits imposed by energy codes such as those found in Section 9 of the ASHRAE/IESNA Standard 90.1 2007 has to be considered for the design.

Light fixtures with Occupancy sensors that shall turn the lighting off within 30 minutes of an occupant leaving the space is considered in administration and outpatient departments. Light fixtures controlled by occupancy sensors shall have a wall mounted, manual switch capable of turning off lights when the space is occupied.

LED light fixtures will be considered for indoor and outdoor applications due to its better color rendering index, efficiency and life.

The following recommended value of Illumination as per BIS 3646(Part ii) have been considered.

| Range of Service | | lumanance in Lux |
|---|---|---|
| 1. Electrical Switch Room / Indoor Substations | | 100-150-200 |
| Compressor Rooms, etc. | | |
| 2. Consulting Area- | General | 200-300-500. |
| Consulting Area | Examination | 300-500-750. |
| 3. Corridors- | | 150-200-300. |
| 4. Intensive Therapy- | Bed Head | 30-50. |
| | Circulation B/w Bed ends | 50-100-150. |
| | Observation | 200-300-500. |
| | Local Observation | 750-1000-1500. |
| | General | 300-500-750. |
| | Local | 10000-50000. |
| | General | 150-200-300. |
| | Diagnosis | 150-200-300. |
| | Operative | 200-300-500. |
| | General | 200-300-500. |
| 9. Reception, Cashier- | | 200-300-500. |
| 10. Entrance, Lobby, Waiting- | | 150-200-300. |
| 11. Staff Rooms- | | 50-100-150. |
| 12. Laundry- | Receiving/Sorting | 200-300-500 |
| | Washing/ Drying /Ironing | 300-500-750. |

**Power Sockets**

The design will be designed confirming to Australian Standard. In all the ICU's the number of sockets are to be maintained according to the standards. Both the Raw power as well as UPS backup has to be given in all the ICU's and OT's.

Power supply shall be 240V single phase, with a single common earth ground and with all outlets in the patient areas on the same phase. Electrical supplies are recommended for PVC insulated cables

concealed within PVC conduit. Supply lines will not cause interference with electronic and other equipment, e.g. monitoring or computers. The patient areas are served by a maintained stand-by power source with the highest priority rating.

Separate uninterruptible power supplies (UPS) are considered for individual items of equipment, e.g. computers, monitors and other life saving equipments. In each bed area uninterruptible supply are considered according to the purpose.

## HVAC

## AIR CONDITIONING & VENTILATION INSTALLATIONS

### 1. Design Criteria

The Air Conditioning and Ventilation Installation will be based on the following criteria:

ASHRAE Fundamentals

ASHRAE 170-2008

HVCA DW 141 and HVCA DW 172

### 2. Ambient Design Conditions

| LOCATION | TEMPARATURE IN °C |
|---|---|
| Maximum outside temperature | 38°C |
| Coincident outside wet bulb | 33°C |
| Minimum outside dry bulb temperature | 25°C |

The maximum dry bulb & wet bulb has been based on weather information available. The above conditions are the mean average maximum and minimum temperatures recorded in the area and which normally does not exceed more than ten days in a year.

### 3. Inside Design Conditions

The following design temperatures will be considered while calculating the air conditioning load. In general, the relative humidity would not be positively controlled but would be indirectly controlled within the comfort range as a result of the design and selection of the cooling plant. Based on the temperature data, heating during winter is not required.

| LOCATION | TEMPARATURE IN °C |
|---|---|
| OPERATION THEATRE | 20-24 |
| STERILE CORRIDOR | 22-24 |
| MRI & MRI EQUIPMENT ROOM | 21-24 |
| CT SCAN | 21-24 |
| ICU'S(NEURO, SICU,CARDIAC)MICU,NICU | 21-24 |
| PATIENT ROOMS, EXAMINATION ROOMS, ISOLATION ROOMS | 21-24 |
| PHARMACY, LABORATORIES | 22-24 |

The indoor temperature has been based on the ASHRAE design manual for hospital and clinics. Any other special requirement that requires deviation from the aforesaid values need to be intimated to us in advance.

**4. Mechanically Ventilated Areas**

The toilets, Basement car parking within the hospital and the spaces that require pressure differential with the surroundings will be mechanically ventilated by means of extract fans located in their respective floors, and discharged out via discharge louvers.

The following is the pressure differential for certain key areas along with the outdoor air change rates.

| LOCATION | PRESSURE DIFFERENTIAL w. r. t ADJACENT SPACE.(P/N) | OUTDOOR ACPH |
|---|---|---|
| Operation theatre | P | 4 |
| Sterile corridor | P | 2 |
| MRI & MRI equipment room | P | 2 |
| Ct scan | P | 2 |
| ICU'S (NEURO, SICU, CARDIAC)MICU,NICU | P | 2 |

| | | |
|---|---|---|
| Patient rooms, examination rooms, | NR | 2 |
| Pharmacy | P | 2 |
| Patient rooms, Examination room, Doctors lounge, Treatment room, Biomedical room | NR | 2 |
| ECG, EMG, TMT,ECHO | P | 2 |
| Isolation rooms | N/P | 2 |
| CSSD-sterile storage | P | 2 |
| CSSD-sterilizer equipment | N | 10 |
| Toilet, Wash Area, Dirty Utility. | N | 10 |
| Mortuary | N | 12 |
| Kitchen | N | 15 |
| Clean Utility | N | 6 |
| Change Room | N | 6 |
| Morgue | N | 12 |
| Waiting Rooms | P | 2 |
| Medical Procedure room | P | 2 |
| Basement Parking | N | 10 |

*P-Positive; N- Negative; ACPH- air changes per hour*

ASHRAE 170 2008 shall be followed as default basis of design.

### 5. Naturally Ventilated Areas:

The naturally ventilated areas are as follows which will be updated, once the architectural drawings are frozen.

| LOCATION |
|---|
| Non-Air conditioned corridors. |
| Plant rooms. |

## 6. People Densities:

| LOCATION | # People (People / m2) |
|---|---|
| PATIENT ROOMS | 2 Per Room |
| OPERATION THEATRE | 8 Persons per theatre. |
| Other patient care area. | Depending on architectural bed arrangements |
| Treatment Rooms | 3 per Room |

## 7. Lighting Loads:

| LOCATION | W/m2 |
|---|---|
| Patient rooms, Examination room, Doctors lounge, Treatment room, Biomedical room | 21.52 |
| OPERATION THEATRE | 26.91 |
| Isolation Rooms | 21.52 |
| CT Scan,MRI | 21.52 |
| ICU'S(NEURO, SICU,CARDIAC)MICU,NICU | 21.52 |
| Sterile corridor | 16.14 |
| ECG, EMG, TMT Echo | 21.52 |
| Waiting rooms | 21.52 |

## 8. Service Zone Requirements (HVAC Installations) *

| LOCATION | Clear Service Zone (mm) |
|---|---|
| Common Areas | 600 mm Clear void for services Required. |
| IP rooms | 500 mm Clear void for services Required. |
| MRI | 750mm clear void for services required |
| CT Scan | 650mm clear void for services required |
| Operation theatre | 550mm clear void for services required |
| Common areas fed using AHU's | 800mm clear void for services required |
| Spaces fed using FCU's | 400mm – 600mm clear void for services required |

*False ceilings voids noted above are clear of all structural elements. A false ceiling allowance of 50mm is included in the stated voids.

* It should be noted that these information's are preliminary to give a general idea of the void requirements. Void requirements shall change depending on the actual design.

## 9. Noise Levels due to HVAC Equipment

| LOCATION | N C Level |
|---|---|
| Patient rooms, treatment rooms, examination rooms, Operation theatres, Admin areas, | 35* |
| Pharmacy, Corridors, | 40 |
| AHU Plant room | 60 |

** With FCU at low speed. Any specific noise requirements to be advised by client / architect for incorporation in the layouts.*

## 11. Air Distribution Scheme

| S NO | Room/Area Description | Air Distribution |
|---|---|---|
| 1. | In Patient rooms, treatment rooms, examination rooms, Admin areas, | FCU per Room |
| 2. | Sterile Corridors, | Floor Mounted AHU |
| 3. | Operation theatres, | Floor Mounted AHU for each OT |
| 4. | Individual Departments | Ceiling Suspended AHU |
| 5. | Dental Surgery | Ceiling Suspended AHU |
| 6. | Blood Bank+ Lab | Ceiling Suspended AHU |
| 7. | Isolation Rooms | Ceiling Suspended AHU for each room |
| 8. | All ICUs | Ceiling Suspended AHU |
| 9. | Doctor's Lounge | FCU per room |

The above list broadly covers all major areas of hospital. All the other areas will also be dealt on similar lines. Based on the above AHU rooms will be identified as part of our space planning documentation for incorporation to architectural layouts.

Digital, wall mounted thermostats will be installed for each FCU, in positions to be agreed with the Architects. These thermostats will be not be connected to the BMS system. These controllers could be programmable to permit energy savings during unoccupied periods. No provision for door / window interlock switches will be made.

AHU's feeding common areas will be fed from BMS with set point adjusters provided with lock and key arrangement.

The following main areas shall have the conditioned air directly exhausted to outdoors without any recirculation. In such cases, either a ceiling mounted TFA shall be used (or) TFA supply and extract shall be provided to condition the space and to maintain air quality requirements.

| Sl NO | Room/Area Description | Air Distribution |
|---|---|---|
| 1. | Isolation Rooms | No Air Recirculation |
| 2. | Clean Utility | No Air Recirculation |

### 13. Toilet & General Ventilation

All toilets, patient care areas and circulation areas will be ventilated in accordance with ASHRAE 170-2008 standards. The proposed extract rates will be as per following table for certain key areas.

| Location | Extract Rate, ACH |
|---|---|
| Toilets | 10 |
| Dirty utility, Clean Utility | 12 |
| Janitor | 10 |
| Mortuary | 12 |
| Isolation room for no recirculation | All air supplied will be exhausted |
| OT | 2 |
| OT dirty corridor | Exhaust to maintain negative pressure w. r. t to adjacent zones |
| Enclosed Parking Area | 10 |

All extract to zones will be taken from inside the space through extract air diffusers / grilles. Attention will be provided to ensure the extract diffusers form a part of the return air diffuser so that the uniformity of AC outlets inside the space will be maintained.

### 14. Fresh Air Ventilation

Fresh air as per ASHRAE 170-2008 recommendations as listed in Naturally Ventilated Areas.

Equipment for Fresh air supply to the hospital building is divided floor wise and each floor has dedicated FA units. The TFA unit feeding conditioned areas shall have FA unit with cooling coil.

Separate insulated duct work from all the FA units (irrespective of FA being treated or not) will feed FA to the individual spaces. The duct work will be terminated using a VCD and wire mesh adjacent to the AC unit. Such arrangement will ensure easy conversion of FA unit to TFA in event of addition of more air conditioned areas to the hospital.

**15. Lift & Stair Case Pressurisation (to be discussed and agreed upon)**

The fireman's lift lobby, and escape stair cases will be pressurised by a duty / standby supply fan arrangement in accordance with Local Civil Defence requirements. Masonry pressurisation shafts have been provided. The lift shaft shall also be pressurized.

A pressure of 50 Pa will be maintained in the staircases. The lift lobby shall be pressurised to 10 Pa. All pressurisation fans will operate in duty and standby configuration. The operation of fans will be controllable through fire man switches located on the Ground lobby. The fans will work in conjunction with the signal from fire alarm control panel.

Masonry shaft with grilles fixed to the staircase walls will deliver the air from the fans to the staircase. A pressure relief damper set at 50 Pa will relieve the excess air from the stairs in event of air pressure exceeding 50 Pa.

**16. COOLING SYSTEM**

The Air conditioning equipments planned are Direct expansion type. The terminal units include high wall split units, ductable type splits, and Air handling units with DX cooling coil for critical areas. The refrigerants used should be eco friendly refrigerants like R410 a, R407c, R32 etc. Redundancies have been considered for critical area like OTs/ Cath labs to avoid any disruption in the normal operations.

**PLUMBING**

**1.0 CODES & STANDARDS**

- IS 5329 – 1983 - Code of practice for sanitary pipe work above ground for buildings
- IS 2064 – 1973 - Code of practice for selection, installation and maintenance of sanitary a IS 1200 (Part 1) - Method of measurement of building earthwork
- IS 1200 (Part 16) - Method of measurement of laying of water and sewer lines including appurtenant
- IS 1200 (Part 19) - Method of measurement of Water supply, plumbing and drains

- IS 783 – 1959 - Code of practice for lying of concrete pipes
- IS13592 – 1992 - Specification for un-plasticized PVC pipes for soil and waste discharge system inside the building including ventilation and rainwater.
- IS 2527 – 1984 - Code of practice for fixing rainwater gutters and down pipes for roof drainage.
- IS 6784 – 1984 - Method of performance testing of water meters (Domestic type).
- IS 12235 (Parts 1 to 11) - Methods of test for un-plasticized PVC pipes.
- IS 458 – 1988 - Specification for pre-cast concrete pipes (with or without reinforcement)

## 2.0 CODES & GUIDELINES

| | | |
|---|---|---|
| 1. | **National Building Code of India** | **Part IX September 2005** |
| 2. | American Society of Plumbing Engineers (ASPE) | Design Data Book Volume I to IV |
| 3. | Uniform Plumbing Code of India | 2014 Edition |
| 4. | Institute of Plumbing Engineers, UK | Design Data Book – 2002 |

## 3.0 WATER TREATMENT

The quality of water fed to the proposed building shall in accordance with the requirements specified in IS: 10500-1991- Drinking Water Specifications, depending on the analysis of the water sample available at site, a suitable treatment scheme shall be worked out.

In general, entire incoming water from Municipal / tanker & Bore well source to the complex shall be treated in the common treatment plant prior to supply to the individual tower.

Water Treatment Plant may comprise of the following preliminary systems, i.e

- Pressurized Sand Filter
- Activated Carbon Filter
- Disinfection System
- Filter Feed Pumps Including Standby

## 3.1 WATER DISTRIBUTION

Distribution of water supply to the proposed tower is being designed as follows,

- Water from sources like bore well, corporation water, tanker lorry water, harvested rain water will be collected in the fire water sump tanks.
- Overflow water from fire water tank will come to raw water tank.
- Based on the water analysis report, water shall be treated to required quality & will be collected in the treated water tank.
- It is always advisable to take water sample during summer season, to obtain an accurate test report (values of parameters).
- Water from the treated water tank will be catered to the building through individual Hydro-pneumatic system located at pump room.
- Harvested rain water from the rain water harvesting tank will be supplied to the raw water tank & the same process will be done for reuse of harvested rain water for domestic purpose.
- Overflow from the overhead fire water tank will come to OH standby tank to arrest water stagnation.

## 4.0 SEWAGE SYSTEM

### 4.1 SEWAGE DISPOSAL

An independent system for sewage and sullage up to the STP on conventional water carriage method shall be used. The drainage system shall be a 2-pipe system, in which the soil & waste pipes are distinct and separate. The soil pipe shall be connected to the soil pipe stack and then to the sewage manholes directly and the waste pipes through a trapped Gully. All traps of water closets and the urinals shall be completely vented in the system.

- The sewerage system shall be designed as two pipe system as per IS specifications.
- Separate vertical stacks from toilets, kitchen etc., shall be considered.
- Vent pipes are provided to vertical stack to maintain water seal in the water appliances
- Floor traps are provided in each toilet/utility/kitchen with min 50 mm water seal to avoid smell coming from pipes
- UPVC SWR grade pipes shall be proposed for sewer lines within the building and agricultural grade pipes shall be provided for lines running below the ground.

### 4.2 SEWAGE TREATMENT PLANT

The objective of sewage treatment is to stabilize decomposable organic matter present in the sewage so as to produce treated effluent and sludge, which can be disposed of to the environment without causing any health hazards or nuisance.

It is proposed to install a sewage treatment plant to recover the recycled water of quality suitable for flushing & HVAC makeup water. The process proposed to be adopted is highly efficient MBBR/SBR treatment system.

## 5.0 SANITARY FIXTURES & FITTINGS

Selection of Sanitary fixtures & CP fittings shall be water efficient type confirming to green building concept, suits to aesthetic appeal by Architects with emphasis on water efficient fixtures satisfying the following norms.

| SL.NO | SANITARY FIXTURES / CP FITTINGS | MAX. FLOW RATE |
|---|---|---|
| 1. | Water Closets | 6 litre / flush |
| 2. | Urinals | 4 litre / flush |
| 3. | Lavatory, Metered Faucet (Public) | 1 litre / use |
| 4. | Lavatory, Faucet (Private) | 6 litre / min. @ 550 kPa |
| 5. | Sink, Faucet | 6 litre / min. @ 550 kPa |
| 6. | Bidet, Hand-held Spray | 6 litre / min. @ 550 kPa |
| 7. | Shower head or hand-held Spray | 10 litre / min. @ 550 kPa |

## 5.1 PIPE SPECIFICATION

| | | |
|---|---|---|
| 1. | **Domestic water supply pipes** | UPVC ASTM Sch 40 |
| 2. | **Hot Water supply pipes** | CPVC SDR 11 / Sch 40 |
| 3. | **Drainage Pipes** | PVC Sound proof Pipes |
| 4. | **Drainage Pipes** | Poly Propylene pipes |
| 5. | **External Drainage pipes** | PVC pipes 6 Kgf/cm2 |

**FIRE FIGHTING:**

## 1.0 CODES & STANDARDS

- The National Building Code (NBC) and Local Fire Authority together form the basis for the fire protection design.
- Fire protection system shall be designed and installed as per National Building code (NBC) of India 2005, part IV Fire & Life safety.

## 2.0 FIRE ESCAPE STAIRCASE

For fire escape staircase, the travel distance on the floor from any portion shall not exceed 30m.

## 3.0 TYPE OF SYSTEM PROPOSED

| SL.NO | Description | Area/Building | REMARKS |
|---|---|---|---|
| 1. | Fire Extinguisher | Entire Tower | Kitchen, Lift, near each fire duct on every floor, Parking, DG, Electrical room |
| 2. | Hose Reel | Entire tower , one each for 1000 m2 | One each in every fire duct. |
| 3. | Wet Riser System | Entire tower , one each for 1000 m2 | One each near landing of every fire staircase. |
| 4. | Yard Hydrant System | Periphery of the tower | Hydrant Stand post to be installed at an equal interval of 45 meter. |
| 5. | Automatic Sprinkler System | Entire Tower | To be installed in all floors at appropriate places and in consultation with local fire authorities. |
| 6. | Manually Operated Fire Alarm System | Entire tower , one each for 1000 m2 | Manual Call points & Hooters are considered at every floor near staircase. |

| | | | |
|---|---|---|---|
| 7. | Automatic Detection & Alarm System | Entire Tower | Automatic detectors to be installed in all floors at appropriate places and in consultation with local fire authorities. |
| 8. | Signage's | Entire Tower | Emergency Exits, Staircases, Lifts, Fire Ducts etc should be kept in the respective Floor at strategic points. |

**4.0 FIRE WATER STORAGE TANK**

Underground Sump & main Fire pumps are required and will be designed based on NBC

**5.0 FIRE WATER PUMP**

Firewater pumps are required and will be designed based on NBC

**6.0WET RISER SYSTEM**

Wet riser shall be provided for each floor with separate wet riser, tap off on each floor for connection to fire hydrant landing valve and fire hose cabinet containing first aid box, swinging hose reel, fire man's axe, 63 mm dia canvas hose and nozzles. In addition, wall / floor mounted hand-held type fire extinguishers shall be placed at suitable locations.

For external, a fire fighting ring main shall be provided around the Block. External yard hydrants shall be suitably located 2 meter minimum away from the building @ 45 meter centre to centre. Necessary hose pipe and nozzle shall be placed in a external hose closed cabinet with glass shutters at each yard hydrant.

**7.0 PORTABLE FIRE EXTINGUISHERS**

All Fire extinguishers shall be portable and hand held. An operating instruction should be pasted on the extinguisher body, included with an extinguisher signage, which shall be mounted on wall with mounting bracket or on ground for easy identification, etc.

Portable ABC type fire extinguisher of capacity 4 Kg fitted with gun metal cap with brackets are located near each staircase landing or inside fire ducts on every floor.

9 Litre Stored pressure mechanical foam squeeze grip cartridge type fire extinguishers are located near electrical room & DG.

## 8.0 YARD HYDRANTS

Yard hydrants shall be installed at every 45m along the periphery of the building to protect the building from outside. Yard hydrant consist of single headed hydrant valve fixed on the standpipe along with 2x15 meter long fire hose, branch pipe with nozzle kept in the hose cabinet located next to the stand pipe.

External hydrants shall be tapped from the ring main connected with internal hydrant system through isolation valve.

Three way fire brigade inlet connections shall be provided to fill the rising main of the hydrant system in case of failure of pumps. Tank filling inlet connection shall be provided to the sump.

## 9.0 AUTOMATIC SPRINKLER SYSTEM

All sprinklers are with temperature rating of 68deg pendent recessed type for false ceiling area and pendant type considered for car parking area. The sprinklers are designed to cover 9 to 12 sq.m each. The sprinkler system is fed by dedicated sprinkler pump; it is possible to feed water from the hydrant pump to the sprinkler system in emergency.

The sprinklers in the building shall be fed from different risers, located near the landing of the staircase. Each floor shall be considered as separate zones to be annunciated separately at fire control room. The sprinkler piping network of each floor shall be provided with suitable size of butterfly valve, flow switch and drain assembly.

The sprinkler mains at each floor level is connected with a water flow switch, which will transfer audio indications to fire alarm panel in case of water flow in the pipes.

The sprinkler system shall be provided in all areas except toilets, electrical room, DG, communication, fire control or AHU rooms as per norms. If the void space above false ceiling is more than 800mm additional set of above ceiling sprinklers shall be provided.

## 10.0 ADDRESSABLE DETECTION & ALARM SYSTEM

Address able analogue type fire detection and alarm system shall be provided in all the floors of the building as per National Building Code of India and IS 2189. The provisions are intended to provide early notification to the building occupants of a fire scenario and inform building occupants to evacuate the area accordingly. It is proposed to house Main Fire Alarm control panel & Public Address system console, Amplifier, Goose neck, mic in Fire control room in Ground floor level.

The fire detection & alarm system shall be consisting with the following;

- Addressable fire detection & alarm control panel.
- Multi sensor detector
- Smoke detectors & Heat detectors
- Manual call point
- Electronic Hooter

The two way voice communication system includes speakers and electronic horn notification appliances in each stair landing of the building as per codes. The system has manual controls at fire control room, so that live voice messages can be transmitted to the building occupants on a selective basis by floor or overall speakers in the building.

## MEDICAL EQUIPMENT

| Construction of Taluk Level Hospital in CHC, Chithirapuram | | |
|---|---|---|
| **MEDICAL EQUIPMENT LIST** | | |
| **Department** | **Description** | **Quantity** |
| **Emergency** | | |
| | Wheel chairs | 6 |
| | Stretcher | 6 |
| | ECG machine | 1 |
| | Patient monitor (ECG, SpO2, NIBP, Temp) | 3 |
| | Syringe pump | 3 |
| | Infusion pump | 3 |
| | Medical Furniture | 1 |
| | Patient trolley for Resuscitation room | 2 |
| | Procedure Table for Minor Procedure room | 1 |
| | | |
| **Triage** | | |
| | Adult Patient ICU beds with X ray facility (collapsible side rails, IV poles) | 4 |
| | Over bed Table (cardiac Table) | 4 |
| | Bedside locker | 4 |
| | Patient Monitor (Adult/Paed)-ECG, NIBP, SpO2 | 2 |
| | Syringe pump | 1 |
| | Infusion pump | 1 |
| | ECG machine -12 channel. | 2 |
| | Instrument sets | 1 |
| | Defibrillator (with pacing) | 1 |
| **Nurse's Station** | | |
| | BP Apparatus | 8 |
| | Stethoscope (Adult & Paediatric) | 8 |
| | Torch | 8 |
| | Medicine/Instrument trolley | 8 |
| | Crash Cart | 5 |
| | Dressing trolley | 8 |
| | Linen trolley | 8 |
| | Portable suction | 5 |
| | Mobile light (LED) | 5 |

| Department | Description | Quantity |
|---|---|---|
| **Radiology** | | |
| | Mamography | 1 |
| **Ultrasound Scan** | Ultrasound unit High end | 1 |
| **X-ray** | Analog x ray (300 mA) | 1 |
| **Operation Theatres Complex** | | |
| **Medical Furniture for OT** | | |
| | Mayo trolley | 1 |
| | Crash cart trolley | 1 |
| | Instrument trolley | 8 |
| | Patient shifter roller | 3 |
| | Patient transfer trolley | 1 |
| | Linen trolley | 7 |
| **SERVICE DELIVERY UNITS** | | |
| | Supply, Installation, testing and commissioning of Surgeon Pendent with Double Arm , Terminal units as per consultant drawing,330 degree angle rotation of column and arm, with air break as standard for arm system, 3shelves .,Provision for 12 nos Electrical and 4 data points. | 4 |
| | Supply, Installation, testing and commissioning of Anesthesia Pendent with Single Arm, Terminal units as per consultant drawing330 degree angle rotation of column and arm, with air break as standard for arm system, 2shelves ,IV pole with arm-1no.,Provision for 12 nos Electrical and 4 data points. | 4 |
| | Supply, Installation, testing and commissioning of Single Arm Pendent, Terminal units as per tender drawing, 330 degree angle rotation of column and arm, with friction break as standard for arm system, Provision for 12 nos Electrical and 4 data points. Accessories include two shelves , one IV pole and one monitor arm | 4 |
| | Supply, Installation, testing and commissioning of Rigid pendants, Terminal unit provisions as per tender drawing, 330 degree angle rotation of column, with friction break as standard for arm system, Provision for 10 nos Electrical and 2 data points. Accessories including one drawer one shelf, IV pole and one monitor arm with one basket for ECG leads cable holder | 1 |

| Department | Description | Quantity |
|---|---|---|
| | Supply, Installation, testing and commissioning of Bed head panels with Terminal unit provisions as per tender drawing, Provision for Electrical and data points as per consultant specification. Accessories including suction holder and one monitor holder with fall protection and one basket for ECG leads cable holder | 135 |
| | OT Table (Gen. Surg, Uro, Gastro) | 4 |
| | OT Lights double dome-2, 60, 000 Lux | 4 |
| | Syringe pump | 4 |
| | Electrosurgical Unit with vessel sealing | 4 |
| | Anaesthesia machine with vaporisers | 2 |
| | Patient monitor-Hi end(ECG,SpO2,NIBP,TEMP, 2IBP,EtCO2) | 4 |
| | Patient Warmer Unit | 4 |
| | Fluid warmer | 4 |
| | Electrosurgical Unit | 4 |
| | Patient Warmer Unit | 4 |
| | Intelligent Automatic Tourniquet | 4 |
| | Defibrillator (common) | 4 |
| | Operating Microscope | 3 |
| | Phaco emulsifying System | 1 |
| | Surgeon's stool | 4 |
| | Portable light | 2 |
| | Heart Lung machine | 1 |
| | Hypo/ hyper thermia units | 1 |
| | Sternal saws | 2 |
| | Defibrillator | 2 |
| | Pacemakers | 2 |
| | Head light & loops | 3 |
| | IABP | 1 |
| | Cardiac Monitoring (ECG, SpO2, NIBP, 4IBP, CO, Temp, EtCO2 | 1 |
| | Anesthesia machine | 1 |
| | ESU | 2 |
| | OT tables | 2 |
| | OT Lights | 2 |

| Department | Description | Quantity |
|---|---|---|
| | Warming units | 1 |
| | Portable light | 1 |
| | Nerve stimulator | 1 |
| | Fluid warmer | 1 |
| | Syringe pumps | 2 |
| | Surgical Instruments | 4 sets |
| | **Furniture** | |
| | Dressing trolley with bowl | 1 |
| | Procedure trolley | 2 |
| | Crash cart | 1 |
| | Linen trolley | 1 |
| **SICU/MICU** | | |
| 1 | Patient Monitor (ECG, SpO2, NIBP, 2IBP, Temp, CO for 2 monitors, display12.1") | 12 |
| 2 | Defibrillator | 1 |
| 3 | Syringe pump | 12 |
| 4 | Infusion pump | 5 |
| 5 | ECG machine -12 channel. | 1 |
| 6 | Radiant warmer | 1 |
| 7 | Adult / paediatric Ventilators | 2 |
| 8 | ABG machine with Electrolyte | 1 |
| 9 | Alpha beds | 7 |
| 10 | Nebuliser | 4 |
| 11 | BP apparatus | 4 |
| 12 | Baby weighing scale | 1 |
| 13 | Steam inhalers | 4 |
| 14 | Refrigerator | 2 |
| 15 | NEEDLE DISTROYER | 2 |
| 16 | Warming unit | 2 |
| 17 | Furniture | |

| Department | Description | Quantity |
|---|---|---|
| 18 | Dressing trolley with bowl | 2 |
| 19 | Procedure trolley | 2 |
| 20 | Crash cart | 1 |
| 21 | Linen trolley | 2 |
| 22 | Patient bed (with collapsible railing, iv pole &Mattress) | 12 |
| 23 | Bed side locker | 12 |

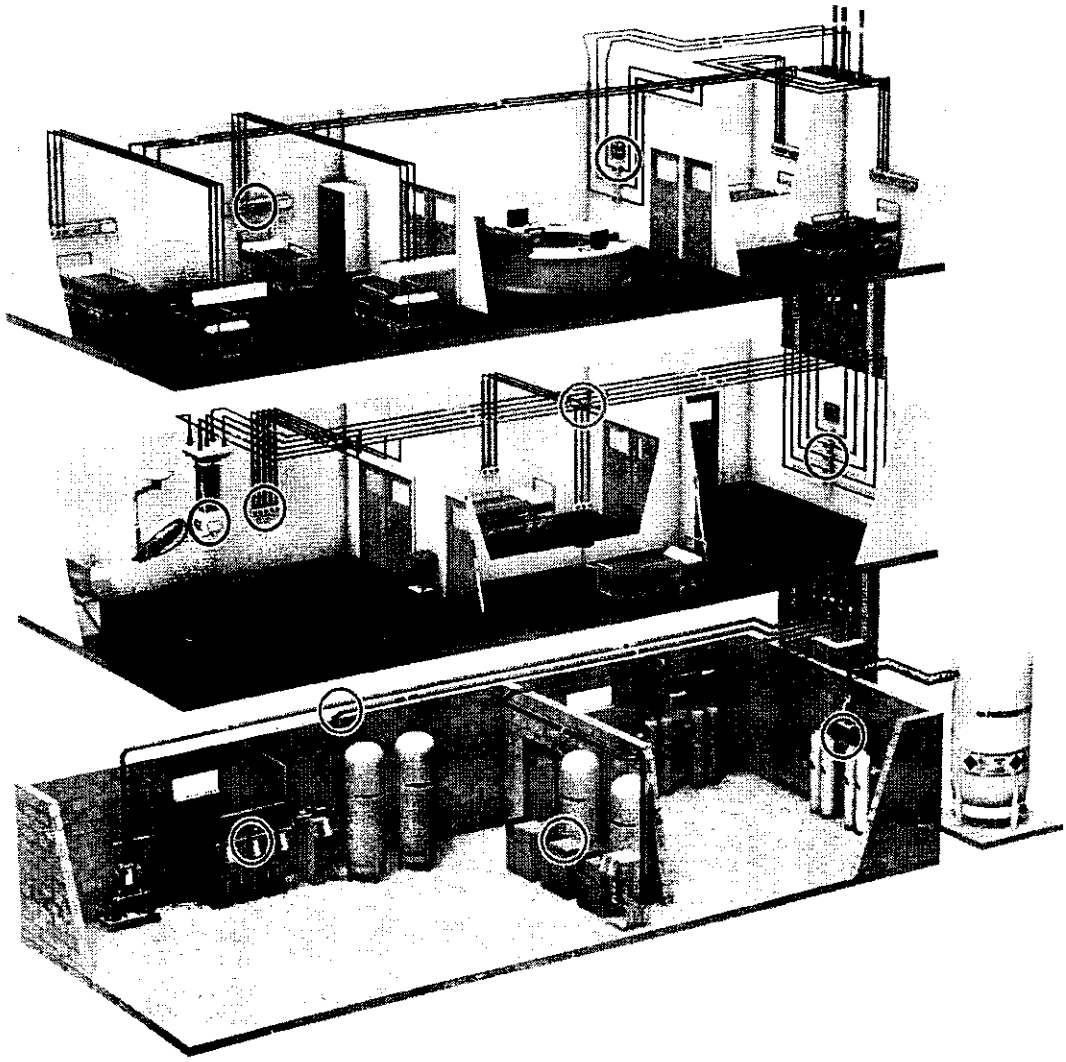
| | | |
|---|---|---|
| 24 | Over bed Table (cardiac Table) | 12 |
| 25 | Needle & Hub destroyer | 1 |
| 26 | Crash Cart | 1 |
| 27 | Medicine/Instrument trolley | 1 |
| | | |
| **Biochemistry** | | |
| 1 | Biochemistry Analyser | 1 |
| 2 | Immuno Analyser | 1 |
| 3 | Mini Vidas | 1 |
| 4 | Bench top Centrifuge | 1 |
| 5 | Cell counter 5 part - 1,3 Part - 1 No. (Hematology) | 1 |
| 6 | Microscope | 1 |
| 9 | ESR machine | 1 |
| **Histopathology** | | |
| 1 | Cryostat | 1 |
| 2 | Microscope | 1 |
| 3 | Weighing Balance | 1 |
| 4 | Microtome | 1 |
| 5 | Grossing Station | 1 |
| **Microbiology** | | |
| 1 | Automated Blood Culture | 1 |
| 2 | Automated Sensitivity | 1 |
| 3 | Elisa | 1 |
| 4 | Furniture for Medical Lab | 1 |
| **Nursing Station -Wards** | | |
| | O2 cylinder with trolley | 4 |
| | portable Suction Unit | 4 |
| | Refrigerator | 4 |
| | BP apparatus | 4 |
| | Stethoscope | 4 |
| | Dressing trolley with bowl | 4 |
| | Procedure trolley | 4 |
| | Linen trolley | 4 |

| **Department** | Description | Quantity |
|---|---|---|
| **Wards:** | Patient bed (with collapsible railing, iv pole & Mattress) | 117 |
| | Bed side locker | 117 |
| | Over bed Table (cardiac Table) | 117 |
| | | |

*9.0 Flow Requirements*

| Service | Location | Nominal pressure (kPa) | Design flow (L/min) | Typical flow required (L/min) | Test flow (L/min) |
|---|---|---|---|---|---|
| Oxygen | Operating rooms and rooms in which N2O is provided for anaesthetic purposes | 400 | 100(1) | 20 | 100 |
| | All other areas | 400 | 10 | 6 | 40 |
| Nitrous oxide | All procedure areas | 400 | 15 | 6 | 40 |
| Medical air | Operating rooms | 400 | 40(3) | 40 | 80 |
| 400 kPa | Critical care areas, neonatal, high dependency units | 400 | 80(3) | 80 | 80 |
| | Other areas | 400 | 20 | 10(3) | 80 |
| Surgical air | Orthopaedic and neurosurgical operating rooms | 700 | 350(4) | 350 | 350 |
| Vacuum | All areas | 40 (300mm Hg below atmospheric pressure) | 40 | 40 maximum, further diversities | 40 |

## 10.0 Basic System Distribution



Manifold/
compressor :
*Primary*
*Secondary/reserve*
*supply*

Line
Isolation
valve

AVSU/LVA

Main
Header

Floor
header

Outlet

## EXTRA LOW VOLTAGE SYSTEM

### Communication Systems

### 1.0 General

The communication systems will be designed to provide voice, video and data communications from all the ancillary spaces to the Central control room/Server Room located within the Facility and it can be remotely accessed for operations.

The design of the communication systems will include the following:

- Telephone - Private Automated Branch Exchange (PABX) System
- Closed Circuit Television (CCTV)
- Access Control System (ACS)
- Local Area Network (LAN) System
- Voice and Data Cabling (VDC) System
- Public Address (PA) System
- Nurses Control System(NCS) & Central Monitoring System(CMS)

### 2.0 CODES & STANDARDS

| Sl No | Description | Standards |
|---|---|---|
| 1. | Telephone Cables | I.T.U or I.T.L specifications |
| 2. | Telephone Cables(armoured) | IS-1554Part-1-1964 |
| 3. | MA TV | Society of Cable Radio andTV Relay Equipment or Indian Standards |
| 4. | Public Address & Sound System | NFPA - 72 |
| 5. | Terminal Boxes | Shall comply with BS4662. |

| | | |
|---|---|---|
| 6. | Low Voltage Commissioning Standard | The latest edition of the Cop and IEE Wiring Regulations |
| 7. | Installations of ELV | Under Indian Standard Code of Practice 732 |

- ICAO Annex 17, Security
- ANSI/TIA/EIA SP2840 Commercial Building Telecommunications Cabling Standard
- EIA/TIA 606 Administration Standard for Telecommunications Infrastructure of Commercial Buildings
- ANSI/TIA/EIA-607 Grounding and Bonding Requirements for Telecommunications in Commercial Buildings
- BS 7671 Regulations for Electrical Installations - IEE Wiring Regulations 17th Edition or the latest edition
- BS 6833.2 Apparatus Using Cordless Attachments (Excluding Cellular Radio Apparatus) for Connection to Analogue Interfaces of Public Switched Telephone Networks
- BS EN60950 Specification for Safety of Information Technology Equipment including Electrical Business Equipment
- IEC 61082 – Preparation of documents used in Electro technology
- IEC 65 - Safety requirements for mains operated electronic and related apparatus for household and similar general use
- CCITT Q.931 Standard – ISDN User Interface Layer 3 Specification for Basic Call Control
- CCITT Q.761 Standard – Functional Description of the ISDN User Part of Signalling System No 7
- CCITT I.420 Standard – Basic Rate User Network Interface
- CCITT I.421 Standard – Primary Rate User Network Interface
- CCITT G.703 Standard – Physical/Electrical Characteristics of Hierarchical Digital Interfaces
- CCITT G.704 Standard – Synchronous Frame Structures Used at Primary and Secondary Hierarchical Level
- EIA RS-232C – Specification of the Mechanical and Electrical Characteristics of the Interface used for Connecting Data Circuit Terminating Equipment and Data Terminal Equipment
- EIA RS-422A – Electrical Characteristics of Balanced Voltage Digital Interface Circuits

- EIA RS-449 – General Purpose 37 Pin and 9 Pin Interface for Data Terminal Equipment and Data Circuit Terminating Equipment Employing Serial Binary Data Interchange
- EIA/TIA 568 – Commercial Building Telecommunications Wiring Standard
- EIA/TIA 569 – Commercial Building Standard for Telecommunications Pathways and Spaces
- BS EN 50173:2007 Information Technology – General Cabling Systems
- BS EN 50174:2001 Information Technology – Cabling Installation
- ANSI/EIA/TIA Technical Services Bulletin TSB36
- EIA/TIA 570 – Residential and Light Commercial Telecommunications Wiring Standard
- ETS GSM 11.10 – GSM DCS 1800 Mobile Station Conformity Specification
- IEEE 802.3 – CSMA/CD Access Method and Physical Layer Specifications (Ethernet)
- IEEE 802.5 – Token Ring Access Method and Physical Layer Specifications
- IEEE 802.11b/g/n Wireless LAN standard
- IEEE 802.3u Fast Ethernet over Fibre Optic
- IEEE 802.3z 10G b/s Ethernet standards
- IEEE 802.3a 10G b/s Ethernet over Twisted Pair
- IEEE 802.3a Link aggregation for parallel links
- IEEE 802.3af Power over Ethernet
- IEEE 802.3ae 10G b/s Ethernet over Fibre Optic
- IEEE 802.1q VLAN Tagging
- IEEE 802.1p Traffic Class Expediting
- IEEE 802.1d Spanning Tree Protocol
- IEEE 802.1w Rapid Spanning Tree Protocol
- IEEE 802.1s Multiple Spanning Tree Protocol
- IEEE 802.1x Port-Based Network Access Control
- IEC 529 – Degree of Protection Provided by Enclosures for Electrical Equipment
- IEC 11 – Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical Radio-Frequency Equipment
- IEC 79-7 – Increased Safety Requirement for Electrical Equipment for use in Explosive Atmospheres
- IEC 79-11 – Guidelines for Design and Assessment of Intrinsically Safe Circuits
- IEC 79-15 – Requirements for Non-Sparking Electrical Equipment

- BS 6513 Wideband Cabled Distribution Systems
- EIA-422-A Electrical Characteristics of Balanced Voltage Digital Interface Circuits
- IEC 96-3 Radio Frequency Cables, Part 3 - General requirements and tests for single unit coaxial cables for use in cabled distribution systems
- CCIR Recommendation 500-3, 562-2, 567-2
- EN55022 / CISPR 22 Class A standards issued by the European Committee for Electro technical Standardization (CENELEC)
- IEC Display Monitor Standard 60065
- IEC Display Monitor Standard 60950
- BS 5954 Dimensions of Mechanical Structures of the 482.6 (19 in) series Part 2 Specification for Cabinets and Pitches of Rack Structures; Part 3 Specification for Sub racks and Associated Plug-In Units
- BS 6527 Specification for Limits and Methods of Measurement of Radio Interference

### 3.0 Commercial and Light Industry

- ISO/IEC11801- Information technology –Generic cabling for customer premises
- ISO/IEC 24764 - Information technology -- Generic cabling systems for data centres
- TIA-942 - Telecommunications Infrastructure Standards for Data Centres

### 4.0 DESIGN CRITERIA for Telephone System

- Provision of analogue telephone can be considered in the Patient Rooms and IP/digital telephones have been provided in the administrative areas.
- Provision of 8-pairs telephone cables with the minor cable containment and appropriate type of phone jack for the end devices;
- All cables shall be PVC insulated, and shall be housed in galvanized-screwed or PVC conduit and/or galvanized trunking.
- Terminate all telephone cables at the IDF Room in the PTB Extension, whereas PABX System configuration and programming and cable jumpering.

**DESIGN CRITERIA for Access Control System**

- Controller(s) and the related ACS equipment components, mounting brackets and necessary accessories. Provision of all containment as required for the connection to the final field equipment devices. This shall include but not be limited to cable trunking, trays, cable ladders, concealed conduits, back boxes, termination boxes, flexible conduits, etc.
- The ACS System have to be interfaced with the fire services system by means of the electromagnetic (EM) door lock.

**5.0 DESIGN CRITERIA for Closed Circuit Television (CCTV) System**

Analogue and IP fixed and pan/tilt/zoom cameras, lens, housing and brackets.

- The camera shall have at least 720p high definition video quality for general surveillance and 1080p high definition video quality for critical areas
- Optical transceivers;
- Video distribution amplifiers;
- CCTV POE network switches such as CISCO 2960 series or equivalent;
- Digital Video Recorders (DVR) which shall record all 24x7 video images for 24-40 day continuously but not more than 65 days.;
- Equipment enclosures, power supplies, optical transceivers with fibre cable organizers;
- Mounting brackets and poles;
- Surge arresters for all outdoor equipment installations;
- Fibre patch cord and horizontal fibre cables to and from cameras to new IDF Room(s) and their termination and accessories;
- Coaxial cabling and coaxial patch cords, their termination and accessories; and
- All necessary local cable containment for the power and control cables required connected to the main trunking.
- IP Camera solution is the main approach for this project.

**6.0 DESIGN SUMMARY for Local Area Networking System**

- All necessary horizontal cabling from the IDF Room to all the Access Points and a POE Network Switch (i.e CISCO 2960 or equivalent) shall also be provided.
- All upstream cabling works shall be for voice and data cabling works.

- The quantities and locations of Access Points shall be restricted by the available ports at POE edge switches and licenses on the wireless controllers.
- The Contractor shall evaluate the coverage based on the particular equipment to be provided, and develop the layout in details with coordination among other related services including architectural and electrical.
- The equipment details and locations to demonstrate the required coverage and performance can be met before implementation.
- The system standard to be used shall be based on IEEE 802.11b (Wi-Fi) standard and also IEEE 802.11a/g.

## 7.0 DESIGN CRITERIA for Voice & Data Cabling System

- All voice and data cabling outlets, fibre and copper termination frames, media converters, junction boxes, termination boxes, faceplates, etc. which are installed in exposed outdoor environment shall be provided with suitable weather-proof housing with a minimum standard of IP65 rating.
- IDF rooms to take care all various signalling service and networking provision.
- The design and implementation of new IDF Room(s), shall follow the local code, international standard and industry requirement such as ISO/IEC 11801, ISO/IEC 24764, TIA-942.
- Cabling provisions shall be low smoke and fume (LSF/LSOH) type and shall apply to optic fibre and Cat 5e or Cat 6 UTP cables.
- Cable labelling, numbering and marker for all cables, patch panels, equipment racks, frames, outlets, patch cords, etc; in particular, all the external cables shall be labelled properly in each drawpit at cable entry and exit points.

## 8.0 DESIGN CRITERIA for BMS

- Provide all interface components for BMS, including dry contacts, relay, high level interface, cables, trunking, conduits and local I/O panel etc. to interface with the Building Services (BS) / Electrical & Mechanical (E&M) equipment.
- Communication networks which consist but not be limited to optical fibre cables, Cat 5e copper cables, network switches, optical fibre transceiver and receiver and routers.
- The hardware and software for transmitting and receiving BMS signals to and from the PTB.

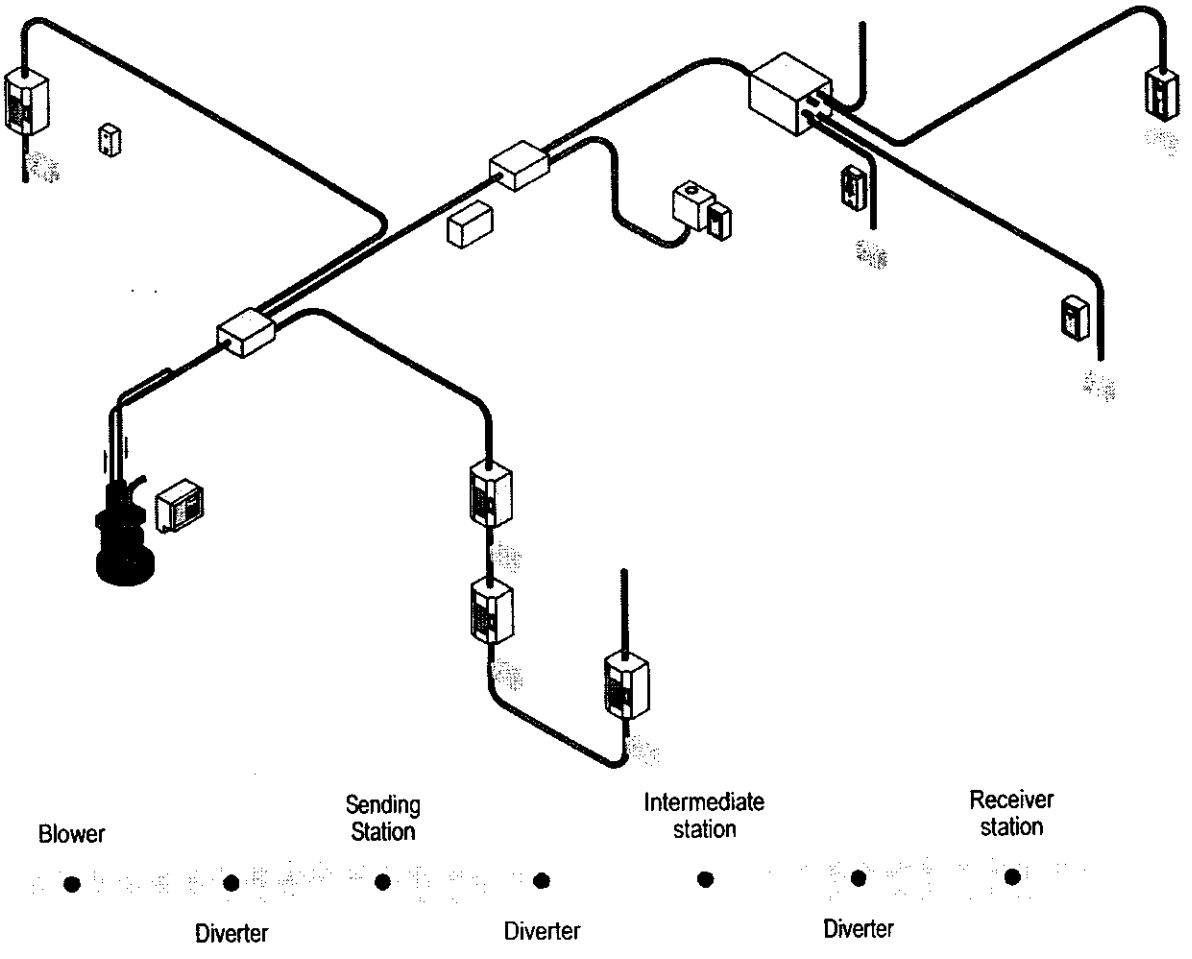
- Develop a full point schedule listing the exact quantities of devices for each type of field devices requested in the BMS Point Schedules according to the respective E&M System if necessary. Such schedule shall include the location of the I/O panel, and the field equipment under the monitoring and control by the I/O PLC and I/O module.
- The Contractor shall be required to design, supply and install the BMS I/O panels, with sufficient quantities to control and monitor all the field equipment type required in the BMS Point Schedules

## PNEUMATIC TUBE SYSTEM

**1.0 Pneumatic tube systems** (PTS) helps hospitals meet patient needs by efficiently transporting drugs, documents and specimens to and from nurses' stations, labs, inpatient and outpatient pharmacies, blood banks and the ED.

In addition to relieving vital staff members of the routine transport of lab samples and medications, pneumatic tube systems deliver these items in a fraction of the time. Perhaps even more important than increased efficiency is the fact that critical samples and medications reach their destination in seconds vs. minutes.

*2.0 Typical system*




**Proposed Hospital Waste Management**

The hospital development needs to be followed the segregation of waste at its source, which will help to reduce or even stop the chances of contamination. Following are the types of wastes can be generated in our Hospital.

**Types of Hospital Waste:**

There are two types of hospital wastes.
1. Risk Waste
2. Non-Risk Waste

**Risk Waste:**

Risk waste is further subdivided in seven (07) groups.
1. Infectious waste
2. Pathological waste
3. Sharps
4. Pharmaceutical waste
5. Geno toxic waste
6. Chemical waste
7. Radioactive waste

**Non-Risk Waste:**

Non-risk waste is that, which is comparable to normal domestic garbage and presents no greater risk, therefore, than waste from a normal home. This general waste is generated by almost everybody in the hospital, ie., administration, patient's risk, cafeterias rooms, cafeterias and nursing station. Such waste may include:

1. Paper and cardboard.
2. Packaging.
3. Food waste, i. e., leftover food, fruit and vegetable peelings.
4. Aerosols. (spray)

**Waste Segregation Guidelines:**

The risk waster should be segregated at the point of generation from Nonriskwaste. It is useful for safe disposal of risks waste.

The process of segregation at source has two advantages

1. The risk waste is separated from non-risk waste which accounts for 20%of the total medical waste.
2. At source segregation minimizes the chances of infection and injury to the persons who handle the waste.

For the different types of waste separate containers are required i. e. risk waste sharps and non-risk waste. All the different colored containers limed with plastic bags are placed in each ward and department.

The person responsible for waste handling must do source segregation to reduce the chance of infection and lesser amount of waste to be incinerated. Segregation must be practiced from the source of generation to handling, transportation till the final disposal. The following steps should be observed. All categories of risk waste other than sharps are collected in "white color"container lined with plastic bag. When the plastic bags, and immediately replace it with a new plastic bag, and immediately replace it with a new plastic

bag. The bags are sealed and labeled on site with the name of ward and location. The sharps are stored in "Red" color hard plastic container lined with a plastic bag. The medical staff cuts the needles or syringes making it unfit for reuse. If the sharp container is to be incinerated, it shall be placed in the yellow waste bag with the other risk waste. Large quantities of pharmaceutical waste shall be returned to suppliers. Small quantities maybe placed in a yellow waste bag, preferably after being crushed.

Radioactive waste may be placed in large yellow container or drum and may be marked with "Radioactive" waste. Non-infectious radioactive waste may be placed in white bags. The non-risk waste is stored separate from all other waste and is collected in a "Blue" container with a plastic bag lining. The blue containers should be located in the corridors open spaces and other visiting places etc.

**Container Specification:**

All the containers in hospital wards and department should be capable of handling waste without spillage a puncture. The 40 liters capacity containers well are sufficient for one day storage. The containers will be of hard polythene materials.

**Infectious Waste:**

This is the waste contaminated by any type of bacterium, virus, parasites or fungi, which includes:

1. Cultures (the growing of microorganisms in a nutrient medium (such as gelatin (Proteins from bone & skin) or agar) from laboratory work.
2. Waste from surgery and autopsies (post-mortem).
3. Waste from infected patients.
4. Waste from infected hemo dialysis patients
5. Infected animals from laboratories.
6. Any material having been in contact with infected patients.

**Pathological Waste**

This waste includes:

1. Tissues
2. Organs
3. Body parts
4. Fetuses (Unborn Vertebrates)
5. Blood and body fluids

**Sharps:**
Sharps include the following whether infected or not:

1. Needles
2. Syringes
3. Scalpels (A thin straight surgical knife used in dissection and surgery)
4. Infusion sets
5. Saws and knives
6. Surgical blades
7. Broken glass
8. Any other items that can cut and puncture

**Pharmaceutical Waste:**

1. Expired or unused pharmaceutical products.
2. Spilled or contaminated pharmaceutical products.
3. Surplus drugs, vaccines or sera.
4. Discarded items used in handling pharmaceutical, for example bottles, gloves, masks, tubes.

**Geno toxic Waste:**

These wastes include:

1. Cyto toxic drugs and outdated material.
2. Vomiting, feces or urine from patients treated with cyto toxic drugs or chemicals.
3. Contaminated materials from the preparation and administration of the drugs such as syringes, vials (A bottle that contains a drug(especially a sealed sterile container for injection by needle) etc.

**Chemical Waste:**

1. Chemical waste can include the following;
2. Chemicals from diagnostic and experiment work
3. Cleaning processes
4. Housekeeping and disinfecting procedures.
5. Mercury waste such as from broken clinical equipment spillage.
6. Cadmium waste, mainly from discarded batteries.

**Radioactive Waste:**

These wastes include Liquid, solid or gaseous waste contaminated with radio nuclides generated from in vitro (outside) analysis of body tissue/fluid, invivo(body organ imaging) and tumor localizations and investigations and therapeutic procedures.

All the above-mentioned hospital waste can be controlled and managed by a proper waste segregation and management, following agencies can take part in the role of action,

1. All Bio medical waste can be collected by IMAGE

Indian Medical Association, Kerala State Branch, established IMAGE, a state-of-the art Common Biomedical Waste Treatment and Disposal Facility at Palakkad and it was commissioned on 14th December2003. IMAGE was conceived and launched to support health care providers to overcome the challenges posed by the responsibilities laid down in the Biomedical Waste (Management and Handling) Rules 1998.

IMAGE (Indian Medical Association Goes Eco-friendly), the biomedical waste treatment and disposal project of the Indian Medical Association has been wrought with challenges. IMAGE is unique inconception and execution. The project is a testimony of the grit, determination and social commitment of the Indian Medical Association.

I.M.A by its persistence has achieved resounding success by overcoming the difficulties in dealing with a ravaging issue of biomedical waste in the state of Kerala. The story of IMAGE reflects public trust and the unshakable faith in IMA's credentials. IMAGE is an institution of excellence and is now renowned as **"THE KERALA MODEL"** having catapulted God's Own Country ahead of other states in the field of Biomedical Waste Management.

2. Non-Risk waste can be Incinerated at Hospital

Hospital waste is becoming increasingly complex due to changing technologies and increase in the services that the hospitals perform for the community. Out of the available technology for the final disposal of solid wastes, incineration is best suited for hospital waste as it renders the waste nontoxic, nonhazardous, non-putrescible and reduces the volume of material for ultimate disposal. Present study was carried out in a service hospital to analyze the requirement of incinerator considering the state of art available in this country. Multi chambered oil fired incinerator installation as an onsite facility for hospital solid waste disposal has been recommended as more environment.

3. Food wastes can be converted using organic waste converter

Excel OWC (Organic Waste Convertor) is an easy to use Decentralized Waste Management System to turn large amounts of organic waste such as kitchen waste, garden waste, food processing waste etc. into compost. The system is designed to eliminate odour and also to remove the problem of irritants such as flies and rats.

The Excel OWC is a bio-mechanical Composting System which consists of the OWC machine, Curing System and a number of optional accessories for specific waste challenges.

4. AUTOMATIC ORGANIC WASTE COMPOSTING MACHINE

Processes all types of BIO-WASTE like Food Waste, Fruits, Vegetables, Poultry, Fish, Chicken/Mutton, etc. 70 – 80% volume reduction of bio waste or any other waste and conversion it into compost in a day. Compost can be used for Plants, Garden, farming, etc., Odor free, Reduction in Labor costs, landfill costs and/or waste water costs. No Secondary Pollution

5. CONTRIBUTION TO ENVIRONMENT AND SOCIAL RESPONSIBILITIES

Prevention of Global Warming Minimization of waste at source, convert bio-waste / kitchen waste / garden waste into compost for reuse Completes ecological loop – food goes back to the soil after composting process Virtually no costs of collection, transportation, disposal of waste / garbage. Thereby huge savings Creating awareness in zero garbage cities. Protects Environment, Wildlife, Economy, etc. No Water Pollution or Secondary Pollution

## 12. FINANCIAL ESTIMATE & COST PROJECTIONS

The Financial estimate has been done for most of the items using the PRICE software. For items not covered in PRICE, rates as per Observed data based on Market Discovery have been followed. The cost index of 55.88 % for Idukki has also been applied. The General Abstract of Estimate is as follows. The detailed estimate prepared using PRICE software is appended as Annexure.

| CONSTRUCTION OF TALUK HOSPITAL,CHITHIRAPURAM | | |
|---|---|---|
| General Abstract | | |
| Sl.No. | Description | Amount in INR |
| 1 | Construction of Hospital Block, Substation & Mortuary Blocks,Roads, Compound Wall etc | 353678145 |
| 4 | MEP- Water Supply &Sanitary | 25000000 |
| 5 | MEP- HVAC | 5000000 |
| 6 | MEP- Electrical | 25000000 |
| 7 | STP | 10000000 |
| 8 | MGPS | 5000000 |
| 9 | Firefighting System | 12500000 |
| 10 | ELV-DATA,CATV,CCTV,ELV Cables etc. | 10000000 |
| 11 | PNEUMATIC TUBE SYSTEM | 4000000 |
| 12 | Elevators | 7500000 |
| 13 | MLCP | 10000000 |
| 14 | Modular OT | 5000000 |
| 15 | Solar Panels | 500000 |
| 16 | Landscaping | 300000 |
| 17 | Incinerator | 400000 |
| 18 | Biogas Plant/Organic Waste Converter | 500000 |
| 19 | Water Purifiers | 2000000 |
| 20 | Signage& Way Finding | 1000000 |
| 22 | Interior Furniture & fitments (Except Medical Furniture & Equipment) | 6000000 |
| 23 | Medical Equipment | 70000000 |
| 24 | Total | **553378145** |
| | Contingencies @ 3% | 16601344 |
| 25 | Project Expenses @ 5% | 27668907 |
| 26 | Total Project Cost | **597648397** |
| 27 | Centage Charges @ 3.75% of Project Cost | 22411815 |
| 29 | Grand Total | **620060211** |
| *Say 62 Crores plus GST at applicable rates extra* | | |

## 13. REVENUE STREAMS

As far as Government Hospitals in Kerala are considered, their development is envisaged considering the benefit to the general health of the community as a whole - and not with a profit motive-in line with the Government's Vision to provide Free Super Specialty Health Care to all.

However, even though it is based on altruistic principles, they too have definite revenue streams, which are essential for the upkeep and operations of the Hospital:

Let us examine the Expected Revenue Streams of the Govt. CHC :

1. Revenue from Diagnostic and Laboratory Services
2. Revenue from Pharmacy
3. Revenue from In-Patient Wards & Pay Wards
4. Revenue from Out-Patients
5. Revenue from Procedures including Surgical Procedures
6. Revenue from Parking fee
7. Reimbursements from Central agencies and Insurance Providers
8. Revenue from Possible Sponsorships and Advertisements.

Although Government Hospitals are meant to provide Healthcare at subsidized rates as a Social responsibility, there is certainly a component due to it through Governmental funding from the Taxes and Revenues that the Government is getting from the general public. Also, most of the services offered, gets reimbursement / funding from schemes like RSBY-Rashtriya Swasthya Bima Yojana, CHIS-Comprehensive Health Insurance Scheme, KBF-Karunya Benevolent Fund, Arogya Kirana, etc wherein the concerned Nodal Agencies/ Insurance Providers Reimburse the costs incurred.

**The typical Expenses incurred is as follows:**

1. Salaries to the Human Resources (HR) utilized.
2. Cost of Consumables & furnishings
3. Cost of Drugs given, mostly at Subsidised rates
4. Cost of maintaining Diagnositc & Patient Care Equipment.
5. Administrative Expenses.
6. Expenses related to Electricity & Water supply
7. Other recurring Expenses like Maintenance expenses, Laundry

**Innovative Ideas for Additional Revenue Generation:**

**CSR funding from Corporates:**

The Government can chalk out a policy, wherein the CSR funding available with major corporates and companies in medical can be utilized for meeting the operational expenses incurred. For example, an area of upmost importance in a Governmental hospital which is currently lacking vis-à-vis to Private Hospitals is that of proper upkeep and maintenance, including employing janitors for continuous cleaning. This can very well be arranged

through such CSR funding, provided Government chalks out a plan and seek the CSR funding based on a special programme announced state wide. Even relatively small companies-for which CSR funding is not mandatory may come up to divert fund for this noble cause.

**Sponsorships & Advertisements**

Another area wherein funding from such agencies and even general public can be sought is that of providing food to the patients. If a dedicated mechanism to sponsor food for the patients – on a daily or monthly basis is rolled out, there would certainly be sponsors available from even general public who will be ready to bear the expenses on days of importance like birth days. Also, the possibility of generating additional revenue through Advertisements may also be explored, which will also fetch considerable revenue, considering the immense foot falls on a daily basis in the Hospital.

**Savings Through the On-Grid Solar Panels Installed:**

The savings on Electricity Bill obtained through the On-Grid Solar Panels, installed could be considered as an indirect Revenue from the Project.

## 14. COST BENEFIT ANALYSIS & INVESTMENT CRITERIA

The development and up gradation of Government Hospitals are basically done as part of the Social responsibility of the Government. Obviously, the profit motive is not the driving force or even a critical criterion. The concern about the community health at large is the main concern and is definitely the deliverable intended by the Government through such developmental Specialty Health Care to all.

However, the Cost-Benefit Analysis is an essential component of any Social Project. The costing of this Project shall include the Capital Expenditure and recurring Operational costs. As far as this Project is concerned, the Capital outlay may be provided by the Government as part of its Social responsibilities, with the benefit from doing so having far reaching good effects of the health and welfare of the population consuming it. When we try to analyze the feasibility / viability of this Project, the exponential effects of providing quality health care to the general public has to be considered it terms of its long-term Socio-Economic fall outs.

The Socio-Economic Fallouts of this Project can be enumerated as follows:

1. Overall increase in the health of the benefitting population and its long-term effects on the economy and wellbeing of the Society.
2. Increase in Life Expectancy of the people, contributing to more productive days.
3. Offering state of the art medical care to the economically weaker sections of the society.
4. Producing generations of healthy citizens obviously has its own benefits for the State.
5. At Critical times, Government Hospitals like this plays a very vital role in controlling the outbreak of Dangerous Epidemics like the recent incidents of Nipah, Chikungunya thus directly contributing to the whole society.
6. In the Propagation of Health care awareness programmes and immunization programmes, these Hospitals play an important role.
7. The Contribution of Government Hospitals in molding Healthy citizens are vital for the betterment of the Society, thus indirectly contributing to the GDP.

The Economic benefit of this Project may be reckoned as the cumulative net financial impacts and fallouts during the life of the Project and may not be measured in terms of the direct monetary returns from the Project.

## 15. ENVIRONMENTAL & SUSTAINABLE ASPECTS

The Environmental Management Plan (EMP) is a site specific plan developed to ensure that the project is implemented in an environmentally sustainable manner where all contractors and subcontractors, including consultants, understand the potential environmental risks arising from the proposed project and take appropriate measures to mitigate them.

The objective of the EMP are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels.
- To identify measures that could optimize beneficial impacts.
- To create management structures that address the concerns and complaints of stakeholders with regards to the development.
- To establish a method of monitoring and auditing environmental management practices during all phases of development.
- Ensure that the construction and operational phases of the project continues within the principles of Integrated Environmental Management.
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project.
- Ensure that the safety recommendations are complied with
- Propose mechanisms for monitoring compliance with the EMP and reporting thereon.
- Specify time periods within which the measures contemplated in the final environmental management plan must be implemented in true spirit.

The global number of hospitals is not readily known, but their combined environmental impacts are significant. By implementing an environmental management system, healthcare facility can prevent pollution, analyze and potentially address the life-cycle impacts of their products and services. This will allow them to more effectively comply with applicable regulations, foster good community relations, provide better healthcare services, and stay competitive within the Industry.

The various aspects having possible effects on the Environment can be examined as follows:

### Air Pollution

### Construction Phase

Environmental impacts during construction phase will be mainly due to civil works such as site preparation, RCC foundation, construction etc. material and machinery transportation, fabrication and erection etc. The construction phase impacts are temporary and localized phenomena, except the permanent change in local landscape and land use pattern at the project site. However those require due consideration during project execution. Also, wherever applicable, detailed procedures shall be implemented to prevent / mitigate adverse impacts and occupational hazards.

To mitigate the impact of suspended Particulate Matter (dust) during the construction phase of the proposed project, the following measures are recommended for implementation.

- A duct control plan
- Cordoning off the construction area
- Procedural changes to construction activities.

**Operation Phase:**

During the operational phase of the site the following measures are recommended for implementation:

- Vehicle emission controls and alternatives
- Effective use of Chimneys for Incinerators
- Greenbelt development.

Vehicle Emission Controls.

Parking areas shall not cause pollution to the in-patient wards and treatment rooms. Car parking areas shall be given hardscape paving as far as possible.

Green bell Development:

Increasing vegetation in the form of green bell is one of the preferred methods to mitigate pollution. Plants serve as a sink for pollutants, act as a barrier to break the wind speed as well as allow the dust and other particulates to settle out there. It also helps to reduce the noise level to some extent. Hence, proper green belt development shall be ensured to mitigate air and noise pollution.

**Noise Pollution:**

**Construction Phase**

During the construction phase, there would be a temporary increase in ambient noise levels due to construction machinery operation and movement of construction vehicles. Exposure to continuous and intermittent noise levels louder than 115 dB(A) would not who will be working very close to noise generation source.

To mitigate

- Servicing of all construction vehicles and machinery shall be done regularly and during routine be permitted. Following mitigation / management measures shall be adopted during construction period.
- For protection of construction workers, earplugs should be provided to those workers servicing operations, the effectiveness of exhaust silencers shall be checked and if found defective will be replaced. Vehicles hired for bringing construction materials at site shall conform to the noise emission standards and shall be operated during non-peak hours.

- Workers employed in high noise areas will be rotated. Earplugs / mutts, or other hearing protective wear will be provided to those working very close to the noise generating machinery.
- Smooth flow of traffic should be ensured on the internal road to avoid idling and honking of vehicles.
- Ambient Noise level monitoring shall be conducted at suitable locations at periodic intervals during construction phase to conform to the stipulated standards both during day and night time. Data shall be reviewed and analyzed by the project manager for adhering to strict measures.
- Noise levels will also be monitored at point sources for occupational noise exposure and ensuring health risk.

**Operation Phase**

- To mitigate the impact of noise due to vehicular movement during the operational phase the greenbelt development is recommended for implementation. Selection of the plant species shall be based on their adaptability to the existing geographical conditions. A diverse variety of indigenous evergreen and ornamental trees would be planted. Emphasis on native plant species which are having good ornamental values and fast growing with excellent canopy cover will be given.

- Use of Sound insulated Generators is made mandatory.

**Water Pollution**

**Construction Phase**

To prevent degradation and maintain the quality of the water source adequate control measures have been proposed to check the surface run-off as well as uncontrolled flow of water into any water body. Following management measures are suggested to protect the water quality during the construction phase.

Avoid excavation during monsoon season.

- Care should be taken to avoid soil erosion.
- Pit latrines and community toilets with temporary septic tanks shall be construction on the site during the construction phase to prevent waste water from entering the water bodies.
- To prevent surface and ground water contamination by oil/grease, leak proof containers should be used for storage and transportation of oil /grease. The floors of oil /grease handing area should be kept effectively impervious. Any wash off from the oil/grease handling area or workshop shall be drained through impervious drains. Clarifiers or oil/water separators shall be constructed and effluent should be treated appropriately before releasing it.
- Construction activities generate disturbed soil, concrete fines, fertilizer, oils and other wastes. On-site collection and settling of storm water, prohibition of equipment washes

downs, and prevention of soil loss and toxic releases from the construction site are necessary to minimize water pollution.

- All stacking and loading areas should be provided with proper garland drains equipped with baffles to prevent run off from the site to enter any water body.

**Operation Phase**

In the operation phase of the project, water conservation and development measures need to be taken including all possible potential for conservation of water reuse, harvesting and recycling of water. These could be in the form of the following:

- Minimizing water consumption
- Promoting reuse of water after treatment and development of closed loop systems for flushing, landscaping and DG cooling.

Water consumption will be minimized by a combination of water saving devices such as implementing fixtures that are low flow and water efficient models together with other water conservation measures. Furthermore, to ensure ongoing water conservation, an employee education and awareness programme will be introduced for the employees of the proposed project. Following section discusses the specific measures which shall be implemented.

Domestic usage:

- Use of water efficient plumbing fixtures (ultra-flow toilets and urinals) water efficient plumbing fixtures use less water with no marked reduction in quality and service. To install water less W.C and urinals this will help in conserving sufficient quantity of water.
- Leak detection and repair techniques.
- Meter water usage, employ measurement & verification methods. Monitoring water use is a precursor for management.
- Awareness campaign to disseminate knowledge on strategies and technologies that can be used for water conservation.

As preventive healthcare advocates, hospitals must lead the way in environmental awareness and protection - especially now that man-made pollution has been potentially associated with increase in certain types of human illnesses, such a cancer, neurological, reproductive and developmental effects and allergies. The recent growth of environmental medicine as a medical specialty reminds us to carefully address and monitor environmental conditions in hospitals.

## 16. RISK ASSESSMENT AND MITIGATION MEASURES

Risk management is a process that continues throughout the life of a project. It includes process of risk management planning, identification, analysis, monitoring and control. Many of these processes are updated throughout the project life cycle as new risk can be identified at any time. It's the objective of risk management to decrease the probability and impact of events averse to the project. Risk assessment is the act of determining the probability that a risk will occur and the impact that event would have, should it occur. This is basically "cause and effect" analysis. The cause is the event that might occur, while the effect is the potential impact to a project, should the event occur. Risk mitigation planning is the process of developing options and actions to enhance opportunities and reduce threats to project objectives. Risk mitigation implementation is the process of executing risk mitigation actions. Risk mitigation progress monitoring includes tracking identified risks, identifying new risks, and evaluating risk process effectiveness throughout the project.

Environmental Risk

Natural risks that may affect the facilities and their resulting damage to property and the personnel.

Strong earthquake

Tsunamis (floods)

**Legal or contractual risk**

Documentation of the construction contract project financial risks and their respective project controls intended to protect the owner's project interest.

Contract risk analysis is used for:

- Evaluating the current project controls environment and identifying controls gaps
- Communicating within an organization and share responsibilities for mitigating risks.
- Identifying contracting improvement opportunities.

The two most common types of contracts are:

- Lump sum or fixed price contracts
- Reimbursable expense contracts which include:
  - ✓ Guaranteed maximum price
  - ✓ Cost plus

The primary risks of lump sum contracts are:

- Specified services not provided
- Contract quantities not installed
- Contract work performed by others

Reimbursable contracts have the additional risk of identifying, qualifying and quantifying which costs are truly project costs. It is the understanding of these costs that enables the control professional to avoid many unnecessary project costs.

**Risk mitigating controls**

- Verify general conditions calculations on every pay application.
- Verify job cost transactions do not include general conditions types of costs
- Verify general conditions calculations are on actual costs or a percentage of the cost of work.
- Review all materials purchases for sales tax treatment.
- Transfer all sales tax credits to the contingency budget.
- Compare owner direct and contractor purchases for duplicate transaction.
- Observe job site security
- Reconcile all credit card purchases with supporting documentation.
- Verify approval and timeliness

**SCHEDULE RISK**

This risk arises from the possibility that the procurement process takes longer than expected or the design / construction process takes longer than expected.

Measures to mitigate this risk include:

- Procurement and legal documentation will be based on industry accepted templates.
- A Request for Qualifications (RFQ) process is being used to short-list the best proponent teams.
- Contractual documentation will be prepared ahead of time and appended to the RFP so that proponents can consider these documents during proposal preparation.
- Concept design drawings will be included in the RFP to support the procurement cycle.

**COST RISK**

This risk arises from the possibility that overall project cost and construction costs are higher than Budget.

Measures to mitigate this risk include:

- The preliminary budget is based on an indicative design and a quantity surveyor report that contains appropriate cost contingencies.
- Estimates of construction escalation and inflation have been included in the budget based on the current market forecasts. The capital cost will be checked by a quantity surveyor immediately prior to release of the RFP to ensure the project is estimated within budget.
- The project RFP will include a mandatory affordability ceiling which proponents must meet in order to have the rest of their proposal evaluated. This will ensure that VIHA

does not enter into construction contracts without the assurance the project can be completed within budget.

**OPERATING RISK**

This risk arises if the facility is not well-maintained over time and / or the cost of maintenance is higher than expected. Measures taken to mitigate this risk include:

- Detailed performance specifications will be included as part of the Project Agreement and ensure the proper maintenance schedule is provided.
- The operator will be required to include a facilities maintenance provider in the design / construction process and to maintain the facilities over the contract term.

## 17. PROJECT MANAGEMENT ORGANISATION

Health & Family Welfare (P) Department, Government of Kerala, vide **G.O. (Rt) No.3424/2018/H&FWD dated 16.11.2018** has accorded sanction to engage Kerala State Electricity Board Limited as Special Purpose Vehicle (SPV) for execution of the Project **"Up gradation of Primary Health Centre (PHC) Chithirapuram to Taluk Hospital"**, through Kerala Infrastructure Investment Fund Board (KIIFB). The rates of Centage Charges to SPVs for execution of KIIFB Projects are fixed for Planning, Designing, Supervising and Handing over of Projects. Subsequently Health & Family Welfare (P) Department, Government of Kerala, vide **G.O. (Rt) No.-----/2019/H&FWD dated Nil** has renamed the above project as **"Construction of Taluk Level Hospital at Community Health Centre, Chithirapuram".**

The capabilities of the Project Management Organization for this project, i.e. KSEBL shall be summarized as follows:

- KSEBL has on its rolls, an unmatched work force of Engineers and Officers with long years of Professional experience in the planning and execution of large projects which include Hydro / Thermal / Wind/ Solar power projects, tunneling, roads, bridges, buildings, independent colonies with all infrastructure etc.
- KSEBL has one of the most professional structural design wing perhaps one of the best in India.
- Geological and Foundation Engineering challenges that the Engineers of KSEB have overcome in various terrains have no equals in Kerala.
- The consultancy wing of KSEBL is well equipped in giving total engineering solutions, in the implementation of the wide spectrum of intricate Infrastructure Projects.

## 18. IMPLEMENTATION SCHEDULE

**Project Gestation Period:**

The gestation period of the Project: **"Construction of Taluk Level Hospital at Community Health Centre, Chithirapuram"** shall be 24 months from the date of commencement of work.

## 19. STATUTORY CLEARANCE

The Various Statutory Clearances & the Provisions & stipulations of Applicable codes are as follows:

All the provisions stipulated in various codes as applicable have been considered, the details of which are as follows:

**NATIONAL BUILDING CODE OF INDIA:**

**PART 3 development control rules and general building requirements:**

4.6.1.4 **Requirements for fire tender movement**

a) Buildings having height more than 15 m above ground level shall necessarily be accessible by fire tender, as follows

1) For buildings having floor area less than 10 000 m2, fire tenders shall have access to at least one-third of the perimeter of building which shall be minimum 6.0 m wide and having 9.0 m turning radius.

2) For buildings having floor area more than 10 000 m2, fire engine shall have an access to at least to half of the perimeter of building which shall be minimum 6.0 m wide and having 9.0 m turning radius.

b) If podium is not accessible by fire tender, the podium may be such that it is not extended beyond the building footprint to an extent more than 11.0 m on the side where fire tender access is provided Such restriction shall not apply in case podium is accessible by fire engine

c) Minimum 6.0 m driveway width and 9.0 m width at turning shall be available for fire tender movement all around the podium.

**NOTE**. The width and turning radius of ramp for fire tender access, and requirements of motorable open space for fire tender movement given above pertain to fire tender weighing up to 45 t and its operability. For heavier fire tenders, these shall be as per the requirement laid down by the Fire Department

**KPBR – KERALA PANCHAYATH BUILDING RULES: CHAPTER V – Rule 35.**

Since the area falls in Pallivasal Panchayath, the building rules as applicable to this Project shall be KPBR. The various relevant clauses of KPBR, which are applicable to the Project are as follows:

**CHAPTER V - OCCUPANCY - Rule 30. Occupancy of buildings.-**

(1) The occupancy of any building or part thereof shall be governed by the usage of plots proposed for development or redevelopment according to the provisions contained in the development plan or detailed town planning scheme prepared for the area.

(2) All buildings, whether existing or hereafter proposed, shall be classified in one of the following occupancies according to the use or character of occupancy, namely:-
Group Al Residential
Group A2 Special Residential
Group B Educational
Group C Medical/Hospital
Group D Assembly
Group E Office/Business
Group F Mercantile/Commercial
Group GI Industrial
Group G2 Small industrial
Group H Storage
Group I(1) and Group I(2) Hazardous

Notes:-

(i) Any building not specifically covered by any of the occupancies under sub rule (2) shall be in the group which most nearly resembles its exiting or proposed use.

(ii) Any building which accommodates more than one use under sub-rule (2) shall be included under the most restrictive group.,

(3) The description of occupancies are given below, namely:-

**Group C.** - Medical or Hospital Building shall including any building or part thereofexceeding150 Sq. metres of built up area used for purposes such as medical or other treatment or care of persons suffering from physical or mental illness, disease or infirmity, care of infants, convalescents or aged persons. Hospitals, sanitoria, clinic, homes for the aged and the infirm, convalescent homes, mental hospitals are included in this group.

**KPBR - RULE 31. Coverage and floor area ratio.-**

(1) The maximum percentage of coverage permissible for each occupancy shall limit the maximum area at any floor of a building. The floor area ratio value shall limit the maximum buildable total floor area. Floor area ratio ie, F.A.R. shall be calculated as shown below:

F.A.R= Total floor area on the floors / Plot area

(2) The percentage of coverage and the F.A.R. value of building under different occupancies shall not exceed the maximum specified in Table 2 below.



(9) in rule 31,—

(i) for TABLE 2 under sub-rule (2), the following table shall be substituted, namely:—

TABLE 2

**Coverage and Floor Area Ratio (F.A.R.)**

| | | | *Maximum permissible F. A. R.* | |
|---|---|---|---|---|
| *Sl. No.* | *Occupancy* | *Maximum permissible coverage (percentage of plot area)* | *Without Additional Fees* | *With Additional Fee at the rate of ₹ 5,000 per square meters of additional floor area* |
| (1) | (2) | (3) | (4) | (5) |
| 1 | Residential A1 | 65 | 3.0 | 4.0 |
| 2 | Special Residential A2 | 65 | 2.5 | 4.0 |
| 3 | Educational B | 35 | 2.5 | 3.0 |
| 4 | Medical/Hospital C | 60 | 2.5 | 3.5 |
| 5 | Assembly D | 40 | 1.5 | 2.5 |
| 6 | Office/Business E | 70 | 3 | 4.0 |
| 7 | Mercantile/Commercial F | 70 | 3 | 4.0 |
| 8 | Industrial G1 | 65 | 2.5 | .. |
| 9 | Small Industrial G2 | 75 | 3.5 | 4.0 |
| 10 | Storage H | 80 | 3 | 4.0 |
| 11 | Hazardous I(1) | 45 | 2 | .. |
| 12 | Hazardous I(2) | 40 | 1.5 | .. |

(10) in rule 53,—

(a) in sub-rule (1),—

(i) for the figure "75" the figure "100" shall be substituted;

**(33) Access**

(1) The minimum clear width of access to a building and plots as well as the width of the street giving access to the plot from the main street shall be as shown in Table 4.

**Table 4**
**Access**

| | | Residential | | Non Residential | |
|---|---|---|---|---|---|
| Sl. No. | Type of Building | Single Units | Multiple Units | Up to 300Sq. meter of carpet area in each floor | Above 300Sq. meter of carpet area in each floor |
| 1. | Single storey | No minimum | 1.20 metres | 1.20 metres | 3.60 metres |
| 2. | Two storey | 90 cms | 2.00 metres | 3.60 metres | 5.00 metres |
| 3. | Three storeys | 1.20 metres | 3.60metres | 5.00 metres | 5.00 metres |
| 4. | Above three storeys | 3.60 metres | 5.00 metres | 5.00 metres | 7.00 metres |

Provided that wherever off street parking is required for the building as per these rules, motorable access width shall be provided to the plot. Provided further that the access width of any building shall be modified to be in accordance with the provisions in any detailed development plan for the area.

(2) No person shall at any time construct or cause or permit to construct or reconstruct any building which in any way encroaches upon or diminishes the area set apart as access to that building.

(3) No person shall construct a building or undertake construction work on a building which reduces the access to any building previously existing, below the minimum width required under these rules.

(4) No building shall be constructed so as to deprive any other building of an existing access.

(5) The space set apart as access shall be separately distinguishable from any house gully or open space required to be provided under any other rule.

(6) Every access shall be drained and lighted to the satisfaction of the Secretary and manhole covers or other drainage, water or any other fittings laid in such access shall be flush with finished surface level so as not to obstruct safe travel over the same.

**34. Parking, loading and unloading spaces.-**

(1) Each of street parking space provided for parking motor cars shall be not less than 15Sq. mts. area (5.5 mts. x 2.7mts.) and for scooters and cycles the area of each parking space provided shall be not less than 3 sq. mts. and 1.5 sq. mt. respectively.

(2) For buildings of different occupancies, off-street- parking spaces for motor cars shall be provided within the plot as specified in Table 5.

**Table 5**
**off-street Parking Space**

| Sl. No | Occupancy | One parking space for every or fraction of |
|---|---|---|
| (1) | Group A1- Residential Apartment Houses/Flats | (a) 8 units (with each unit upto 100 sq. metres of carpet area)<br>(b) 4 units (with each unit above101 sq. metres and upto 150 sq. meter of carpet area)<br>(c) 2 units (with each unit above151 sq. metres and upto 200 sq. meter of carpet area)<br>(d) Single unit (exceeding 200 sq metres of carpet area) |
| (2) | Group A2- Special Residential, Lodging and Rooming Houses, Tourist homes and hostels, Dormitories without any attached eating facility such as restaurant, Canteen, Cafeteria, mess or dining | (i) Rooms with attached bath and w.c.<br>(a) 8 rooms (with each room upto 12 sq. metres carpet area)<br>(b) 5 rooms (with each room above 12 sq. metres and upto 20 sq. metres carpet area)<br>(c) 3 rooms (with each room above 20 sq. metres carpet area)<br>(ii) Rooms without attached bath and w.c.<br>(a) 18 rooms (with each room upto 5 sq. metres carpet area)<br>(b) 12 rooms (with each room above 5 sq. metres and upto12 sq. metres carpet area)<br>(c) 6 rooms (with each room above 12 sq. metres carpet area)<br>Note:- At the rate of one parking space for every 30 sq. metres carpet area of dining space/20 seats of dining accommodation shall be provided in addition to the above, in case of Special Residential Buildings attached with eating facility. |
| (3) | Group B-Educational<br>(i) High Schools, Higher Secondary Schools, Junior Technical Schools, Industrial Training Institute etc. | (i) 300 sq metres of carpet area. |
| | (ii) Higher educational institutes. | (ii) 200 sq metres of carpet area. |
| (4) | Group C- Medical/Hospital | 100 sq metres of carpet area. |
| (5) | Group D- Assembly | 25 seats of accommodation<br>Note:-<br>(i) In case of wedding halls and community halls, for calculating the carpet area or seating accommodation, for the purpose of off street parking, the carpet area of either the auditorium or the dining hall, which ever is higher, alone need be taken.<br>(ii) for the purpose of this rule 1.50 sq metres carpet area shall be considered as one seating accommodation. |
| (6) | Group E- Business/Office Building | 100 sq metres of carpet area |
| (7) | Group F- Mercantile/ Commercial building exceeding 75 sq. metre carpet area | 100 sq metres of carpet area |
| (8) | Group G1- Industrial Building exceeding 100 sq. metres of carpet area. | 200 sq metres of carpet area |
| (9) | Group G2- Small Industrial exceeding 100 sq. metres of carpet area. | 200 sq metres of carpet area |
| (10) | Group H-Storage | 200 sq metres of carpet area |

Provided that in Second Grade Municipalities and Third Grade Municipalities it shall suffice if 75 per cent and 50 per cent respectively of the above parking is provided in

village panchayats where the provisions of the Kerala Panchayath Building Rules, 1999stand extended, off street parking shall be provided as in third grade municipalities.-

(3) Wherever any parking space is required under these rules, 25% of that area shall be provided additionally for parking scooters or cycles.

(4) Every off-street parking space shall be provided with adequate vehicular access to a street; area of drives, aisles and such other provisions required and adequate area for maneuvering of vehicles shall be provided in addition to the parking space.

(5) In addition to the parking space as in Table 5, in the case of Group F Mercantile or Commercial, Group G-Industrial and Group H storage occupancies, loading and unloading spaces each 30 sq. mts. shall be provided within the plot, at the rate of one such space for each 1000 sq. mts. of floor area or fraction thereof, exceeding the first 700sq. mts. of floor area.

(6) Not exceeding fifty per cent of the area of mandatory open yard (space) shall be taken into account for calculating the required off street parking space if such open space has adequate vehicular access and area for maneuvering.

(7) The Government may, if adequate off street parking facility is available to their satisfaction near the site proposed for building, in any parking building or parking area provided by the Panchayath or quasi-Government agency or private agency, permit the Secretary by general or special order and subject to conditions specified there in to allow reduction in off street parking space in any or all buildings in that area to the extent not exceeding 50 per cent of the required number of off street parking space.

**48. Lift.-**

(1) Every building exceeding 3 storeys (excluding sunken floors) in the case of hospitals/medical occupancy and 4 storeys (excluding sunken floors) in the case of other occupancies having plinth area more than 2500 sq. metres shall be provided with one liftfor every 2500 sq. metres or part thereof exceeding first 2500 sq. metres, in addition to the required number of staircases as per rule 39.

(2) The planning, design and installation of lifts shall be in accordance with Part VIII, Building services, Section 5, Lift, Elevators and Escalators in National Building Code of India, 1983.

(3) Whenever more than one lift is required as per sub rule(1) or byelaws made under the Act, at least one lift shall be a higher capacity lift that can carry a stretcher

## CHAPTER VI

## PARTS OF BUILDING

**35. Mezzanine floor.-**

(1) The floor area of mezzanine floor shall not exceed one third area of the main floor or room accommodating the mezzanine floor.

(2) The headroom measured from the surface of the floor to any point on the underside ofthe mezzanine floor shall not be less than 2.2 mts.

**36. Height of room.-**

The height of room in a building other than residential occupancy shall be not less than3.00 metres: Provided that in the case of air conditioned rooms it shall be not less than2.4 metres.

**37. Water closet.-**

Every building shall be provided with at least one water closet.

**38. Size of bathroom and latrine.-**

(1) The area of bath-room shall not be less than 1.50 sq.m. with either side not less than 1.1m, carpet area of a latrine shall not be less than 1. 1 0 square metres with one side not less than 1.0 metre:
Provided that the area of combined bathroom and latrine shall be not less than 2.2 square metres with one side not less than 1. 1 metres:

(2) The height of bathroom or latrine shall be not less than 2.20 metres.

**39. Staircases.-**

(1) Any building having more than four floors including basement or sunken floors, shall have at least two staircases, one of which may be an external stairway:
Provided that when the second staircase provided as external stair way conforms to the provisions of fire escape staircase, a separate fire escape stair need not be provided.

Note:- An external stair is one which is connected to public areas and/or common areas on all floors and leads directly to ground, has at least two sides abutting external wall, these two sides being provided as open or with break open glass and has landing areas accessible from the external side or a external stair which is wholly open and removed from the main building, such an external stair shall be removed and away from the main stairway.

(2) The minimum width of stair shall be not less than 1.20 metres

(3) The minimum width of tread shall be 30 cms

(4) The height of riser shall not exceed 15 cms.

(5) The height of handrail shall be not less than 90 cms.

(6) The width of passages giving access to the staircase in any building shall not at any point, be less than the width of the stair.

**40. Ramps.-**

Ramps if provided as a substitute for stairways shall be laid with a slope not exceeding 1 in 10 and such ramp shall comply with all requirements of a stairway and shall be surfaced with approved non-slippery materials.

**41. Corridor, verandahs and passageways.-**

The clear width of any corridor, verandah or passageway in any building shall be not less than 1.0 metre at any point.

**42. Fire escape staircase.-**

(1) Fire escape stair case shall be provided for every buildings of,-
(a) residential occupancies exceeding three storeys above ground level;
(b) occupancies other than residential exceeding two storeys above ground level.

(2) The width of fire escape staircase shall be not less than 75 cm, the width of fire escape stair tread shall be not less than 15 cm, the height of the fire escape stair riser shall not exceed 19 cms, and the number of riser shall not exceed 16 per flight of stairs.

(3) The height of handrail of a fire escape staircase shall not be less than 100cms.

(4) Fire escape stair shall be constructed only in the exterior of the building and shall be connected directly to the ground.

(5) Fire escape stairs shall have a straight flight.

(6) Entrance to fire escape stair case shall be separated and removed from internal staircase.

**43. Travel distance to emergency staircase.-**

(1) Every building meant for human occupancy shall be provided with emergency exit sufficient to permit safe escape of occupants in case of fire or whenever other emergency occurs.

(2) Emergency exits shall be located in such a way that the travel distance on each floor shall not exceed 30 metres for every occupant.

**44. Fire Protection requirements.-**

All requirements in respect of fire protection shall be as in Part IV, Fire Protection in National Building Code of India, 1983 and amendment No. 3 under Fire Protection Annexure II.

**SETBACKS: Chapter VII – rule 54. – Group C.**

**54. Educational, Medical or Hospital and office or business occupancies**

(1) Approval of the District Town Planner shall be obtained for the usage of plot upto .5 hectares and the layout of buildings upto 500 sq. metre area under educational, medical / hospital and official business occupancies and approval of the Chief Town Planner shall be obtained for the usage of plot exceeding 0.5 hectare area and layout of buildings with more than 500 sq. metres of area;

(2) The usage of plots proposed for development or redevelopment of land or construction of any building shall be governed by the provisions contained in the detailed town planning scheme or development plan for the area:
Provided that where no such plan exists the usage of plot and or building shall be decided by the District Town Planner or Chief Town Planner, as the case may be.

(3) All buildings upto 10 metres height under educational, medical/ hospital or office/business or storage occupancy with more than 300 sq. metres built up area and shall have the minimum open (yards) spaces as shown below:-

(i) front yard-average 6 metres with minimum 4.5 metres
(ii) side yards-average 2 metres with minimum 1.5 meters (each side).
(iii) rear yard-average 3 metres with minimum 1.5 metres:
Provided that where more than one building is proposed to be constructed in the same plot it shall suffice if the open spaces under this sub rule are provided from the plot boundaries with open yards (space) between two buildings not less than 1.5 metres for buildings upto 10 metres height and three metres exceeding that height: Provided further that where the height of the building exceeds 10 metres, the open yard (space) from the boundaries shall be increased proportionately at the rate of 50 cms for every 3 metres increase in height.

(4) Every hospital shall be provided with incinerator for the disposal of hazardous and pathogenic wastes.

(4a) In the case of buildings exceeding three floors from ground level under educational, medical/ hospital or office/business occupancy, a certificate of approval from the Director of Fire Force or an officer authorised by him in the behalf shall be obtained and produced by the applicant before issuing permit.

(5) All other requirements in respect of fire protection shall conform to Part IV, Fire protection, National Building Code of India, 1983, Amendment No. 3 and shall also be subject to any further condition laid down by the Secretary. -

(6) Sanitation facilities to be provided shall be computed at the rate of not less than 1 person per 4.75 Sq. m of carpet area of the building and shall be provided in umbers not less than those stipulated in Table 9 and Table 9A, as the case may be .

## Table 9a

| TABLE-9A | | | | | | |
|---|---|---|---|---|---|---|
| Sanitation requirements for Medical/Hospital Occupancy | | | | | | |
| S. No. | Fitments | Hospitals with indoor patients ward | Hospitals with outdoor patients | | Administration Building | |
| | | For males and females | For males | For females | For male personnel | For female personnel |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| 1 | Water closet | One for every 8 beds or part thereof | One for every 100 persons or part thereof | Two for every 100 persons or part thereof | One for every 25 persons or part thereof | One for every 15 persons or part thereof |
| 2 | Ablution taps | One in each water closet plus one water tap with draining arrangement in the vicinity of water closets and urinals for every 50 beds or part thereof | One in each water closet. One water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closet and urinals | | One in each water closet. One water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closet and urinals | |
| 3 | Wash basins | Two upto 30 beds; acc one for every additional 30 beds or part thereof | One for every 100 persons or part thereof | | One for every 25 persons of part thereof 30 beds or part thereof | |
| 4 | Baths with shower | One bath with shower for every 8 beds or part thereof | | | One on each floor | |
| 5 | Bed pan washing sink | One for each ward | | | | |
| 6 | Cleaners sink | One for each ward minimum | One per floor minimum | | One per floor minimum | |
| 7 | Kitchen sink & dish washers (where kitchen is provided) | One for each ward | | | | |
| 8 | Urinals | | One for every 50 persons or part thereof | | Nil up to 6 persons 1for 7-20 persons 2 for 21-45 persons 3 for 46-70 persons 4 for 71-100 persons From 101 to 200 persons add at the rate of 3%. For over 200 persons add at the rate of 2.5%. | |

## CHAPTER XVI A

## RAINWATER HARVESTING

### 109A. Roof top Rain Water harvesting Arrangements :-

(1) Unless otherwise stipulated specifically in a Town Planning Scheme, workable rainwater harvesting arrangements shall be provided as an integral part of all new building constructions for the following occupancies namely:-

(i) Group Al residential (with floor area of100 sq.m or more and plot area of 200or more)
(ii) Group A2 Special Residential
(iii) Group B Educational
(iv) Group C Medical/Hospital
(v) Group D Assembly
(vi) Group E Office/Business
(vii) G1 and G2 Industrial (only for workshops, assembly plants laboratories, dry cleaning plants power plants Gas plants Refineries diaries food processing units and any other occupancies notified by the

Government from time to time (vii)Group GI hazardous (automobile wash stall, Automobile service Stations, Service Garages,with repairing facilities and any other occupancies notified by the Government from time to time.

Provide that the floor area to be considered shall be the total floor area in all floors.

Provided further that the rainwater harvesting arrangements is not mandatory for thatched roofed building.

(2) The components of workable rooftop rainwater harvesting arrangements as stipulated in Sub-rule (1) above shall include.

(i) Roof catchment area
(ii) Roof gutters
(iii) Down pipe and first flush pipe arrangement
(iv) Filter unit and
(v) Storage tank with provision for drawing water and spillover

(3) The minimum capacity of the storage tank as stipulated in Sub-rule (2) (v) of therooftop rainwater harvesting arrangements shall be at the rates given below

Group A1 25 liters/sqm of total floor area.
Group A2 25 liters/sqm of total floor area
Group B 50 liters/sqm of total floor area
Group C 50 liters/sqm of total floor area
Group D 50 liters/sqm of total floor area
Group E 50 liters/sqm of total floor area
Group G1 & G2 50 liters/sqm of total floor area
Group I(1) 25 liters/sqm of total floor area

(4) The Panchayath shall enforce workable artificial groundwater recharging arrangements as an integral part of all new building construction through collection of rooftop rain water

(5) The component of workable artificial groundwater recharging arrangements as stipulated in sub-rule (iv) above shall include

(i) Roof catchment area
(ii) Roof gutters
(iii) Down pipe
(iv) Filter units
(v) Recharge well/percolation pit

(6) Where ever rooftop rain water harvesting arrangements as stipulated in sub rules (I) to(iii) above are provided, additional arrangements for carrying the spill over water from storage tanks to recharge well or percolation pit need only be provided.

(7) The owner(s)/occupier(s) shall maintain the roof top rain water harvesting arrangements and artificial ground water recharge arrangements in healthy working conditions.

(8) The Panchayath may, in exceptional cases such as water logging or impermeable subsoil conditions to considerable depths exempt constructions from the mandatory ground water recharging arrangements

## 20. OPERATIONS AND MAINTENANCE PLAN

Although the Government spend huge funds for developing public infrastructure like hospitals and most of which are professionally planned and executed,our system fails in the proper upkeep and maintenance of the infrastructure resulting in early deterioration and decreased life span of the assets created, resulting in its under utilization. Therefore, a proper operation and maintenance plan is of vital importance for any project to see that the goals in establishing them are achieved.

**O&M of Various Systems involved:**

As far as the Development of Govt. CHC for Women and Children in Kollam is concerned, definite plans for its up keep are ensured in the following three methodologies.

1. **Annual Maintenance Contract (AMC):** by the Original Manufacturer:
   An AMC by the Original Manufacturer shall be insisted for 5 years after the customary warranty period of 1 year, thereby ensuring trouble free performance of the various systems.
2. **Mandatory Training Clause:** Training to essential staff shall be made mandatory for the various suppliers, so as to ensure that the equipment is handled as per the operation manuals.
3. **SOP:** A Standard Operating Procedure (SOP) shall be evolved for all the systems so that even persons who are not having in depth knowledge of the systems can ensure that the operation of the complicated systems are as envisaged as per its original design specifications.

## 21. Conclusion

Dearth of infrastructure is currently the main limitation of the Community Health Centre (CHC), Chithirapuram which otherwise is one of the very effectively functioning Government Hospitals. Hence the proposal put forth now under the behest of the Health & Family Welfare Department is a path breaking initiative aimed at alleviating the above, in its stride to provide free quality Health for all. Upmost care and futuristic planning have been made for the Proposed Hospital Block, not only to see that state-of-the-art infrastructure is created but also that definite systems are evolved for its up keep.

When ultimately the functioning of the Hospital ensues after completion of the Infrastructure within the tight time lines, we are sure that a Paradigm shift can definitely be brought out in the way Government Hospitals are assessed and utilized by the general public.