

## *Hospital planning*

*By*

*Mr. G. Srinivasan, Secretary, Aravind Eye Hospital, Madurai.*

The hospital planning can be divided into Two Categories:

- I. Feasibility study for the hospital to be located in a particular area
- II. Actual planning of the buildings, equipments etc.,

### **I. In the feasibility study, we have to analyze the following:**

- a. The need of the hospital in that location
- b. Site conditions
- c. Economy of the area where the hospital is going to be located
- d. The catchment of the area for the patients to utilize the services
- e. Availability of Manpower
- f. Financial Resources

a. **Need of the Hospital in a particular location:** It is better to appoint a consulting firm, who is specialized in hospital planning to survey the locality for the feasibility of the hospital. It is better to appoint an outside expert so that we will not have preconceived opinion about the project. In the survey, they should examine whether the local community will be able to use the hospital and whether they can afford for the services given by the hospital. If the community is wealthy, the hospital should have luxury otherwise the hospital should have moderate facilities. Also we should see whether the hospital staff would have facilities for their people such as schools, good transport and easy accessibility to that area etc.,

b. **Site conditions:** The selected site should be large enough for future expansion. It should be suitable for building construction and it should not be water located area and should be easily accessible from any direction. It should have bus routes and should be on the main road. The availability

of water supply should be considered and also the disposal of sewage should be taken care of. If the water table is very high then the disposal of sewage will be of a problem. Water also should be portable so that the equipment and pipeline will not be corroded due to salts. The soil condition of the site should be studied so that the foundation for the building can be designed economically. Some times, if the soil is clay then the foundation cost will be very high. In some places, we find that even if we put borewell upto 400 to 500 ft, there will not be any water, which will increase the recurring cost for supply of water. Also we should see whether the Corporation/Panchayat could supply enough quantity of water since consumability of water in the hospital per bed per day will be approximately 300 – 400ltr. So buying water from outside will be very expensive. Also we should see that electrical power supply (3 phase) of industrial supply would be available in that locality. Other facilities like telephone, roads, and central sewage should be considered before selecting the site.

- c. **Economy of the area where the hospital is going to be located:** we should study the earning capacity of the people in that area so that the hospital can be designed in a moderate way or luxuries way. Always we should see that services should be affordable by the local community. The facility should be available for all categories of people.
  
- d. **The catchments of the area for the patients to utilize the services:** In the preliminary survey, we should find out whether the people can use the services of the institution. We should see the availability of hospitals in that area so that we can assess the people who are going to utilize the facilities of the new hospital. Also we should see whether facilities are available such as quarters etc., for the patients who are coming from little far away.

- e. **Availability of Manpower:** We should ascertain whether enough paramedical staff and other personnel like sweepers, watchmen, office staff etc are available locally. Otherwise it will be very expensive to appoint people from outside. Also facilities like transport, education institution and other basic facilities should be available for the staff nearby the institution.
  
- f. **Financial resources:** Before starting up the project, we should study the financial resources available. Mostly the finances for the project to be done by either banks or other financial institutions such as HUDCO, LIC etc., we should plan in such a way that will be within our resources so that the project will not be stopped in the middle. In most of the organizations, the project will be started without proper planning of finances, which will delay the project or stop the project. We should budget in such a way that the pay back period within 7-10 years. Then only the project will be feasible. In hospitals, the medical equipments are very expensive and often – new developments will be coming up. Unless the hospital is moderately equipped, it is very difficult to complete with the neighboring organization. More time to be spent on planning the preliminary things. In our country, we spend less time in planning and more time in executive. By this there will be lot of changes in planning and also more of remodeling etc., which will cost more money.

### **III. Actual planning of the buildings, equipment etc.,**

After preliminary studies and survey etc., the planning of the building may be done. We should appoint an architectural firm who is well versed in hospital designing. We have to prepare a master layout, so that the positioning of the various buildings can be located in that site. Before preparing the master plan, an advisory committee should be formed to get various, information from various department heads. With this information

we can prepare the spaces needed for each department such as reception, waiting area, registration, examination rooms, treatment rooms, toilets, space for laboratories, X-ray, Scan etc.,

Hospitals can be divided into corporate hospitals, Government Hospitals and private clinics. Also it can be divided into general hospital, which will have all the departments and Specialty Hospital like Eye Hospital, Cancer Institute, E&T Hospital etc., when we design any hospital, we should get the information about facilities to be available for the particular department and also we should see the flow of patients so that the departments can be positioned accordingly. In the master plan, we should provide space for future expansion and the facilities should be provided in such a way. Common facilities like X-ray, lab, scan etc can be provided in a common area so that all the departments can be easily accessible.

Every specialty has got different types of planning. Some specialties may have bigger examination room and lot of diagnostic equipment should be in the examination room. Before planning we should study the equipments and furniture to be provided for the particular department so that we can plan the size of the room. Also we have to see what type of power plugs, computer connection, UPS needed for each department so that all the things can be planned for each type of room.

According to the economic condition of the patient and demand from the community, the inpatients room should be designed. In some places, we should have more luxury rooms whereas in other places we may need more common rooms. Facilities should be provided in the hospital for public such as toilets, wider veranda, cafeteria, medical stores, optical stores, gift stores etc., The nursing station should be in a central place, The inpatients area should be very quite. The reception area should have welcoming atmosphere for the people to come to the hospital.

When we plan for specialty clinics, the requirements should be discussed with people who are going to use the department and the layout of the various facilities should be done according to the flow of patients. When we plan the buildings, we should use the right materials so that the maintenance cost will not be increased.

### ***Planning & Co-ordination with other departments***

- Land purchase
- Legal Opinion
- Encumbrance certificate – 30 years
- Clearance for the Urban land
- Income Tax clearance – appropriate
- Registration
  - Change of use of land (Revenue)
  - Name Transfer (Patta)
  - Highways permission for approach
  - Electricity Board
- Appointment of Architect
- Plan Approval
- Appointment of contractors (Civil, Electrical, Air-conditioning, Sanitary, Lift etc.,)
- Appointment of Engineers
- Chief Electrical Inspector
- Pollution Control Approval
- Furniture supplies
- Equipment supplies
- Bankers (Financial Institutions)

## ***Planning and Co-ordination with other Departments***

**By**

**Mr. G. Srinivasan, Secretary, Aravind Eye Hospital, Madurai**

Before we start the construction of the hospital, we have to purchase the required land for the construction. We have to get legal opinion through a lawyer regarding the documents of the land. Then the land is to be registered through Sub Registrar's Office. We have to get clearance from the Urban Land Department for the Exemption of the land from the Urban land ceiling. We have to get Encumbrance certificate for atleast 30 years for the ownership of the land through Registrar's Office. We have to get Income Tax clearance if the land value is more than 5 lakhs and clearance from Appropriate Authority if the value of the land is more than 20 lakhs in cities.

After the land is registered, we have to apply to the Revenue Department to change the use of the land ie, from agricultural or industrial to hospital construction. After registration, the name of the owner should be changed through revenue department by getting a patta. If the land is on the highways, we have to get permission from the highways department for providing an approach from the road to the proposed hospital land. We have to apply to the electricity board for power supply permission for the construction.

If the size of the project is big and consumes HT power supply, which is more than 110KVA, we have to apply for HT power supply, for which, the electrical inspector should certify and then only the Electricity Board will give the power supply. For HT power supply, we have to provide our own transformer. For specialized works, such as air-conditioning, sewage treatment plant etc., we need to have special consultants, so that the work can be done economically.

If finance is to be arranged through banks or from any other financial institutions, we have to prepare the project report regarding the feasibility of the project. We have to study about various financial institutions to know the variations in the rate of interest and to minimize the interest rate for the loans.

## *Water Supply*

### **The sources for water supply are:**

1. Borewell at the site
2. City supply
3. Private

The need of water for the hospitals is very high. The requirements of water should be calculated considering the patient load, (inpatients and outpatients) and also the residential area. Normally the water consumption per bed will be around 300- 400ltrs per day and for residents is about 100-200ltrs per head per day. Hence we have to calculate the total requirements of water per head per day to find out the total quantity of water requirements.

The water to be used should be tested for finding out the quality of water and the salts and other chemical ingredients in the water. This water can be tested to get the percentage of impurities so that we can have equipments to treat the water to make it soft. Some times if the water has got salts, which will form scales in the pipelines and the pipelines will be blocked. We have to provide water-softening plants to reduce the salts so that the pipelines can be maintained. For operation theatres, sterilization rooms and laboratories, we have to use good water so that we can avoid the scaling of the instruments, autoclave etc.,

When the total quantity of water is calculated, we have to design the water tanks overhead tanks and underground reservoir etc., In one cubic meter we can store 100ltr of water. Normally we should have atleast 2-3 days stock of water should be stored. For providing water to various places, we have to use pipelines to different diameters according to the requirements of water in that area. We use galvanized iron (G.I) pipelines of different pressure capacities ie. A, B, C types of pipes, which represents the thickness of the pipes.

In some places, they use PVC pipes of Grade 4 KG pressure per sq.cm or 6 KG pressure per sq.cms. For underground supplies, we can use PVC pipes of higher diameter. In some of the buildings, the entire interior as well as exterior pipes, are used by PVC pipes. In some area, when there is difference of temperature for interior and exterior lines, there may be expansion due to heat. The joints in PVC lines may leak. When we use G.I pipes in the below ground level, we have to paint with corrosion resistant paints and some times we use tar coated gunny to avoid corrosion. Care should be taken to have proper joints to avoid leakages. The pipes also should be designed according to the discharge of water. In PVC pipes proper adhesive should used for joining the pipes. The water lines has to be designed depending upon the horizontal distances of the pipelines and the vertical heights. Necessary valves should be provided at different distances so that the maintenance can be done without dismantling all the pipes. Too many bends and joints should be avoided to reduce the friction.

When we get water supply through city lines, they will provide water meters. If the water contains sand particles and salt content, the meter does not work properly. Always it is better to put a filter media before the water meter to avoid the breakages of the meter. If there is a scarcity of water and if its expensive then it is better to provide some way of water treatment plant for recycling the water. The waster water can be treated either by chemical, mechanical or natural flow system. In some area, the treated water are used for flushing cisterns, gardens, road cleaning works and other areas where we don't touch the water. If possible the rain water can be collected and stored. In operation theatre and sterilization areas we need soft water for the safety of the equipments and surgical instruments.

In some area, if we have central airconditioning plants, the condensed water can be collected from the air handling units, which is equal to distilled water, which can be collected and used for the O.T. and sterilization rooms

## ***Sanitary Arrangements***

In sewage disposal, we have got two types of disposal system. One for the grey water, which comes from toilets, kitchen area and other one water from washbasin, bathrooms etc.,

Depending upon the volume of sewage, we have to design the pipes. Usually for toilets outlets, we use stoneware pipes. Nowadays PVC pipes also used for sewage disposal. The sewage can be disposed in 3 ways.

1. Leachpit – If it's a small quantity
2. Septic Tanks
3. Mechanical treatment plant or with the modern developments of central flow ie., baffled tanks with arohic and anirobic filters.

The capacity of the sewage disposal should be designed according to the quantity of the sewage. Necessary manholes, gully traps and nahini traps should be used for avoiding the bad smell in the atmosphere. The manholes are useful to remove the blocks in the pipelines. Proper filter should be provided so that the plastic or solid materials can be avoided. In hospitals we find there are lots of bio-medical waste, tissues, blood, cotton and other bio-medical waste. As per the government rules, we have to collect all these materials separately in different colour bins so that this can be disposed according to the rules. In big hospitals they have to provide their own incinerators to dispose the bio medical waste. Now as per the government rules to avoid pollution inside the city area, the government insists to have common incinerators outside the city livings.

Care should be taken in both water supply and sanitary installation at the construction time itself to avoid maintenance problems. The location of the pipelines for both water supply and sanity should be provided in such a way that the maintenance people have easy way to attend the repairs. Necessary air vents should be provided to avoid air blocks in the pipelines, which may sometimes blow of the pipelines.

## ***Role of Administrators in Maintenance and Security***

### **Engineering Maintenance:**

- Civil
- Mechanical
- Electrical
- Air – conditioning

### **Civil**

**Carpentry:** It is better to employ a carpenter permanently so that maintenance of furniture, fixing up of doors and windows, changing of small wooden partition and repairing steel furniture can be done at the site itself. If we don't do the repairs then and there then it will be expensive to replace the furniture.

**Masonry:** Masonry works such as filling of small cracks, stopping of leakages, plastering can be done if we have a mason with helpers.

**Painting:** Since the hospital needs a good appearance, we have to paint often. The painting can be divided into two. Internal and External painting. For external and internal walls, we use cement based paints than the oil based paints. In some places we use white wash (lime wash) for ceiling and some fiction in the walls to avoid painting frequently. Normally once in 5 years the painting should be done unless its required often.

Nowadays new kinds of paints are available in the market for a longer duration such as weathershield. We have to calculate the covering capacity of each type of paint and also the labor charges per sq.mtr for contracting the jobs. In big hospitals, there will be 3-4 painters will be working continuously so that the maintenance can be done then and there like painting furniture or walls, which require immediate painting. For doors and windows the enamel paintings should be used over the primary coat of painting. In enamel paints, there are varieties, which are cheaper and expensive paints have longstanding quality. For

ironwork, we can use anticorrosive paints as base and enamel paint as a final coat. For some good woodwork, people use natural colour polishing such as lacquer polish etc., For some small furniture French polish which is cheaper comparing the lacquer polish. The sewage pipes and water line pipes also maintained by painting with anti – corrosive paints to avoid corrosion etc.,

**Flooring:** The maintenance of the flooring depends upon the type of floor. If its mosaic or any natural stone flooring the polishing can be done with a machine to remove the dirt and also keep the surface smooth. Nowadays the granite flooring is done in some of the big hospitals. Unless these types of flooring are kept clean it will be very difficult to repolish the granite. In some flooring we can use some of chemicals to remove the strains and also we can provide some types of wax polish once in 3 months to keep the floors clean.

**Plumbing and sanitary:** In hospitals there will be problems in the waterlines and sewage lines often we find some solid materials such as cotton, bandage cloth will block the pipelines. Necessary valves and cleaning door should be provided in the pipelines so that the maintenance can be done easily. Some times they use chemicals also to clean the blocks or remove the scales in the pipelines. In high raise buildings, it is better to have projected slabs in each floor so that the maintenance can be done easily without scaffolding etc.,

### **Mechanical**

- Lift
- Vehicles
- Theatre Equipment
- Fire protection

## **Electrical**

- Panel Board
- Transformers
- Generators
- Lights, Fans
- Air- conditioning
- Autoclaves

## **Security**

- Type of securities
- Position of Rooms
- Punching clock
- Close Circuit TV
- Foolproof Controls
- Supervision