CHAPTER 4 BASIC DESIGN

BASIC DESIGN

4-1 Basic Design Policies

In conducting basic design work, the following should serve as the basic objectives in conjunction with the contents of the project examined in Chapter 3.

(1) To work out the layout plan that will most efficiently and functionally link the projected facilities and the existing ones, giving due consideration to the arrangement of departments within the existing facilities.

The departments should be arranged so that the flow paths of patients, staff and equipment/materials, and the functional links between departments within the existing and projected facilities may be efficient enough.
In light of the fact that a hospital is a facility which continues to expand, this project should be part of hospital's total facilities system in the future.

(2) To implement this project so as not to disturb current operations at the existing facilities.
This project should be implemented in a manner that will not disturb ongoing operations at existing facilities. Inconveniences caused by shifting departments under this project should be minimized.

(3) To reduce the costs for maintenance and operation of the facilities and equipment.

Highly durable building materials should be selected, and frequency of repair of the facilities should be minimized so that the overall facilities/equipment maintenance and operation costs may be reduced.

When selecting high-grade equipment, the maintenance personnel's capabilities, the local distributors' repair capabilities and the local supply system of expendable supplies and repair parts should be taken into consideration.

(4) To make the projected facilities conform to the basic policies of technical cooperation.

Since 1980, the government of Japan has been providing technical cooperation. In addition, the projected facilities also will be utilized by Japanese experts after completion of this project. For these reasons, the scale, arrangement and grade of the facilities and equipment should be determined accounting for smooth implementation of the above-mentioned technical cooperation.

(5) To work out and implement this project giving due consideration to the local conditions related to administration of the projected facilities.

At wards, for example, a single patient requires a number of attendants. In the case of patients from outside Kathmandu, their attendants are allowed to stay in the hospital. Since their presence help reduce the nurses' and the health assistants' workloads, it is impossible to totally exclude them. This project should be implemented taking this and the scale of similar medical conditions in Nepal into consideration.

4-2 Examination of the Basic Design Conditions

In working out the basic design, the following design conditions should be examined.

(1) Natural Conditions

The projected facilities should be designed in a way that conforms to local natural conditions to make for a lasting living environment. For this reason, the basic design should consider the following natural conditions.

1) Climate

In and around Kathmandu there are two seasons; The rainy season (June through September) and the dry season (October through May). In the city, the total rainfall during the rainy season accounts for about 80 percent of the annual total. At this time it usually rains for two to three hours a day.

It is therefore, necessary to design buildings which are resistant to water and easy to drain assuming that they may be often exposed to heavy rain. During the dry season, on the other hand, the rainfall is slight, the temperature ranges from 15 to 20°C, the humidity from 20 to 40 percent in the daytime, which makes for comfortable living conditions. As the city is located inland, the temperature varies widely within a day. From December to February, in particular, it gets very cold at night, with the average nighttime temperature being 2.2°C. Therefore, design measures against low nighttime temperatures should be taken.

During the rainy season, the wind blows from the southwest; during the dry season it blows from the northeast. The wind force is small but during the rainy season it becomes great only for several minutes before it begins to rain. So there is no need to work out measures against strong winds.

2) Topographical Features

The entire IOM site slopes gently down towards the south. the site for the basic medical science building is located on the southwestern side of the site at its lowest level. This means that puddles form at this site during the rainy season.

On the other hand, the level of the wards site, located on the northern side of TUTH, is 2.5 to 3 meters higher than the TUTH site as a result of piling up surplus soil resulting from the construction of TUTH. It is necessary, therefore, to make good use of the high level of the site to design structures resistant to rain and easy to drain, and to decide the height of the ground floor.

3) Geological Features

According to the geotechnical survey data which had been carried out at the time of basic design survey stage of TUTH and Nursing Campus, the layer up to 1.5 meter below the ground surface is a clayey silt. Then a layer of mid-sand with trace of mica for about 1 meter thick, followed by well consolidated fine-sand. The layer of mid-sand 1.5 meter below the ground surface shall be considered as the supporting layer for the foundation.

4) Earthquakes

The Kingdom of Nepal is in the Eurasian seismic zone and therefore has suffered many earthquakes. In 1934 there was the Himalaya Earthquake and in August 1987 there was a great earthquake registering 6.7 on the Richter scale at a point 160km southeast of Kathmandu. For this reason, it is necessary to account for possible effects of earthquakes in working out the structural plan.

(2) Local Construction Situation

1) Building Materials

In Nepal, most buildings have reinforced concrete pillars, beams, floors and brick walls. This widely used method of construction will be adopted for this project in light of the technical level of the local construction industry, the quality of labor force in the industry and the desireability of reducing construction costs. Main building materials, such as reinforcing bars, should be imported from Japan because the locally available ones are not of sufficient quality. The construction machines will also be brought from Japan in order to shorten the period of construction and improve construction precision.

2) Laws and Regulations

In Nepal, there are no mandatory building standards. In actuality, therefore, buildings are designed on the basis of architects' experiences and knowledge, or in accordance with Indian building standards. In this project, architectural design data(including that on seismological force, wind pressure and the like) which was used in past Japanese grant aid projects, will be used. When calculation criteria are needed, the Japanese or Indian building standards will be applied correspondingly.

4-3 Basic Design of Facilities and Equipment

4-3-1 Layout Plan

(1) Basic Medical Science Building

It is desirable that the basic medical science building be located close to TUTH to make it easy for medical officers and other medical professionals to move about and to minimize problems of students and patients movements. In this project, a lot located on the southwestern side of the hospital will be the site for the basic medical science building. Initially, this lot and another lot on the southern side of the Dean's office building were chosen. But the latter lot was rejected partly because it is located far from the hospital and partly because the lot is not large enough for all projected facilities.

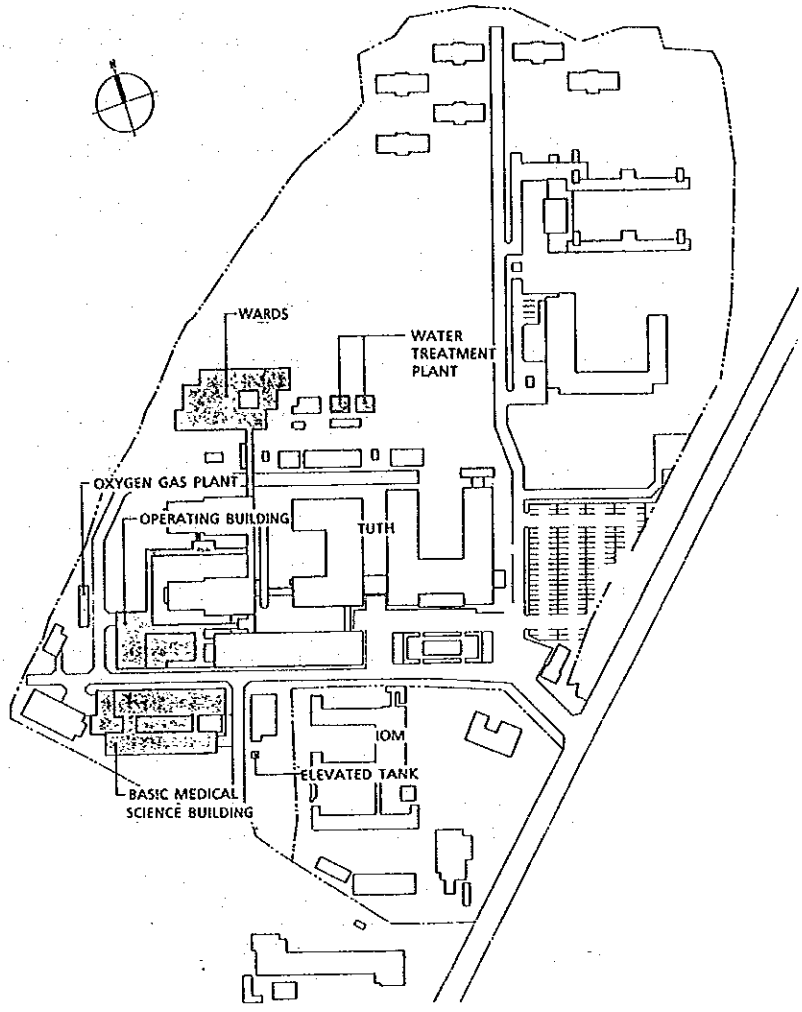
(2) Wards

The lot chosen for extension of wards in the TUTH construction project (Phase 1 and Phase 2) is best suited as the site for the wards to be constructed under this project. As this site is a boundary between two different ground levels (difference of 2.5 to 3 meters), its higher portion on the northern side will be used as the construction site.

(3) Operating Building

As the projected extension of the operating building is aimed at expanding the functions of the operation division, the site for the extension must be located close to the existing operating building. Therefore, the site on the western side of the existing operating building will be used as the site for a new extension. The existing external toilet will be dismantled and removed.

Fig. 4-1 Layout Plan



4-3-2 Architectural Plan

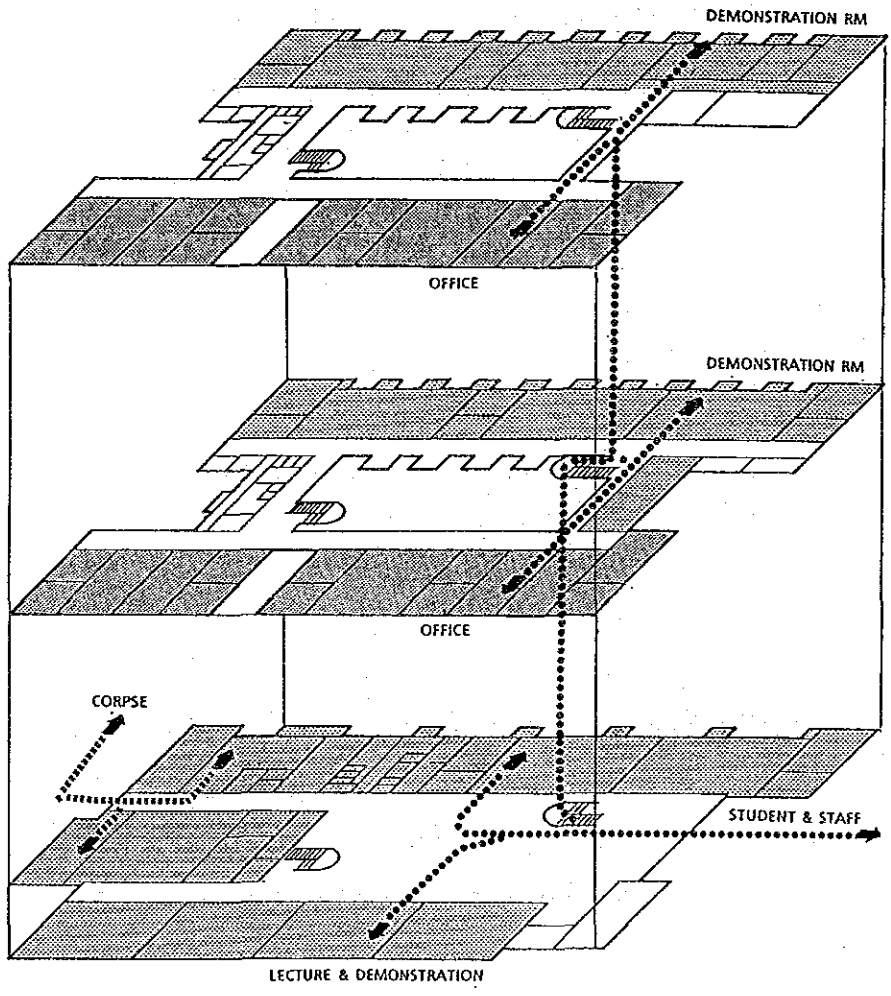
(1) Plan

In the plan, the rationale for the arrangement and function of each department, and for the calculation of the scale of each facility will be explained for each projected building. To determine the necessary number and scale of demonstration rooms, it is necessary to determine the type of activity to be conducted in the rooms and the planned arrangement of individual pieces of equipment in them. As for the design of the staff rooms, the scale of each individual room will be determined on the basis of the personnel placement plan (which is based on the overall personnel plan) referring to applicable Japanese standards and local actual examples.

1) Basic Medical Science Building

The basic medical science building will consist of lecture rooms, demonstration rooms and staff rooms. The plan for this building will include a corridor connected to one side of each facility. This arrangement optimizes ventilation. The lecture rooms and the staff rooms will be located on the southern side to enhance the living environment with better ventilation. The demonstration rooms will be located on the northern side to avoid direct sunlight, which can cause chemical and physical changes in test samples. Of the demonstration rooms, the dissecting room (anatomy and forensic medicine demonstration room) will be located on the ground floor to facilitate the transportation of corpses.

Fig. 4-2 Concept of Basic Medical Science Building Plan



a. Lecture Rooms

Lectures on basic medicine and clinical medicine will be given in the lecture rooms. Each lecture room should have a seating capacity of 60. During the four-year period (Phase 1, Phase 2, Phase 3) four lecture rooms are to be constructed. As lectures on community medicine will be accompanied by group discussions, two lecture rooms will be designed so that they can be divided into two smaller rooms, each with a seating capacity of 30. Also, one lecture room will be equipped with a set of video machines, and a slide screen, so films made at TUTH and other medical facilities may be used in the room.

b. Demonstration Rooms

As the equipment and the content of training differs from one subject to another in practical training in anatomy, physiology, pharmacology, pathology, biochemistry, microbiology, forensic medicine and community medicine, a demonstration room for exclusive use in practical training in a specific subject will be constructed in this project. One of the advantages of this arrangement is that personnel in charge of practical training in a specific subject can manage their demonstration room on their own. However, expensive equipment, equipment which requires careful handling and precision equipment will be installed in the laboratory for common use.

Practical training in anatomy will be carried out in groups of ten students, with each group using one corpse per year. As the corpse being dissected is not returned to the corpse preserving pool after each dissecting session, the anatomy demonstration room should be large enough for six dissecting tables. Furthermore, a room to make corpses ready for dissection and an anatomical specimen room should be attached to the dissecting room.

The demonstration rooms for use in practical training in physiology, pharmacology, pathology, biochemistry, microbiology and community medicine will all have a seating capacity of 30 and will be equipped with all necessary machines and tools.
A museum for pathology will be attached to the pathological demonstration room.

In lectures on forensic medicine, the students acquire a practical knowledge of the subject through demonstrations conducted by the lecturer. For this reason, the forensic medicine demonstration room should have a dissecting table and observation space for students. In the forensic medicine demonstration room, lectures will often be given with the use of models, a museum should be attached to this room.

c. Laboratory for Common Use

Equipment which requires operational expertise or constant room temperature are expensive and therefore will be shared with various training classes. These pieces of equipment will be installed in a laboratory for common use equipped with an air conditioning system.
Equipment for advanced research, such as the electron microscope, and the microtome for preparation of specimens, are not included in this project. However, since they are necessary for basic research, a laboratory where they can be installed in the future will be constructed.

d. Staff Rooms (for professors, readers, lecturers and administrative clerks)

The scale of each staff room will be decided on the basis of the scale of the staff, and the existing facility or facilities concerned.

Fig. 4-3 Scale of Area for Staff Room

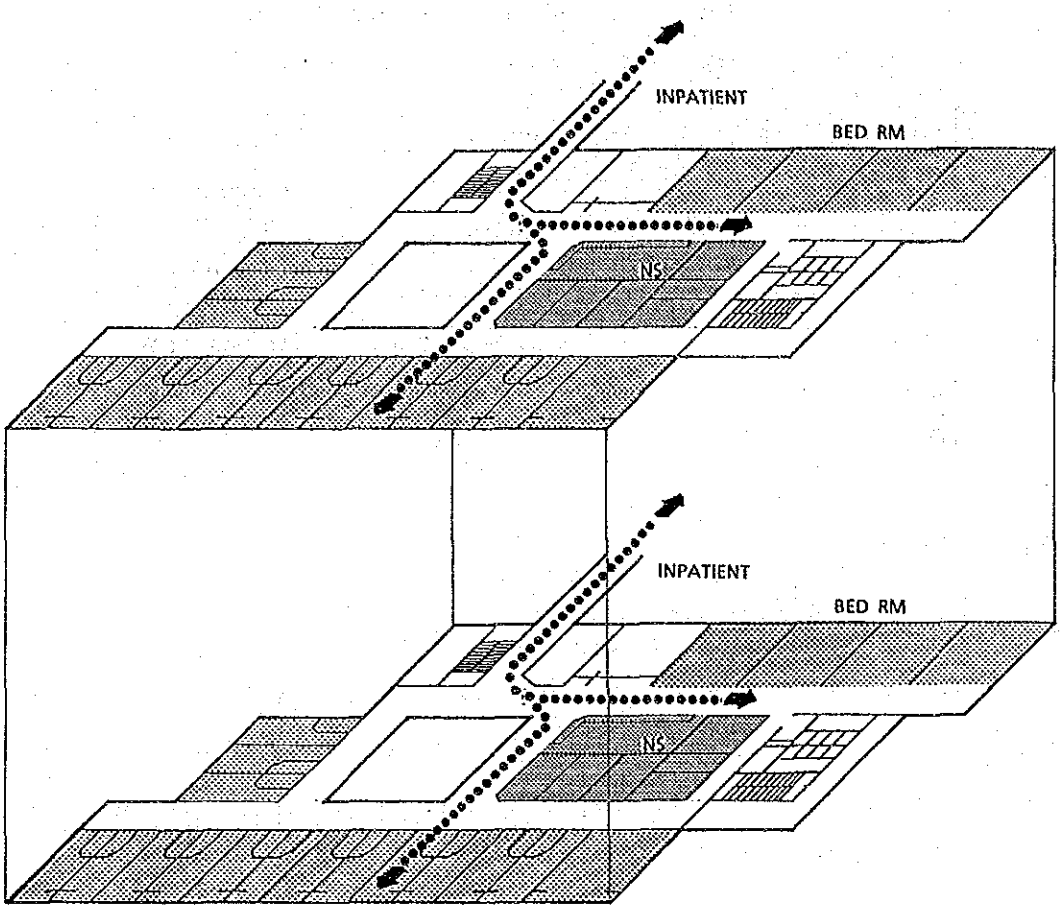
	area	remarks
Professor	20m²/person	1 person/room
Reader	10m²/person	2 persons/room
Lecturer	8m²/person	common
Asst. lecturer	5m²/person	
Manager	20m²/person	1 person/room
Chief officer	10m²/person	common
Officer	5m²/person	

2) Wards (100 beds)

The wards will consist of bed rooms and nurse stations. Of the existing 300 hospital beds, 125 (42 percent) are installed in one-bed and two-bed rooms and 175 (58 percent) in six-bed rooms. In this project, too, 40 of the 100 hospital beds will be installed in one-bed and two-bed rooms and 60 in six-bed rooms.

The Nepalese side is planning to increase the ration of free beds, which is presently about 15 percent, to 40 percent in the future. On the other hand, charges for paying beds are 225Rs/day for one-bed rooms, 90Rs/day for two-bed rooms and 8Rs/day for six-bed rooms. At present, these paying beds are installed together with free beds in the same bed rooms, causing many patients using paying beds to complain. In this project, in which another 100 beds are to be installed, one-bed and two-bed rooms will have paying beds only, and six-bed rooms will be located on the southern side. The facilities for the nursing care department, including nurses stations, will be set up between the bed rooms on the southern side and those on the northern side, and near the ward entrances to facilitate surveillance of the bed rooms and the comings and goings of the attendants.

Fig. 4-3 Concept of Ward Plan



a. Bed rooms

1-bed and 2-bed rooms will be equipped with toilets and showers. Also, in these bed rooms spaces necessary for medical officers' and nurses' rounds will be secured around each sickbed. Spaces for the attendants will also be secured. In 6-bed rooms, the partitions should be as high as the sickbeds so that nursing care and observation may be conducted with ease.

b. Nurse Stations

The scale of each nurse station will be such that it will be possible for groups of 13 nurses to work in shifts. Around each nurse station will be a treatment room, a nurses' room, on call doctor's room and an equipment store room.

c. Toilets, Showers and Wash rooms

Toilets, showers and wash rooms for common use should be structured so as to prevent odors and stains from entering the wards. These facilities should be accessible from outside of the buildings.

3) Operating Building

The operating building should be located adjacent to the existing operating building to ensure effective linkage between the two facilities. At the same time, the amount of remodeled space in the existing operating building should be minimized so that operating service will not be suspended while extension and remodeling are being carried out.

- Patients' path of flow

There should be only one doorway for patients at the existing operating building.

- Doctors' and nurses' path of flow

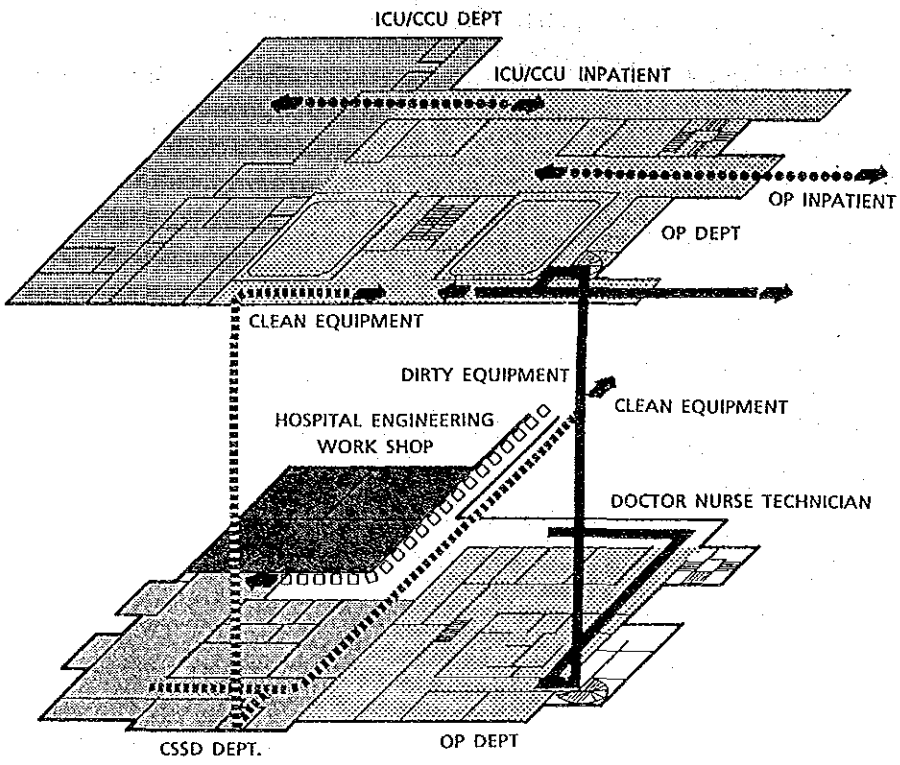
At present both doctors and nurses are utilizing the doorway for patients. In this project, however, the doorway will be set up on the ground floor of the extended portion of the facility to distinguish this path of flow from patients' path of flow. Doctors and nurses are to change their clothes on the ground floor of the extended portion of the facility and then go upstairs to the first floor where the operating rooms are located. The extended portion will be connected to the existing facility with a passageway.

- Sterilizing equipment's path of flow

The central sterilizing supply room, which is to supply sterilizing materials to both the operation division and the outpatients' ward department, will be located on the ground floor of the extension. This positioning of the central sterilizing supply room is considered functionally optimal.

Sterilizing materials will be supplied to the operation division via elevator. Their supply to the existing operating building will be via the passageway. Used materials will be discharged via the central doorway and then transported to the central sterilizing supply room on the ground floor via the existing elevator or ramp.

Fig. 4-4 Concept of Operating Building Plan



a. Operating Rooms

Two operating rooms (50 to 56m^2) capable for handling large-scale operations on serious cases as well as for circulatory diseases and malignant tumors will be established. An operation observation room will be built between the operating rooms. The operation observation room will have an observation window through which the students are to an observe operations. As it will be necessary to perform technically more difficult operations in

these operating rooms in the future, the air conditioning system should be so designed as to keep the degree of cleanliness of these operating rooms at class 10,000.

Angiocardiographic equipment is indispensable in performing heart operations. As it is expensive, hard to maintain and difficult to manage, it is not included in this project. There will be a room constructed where equipment can be installed in the future. The room will be so designed as to make it possible to perform operations in it. Until the angiocardiographic equipment is installed, the room will be used as an auxiliary operation room of the operation division.

b. Preoperative Treatment Room

A preoperative treatment room to be used for making preoperative preparations, including anesthetization, will be constructed. The minimum number of beds to be installed in such a room is two for each operating room. Therefore four beds will be installed in this room. In the case of the existing operating rooms, the room currently used as recovery room will be changed into a preoperative treatment room.

c. Recovery Room

At least two sickbeds are required for each operating room. In this project, a total of 10 sickbeds -- for the three existing general clean operating rooms and the two new operating rooms -- will be installed near the doorway. As it is necessary to expand the ICU and CCU in the future, some of the existing ICU and CCU will be moved to the projected facility. An oxygen gas aspirator will be installed by the side of each sickbed.

d. ICU and CCU

As the ICU and CCU should be located adjacent to the facilities of the operation division, the CCU should be located at a place where it is easy to receive emergency patients. A certain number of ICU and CCU will be utilized by two nursing care unit, and all sickbeds will be arranged in a manner that facilitate observation from each nurse station.

e. Doctors', Nurses' and Technicians' Locker Rooms

These locker rooms will be set up on the ground floor of the operating building and utilized by the entire staff of the operation division. The scale of the men's locker room (for doctors and students), the women's locker room (for doctors, nurses and students) and the technicians' locker room (for male technicians only) will be decided according to the number of prospective users, and an appropriate number of lockers, chairs and the like will be installed in each locker room. All of these locker rooms will be equipped with showers. A resting area will also be attached to each locker room. This room will be used for preoperative briefings, resting after long operations, and taking meals after changing clothes.

f. Central Sterilizing Supply Room

This facility is to supply sterilizing equipment to all other facilities of TUTH, and its scale will be determined on the basis of the necessary number of autoclaves, which is three. However, the future addition of 100 beds should also be taken into account. Sterilizing equipment will be supplied to the ward and outpatient division via passage connected to the passage on the ground floor of the existing building.

g. Existing Central Sterilizing Room

There are two central sterilizing supply rooms -- the central sterilizing supply room for the outpatient and ward division and the central sterilizing supply room for operations -- in the existing facilities of TUTH. In the case of the central sterilizing supply room for the outpatient and ward division, materials are supplied via passageways attached to the director's room and the administration officers' room. As this is inappropriate in terms of path of flow, these sterilizing supply rooms will be moved to the projected facilities. The vacant spaces will serve as storage for the operation division. As a result of moving the two existing central sterilizing supply rooms, a new store room will be built, which will also serve as a space for emergency operations.

4) Oxygen Gas Plant and Water Treatment Plant

a. Oxygen Gas Plant

An oxygen gas plant with a capacity of $5m^3$/hour will be set up. The plant's capacity is calculated assuming that the daily consumption of oxygen gas is 35 to $36m^3$ and that the prospective plant is to operate for eight hours a day. Furthermore, in consideration of regular maintenance and the possibility of machine trouble, storage space for a half month's supply of oxygen gas and 100 oxygen gas cylinders should be included in the project. For this purpose, a building for the oxygen gas plant and a cylinder storage will be constructed.

b. Water Treatment Plant

The projected water treatment plant's capacity will be set at $110m^3$/day on the basis of the present water consumption at a part of the existing facilities.

Water will be treated first by removing iron by contact filtering and then by oxidizing the residual iron by chlorine treatment and finally by removing manganese by contact filtering. At the same time, colors, impurities and floatage will be removed by condensation filtering. For this purpose, a water treatment plant and a treated water tank will be installed.

The ammonia largely detected in water quality analysis is commonly found in Kathmandu valley ground water. A large-scale facility and high maintenance and operation costs are required to remove the ammonia. As these requirements go beyond a hospital's financial resources, removal of the ammonia is not included in this project. When it becomes necessary to supply water without the ammonia to the laboratories and other facilities, such water can be supplied by the use of a distilled water production device.

5) Hospital Engineering Workshop

The existing workshop which the Nepalese constructed can be changed into a hospital engineering workshop for large machines, and a new hospital engineering workshop will be utilized for maintenance of medical equipment, and storage of backup equipment and specifications for buildings and equipment. When the facilities of the outpatient department are extended in the future, the existing workshop will become a functional hindrance. So it will be necessary to move this workshop to the side of the projected workshop.

It will also be necessary to set up a room for monitoring all operations within the hospital. In this room, warning information will be intensively managed.

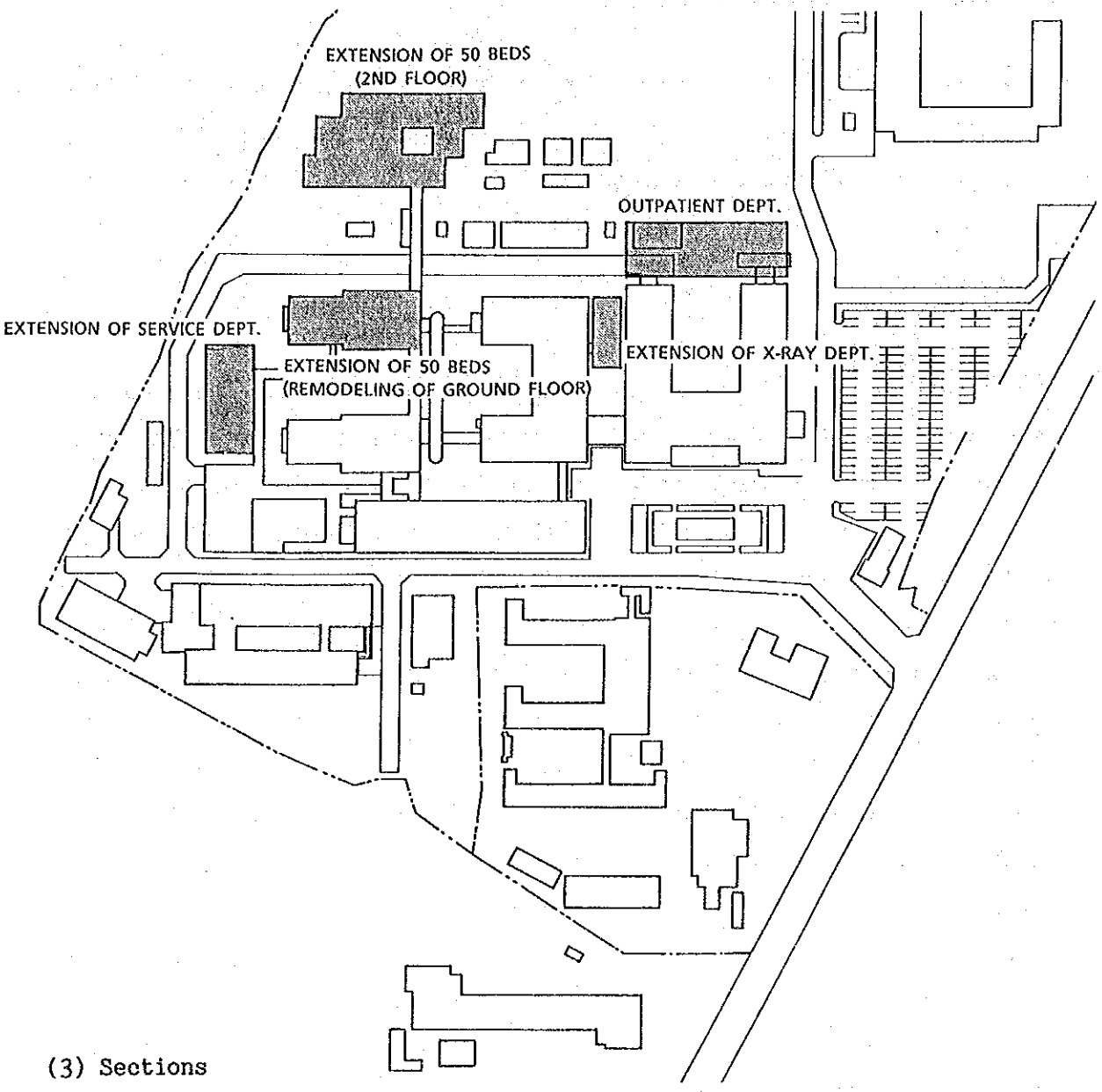
6) Clinical Laboratory Department

As the virological laboratory room located on the ground floor of TUTH will be moved to the first floor, a class room adjacent to the laboratory on the first floor will be remodeled into a laboratory. The bacteriological laboratory will also be expanded.

(2) Future Plan

The architectural design of the facilities of TUTH was done on the assumption that the hospital will eventually have a total of 500 beds. Although in the initial stage of the architectural facilities were designed on the assumption that another 200 beds were the only future addition, it became necessary to review the scale of each facility as a result of the greater-than expected increase in the number of patients. At the hospital, the functions of its departments are complicatedly interconnected with each other. An increase in the number of outpatients exerts chain-reacting effects on all departments. Therefore, in this project, the extension of the ward building (addition of 100 beds) and the existing facility of the operation department, which is given priority in terms of urgency, is included. In the future, however, it will be necessary to extend the facilities of the outpatient, X-ray, service and ward (addition of 100 beds) departments. In this project, the site plan and plans were prepared taking these factors into consideration. Here the layout of the facilities which need to be extended in the future is shown so that it may serve as an important item in working out the future plan.

Fig.4-5 Future Plan



(3) Sections

The basic medical science buildings, wards and the operating building to be extended under this project have different location requirements. Therefore, the cross sections of the extended portions should be drawn up in a manner that meets these respective conditions.

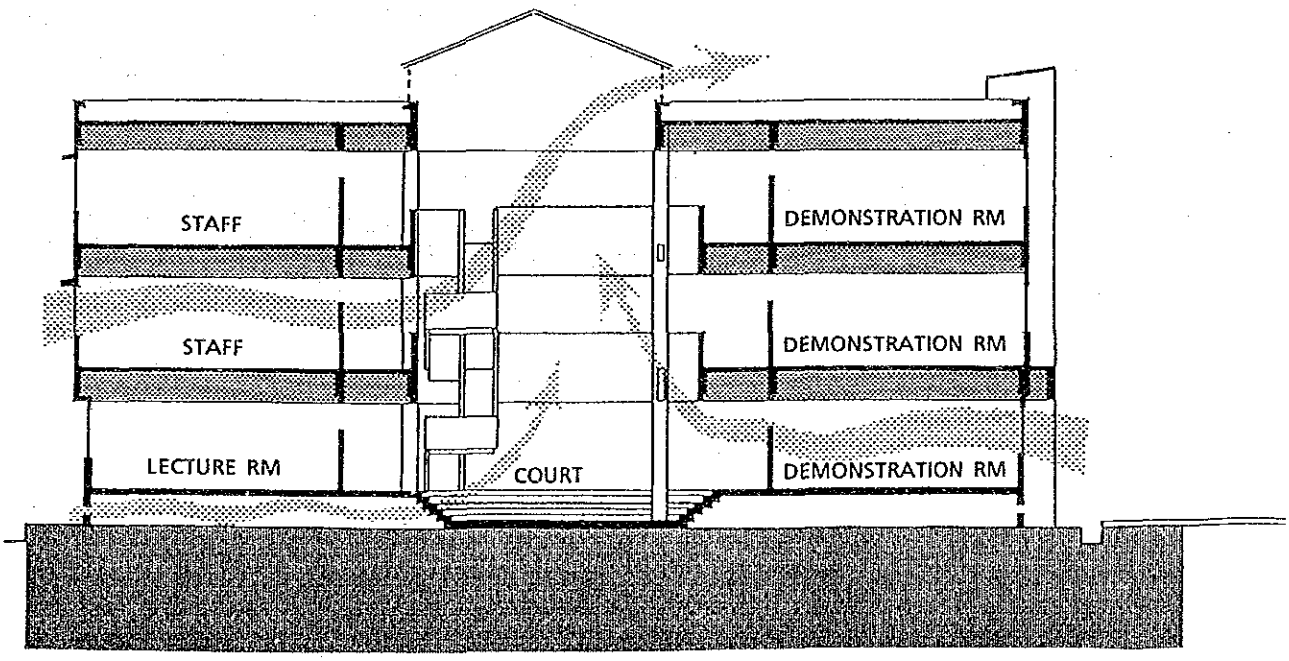
1) Basic Medical Science Building

As stated in "4-2-(1)-2) Topographical Conditions," the project site is located in a low land where puddles are likely to form. Therefore,

the level of the ground floor should be GL plus 1.2 meters in order to protect against rain water. The floor height will be 4.0 meters for the ground, first and second floors. Eaves should be attached above the openings of the walls on the southern side to avoid direct sunlight. But the walls on the northern side will have no eaves since direct sunlight does not reach them.

Exhaust and waste water from the demonstration rooms located on the northern side will be directed northward at each story and then released out along the wall surfaces. Each room will have a false ceiling for sound absorption.

Fig. 4-6 Cross Section of Basic Medical Science Building



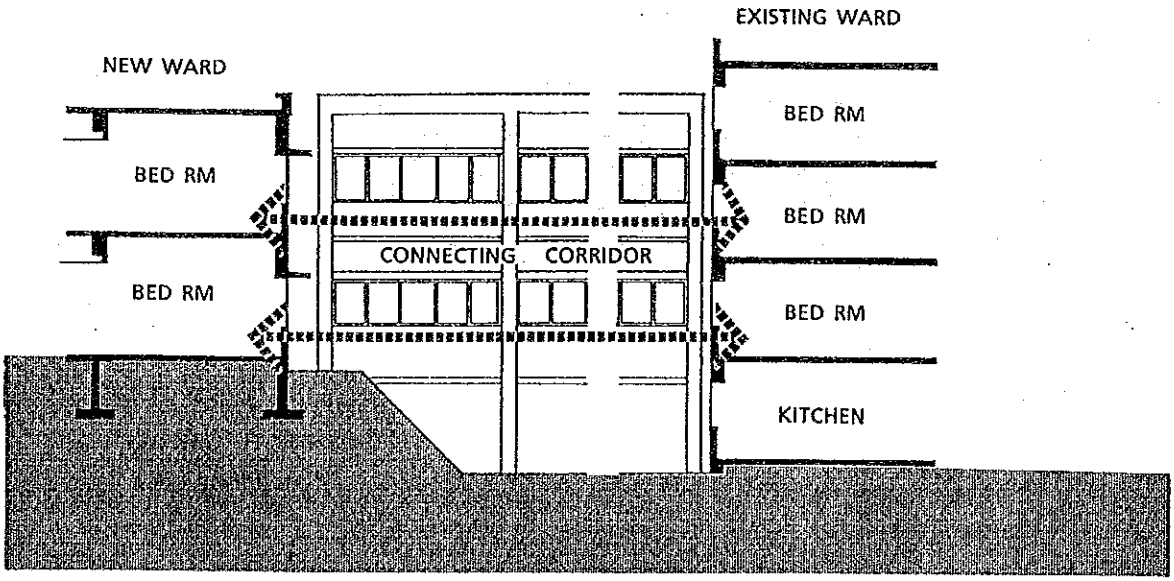
2) Wards

Since the site for the wards is higher by 2.5 to 3 meters than that of the existing hospital facility, the ground floor of the new ward building will be connected to the first floor of the existing facility and the first floor of the new facility will be connected to the

second floor of the existing facility. As there will be no elevators in the new ward building, the elevator and ramps in the existing facility will be used for transportation of service carts, etc. The level of the ground floor will be 0.5 meter above the ground and the height for the ground and first floors will be 3.6 meters. As in the case of the basic medical science building, eaves will be attached above the openings of the walls on the southern side.

Since An additional 100 sickbeds will be installed in the future, the building's roof will consist of horizontally placed slabs, and corrugated iron sheets. The space below the roof should be well ventilated. When the projected facility is extended in the future, the extension should be of steel-frame construction. So anchors for steel pillars should be laid beforehand. The steel-frame construction is chosen for extension of the projected facility because this structure is faster to build and because the steel-frame construction work will minimize disturbance to patients.

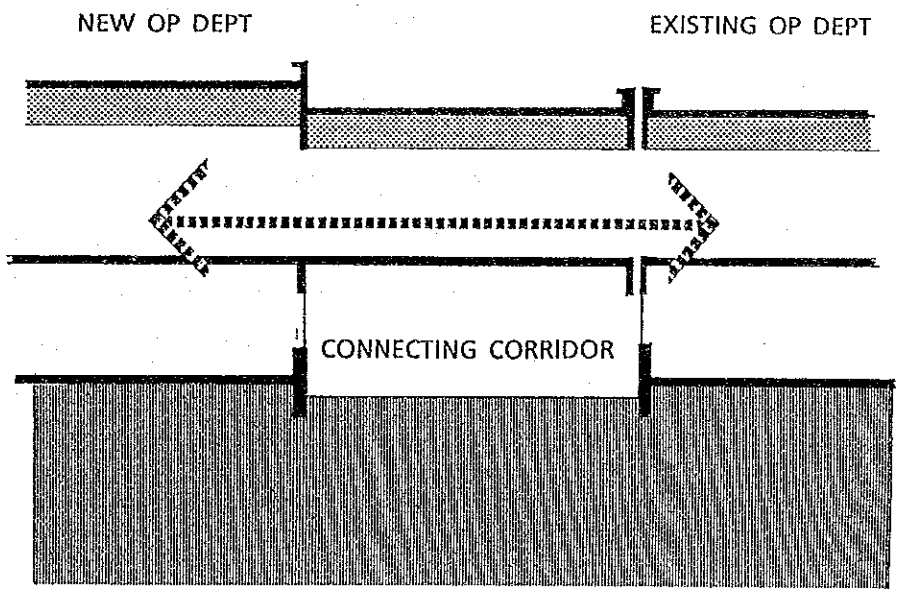
Fig. 4-7 Cross Section of Ward Building



3) Operating Building

As the new operating building will be connected with the existing operating building, the ground and first floors of the new facility must be of the same height as the corresponding floors of the existing facility. Thus, the level of the ground floor should be GL plus 0.5 meters and the height of the ground floor will be 3.4 meters. The height of the first floor will be 4.8 meters in consideration of the air conditioning system for the operating rooms and the operation observation room.

Fig. 4-8 Cross Section of Operating Building



(4) Structural Plan

1) Outline of the Buildings

This is a project to extend and remodel the existing facilities of IOM and TUTH. In this project, the basic medical science building, the

ward building and the operating building will be extended, and the existing facilities of the clinical laboratory will be remodeled. As for the scale of the extension and remodeling, the basic medical science building will be three-stories (basic span: 4.5m × 10.2m (8.1m); story height: 4.0 meters for the ground, first and, second floors). The ward building will be two-storied with a penthouse (basic span: 6.3 × 6.0m (7.5m); story height: 3.6 meters for the ground and first floors). This building is planned to be extended by one story with the same story height in the future. The operating building will be two-storied with a penthouse (basic span: 7.5m × 5.5m; story height: 3.4 meters for the ground floor, 4.8 meters for the first floor where operating rooms will be located).

2) Forms of Structure

a. Foundation

According to the geotechnical survey data on the project site, there is a layer of mid-sand with trace of mica, 1.0 meter thickness and N value of 12 to 15, 1.5 to 2.5 meters below the existing ground surface. Below this layer, a clay-laden silt layer rests on a well-consolidated sand layer. As the projected buildings are two- or three-storied reinforced concrete buildings, a direct foundation method will be employed. The supporting layer will be the sand layer about 1.5 meters below the existing ground surface.

b. Superstructure

The projected buildings will be of reinforced concrete with rigid frame structure considering the local construction conditions seismological and economic factors. Walls will be of brick in consideration with the local construction conditions and economic factors involved. Since there should be ample space between the floor slab and the ground to protect against moisture, the

suspended slab will be employed. The future extension to the ward building will be of steel frame construction to minimize noise and vibration during the construction work.

3) Materials

Concrete	: ordinary concrete (4-week compressive strength)	Fc=180kg/cm^2	
Reinforcing bars	: 16mm or less	SD30	Ft = 3,000 kg/cm^2
	19mm or more	SD35	Ft = 3,500 kg/cm^2
Structural steel	:	SS41	F = 2,400 kg/cm^2

4) Load and External Force

a. Live Load

The values of live load for the main facilities shall conform to the Japanese Building Standards Law. Following are the typical live loads for each room's occupancy.

Occupancy	Slab · Beam	Column · Girder	Seismic (kg/m^2)
OFFICE	300	180	80
CLASSROOM	230	210	110
WARD	180	130	60
LABORATORY	400	320	180
CORRIDOR · HALL	300	270	160

b. Wind Pressure Force

Calculated in accordance with the Japanese Building Standards

$P=C \cdot q$

$q=60\sqrt{h}$

P : wind pressure (kg/m^2)
C : wind pressure coefficient
q : velocity pressure (kg/m^2)
h : height above ground level (m)

c. Seismic Force

Calculated in accordance with the Indian Building Standards.

$F=K \cdot W$

$K=\alpha \cdot I \cdot \beta$

K : Basic shear coefficient
α : zone factor (Zone V) 0.08
I : Occupancy importance factor 1.5
β : Ground condition coefficient (sand layer) 1.2

Thus,

$$K=0.08\times1.5\times1.2=0.144$$

(5) Utility Plan

1) Electrical Facility Plan

In working out the electrical facility plan, it is necessary to integrate the functions of the extended or remodeled facilities with those of the existing facilities. Shown below are the major points of planned changes in the overall electrical system.

- The Telephone exchange system for the existing facilities is of the cross-bar type. As this system is already outdated and it is impossible to add new circuits, the existing equipment will be removed. An electronic PABX capable of connecting all the facilities will be installed in the existing telephone room, and new circuits will be added.

- A 120W amplifier is used in the existing public address system but this amplifier's capacity is too small to cover the projected facilities. Therefore, the existing amplifier will be replaced with a new public address system with a larger capacity amplifier.

- The two existing fire alarm control panels are capable of covering a total of 40 alarms but their total capacity is not enough to cover the projected facilities. For this reason, these existing panels will be replaced with a new one capable of covering a total of 60 alarms.

a. Power Supply System

Electricity is to be supplied to the basic medical science building from the 11kV overhead power cable installed along the western boundary of the project site via a service line. The power supply system will be installed on the ground floor. The high-voltage and low-voltage equipment will be housed in an enclosed-type switch gear panel.

A transformer for the existing facilities will be installed in the existing electricity room in anticipation of a future need to create high-tension branches. Also, the existing generator's capacity is not large enough to cover the projected facilities. In this project, a newly built electricity and generator room will receive high-tension branches from the existing electricity room and will supply the ward building and the operating building. The power supply system will be housed in a enclosed-type switchgear panel. The transformer capacity will be about 600kVA. An automatic voltage regulator and a generator will be installed for supply of electricity to the operating building. The generator's capacity will be about 200kVA.

b. Main Line Power Equipment

The main line from the low-voltage switchgear panel of the substation to electricity distribution boards and power control

boards and the line from the power control board to the generator and other equipment will be installed.

- Mechanical and plumbing equipment — 3-phase, 3-wire 400V
- Lighting and socket outlet — 3-phase, 3-wire 400V/230V

Air conditioning, plumbing and a supervisory panel will be installed in the office room of the operation department's equipment maintenance workshop for intensive observation.

c. Lighting and Socket Outlet

- Lighting

The main light sources will be fluorescent lights. The light fixtures for use in the basic medical science building will be mounted directly to the ceilings, while those in the operating building will be recessed into the ceilings. The following table shows the mean values of luminous intensity for the main facilities.

Table 4-3 Target Illumination Level

Building	Room	Design Target Illumination Level
Basic Medical Science bldg.	Lecture rm	200ℓx
	Demonstration rm	300ℓx
	Staff rm	200ℓx
Ward	Nurse station	200ℓx
	Bed rm	100ℓx
	Seminar rm	200ℓx
Operating bldg.	Operating rm	500ℓx
	ICU, CCU	300ℓx
	CSSD	200ℓx

Lighting fixtures will also be installed along the roads and in the courtyards.

- Socket Outlet

The type of socket outlet will comply with BS standards. Those installed in the operating rooms, ICU and CCU should meet the capacity requirements of the medical equipment concerned. The socket outlet used with the generator circuit will identified visually.

d. Telephone System

An electronic-PABX capable of covering both the existing facilities and the projected facilities will be installed in the existing telephone exchange room. the existing wiring will be used to connect the new switchboard with the existing telephones. The new switchboard will cover 10 circuits and about 300 extensions. The service line (COL trunk line) to MDF will be installed by the Nepalese side.

e. Public Address System

A new public address system to cover both the existing facilities and the projected facilities will be installed in the office room of the operation division's equipment maintenance workshop. The existing wiring will be used to connect the new public address system to the existing speakers. The existing public address system will be removed as soon as the new public address system comes into operation.

f. Paging System

A wireless paging system aimed at facilitating communications within the hospital as well as within IOM will be installed. Its main control unit will be installed in the existing telephone exchange room. This system will be linked with the E-PABX exchange. Namely, paging can be performed by dialing telephone numbers. Judging from the number of professors, night nurses, and

staff in charge of maintenance and management of the buildings, the number of receivers will be about 45.

g. Nurse Call Interphone System

The nurse call interphone system which connects the nurse stations to each sickbed, lavatories and the like will be of the interactive type (one channel per bed).

Nurse stations	:	nurse call host unit
Bed room, lavatories, showers	:	wall units (microphone, call button, lamp, reset button)
Bed room, lavatories, showers	:	speakers

h. Fire Alarm System

A Fire alarm control panel to cover both the existing facilities and the projected facilities will be installed in the operation division's equipment maintenance workshop. A location lamp, an alarm bell and an alarm button will be mounted on the upper part of the fire hydrant, and the starting switch will be housed within the hydrant. No detector will be installed.

In the case of the existing hydrant, the alarm button is mounted on its outside causing patients to mishandle it. For this reason, the power supply to the transmitters is often cut. In this project, the starting switch will be housed in the hydrant so that it may function properly. The two existing alarm receiving boards will be removed as soon as the new one comes into operation.

i. Lightning protection System

A lightning protection system will be installed to prevent damage by lightning.

2) Air Conditioning System

In light of the actual use of similar air conditioning systems in Kathmandu and the unique methods of facility maintenance and management employed at the hospital, an easy-to-operate air conditioning system will be installed to reduce maintenance and management costs.

a. Design Conditions of Indoor/Outdoor Temperature and Humidity

- Design Conditions of Outdoor Temperature and Humidity

The following conditions (shown in an ASHRAE handbook) will apply.

Summer	Dry-bulb temperature	:	32°C DB
	Wet-bulb temperature	:	26°C WB
Winter	Dry-bulb humidity	:	1°C DB
	Wet-bulb humidity	:	-2°C WB

- Design Conditions of Indoor Temperature and Humidity (targeted values)

While a targeted control range is set for the design indoor temperature, no humidity control will be conducted in order to reduce the operating cost, except for the operating rooms where humidity control is indispensable.

Operating Rooms

Summer	Dry-bulb temperature	:	25°C +2
	Relative humidity	:	55% ±5
Winter	Dry-bulb humidity	:	25°C +2
	Relative humidity	:	55% ±5

Other Facilities

Summer	Dry-bulb temperature	:	26°C ±5
Winter	Dry-bulb humidity	:	22°C ±5

b. Air Conditioning System

A localized air conditioning system consisting of air-cooled heat pump air conditioners, which is easy to maintain and manage, will be adopted. The space to be air conditioned should be minimized so as to reduce the operating cost.

The operating rooms, ICU, CCU, and the central material room, all of which require very clean air, will be air conditioned using air-cooled heat pump package-type air conditioners (single ducts). As stated in "4-3-2-1," the targeted degree of cleanliness for the operating rooms requiring particularly clean air should be class 10,000. The following table shows the facilities to be air conditioned and the air conditioning systems to be employed for these facilities.

Table 4-4 Rooms to be Air Conditioned and Air Conditioning System

	Rooms to be air conditioned	Air conditioning system
Basic medical science bldg.	Data processing rm, Common Lab, Preparation rm, EMS, Forensic medicine autopsy	Individual air conditioning system with air cooled split type head pump air conditioners
Operating building	Operating rm, ICU/CCU, CSSD	Single duct system with air cooled packaged type heat pump air conditions for each zone.
	Locker rm, Observation rm	Individual air conditioning system with air cooled split type heat pump air conditioners.
Remodeling	Recovery rm	Single duct system with air cooled packaged type heat pump air conditioners for each zone.

c. Ventilating System

Facilities which will not be air conditioned will be equipped with ceiling fans. In those facilities where odors, heat and fine dust are likely to be generated, an air exhauster will be installed.

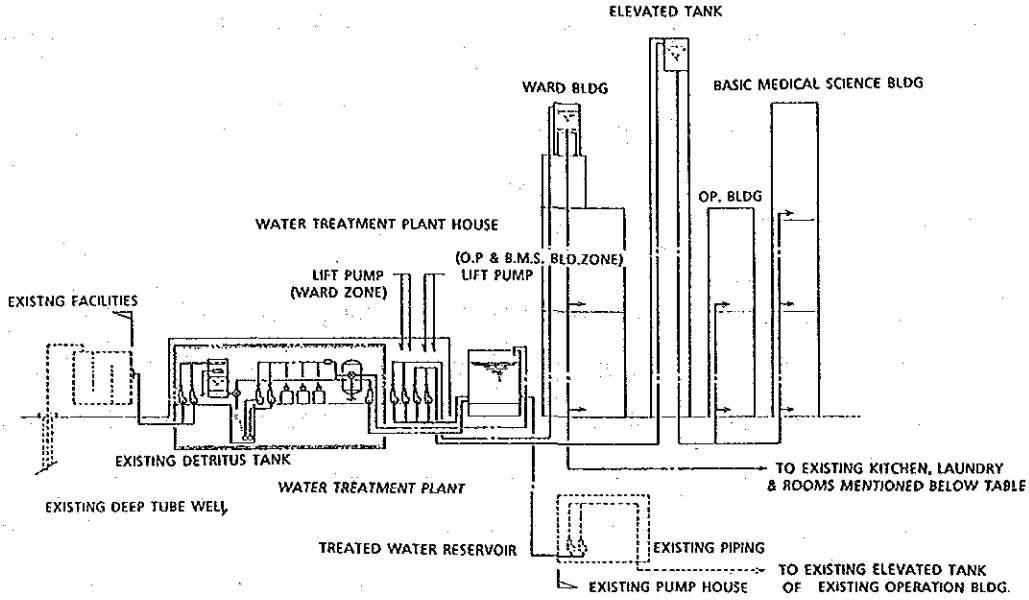
3) Plumbing and Sanitary System

a. Water Supply System

Both city water and well water are used at TUTH. As for city water, the service pipe has a relatively small diameter, and the time water may be taken is limited. As the quantity of city water supplied is obviously too small in comparison with the estimated water requirements of the projected facilities, a water supply system in which the existing well serves as a reliable water source will be established under this project.

The well water pumped from the existing deep well (depth: 250m; diameter: 100mm) on the northern side is sent to the existing water tank where sand is removed. After iron removal treatment, treated water is stored in the new water tank (concrete tank installed on the ground; capacity: 110m^3). The water stored in the new water tank will be pumped up into the new elevated water tanks of the ward building and the basic medicine building (including the operation building), it will then be supplied by gravity to all the facilities that require water supply. The piping material will be polyvinyl chloride lined steel pipe.

Fig. 4-9 Schematic Diagram of Water Supply System



Treated Water Supply in the existing TUTH

Outpatient Dept.		NOS.	Central Diagnosis Dept.		NOS.
	DENTAL TREATMENT	3		BACTERIOLOGY	1
	E.M.T. TREATMENT	1		STERILIZATOIN	1
	ORTHOPEDICS	2		BIOCHEMISTRY	3
	UROLOGY	1		SERUM	2
	DARKROOM (X-RAY)	1		PATHOLOGY	2
	GENERAL SURGERY	1	Others	KITCHEN	1
				LAUNDRY	1

b. Hot Water Supply System

Hot water will be supplied by the use of a localized hot water supply system in which electricity is used as the heat source. A solar water heating system will be installed in the ward building in order to reduce running costs (Solar water heating systems are widely used in Nepal). The piping material will be deoxidized copper tube.

c. Draining and Vent Piping System

A drainage culvert is laid along the southern boundary of the project site, and the water discharged from the existing facilities pours into this culvert. Separate piping systems will be adopted indoors and outdoors.

Soil waste water will be discharged into the existing culvert after the treatment of septic tank and plane oxidization bed system the same as in existing treatment facilities. Waste water and rainwater will be discharged directly into the culvert,

A circuit and stack ventilating system will be used as the ventilating system. The piping material will be polyvinyl chloride (PVC) pipe.

d. Sanitary Fixtures Installation

Sanitary fixtures suited to the local customs will be installed.

e. LPG Piping System

Piping for supply of LPG will be laid.

f. Fire Extinguishing System

Indoor fire hydrants and portable fire extinguishers will be installed in accordance with the Fire Services Law of Japan and guidance from the local fire authorities.

g. Medical Gas Supply System

Piping for oxygen, and nitrous oxide supply and vacuum piping system will be installed. Copper tube will be used as the piping material.

Table 4-5 Medical Gases Service Area

	Room name	Medical gases			
		O_2	N_2O	Vacuum	Compressed Air
Ward	Bed rm	○	-	○	-
		○	-	○	-
Operating building	Operating rm	○	○	○	○
	Preoperation rm	○	○	○	-
	ICU/CCU	○	-	○	-

h. Water Treatment Facilities

Water treatment facilities will be installed to remove impurities, iron and manganese from the water to be supplied to the hospital facilities. It will also prevent medical equipment troubles due to deterioration in water quality.

4-3-3 Building Material Plan

Building materials used in this project will be selected taking into account the required properties, the current situation of the Nepal construction industry, the time required for completion of the construction work, estimated construction/facility maintenance, operation costs, and other factors. Locally available materials which do not pose problems in terms of price, quantity supplied, method of supply and quality should be utilized as much as possible.

(1) Structural Materials

Reinforced concrete used for major buildings around the country will be the main structural material.
However, Japanese-made reinforcing bars and other raw materials will be used in principle because the locally available raw materials are not consistent in quality or strong enough.

(2) External/Internal Finishing Materials

The methods of finishing the major portions of the projected facilities such as roofs, external walls, furniture, floors, internal walls and ceilings are shown in the following table in comparison with the main finishing methods used in Nepal.

Table 4-6 Finishing Materials

Portion	Nepalese method	Method for the projected facility
Roof	• Concrete / Mortar • Roof tile • Concrete / Asphalt waterproofing	• Concrete / Asphalt waterproofing / Heat insulation / (ABMSB, OPB) • Concrete / GIS / (Ward)
External Wall	• Fair faced bricks	• Fair faced bricks
Doors & Windows	• Wooden sash • Steel sash • Aluminum sash	• Aluminum sash
Floor	• Cast in place terrazzo	• Cast in place terrazzo
Wall	• Mortar / paint	• Mortar / paint
Ceiling	• Mortar / Paint • Decorative gypsum board • Mineral acoustic tile	• Mineral acoustic tile • Decorative gypsum board • Calcium silicate board / paint • Perlite mortar

Room name	Nos.	Area (m^2)
1. Basic medical science building		
Lecture room	4	352
Dissecting room, Ante room	1	117
Preparation room	1	40
Museum	1	30
Physiology demonstration room	1	164
Pharmacology demonstration room	1	164
Pathology demonstration room	1	216
Biochemistry demonstration room	1	164
Microbiology demonstration room	1	164
Forensic medicine demonstration room	1	110
Community medicine demonstration room	1	164
Common laboratory	1	254
Office	1	65
Staff room for anatomy	1	76
Staff room for physiology	1	76
Staff room for pharmacology	1	76
Staff room for pathology	1	114
Staff room for biochemistry	1	76
Staff room for microbiology	1	57
Staff room for forensic medicine	1	38
Staff room for community medicine	1	208
Meeting room	2	76
Typing room	2	54
Entrance hall	1	158
Locker room	1	31
Storage	2	16
Toilet	1	157
Mechanical room	1	77
Others	1	1,273
Total		4,567 m^2

Room Name	Nos.	Area (m^2)
2. Ward		
6-bed room	10	398
2-bed room	12	288
1-bed room	16	432
Day room	2	76
Nurse station, Treatment room, Medical equipment store, Store room	2	174
Resting room	2	52
Doctor's room	2	26
Storage	2	22
Linen store	2	22
Seminar room	2	36
Toilet, Shower, Washing room, fifth utirity	2	162
Stairs, Corridors		840
Sub-total		2,528 m^2
3. Operating building		
Operation room	2	136
Equipment store	2	30
Clean corridor	1	95
Preoperation room	1	30
Anaesthetist room	1	20
Hall	1	98
Observation room	1	68
X-ray operating room	1	96
Doctor's locker room	1	54
Technicians' locker room	1	31
Nurses' locker room	1	35
Office room	1	15
Meeting room	1	15
Lounge	2	13
Toilet	1	19
ICU · CCU bed room	1	230

Room name	Nos.	Area (m^2)
Doctor's room	1	15
Examination room	1	9
Nurses' room	1	9
Treadmill room	1	17
Central sterilizing supply room	1	248
Mechanical room	1	393
Stairs, Corridors		704
Sub-total		2,380 m^2
3. Remodeling	1	446 m^2
4. Oxygen gas plant and Water treatment plant		
Mechanical room, cylinder store	1	130 m^2
Water treatment mechanical room	1	68 m^2
5. Remodeling of Clinical laboratory		
Clinical laboratory	1	174 m^2
6. Maintenance workshop		
Workshop	1	203 m^2
7. Ancillary buildings		
Septic tank	1	31 m^2
Elevated tank	1	25 m^2
Water tank	1	68 m^2
Connecting corridor	1	599 m^2
Generator room	1	76 m^2
Sub-total		799 m^2

4-3-4 Medical Equipment Plan

In the medical equipment plan, individual pieces of equipment will be selected in accordance with the following guidelines:

1. To select equipment which are deemed important and urgently needed to address the present conditions and goals of the activities by the department concerned.

2. To select equipment which the Nepalese side can maintain, manage and inspect routinely.

3. Large-scale precision equipment which requires special operating techniques should be shared by the departments concerned under the supervision of the engineer or technician in charge.

4. To select equipment suited to the content of the planned project-type technical cooperation.

(1) Basic Medical Science Building

General-purpose equipment for use in practical training will be selected as one for use in practical training in basic medicine. As for advanced medical research equipment such as an electron microscope or a gas chromatograph, only the spaces necessary for future installation of such equipment will be secured in this project.

1) Anatomy

Autopsy tables and tools necessary for 60 students to receive practical training in system anatomy will be installed. Generally, a cadaver preservation pool should be able to preserve corpses for two years of training. In this project, therefore, a cadaver preservation pool capable of preserving twelve corpses at a time will be installed. A dutronic injector for preparation of tissue specimens and some other pieces of equipment will also be installed.

Practical training in the use of microscopes which is necessary for training in histopathology will be carried out in the pathological demonstration room.

2) Physiology

Those pieces of equipment, including physiograph and expirograph, which are necessary for basic training on respiratory and circulatory functions of the human body will be installed.

3) Pharmacology

Research and study in this branch of medicine is concerned primarily with drugs' effects on the human body. In the new facility, research on drug poisoning and the like will be carried out. Therefore, glassware and basic measuring instruments, including a flame photometer, will be installed.

4) Pathology

Activities in this department will centre on histopathology, and students receiving practical training in this department will concentrate on study by the use of microscopes. Therefore, devices to be installed in this department include 30 microscopes (which can use both mirrors and light sources).

5) Biochemistry

In this department, training in clinical biochemistry will be carried out in addition to urinalisis training which is currently conducted in the existing demonstration room. Therefore, such instruments as the spectrophotometer, electrophoresis apparatus and pH meters will be installed.

6) Microbiology

Activities in this department have thus far been carried out as part of those conducted in the pathology department, but this department is going to become independent. In this project, therefore, devices necessary for basic study and training on infectious diseases, such as a centrifuge, an anaerobic jar and a deep freezer will be installed.

7) Forensic Medicine

At present medicolegal autopsies are carried out in facilities outside of the hospital. In this project, an autopsy table necessary for conducting medico-legal autopsies, Mortuary refrigerator (for two corpses) and a formalin tank (necessary for preparation of organ specimens) will be installed.

8) Community Medicine

In this department, it is expected that practical training in nutrition, medical sociology epidemiology, and health education will be carried out. Practical training will be conducted indoors and outdoors. Basic instruments to be installed in this department include a pH meter, a water bath, a centrifuge and a deep freezer.

9) Common Laboratory

Instruments requested by many clinical departments, such as a fume hood, and a safety cabinet are expensive and require expert knowledge of their operation. Therefore, these instruments will be installed for common use only.

(2) Ward (100 beds)

Beds, medical examination coaches, film illuminator, electric suction pumps, stretchers, wheel chairs and refrigerators, which are required by two nursing care units will be installed.

(3) Operating Building

1) Operation Department

In the existing operation department are installed basic operating equipment and devices provided under a grant aid programme implemented immediately after the department's establishment. Special operating equipment and devices provided under technical cooperation programmes were implemented later. In this project, a minimum number of operating tables, operating lights, and anaesthesia apparatus will be installed.

2) ICU/CCU Department

The existing facility of the ICU/CCU department will be remodeled into a recovery room, and the existing central monitor, bedside monitors and other devices will be moved to the new facility (with 6 ICU and 5 CCU). In keeping with an increased number of beds, the number of devices will be increased. Also, to match the expanded functions of the CCU section, bedside monitors capable of measuring irregular pulses will be installed. The new facility will be able to effectively cope with cases of circulatory disorders.

3) Central Sterilizing Supply Department

The central room, which is indispensable to the hospital medical care activities, will be divided into the clean section and the contamination section. Also, a new section in charge of emergency sterilization will be set up within the existing central material room. Part of the equipment installed in the room will be moved to the new facility. A large-sized steam sterilizer (capable of housing twenty-four 27cm diameter casts), a steam sterilizer (to be moved from the existing facility) and a small-sized steam sterilizer (capable of housing six of 27cm diameter casts) will be installed to accommodate

the existing facilities (five rooms of the outpatient and operation divisions plus 300 sickbeds) and the projected facilities (two operating rooms plus 100 sickbeds). The specifications of these steam sterilizers are based on the general standard of their use -- twelve 27cm diameter casts per 100 beds.

(4) Hospital Engineering Workshop

This facility will be equipped with tool sets for use in repair and inspection of TUTH's medical equipment and IOM's educational equipment.

(5) Replacement of the Existing Equipment

Some of the equipment and devices provided under the grant aid and technical cooperation programmes implemented in the past have been in use for five years now, and are therefore, very likely to break down. Also, those frequently used devices that do break down suspends the medical examination, diagnosis and treatment services in which they are used. In light of the importance, frequency of use, and number of these equipment and devices, a blood gas analyzer will be installed.

Major Medical Equipment List

1. Basic Medical Science Building

   Autopsy table, cadaver preservation pool, student channel physiograph, expirograph, flame photometer, water still, spectrophotometer, electrophoresis apparatus, pH meter, centrifuge, anaerobic jar, deep freezer, mortuary refrigerator, formalin tank, fume hood, biohazard cabinet, etc.

2. Ward

   Bed, X-ray film illuminator, electric suction pump, stretcher, wheel chair, refrigerator, etc.

3. Operating Building

   Operating table, operating light, anaesthsia apparatus, electrosurgical unit, ultrasound apparatus, bed side monitor, defbrillator, ventilator, high pressure sterilizer, etc.

4. Oxygen Gas Plant

   Oxygen gas plant

5. Remodeling of the Clinical Laboratory

   Cabinet, etc.

6. Hospital Engineering Workshop

   Tool set, etc.

7. Replacement and addition of equipment in existing TUTH

   Blood gas analyzer

4-3-5 Area of Facilities

Based on the result of 4-3-2, the floor areas of each building are shown in the Table below.

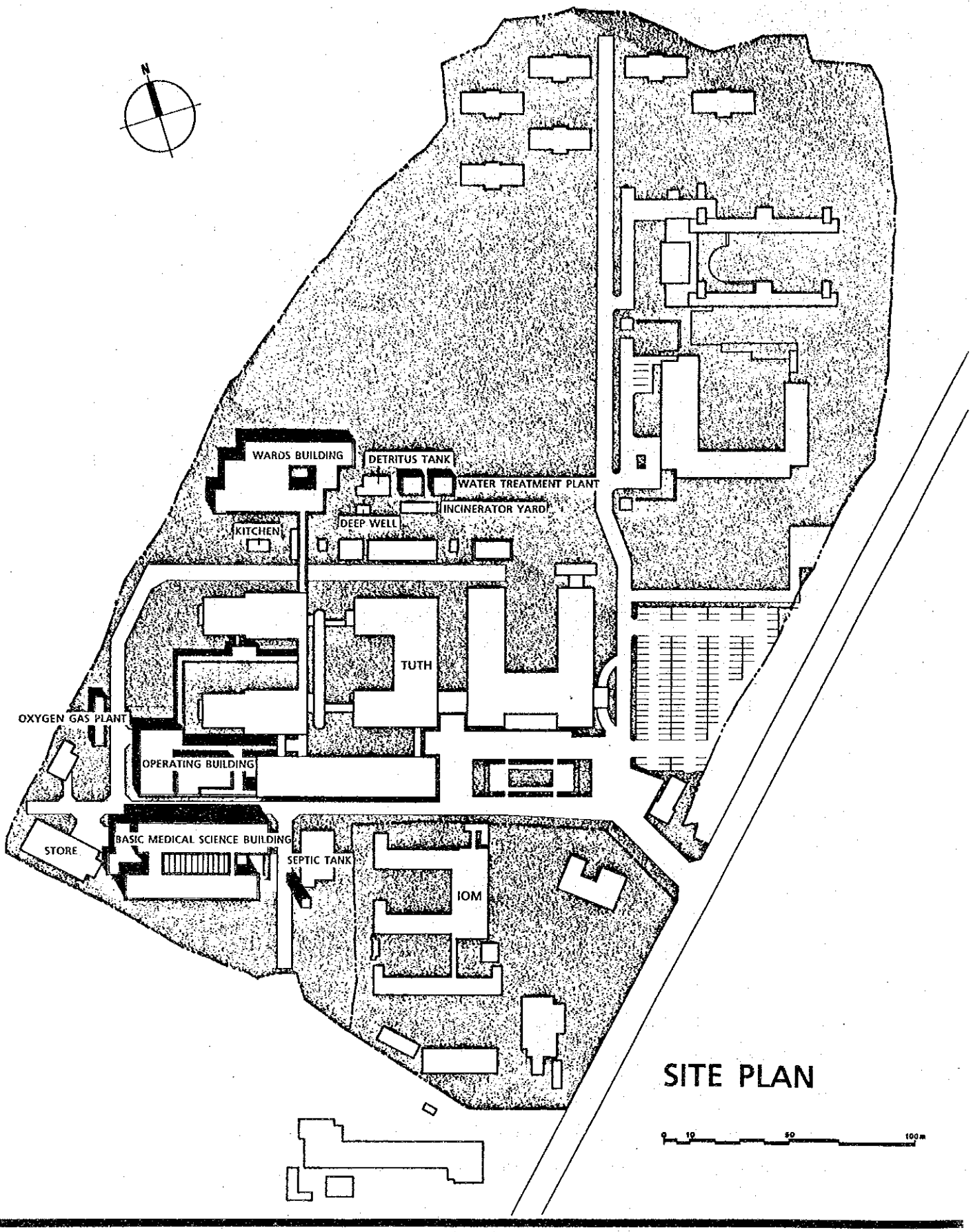
Table 4-13 Area Schedule

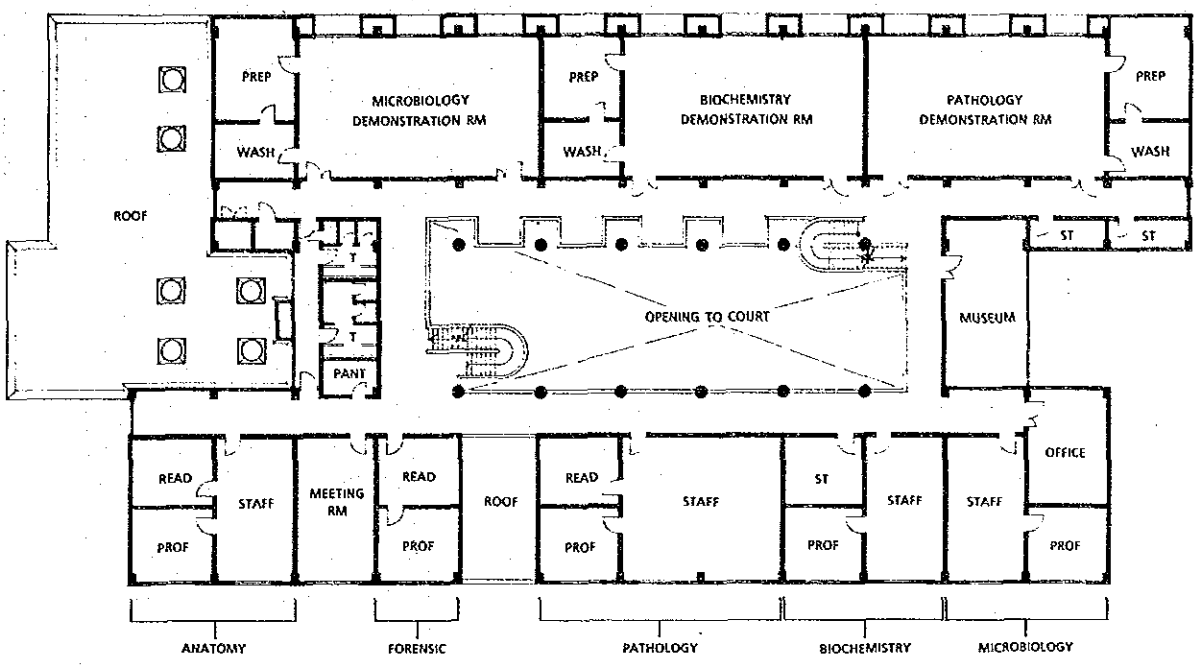
Building	Area (Expansion)				Remodeling area (m^2)
	GFL	1FL	2FL	Total (m^2)	
1. Basic Medical Science Building	1,747	1,406	1,414	4,567	
2. Ward	1,254	1,254	20	2,528	
3. Operating Building	919	1,145	316	2,380	446
4. Oxygen Gas Plant & Water Treatment Plant	198	-	-	198	-
5. Remodeling of the Clinical Laboratory	-	-	-	-	174
6. Hospital Engineering Workshop	203	-	-	203	-
7. Ancillary Facilities	565	100	100	765	34
	4,886	3,905	1,850	10,641	654

4-3-6 Basic Design Drawings

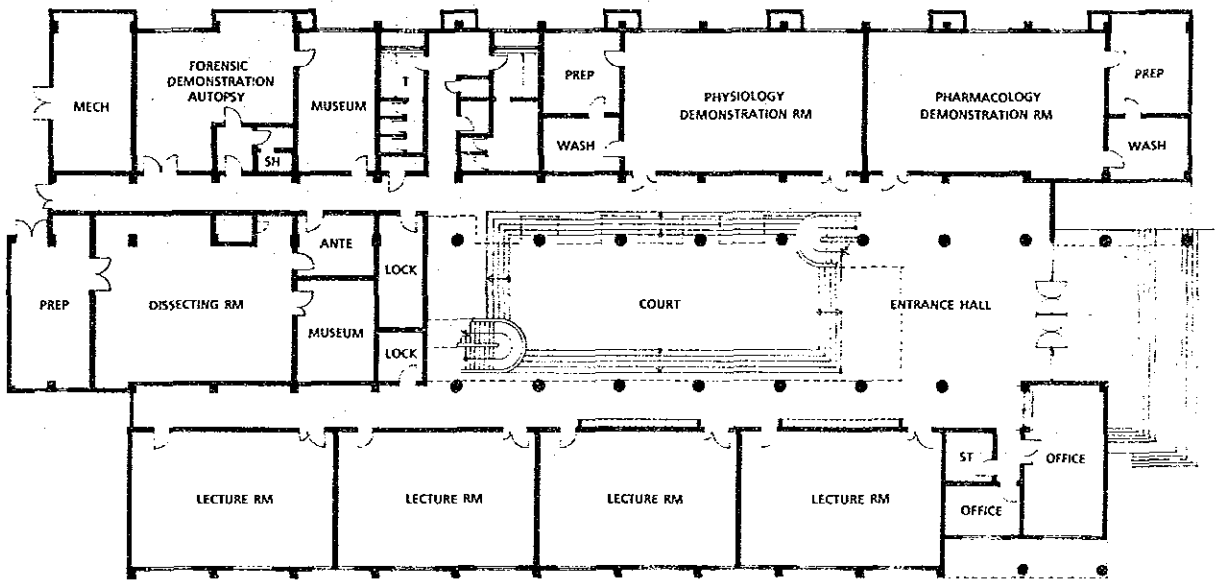
(1) List of Drawings

1) Site Plan
2) Basic Medical Science Building Plan (1)
3) Basic Medical Science Building Plan (2)
4) Basic Medical Science Building Elevation
5) Ward Plan
6) Ward Elevation & Section
7) Operating Building Plan (1)
8) Operating Building Plan (2)
9) Operating Building Elevation & Section
10) Remodeling of Clinical Laboratory Plan

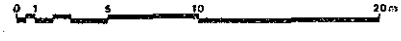

N
WARDS BUILDING
DETRITUS TANK
WATER TREATMENT PLANT
INCINERATOR YARD
DEEP WELL
KITCHEN
TUTH
OXYGEN GAS PLANT
OPERATING BUILDING
BASIC MEDICAL SCIENCE BUILDING
STORE
SEPTIC TANK
IOM
SITE PLAN
0
10
50
100m



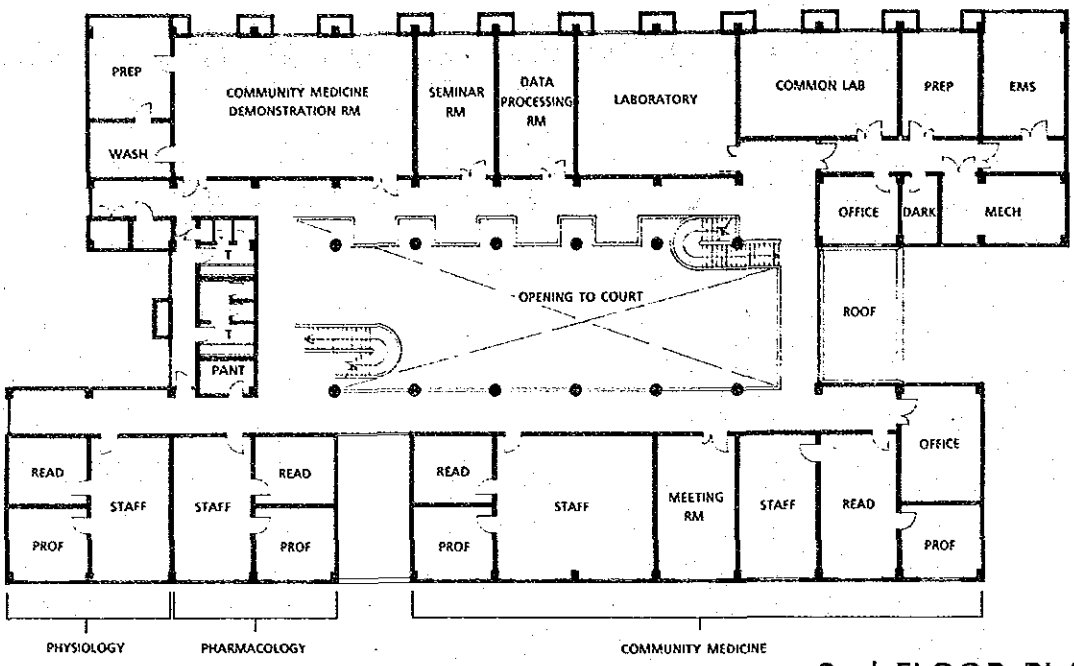
1st FLOOR PLAN



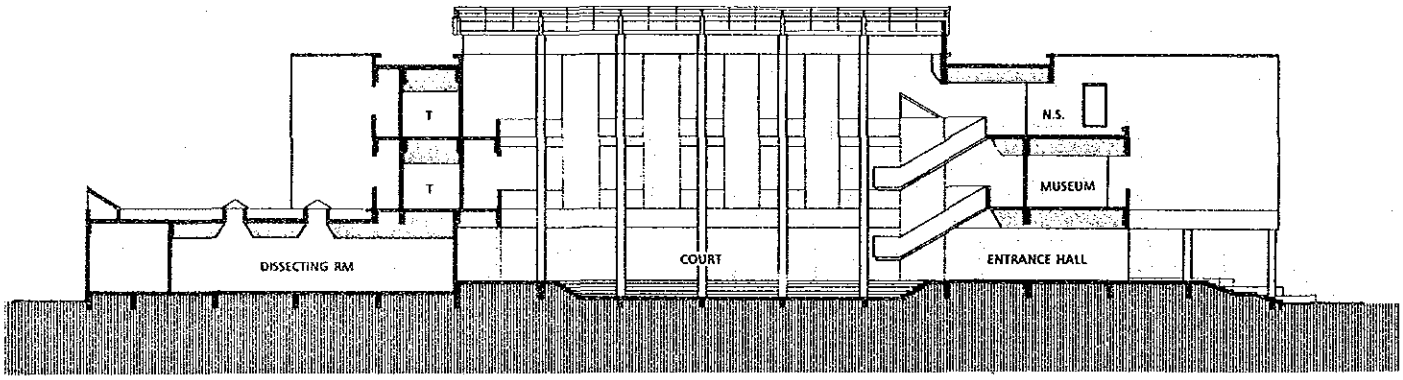
GROUND FLOOR PLAN



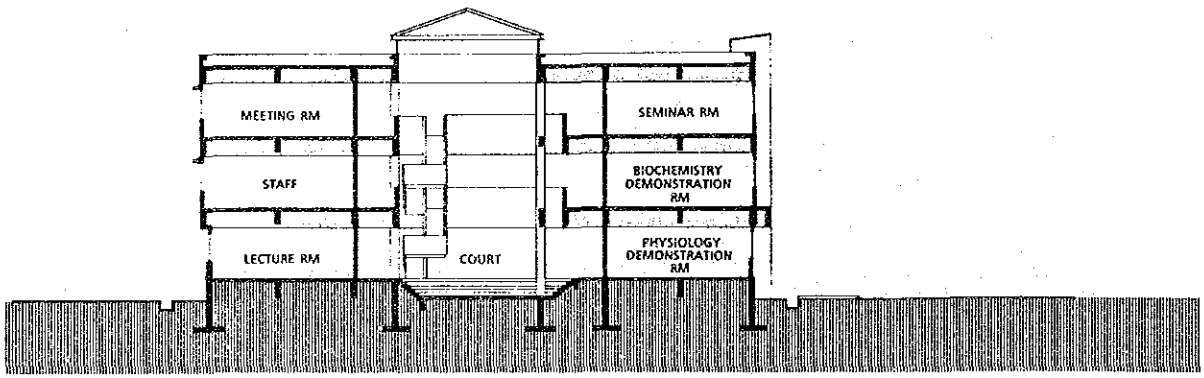
BASIC MEDICAL SCIENCE BUILDING



2nd FLOOR PLAN



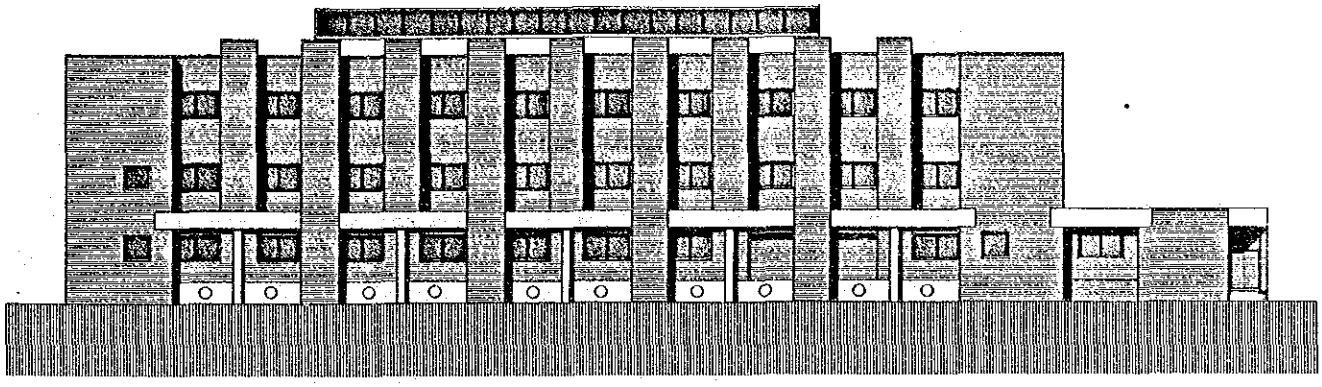
SECTION – 1



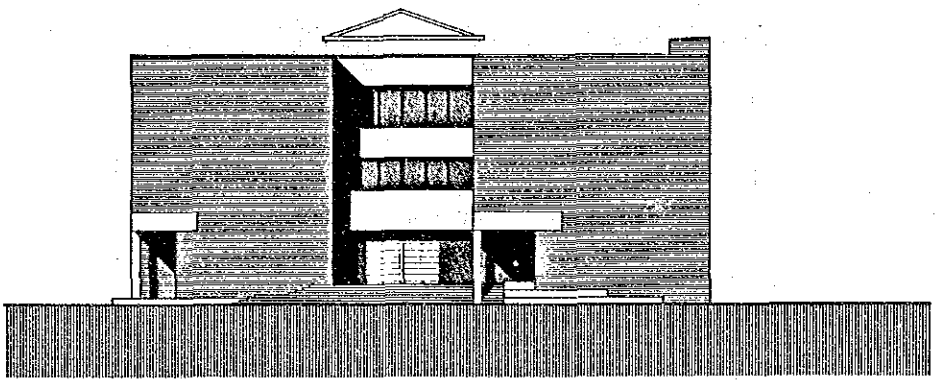
SECTION – 2

BASIC MEDICAL SCIENCE BUILDING

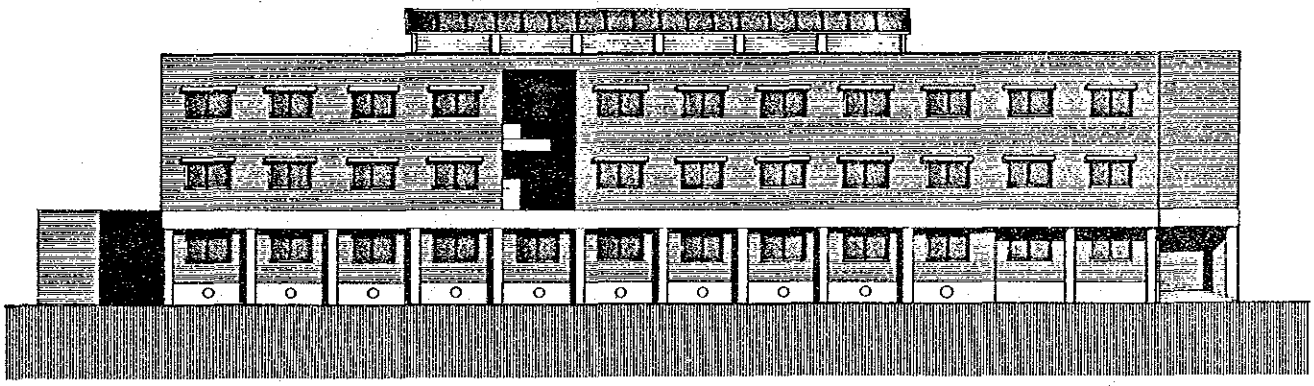
0 1 5 10 20m



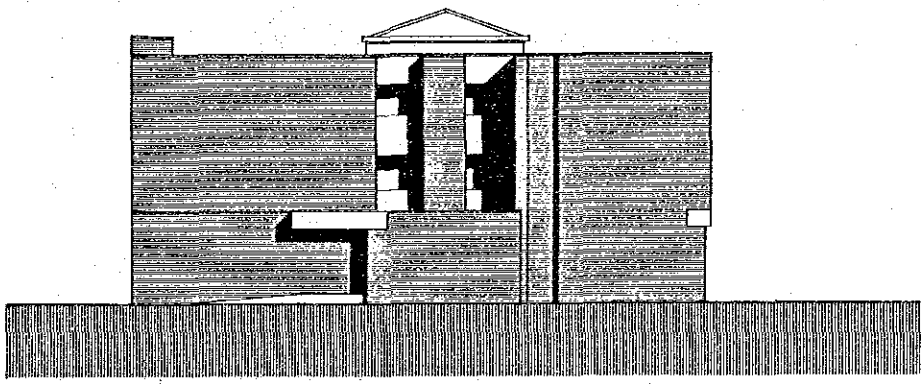
NORTH ELEVATION



EAST ELEVATION



SOUTH ELEVATION

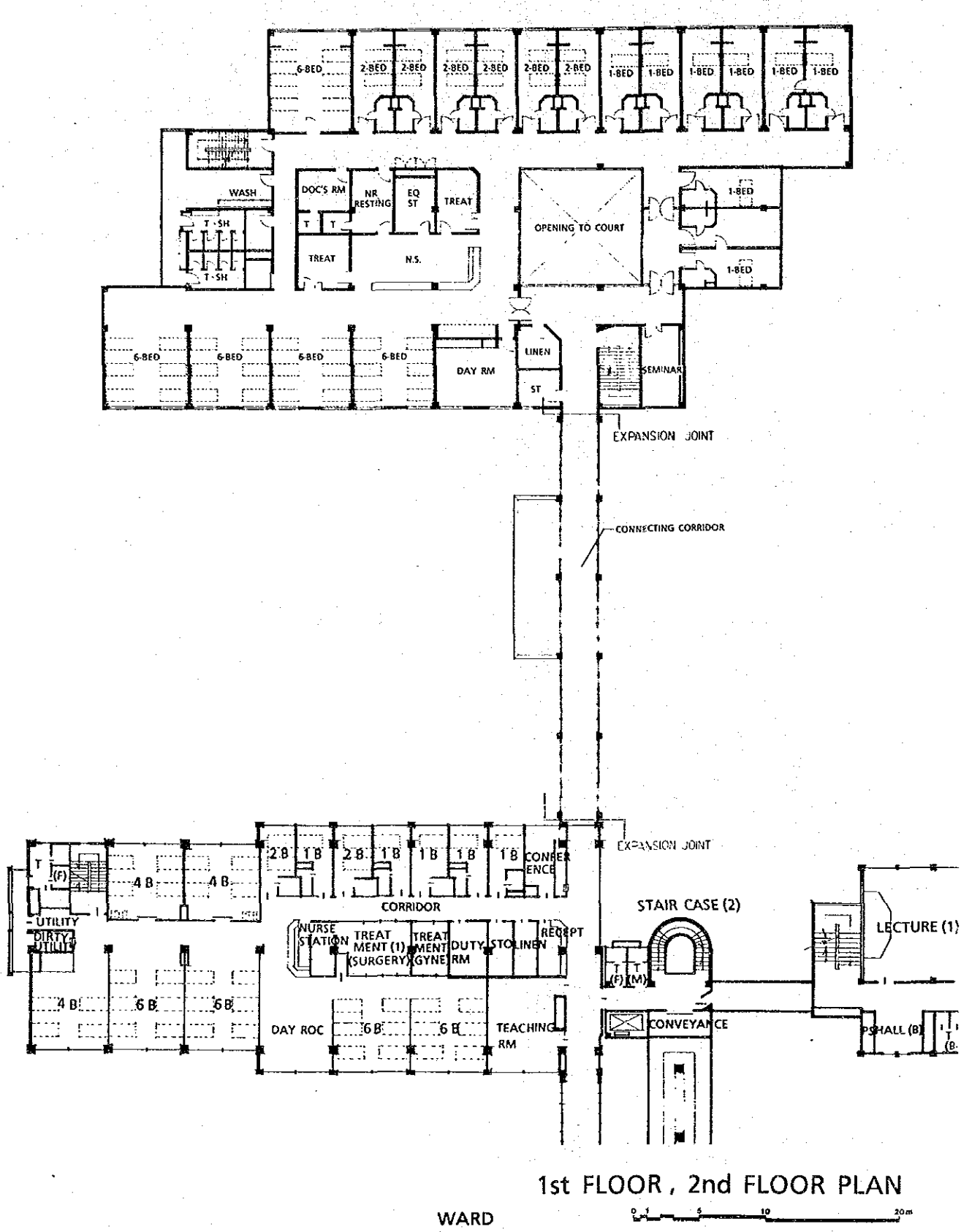


WEST ELEVATION

BASIC MEDICAL SCIENCE BUILDING

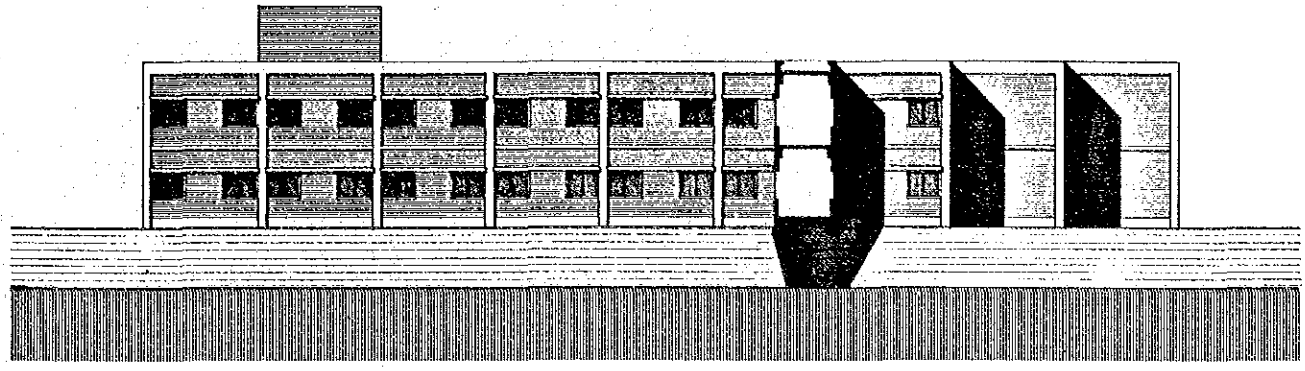
0 1 5 10 20m

THE PROJECT FOR THE EXPANSION OF TRIBHUVAN UNIVERSITY INSTITUTE OF MEDICINE AND THE TEACHING HOSPITAL

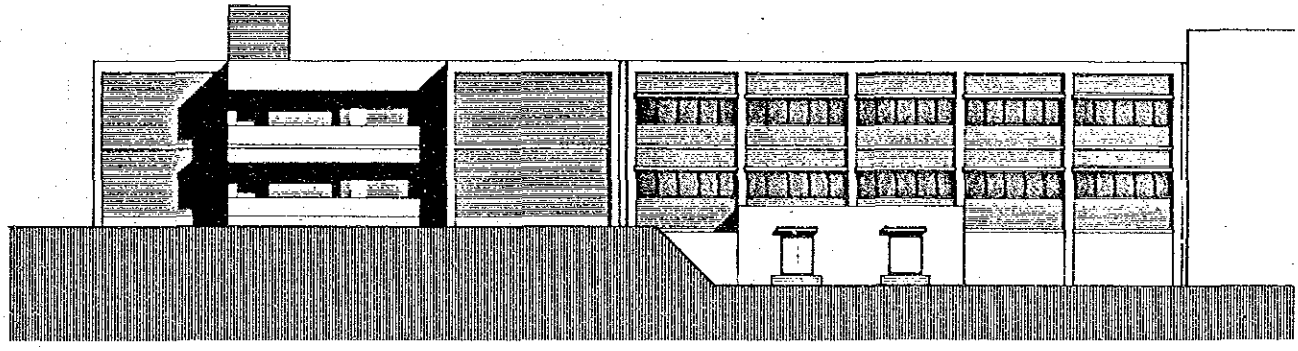


1st FLOOR , 2nd FLOOR PLAN

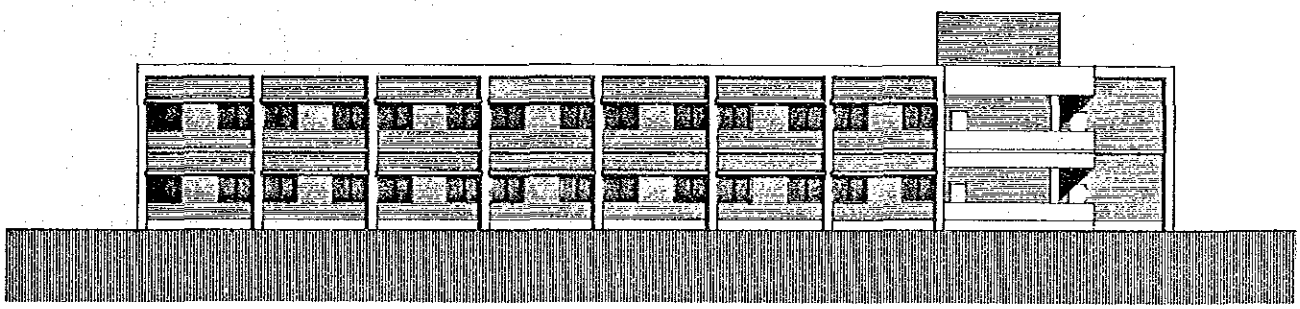
WARD



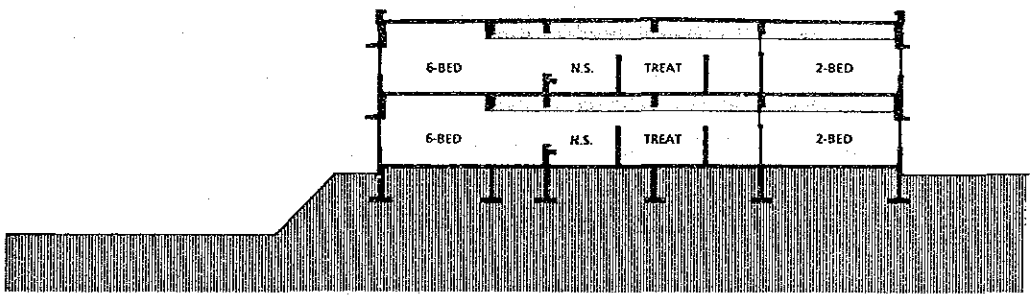
SOUTH ELEVATION



WEST ELEVATION



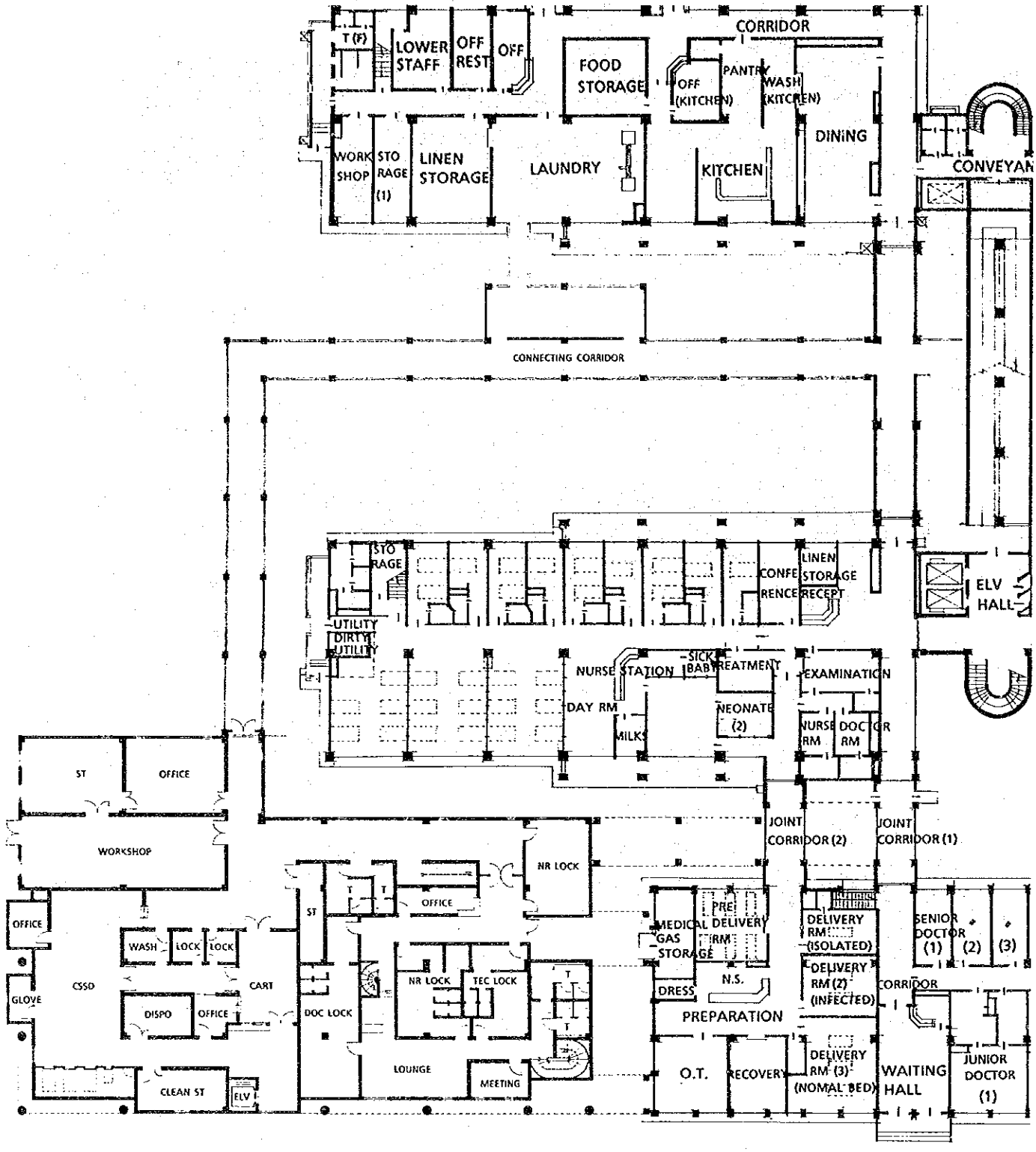
NORTH ELEVATION



SECTION

0 1 3 10 20m

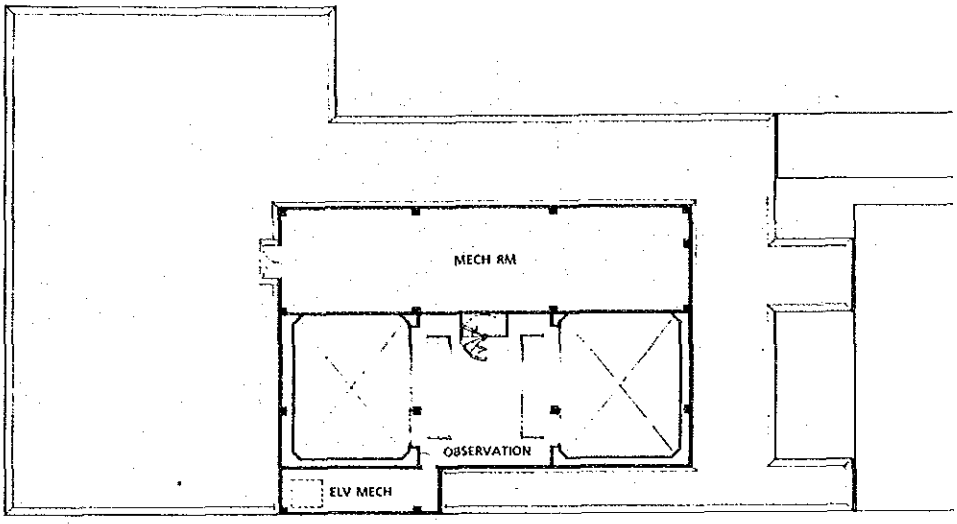
WARD



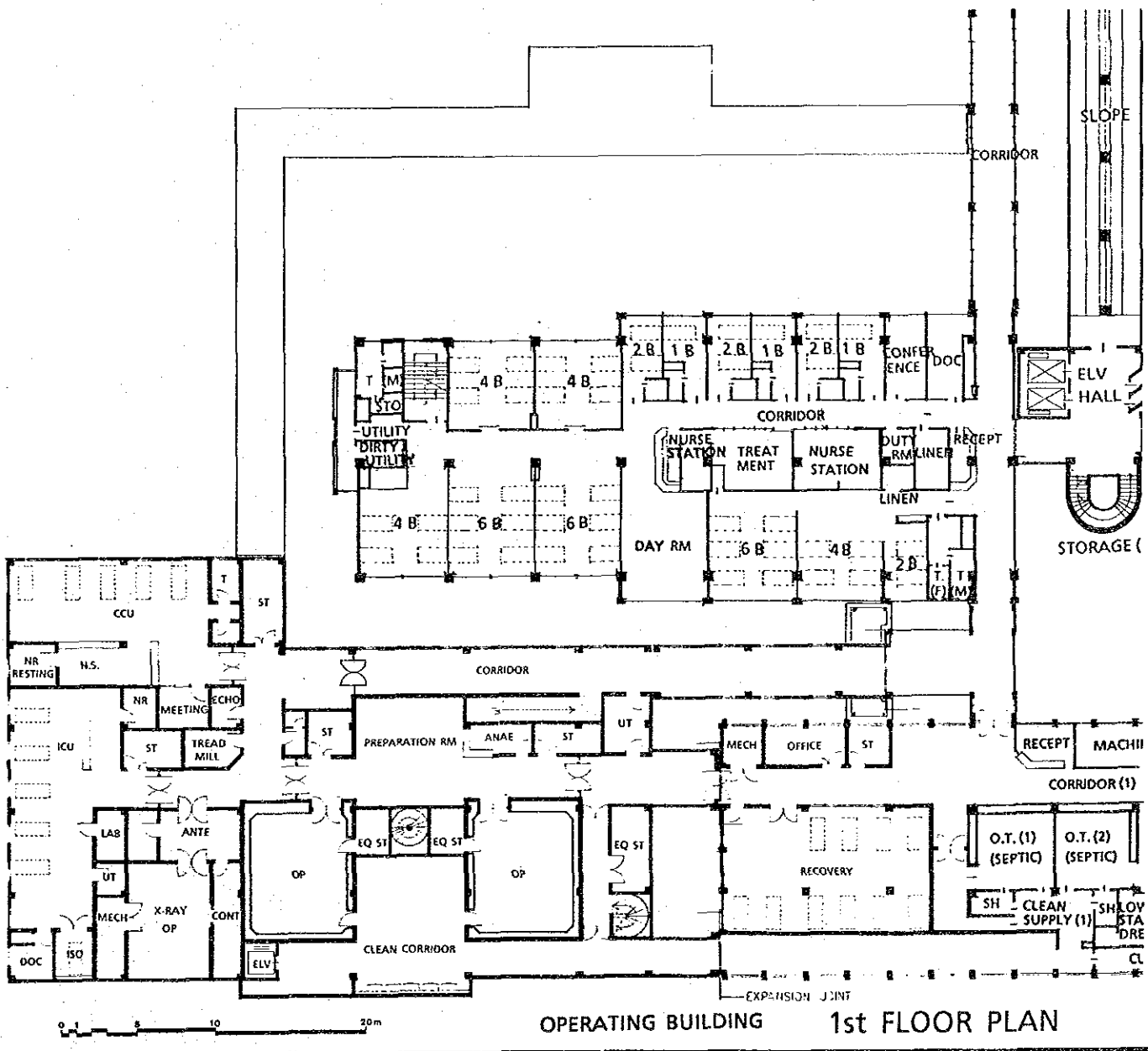
GROUND FLOOR PLAN

0 1 5 10 20m

OPERATING BUILDING

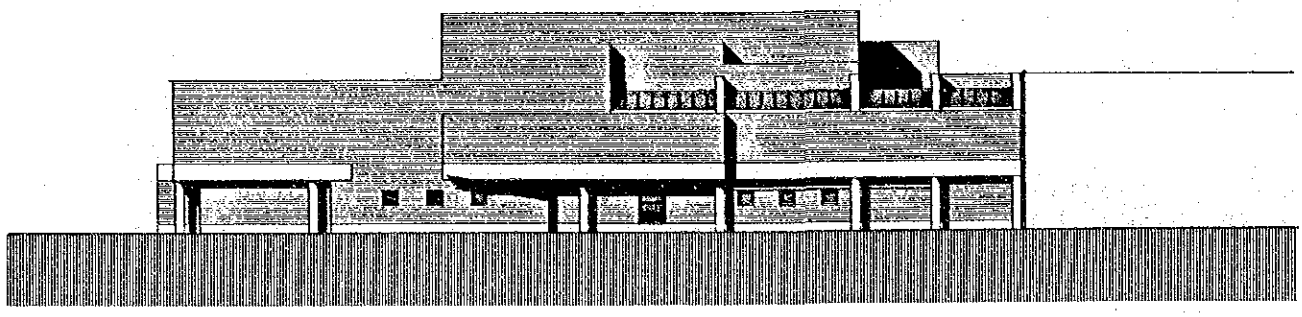


2nd FLOOR PLAN

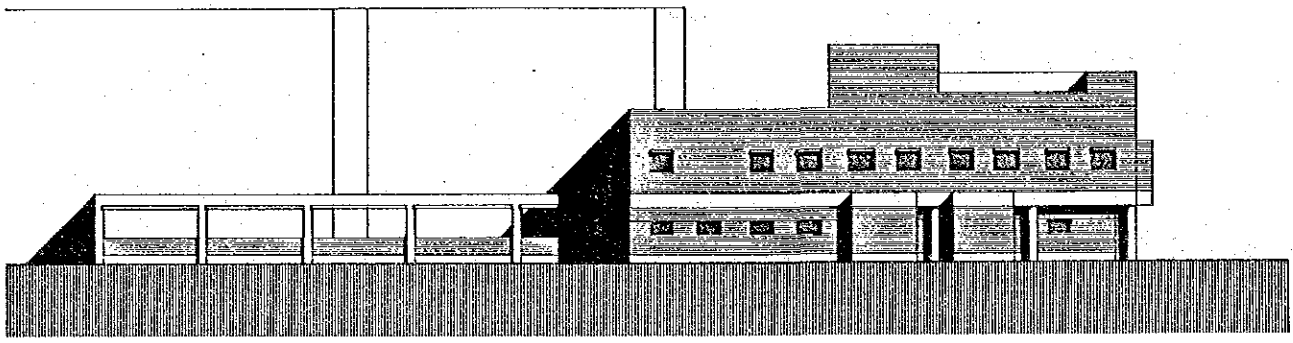


OPERATING BUILDING 1st FLOOR PLAN

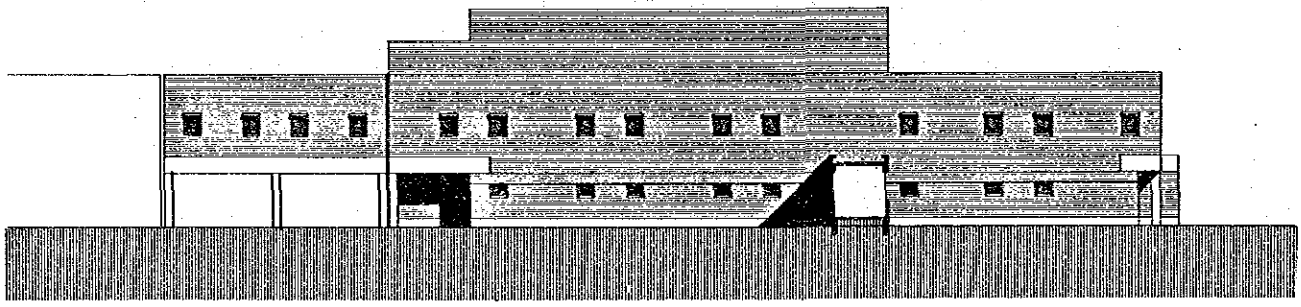
THE PROJECT FOR THE EXPANSION OF TRIBHUVAN UNIVERSITY INSTITUTE OF MEDICINE AND THE TEACHING HOSPITAL



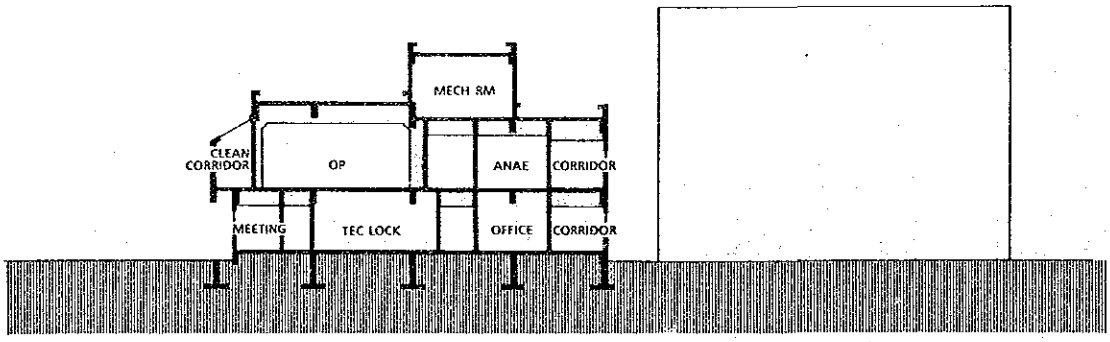
SOUTH ELEVATION



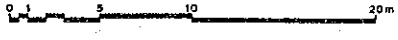
WEST ELEVATION



NORTH ELEVATION

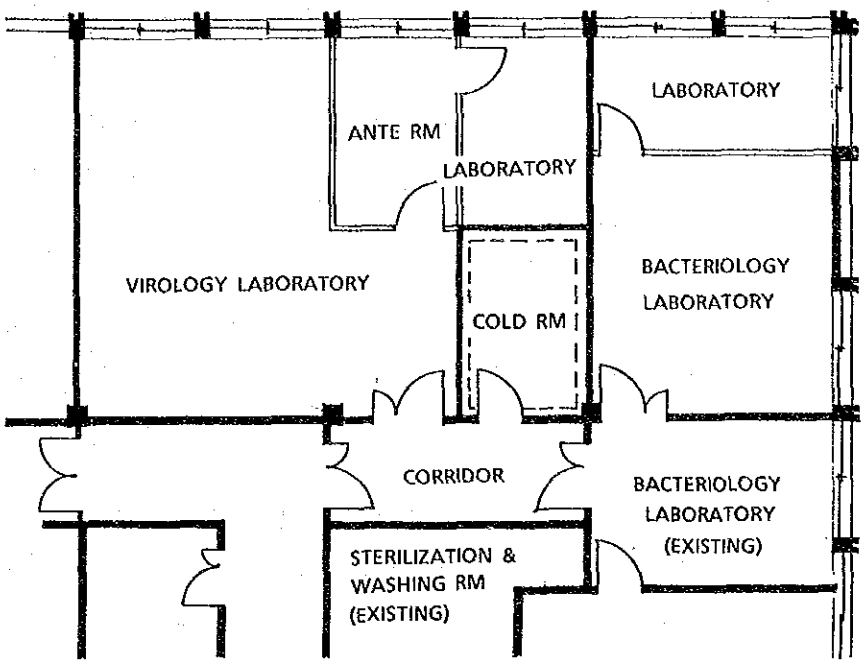


SECTION



OPERATING BUILDING

THE PROJECT FOR THE EXPANSION OF TRIBHUVAN UNIVERSITY INSTITUTE OF MEDICINE AND THE TEACHING HOSPITAL



1st FLOOR PLAN

0 1 5 10 m

REMODELING OF CLINICAL LABORATORY

4-4 Execution Plan

4-4-1 Execution Guidelines

This project will be implemented in three phases. In order to complete individual construction work and equipment work on schedule, it is necessary to give due consideration to the following points:

1) The procedures for tax exemption and clearing for the imported construction machines and materials through the customs should be executed promptly.

2) The construction schedule should be worked out taking into account possible construction delays during the rainy season from June to August and the Dasain festival from October to November.

3) In the work to remodel the facility of the ICU department in the existing operating building, it is necessary to move the ICU's facility to the new facility upon completion of the new operating building. The move will be carried by the Nepalese side. Also, the path of vehicles flow to the existing hospital autopsy will have to pass through the inside of the temporary boundary wall for construction work. To cope with such a problem, it is necessary to coordinate the construction schedule and the work to manage the construction site with the operations carried out at the hospital.

4-4-2 Supervision of the Construction work and Equipment Work

In accordance with the procedure of the government of Japan's grant aid, the Japanese consulting firm will conclude a contract for consulting services with the executing agency responsible for the implementation of the project, will work the detail design and supervise construction work and equipment work in compliance with provisions of the contract. The objective of the supervision is to see whether or not the work complies

with the drawings and specifications, to secure the desired quality by providing instructions, advice and to ensure that all works conform with construction and equipment contract provisions. The activities of the consultant include the following:

1) Assisting with the Tender Procedures and Contracting

To select a Japanese contractor for the construction work and equipment work, the consultant will prepare tender documents, announce tenders publicly, accept applications for entry in the tender, perform prequalification screening, issue tender documents, accept tenders offered, evaluate the results, and give advice on contracting.

2) Instructions, Advice and Coordination for the Contractor

The consultant will examine the construction schedule, the construction plan, the materials and equipment procurement/installation plan, and provide instructions, advice and coordination to the contractor.

3) Examination and Approval of Shop Drawings, Manufacturing Drawings and Other Documents

The consultant will examine and approve shop drawings, manufacturing drawings and other documents submitted by the contractor.

4) Confirmation and Approval of Construction, Materials and Equipment

The consultant will confirm the consistency of data on construction, materials and equipment with the drawings and specifications, and approve their use in the project.

5) Witness for Plant Inspection

If necessary, the consultant, will witness and give necessary instructions in plant inspections of the building components and equipment at the manufacturers' plants.

6) Reporting on Progress

The consultant will report to the project executing agency on the

progress of construction work and equipment work based on the situation at the construction site.

7) Inspection and Testing upon Completion

The consultant will conduct a final inspection upon completion, and test facilities and equipment operation. Final inspection reports will then be submitted to the Nepalese side. In particular, major equipment used in sophisticated laboratory works will be installed, adjusted and tested with standard samples by professional specialists or engineers dispatched by the manufacturers. The consultant will ascertain that test results are consistent with specifications.

8) Training in Maintenance and Operation of the Equipment

Considerable maintenance and operation skills are required for some equipment installed under this project. For this reason, Nepalese engineers responsible for equipment should receive the necessary training, from the manufacturers' professional specialists and engineers, for operating, troubleshooting and repairing the equipment during the period of installation, adjustment and test running. The consultant will give necessary instructions in the training programme.

The consultant will dispatch a resident engineer to the site throughout the period of the Japanese works due to the scale of this project. In addition, the consultant will dispatch engineers to the site for inspection, instruction and coordination as needed, according to the progress of the works. The consultant will also establish a system in Japan in which the engineers in charge will keep in contact with and support the resident engineer or engineers. The consultant will report progress, disbursement, completion, transfer, etc. of the project to concerned Japanese government authorities.

4-4-3 Equipment/Material Procurement Plan

As far as the construction materials are concerned, those which are locally available and which are equal to Japanese-made ones in terms of quality and performance, less expensive than Japanese-made ones and guaranteed quicker delivery than for other local construction works will be procured locally. As for cement, cement which can easily be procured locally will be used. As most of the construction machines concerned are hard to procure locally, they will be imported from Japan. As for procurement of copying machines and computers which require considerable skills and costs for maintenance and operation, it is necessary to select manufacturers who have a reliable distribution and after-sales service network in Nepal.

4-4-4 Project Implementation Schedule

This project will be implemented in phases -- Phase 1 (construction of the basic medical science building and installation of equipment), Phase 2 (construction of the wards and the operating building and installation of equipment) and Phase 3 (remodeling of existing operating building). Phase 1 will be implemented after the representatives of both governments sign the Exchange of Notes concerning Japan's grant aid. Upon signing of the Exchange of Notes, the government of Nepal will appoint a Japanese consulting firm, and then a consultancy agreement will be concluded between the government of Nepal and the Japanese consulting firm.

The project implementation schedule, which excludes the above procedures, will be divided into three stages, namely, detailed design, tender for selection of contractor, and construction work and equipment work.

Phase 2 and Phase 3 will be implemented in the same way as Phase 1 after the signing of the Exchange of Notes concerning Phase 2 and Phase 3. In Phase 2 and Phase 3, however, the construction work and the work to

install equipment will be contracted out to the contractor who has been assigned to carry out the construction work and equipment work in Phase 1.

(1) Detailed Design

After signing of the consultancy agreement, the detailed design work will commence upon verification of the agreement by the government of Japan. In the detailed design work, detailed design drawings, specifications and tender requirements, all of which are used in inviting tenders for the construction work and equipment work will be prepared. In the meantime, the Japanese consulting firm shall exchange views with the Nepalese side concerning details of the facilities and equipment, and will finally obtain the Nepalese side's approval of the above tender documents. Three and a half months, three months, and one and a half months will be required for the detail design stage of Phase 1, Phase 2, and Phase 3 respectively.

(2) Method of Placing Orders for Equipment

Many pieces of equipment to be installed under this project will require construction work before installation. It will be necessary to install anchors, pipes, ventilators and the like before equipment installation. In addition, removal or repair of the existing equipment will also be necessary. For this reason, it is difficult to separate the construction work and the equipment work. It is reasonable therefore to place orders for the construction work and the equipment work with a consortium of companies, which, as a group, will be responsible for the construction and equipment work.

(3) Contracting Out Phase 1 Construction Work and Equipment Work

The contractor (which is a consortium of Japanese companies) will be selected through competitive bidding. The tender for Phase 1 construction work and equipment work will be conducted in the order of public notice of tender invitation, tender, evaluation of the tender, appointment of the

contractor and signing of the contract. This procedure will take about two months.

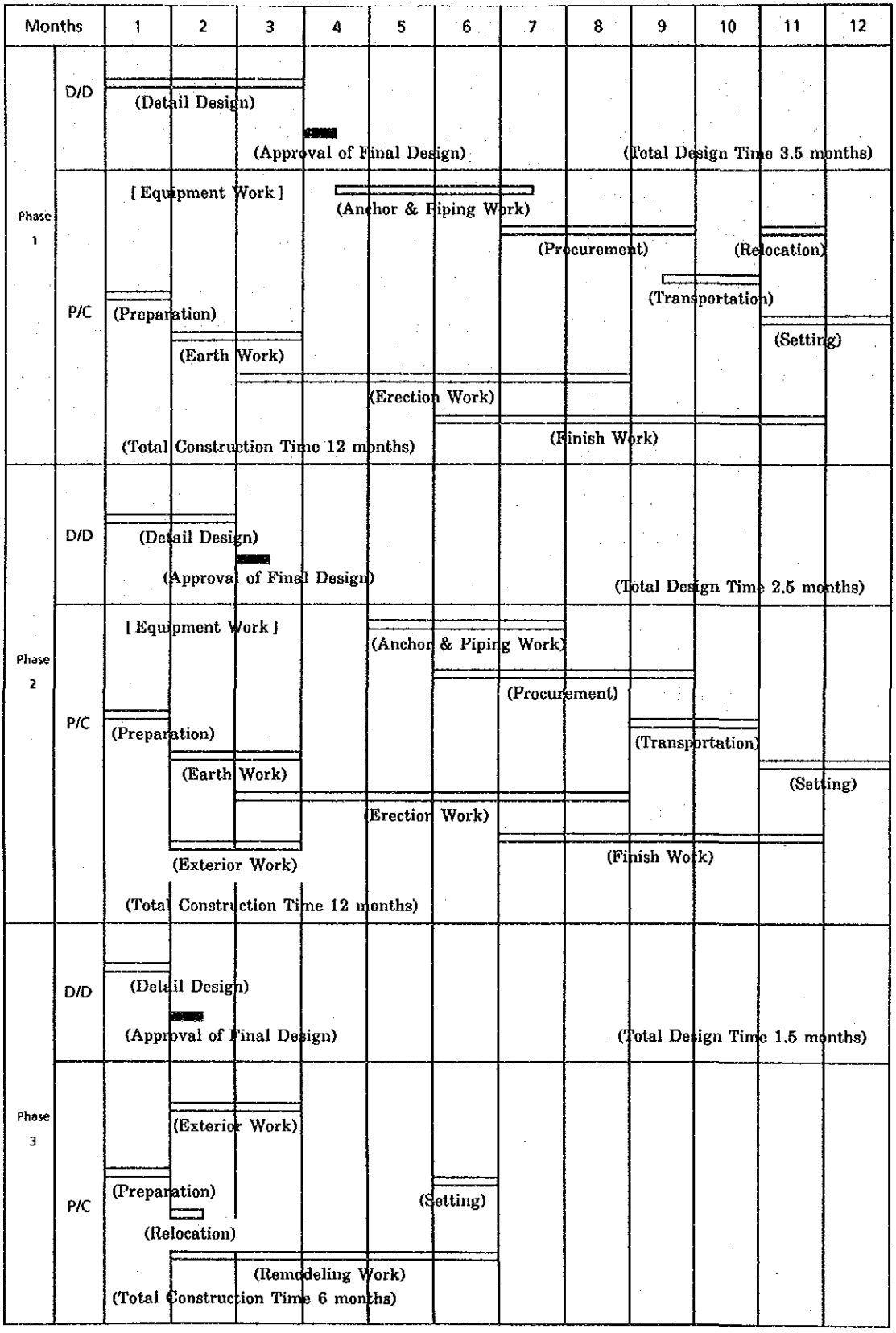
(4) Period of Construction Work, and Equipment Work and Contracting Out Phase 2 and Phase 3 Construction Work and Equipment Work

After signing of the contract, the construction work and equipment work will commence upon verification by the government of Japan. In light of the scale of the facilities, local climatic conditions, the situation of the local construction industry and the division of the whole construction work and equipment work into Phase 1, Phase 2 and Phase 3, it will take about 26.0 months to complete the entire construction work including equipment work. However, the government of Nepal will contract out Phase 2 and Phase 3 construction work (including equipment installation work) to the contractor selected for Phase 1 construction work and equipment work, after signing of the Exchange of Notes concerning Phase 2 and Phase 3 respectively.

(5) Implementation Schedule

The implementation schedules for each phase worked out after examining the abovementioned factors are as shown in Fig. 4-10.

Fig. 4-10 Implementation Schedule



Note: D/D: Detail Design P/C: Procurement and Construction

4-4-5 Estimated Project Costs of the Project to be Defrayed by the Government of Nepal

The estimated project costs to be borne by the government of Nepal are as follows.

1) Site preparation costs ..... Rs 20,000

   1. Cost of moving of power cables: Rs 20,000

2) Infrastructure costs ..... Rs 35,000

   1. Power supply costs:
      present facilities and addition of an existing 11kV power cable

   2. Telephone costs:
      addition of 5 circuits (35,000/Rs): Rs 35,000

3) Construction costs ..... Rs 623,000

   1. Waste depots: Rs 623,000

4) Exterior work costs ..... Rs 887,000

   1. Gate (southern gate) : Rs 87,000
   2. Plantings : Rs 800,000
   3. Dismantling and removal of existing buildings

5) Equipment costs 0

   1. Furniture : continued use of existing furniture
   2. Equipment : continued use of existing furniture

6) Total costs {1)+2)+3)+4)+5)} ..... Rs 1,565,000

The above estimated project costs borne by the government of Nepal do not include taxes, fees, charges or administration expenses.

In order to implement this project smoothly and to make effective use of the facilities constructed or improved under this project, it is desirable that the government of Nepal take necessary budgetary measures, prepare designs and implement construction work at the appropriate time.

CHAPTER 5 PROJECT EVALUATION AND CONCLUSION

PROJECT EVALUATION AND CONCLUSION

5-1 Expected Effects of the Project

In this project, construction of new facilities and remodeling of the existing facilities of Tribhuvan University Institute of Medicine (IOM) and Tribhuvan University Teaching Hospital (TUTH) will be carried out to qualitatively and quantitatively improve Nepal's medical manpower, especially its medical officers, which the country urgently needs, and to cope with the increase in workload at TUTH. TUTH was established in March 1984 with grant aid from the government of Japan to improve the country's ability to train medical manpower, including medical officers, by enhancing of the hospital's educational functions.

After completion of this project, IOM will be responsible for the operation, management and maintenance of the newly constructed or remodeled facilities, as well as the existing facilities. Thus, there will be no problem with the operation, management and maintenance of the facilities constructed or remodeled under this project. Furthermore, the following effects can be expected from this project.

1. Basic Medical Science Building

In 1989, the number of medical officers per 10,000 population was only 0.53. Despite the urgent necessity of educating and training medical manpower, particularly medical officers, the present facilities of IOM, with some exceptions, are of such poor quality that they are not even sufficient to educate and train paramedical staff. While the minimum medical manpower required for medical education is met, IOM's annual intake of medical students is still limited to 30. It is confirmed that after completion of this project, it will be possible for IOM to increase its annual intake to 60 without greatly expanding its present teaching staff. Therefore, it is expected that IOM will increase its annual intake

of trainees in its medical officer training course (MBBS) upon project completion. Nepal has been greatly dependent on India, Great Britain, Bangladesh and other foreign countries for educating and training high-level health care professionals. About 45 Nepalese medical students obtain a medical doctor's license in foreign countries every year. This trend will probably continue. If, for example, IOM's annual intake of medical students increases to 60, it will be necessary to train more than 120 medical officers a year to increase the total number of medical officers from 954 in 1988/89 to 2,400 (targeted number) in the year 2000. Thus, a considerable number of Nepalese medical students will have to be trained in foreign countries for some time to come.

However, medical education institutions of some foreign countries do not authorize the credits their Nepalese medical students obtained at IOM because of the low level of IOM facilities. This makes it difficult for some Nepalese medical students to further study medicine in such foreign institutions of medical education. Upon completion of this project, IOM will increase its annual intake of medical students by 30 and it will become easier to Nepalese medical students to study abroad and obtain a medical doctor's license there. Therefore this project is judged to be conducive to the improvement and expansion of the country's medical officer training programme.

In addition, the improvement of the country's medical officer training programme will make it possible to provide advanced health services to all of its people. It will also help save foreign currency now spent on medical education in foreign countries.

2. Addition of 100 beds

Upon completion of the basic medical science building IOM's annual intake of medical students will be increased to 60. The total number of students on IOM's central campus will be 1,108 -- 300 in the medical officer training course, 350 in the paramedical staff training course, 360 in the

staff nurse training course, 60 in the BN nurse training course and 38 post graduates. As the present total of 300 sickbeds is insufficient for education and clinical medicine training, and since there has been a marked increase in the number of outpatients in recent years, it is necessary to increase the hospital's total number of sickbeds. Furthermore, the number of hospital sickbeds in Nepal per 10,000 population is 2.4 (1988), compared with 2.9 in Bangladesh, 6.1 in Bhutan and Maldives and 6.9 in India. There is a strong need for a policy measure to increase the country's total number of hospital sickbeds.

The government of Nepal has adopted a goal of increasing the total number of hospital sickbeds to 4,802 by the year 1995 and 6,470 by the year 2000. Under this programme, TUTH is to increase its total number of sickbeds by 200.

Upon completion of the project, it will also be necessary to increase TUTH's total number of nurses. In accordance with the provisions of its by laws, TUTH intends to operate part of the new wards as a pay ward and cover the total operation, management and maintenance costs, including personnel expenses, with the income from rental of beds.

3. Expansion of operation room ICU and CCU

In Nepal's present health service system, utmost emphasis is placed on the improvement and expansion of primary health care services to control such infectious diseases as malaria, tuberculosis and typhoid fever and to improve health conditions. But the need to meet the people's demands for advanced health services at hospitals becomes greater from year to year. As it has become increasingly difficult to receive advanced medical care services in India as a result of the worsening relations with India, it is time for the country to more actively promote the development of advanced medical care.

As TUTH's past records of medical treatment show, a considerable number of cases of circulatory trouble and malignant tumors, which are among the major causes of death in advanced countries, have been reported. It is obvious that this, together with the extension of the country's average life span, will become an important area of medical care requiring major policy measures in the near future. As such major policy measures require advanced technologies and facilities, however, it will be difficult to promptly implement them in light of the maintenance, management and operation requirements involved. Yet, there is a strong need for Japan to provide cooperation in this area, in stages and with a long-term perspective.

Although at present TUTH has 3 clean operation rooms, 2 non-clean operation rooms and 1 infectious disease minor operation room, it cannot keep pace with the rapid increases in the number of operations in recent years. In addition, most of these operation rooms are small, with the largest having a space of about $34m^2$. All of them are insufficient for large-scale operations or observations by students. If large operation rooms are added and the existing ICUs and CCUs are improved and expanded under this project, it will not only contribute to the improvement in the hospital's educational functions, but will also make possible technical cooperation for medical care technology transfer. This is a prerequisite for introducing of advanced medical care in this country. The increased number of operation rooms will help resolve the problem of the marked increase in the number of operations.

4. Oxygen Gas Production Plant

Despite the fact that oxygen gas is essential to hospital health services, oxygen gas production is very low. On top of that, priority is given to production of oxygen gas for industrial use. The country has thus far been heavily dependent on India for supply of this gas, so the worsening of relations with India has greatly affected the country in terms of

oxygen gas supply. At present, an oxygen gas production plant constructed with Japan's technical cooperation is in operation at Kanti Hospital. But TUTH intends to construct its new oxygen gas production plant because Kanti Hospital is under the jurisdiction of the Ministry of Health, while TUTH falls under the jurisdiction of the Ministry of Education and Culture, and because Kanti Hospital has a small production capacity.

As the new oxygen gas production plant is expected to ensure stable supply of high quality oxygen gas for medical use, the serious oxygen gas shortage will be eliminated, and there will no longer be situations where operations have to be postponed or cancelled due to insufficient supply of oxygen gas. Furthermore, if a certain quantity of oxygen gas is stored for emergencies, it will be possible to supply the medical facilities near TUTH with the oxygen gas stored for emergency use. The projected oxygen gas production plant should be easy to operate; its components should be easy to fix and compatible with those in Kanti Hospital's plant, making it easier to maintain and manage Kanti Hospital's plant, and allowing the two plants to back each other up to ensure stable supply of oxygen gas.

5. Water Treatment Plant

At TUTH, its well is the major source of water supply, but the well water is of poor quality. For this reason, the mesh of the filters mounted on the pure water production equipment, the distiller, the boiler and the autoclaves is easily clogged, which is one of the main causes of machine troubles. The inside of the scalder is covered with reddish brown scales. Thus, there is an urgent necessity to improve the quality of the water supplied within TUTH.

The raw water used at TUTH has a very high iron, manganese and ammonia content. Analysis determined that iron and manganese compounds are the main cause of the clogging of the mesh and the generation of scales.

In this plant, a ceramic filtration method will be employed to remove iron and manganese; pH adjustment will be achieved through chlorination to minimize plant maintenance costs.

The expected effects of this include lower maintenance costs for the refined water production equipment, the sterilized refined water production equipment, the distiller, the boiler and the autoclaves, prevention of machine troubles, prevention of discoloration of medical linen due to iron, and an improvement in the washing machine's performance.

6. Expansion of Existing Facilities of the Clinical Laboratories

At TUTH's clinical laboratories, there is an urgent need to expand the scope of biological and bacteriological examination. Most of the examinations carried out at the division's bacteriological laboratory are for infectious diseases. Furthermore, transfer of the technologies for culture separation and property, sensitivity examination of properties and sensitivity of dysentery bacilli, cholera bacilli and salmonellas has been completed through Japan's technical cooperation. As a result, there has been a sizable increase in workload at this laboratory, and more space is required. After completion of the facilities of TUTH, a strong need was felt to establish a virus laboratory, and the equipment warehouse and part of the staff rooms were converted into laboratory facilities. But these facilities are small. On top of that, the shortage of power sources and insufficient air conditioning has increased the possibility of infections within the hospital.

If the laboratory facilities are expanded, the technical level of treatment of viral and bacterial diseases is enhanced, and the hospital's capacity to accept referrals from other hospitals expands, TUTH will greatly improve its treatment of infectious diseases, which are the most prevalent diseases in Nepal. Furthermore, as most of IOM's basic medical science-related facilities are educational facilities, their expansion

will technically enhance the new training courses on virology and microbiology/bacteriology. As medical technology applies to clinical medicine and basic medical science, it is necessary, and possible, to utilize the staff and facilities of the two areas to expand the scope of basic medical science education at IOM. Furthermore, as it is necessary to expand and improve the hospital's medical technology to develop advanced medical care, the expansion of these laboratory facilities will have a far-reaching ripple effect.

7. Hospital Engineering Workshop

At TUTH, there are many pieces of medical equipment supplied as part of Japan's technical cooperation, in addition to those supplied at the time of the construction of its facilities. In this project, it is necessary to procure more than one unit of important equipment so that a backup unit or units may be utilized when machine trouble affects the regular unit or units. In this project, an overall system for deciding on specifications and placing orders for maintenance components and repair services will be worked out accounting for maintenance and management of medical equipment, storage of backup units and future equipment procurement plans.

The expected effects of such a system include:

a. Verification of equipment performance and safety through its acceptance testing.

b. Spread of engineering knowledge for the use of equipment among the clinical division's staff members in charge of equipment operation.

c. Regular inspection of equipment to ensure safety, high performance and prevention of machine troubles.

d. Repair of equipment, contracting out of repairs and procurement of components.

e. Storage of backup units.

f. Selection of proper specifications for equipment to be installed from a comprehensive point of view.

As at TUTH, the division in charge of this facility is also responsible for the maintenance of the generator, the water treatment plant, etc. The existing information management systems, including the alarm system, will be centralized. This will result in more efficient, safer measures against power failures, machine troubles, fires, etc.

The expected effects of this project and the results of their evaluation are as summarized in the following table.

Table 5-1 Summary of Project Effects

Items requested	Present condition/problems	Measures to be taken under this project	Effects of improvements made
Basic Medical Science Building	• Shortage of educational facilities • Poor quality of educational equipment • Education and training in the medical officer training course and the paramedical staff training course are carried at the same facilities • Shortage of teaching staff rooms	• 4 lecture rooms (seating capacity: 60) • 8 training rooms 1. Anatomy 2. Physiology 3. Pharmacology 4. Pathology 5. Biochemistry 6. Microbiology 7. Forensic medicine 8. Community medicine • Laboratory for common use • Staff rooms • Educational equipment	• It will become possible to increase by 30 the annual intake of students to take the medical officer training course to a total of 60. • It will become possible to conduct research and development activities by introducing additional equipment in the future. • Educational and research activities will be promoted as a result of an increase in the number of teaching staff rooms. • Improvements in the contents of the educational programs are expected. • It will be become easier to have graduates of IOM study abroad as a result of foreign countries' higher estimation of the quality of the country's medical education.
Ward building Addition of 100 beds	• Shortage of patient-cases necessary in education on clinical medicine • Shortage of sickbeds resulting from the sharp increase in the number of outpatients	• Addition of 100 hospital beds • Equipment for the ward building • Centralised oxygen gas and suction equipment.	• Sufficient number of patient-cases for educational use will be secured • Shortage of hospital beds due to the rapid increase in the number of outpatients will be resolved to some extent • An increase in income can be expected through introduction of paid beds

Items requested	Present condition/problems	Measures to be taken under this project	Effects of improvements made
Operating building	• The hospital currently has a total of 6 operating rooms-3 clean operating rooms, 2 non-clean operating rooms and 1 infectious disease operating rooms. Because most of them are too small, with even the largest operating room having a floor space of 34m², however, it is difficult to perform major operations. • There is a serious shortage of operating rooms due to the rapid increase in the number of operations performed • Insufficient capacity of CSSD. • Shortage of spaces, such as locker rooms, for the use of the staff members.	• The following facilities will be newly established in addition to the 3 existing clean operating rooms and 2 non-clean operating rooms. • 2 large operating rooms • X-ray operating room • 6 ICU beds • 5 CCU beds • Locker room • Space for resting and taking meals for the staff members • Operation observation facility • CSSD	• It will become possible to do large-scale operations and those performed for guidance purposes. • It will become possible to increase the CSSD's capacity as well as to separate clean and the non-clean areas. • Improvement in educational functions • Addition of a locker room and a space for resting. • It will become possible to make preparations for the introduction of advanced medical care in the future as a result of technical improvements in both preoperative and postoperative services.
Oxygen gas production plant	• Shortage of oxygen gas Daily consumption of oxygen gas: 35~36m³	• Oxygen gas production: 5m³/hour • Oxygen gas plant to store oxygen gas clynders	• Stable supply of oxygen gas • Qualitative improvements • It will become possible to establish a system for mutual backup with Kanti hospital's oxygen gas production plant. • About a half month's supply of oxygen gas cylinders (100 units) will be stored to provide against emergencies.
Water treatment plant Quantity treated: 20t/hour	• Poor water quality	• Estimated quantity treated: 14m³/hour • Treated water supply facility Overall supply: New facilities constructed under this project 1st floor of the existing ward building on the northern side Partial supply: 9 points in the outpatient building. 11 points in the central medical examination building.	• Removal of iron and manganese which are the cause of clogging of the filters of the medical equipment • pH treatment • Removal of ammonia is not included in this project. • Targeted values for the quality of treated water Fe 7.25mg/ℓ→≤0.3mg/ℓ Mn 0.57mg/ℓ→≤0.3mg/ℓ
Expansion of the Clinical laboratories	• Shortage of facilities at the viological and bacteriological laboratories	• Move and expansion of the viral and microbiological laboratories	• Resolution of the shortage of floor spaces • Lessening of the danger of infections within the hospital
Expansion of the X-ray department	• Shortage of general X-ray equipment due to the fact that almost all of the X-ray examinations are done through general X-ray • Present condition of facilities 4 X-ray rooms: No.1 general X-ray No.2 tomography No.3 fluoroscopy No.4 blood vessel X-ray + bucky stand • 1 movable X-ray machine 1 movable X-ray machine for use in surgical operations	• A bucky stand, an automatic processor and a movable X-ray machine are to be installed under the technical cooperation program. As these additions are considered bearable for the current work load at the hospital, no remedial measures for this division are included in this project.	
Hospital engineering workshop	• Poor quality of the equipment maintenance facility and shortage of equipment	• Workshop • Equipment warehouse	• Improvements in the maintenance and management of the medical equipment

5-2 Conclusion

After examining the request made by the government of Nepal, the field survey, and the analysis of the background and contents of this project, it was confirmed that this project will not only yield the great effects described above but will also contribute to the enhancement of standards of living through improved health services. Accordingly, it is judged appropriate and reasonable to implement this project with grant aid from Japan. Furthermore, it is possible to secure the necessary number of local health service professionals and the necessary budget for the operation and management of the facilities constructed, expanded or improved under this project, although the Nepalese system for its operation and management is not sufficient in terms of total number of health service professionals and budget. The evaluation of the expected effects of this project, examination of its nature, and the practicality of the proposed system for operating and maintaining it is detailed below.

5-2-1 Target Effects of the Project

The objectives of this project include the increase in the number of medical officers and other health service professionals, improvement in their capabilities, improvement in TUTH's medical care and education functions, enhancing education and training of medical manpower, including medical officers, structuring the government of Nepal's policies to cope with the recent increased demand for health services, realization of a nationwide referral function and enhancement of the quality of the country's overall health services.

5-2-2 Evaluation of Targeted Effects of the Project

It is difficult to quantitatively evaluate the objectives of this project. On the other hand, the concrete effects of this project on the individual facilities planned are as described in "5-2 Effects of the Project".
In Nepal, there is an absolute shortage of medical officers, and the

government of Nepal's efforts to educate and train medical officers have just started. In view of the fact that even today more than half of the country's would-be medical officers are trained in foreign countries, this project, aims to secure the necessary number of medical officers and other health service professionals by expanding facilities of IOM, the country's only institution for medical manpower development. The resulting increase in the medical department's annual intake of medical officer student trainees as well as improved curricula content is considered appropriate and reasonable. On the other hand, TUTH, established in 1984, has overcome the difficulties it faced immediately after opening, and now requires a drastic expansion of its facilities and staff in order to cope with the ever-increasing demand for health services, exemplified by the marked increase in outpatients and inpatients.

Furthermore, the necessary number of cases will certainly be secured and IOM's annual intake of medical officer student trainees will certainly be increased from 30 to 60 upon completion of this project for TUTH to function effectively.
Thus, it is necessary to increase the number of patients who can help in clinical education programmes at the hospital. In this project, therefore, the number of beds for the hospital will be increased by 100 to a total of 400.

The expansion of operation division facilities is aimed at coping with the rapidly increasing number of operations, improving the division's ability to sterilize the equipment, implementing in stages educational programmes preliminary to performing advanced operations currently performed at foreign medical facilities, establishing preoperative/post-operative service techniques and systems for ICUs/CCUs, securing educational spaces, and improving the working environment for the division's staff from a long-term perspective. Thus, the expansion of this division's facilities will greatly contribute to a marked improvement in TUTH's functions.

The activities of TUTH's medical technology department are closely interrelated with those of IOM's basic medicine education section. Generally, routine examinations are carried out by the former and laboratory research work is carried out by the latter. Regarding the operation of the laboratory-related portion of the basic medicine-related facilities, however, priority will be given to improve educational functions for the time being, due to the shortage of staff members and equipment. Therefore, the cooperation of TUTH's clinical examination division will be required. Also, the clinical examination facilities will be utilized for laboratory research. Thus, expansion of the division's facilities will greatly contribute to improved research in the area of basic medicine.

The above-mentioned expansion of basic medicine facilities, wards and operating building, and the expansion and improvement of clinical examination division facilities are both reasonable and urgently needed. Furthermore, these facilities are all closely interrelated, and are expected to enhance the educational effects of this project, which are the most important of all the effects expected of this project.

The planned oxygen gas production plant and the water treatment plant, are aimed at meeting the minimum requirements in the areas of health service and research work, and are also considered appropriate and reasonable.

The maintenance and management services of the hospital engineering workshop are expected to perpetuate the effects of the grant aid the government of Japan has thus far provided, and should enhance the effects of the technical cooperation which the government of Japan will provide in the future.

5-2-3 Characteristics of the Project

This project is part of a series of Japan's grant aid programmes centered on the Tribhuvan University medical education project launched in 1980. Thus far, Tribhuvan University Teaching Hospital (established in March 1984) and the nurses campus (established in March 1986) have been constructed under the grant aid programmes. The project's main objective is to improve and expand IOM's medical education functions and TUTH's health service functions. It is also aimed at reassessing the functions of the hospital which has been operating for about six years and revitalizing the hospital by integrating the functions of the facilities to be under taken in this project with those of existing facilities. In this context, it is necessary to ascertain the extent to which the Nepalese can operate and maintain the projected facilities to maximize the effects of present and future technical cooperation programmes.

As it will be difficult to overcome these problems currently facing IOM and TUTH through this project alone, only those areas considered reasonable in terms of degree of urgency and priority are included in this project.

5-2-4 Operation and Management of the Project

Tribhuvan University Institute of Medicine will be responsible for the implementation of this project as well as for the operation and management of the projected facilities. IOM's annual intake of students to take the medical officer training course will increase from 30 to 60 upon completion of the new basic medical science building, but there will be no problem with the operation of the training course and the new building, except that additional auxiliary staff will be required for teaching and administration. On the other hand, the projected addition of 100 beds will require expansion of the nursing care staff. But TUTH is planning to

operate some of the additional beds as pay beds and cover the additional ward administration expenses with the income from their rental.

The expansion of the medical technology department is aimed mainly at coping with the present space shortage and ensuring safety. As the department's operations are closely interrelated with those of the basic medical science education section of IOM, the planned technical cooperation will be implemented on a selective basis. So there is no problem with its operation.

Regarding the personnel responsible for the operation and management of the hospital engineering workshop, the oxygen gas production plant and the water treatment plant, the present staff of 29, including 4 university graduates, will need to grow.

As mentioned above, the objective of this project is to expand and improve the functions of both IOM and TUTH.
Accordingly, both institutions are to operate and manage the projected facilities with their present organization and staff. Part of the additional costs for operation and management of the projected facilities will be covered by income from medical service charges. Also, it will be easy to increase the number of staff, particularly nurses. As there is no particular problem with the operation and management of the projected facilities, this project is considered highly reasonable and practical in terms of the operation and management of the projected facilities.

APPENDIX – 1

1-1 Member List of the Basic Design Study Team

(1) Basic Design Study (November 7 ~ December 3, 1989)

Dr. Yoshitaka MORI	Leader	Professor, Hyogo College of Medicine
Dr. Hitoshi KOYANAGI	Clinical Medicine	Professor, Tokyo Women's College
Mr. Tsutomu IWASAKI	Project Coordination	Grant Aid Planning and Survey Department, JICA
Mr. Ken MAJIMA	Project Manager, Architectural Planning	Yamashita Sekkei Inc.
Mr. Masahiro KATSUME	Architectural Design	〃
Mr. Kazuhiko KON	Water Treatment & Mechanical Facilities	〃
Mr. Norio ISHIOKA	Electrical Facilities	〃
Mr. Kazhuhiro ABE	Medical Equipment Planning	〃

(2) Explanation of Draft Final Report (February 23 ~ March 4, 1990)

Dr. Yoshitaka MORI	Leader	Professor, Hyogo College of Medicine
Dr. Masao FUJITA	Clinical Medicine	Professor, Tokyo Women's College
Mr. Akira OKUYAMA	Project Coordination	General Affairs Department, JICA
Mr. Ken MAJIMA	Project Manager, Architectural Planning	Yamashita Sekkei Inc.
Mr. Masahiro KATSUME	Architectural Design	〃
Mr. Kazhuhiro ABE	Medical Equipment Planning	〃

1-2 Survey Schedule

(1) Basic Design Study (November 7 ~ December 3, 1989)

No.	Date	Place	Schedule
1	Nov. 7 (Tue)		●Lv. Tokyo (Messrs. Majima, Katsume, Abe)
2	Nov. 8 (Wed)	Kathmandu	●Ar. Kathmandu ●Meeting at JICA Office
3	Nov. 9 (Thu)	〃	●Meeting at Institute of Medicine (IOM) ●Courtesy call on Embassy of Japan
4	Nov. 10 (Fri)	〃	●Survey on IOM and TUTH ●Meeting at TUTH ●Survey on construction condition
5	Nov. 11 (Sat)	〃	●Survey on TUTH
6	Nov. 12 (Sun)	〃	●Meeting at TUTH and IOM
7	Nov. 13 (Mon)	〃	●Survey on TUTH, Kanti children's hospital ●Meeting at JICA Office
8	Nov. 14 (Tue)	〃	●Meeting at TUTH ●Meeting and Survey on Pathology, Anatomy, Radiology, Dermatology, Psychiatry, Dentistry, ENT, Pharmacy ●Survey on construction condition
9	Nov. 15 (Wed)	〃	●Ar. Kathmandu (Messrs. Ishioka, Kon) ●Meeting and Survey on Pharmacology, General medicine, Forensic medicine, Radiology, Pathology
10	Nov. 16 (Thu)	〃	●Survey on Anatomy, Surgery, Operation/ICU, Physical examination, Ward, Community medicine ●Survey on maintenance dept. (Messr. Ishioka, Kon)
11	Nov. 17 (Fri)	〃	●Survey on construction condition (Messrs. Ishioka, Kon) ●Survey on medical equipment (Mr. Abe) ●Meeting at IOM and survey on Bir hospital, Patan hospital (Messrs. Majima, Katsume)
12	Nov. 18 (Sat)	〃	●Survey on construction site
13	Nov. 19 (Sun)	〃	●Survey on TUTH (Mr. Abe) ●Survey on construction condition (Mr. Katsume) ●Meeting at maintenance dept. (Messrs. Ishioka, Kon)
14	Nov. 20 (Mon)	〃	●Meeting at IOM ●Survey on construction condition (Messrs. Ishioka, Kon)
15	Nov. 21 (Tue)	〃	●Meeting and survey on Dentistry, ENT, Emergency, Pharmacy, Dermatology, Orthopedics ●Survey on construction condition (Messrs. Ishioka, Kon)

No.	Date	Place	Schedule
16	Nov. 22 (Wed)	Kathmandu	● Ar. Kathmandu (Dr. Mori, Mr. Iwasaki) ● Meeting with the team ● Courtesy call on JICA Office
17	Nov. 23 (Thu)	〃	● Courtesy call on Embassy of Japan ● Courtesy call on IOM, TUTH
18	Nov. 24 (Fri)	〃	● Courtesy call on vice-chancellor of Tribhuvan University
19	Nov. 25 (Sat)	〃	● Meetign with Deam
20	Nov. 26 (Sun)	〃	● Courtesy call on the Ministry of Fiance ● Survey on construction condition (Messrs. Katsume, Abe, Ishioka, Kon) ● Meeting at IOM
21	Nov. 27 (Mon)	〃	● Ar. Kathmandu (Dr. Koyanagi) ● Meeting at IOM ● Meeting within the team
22	Nov. 28 (Tue)	〃	● Meeting at IOM
23	Nov. 29 (Wed)	〃	● Meeting within the team ● Meeting on the minutes
24	Nov. 30 (Thu)	〃	● Courtesy call on the Ministry of Education and Culture ● Signing of the minutes ● Survey on construction condition
25	Dec. 1 (Fri)	〃	● Report the result to JICA Office and Embassy of Japan ● Meeting at TUTH
26	Dec. 2 (Sat)	〃	● Lv. Kathmandu
27	Dec. 3 (Sun)		● Ar. Tokyo / Osaka

(2) Explanation of Final Draft Report (February 23 ~ March 4, 1990)

No.	Date	Place	Schedule
1	Feb. 23 (Fri)		● Lv. Tokyo (Messrs. Okuyama, Majima, Katsume, Abe)
2	Feb. 24 (Sat)	Kathmandu	● Ar. Kathmandu ● Meeting with expert and coordinator of TUTH
3	Feb. 25 (Sun)	〃	● Meeting at IOM ● Survey on site
4	Feb. 26 (Mon)	〃	● Meeting at IOM ● Survey on site
5	Feb. 27 (Tue)	〃	● Meeting at IOM ● Survey on TUTH
6	Feb. 28 (Wed)	〃	● Ar. Kathmandu (Dr. Mori, Fujita) ● Survey on construction condition ● Meeting within the team ● Courtesy call on IOM
7	Mar. 1 (Thu)	〃	● Meeting on IOM ● Signing of the minutes ● Report the result to JICA Office and Embassy of Japan
8	Mar. 2 (Fri)	〃	● Meeting at TUTH ● Meeting within the team
9	Mar. 3 (Sat)	〃	● Lv. Kathmandu
10	Mar. 4 (Sun)		● Ar. Tokyo/Osaka

1-3 Member List of the Nepalese Counterparts

(1) Ministry of Finance

Mr. P. P. Dahal	(Joint Secretary)

(2) Ministry of Education and Culture

Sir. P. N. Chowdhary	(Minister)
Mr. U. B. Amatya	(Under Secretary)

(3) Tribhuvan University

Dr. S. Rj Pathak	(Vice-Chancellor)

(4) Tribhuvan University Institute of Medicine

Dr. B. P. Prasai	(Dean)
Dr. G. P. Acharya	(Prof. of Medicine)
Dr. A. K. Sharma	(Prof. of Surgery)
Dr. M. P. Upadhayay	(Prof. of Ophthalmology)
Dr. Hemang Dexit	(Prof. of Child Health)
Dr. K. K. Kafle	(Prof. of Pharmacology)
Dr. R. C. M. Amatya	(Prof. of ENT)
Dr. T. B. Budathoki	(Prof. of Radiology)
Dr. R. Amatya	(Prof. of Anaesthesiology)
Dr. S. K. Dutta	(Prof. of Anatomy)
Dr. M. P. Shrestha	(Prof. of Community Medicine)
Dr. H. G. Shrestha	(Asst. Prof. of Pathology)
Dr. S. B. Sharma	(Asst. Prof. of Forensic Medicine)
Dr. N. K. Singh	(Asst. Prof. of Dermatology)
Dr. M. K. Nepal	(Asst. Prof. of Psychiatry)
Dr. B. Shrestha	(Chief Planning)
Dr. M. P. Gupta	(Head of Emergency)
Dr. R. D. P. Shah	(Head of Endoscopy)
Dr. P. K. Jha	(Lecturer of Orthopedic)
Mr. S. K. Gupta	(Assistant Dean of Academic)
Mr. N. P. Thapaliya	(Planning Section)

(5) Tribhuvan University Teaching Hospital

Dr. B. R. Rizal	(Director)
Ms. S. Bhattacharya	(Matron)
Ms. K. Srivaslare	(Pharmacist)
Mr. K. P. Nepal	(Assistant Physiotherapy)
Mr. C. K. Rai	(Administrative Officer)
Mr. J. Acharya	(Administrator)
Mr. R. Taujale	(Maintenance Officer)

Mr. D. N. Pathak	(Maintenance Officer)
Mr. R. Shrestha	(Assistant Maintenenace Officer)

(6) Bir Hospital

Dr. T. B. Khatry	(Director)
Dr. N. B. Rana	(Chief of Anesthesiology)
Dr. N. B. Amatya	(X-ray Dept.)
Dr. M. B. Sherestha	(Dental Dept.)

(7) Kanti Children's Hospital

Dr. N. B. Thapa	(Director)

(8) Nepal Electricity Authority

Mr. D. R. Sakya	(Deputy Director)

(9) Nepal Telecom Corporation

Mr. R. L. Shrestha	(Regional Manager)

(10) The Embassy of Japan

Mr. Kazuaki Arichi	(Ambassador of Japan)
Mr. Takao Nishina	(Counsellor)
Mr. Toshiaki Tanaka	(Second Secretary)

(11) JICA Nepal Office

Mr. Hidekazu Kumano	(Resident Representative)
Mr. Masatoshi Nagatomo	(Deputy Resident Representative)
Mr. Masahito Oyama	(Assistant Resident Representative)
Mr. Yoshinori Terasaki	(Coordinator)
Mr. Kenji Sawamura	(TUTH Technical Cooperation Team Leader)
Mr. Yoshikuni Sato	(TUTH Technical Cooperation Expert)
Mr. Toshimoto Ishibashi	(ditto)
Mr. Mamoru Nakanishi	(ditto)
Mr. Yurie Tomiyoshi	(ditto)
Mr. Kenzo Sasagawa	(ditto)
Mr. Kouichi Mimura	(ditto)

MINUTES OF DISCUSSION
ON
THE BASIC DESIGN STUDY OF THE PROJECT
FOR
THE EXPANSION OF TRIBHUVAN UNIVERSITY, INSTITUTE OF MEDICINE AND THE TEACHING HOSPITAL
IN
THE KINGDOM OF NEPAL

In response to the request of His Majesty's Government (HMG) of Nepal, the Government of Japan decided to conduct a basic design study on the Project for the Expansion of Tribhuvan University, Institute of Medicine and the Teaching Hospital (TUTH) (hereinafter referred to as "the Project") and entrusted the study to Japan International Cooperation Agency (hereinafter referred to as JICA).

JICA sent to the Kingdom of Nepal a study team headed by Dr. Yoshitaka MORI, Professor of Hyogo College of Medicine from November 7 to December 3, 1989.

The team had a series of discussions on the Project with the authorities concerned of His Majesty's Government of Nepal, and conducted a field survey in Kathmandu.

As a result of the study, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, as attached herewith, should be examined towards the realisation of Project.

Kathmandu, November 30, 1989

Prof. Yoshitaka MORI
Team Leader
Basic Design Study Team
Japan International
Cooperation Agency

Prof. B.R. Prasai
Dean
Institute of Medicine,
Tribhuvan University,
Nepal

ATTACHMENT

1. The Project Title

   The Project for the Expansion of Tribhuvan University, Institute of Medicine and the Teaching Hospital

2. The Objective of the Project

   The objective of the Project is to improve the present conditions of Tribhuvan University, Institute of Medicine and the Teaching Hospital (TUTH) in the field of medical education and medical services through construction and remodeling of hospital buildings, and through supply and installation of medical equipment.

3. The Responsible and Coordinating Agencies

   The Institute of Medicine (IOM), Tribhuvan University shall be responsible for the efficient management and execution of the Project under the overall coordination of the Ministry of Education and Culture (MOEC).

4. The Executing and Implementing Agency

   Institute of Medicine, Tribhuvan University

5. The Project Site

   The project site is in the premises of TUTH at Maharajgunj, Kathmandu as shown in Annex I.

6. The Major Items Requested for the Project

   The major items requested for the Project are listed in Annex II.

7. Grant Aid Programme

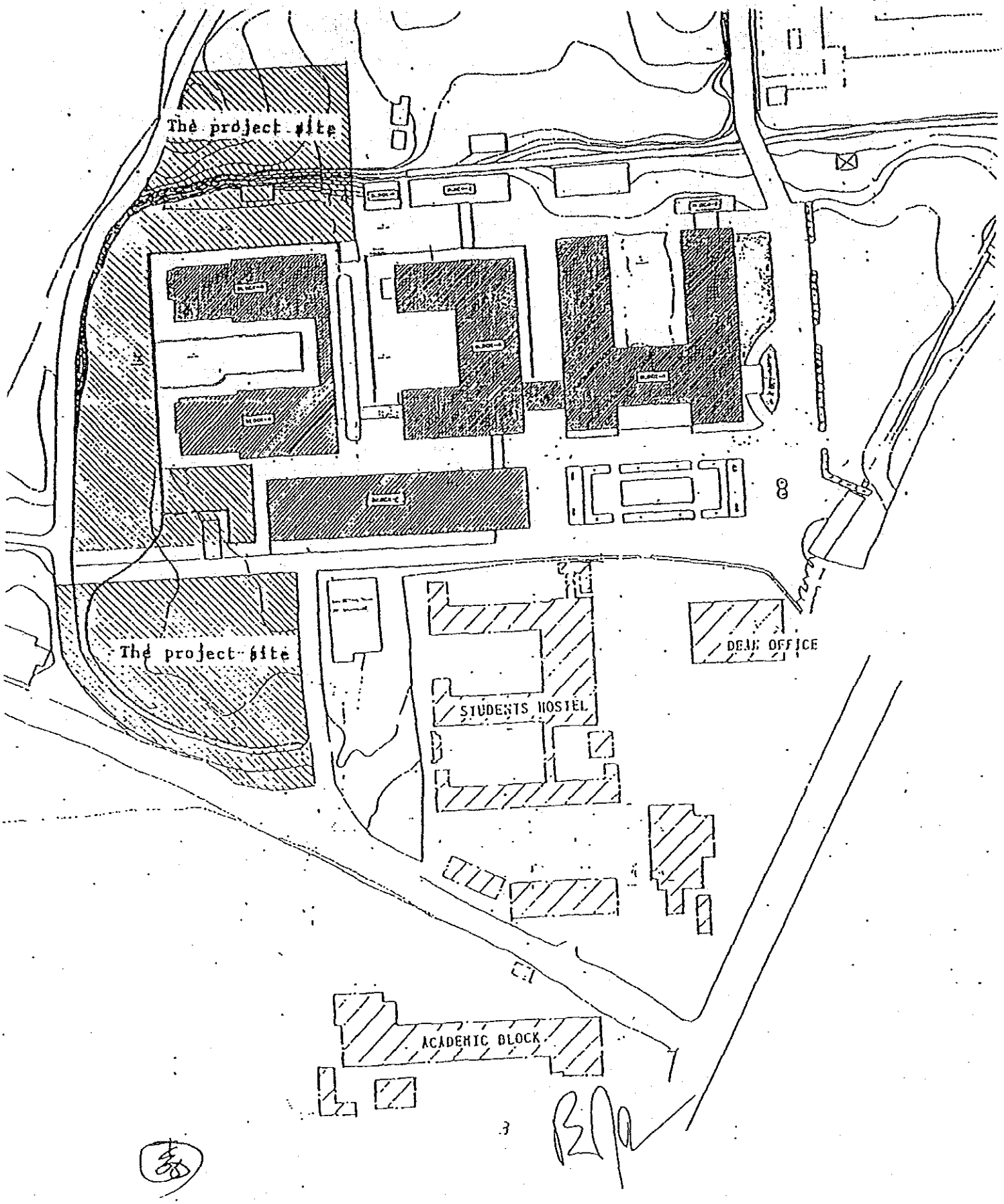
   (1) HMG, Nepal has understood the system of Japan's Grant Aid Programme and the principle of use of Japanese consulting firm and contractor(s) for the implementation of the Project.

   (2) The Study Team will convey to the Government of Japan the desire of HMG, Nepal that the former takes necessary measures to cooperate in implementing the Project by providing necessary facilities and equipment as listed in Annex II under the Japan's Grant Aid Programme.

(3) HMG, Nepal will take necessary measures as listed in Annex III, on condition that the Grant Aid by the Government of Japan would be extended to the Project.

Annex I

The site for the Project.



Annex II

The Major Items Requested for the Project.

1. Items requested by HMG, Nepal in order of priority are as follows:

   (1) Basic medical science building

   (2) Expansion of 100 beds

   (3) Expansion of operation theatre, I.C.U. and C.C.U.

   (4) Oxygen gas plant and water treatment plant

   (5) Minor remodeling of the existing clinical laboratories, X-Ray facilities, etc.

   (6) Maintenance Workshop

2. Medical equipment.

   Appropriate medical equipment for the above items will be included in the Project.

Annex III

The Arrangements required to be taken by HMG, Nepal.

1. To secure the site for the Project.

2. To demolish, clear, and level the site prior to the commencement of the construction.

3. To undertake incidental outdoor work such as gardening, fencing, gates, and exterior lighting in and around the site.

4. To construct the access road to the site prior to the commencement of the construction.

5. To provide facilities for distribution of electricity, water supply, telephone, drainage, sewage and other incidental facilities to the project site.

6. To bear commissions to the Japanese foreign exchange bank for the banking services based on the Banking Arrangement.

7. To ensure the necessary budget and the personnel for the proper and effective operation, and maintenance of the facilities and the equipment provided under the Grant.

8. To ensure prompt unloading, tax exemption, customs clearance at the port of disembarkation in the Kingdom of Nepal for prompt internal transportation of the materials and equipment provided under the Grant.

9. To exempt Japanese nationals from custom duties, internal taxes and other fiscal levies which may be imposed in the Kingdom of Nepal with respect to the supply of products and services for the Project.

10. To accord Japanese nationals whose services may be required in connection with the supply of products and the services under verified contract, such facilities as may be necessary for their entry into the Kingdom of Nepal and stay therein for the performance of their work.

11. To maintain and use, properly and effectively the facilities constructed and equipment purchased under the Grant.

12. To bear all the expenses other than those to be borne by the Grant, necessary for the construction of the facilities as well as for the transportation and installation of the equipment.

Minutes of Discussions
on
The Draft Final Report of the Basic Design Study
on
The Project for The Expansion of Tribhuvan University,
Institute of Medicine and The Teaching Hospital
in
The Kingdom of Nepal

In response to the request made by His Majesty's Government of Nepal, the Government of Japan decided to conduct a basic design study on the Project for the Expansion of Tribhuvan University, Institute of Medicine and the Teaching Hospital (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to the Kingdom of Nepal a study team from November 7 to December 3, 1989.

As a result of the study, JICA prepared a draft report and dispatched a mission headed by Dr. Yoshitaka Mori, Professor of Hyogo College of Medicine to explain and discuss it from February 23 to March 4, 1990.

The team had series of discussions on the Project with the officials concerned of Tribhuvan University, Institute of Medicine and the Teaching Hospital headed by Professor B.R. Prasai, Dean, Institute of Medicine, Tribhuvan University. After clarifying its contents, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Kathmandu, March 1, 1990

Prof. Yoshitaka Mori
Team Leader
Draft Report Team of
Basic Design Study
Japan International
Cooperation Agency

Prof. B.R. Prasai
Dean
Institute of Medicine,
Tribhuvan University,
Nepal

ATTACHMENT

1. The Nepalese side agreed in principle to the basic design proposed in the Draft Report with minor but appropriate alteration to be incorporated in the Final Report.

2. The Final Reports (10 copies in English) on the Project will be submitted to the Nepalese side in April 1990.

3. The Nepalese side understood the system of Japan's Grant Aid Programme and confirmed the arrangements to be taken by the Government of the Kingdom of Nepal for the realization of the Project as agreed upon in the "Minutes of Discussions" dated November 30, 1989.

4. The Nepalese side ensured that annual intake of MBBS course will increase from 30 to 60 upon completion of the basic medical science building.

5. The Nepalese side agreed to secure additional personnel required for proper operation of IOM and TUTH facilities proposed in the (draft) basic design study report.