

No. 09

**BASIC DESIGN STUDY REPORT  
ON  
THE TEACHING HOSPITAL PROJECT  
FOR  
TRIBHUVAN UNIVERSITY  
IN  
THE KINGDOM OF NEPAL**

NOVEMBER 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

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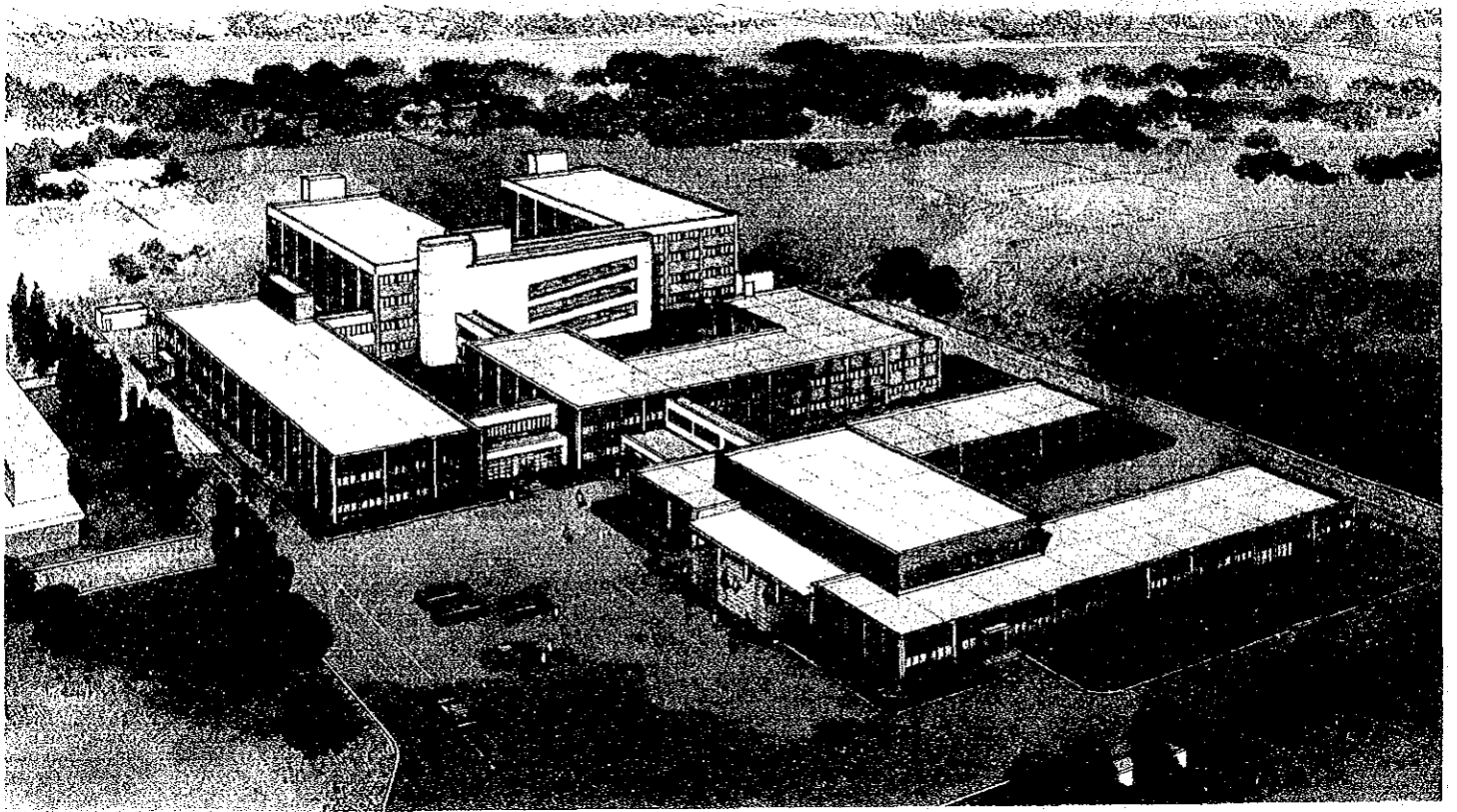
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## PREFACE

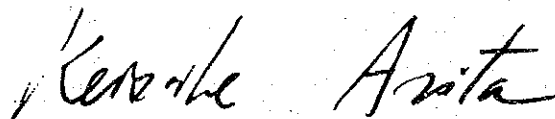
In response to the request of the His Majesty's Government of the Kingdom of Nepal, the Japanese Government decided to conduct a survey on the Tribhuban University Teaching Hospital Project and entrusted the survey to the Japan International Cooperation Agency (JICA). The JICA sent to Nepal survey teams, i.e. from January 20 to 29, 1981 and from June 26 to July 19, 1981.

The team exchanged views with the officials concerned of the His Majesty's Government of the Kingdom of Nepal and conducted field survey. After the team returned to Japan, further studies were made and the present report has been prepared.

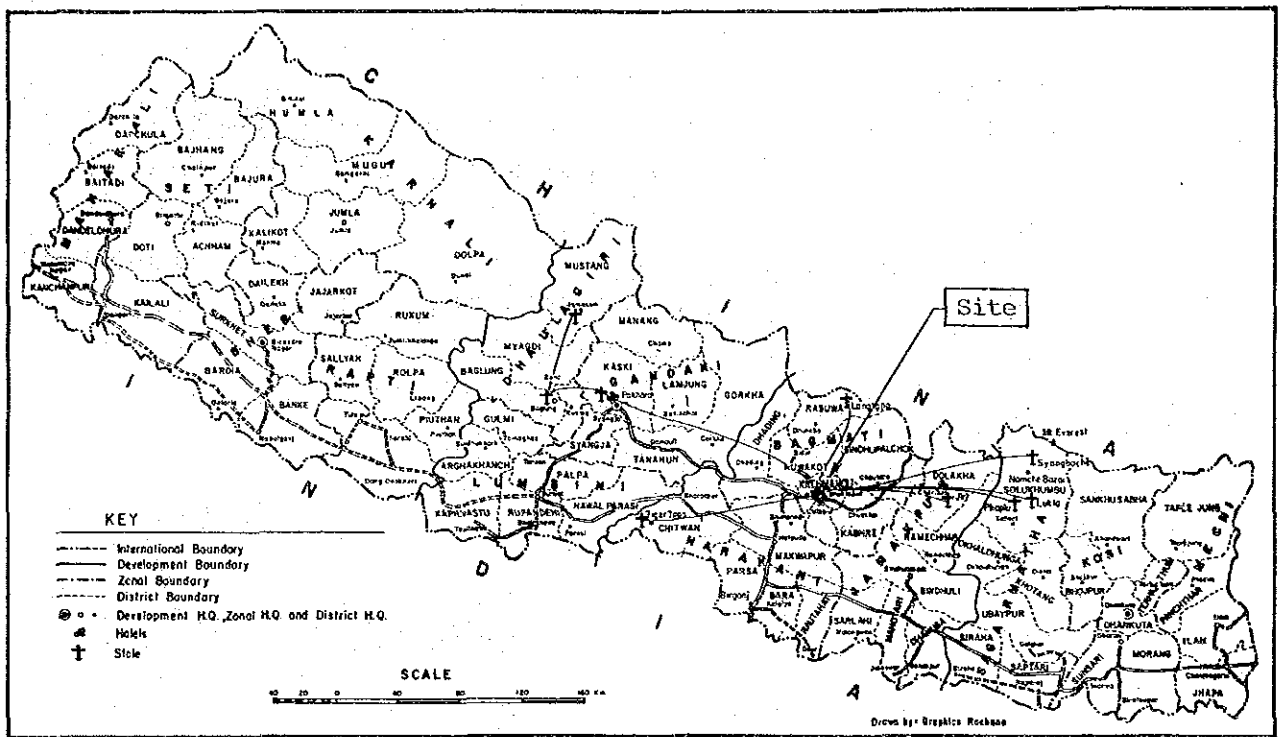
I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the His Majesty's Government of the Kingdom of Nepal for their close cooperation extended to the teams.

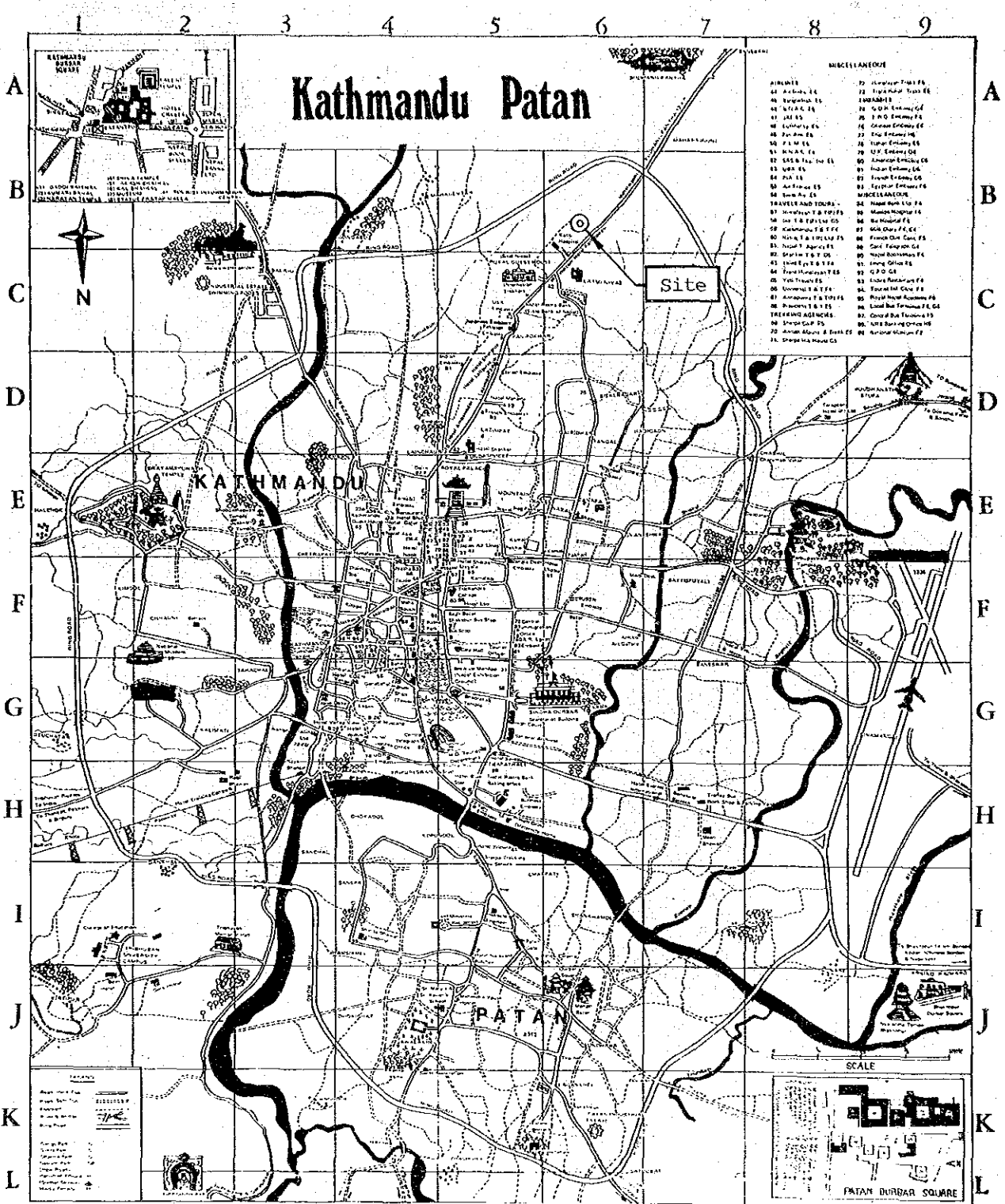
November, 1981



Keisuke Arita, President  
Japan International  
Cooperation Agency



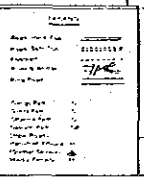
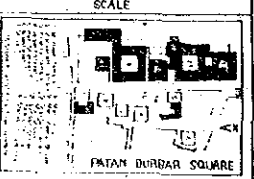
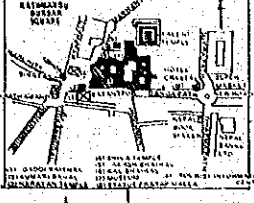




# Kathmandu Patan

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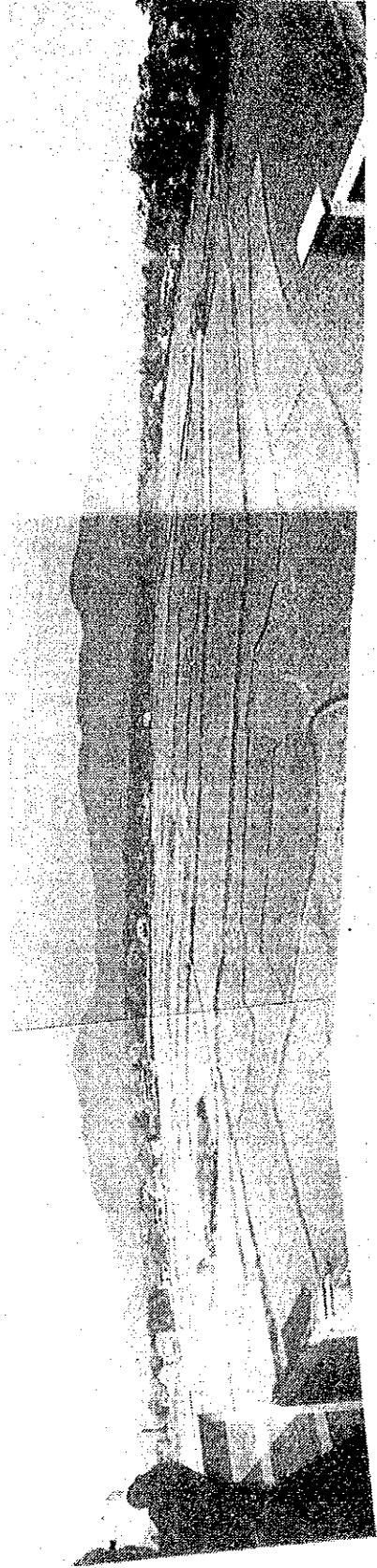
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SCALE



Site View from North-East



Site View from Institute of Medicine

## SUMMARY

- 1) In order to improve health and medical services for the people, the His Majesty's Government of the Kingdom of Nepal founded a medical school at Tribhuvan University in 1972, departing from the previous method of medical training dependent on foreign assistance, e.g., sending students to the U.S.S.R. and India. They have since then been making every effort to domestically train medical staff as an important measure under the Long-term Health and Medical Program: 1975-1990. However, in view of the fact that there is a definite shortage of medical personnel, e.g., doctors and nurses, and that the diploma course at the Medical School has only recently been established, construction of a teaching hospital as a place of clinical training is considered to be an urgent task.

On the occasion of King Birendra's visit to Japan in May, 1978, a request was made by the Nepalese Government for Japanese cooperation concerning the training of medical manpower and the construction of a teaching hospital. In view of the importance and urgency of the training of medical manpower in Nepal, the Japanese Government began providing technical cooperation in project form in August, 1980. As regards the construction of the proposed teaching hospital, after sending a preliminary survey team to Nepal in January, 1981, to study the scope of the Nepalese request and the arrangements for receiving it, it was decided to carry out a basic design survey.

- 2) The total number of doctors residing in Nepal was 415 in 1979. The doctor/population ratio was one per 36,450 population in 1974. This ratio indicates the extent of the shortage of medical manpower in Nepal, especially compared with the ratio of one per 868 population in the case of Japan (1973).

The Nepalese Government has placed the teaching hospital construction project as a national project of high priority among its medical and health measures along with the medical cooperation project which is already in progress, intending to forcefully step up the training of medical manpower under the long-term medical and health program lasting until 1990.

- 3) This basic design survey is intended to study the economic and technical level, climate, topography, customs, etc. in Nepal on the basis of field surveys so that a basic design survey report for the construction of a teaching hospital suitable for local conditions can be prepared.
- 4) The proposed teaching hospital, to be located adjacent to the Institute of Medicine of Tribhuvan University, is intended to train medical manpower. At the same time, being one of Nepal's leading general hospitals, it is to have independent functions as such, although emphasis may be placed on its link with Kanti Children's Hospital adjacent to the existing university facilities. Furthermore, wards are to be separated from other facilities to prepare for a future increase in bed capacity with the scale and equipment for diagnosis and treatment facilities given some allowance for the future expansion of wards. Consideration is also to be given to the use of the central diagnosis and treatment department as the central medical center in Kathmandu, making its facilities available for existing medical demands.
- 5) The proposed teaching hospital is to provide 305 beds with a total floor space of about 15,000m<sup>2</sup>, or about 50m<sup>2</sup> per bed. The hospital is to consist of four blocks: outpatient (two-story), testing and administration (two-story), operation (two-story) and wards (4-story).

6) Contents of the facilities

o Outpatient Department

Medical office: reception, screening.

Diagnosis and therapy section: examination room, treatment room, waiting room.

Casualty section: reception, operation room, treatment room, observation room, staff room.

Dispensary: reception, office, store room.

o Central examination and treatment department

Radiology unit: waiting room, radiography room, technician's room, reading room, dark room, film store room.

Physiological test section: cardiograph, electroencephalogram, electromyogram, pulmonary function test.

Sample test section: serum, bacteria, virus, biochemistry, pathology, blood sampling, urine sampling.

OT unit: operation room, anesthetic room, recovery room, staff room.

CSSD: reception, washing room, sterilization room, equipment room.

Pharmacy: preparation room, store room.

Pathoanatomy section: autopsy room, specimen room, mortuary room, staff room.

Physiotherapy section: reception

o Administration department

General administration section: general office, Director's room, Deputy Director's room, Matron's room, reception room, conference room.

Medical office: professors' rooms, part-time professors' rooms, senior doctors' rooms, junior doctors' rooms.

o Service department: machinery room, kitchen, staff dining room, laundry.

o Ward unit

General ward: sick rooms, nurse station, treatment room, day room, conference room.

Obstetric ward: sick rooms, nurse station, treatment room, day room, conference room, labor room, delivery room, infants' room.

ICU, CCU: sick rooms, nurse station, treatment room.

o Research department: common laboratory, library, lecture room, anesthetic laboratory.

As regards medical equipment, mainly those for which maintenance can be carried out easily and at low costs are to be installed by taking account of those to be provided under technical cooperation which has been in operation since 1980.

- 7) In view of the scale of the facilities, they are to be constructed in two phases. In the first phase, two blocks, outpatient and test/administration, are to be constructed, allocating four months to implementation designing, one to tender and contract formalities and fourteen months to construction. In the second phase, the other two blocks, operation and wards, may be constructed, allocating four months, one month and twenty-one months respectively.
- 8) As regards construction arrangements, a Japanese general contracting firm is to be responsible for the entire construction work from the procurement of materials to site work control.

- 9) As regards maintenance and administration, they are expected to require an annual budget of about ¥400 million, including personnel, utility, medical and cleaning costs. Therefore, adequate funds provided by the Nepalese Government and technical training for maintaining hospital functions will be indispensable for satisfactory hospital administration.
- 10) The construction of this teaching hospital is expected to greatly contribute to the training of medical personnel, an urgent task for Nepal's medical and health services, providing, at the same time, a base for Japan's technical cooperation. Moreover, it is expected to play an important role as a general medical center for the country, contributing to the improvement of medical treatment techniques not only by increasing the number of beds but by making the central treatment department available to augment the existing medical facilities.
- 11) The following steps must be taken by the Nepalese Government to ensure satisfactory and prompt implementation of this project:
  - i) Problem areas prior to and during construction
    - (1) Preparation of the site prior to the commencement of construction and provision of land space for a temporary office and workshops, etc.
    - (2) Preparation of urban infrastructure prior to the completion of construction.
    - (3) Nepalese cooperation in various formalities, tax exemption and customs clearance concerning the transportation of construction machinery and materials.
    - (4) Stable supply of domestic construction materials.

ii) Problem areas after construction

- (1) Recruitment of maintenance and control personnel for buildings and equipment.
- (2) Establishment of an administrative organization.
- (3) Budgetary measures necessary for smooth administration and management.

Of the above steps, the budgetary measures concerning the recruitment of doctors, nurses, maintenance and control personnel are important as they decide the outcome of this project. Therefore, unless these conditions are met on the Nepalese side, complete implementation of this project will be impossible and its objectives, i.e., training of medical manpower and the raising of the medical and health services, cannot be expected to be achieved.



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## INTRODUCTION



## INTRODUCTION

In order to change the form of medical training dependent on foreign institutions, the Nepalese Government founded the Institute of Medicine at Tribhuvan University in 1972 to train medical manpower in the country as a step towards improving the country's medical and health services. However, satisfactory results have not been obtained due to an absolute shortage of medical personnel and unsatisfactory existing medical facilities as a place for clinical training. Accordingly, construction of a teaching hospital equipped with modern facilities is an urgent task.

In May, 1978, the Nepalese Government requested the Japanese Government for Japan's cooperation for the training of medical manpower and the construction of a teaching hospital. In response to the Nepalese request, the Japanese Government began to provide medical cooperation in August, 1980, for the Institute of Medicine of Tribhuvan University, in view of the importance and urgency of the training of medical manpower, supplying equipment and materials and providing training programs in Japan. A further request was made for the construction of a teaching hospital with grant-in-aid to provide a key point for technical cooperation. In response to the request, a Japanese preliminary survey team was sent to Nepal in January, 1981, to ascertain the possibility of cooperation.

As a result of the preliminary survey, it was decided to carry out a basic design survey in connection with the construction of the proposed teaching hospital. Accordingly, two survey teams have been sent since June, 1980.

The basic design survey was intended to carry out a survey of medical services, the level of medical training, climate, topography, customs and manners from the viewpoint of a teaching hospital suitable for the condition in the country so that the most suitable teaching hospital construction plan may be formulated.

The Basic Design Survey Report first outlines the background to the project and the proposed construction site, examines the project from technical points of view such as objectives, contents, scale and

medical equipment, describes the implementation of construction and administration and management after construction, and finally evaluates the project together with some recommendations.

In addition, the appendix contains Minutes made during field surveys and information on the conditions of construction, existing hospitals in Nepal.



## **CHAPTER 1. BACKGROUND OF THE PROJECT**



## CHAPTER 1. BACKGROUND OF THE PROJECT

### 1.1 Medical Administration

The health and medical policy in Nepal has been carried out centering around the Long-term Health and Medical Program: 1975-1990. Currently, the 6th Development Phase (1980-1985) is in progress, aiming at gradually integrating various health and medical projects into a system of basic health and medical services. The major objectives of the Long-term Health and Medical Program are as follows:

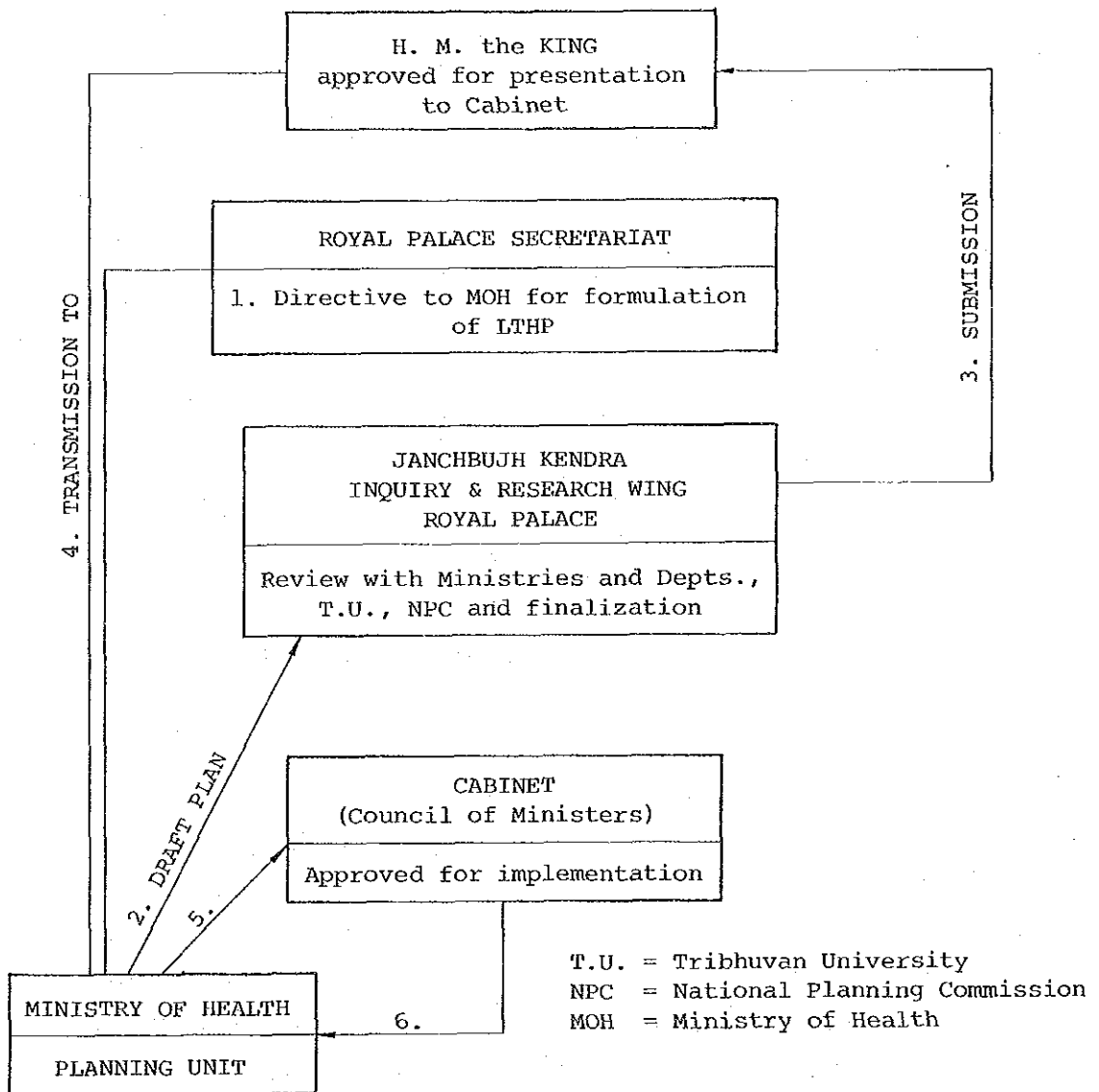
- 1) Extension of health and medical services to all strata of society.
- 2) Dissemination of family planning to check a rapid increase in population and improvement in the health of mother and child are to be fostered.
- 3) Domestic training of medical personnel to be engaged in health and medical services is to be gradually increased.
- 4) Eradication of contagious diseases, e.g., malaria, smallpox, leprosy, tuberculosis, etc.
- 5) Education on health, nutrition, environmental hygiene, etc. is to be promoted.
- 6) Improvement in hospital services is to be fostered.

Tribhuvan University participates in the formulation of the government health and medical policy together with the Ministry of Health and the National Planning Commission and the role it plays with respect to the works (3), (4) and (6) is particularly important. The present project and the medical cooperation project preceding the former are the two concrete measures with a high degree of priority under the health and medical policy. The process of formulation is as shown below.

Long-Term Health Plan (1975-1990) (LTHP)

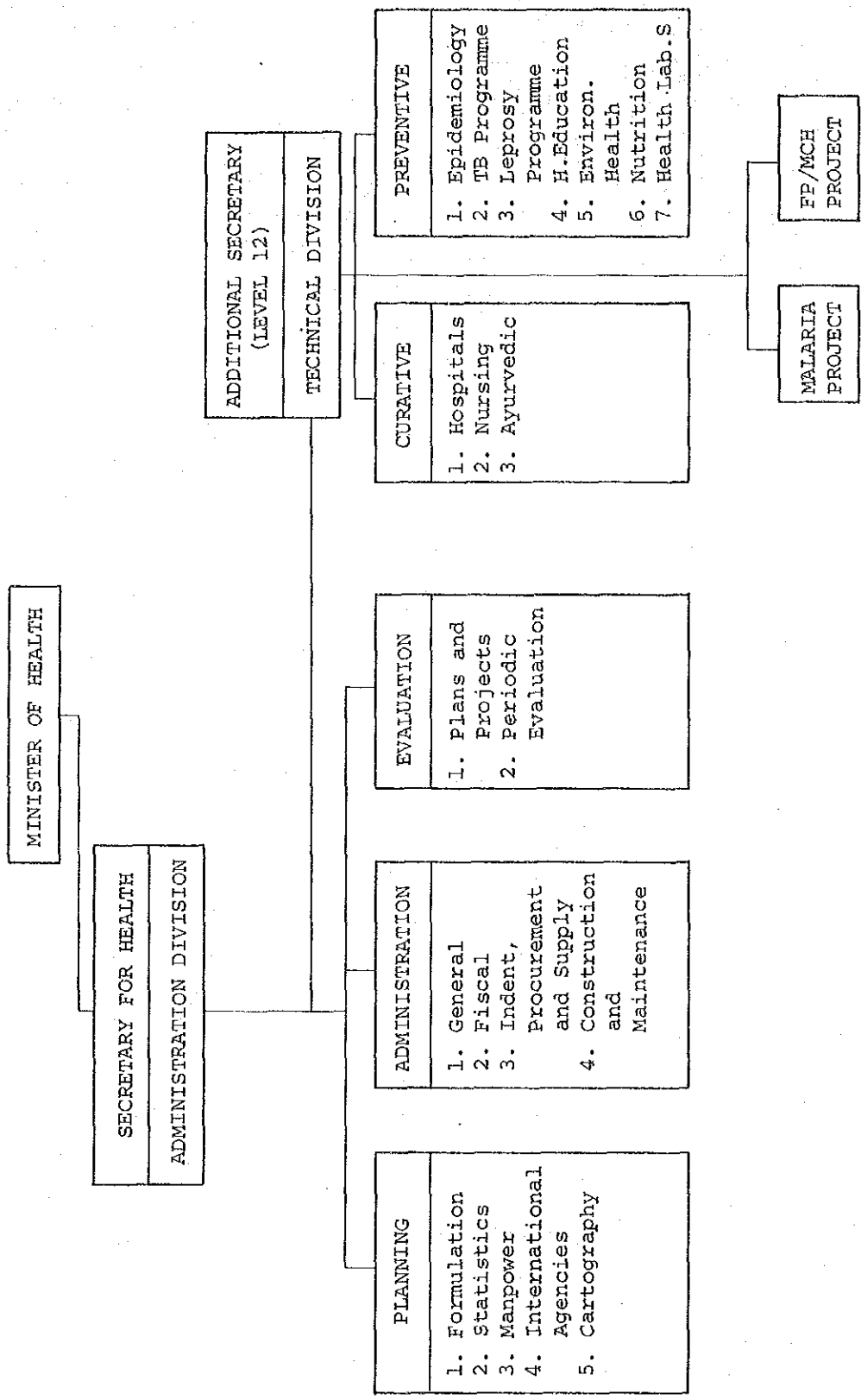
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The Ministry of Health is the only one which has formulated a long-term plan. The Planning Commission and the Ministry of Finance were members of the drafting committee.

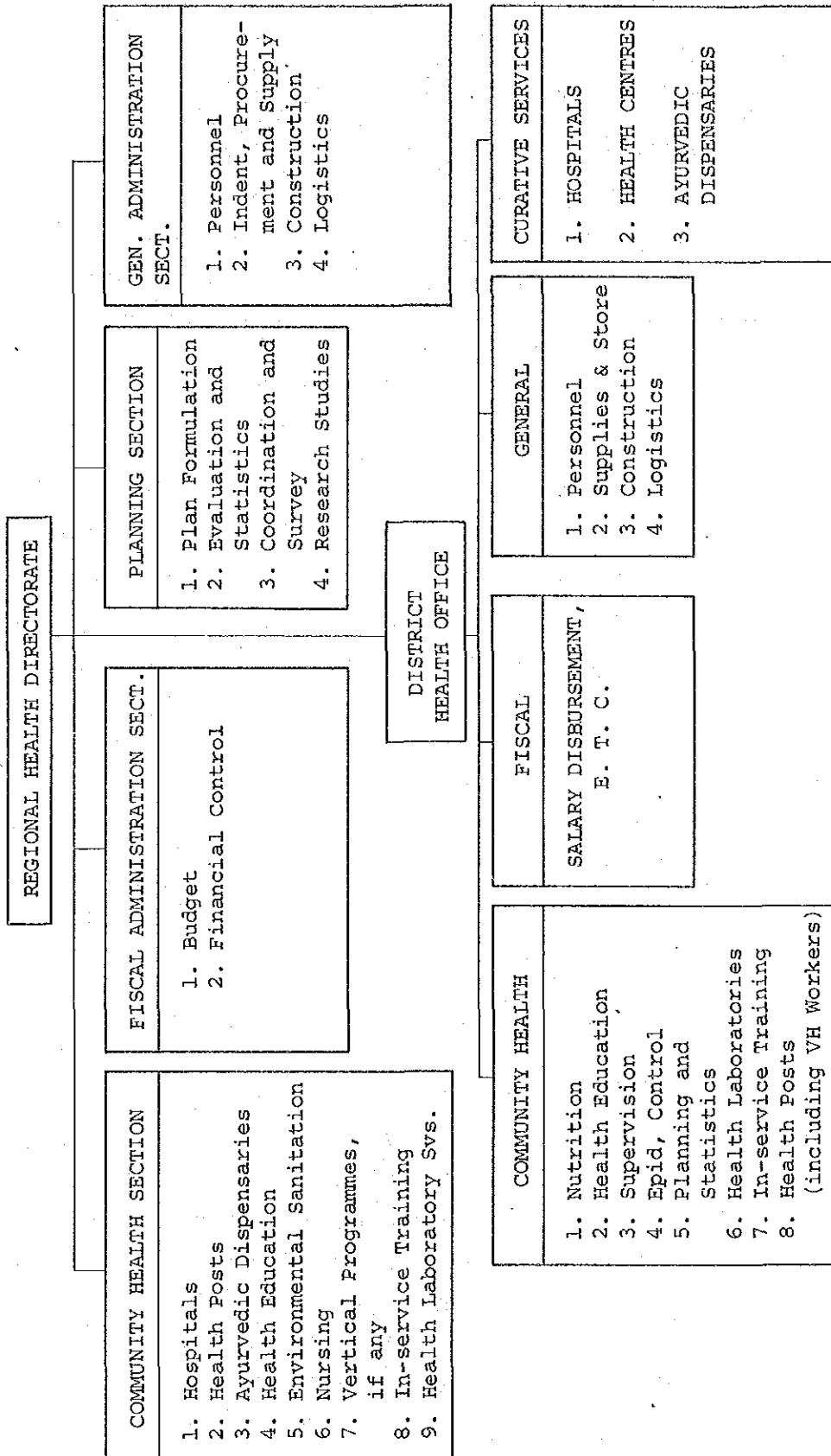


The figure below shows the organization and the structure (revised plan) of the medical administration. As described under (1) above, as emphasis is placed on the promotion of equal opportunity in health and medical services, the revised structure is featured by the emphasis placed on the regional and district health sector. This is because special efforts are being made for the training of community physicians to provide primary health care in view of the present conditions in the country.

RE-ORGANIZATION OF THE HEALTH MINISTRY  
 (After the establishment of Regional Directorates)



ORGANIZATION OF REGIONAL HEALTH DIRECTORATE AND DISTRICT HEALTH OFFICE  
(PROPOSED)



## 1.2 Condition of the Medical Service

### 1. System of the administration service

The administration service in Nepal is divided into five regions according to major rivers. Each region consists of 2 - 3 zones (a total of 14) with each zone consisting of 5 - 8 districts. Finally, each district consists of number of panchayats.

The medical facilities corresponding to this division may be outlined as below.

#### 1) Central hospitals

The central hospitals to provide advanced specialist treatment are located in Kathmandu. They are: Bir Hospital, a general hospital with 300 beds, Kanti Hospital, a children's hospital with 150 beds and Maternity Hospital with 200 beds.

#### 2) Zonal hospitals

These hospitals, which are being planned, are to provide relatively advanced treatment in each zone, each accommodating 100 beds.

#### 3) District hospitals

These are to have about 15 - 25 beds each with 2 - 3 doctors to provide general treatment without specialization.

#### 4) Health posts

Each panchayats is to be provided with a health post. The staff include health assistants, auxiliary nurse midwives, auxiliary health workers, Institute of Medicine Certificate holders, etc., but not doctors. These public health clinics provide simple treatment and guidance on public hygiene and family planning.

In addition, there are health centers to provide guidance on public hygiene and preventive medicine and Ayurvedic dispensaries.



As private medical facilities, there are hospitals operated by foreign missions, e.g., Shanta Bahwan Hospital (135 beds).

## 2. Medical facilities

According to a survey conducted in 1979, there were the following facilities in Nepal:

• Number of hospitals	75
• Total number of beds	2,667
• Public health clinics	583
• Health centers	24
• Ayurvedic dispensaries	85

## 3. Medical personnel

As of 1979, the medical personnel practicing in Nepal were as follows:

• Doctors	415
• Dentists	18
• Registered nurses	362
• Trainee nurses	995
• Medical technicians	558
• Trainee medical technicians	860

The population per doctor, when simply compared to that in Japan, is 36,450 persons (1974) in Nepal, compared to 868 persons (1973) in Japan, as much as 42 times the latter. It is estimated by the Nepalese party that the total number of doctors required in 1990 will be 1,150. In view of the current number of doctors, there will be a total of 220 doctors short after training 310 at the I.O.M.\* of Tribhuvan University and 220 abroad. Therefore, the training and recruitment of doctors is the most urgent task at present.

---

\* Institute of Medicine

#### 4. Trends in diseases

According to the 1977 report, the basic demographical figures were as follows:

Total population:	11,559,983
Mortality rate:	22.80
Infant mortality rate:	172.20
Rate of increase:	2.07
Average life expectancy:	40.6

According to the 1978 - 79 report, the major diseases in Nepal are as follows in the order of frequency:

1. Gastroenteritis (mainly diarrhea caused by infection)
2. Cholera
3. Dysentery
4. Typhoid
5. Encephalitis
6. Hepatitis
7. Diphtheria
8. Polio

The above list was obtained by analysing the causes of illnesses diagnosed at 13 major hospitals with a total of 540 beds.

Next, the major causes of death were as follows:

1. Dysentery and digestive diseases
2. Respiratory diseases (mainly tuberculosis)
3. Complications at childbirth (mainly tetanus and puerperal fever)
4. Accidents

#### 5. Condition of public hygiene

As regards the condition of public hygiene, the use of wells, fountains and rivers for drinking water seems to be

causing infectious gastroenteritis. Nutrition is particularly poor in the lower classes, probably contributing to the spread of chronic diseases such as tuberculosis.

Moreover, the shortage of public health personnel and unsatisfactory road and transport networks in addition to a high illiteracy rate are preventing the dissemination of knowledge of public hygiene.

#### 6. Customs and manners

It is still the prevailing custom in Nepal that if a patient is hospitalized, his family stay in the hospital to nurse him. Therefore, the bedside space is often used to provide the family with space for accommodation and the space inside and outside the hospital is used for cooking and laundry.

#### 1.3 Condition of the I.O.M. of Tribhuvan University

Tribhuvan University was founded in 1959 with the King as its chancellor. The I.O.M. was founded in 1972. The diploma course was established in July, 1978 with a total number of 22 students as of 1979. The number of students is, however, scheduled to increase to 50 three years later. The size of the teaching staff as of June, 1980, including part-time professors and assistants, was 68 (see Table 1). The size of the staff including paramedicals as of May, 1980, was 213 (see Table 2).

If the number of diploma students is increased to 50, the size of the teaching staff needs to be increased to 220. Therefore, the training of teachers is the most urgent task at present.

Under the circumstances, it was decided to carry out a medical education project at the Institute of Medicine of Tribhuvan University as a national project in FY1980-1985 for raising the standards of diagnosis and treatment and conducting medical research and surveys, in addition to the urgent task of training medical manpower.

The project is to be carried out in two phases with the first phase (1980-82) providing a 300-bed hospital and the necessary medical equipment and the second phase (1983-84) providing a 200-bed hospital and the necessary medical equipment. As regards the training of medical manpower, the first phase is to be devoted to basic training and the second phase to both basic and clinical training.

The costs of the project are to be as shown below with foreign assistance accounting for 56% of the total.

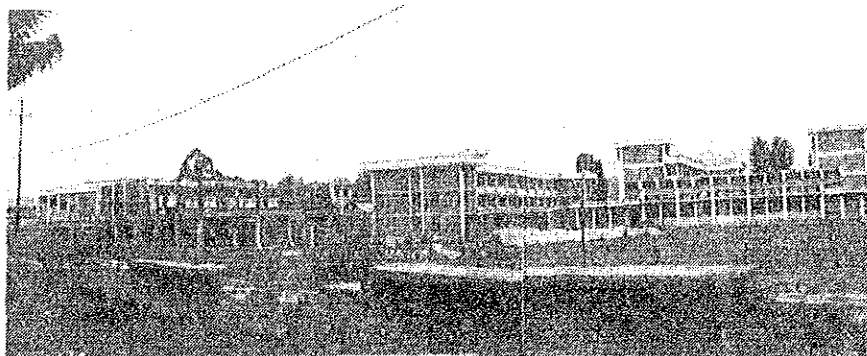
(Unit: US\$)

	First phase (1980-82)	Second phase (1983-84)	Total
Government budget	4,000,000	3,000,000	7,000,000
Foreign assistance	6,000,000	3,000,000	9,000,000
Total	10,000,000	6,000,000	16,000,000

Although the project is to be carried out by the I.O.M. of Tribhuvan University, the Teaching Hospital Coordinating Committee, including those officials of the authorities concerned, is the decision-making body (see the list of members).

Emphasis in training should be placed on public hygiene to train community physicians who can work as medical officers for health and medical services in various regions of Nepal.

The budget for the I.O.M. for Fiscal 1979 (July 1979 - June 1980) was 6,500,000 Nepalese rupees (US\$1.00 = Rs 12.00).



Institute of Medicine

Table 1 Present teaching staff of I.O.M. (as of June '80)

Course	Professor		Asst. prof.	Lecturer	Instructor	Total	
		Employed				Whole	Exclusive
Community medicine	3	1	1	3	5	13	9
Internal medicine	2	-	1	6	1	10	8
Anatomy	-	1	-	1	1	3	2
Physiology	-	1	-	1	-	2	1
Pharmacology	-	1	-	1	1	3	2
Surgery	2	-	-	1	-	3	1
Pathology	-	1	1	3	-	5	4
Gyne & obs.	2	-	-	1	-	3	1
Forensic medicine	-	-	-	-	-	0	0
Environmental hygienics	-	-	-	-	1	1	1
Health education	-	-	-	5	-	5	5
Bio-statistics	-	1	-	1	-	2	1
Pediatrics	1	-	2	3	-	6	5
Ophthalmology	1	-	1	1	-	3	2
E.N.T.	-	-	-	1	-	1	1
Dermatology	1	-	-	-	-	1	0
Orthopedics	1	-	-	-	-	1	0
Psychiatrics	-	-	-	-	-	0	0
Biochemistry	-	-	-	1	1	2	2
Dental surgery	-	-	-	-	1	1	1
Radiology	-	1	-	-	-	1	0
Pharmaceutics	-	1	-	-	-	1	0
Anesthesiology	1	-	-	-	-	1	0
Total	14	8	6	29	11	68	46

Table 2 Staffing Pattern in Institute of Medicine (as of May '80)  
 \* ( ) Jun. '80

	<u>Sanctioned Posts</u>		<u>Filled Posts</u>	
<u>Doctors</u>				
Professor	6	(13)	-	- (22)
Associate Professor	16	(20)	6	(6)
Lecturer	26	(30)	17	(29)
Asst. Lecturer	19	(19)	7	(11)
Sub Total	67	(82)	30	(46)
<u>Nursing</u>				
Professor	1		-	
Associate Professor	4		1	
Lecturer	21		8	
Asst. Lecturer	24		12	
Instructor	24		11	
Deputy Instructor	26		8	
Asst. Instructor	46		42	
Sub Total	146		82	
<u>Ayurved</u>				
Asst. Professor	1		1	
Lecturer	7		5	
Asst. Lecturer	1		1	
Instructor	1		-	
Deputy Instructor	1		-	
Asst. Instructor	2		2	
Sub Total	13		9	
<u>Health Education</u>				
Lecturer	7		4	
Asst. Lecturer	6		-	
Instructor	8		2	
Deputy Instructor	1		-	
Asst. Instructor				
Sub Total	22		6	
<u>Sanitation</u>				
Lecturer	5		-	
Asst. Lecturer	5		-	
Instructor	3		-	
Deputy Instructor	1		1	
Asst. Instructor	1		1	
Sub Total	15		2	

	<u>Sanctioned Posts</u>	<u>Filled Posts</u>
<u>Health Lab.</u>		
Lecturer	3	3
Asst. Lecturer	2	-
Instructor	1	-
Deputy Instructor	5	1
Asst. Instructor	12	13
Sub Total	23	17
<u>Radiology</u>		
Asst. Lecturer	1	-
Instructor	1	1
Deputy Instructor	1	-
Asst. Instructor	4	4
Sub Total	7	5
<u>Pharmacy</u>		
Lecturer	2	-
Asst. Lecturer	2	-
Instructor	1	-
Deputy Instructor	1	-
Asst. Instructor	11	10
Sub Total	17	10
<u>General Medicine</u>		
Deputy Instructor	2	-
Asst. Instructor	60	52
Sub Total	62	52
Grand Total	371	213

#### 1.4 T.H.C.C.\* Master Plan

The T.H.C.C., the main body responsible for the construction of this teaching hospital is formulating a plan to improve the I.O.M. by adding a teaching hospital, a students' dormitory and a school of nursing in the site area so that it may serve as the medical center of Kathmandu in the future. This teaching hospital may, therefore, be considered to be the first phase of the improvement plan.

The T.H.C.C. Master Plan obtained during the preliminary survey of January, 1981, may be outlined as below.

i) Size of the site: approximately 8.3ha (area adjacent to the north side of I.O.M.). However, the farmland (about 4 - 5ha) on the northwest of the site is expected to be acquired for future expansion.

ii) Contents of proposed facilities:

(1) The Hospital zone (500 bedded Teaching Hospital)

(2) The academic zone (basic science blocks, Nursing School, auditorium, cafeteria, administration and research unit.)

(3) Residential zone

Comprising of the dormitories for male and female students and housing for the working personal.

(4) Public Service zone,

Comprising of the roads and parking parks etc.

(5) The existing I.O.M.

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\* Teaching Hospital Coordinating Committee



iii) ABSTRACT OF THE SPATIAL ANALYSIS FOR A 500 BEDDED TEACHING HOSPITAL

<u>S.No.</u>	<u>Department</u>	<u>Total area available</u>	<u>Unit</u>
1.	Nursing Unit	11858 m <sup>2</sup>	23.61 m <sup>2</sup> /bed
2.	Operating Suit	1872 m <sup>2</sup>	3.7 m <sup>2</sup> /bed
3.	Delivery suite <del>industry</del> labour rooms	1224 m <sup>2</sup>	2.4 m <sup>2</sup> /bed
4.	Emergency	432 m <sup>2</sup>	0.85 m <sup>2</sup> /bed
<b>5.</b>	<u>Adjunct facilities</u>		
5.	Pathology	1152 m <sup>2</sup>	2.3 m <sup>2</sup> /bed
6.	Radiology	1512 m <sup>2</sup>	3.02 m <sup>2</sup> /bed
7.	Physical medicine	540 m <sup>2</sup>	1.08 m <sup>2</sup> /bed
8.	Pharmacy	400 m <sup>2</sup>	0.8 m <sup>2</sup> /bed
<b>8.</b>	<u>Service department</u>		
9.	Deitary	1200 m <sup>2</sup>	2.4 m <sup>2</sup> /bed
10.	House keeping	200 m <sup>2</sup>	0.4 m <sup>2</sup> /bed
11.	Laundry	720 m <sup>2</sup>	1.4 m <sup>2</sup> /bed
12.	C.S.S.D.	540 m <sup>2</sup>	1.08 m <sup>2</sup> /bed
13.	Central general store	2000 m <sup>2</sup>	4.0 m <sup>2</sup> /bed
14.	Employee facility	400 m <sup>2</sup>	0.8 m <sup>2</sup> /bed
15.	Building maintenance and operation	1900 m <sup>2</sup>	3.8 m <sup>2</sup> /bed
	<u>Administration</u>		
16.	Medical Records	420 m <sup>2</sup>	1.6 m <sup>2</sup> /bed
17.	Offices A/c, /gen. adm. representative, matron etc.	2500 m <sup>2</sup>	5.6 m <sup>2</sup> /bed
18.	Meeting room etc.	200 m <sup>2</sup>	0.4 m <sup>2</sup> /bed
19.	Stores	600 m <sup>2</sup>	1.4 m <sup>2</sup> /bed
20.	Out patient department	2520 m <sup>2</sup>	5.4 m <sup>2</sup> /bed
21.	Ambulance Service and garages	300 m <sup>2</sup>	0.6 m <sup>2</sup> /bed
22.	Clinical teaching facilities under the hospital. (Dept. of anaesthesia, Dept. of pathology and class rooms etc)	1200 m <sup>2</sup>	4.0 m <sup>2</sup> /bed
23.	Conference Hall for 250 seats	350 m <sup>2</sup>	0.7 m <sup>2</sup> /bed
	Total	34140 m <sup>2</sup>	76.9 m <sup>2</sup> /bed

ACADEMIC FACILITIES

<u>S.No.</u>	<u>Department</u>	<u>Total area available</u>	<u>Unit</u>
<u>Administrations</u>			
1.	Central Deans Office and P.A. with conforence room	60	
2.	Offioes. (General administrations, record, information, Scholarship and Accounts etc.)	1000	
3.	Store	100	
4.	Examination Section	200	
<u>Basic Sciende department</u>			
5.	Department of anatomy Department of physiology	100	
6.	Department of Biochemistry	400	
7.	Department of Pathology	500	
8.	Department of Pharmaology	400	
9.	Animal House	400	
<u>Nurshing School</u>			
10.	Teaching Spaces (1) Class rooms (2) Multipurpose demonstration rooms (3) A.V.D. (4) Lecture room	630	
11.	Supporting facilities (Utility rooms, Store, Toilet, Equipment etc.)	400	
12.	Administration Spaces	1030	
Total		<u>6220</u>	

<u>S.No.</u>	<u>Department</u>	<u>Total area available</u>	<u>Unit</u>
13.	Main auditorium for 500 accomodation with back stage etc.	750	
14.	Central cafeteria for 250 soats	550	
15.	Library student's for 50,000 books	500	
	Total	1800	m <sup>2</sup>

The Residential Unit

	Total area M <sup>2</sup>	Unit
1. Hostel accommodation for 891 students (including indoor sports recreation etc)	10692	12M <sup>2</sup> /student.
2. Housing for the working personnel (1400 persons)	27600	19,7 M <sup>2</sup> /person
Gross floor area for housing approximetly	38,292 M <sup>2</sup> 38300 M <sup>2</sup>	

iv)

ABSTRACT OF THE COST ESTIMATE

<u>S.No.</u>	<u>Particular</u>	<u>Total Area</u>	<u>Rate Rs. per unit</u>	<u>Cost in Rs. H.C.</u>
A				
I	Teaching hospital block for 500 beds	34140 m <sup>2</sup>		51,385,000/-
	(i) Nursing unit O.T. Delivery room etc.	14954	1500/m <sup>2</sup>	22,431,000/-
	(ii) Adjunct diagnostic facilities and services dept + OPD	13516	1500/m <sup>2</sup>	20,274,000/-
	(iii) Administration and teaching facilities in the hospital with ambulance services and garages	5320	1500	7,980,000/-
	(iv) Conference hall 280 seat	350	2000	700,000/-
II	Academic facilities (including administration Basic Science Department and Nursing School)	6220	3500	9,330,000/-
	Main auditorium	750	2000	1,500,000/-
	Central cafeteria	550	1500	825,000/-
	Library	500	1500	750,000/-
	Total cost for the teaching hospital for civil works only			63,790,000/-
	Cost of sanitary works at 15% of the civil cost			9,568,500/-
	Cost of electrical works at 10% of the civil cost			6,379,000/-
	Cost of mechanical fittings at 5%			<u>3,189,500/-</u>
				82,927,000/-
	Site development (landscaping, roads and walkways, drainage and fencing etc. at 5% of the Total)			<u>4,146,350/-</u>
				87,073,350/-
	Contingencies, 10%			<u>8,707,335</u>
				<u>95,780,685</u>
		Total:		95,780,685

Cost Estimation for the Residential Unit

Gross floor area for housing unit		38300 M <sup>2</sup>
Cost for civil work of the Residential unit at 1000/- Rs. N.C per M <sup>2</sup>	Rs.	38,300,000/-
Cost for sanitary work at 10% of the civil work.		3,830,000/-
Cost for electrical works at 10% of the civil work.		3,830,000/-
Site development		1,991,200/-
	Total	<hr/> 47,951,200/-
Contingencies	Grand Total	<hr/> 5,316,800/-
		<hr/> 53,268,000/-

## **CHAPTER 2. PROPOSED CONSTRUCTION SITE**





## CHAPTER 2. PROPOSED CONSTRUCTION SITE

### 2.1 Location

The proposed site is adjacent to the Medical School of Tribhuvan University situated about 3km northeast of the center of Kathmandu (approx. 28°N, approx. 85°E, elevation about 1,350m), the capital of Nepal.

Although the area around the proposed site is a mixture of farmland and housing land, since Kanti Children's Hospital and the official guest house and embassies are located there, it is expected to develop as an administrative and educational district in the future.

### 2.2 Present Condition of the Site

The proposed site is being used as farmland, accommodating about 80 tenant farmers. The Nepalese Government belongs to the Government of HMG and as construction has not begun, it is used as farmland.

### 2.3 Site Ground

Although there are no survey data as the area is being used as farmland, the ground consists of psammitic clay and gravel according to a geological map of Kathmandu. According to geological survey data obtained at a point 1km from the site and others, the site area seems to belong to one of the good areas of Kathmandu in terms of ground. According to a rudimentary test conducted at the site of the Dean's Office of the adjacent I.O.M., which is under construction,  $10t/m^2$  may be expected.

### 2.4 Infrastructure

#### i) Preparation of the site

The site is to be prepared by the Nepalese side prior to the commencement of construction.

ii) Approach and hospital roads

The trunk road running on the eastern side of the site is to be used for approach. Hospital roads, including work roads, are to be constructed by the Nepalese side.

iii) Water supply

There are water mains, two of 200 $\phi$  and one of 80 $\phi$ , running along the trunk road on the eastern side of the site. Of these, one of 200 $\phi$  supplies sterilized well water which may be extracted. In addition, with three wells expected to be drilled near Bansbari (2km north of the site) around 1983, water supply is expected to be markedly improved.

iv) Drainage

There is no sewerage plan covering the site area even for the future. Accordingly, installation of septic tanks, discharging into a river or the use of infiltration tanks may be considered for the treatment of sewage and drainage.

v) Power supply

The ring main system for Kathmandu consists of 1) 3-phase 400V power and 2) single-phase 230V current. Since the area around the site is supplied with 11,000V, it will be possible to effect lead-in. As regards voltage fluctuations, they are assumed to be around 10%. However, they may be even larger as the figure is not a measured value.

vi) Telephone service

Although there is no possibility of providing lead-in at present, telephone lines of about 100 circuits are scheduled to be installed in Maharajgang which includes the site area by December, 1983.

vii) Gas supply

LPG imports from India, currently averaging 40 to 50 tons a month, are expected to be increased to 80 tons in the near future. The quality of LPG is: propane 28%, butane 72%.

2.5 Natural Conditions

The Kingdom of Nepal extends from 26° 15' to 30° 30' N and from 80° 15' to 88° 15' E. Since the southern part of the land is located in the Indian monsoon zone and the northern part is adjacent to the mountain region of Tibet (China) with the Himalayas forming the border, there is a large difference in elevation with the climate varying from area to area.

The central mountain region, which includes Kathmandu, has a temperate subtropical climate with moderate changes in temperature, providing relatively comfortable weather conditions. In order to produce economical, safe and functional structures for the proposed teaching hospital, however, consideration of natural conditions will be indispensable in architectural planning.

i) Temperatures, humidity

Although Kathmandu Valley, which includes the proposed construction site, benefits from moderate temperatures and humidity, temperatures in winter are considerably low at night. The table below gives some data on temperatures and humidity.

	Temperatures (°C)		Average humidity (%)
	Highest	Lowest	
1	18.6	1.5	70.4
2	20.4	4.2	64.8
3	25.3	6.6	52.2
4	29.8	10.8	50.2
5	29.8	15.2	66.2
6	28.9	19.0	70.6
7	26.4	19.4	80.4
8	28.0	19.6	78.8
9	26.4	18.1	83.2
10	28.1	14.8	76.4
11	22.8	6.5	72.8
12	19.4	2.8	72.6

ii) Wind and wind direction

Wind directions are predominantly SW and W throughout the year. The average wind velocity seldom exceeds 3 m/sec with little seasonal fluctuations. The maximum velocity rarely exceeds 10 m/sec on any day. In designing, therefore, no special consideration seems to be required concerning wind pressure, etc. apart from paying attention to the positions of openings for natural ventilation.

iii) Rainfall

The climate in Kathmandu Valley can be divided into two seasons: the wet season from June through September and the dry season from October through March. There is much rainfall during the wet season, accounting for 80% of the total annual rainfall, registering the maximum rainfall of 479.6 mm/month (19), or 111.8 mm/day\*. As regards measures to be taken in designing, drainage must be planned with much care and earth works must not continue into the wet season.

1. Average annual rainfall: 1,309.3mm
2. Maximum rainfall: 1,493.7 mm/year  
479.6 mm/month  
111.8 mm/day
3. Average annual rainy days: 94 days (over 1mm).

\* Pani Pokhari (1km south of the site area).

iv) Lightning

Lightning occurs from April into June, on about 30 days in three months.

v) Earthquakes

Although it is not on an earthquake belt, earthquakes occurred fairly frequently in the past. Some of them are listed below.

- 1934: a major earthquake, causing damage to houses in Kathmandu.
- 1939: minor earthquakes, causing slight damage.
- 1951:
- 1980: a major earthquake in the latter part of July in the western part of Nepal, causing serious damage including at least 150 dead and a number of houses destroyed.

## 2.6 Urban Planning Around the Site Area

As regards urban planning around the site area, it is designated as the institutional area under the Kathmandu Valley Plan prepared by the Ministry for Public Works, Transport and Communications, accommodating the embassies of major countries including Japan and government agencies. In the future, five more areas including a historic zone are expected to be designated in Kathmandu to step up the creation of a comprehensive urban environment. However, the site area is not included.



### **CHAPTER 3. OUTLINE OF THE PROJECT**





## CHAPTER 3. OUTLINE OF THE PROJECT

### 3.1 Objectives of the Project

Although the main objective of the construction of the proposed teaching hospital to be attached to Tribhuvan University is the training of medical personnel, it is also expected to achieve some other objectives, e.g., the role of a medical center. Since these objectives are closely related, satisfactory results may be obtained only with integrated hospital management. In concrete terms, the objectives may be outlined as below.

#### 1) Facilities for training medical personnel

Medical training will be given based on a comprehensive curriculum centering around public hygiene and including clinical lectures. Since good results may not be expected unless there are a sufficient number of clinical cases, it will be necessary to have an appropriate number of beds.

#### 2) Medical center in Nepal

At the existing central hospital, antiquated medical facilities are hindering advanced medical treatment. Therefore, those medical equipment to be installed at the teaching hospital are to be able to facilitate advanced treatment to some extent. It will be necessary to improve the medical service by making available these facilities, mainly the central diagnosis and treatment department, to other medical facilities.

#### 3) Central facilities for medical research and surveys in Nepal

The trends in diseases in Nepal show that many of them are due to poor living environment and nutrition. However, details are not available since adequate studies have not been made. Therefore, it will be necessary to deploy adequate research facilities and staff to prepare medical data including statistical data and clinical studies so that the knowledge of public hygiene based on scientific data may be disseminated.

#### 4) Advanced medical facilities for special patients

Since there are no facilities for diagnosing and treating special patients in Nepal, these cases are referred to foreign institutions. Therefore, it will be necessary to provide medical facilities capable of accepting special cases for advanced treatment.

### 3.2 Basic Design

As has been mentioned in Chapter 1. Background to the Plan, in order to forcefully progress the training of medical manpower in Nepal, the Nepalese Government has formulated a master plan for constructing a teaching hospital, dormitories for nurses and students, etc. at a site adjacent to the Institute of Medicine of Tribhuvan University. The proposed teaching hospital is to be the center of these facilities.

In examining the basic design suitable for the objectives of the proposed hospital, it was decided to construct a 300-bed hospital as an appropriate scale for the conditions of Nepal, remembering that it should provide a place for clinical training and a general hospital, taking into consideration the various economic and technical levels such as the condition of medical services and that of construction, site conditions, economy, the effect of the project as economic cooperation, etc. As regards the diagnosis and treatment department, it is to have such facilities as to provide comprehensive and effective diagnosis and treatment (excluding pediatrics as the proposed hospital is adjacent to Kanti Children's Hospital) with such a scale and facilities as to be able to cope with some expansion of the wards in the future.

In view of the above design conditions, it will be necessary to pay sufficient attention to the points given below as basic principles for smoothly carrying out the project.

### 3.2.1 Basic principles for designing

- Since the proposed site is located within the campus of the I.O.M. of Tribhuvan University, land should be effectively used so that as much open space as possible may be secured.
- In order to cope with changes in hospital function or with hospital expansion in the future, the proposed hospital is to be divided into four blocks, accommodating different departments. Furthermore, in order to ensure smooth flows of people, goods and information within the hospital, special attention should be paid to inter-sectional links, providing appropriate lines of flow between blocks.
- Natural conditions of the locality should be taken into consideration in designing.
- The design should take into consideration local medical and nursing customs so that it will be easy to run and to maintain.
- Full use should be made of the materials locally available for construction.
- The design should take into consideration the local construction techniques.
- The design standards are, as a rule, to be based on the Japanese building and equipment regulations and standards. However, the Indian Standards, etc., which are employed in some quarters, are also to be used as required according to the local conditions.

### 3.2.2 Deployment plan

- Approach and existing facilities

The approach to the hospital site is to be made from the trunk road going north from the center of Kathmandu. The site is adjacent to the buildings of the I.O.M. of Tribhuvan University and Kanti Children's Hospital on the southwest.

- Composition and deployment of buildings

According to the basic principles for design, the hospital buildings will be divided into four blocks classified by facilities: outpatient, test and administration, operation and wards.

As a rule, each block is to extend from east to west and is to be positioned by taking account of various factors.

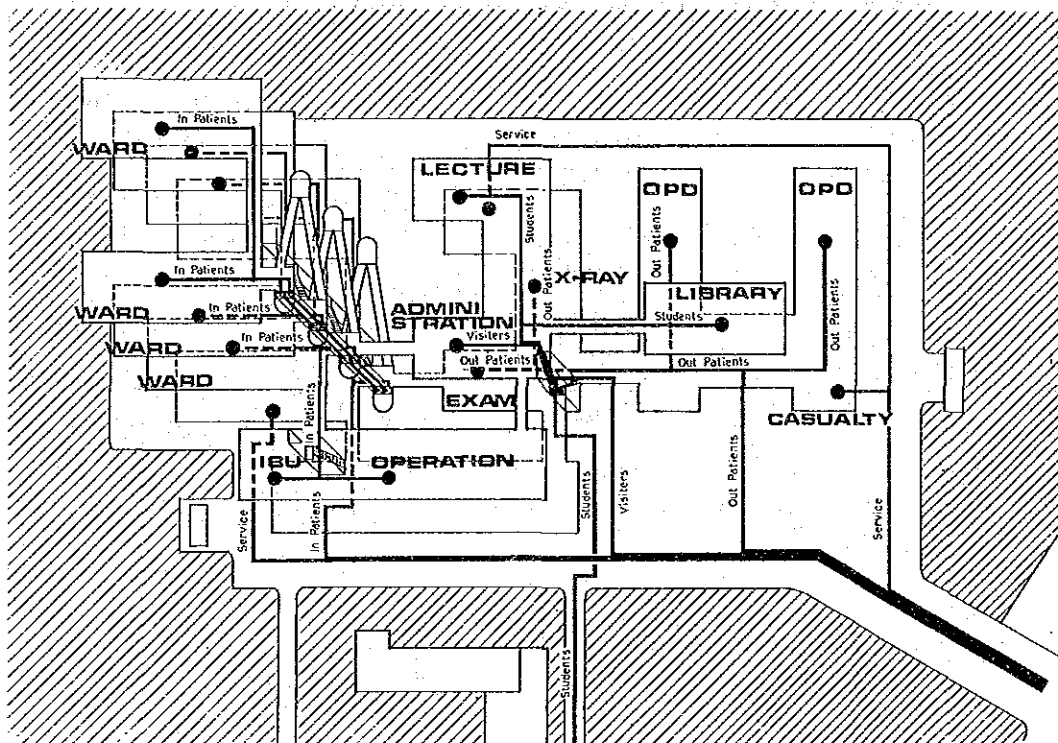
- 1) Since the outpatient block will have a concentration of movements of people and should be easily accessible, it is to be located to face the entrance zone.
- 2) As regards the test and administration block, since its functions require close links to other blocks, it is to be located in the center of the hospital.
- 3) As regards the operation block, since its functions require a close link to the test and administration block and the ward block, it is to be located adjacent to them.
- 4) As regards the wards, since they require an especially favorable environment and should be able to cope with future expansion, the block is to be on the west of the test and administration block and is to be provided with a good view and sufficient space around it.

- Apart from the main entrance located in the outpatient block, each block is to be provided with its own approach and a line of service flow.

- Roofed passages are to provide inter-block connections. In particular, those connecting the outpatient, test and administration, and operation blocks are to avoid the mixing of functions by allocating the ground floor to outpatients and the first floor to internal traffic.

- In order to ensure effective use of land space, the ward block is to be a four-story building with other blocks, outpatient, test and administration, and operation blocks built in two stories.

As regards vertical connections, apart from staircases, elevators and inclined walkways are to be provided at the center of each block for users.



Flow network

- In the light of the scale of the facilities, construction is to be carried out in two phases.

First phase construction: outpatient, test and administration blocks.

Second phase: operation, ward blocks.

### 3.2.3 Buildings planning

- Premises for planning facilities

In planning facilities for this teaching hospital, it is necessary to pay attention to coordination between the first phase construction and various departments because of the restrictions in terms of scale, etc. It is required not only that each department can perform its functions independently during each phase of construction but that all the functions will perform organically at the final stage.

From this point of view, construction has been planned in two groups: the outpatient department including testing functions and the administration department for the first phase and the inpatient departments such as wards and O.T. suite which are inseparable from them and catering facilities for the second phase.

When all the functions at the final stage are considered, the division by department does not necessarily correspond to the block allocation. However, planning was carried out by paying as much attention as possible to coordination between the two. The table on the next page shows the relations in this project.

i) Outpatient department (A block, ground floor)

This department is naturally the busiest section with outpatients. This department is to be located close to the main road through the front garden. The medical office is to be located facing the main entrance hall, accommodating the reception, screening, accounts, medical card filing room, etc., with internal and surgical examination rooms arranged on both sides.

CONSTRUCTION PHASE	1ST PHASE		2ND PHASE	
BLOCK & SECTION DEPARTMENT	BLOCK A	BLOCK B	BLOCK C	BLOCK D (2 WINGS)
OPD (OUTPATIENT DEPT.)	MEDICAL OFFICE  DIAGNOSIS & TREATMENT SECT.  DISPENSARY  CASUALTY			
CDD (CENTRAL DIAGNOSIS & TREATMENT DEPT.)	PHARMACY	RADIOLOGY SECT.  PHYSIOMETRY SECT.  CLINICAL LABORATORY  PATHOANATOMY	OT SUITE  CSSD  PHYSIOTHERAPY	
ADMINIS- TRATIVE DEPT.		GENERAL OFFICE  SENIOR STAFF R.  RECEPTION & CONFERENCE R.	ACADEMIC STAFF QUARTERS  RESIDENT DOCTORS R.	
SERVICES DEPT.		MACHINE R.		CATERING SECT.  LAUNDRY
WARDS			ICU, CCU	GENERAL WARD  OBSTETRIC WARD
ACADEMIC DEPT.	JOINT LABORATORY  LIBRARY	LECTURE R.	ANESTHEOLOGY UNIT	

The fields of examination are as given below.

I-WING: general internal medicine, obstetrics and gynecology, urology, dermatology and psychiatry. In addition, treatment rooms and waiting rooms.

II-WING: general surgery, orthopedics, ophthalmology, otorhinolaryngology (E.N.T.) and dentistry. In addition, treatment rooms and waiting rooms.

Although the casualty section is included in this department, it is to have its own entrance, reception and staff room.

The dispensary section is positioned in such a way that it has access to the main entrance hall and outside.

Toilets for outpatients are positioned outside to maintain cleanliness inside the hospital.

ii) Central examination and treatment department

1) Test section (B block, GF-1F)

The radiology unit and the physiological laboratory, indispensable for the outpatient sections, are to be positioned so that the outpatient department may have easy access to them. Since it is necessary to take into consideration the time zone and cooperation with other hospitals in this section, they are to be positioned on the ground level, having their own entrances and sharing a reception and a waiting room.

The radiology unit consists of four X-ray rooms, a control zone, a staff room, a dark room, a film store room and four viewing rooms for physicians, which are completely separated from the flow of patients.

2) Operation section (C block, 1F)

Since the OT unit is closely related to the wards, it is to be planned in connection with them during the second



phase for inpatient-related sections. As described later, the wards are to be provided on the second floor and above, the OT unit is also to be provided on the second floor. The flow of physicians and that of patients are completely separated with the former provided with space sufficient for performing auxiliary functions as a clean zone for various preparations and with equipment directly supplied from CSSD. Since all the five OT rooms are equipped with an anesthetic room and an anteroom, it will be possible to operate on many patients continuously. This system, rarely used in Japan, has been planned at the request of the Nepalese side. One of the OT rooms is provided with an observation room for teaching purposes.

3) Central equipment sterilization section (C block, 1F)

This section, which is the base for supplying equipment to all the departments, is to be positioned by considering its link with the OT unit. This section consists of a reception, washing room, sterilization room and sterilized equipment room.

4) Pharmacy (A block, GF)

The pharmacy serves the outpatient and inpatient sections as the central medicine center. It is to be positioned adjacent to the medical office in the vicinity of the dispensary for outpatients, consisting of a preparation room and a store room.

5) Pathoanatomy section (B block, GF)

This section is to be positioned next to the machine room so that it will be easy to carry out corpses out of sight from the wards. It consists of an autopsy room, a corpse preservation room, a specimen room and a mortuary. In addition, a toilet, a physicians' room with shower facilities and a nurses' room.

6) Physiotherapy section (C block, GF)

It is to be in such a position that it may be directly approached from outside and also from the wards. It is to share an entrance with the ward section. It is to be provided with a toilet and an equipment room.

iii) Administration department (B block, 1F)

1) General administration office

This is the section of the hospital, next to the outpatient department, where consideration is to be given to approach from outside. It is to share an entrance with the test section, being positioned on the first floor of the B block. Access to the Superintendent's and Deputy Superintendent's rooms is to be through the secretary's room. These rooms and the matron's room are to be provided with toilets. In addition, this section is provided with a general office, a conference room and a reception room.

2) Medical office (C block, GF)

The medical office is to be in such a position as to serve as an interface between the existing I.O.M. and the teaching hospital. It differs greatly from the I.O.M. in Japan. In addition to professors' single rooms and part-time professors' rooms (for 2 - 3 persons), physicians' rooms for both senior and junior doctors are to be equipped with sleeping facilities. The present plan allocates single rooms to senior doctors and 6-man rooms to junior doctors. This section is to be constructed together with the wards during the second phase.

iv) Service department

1) Machine room (B block, GF)

It is to be positioned approximately at the center of all facilities without disturbing the main flow, providing access from behind for the transportation of machinery.

Located at the back of B block, it consists of a power room, a generator room, a pump room and an oil store room.

2) Catering and laundry section (D block, GF)

This section is planned for the second phase construction together with inpatient sections. The catering section consists of a kitchen and a staff dining room seating 100. In pursuit of modernization, no consideration is to be given to the caste system in preparing the menu. As regards the meal service to the wards, the meals are supplied to various units by the kitchen lift through the pantry on each floor. In the case of the obstetric unit, since it is located on the ground level, it is to be served directly from the kitchen.

As regards the laundry section, as a rule, large-sized items are to be sent out. It is planned mainly to handle medical items, etc. which require sterilization.

v) Ward section

The wards are to be housed in two wings in a four-story building with vertical traffic served by two elevators and an inclined walkway in addition to staircases. The two wings are to be connected with a passage. The ward section is to be constructed during the second phase together with the OT unit.

1) General ward (D block, 1 - 3F)

This ward consists of 6 units extending from the first to the third floor. The south wing accommodates 44 beds and the north wing 46 beds. The total capacity is 270. It is planned to allocate over 30% of the space to pay bed rooms and the rest to large rooms accommodating 6 - 8 beds. Centralized observation through a glass panel from a nurse station may be conducted in large rooms. A treatment room is to be provided next to the nurse station. Each unit is

to be provided with a day room and also a conference room for clinical education.

2) Obstetric ward (D block, north wing, GF)

It is planned independently for the north wing of the first floor. It is to have a capacity of 30 with pay beds accounting for about 27%. The rest is provided in 6 - 8 bed rooms. Three types of delivery room are planned: 2-bed room for cleaning, 2-bed room for infectious cases, 1-bed room for isolation cases (equipped for minor operations). In addition, a labor room, an infants' room, a test room (with the reception for casualty cases), a day room and a conference room for clinical education.

3) ICU, CCU (C block, 1F)

These units are planned for the end section of the same floor as the OT unit in order to avoid disturbance from other sections and to be prepared for emergency. This position is near the south wing of the general ward and is easily accessible for meal service. The ICU is to be provided with 4 beds and the CCU 2 beds and equipped for centralized observation from the nurse station.

vi) Research department

One of the objectives of the teaching hospital is to provide both the teacher and the student with a place of study apart from examination and treatment functions. The approach from the Medical School is to be through an entrance provided in the passage connecting the medical office in the C block and the test section in the B block, where personnel are required to change into indoor shoes and then through the change room on the B block side.

i) Joint laboratory, library (A block, 1F)

These rooms are planned on the second floor of the A block so that some connection may be maintained with the sample test section on the second floor of the B block; but they are completely separated from the out-patient department on the first floor, since the joint laboratory is to have costly research equipment installed for joint use. Extensive space is allocated to the library located next to the laboratory so that it may be used for laboratory purposes if the need arises in the future.

ii) Lecture rooms (B block, 1F)

Located next to the sample test section, the lecture rooms comprise four rooms, each with a capacity of about 60 persons. A toilet and a store room are to be provided. The partition between two rooms is to be movable so that they may be used as two large lecture rooms.

iii) Anesthetic laboratory (C block, 1F)

From the viewpoint of clinical education, this laboratory is to be next to the OT unit. In addition to the laboratory, professors' rooms and staff rooms are also to be provided.

### 3.2.4 Scale of Facilities

	Department		Ground floor	1st floor	2nd floor	3rd floor	P.H.	Total	
First phase 5180m <sup>2</sup>	Outpatient wing 2445m <sup>2</sup>	Outpatient	1900m <sup>2</sup>					1900m <sup>2</sup>	
		Research Department		545m <sup>2</sup>				545	
	Administration and laboratory wing 2580	Test section	545	430				975	
		Radiology section	510					510	
		Administration		460				460	
		Service	230					230	
Connecting corridor 155	Lecture rooms		390				390		
	P.H.						15		
Second phase 9820m <sup>2</sup>	Operation wing 2375	Doctors' room	960					960	
		Physiotherapy	220					220	
		CSSD		180				180	
		OT unit		720				720	
		Anesthesiology		140				140	
		ICU, CCU		140				140	
	Connecting corridor 180	P.H.						15	
				90	90				180
	Wards 5880	General ward			1470	1470	1470		4410
		Obstetric ward	735						735
Catering		525						525	
Laundry		210						210	
Connecting corridors 1265		305	305	305	305		1265		
External stairs 120		30	30	30	30		120		
Total							15000m <sup>2</sup>		

### 3.2.5 Structure

#### 1. Basic guidelines

- 1) The main structure is to be of reinforced concrete with Rahmen structure for the framework. Exterior walls and partitions are to be of bricks or concrete blocks.
- 2) Since the proposed site is on relatively good ground in Kathmandu, it is expected to have adequate bearing capacity. The form of foundation is, therefore, to be direct foundation, although will depends on the geological survey.
- 3) Although Nepal is not situated on a seismic zone, since there have been earthquakes of considerable magnitude, seismic force is to be taken into consideration with respect to all buildings.
- 4) In the present plan, expansion joints are to be installed at appropriate positions to cope with uneven subsidence of buildings and their behavior during earthquakes.

#### 2. Guidelines for structural design

The structural design for this project is to be based on the Japanese standards. However, the Indian Standards, etc., which are employed in some quarters, are to be used according to the local conditions.

##### 1) Fixed load

The fixed load is to be computed by taking account of the actual condition of the building concerned, e.g., weight of structural and finishing materials.

##### 2) Working load

The working load is to be based on the Japanese Building Standards Law Enforcement Ordinance by taking account of the

use of the building concerned, types of rooms and actual condition.

3) Structural materials, etc.

Although structural materials will be selected by taking account of the size, structure and use of the building concerned, the local supply capacity, quality, the building method, the condition of transportation from abroad, prices, etc., the following materials seem to be appropriate for the present plan.

(1) Concrete

Since Nepal depends on imports for the supply of cement as its capacity is limited, Japanese products will be used. However, local products are to be used for both coarse and fine aggregate.

A plant is to be provided at the site for mixing control. As regards the concrete strength, normal concrete of  $180 \text{ kg/cm}^2$  28-day compression strength seems to be appropriate in view of the quality of local products. However, it is desirable to determine the actual mixing strength by taking into consideration the actual deviation.

(2) Reinforcement

In view of the production capacity of deformed bars in Nepal, the Japanese deformed bars SD30 will be used for main bars. Thus, since the main materials are Japanese products, the allowance of the materials is to be based on the standards prescribed by the Japan Architectural Association.



Unit: kg/m<sup>2</sup>

Type of room	Floor, small beam	Large beam, column foundation	Seismic force
General rooms wards	180	130	60
Offices laboratories	300	180	80
Classrooms	230	210	110
Meeting rooms (fixed seats)	300	270	160
Meeting rooms (others)	360	330	210
Store rooms	500	400	200

(3) Seismic force

According to the Indian Standard, Kathmandu is in Zone V. The basic horizontal seismic coefficient is thus to be 0.08.

(4) Wind load

$P = c \times q$        $p = \text{wind pressure kg/m}^2$   
 $c = \text{wind pressure coefficient}$   
 $q = \text{velocity pressure}$

Based on the Indian Standard,  $q = 150 \text{ kg/m}^2$  and  $c = 1.0$ .

(5) Ground bearing pressure

It is to be determined by the results of soil surveys.

### 3.2.6 Air Conditioning and Ventilation Facilities

#### 1) Air conditioning unit

Air conditioning is to be provided for operation rooms, recovery rooms, I.C.U. and C.C.U. The method of air conditioning is to be one of centralized air conditioning by package type air cooled heat pump. Ducts in the operation rooms are to be equipped with filters.

#### Design conditions:

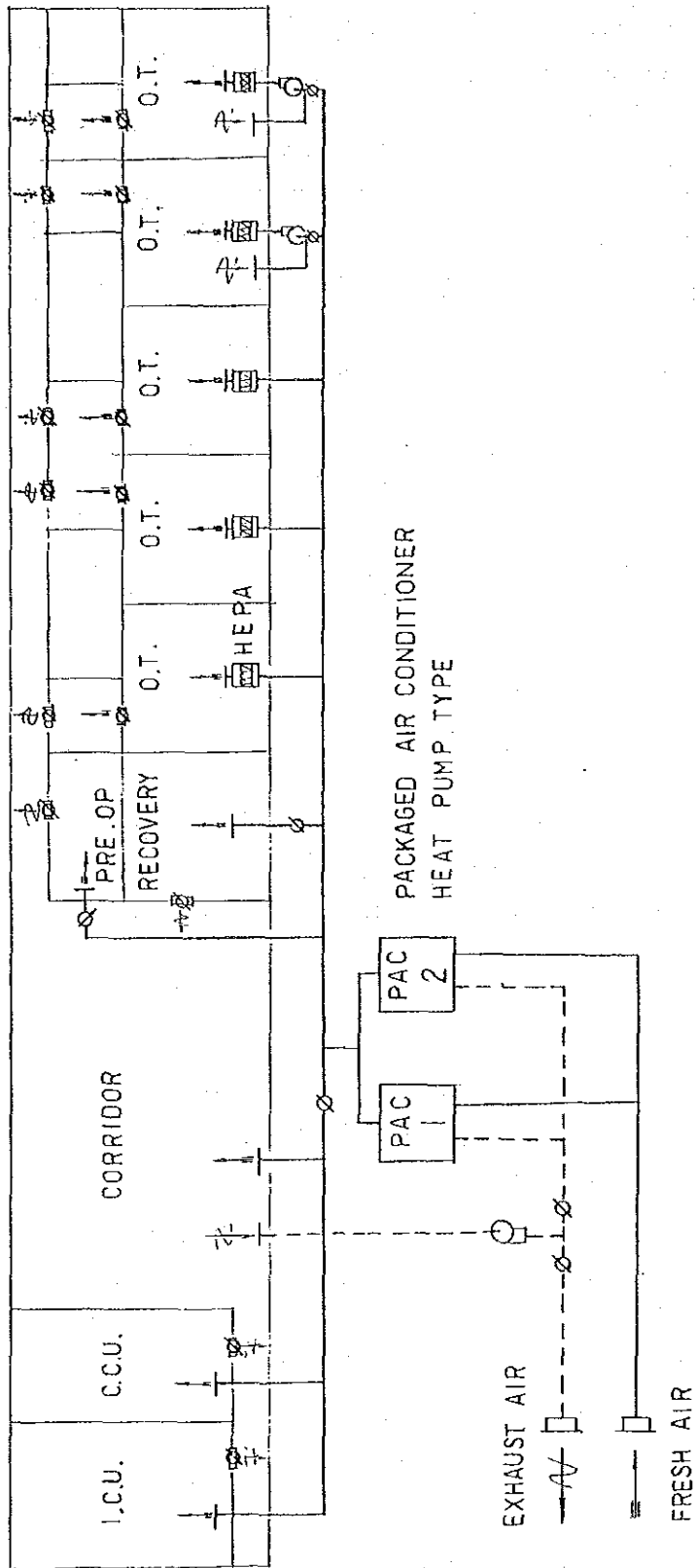
Temperatures in Kathmandu vary from 1.5 to 29.8°C with a mean temperature of 18.4°C and an average humidity of 69.9%.

Room temperatures are to be kept at 24 - 26°C with the room humidity at 50 - 60%.

#### 2) Ventilation equipment

As a rule, natural ventilation is to be used.

In those rooms where natural ventilation cannot be applied, forced mechanical ventilation is to be used.



AIR CONDITIONING SYSTEM

### 3.2.7 Water Supply, Drainage and Sanitary Facilities

#### 1) Water supply system

Service piping up to the receiving tank is to be provided by the Nepalese party. Water is first stored in a receiving tank (160m<sup>3</sup>) installed at the site and is then pumped up to tanks installed above the laboratory, operation and ward blocks (10m<sup>3</sup>, 5m<sup>3</sup> and 10m<sup>3</sup>). It is then gravity supplied to individual taps and other necessary points in each block.

#### 2) Hot water supply system

Hot water is to be supplied to necessary points including shower rooms, examination and treatment rooms and the kitchen by installing electric water heaters, but not to toilets and wash rooms.

#### 3) Drainage

Drainage is to be provided in two systems for sanitary sewage and general sewage. Sanitary sewage first goes into a purification tank for treatment and then joins the general sewage to be discharged. The work from this point is to be provided by the Nepalese side.

#### 4) Plumbing fixtures

Plumbing fixtures are to be installed at necessary points. Those to be used by the public and the patients, e.g., ward and outpatient blocks, are to be of the eastern type and those to be used by doctors are to be of the western type.

#### 5) Fire fighting facilities

Fire hydrants are to be installed on each floor in each block.

6) Medical gas supply

Oxygen tanks and equipment are to be installed in the manifold room with piping provided to serve the operation rooms, ICU, CCU, the delivery room, etc. where outlets are provided.

7) Laundry facilities

Washing machines, spinners, etc. are to be installed for washing linen and uniforms of the medical and nursing staff.

8) Kitchen

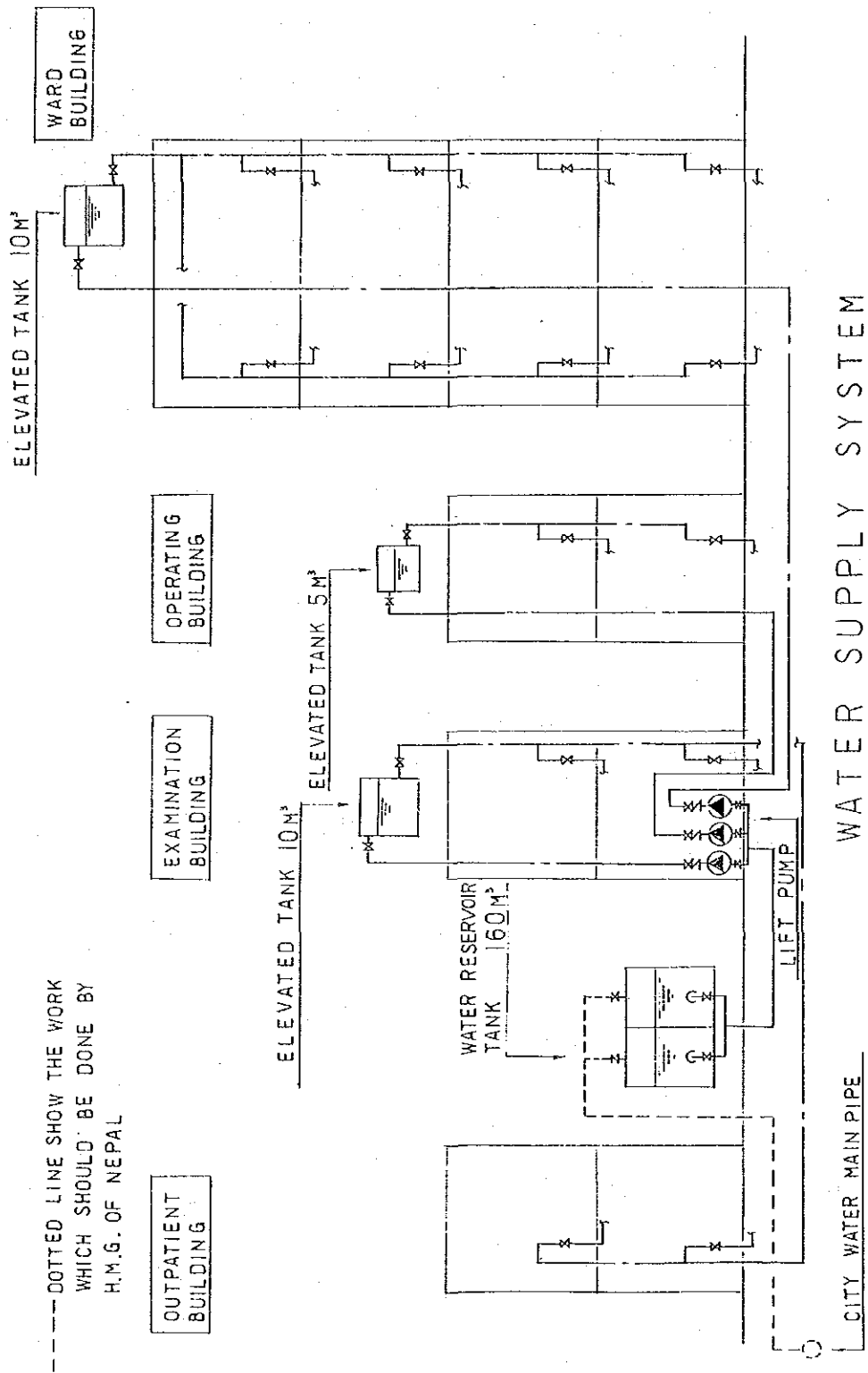
Necessary equipment are to be installed to provide a meal service for the patients, including refrigerators, cooking ranges, sinks, etc.

9) Purification tank

Sanitary sewage discharged from the hospital buildings is separately treated before joining general sewage.

10) Incinerator

An automatic incinerator is to be installed to process inflammable waste.



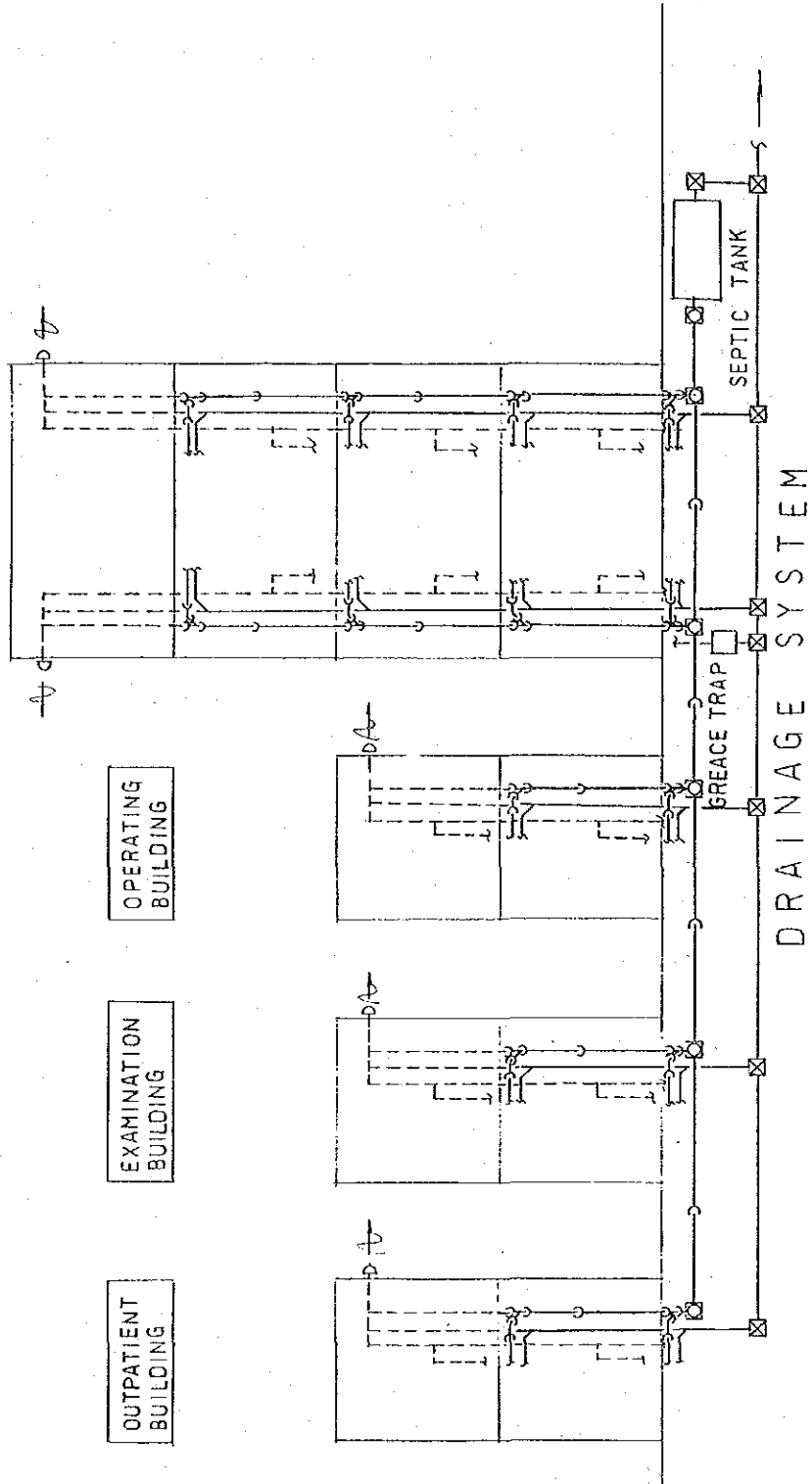
- - - VENT PIPE  
 — WASTE WATER PIPE  
 —○— SOIL WATER PIPE

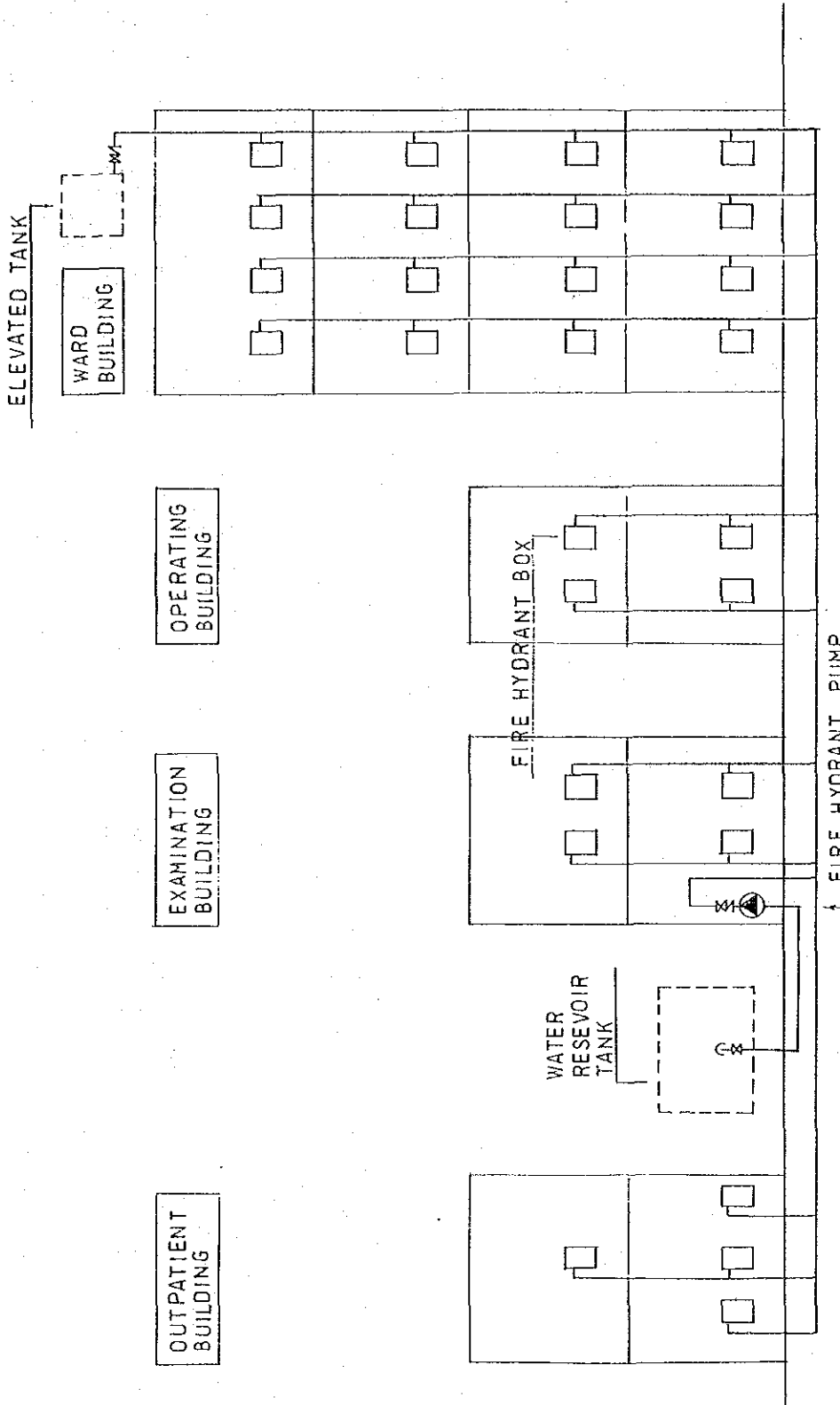
WARD BUILDING

OPERATING BUILDING

EXAMINATION BUILDING

OUTPATIENT BUILDING





INDOOR FIRE HYDRANT SYSTEM



### 3.2.8 Electrical Facilities

#### 1) Incoming power transforming unit

Power is to be received from a NEC power cable at 3 $\phi$  3W 11kV. The power room is to be provided on the first floor of the laboratory block. Of the lead-in work, piping up to a distance of 1m from the building is to be provided by the Japanese side.

Since voltage fluctuations are expected to be large and, in addition, many items of medical equipment are sensitive to them, an automatic voltage regulator (AVR) is to be installed on the secondary side of the transformer.

a) Incoming power: 3-phase 3-wire 11kV 50Hz

b) Transformer:

Capacity: about 800kVA  $\times$  2

Connection method: 3-phase 4-wire 400V/230V

Cooling method: automatic cooling with oil

#### 2) Generators

In order to maintain power supply during power cuts or extremely low voltages, generators are to be installed.

In view of the necessary maintenance work, there are to be two units with both automatic and manual ignition.

(1) Capacity: about 75kVa  $\times$  2

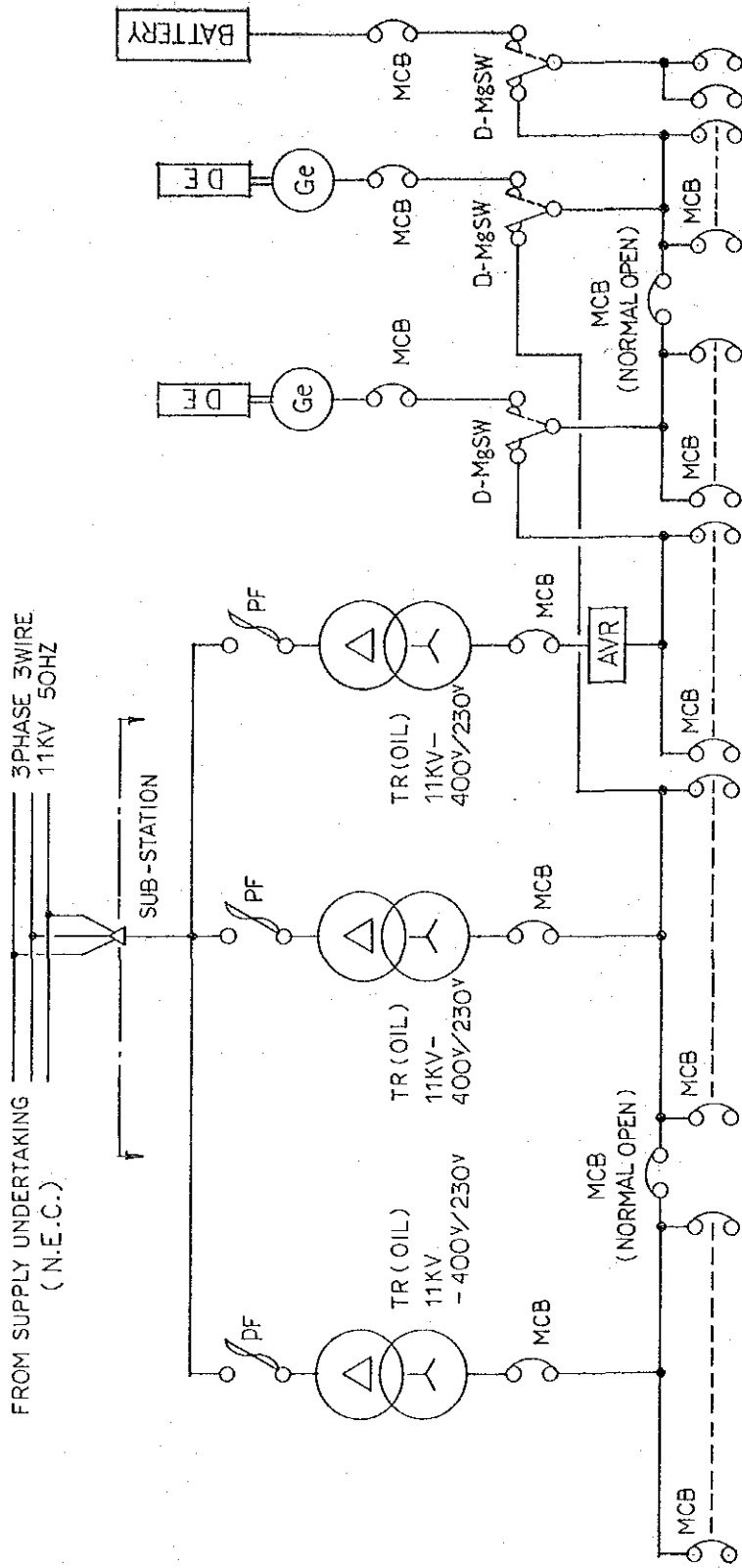
(2) Voltage: 3-phase 4-wire 400V/230V

(3) Ignition: electric

(4) Cooling method: radiator

(5) Fuel: light oil

(6) Load: lighting in operation rooms, ICU, CCU, etc.;  
medical equipment, refrigerators, freezers;  
elevators; air conditioning units, water pump; part  
of lighting in wards, corridors, etc. (safety lights).



SUB-STATION SKELETON DIAGRAM

3) Batteries

Batteries are to be provided to supply emergency power for lighting in operation rooms, ICU, CCU, etc. until after an appropriate voltage has been obtained by the generator following a power cut.

4) Power wiring

Trunk cables are to be installed from the switch board to each power control panel, distribution board and the switch itself to each block and for each system.

(1) Voltage:

Power: 3-phase 3-wire 400V  
Socket outlet: 3-phase 4-wire 400V/230V

(2) Method: cabling

5) Socket outlets for lighting

(1) Lighting equipment

In view of the possible voltage fluctuations, incandescent lamps are to be used mainly for the light source. In addition to bactericidal lamps, diffusion lamps (operation rooms), indicator lamps and three-color lamps (operation, radiology and dark rooms), emergency exit lamps are to be installed at main exits and outdoor lights on the outer walls of buildings. As a rule, equipment is to be of the direct connection type.

(2) Illumination in major rooms

Operation rooms, ICU, CCU: about 500lx  
Laboratories, diagnosis and treatment rooms, lecture rooms, reading rooms, offices and waiting rooms: about 300lx  
Wards and waiting rooms: about 50lx

(3) Light control

In view of the running costs, lights are to be control in small sections and those in corridors may be used at intervals.

(4) Socket outlets

As a rule, the socket outlets for medical equipment are to be earthed.

(5) Earthing facilities

Earthing terminals are to be provided at those points where earthing is necessary for medical equipment (operation and radiology rooms, ICU, CCU, etc.).

(6) Wiring method

As regards indoor wiring, polyvinyl chloride wires protected by polyethylene pipes are to be installed either in the ceiling or in the walls.

6) Communication facilities

(1) Telephone facilities

About 10 lines (initially 2 or 3) are to be led in from the NTC. A simple exchange is to be provided with telephones installed in the Director's room and main offices.

Of lead-in work, the Japanese side is to be responsible for the piping up to 1m from the outer wall of the building.

(2) Intercom

Intercom is to be installed between operation rooms and preparation rooms and also between the radiology room and the control room.

(3) Nurse call facilities

Push buttons are to be installed in sickrooms with an indicator at the nurse station.

7) Fire fighting equipment

(1) Push buttons and fire bells are to be installed at various points in the buildings with an indicator panel in the administration office.

(2) Hydrant pump activating buttons

Pump activating push buttons are to be provided in hydrant boxes installed at various points in the buildings.

(3) Lightning arresters or conductors are to be installed above each building for protection from lightning.

8) Ceiling fans

Ceiling fans are to be installed in sickrooms, diagnosis and treatment rooms and as required.

9) Elevators

(1) Number of units: 3

(2) Type: rope type

(3) Speed: 30 m/min.

### 3.2.9 Disaster Prevention

- 1) Since the wards are to be housed in four-story blocks, each block is to be provided with a fire escape. Inclined walkways for patients in serious cases are also to be provided.
- 2) O.T. suite, ICU, CCU, etc. are to be separated from the rest to prevent in-hospital infection.
- 3) Planning is to be sufficient to cope with instability of power and water supply. As for power failures, generators are to be installed and inclined walkways to replace elevators. Stabilizers are to be installed in medical equipment to cope with drops in voltage. Water tanks of adequate capacity are to be provided in case water supply is cut off.

### 3.2.10 Medical Equipment

As regards the selection of medical equipment, those with high technical transfer effects on education and medicine are to be basic items by taking into consideration the condition of medical services in Nepal and the present condition of the I.O.M. of Tribhuvan University. At the same time, selection is to be made centering around those with low running costs and easy maintenance. In view of the above, basic guidelines may be outlined as below.

- 1) Attention is to be paid to the link with Japanese cooperation in medical technology already in operation.
- 2) Since excessive adoption of advanced medical equipment may increase the Nepalese burden, planning is to be made centering around those necessary for acquiring basic techniques, limiting advanced equipment to X-ray units, ultra sonic diagnosis units, cardiography units and fiberscopes.
- 3) As regards the adoption of basic medical equipment, those Indian and Pakistani models for which maintenance is easy and with which the Nepalese medical personnel are familiar are to be selected as much as possible.
- 4) As regards those medical equipment which are important for diagnosis and treatment, special attention is to be paid to after sales service. That is, the equipment makers are to be able to provide regular inspection on operation and to supply replacements. They are also to have a sufficient capacity for training specialist technicians who are able to maintain and control equipment.

The above guidelines are based on the so-called appropriate technical transfer often discussed in connection with recent international cooperation and are expected to ultimately facilitate the Nepalese efforts in self-help.

## Medical Equipment List

### (I) FIRST PHASE

#### 1. OUTPATIENT DEPARTMENT

- i) O.P.D.
  - a) Diagnostic Instrument Set
  - b) Examination Couch
  - c) O.P.D. Treatment Room Instrument
  
- ii) DISPENSARY SECTION
  - a) Water Refiner
  - b) Medicine Refrigerator
  - c) Prescription Utensil Set
  
- iii) CASUALTY SECTION
  - a) Simple Operating and Stretcher
  - b) Auxiliary Operating Light
  - c) Suction Unit
  - d) High Speed Autoclave
  - e) Observation Bed
  - f) Treatment Utensil

#### 2. CENTRAL DIAGNOSTIC & TREATMENT DEPARTMENT

- i) X-RAY SECTION
  - a) X-Ray Angiographic Apparatus
  - b) X-Ray-TV Apparatus
  - c) X-Ray Tomograph Apparatus
  - d) Dark Room Equipment
  
- ii) PHYSIOMETRY SECTION
  - a) Endoscope (Various type)
  - b) Electrocardiography Apparatus
  - c) Electroencephalograph Apparatus
  - d) Respiratory Test Apparatus
  - e) Ultra Sonic Diagnosis Apparatus
  - f) Respiration Vitalography Apparatus
  
- iii) MORBID ANATOMY SECTION
  - a) Autopsy Table
  - b) Mortuary Refrigerator



- iv) CLINICAL LABORATORY (1)
  - a) Centrifuge
  - b) Microscope
  - c) Hemocytometer
  - d) Spectrophotometer
  
- v) CLINICAL LABORATORY (2)
  - a) System Spectrophotometer
  - b) Centrifuge
  - c) Flame Photometer
  - d) Water Bath
  - e) Water Still
  - f) Analytical Balance
  - g) PH Meter
  - h) Electrophoresis Apparatus
  - i) Densitometer
  - j) Incubator
  - k) Microscope
  - l) Spectrophotometer
  - m) Deep Freezer
  - n) Special Microscope
  - o) Anaerobic Incubator
  - p) Auto Clave
  - q) Shaker (For Tissue Fixation)
  - r) Microtome Apparatus
  - s) Freezing Microtome Apparatus
  - t) Prefabric Refrigerator
  - u) Hot Air Sterilizer
  - v) Water Deionizer Apparatus
  - w) Blood Gas Analyzer

(II) SECOND PHASE

1. CENTRAL DIAGNOSTIC & TREATMENT DEPARTMENT

- i) CENTRAL STERILIZING AND SUPPLY SECTION
  - a) Autoclave
  - b) C.S.S.D. Materials
  
- ii) CENTRAL OPERATING THEATER
  - a) Operating Light
  - b) Universal Operating Table
  - c) Anesthesia Apparatus
  - d) Electro Surgical Unit
  - e) Suction Unit (Heavy Duty Type)
  - f) Patient Monitoring Apparatus
  - g) Water Sterilizer
  - h) Instrument Boiling Sterilizer
  
- iii) PHYSICAL THERAPY SECTION
  - a) Physical Exerciser Apparatus
  - b) Physical Therapy Apparatus
  
- iv) (I.C.U. C.C.U.) SECTION
  - a) Patient Bed (I.C.U. Type)
  - b) Central Patient Monitoring System
  - c) Heart Monitoring Defibrillator
  - d) Automatic Respirator
  - e) Oxygen Therapy Equipment
  
- v) DELIVERY SECTION
  - a) Delivery Bed
  - b) Operating Light
  - c) Water Sterilizer
  - d) Delivery Room Materials
  - e) Operating Table
  - f) Auxiliary Operating Light
  
- vi) NURSERY SECTION
  - a) Infant Incubator
  - b) Infant Respirator
  - c) Infant Phototherapy Apparatus
  - d) Nursing Bottle Sterilizer
  - e) Infant Bassinet Stand

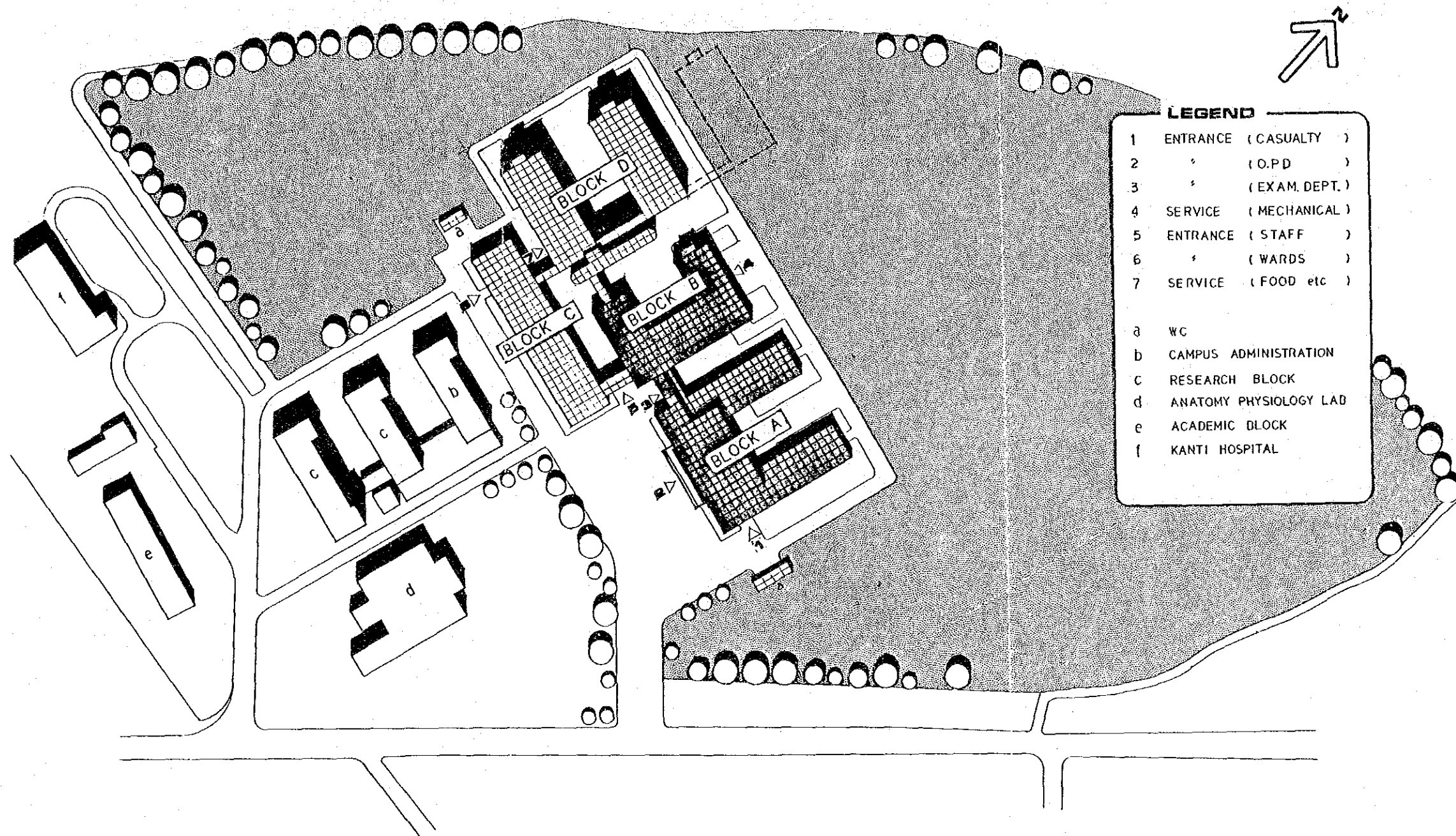
2. WARD DEPARTMENT

- a) Patient Stretcher
- b) Mobile X-Ray Unit
- c) Sterilizer
- d) Portable Suction Unit
- e) Examination Lamp
- f) Nursing Utensil



## **CHAPTER 4. BASIC DESIGN PLANS**

- o Site plan**
- o Ground floor plan**
- o First floor plan**
- o Second floor plan**
- o Third floor plan**
- o Elevation and section**



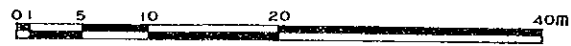
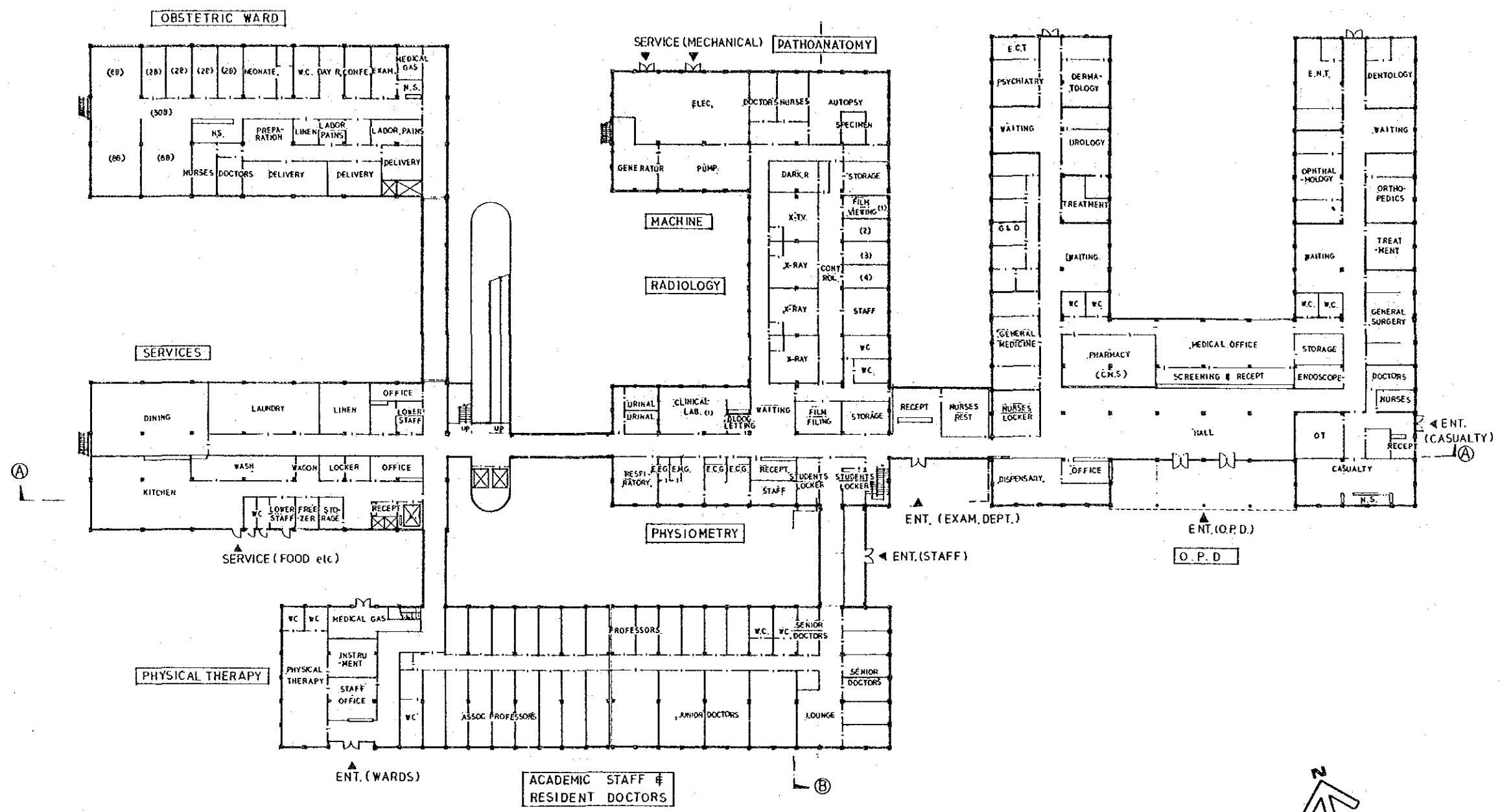
**LEGEND**

- 1 ENTRANCE (CASUALTY )
- 2 ' (O.P.D )
- 3 ' (EXAM. DEPT.)
- 4 SERVICE (MECHANICAL)
- 5 ENTRANCE (STAFF )
- 6 ' (WARDS )
- 7 SERVICE (FOOD etc )
  
- a WC
- b CAMPUS ADMINISTRATION
- c RESEARCH BLOCK
- d ANATOMY PHYSIOLOGY LAB
- e ACADEMIC BLOCK
- f KANTI HOSPITAL

0 5 10 25 50 100 150m

**SITE PLAN**

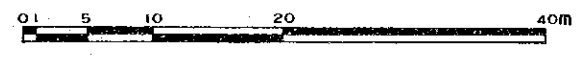
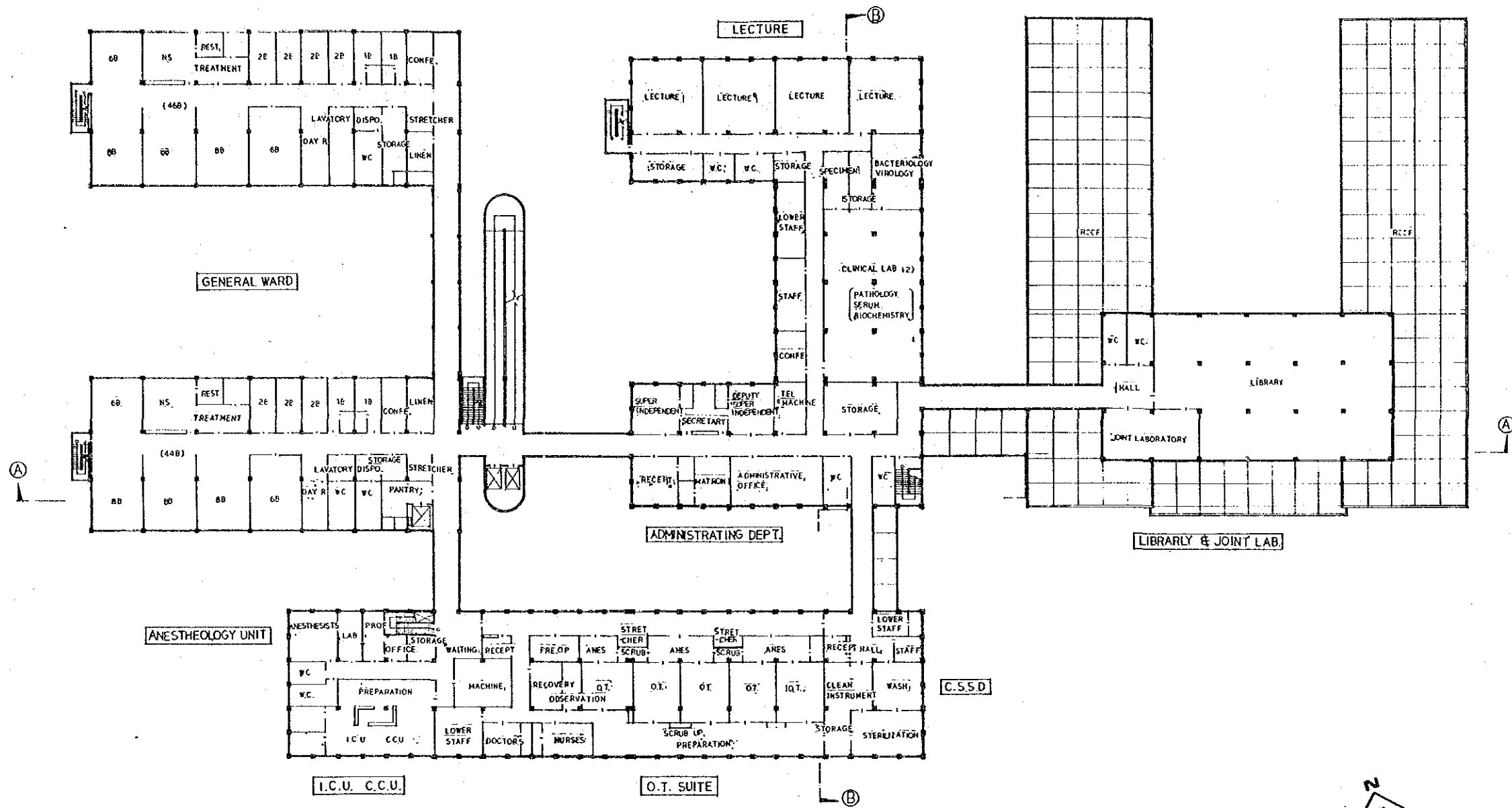
**1**



**GROUND FLOOR PLAN**

**2**



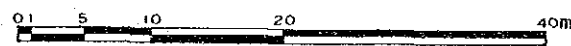
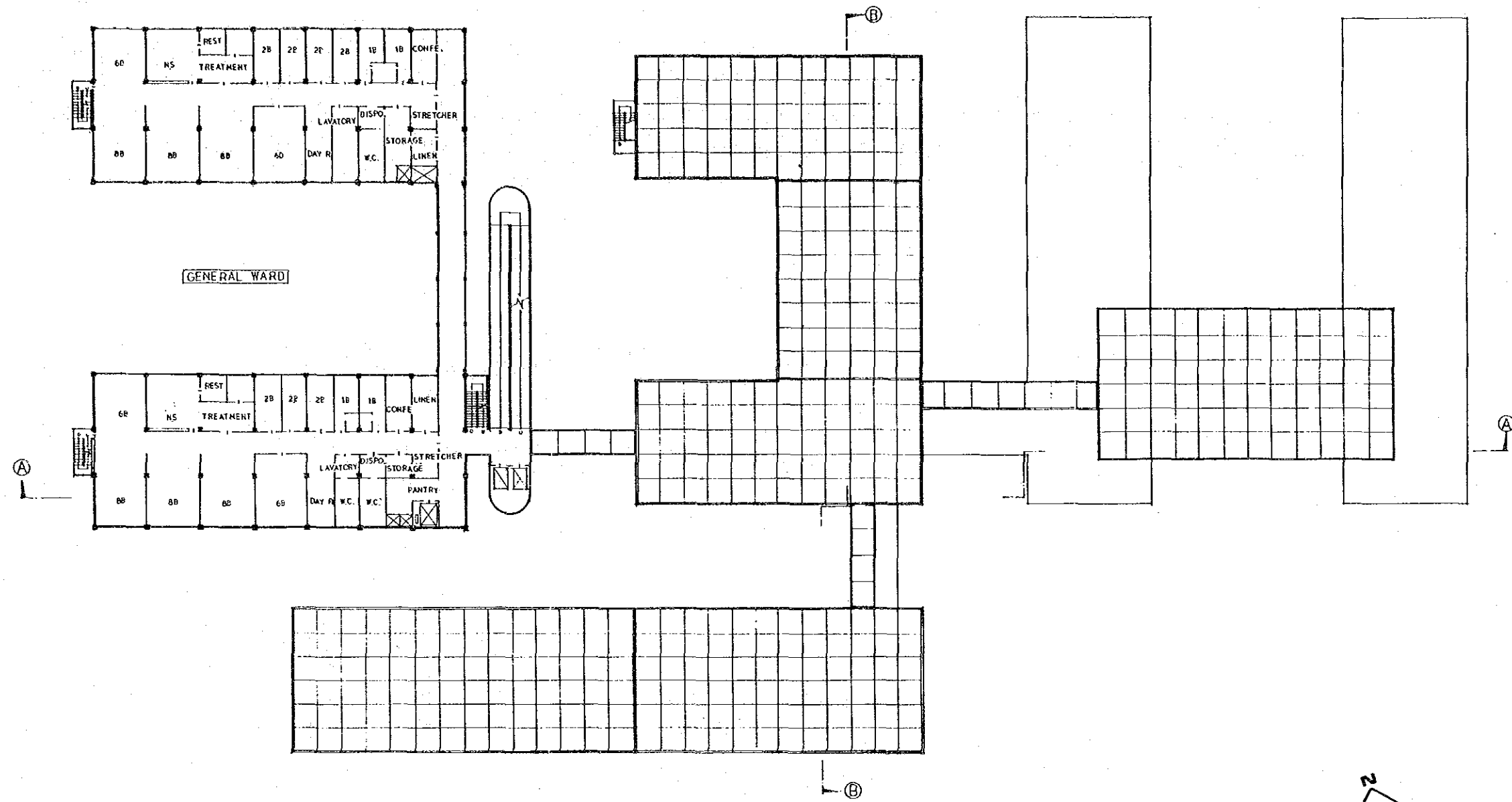


**1ST FLOOR PLAN**

**3**

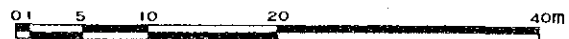
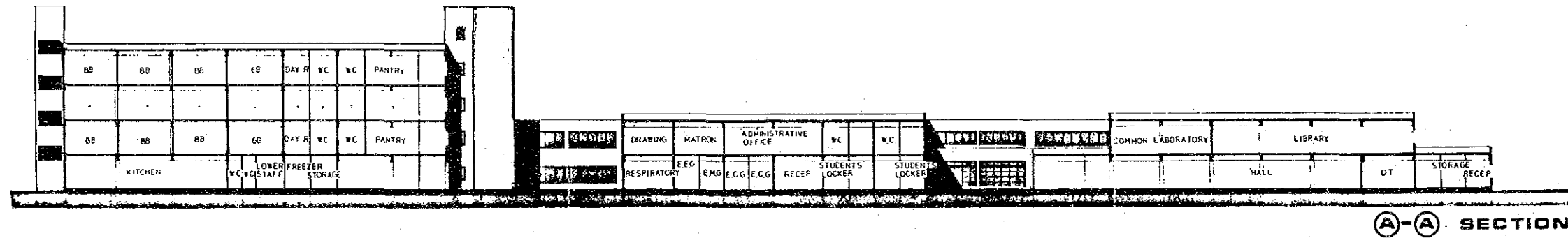
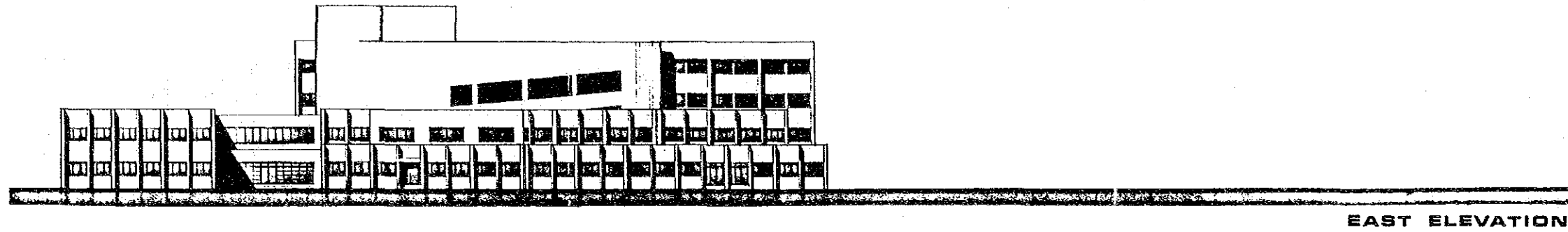
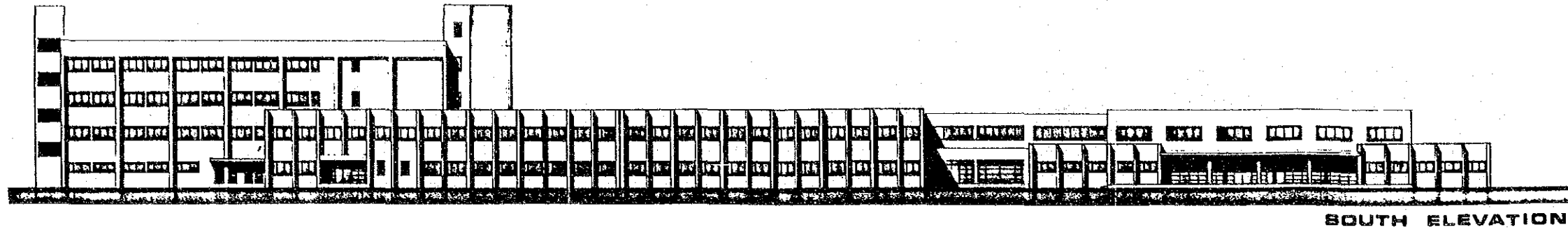






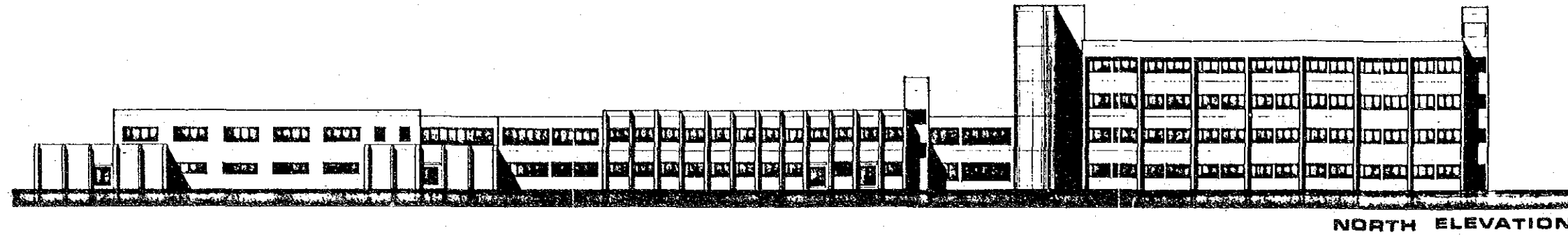
2<sup>ND</sup>, 3<sup>RD</sup> FLOOR PLAN

4

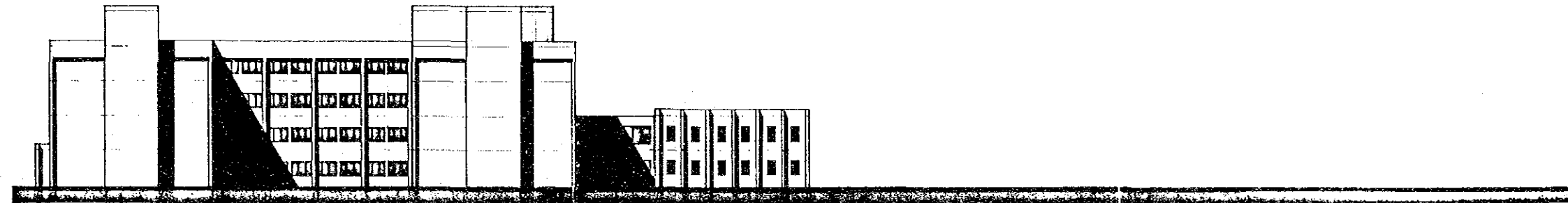


ELEVATION & SECTION

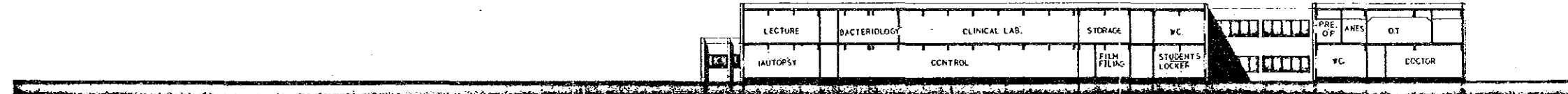
5



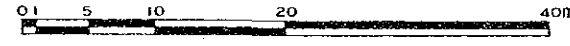
NORTH ELEVATION



WEST ELEVATION



B-B SECTION



ELEVATION & SECTION

6



## **CHAPTER 5. CONSTRUCTION PLAN**



## CHAPTER 5. CONSTRUCTION PLAN

### 5.1 Scope of Construction Work

- 1) Scope of construction by the Japanese side
  - i) Construction, electrical work, water supply, drainage and sanitary work, air conditioning and ventilation work.
  - ii) Of various equipment belonging to the hospital, kitchen, laundry equipment and a telephone switch board (including indoor piping).
  - iii) Of exterior work, the range within 1m from the buildings, entrance yard, service yard, inner court gravel work, incinerator.
  - iv) Water supply connection work (including the reservoir).
  - v) Sanitary sewage and drainage connection work (including the septic tank).
  - vi) Rainwater drainage in the buildings (including the range within 1m of the buildings and yard sections).
  - vii) Medical equipment

- 2) Scope of work to be carried out by the Nepalese side
- i) Preparation of the site prior to construction.
  - ii) Securing of land space for a temporary office, a workshop, a storage yard, etc.
  - iii) Water connection into the receiving tank at the site.
  - iv) Power cable connection into the building.
  - v) Telephone piping to the building.
  - vi) External drain beyond the septic tank (including the permeation tank) and rainwater drain outside the building (beyond 1m from the building).
  - vii) Temporary water, power and telephone services during construction.
  - viii) Exterior work and planting.
  - ix) Curtains, blinds, carpets, beds, office fixtures, etc.
  - x) Customs cooperation with regard to imported machinery and materials.
  - xi) To ensure stable supply of locally available construction materials corresponding to the construction plan.



Approximate cost of the works to be  
contributed by Nepalese side

I	Clearance and leveling of the site	¥43,500,000
II	Water supply intake from Main	6,300,000
III	Sewage Infiltration tank	23,500,000
IV	Electric intake from Main	7,900,000
V	Telephone intake from Main	1,100,000
VI	Others (beds, curtains and so forth)	67,700,000
<hr/>		
	Total	¥150,000,000

## 5.2 Materials and Equipment Procurement Plan

### 5.2.1 Materials

#### 1) Main materials

##### Reinforcement:

Although deformed bars of the specifications given below are produced at a plant in Parwanipur, the supply is small and unstable. Therefore, Nepal largely depends on imports for the supply of reinforcing bars.

(Nepalese products) BS1144, BS4461, Trend Standard EA1968,  
DIN1045, IS1786-1966.

The stock at the National Trading Limited (NTL) consisted entirely of Japanese products. Although Indian products can be used, it seems advantageous to procure Japanese products in view of the supply and demand situation, process control and process precision.

##### Cement:

Himaru Cement Plant in Kathmandu meets about 25% of the total domestic demand. Although the prices are low, stable supply cannot be expected.

The current stock at the NTL consists of Korean products which are reputed to be of a good quality. The present plan, however, is to procure cement from Japan in order to ensure stable supply.

##### Aggregate:

It is possible to obtain river sand for fine aggregate. Crushed stone is generally advantageous for coarse aggregate.

##### Steel work:

As Nepal produces no steel, it is imported mainly from India. It will be safer to avoid field welding because of the

shortage of skilled manpower. Procurement in Japan is to be considered in view of the quality and process control.

Bricks:

Machine-made bricks of a relatively good quality are produced at a plant in Kathmandu. Procurement has recently become difficult, resulting in its low economy as structural materials compared with reinforced concrete.

2) Supplementary materials

Timber:

The timber produced in Nepal for building and furniture include Chilaune, Uttis, Sallo, Sal Khyer, Kattus, Karam and Shisham. However, large and good quality timber is relatively expensive and scarce because of the forest protection policy of the Government and an increase in demand.

Plywood of various thicknesses is produced in Nepal; but they are inferior to Japanese products in water resistance.

Bamboo is abundant in Nepal and is used for various purposes. It is generally used for scaffolding.

Stone materials:

Sandstone and limestone are relatively abundant and are used for various types of stone masonry. The quality of marble produced is not very high; high grade marble is imported from India and other countries.

Slate has been used from olden times in the hill areas. It is being used in increasing quantities with the development of transportation techniques. Slate of 6 - 12mm thickness is generally used for roofing and slate of 10 - 15mm for flooring.

Concrete products:

Almost all of them are produced at the site. Concrete drain pipes and asbestos slates are factory produced, including those of 1m in diameter.

#### Metal fittings:

Simple steel sashes, steel doors and accordion doors are produced in Kathmandu. However, it will be necessary to import aluminum sashes and high grade steel sashes from India, Japan, etc.

#### Wooden fittings:

They are produced at a wooden furniture factory. Since the adhesive used is of a poor quality and the water resistance of plywood is low, flush doors should not be used for external use or areas in contact with water. Panelled doors are to be preferred.

#### Metal works:

Although it is possible to import them from India and China, high grade works are not available.

#### Glass:

Since glass is not produced in Nepal, it is imported mainly from India. It is advisable to avoid large sizes since it seems difficult to obtain replacements for future maintenance. It is possible to obtain reinforced glass and double-glazing glass from India.

#### Waterproofing agents:

The general practice is adopt a pitched roof finished with various roofing materials. In the case of a flat roof, it is given two or three coats of waterproofing asphalt. It is often combined with lime concrete, brick tiles, etc. for covering, protection and insulation.

#### Paints:

Paints are imported mainly from India. Procurement from Japan or a third country may be considered, depending upon the

type. However, since the transportation route passes through the Tropics, special attention is to be paid to emulsion paints to prevent deterioration of the quality.

#### Terrazo tiles:

They are relatively widely used on buildings of medium and higher grades. However, since the quality varies, special attention will be required in terms of control. Standard specifications are 250mm square and 20mm thick. They are obtained in various ways: on-site production, plant production, imported from India, etc.

#### Brick tiles:

Brick tiles produced in Nepal are 110mm or 150mm square and 18mm thick, and are used mainly for flooring.

#### Roof tiles:

Various roof tiles are produced, including concave tiles of 60 to 90mm diameter and 6 to 8mm thick, ribbed tiles (12 × 104 × 208) and western style tiles (produced at the brick tile factory in Kathmandu).

#### Plastering materials:

Nepal has extensive deposits of lime which do not contain impurities such as silica and aluminous shale. The Nepalese traditional method is to mix it with aggregate called Surkee, crushed bricks in various sizes, in various combinations to be used for stone masonry, plastering and insulation.

#### Furniture:

Although simple steel furniture is produced in Kathmandu, it is relatively expensive. Wooden furniture are also produced and those of a suitable quality are obtainable.

### 3) Fixtures

Fixtures are mainly of Indian make which are considerably inferior to Japanese ones in quality. In view of replacements after construction, it seems necessary to use Indian makes to some extent for lighting fixtures and receptacle outlets.

#### 5.2.2 Equipment

As regards the procurement of medical equipment, since Nepal hardly produces any, advanced medical equipment which require an adequate after-sales service should be obtained from Japan and those requiring easy maintenance from India and Pakistan where they are less expensive. Below is the breakdown of main medical equipment.

- 1) Those to be procured from Japan
- 2) Those to be procured from India and Pakistan

Construction machinery required for the proposed construction include the following:

- |                               |                                      |
|-------------------------------|--------------------------------------|
| 1. Light van: 1               | To be procured in Japan.             |
| 2. Truck (4t): 1              | "                                    |
| 3. Dump car (7t): several     | To be rented in Nepal.               |
| 4. Engine welder (6kw): 1     | To be procured in Japan.             |
| 5. Dumping tool: several      | To be rented in Nepal.               |
| 6. Concrete mixer:            | "                                    |
| 7. Hatcher plant:             | "                                    |
| 8. Air compressor:            | "                                    |
| 9. Power winch or hand winch: | "                                    |
| 10. Crane (6 - 16t):          | "                                    |
| 11. Paint sprayer:            | To be procured in Japan as required. |
| 12. Demolishing tool:         | "                                    |

### 5.2.3 Service

Although wages are very low, i.e., 1/8 - 1/10 of Japanese wages, labor efficiency is low, particularly in those works other than traditional ones.

#### Laborers:

Although there are seasonal fluctuations, there is a relatively stable and abundant supply of labor in and around Kathmandu.

#### Skilled workers:

There are few skilled workers. If skilled workers are required in large numbers, their recruitment in India and other countries should be considered.

#### Engineers:

The number of engineers, who can supervise or inspect those works which require advanced techniques, is extremely small. Therefore, it may be necessary to recruit them in India or in Japan in the case of particularly advanced engineers. Below is an outline of established skills.

#### 1) Reinforcement workers:

It seems that they do reinforcement work only. They work rather slowly but carefully. However, they handle mainly small structures and their efficiency falls with larger ones. There are hardly any tools and cutting is done with a chisel. Binding cords are available. Spacer blocks are made of mortar at the site.

#### 2) Bricklayers:

Although their workmanship is rather coarse compared with their Japanese counterparts, since bricks are a traditional building materials in Nepal, they work efficiently, giving the impression that they are used to their work. Laying is done

mainly in the English and French styles with horizontal bars only and seldom with vertical bars. As regards horizontal bars, those of  $6\phi$  are produced.

3) Plasterers:

Plastering is often done by bricklayers in the local style unlike Japan where the process consists of three stages, i.e., base coating, middle coating and finishing. The base is prepared by throwing; this is followed by middle coating and finishing to complete the work in 2 - 3 days. Mortar applied to a brick surface settles well, producing few cracks. However, whether it works well on concrete is not clear.

4) Carpentry:

Reinforced concrete has begun to be adopted for columns, beams and slabs in most brick buildings. However, the standard of form work is very low and time-consuming. For instance, separate form ties are not available and only bracing is used.

Moreover, since formwork materials, plywood, etc. are extremely costly, scrap wood is used which, consumes more time. At any rate, it will be extremely difficult to carry out formwork of precision in a short work period in view of the materials and labor available.

5) Laborers:

Concrete placing is carried out manually by laborers with baskets and iron pots after mixing concrete by pulsometer pump ( $0.2 - 0.4\text{m}^3$ ). Placing is carried out at the rate of 10 - 15  $\text{m}^3/\text{day}$  per mixer with 60 - 70 persons. In view of the scope of work and the area, therefore, 3 - 4 mixers will be required at the site to place 40 - 50  $\text{m}^3/\text{day}$ . Accordingly, the work area is to be divided into small sections with concrete placing in constant operation.



Earth work is normally conducted manually. ( ) has also begun to be used. Since they are used to carry out placing manually, no problem is anticipated providing the work schedule permits it.

6) Installation workers:

Since the number of workers is limited, appropriate guidance, perhaps by Japanese staff, will be required because of the scope of work. In short, there are no skilled workers.

7) Painters:

Although painting is an established craft, the quality of work is extremely poor.

8) Tilers:

Tiling is carried out by bricklayers. However, the work is very poor in quality and it will be extremely difficult to attain the Japanese level of finishing.

9) Interior finish:

Interior finish work is carried out by carpenters. It is, however, carried out in a hand-made form and is poor in quality as well as time-consuming.

### 5.3 Construction Implementation Plan

#### 5.3.1 Basic Outline

Since the implementation of this construction project will contribute not only to the improvement of the medical services in Nepal and of the welfare of the people but to the friendship between Nepal and Japan, it is important to complete the construction of the facilities of such a quality as to meet the objectives under difficult conditions with regard to materials, etc. within the limited construction period.

In implementing the construction, therefore, it is vital to make arrangements by taking into full consideration the local conditions concerning materials and labor so that procurement, management and guidance may be conducted under a comprehensive work control plan. It should, therefore, be carried out entirely by Japanese construction firms under contract.

#### 5.3.2 Design, Implementation and Supervision

In view of the size of the proposed facilities, they are to be constructed in two phases.

##### 1) First phase construction

After the exchange of instruments between the Nepalese and Japanese Governments concerning Japan's cooperation for the implementation of the project, implementation design is to be commenced.

##### (1) Implementation design

Design documents based on the basic design report are to be prepared for tender. This is to take about 4 months.

(2) Tender

About 2 months are to be allocated to public notice, screening of tenderers, addition and assessment, signing of the contract, etc.

(3) Construction

About 14 months are to be allocated for the period of construction including the installation of medical equipment, provided that the procurement of construction materials and machinery encounters no problem.

2) Second phase construction

After the exchange of instruments between in the two governments concerning Japan's cooperation for the implementation of the second phase construction, implementation design is to be commenced.

(1) Implementation design

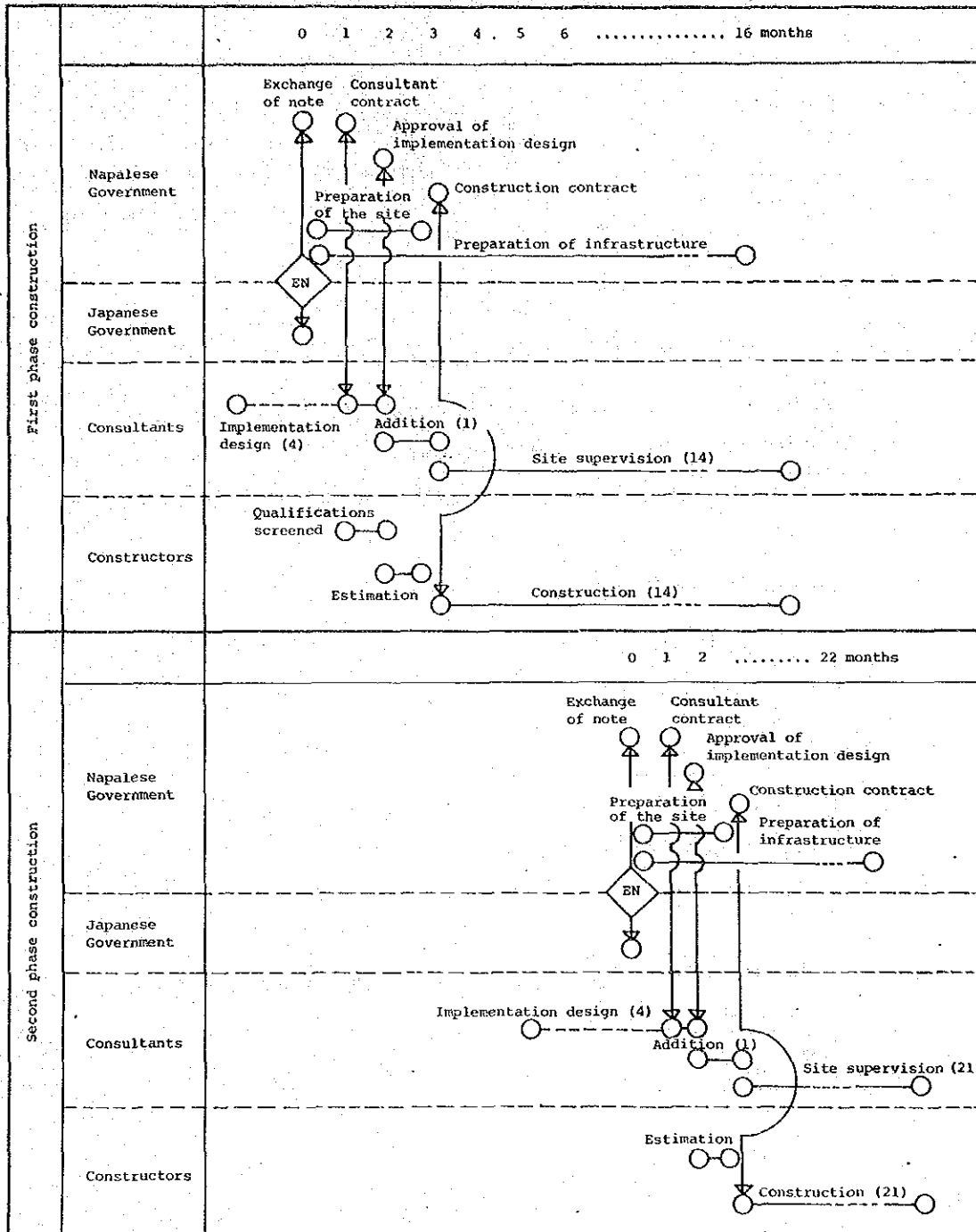
About 4 months are to be allocated as in the case of the first phase construction.

(2) Tender

About 2 months are to be allocated as in the case of the first phase construction.

(3) Construction

About 21 months are to be allocated as in the case of the first phase construction.



## **CHAPTER 6. MANAGEMENT AND ADMINISTRATION PLAN**



## CHAPTER 6. MANAGEMENT AND ADMINISTRATION PLAN

### 6.1 Administration

The proposed teaching hospital is to be administered as a hospital attached to I.O.M. of Tribhuvan University primarily for the training of students. It is also to serve as the center for the modernization of medical services in Nepal. Accordingly, its central diagnosis and treatment facilities are to be made available for the benefit of other medical institutions. Moreover, it should be administered not only for the training of doctors but as the center of medical education in Nepal, contributing to the training of paramedicals.

In order to achieve the above objectives, it is desirable to administer the hospital by setting up an appropriate administrative committee formed with a wide perspective under the Superindendant.

### 6.2 System of Maintenance and Management

A successful outcome of the construction of this teaching hospital depends on the maintenance and management after construction. That is, smooth supply of consumable materials necessary for the maintenance and operation of various facilities and equipment has to be ensured. For that purpose, the Nepalese Government must provide an adequate budget and, at the same time, it will be necessary to secure engineers and increase the maintenance and management capacity. In this respect, Japan's cooperation should cover not only medical education but the technical training for the maintenance of hospital functions.

### 6.3 Manpower Plan

As regards the staffing of the teaching hospital, the Nepalese side plans to assign 69 doctors, 96 nurses and 16 paramedicals. However, in view of the nature of the teaching hospital to train clinical doctors and manpower plans in Japan and elsewhere, the Nepalese plan presents considerable difficulties. For instance, as regards the number of doctors, it will be necessary to recruit not only professors and teaching doctors but interns.

Table (A) Manpower Plan Proposed by the Nepalese Side

#### Reduced Staffing Pattern of Teaching Hospital

<u>Doctors</u>	Proposed Staffing (124)
Anesthesiology	(10)
Dermatology & V.D.	(4)
ENT	(6)
Medicine	(9)
Obs/GYNE	(6)
Ophthalmology	(6)
Physiology	(6)
Psychiatry	(4)
Surgery	(9)
Orthopedics	(9)
<hr/> Sub Total	<hr/> 69
<u>Administration Staff</u>	
1 Hospital Director	(1)
2 Asst. "	(1)
3 Personal Department	(10)
4 Finance Department	(12)



5	General Administration		(112)
	{ Kitchen	(48)	
	{ Laundry	(19)	
	{ Transport. & Communication	(16)	
	{ Pharmacy	(11)	
	{ Linen	(11)	
	{ General Store	(7)	
6	Maintenance Dept.		(29)
	{ Hospital Engineer	(1)	
	{ Hospital Electronic Engineer	(1)	
	{ Assistant Engineer	(3)	
	{ Technicians	(6)	
	{ Plumbers	(4)	
	{ Electricians	(6)	
	{ Carpenters	(2)	
	{ Mason	(1)	
	{ Painter	(1)	
	{ Typist	(1)	
	{ Peon	(2)	
	{ Sweeper	(1)	
7	Procurement & Supply		(6)
8	Medical Record		(16)
	{ Medical Recorders	(4)	
	{ Typist	(2)	
	{ Peon	(4)	
	{ Reception Secretaries	(6)	
Sub Total			187
	{ Nursing		(96)
	{ Matron	(1)	
	{ Asst. Matron	(1)	
	{ Sisters	(13)	
	{ Staff Nurse	(81)	
Sub Total			96

<u>Other Personnel</u>		
1	C.S.S.D.	(10)
2	Dicterics	(4)
3	Library	(11)
4	Pharmacy	(11)
	(Sales Division)	
	Pharmacist Incharge*	(1)
	Pharmacists*	(6)
	Peons	(4)
5	E.E.G.	(4)
	Technicians*	(2)
	Helpers	(2)
6	E.C.G.	(6)
	Technician*	(3)
	Helpers	(3)
7	Orthoptic	(4)
	Orthoptists*	(2)
	Helpers	(2)
8	Audiometry	(3)
	Audiometrist*	(2)
	Helper	(1)
9	Physiotherapy	(8)
	Senior Physiotherapist	(1)
	Physiotherapist	(5)
	Peons	(2)
10	Mortuary Keepers	(4)
11	Hospital Cleaners	(35)
12	Social Services	(39)
13	Audiovisual Section	(17)
Sub Total		156
Grand Total		508

\* Corresponding to the paramedicals in the Japanese plan.  
Total 16 persons.

The number of nurses also seems to be small compared with Japan and other countries. The number of paramedicals who operate medical equipment, totalling 16 according to the Nepalese plan (excluding helpers), seems to be inadequate as they are expected to handle diversified and sophisticated medical equipment at the proposed teaching hospital as shown by the list of equipment and materials in Chapter 3.

In view of the above, the manpower plan shown in Table B is proposed here with the suggestion that the Nepalese side promptly recruit the necessary manpower. As shown in Table C, however, the situation concerning medical manpower in Nepal is serious and the training of not only doctors but also paramedicals including radiologists is one of the important problem areas for the smooth management of the teaching hospital.

Table (B) Manpower Plan Proposed by the Japanese Side

Doctors (including the Director and professors)	16 persons
" (teaching doctors)	38 "
" (inturns)	70 "
Nursing section (including health assistants)	144 "
Technicians (paramedical section)	56 "
Administrative section (clerical section)	73 "
Maintenance section	17 "
Service section	115 "
Total	529 "

Breakdown of medical staff proposed by the Japanese side.

	Name of Staff	Total
Doctor	Chief of Hospital	1
	Chief of Clinics	15
	Medical Specialist Senior Doctor	35
	Resident Physician	70
	Dentist	3
		(124)
Nurse	Chief Nurse	1
	Assistant Chief Nurse	10
	Registered Nurse	36
	Assitant Nurse (Training)	40
	Nursing Attendant	24
	Health Assistant	33
	(144)	
Medical Technician	Pharmacist	2
	Pharmacy Aid	6
	Dental Aid	6
	Radiation Technician	1
	Radiation Technician Aid	4
	Physical Test Technician	3
	Physical Test Aid	6
	Medical LAB Technician	4
	Medical LAB Aid	12
	Physical Therapist	3
	Physical Therapy Aid	6
	Dietitian	1
Food Service Supervisor	2	
	(56)	

(Continued)

	Name of Staff	Total
Administrative Staff	Administrative Officer	1
	Section Officer	7
	Clerk	55
	Statistician (Medical record)	2
	Medical Record, Clerk	6
	Social Case Worker	2
		(73)
Service Staff	Laundry Worker	10
	Seamstress	5
	Janitor	20
	Orderly	40
	Sweeper	40
Maintenance Staff	Driver	4
	M.E. Engineer	2
	Electrician	2
	Plumber	1
	Carpenter	2
	Painter	1
	Gardener	5
Total		529

Table (C) Present Condition of Medical Manpower in Nepal

	M.O.H*	Private Hospital	Others	Total	Population per Doctor
Doctor	persons 365	persons 50	-	persons 415	persons 32,340
Pharmacist	-	-	persons 12	persons 12	persons 1,118,416
Nurse	persons 272	persons 120	-	persons 392	persons 34,237
Health Assistant	persons 420	-	-	persons 420	persons 31,954
Radio- logist	persons 16	-	-	persons 16	persons 838,812

(W.H.O Country Profile 1979)

\* Ministry of Health.

#### 6.4 Financial Plan

Because of the financial condition of Nepal being dependent upon foreign countries for more than half of the national budget, the annual budget for the proposed teaching hospital has been set at about 13,000,000 NRS as shown in Table D.

Examining the Nepalese budget in detail, we find first of all that though the annual consumption of X-ray film is estimated to be about 100 per day, the survey of Bir Hospital, the existing national hospital, gives an estimate of 200 per day. Further, as regards the total number of operations per year, which is closely related to the expenditure for dressing materials, etc., Table F-2 gives 3,000. The above survey of Bir Hospital gives about 5,500 cases of major operation and 700 cases of minor operation.

As one of the objectives of the proposed teaching hospital is to provide advanced medical treatment with the aim to raise the level of medical services in Nepal, requiring a higher level of medical treatment, medical and health expenditure appropriate to the scope of medical treatment is only to be expected.

Further, the fact that the Nepalese budget does not include reserve funds poses a problem. The annual budget plan shown in

Table E is proposed here on the basis of the above comparative appraisal, field surveys and the condition in Japan and elsewhere.

The total annual budget is about 21,000,000 NRS, a difference of about 8,000,000 NRS compared with the Nepalese budget. In order to eliminate the difference, further efforts will have to be made by the Nepalese Government in terms of financial expenditure. At the same time, efficient management of medical services such as those seen in connection with the income forecast for improving the financial status may be an indispensable factor. In order to make these efforts made by the Nepalese side more effective in finance and management, it seems to be necessary to continue technical cooperation provided by the Japanese side regarding the training of doctors and paramedicals and the maintenance of medical equipment. This is proposed as a particularly important task. Finally, the annual income forecast (Table G) appropriate for the annual expenditure plan is given below.

Table (D) Annual Expenditure for Teaching Hospital

1. <u>Services</u>		752,000/-
1.1 Electricity	25,000/- pm	300,000/-
1.2 Telephone	8,000/- pm	96,000/-
1.3 Postage & Telegraphy	3,000/-	36,000/-
1.4 Printing of forms		200,000/-
1.5 Water supply		100,000/-
1.6 Postage		20,000/-
2. <u>X-ray</u>		390,000/-
2.1 Films (39,000 Plates)		312,000/-
2.2 Chemicals		78,000/-
3. <u>Dressing Materials</u>		300,000/-
Gauze		20,000/-
Bandage		100,000/-
Cotton		100,000/-
Adhesive plaster		80,000/-
4. <u>Soaps Detergents and Antiseptics</u>		110,000/-
Soap powder		10,000/-
Detergents		50,000/-
Phenyle		30,000/-
Soap bar		20,000/-
5. Laundry (Soap powder)		25,000/-
6. <u>Surgical Accessories</u>		440,000/-
Gloves		40,000/-
Catgut & sutures		300,000/-
Syringe, needle, drain set		100,000/-
	(Sub total:-	<hr/> 2,017,000/-)



7.	Battery, electrical goods		100,000/-
8.	Diet 300 x 300 days x 10/-		900,000/-
9.	Drugs including gas		2,400,000/-
10.	Linen bed sheets etc.		100,000/-
11.	<u>Fuel</u>		150,000/-
	11.1 Vehicle	100,000/-	
	11.2 Others (Gas)	50,000/-	
12.	Maintenance		100,000/-
13.	Stationery		100,000/-
14.	Salary including provident fund		5,397,804/-
15.	Allowances		1,340,410/-
16.	Travel and daily allowance		300,000/-
			<hr/>
Grand Total:-			<u>12,905,214/-</u>

Table (E) Annual Expenditure Plan for the Teaching Hospital

Item	Amount	Remarks
Personnel costs	¥95,550,000	Based on a WHO report, assuming the wage increase rate of government employee to be 25% and the rate of inflation 10%
Utilities	¥18,080,000	Water rate ¥1,330,000 Power rate ¥11,650,000 Oxygen charge ¥2,530,000 Generator charge ¥2,570,000
X-ray related costs	¥24,000,000	200 sheets/day (11×14" film), including chemical costs
Dressing Materials Costs	¥21,300,000	Surgery 6,000 cases × ¥500 Hospitalization 300 beds × ¥150 × 250 days Outpatient ¥10,000 × 250 days
Surgical materials costs	¥24,000,000	Operations 6,000 × ¥3,000 Minor operations 4,000 × ¥1,500
ICU, CCU related costs	¥21,000,000	3 beds per day × ¥2,000 × 350 days
Laboratory costs	¥18,750,000	75,000 cases × ¥250
Catering material costs	¥10,950,000	¥100 (3 meals) × 300 persons × 365 days
Medicine related costs	¥84,000,000	300 persons × ¥800 (for in-patients)
Medical equipment maintenance costs	¥17,800,000	Costs for sending engineers (once a year for 7 days including transportation costs) ¥9,800,000 Repair costs ¥8,000,000
Cleaning costs	¥2,000,000	
Building repair costs	¥3,000,000	
Subtotal	¥321,530,000	
Rate of inflation	¥48,230,000	15%
Reserve funds	¥32,150,000	10%
Total	¥401,910,000 21,153,000 NRS	1NRS = ¥19

Table (F) Nepalese Income Forecast

Sources of Income of Teaching Hospital

1. <u>Room Rent</u>	-	average accuracy	300 days/bed	
Single	-	50/- X 300 X 30	=	450,000
Double	-	25/- X 300 X 60	=	450,000
Quadruple	-	15/- X 300 X 90	=	405,000
				Total Rs 1,305,000
V.I.P.	-	100/- X 300 X 2		60,000
				Rs 1,365,000

2. Operations

Estimated Number of operations per year

	<u>Total</u>	<u>Paying</u>	<u>Rate</u>	<u>Total</u>
Major	600	360	400/-	144,000/-
Intermediate	1,200	720	200/-	144,000/-
Minor	1,200	720	100/-	72,000/-
Total	3,000	1,800		Rs 360,000/-
	60% of the Total			

3. Obstetrics

Estimated Number Payers.

	<u>Total</u>	<u>Paying</u>	<u>Rate</u>	<u>Total</u>
Cesarean Section	50	30	400/-	12,000/-
Forceps Delivery	200	120	100/-	12,000/-
Normal Delivery	1,600	960	50/-	48,000/-
Total	1,850	1,110		Rs 72,000/-
	60% of Total			

4. ECG

<u>Total No.</u>	<u>Paying</u>	<u>Rate</u>	<u>Total Income</u>
1000	600	50/-	Rs 30,000/-

5. <u>EEG</u>	100	60	100/-	Rs 6,000/-
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6. Xray

		<u>Est. No. per year</u>	<u>Total</u>	<u>Paying</u>	<u>Rate</u>	<u>Income</u>
Plain Xray	Small		10,000	6,000	15/-	90,000/-
	Medium		10,000	6,000	20/-	120,000/-
	Large		10,000	6,000	25/-	150,000/-
	Total		30,000	18,000	(20/-)	360,000/- (360,000/-)

Special Investigations

approx. 150,000/-

Barium Swallow,  
More  
Follow Through  
in serve

I V P  
Retrograde Pyelography  
Cholecysto-graphy  
Angiography  
Ventriculography  
Mycolography  
Bronchography

Rs 510,000/-

7. Pathology

- -

Rs 1,000,000/-

(Bir Hospital - opd - 100,000/-  
21 beds (Payings inpatient)- 150,000/-  
(T.H.- opd - 100,000/-  
180 bed inpatient - 900,000/-  
1,000,000/-)

8. Dental

	<u>Rate</u>	<u>Est. No./-</u>	<u>Income</u>
Xray	5/-	600	3,000/-
Films	10/-	600	6,000/-
			Rs 9,000/-

9. Physiotherapy Services

(a) Rs 1,000/Month

Rs 12,000/-

10. Out Patient Registration

Daily all endance 400.

Average Working edr X 300 X Rs 1 = Rs 120,000/-

120,000

11. Pharmacy

OPD

(400 X 300 X Rs 10) 120 - 0,000

Inpatient 150 - 0,000

(180 X 300) (a) Rs 200/pt

7

12. Catering

180 beds X 300 days X 25/- per day = Rs 1,350,000/-

---

Rs 7,534,000/-

Table (G) Japanese Income Forecast

Sources of Income of Teaching Hospital

1. <u>Room Rent</u>	-	average accuracy	300 days/bed	
Single	-	}	30/-x300x100 =	900,000
Double	-			
Hexade	-			
I.C.U. C.C.U.	-	50/-x300x 6	=	90,000
				Rs 990,000

2. Operations

Estimated Number of operations per year

	<u>Total</u>	<u>Paying</u>	<u>Rate</u>	<u>Total</u>
Major	1,500	800	400/-	320,000/-
Intermediate	4,500	2,500	200/-	500,000/-
Minor	4,000	1,500	100/-	150,000/-
Total	10,000	4,800		Rs 970,000/-

48/. of the Total

3. Obstetrics

Estimated Number Payers.

	<u>Total</u>	<u>Paying</u>	<u>Rate</u>	<u>Total</u>
Cesarean Section	50	30	400/-	12,000/-
Forceps Delivery	200	120	100/-	12,000/-
Normal Delivery	1,600	960	50/-	48,000/-
Total	1,850	1,110		Rs 72,000/-

60/. of Total

4. EKG

	<u>Total No.</u>	<u>Paying</u>	<u>Rate</u>	<u>Total Income</u>
	1,500	900	50/-	Rs 45,000/-

5. <u>EEG</u>	300	150	100/-	Rs 15,000/-
---------------	-----	-----	-------	-------------

6. Xray

		<u>Est. No. per year</u>	<u>Total</u>	<u>Paying</u>	<u>Rate</u>	<u>Income</u>
Plain Xray	Small		20,000	10,000	15/-	150,000/-
	Medium		20,000	10,000	20/-	200,000/-
	Large		20,000	10,000	25/-	250,000/-
	Total		60,000	30,000		600,000/-
Special Investigations					approx.	150,000/-
					Rs	<u>750,000/-</u>

7. Pathology

( Bir Hospital - opd - 100,000/-						Rs 1,200,000/-
21 beds (Payings inpatient)- 150,000/-						
( T.H.- opd - 200,000/- )						
100 bed inpatient-			1,000,000/-			
			<u>1,200,000/-</u>			

8. Dental

	<u>Rate</u>	<u>Est. No./-</u>	<u>Income</u>
Xray	5/-	600	3,000/-
Films	10/-	600	6,000/-
			Rs <u>9,000/-</u>

9. Physiotherapy Services

(a) Rs 1,500/Month Rs 18,000/-

10. Out Patient Registration

Deily all endance 450  
 Average Working edr x 300 x Rs 1 = Rs 135,000/-  
135,000

11. Pharmacy

OPD  
 ( 450 x 300 x Rs 10) 1,350,000  
 Inpatient  
 ( 100 x 300 ) (a) Rs 300/pt

7

12. Catering

100 beds x 300 days x 30/- per day = Rs 900,000/-

Grand total Rs 7,204,000/-





## **CHAPTER 7. EVALUATION OF THE PROJECT**



## CHAPTER 7. EVALUATION OF THE PROJECT

The Kingdom of Nepal launched the Institute of Medicine at Tribhuvan University in order to domestically train medical doctors who had previously been trained in foreign countries. However, it is far from a medical school because of its inadequate basic facilities. Moreover, because of the lack of a hospital attached to the Institute, its students are distributed between antiquated hospitals in Kathmandu for practice. In the field of medical administration, too, improvement of medical facilities in the provinces and an increase in medical personnel pose urgent tasks. Therefore, the importance of the role to be played by the I.O.M is immeasurable.

Under such circumstances, the effects of the construction of the proposed teaching hospital on the I.O.M and, ultimately, on the medical services, etc. in the Kingdom of Nepal may be summarized as below.

### i) Training of medical personnel

The absolute shortage of medical personnel in Nepal is due to a shortage of facilities provided with modern equipment. The training of medical personnel is expected, therefore, to improve markedly with the construction of this hospital.

### ii) Modernization of medical services

Most of the existing medical facilities are provided with antiquated equipment, hampering diagnosis and treatment. If the modern facilities of this teaching hospital are made available to other institutions, it will greatly contribute to the improvement of the standard of medical services in the country.

### iii) Base for Japanese technical cooperation

Japan's cooperation in medical technology with the I.O.M has been in progress since August, 1980. The construction

of the teaching hospital is expected to make the technical cooperation even more effective, providing an important base for Japanese activities.

iv) Promotion of medical administration

Nepal is currently stepping up a long-term medical and health program and one of the urgent tasks is to improve the medical and health services in remote agricultural and underdeveloped areas. The construction of the teaching hospital will, therefore, greatly contribute to the improvement of these services by training a large number of medical personnel.

As regards the various benefits to be brought about by this project, it is important to bear in mind that they are on the assumption that the teaching hospital will be soundly managed and controlled after construction and that as has been analyzed in Chapter 6 by the Survey Team, in Nepal which is dependent upon foreign economic assistance for more than half the national budget and has an acute shortage of medical manpower, budgetary measures for hospital management involving about ¥400 million (about 21,000,000 NRS) and the recruitment of medical staff and personnel, numbering about 530, who make possible the implementation of advanced medical care necessary for raising the level of medical services and the training of medical manpower are indispensable for a successful outcome of this project.

## **CHAPTER 8. RECOMMENDATIONS**



## CHAPTER 8. RECOMMENDATIONS

In order to ensure prompt construction and satisfactory management of the teaching hospital, it is urged that those works confirmed in the Minutes, e.g., site preparation, preparation of infrastructure, be accurately carried out by the Nepalese side. At the same time, recommendations on the points given below are made to the Nepalese Government.

- i) Since the construction materials such as man-made bricks and cement are under the quota system in Nepal, cooperation by the Nepalese Government concerning stable supply of construction materials is indispensable for the implementation of this project.
- ii) Since the teaching hospital is expected to use about 300 of water tons per day, it is necessary to consider environmental conservation in the site area and the measures proposed by the Japanese side such as the installation of infiltration tanks are to be adequately carried out prior to the completion of the construction.
- iii) Since the area reserved for future plans on the Institute of Medicine campus north of the construction site will continued to be used as paddies even after the completion of the construction, necessary measures such as the installation of retaining walls are to be taken to prevent the inflow of rainwater into the hospital grounds during the wet season.
- iv) Maintenance and control personnel responsible for buildings and equipment are to be selected during the construction period so that they may be familiar with actual duties such as machine operation.
- v) A preparatory system is to be formed with administrative personnel within the administrative organization centering around THCC to be familiar with the contents of the hospital design to ensure smooth administration after completion.

vi) Adequate budgetary measures are to be taken and personnel recruited to ensure smooth maintenance and administration after completion of the hospital.

Of the above points, iv) vi) are particularly important and, unless these conditions are met, it will be simply impossible to achieve the basic objectives of this point, i.e., construction of a teaching hospital and the training of medical manpower in Nepal.