

BASIC DESIGN REPORT
ON
GENERAL HOSPITAL CONSTRUCTION PROJECT
IN
THE SOCIALIST REPUBLIC OF THE UNION OF BURMA

MARCH 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

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ABBREVIATIONS

BURMA (SOCIALIST REPUBLIC OF THE UNION OF BURMA)

R.G.H. (RANGOON GENERAL HOSPITAL)

C.C. (CONSTRUCTION CORPORATION)

I.C.U. (INTENSIVE CARE UNIT)

C.C.U. (CORONARY CARE UNIT)

E.C.G. (ELECTROCARDIOGRAPHY)

E.E.G. (ELECTROENCEPHALOGRAPHY)

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国際協力事業団	
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PREFACE

It is with great pleasure that I present this Report on Basic Design for General Hospital Construction Project to the Government of the Socialist Republic of the Union of Burma.

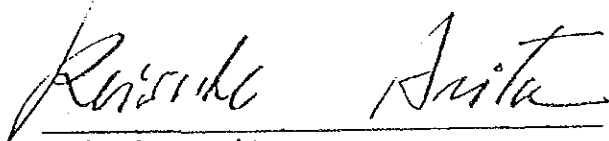
This Report embodies the result of survey which was carried out in Burma from December 12th to December 30th, 1980 by a Japanese Survey Team commissioned by the Japan International Cooperation Agency following the request of the Government of the Socialist Republic of the Union of Burma to the Government of Japan.

The survey team had a series of discussions with the officials concerned of the Government of Burma and conducted an extensive field survey and data analyses.

I hope that this report will prove to be useful as a basic reference for development of the project.

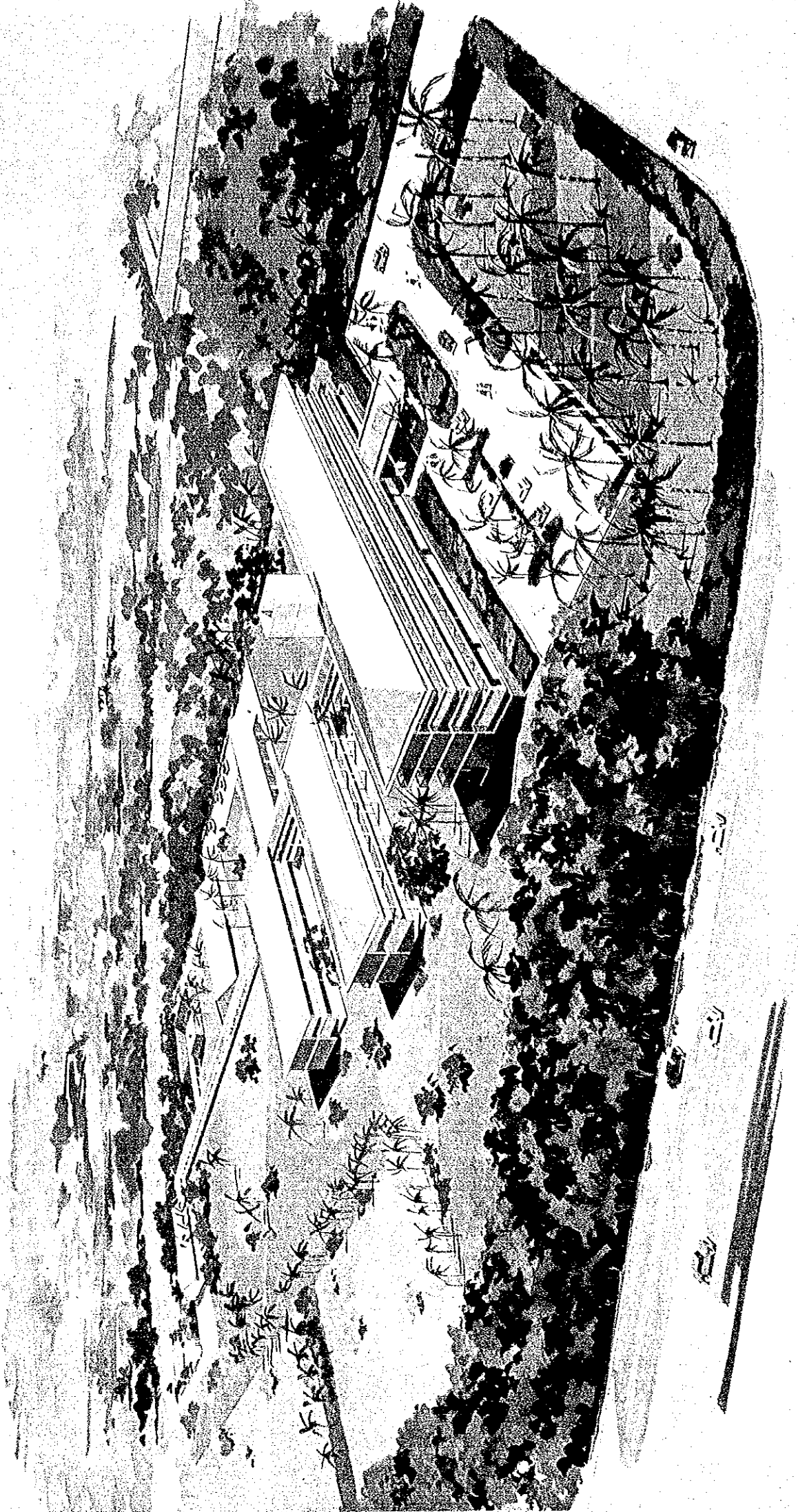
I wish to express my deep appreciation to the officials concerned of the Government of Burma for their close cooperation extended to the survey team.

March, 1981



Keisuke Arita
President
Japan International Cooperation
Agency

BIRD'S EYE VIEW



Summary

The Government of the Socialist Republic of the Union of Burma has requested the cooperation of the Government of Japan in the establishment of a general hospital to be operated by the Department of Health of the Ministry of Health, which will contribute to the improvement of the medical service with the longer-term object of wider benefits to public welfare. The purpose of this project is to provide the best possible design which would be both in accordance with this request and suitable for the existing medical infrastructure of Burma.

The aim of the project is to construct a general hospital with special emphasis on the diagnosis and treatment of epigastric diseases, an area in which the Burmese medical organization is considered to need improvement with the most urgency. The construction of this hospital will have implications much greater than just the completion of one hospital. The design policy—to give it the best possible provisions for the diagnosis and treatment of its patients, for service as a general hospital and for hygienic operation—can, if realized, be expected to produce a model hospital helping to raise the level of medical care throughout the nation.

1) Functions of the Hospital

The hospital will have departments of internal medicine, surgical medicine, obstetrics and gynaecology, and paediatrics. An out-patient service will be included. It will have a central laboratory, radiological department, surgery department and also wards with a total of 220 beds.

2) Construction Site

The construction site is in a part of central Rangoon, and it is surrounded by many schools, including a medical college, the Rangoon General Hospital and a dental college.

On the west side of the site is the Prome Road, which is National Highway No. 2, and on the south side is the Bogyoke Aungmye Road, one of the main east-west roads of the city.

The site has a total area of about 15 ha. Of this, about 5 ha. towards the east is used by the medical college, and the hospital will use the remaining area of about 10 ha.

3) Scope of Work

This hospital consists of the following buildings, related installations, and medical equipment.

- 1 Buildings

Main Building

- Outpatient and Emergency Department	1,750 m ²
- Administration Department	800
-Wards	3,650
	<hr/>
	6,200

Surgery and Radiology Building

- Surgery Department	1,000
- Radiology Department	850
	<hr/>
	1,850

Laboratory and Special Ward

- Laboratory	700
- I.C.U. and Special Ward	800
	<hr/>
	1,500

The cost of the following items is to be borne by the Government of Burma:

- Building - Canteen, kitchen, laundry, power substation, repair-shop, mortuary, garage and stores.
- Related Facilities - City water, sewerage, electricity and telephone.
- Outdoor Work - Clearance of the site including underground obstacles, land reclamation and planting.
- Furniture - Wooden furniture and ordinary beds for wards.

4) Construction Period

Two and a half years will be needed to complete the construction. See 4-2-5-(3) "Construction Schedule".

5) Problems in Executing the Plan

- Actions to be taken by the Ministry of Health
 - To complete the dismantling of existing structures and the preparation of the site before construction starts.
- Securing manpower and the training of personnel
 - Physicians and technicians shall be trained to be able to make the most effective use of the medical and laboratory equipment provided.
- A reliable supply of pharmaceuticals
 - The continuous supply of pharmaceuticals and supplies must be ensured. To this end, an effort shall be made to produce them domestically, with the cooperation of relevant agencies.

◦ Ensurance of hygienic conditions

- Extension of the city water supply and sewer systems.
- Restrictions on visiting inpatients and the provision of a comprehensive catering service.

The intention is to provide a clean model hospital which will eventually help to raise sanitary standards throughout Burma.

◦ Construction Costs

The construction costs will be reduced if the following proposals are carried out.

- The construction is to be performed with local materials and by local methods. We hope that the materials shall be made available cheaply, promptly, and in the necessary quantities.
- Arrangements shall be made to enable materials to be procured from third countries.
- To authorize the re-export of the construction equipment brought into Burma for This Project after completion of the Project.

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CHAPTER 1 BACKGROUND OF THE REQUEST

1-1 PAST CIRCUMSTANCES

1-2 OUTLINE OF THE BASIC DESIGN SURVEY

1-3 THE BASIC DESIGN SURVEY TEAM

1-1 Past Circumstances

In February 1980 the Government of the Socialist Republic of the Union of Burma requested the cooperation of the Government of Japan in the establishment of a medical centre with the special aim of improving the nation's medical service as a whole. The Japanese Government thereupon dispatched a mission in July 1980. Headed by Dr. Takashi Teramatsu, director of the Tuberculosis and Thoracopathy Research Institute of Kyoto University, the mission went to Burma under the auspices of the Japan International Cooperation Agency to sound out the Burmese wishes, to investigate the state of the nation's medical service and thus to determine whether the plan outlined by Burma would be feasible.

The contact mission made recommendations to the Japanese Government after reaching a consensus about the plan for the centre, gained through consultations with the Burmese authorities concerned, inspection of the Rangoon General Hospital and other work.

They concluded that the Burmese plan to establish a medical centre as a nucleus for the national medical service handling the diagnosis and subsequent referral of difficult cases from everywhere in the country was in itself reasonable; both from the medical premise that patients must be properly treated after adequate and accurate diagnosis, and for the purpose of enabling hospitals with limited facilities to administer as effective a treatment as possible. They noted, however, that there were certain questions remaining about the operation and maintenance of sophisticated equipment.

After receiving these recommendations, the Japanese Government officials responsible continued to study the plan for the medical centre and the possibility of its eligibility for finance by Japanese aid programmes, and concluded that the establishment of a general hospital capable of being operated by the Burmese themselves and combining the functions of a diagnostic centre and a training hospital would be most suitable for the Burmese medical service in its present state for the following reasons, communicated to the Burmese Government.

1. Burma would have to bear a great financial burden in the future in order to operate and maintain sophisticated medical equipment.
2. The operation and maintenance of equipment not previously used in Burma would be technically impossible for the present.
3. Securing the beds needed to ease the present inadequacy of Burmese medical facilities even slightly would be as important as the establishment of the medical centre.

The Burmese Government agreed with these Japanese comments and, in November 1980, requested the Japanese Government to grant aid towards the construction of a general hospital.

On receiving this request, the Japanese Government dispatched in December 1980 another J.I.C.A. study team, headed again by Dr. Takashi Teramatsu, to prepare a basic design for the general hospital construction project.

1-2 Outline of the Basic Design Survey

The Survey team sought to understand the situation of the Burmese medical service through talks with officials of the Burmese Ministry of Health and interviews with hospital personnel such as physicians and nurses, at the Rangoon General Hospital, the North Okkalapa Hospital, the West Rangoon General Hospital, the Children's Hospital, the Central Women Hospital, and other hospitals, as well as through on-the-spot interviews and the inspection of various facilities.

As a result, the survey team reached two conclusions about building such a hospital in Burma with medical services in their present state. First, that securing a certain number of beds for a general hospital is as important as equipping it as a diagnostic centre and a training hospital; and, secondly, that equipping it to perform these functions, as well as possible, is also important, providing that the Burmese

give every possible assistance to its successful operation and maintenance. The survey team then carried out basic design work according to these premises.

The place first offered by the Burmese Government as the site of the project turned out only to be usable for the construction of four or five-storey buildings, owing to regulations of the Rangoon city authorities concerning land use.

The survey team then asked for an alternative site for the hospital (which the Burmese side has asked to be of a two-storey design) and concluded that the best of those offered would be the site of a former prison, which is not yet subject to this Rangoon city regulations. Thus the survey team assumed that this will be the project site.

However, when the Burmese authorities, immediately before the completion of the study, again requested a four-or five-storey building for the same reason as in the initial choice of project site. It was agreed that the decision of the number of storeys of the building should be left to further negotiation between the two governments.

This matter was later discussed through diplomatic channels and a plan of four- and two-storey buildings as proposed by the Japanese Government in accordance with the recommendations of the survey team was accepted by the Burmese Government. This new basic design survey report is based on this new decision.

The project site adjoins the Medical College I.

1-3 The Basic Design Survey Team

This survey team was headed by Dr. Takashi Teramatsu.

(1) Basic Design Survey Team

- Dr. Takashi Teramatsu Team Leader.
Director, Chest Disease Research
Institute.
Professor, Faculty of Medicine,
National University of Kyoto.
- Dr. Kanji Torizuka Director, Radiation Biology Center.
Professor, Faculty of Medicine,
National University of Kyoto.
- Dr. Hiroo Imura Professor, Faculty of Medicine,
National University of Kyoto.
- Mr. Masahito Oyama Team Coordinator.
Social Development Cooperation
Department,
Japan International Cooperation
Agency (JICA).
- Mr. Bunkichi Kuramoto Grant Aid and Procurement Department,
JICA.
- Mr. Kazuo Nagata Director, Senior Architect,
Nihon Architects, Engineers &
Consultants, Inc. (NAEC)
- Mr. Ichiro Kanagawa Senior Architect,
NAEC.
- Mr. Junkichi Takahashi Senior Architect,
NAEC.
- Mr. Haruhide Ohno Senior Engineer,
NAEC

(2) Basic Design Report Team:

- Dr. Takashi Teramatsu Team Leader.
(see above)
- Mr. Yoshihisa Kondo, Work Coordination.
Counsellor, 2nd Development Study
Section, Social Development
Cooperation Division,
Japan International Cooperation
Agency.
- Mr. Kazuo Nagata, Architectural Planning.
(see above)
- Mr. Ichiro Kanagawa Architectural Planning.
(see above)

CHAPTER 2 PRESENT STATE OF MEDICAL CARE IN BURMA

2-1 MEDICAL CARE IN BURMA:

INSTITUTIONS AND PRESENT SITUATION

2-2 PRESENT ISSUES AND FUTURE PROSPECTS

2-1 Medical Care in Burma: Institutions and Present Situation

In accordance with the ideals of socialism, medical care in state medical facilities is free of charge, although the inpatients must provide their own meals.

There are 513 state-run hospitals with a total of 29,000 beds, including specialty and teaching hospitals each with between 16 and 150 beds, divisional hospitals each with some 200 beds and station hospitals each with 16 beds. Under these state hospitals are 47 urban health centres and 1,077 rural health centres.

The private medical care facilities include, among others, clinics operated by individual physicians, who constitute half of all physicians in Burma; more than 200 medical co-operatives, each run by one physician and a few assistants; and more than 500 general practitioners using indigenous medicine.

Population: 33,639,000 (1980)

Population increase: 2.2%/year (1972-77)

Crude birth rate: 29.1/1,000 men (1977) in urban areas

Crude death rate: 10.4/1,000 (1977) in urban areas

Infant mortality rate: 56.3/1,000 (1977)

Number of hospitals: 288 (1964) - 512 (1978)

Number of beds: 15,936 (1964) - 28,378 (1978)

Number of inpatients: 426,727 (1964) - 1,008,571 (1978)

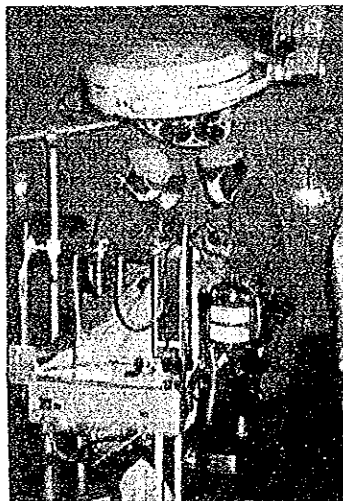
Aggregate total of outpatients: 6,293,184 (1964) - 13,709,361 (1978)

Main diseases:

1. Infective and Parasitic diseases	32.4%
2. Injuries resulting from accidents, poisoning and violence	11.7
3. Complications of pregnancy, childbirth and puerperium	11.5
4. Other symptoms and ill-defined conditions	11.2

- | | |
|-------------------------------------|------|
| 5. Respiratory diseases | 9.3% |
| 6. Diseases of the digestive system | 6.4 |

Contagious diseases such as malaria, gastroenteritis, diarrhoea, and tubercular fever occur frequently. Respiratory diseases and diseases of the digestive system have high mortality rates. Malnutrition and albumin deficiency are observed in more than 50% of children of five years old and under.



SURGERY

2-2 Present Issues and Future Prospects

The three measures essential for improving the standard of medical care in Burma are:

1. Dissemination of health education among the people.
2. More and better medical and health care facilities and equipment.
3. More and better physicians and nurses.

It would require enormous financial efforts for the state to accomplish these targets nationally. The present situation must be described as being far from ideal.

According to these premises, increasing the number and quality of health centres and clinics in rural areas is the task most necessary in order to raise the standard of medical care of the country as a whole.

Another thing that must be pointed out here is that medicines (primarily antibiotics) are provided haphazardly by each medical care facility owing to the difficulty of adequate methods of diagnosis. (Although such medication will be useful to some extent, as contagious diseases are widespread.) More accurate diagnoses will eventually result in financial savings.

Such improvement in the methods of diagnosis will have a good effect on medical education, and in the long run will contribute to raising diagnostic standards throughout the nation. Judging from the present situation of RGH and other principal Burmese hospitals, there is an urgent need to improve diagnostic standards for the upper abdomen, including the liver, pancreas, gall bladder and spleen.

CHAPTER 3 BASIC CONCEPT OF THE PROJECT

The major hospitals in the Rangoon area at present include Rangoon General Hospital, East and West Rangoon Hospitals, Paediatric Hospital and North Okalappa Hospital. The number of hospitals is small for the population. The Rangoon General Hospital, the biggest in Rangoon, is already superannuated, suggesting the need for a new general hospital. On the other hand, medical equipment is inadequate at existing hospitals and there is a marked delay in the introduction of new medical technology. A case in point is the CT scanner. One unit for the head has been ordered, but no others are available in Burma today. Neither is it an easy task to maintain equipment, and there is a need to train technicians, maintain parts and buildings and supply electricity and gas. However, some hospitals are extremely enthusiastic about the acquisition of new equipment. In these circumstances and in response to suggestions of the authorities concerned, the survey team has come out with the following concept.

1. The new hospital will be a general hospital incorporating departments of internal medicine, paediatrics, surgery and gynaecology.
2. It will have about 220 beds
3. An attempt will be made to emphasize the central divisions of the hospital: The laboratory, and the surgery and X-ray departments.
4. The latest, most automated medical equipment will not necessarily be required, but basic equipment should be provided, bearing in mind the time set for completion of the hospital. Having as many machines as possible will ensure that no function of the hospital might come to a standstill owing to the breakdown of any one machine.
5. Smooth operation of this equipment will need the ensurance of a stable supply of electricity, clean water and proper temperature and humidity. Full attention will be paid to this when the hospital is constructed.
6. The biggest question raised by medical equipment concerns its maintenance, control, repair, and so forth. Unless these are properly carried out, it will be difficult to use effectively whatever equipment is available. Therefore, it will be necessary to train technicians, and programmes for their training and that of physicians will be required. In other words, the most practical solution would be to

train a certain number of people every year and then to deliver the equipment.

Therefore, when working out a concept for the new hospital full attention must be paid to conditions in Burma so that upon completion it may become a model for the nation.

CHAPTER 4 ESTABLISHMENT PLAN

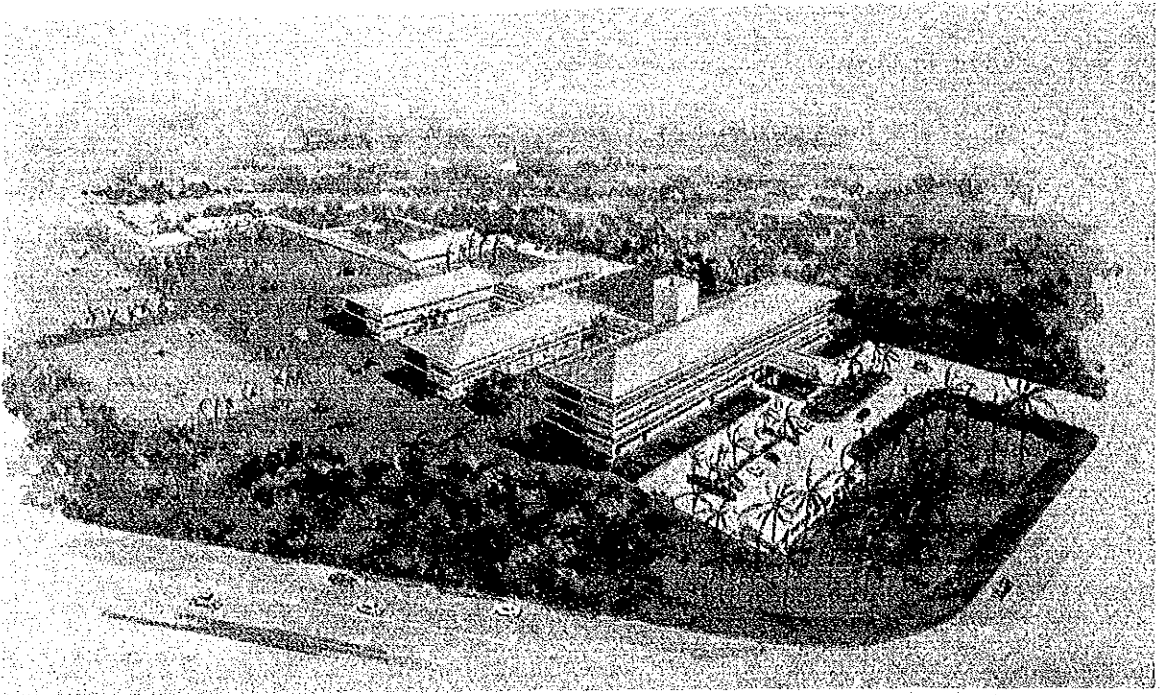
4-1 BASIC POLICY

4-2 BASIC DESIGN

4-1 Basic Policy

The basic design of this hospital was carried out according to the following policy tenets:

1. It shall be a general hospital for internal medicine, surgery, obstetrics and gynaecology, and paediatrics.
2. It shall have facilities adequate to treating the epigastric diseases of most concern to the Burmese medical service.
3. It shall give as much assistance as possible to the education and training of medical-school graduates.
4. It shall be easily operated and maintained.
5. It shall be kept as clean as possible. Specifically, it must be planned so that any sectors that may be contaminated can be separated from certain "clean" zones.
6. There shall be about 220 beds.
7. The hospital shall be a four-storey building in order to make the most effective use of land.
8. Local planning and engineering methods and materials shall be used wherever possible and the climatic and other conditions in Rangoon shall be borne in mind.
9. Sufficient green areas shall be provided on the sides facing busy roads to insulate the hospital from the surrounding noise.
10. The hospital shall be designed to permit extensions to each medical department, thereby anticipating future change and development.



4-2 Basic Design

4-2-1. The Construction Site

(1) Selection of the Construction Site

The Development of Health offered five different sites for the construction of this hospital. These were Sites H(10.3 ha), A(8.1 ha), B(11.5 ha), C(5.1 ha), D(10.3 ha), and E(5.4 ha).

Finally the Department of Health selected sites C, D (excluding the existing Medical College 1) and E as desirable.

Since none of the three sites is large enough by itself, we had to choose a combination of two sites, either E plus C, or C plus D.

We chose C plus the area of D not used for Medical College 1 for the site, for the following reasons:

1. The site could be entered from Bogyoke Aungmye Road, which has much lighter traffic than Prome Road, and so it would be safer.
2. As the site would contain the Medical College 1, closer relations could be established with this.
3. Sites C and D are not separated by a road, and when combined have a shape more easily usable for a convenient and efficient building layout.

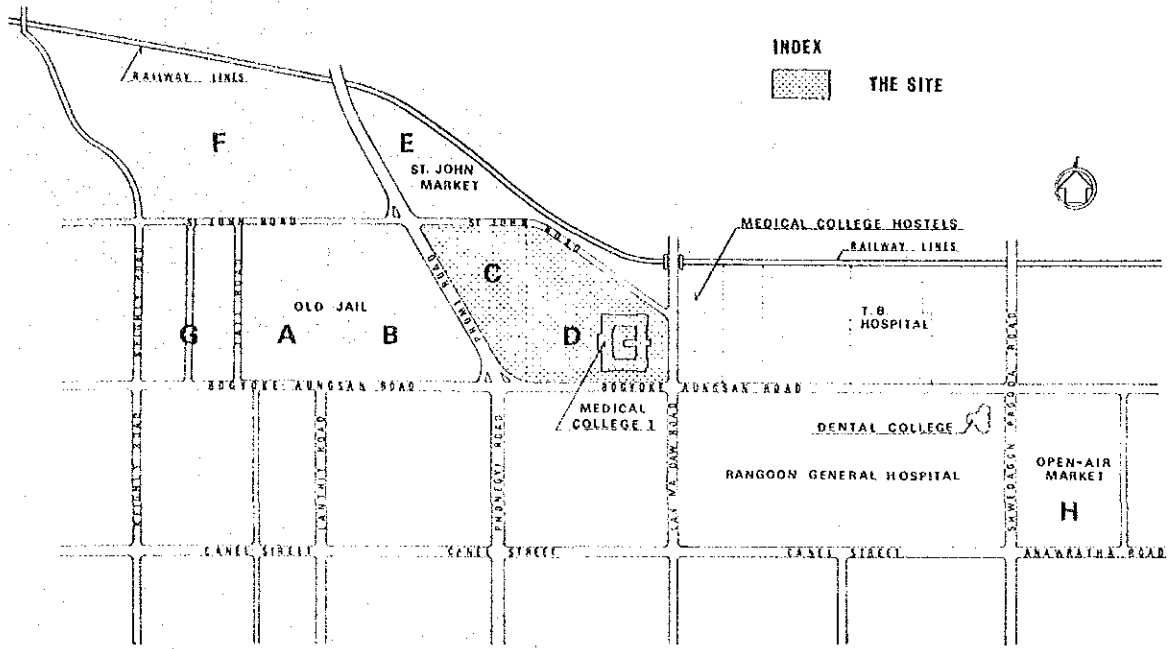


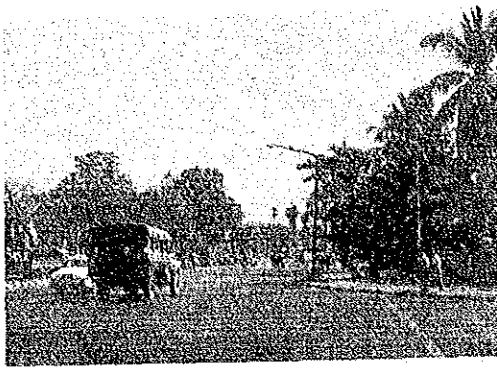
Fig 4-1 LOCATION OF PROPOSED SITE



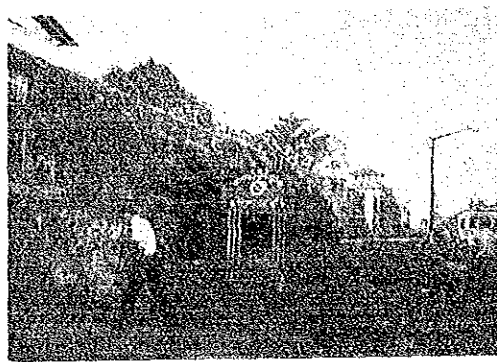
SITE E AS SEEN FROM PROME ROAD



SITE C AS SEEN FROM PROME ROAD



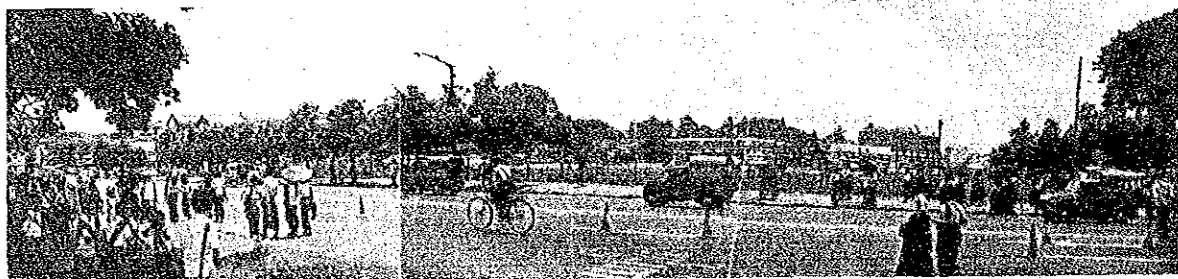
SITE D AS SEEN FROM BOGYOKE AUNGSAN ROAD



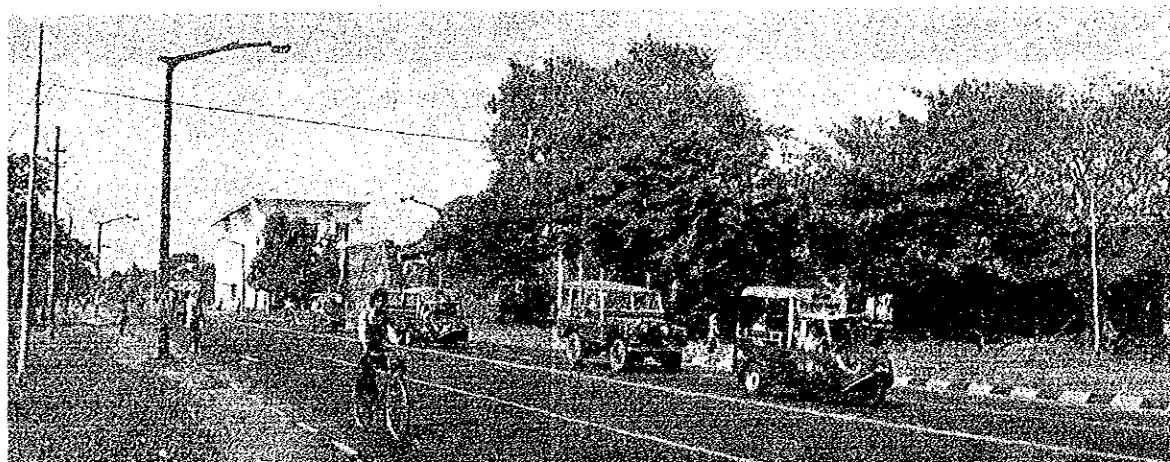
SITE A AS SEEN FROM ST, JOHN ROAD



WITHIN SITE A



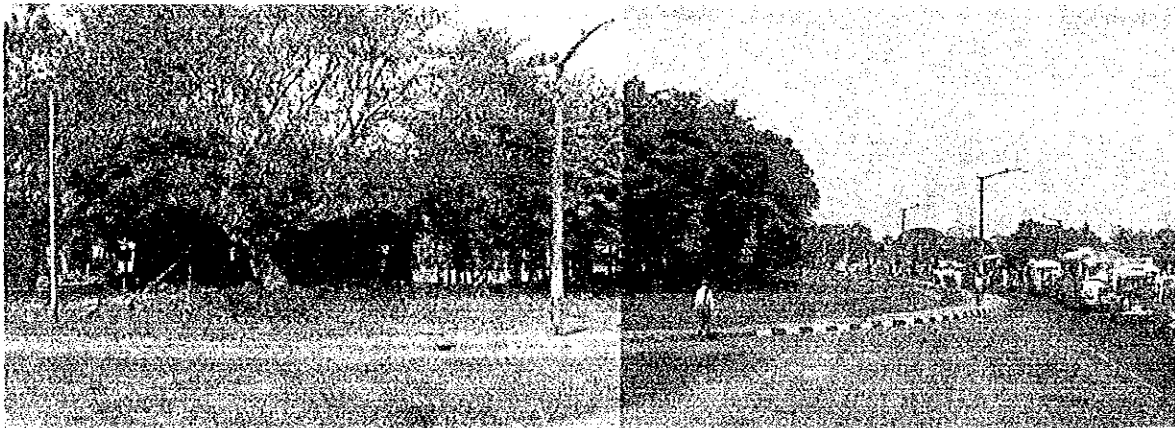
SITE H AS SEEN FROM BOGYOKE AUNGSAN ROAD



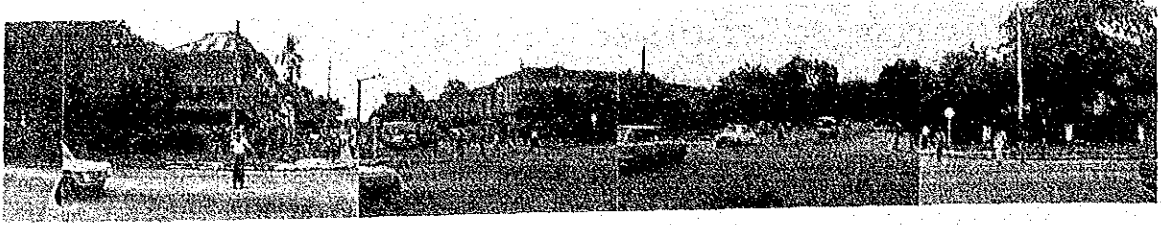
SITE B AS SEEN FROM BOGYOKE AUNGSAN ROAD

(2) Environment and Land Use of the Surrounding Area

The two-storey brick building of Medical College 1 stands in the eastern part of the site. Across the Lan Ma Daw Road further to the east are three-storey Medical College hostels, public high schools and a tuberculosis hospital. Across the street to the southeast is the Rangoon General Hospital, Burma's largest hospital with 1,500 beds. It is Burma's principal teaching and referral hospital, taking care of more than 44,000 inpatients and 134,000 outpatients a year. South of the proposed new site runs the Bogyoke Aungmye Road, carrying one-way traffic from west to east. South of the road are two-storey wooden dwellings. Across the very busy Prome road to the west of the site is a jail. Only one of the five two-storey brick buildings of this jail is presently used as a jail, and the four others are used by the Army for training recruits. Plans are afoot to construct a general hospital on the site, which is of about 20 ha. Ample green space is available along the Prome Road. Site E is situated north of the selected site, across St. John Road. Virtually all of this site is occupied by a very crowded covered market. Further north from the site runs Rangoon's loop railway.



PROME ROAD AND THE FORMER SITE OF THE JAIL



MEDICAL COLLEGE I



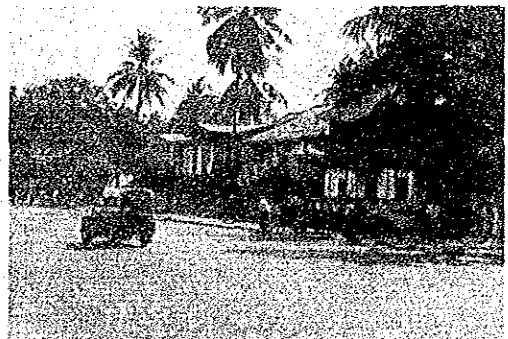
ONE PART OF THE OLD JAIL NOW USED BY THE ARMY FOR TRAINING RECRUIT



MARKET ON SITE E



RANGOON GENERAL HOSPITAL



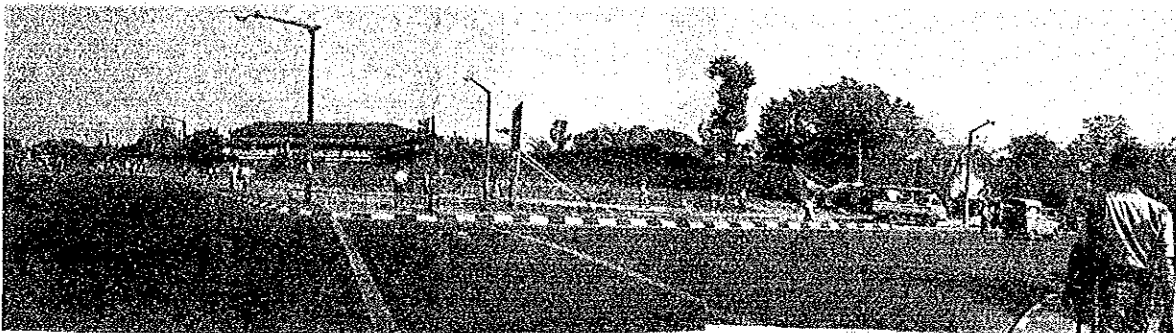
RANGOON GENERAL HOSPITAL

(3) Present State of the Construction Site

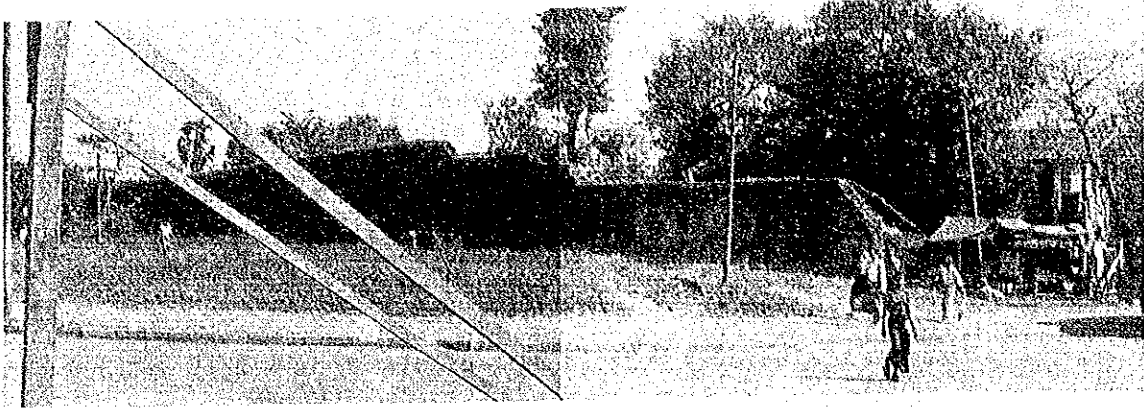
This site is situated on the Bogyoke Aungasan Road, Rangoon's principal thoroughfare, 1.7 km west of Rangoon Station. As noted earlier, the site is conveniently located for access by road and railway, and there is already a cluster of hospitals and related facilities nearby, making the site a suitable environment for building another hospital.

In the triangular western half of Site C is a very crowded covered market, and another 10-meter-wide covered market stretches north along St. John Road.

Behind the rows of stalls of the market are several buildings in a college staff housing compound. Pairs of one- and two-storey wooden houses face each other, and two two-storey brick buildings face Bogyoke Aungsan Road in a spacious area of 36 m x 10 m. On the southern side stand the remains of the jail wall. On the border between Sites C and D stands a brick wall, about four metres high, which used to be the eastern limit of the jail. The wall stretches about 240 meters from a road in the south to another road in the north. In the northern section of Site D is a water tank, from which water appears to be supplied to the Medical College dormitories. Two two-storey buildings are on the southern side. Considerable green space remains in both Sites C and D. As both sites are slightly higher than the surrounding roads, neither will be flooded in the rainy season.



SITES C AND D AS SEEN FROM BOGYOKE AUNG SAN ROAD



OUTER WALLS OF THE OLD JAIL FORMING THE BOUNDARY
BETWEEN SITES C AND D.



BUILDINGS TO THE NORTH SIDE OF SITE C



ST. JOHN ROAD WITH SITE C
TO THE LEFT AND SITE
E TO THE RIGHT



SITE C AS SEEN FROM
ST. JOHN ROAD

(4) Ground of the Construction Site

The ground of Rangoon and its surroundings is the alluvial layer formed by the Irrawaddy River. The soil conditions of site H are estimatable from data from borings made for the adjacent Rangoon General Hospital and of Sites A, B, C and E from those for the office building of a trade corporation to be constructed in the neighbourhood.

Soil engineers of CC believe that the height of Site H is relatively low and that earth is buried or a new alluvial layer is formed up to a depth of 3 m below ground level, and that the water level is as low as 7 m below ground level in the dry season but reaches ground level in the rainy season. Therefore, the bearing capacity is presumably small. The whole area covering Sites A, B, C and E is relatively high and the topsoil is formed of what is known as the Irrawaddian Series alluvial layer, as is the topsoil of Rangoon's northern suburbs. The water table reaches a depth of about 7 m below ground level in the dry season and is never higher than about 3 m below ground even in the rainy season. Therefore, a bearing capacity of 7.0 tonnes/m² may be presumed at a depth of 1.5 m below ground level under the foundation.

The foundations of buildings up to two storeys high are constructed with footings in Rangoon nowadays, whereas piles or mats are used for the foundations of buildings of three storeys or more.

The boring surveys referred to earlier were both made to a depth of 13 metres. At both sites, the layer extending down to a depth of 3 m from the ground level is sand with silt. The *N* value increases with the depth. CC engineers said that no liquification had ever been caused by seismic activity. Settlement has never been measured, but it is maintained that none originates at levels well below the surface. From these observations, one can infer that the alluvial layer formed by the Irrawaddy River is very sandy and relatively stable.

For Site C, the ground conditions of which are relatively favourable, a survey of soil conditions with borings is needed along the location of the proposed buildings.

BORING DATA OF RANGOON GENERAL HOSPITAL COMPOUND

SHE. SPL LBY. IT. No.		DEPTH Ft.	VISUAL CLASSIFICATION	MOISTURE CONTENT %	DENSITY Lb/Cu. Ft.		UNCONFINED COMPRESSION	
					WET	DRY	STRENGTH Lb/Sq. Ft.	STRAIN %
1		0 ~ 2	Brownish Grey, Clayey SILT, some SAND	18.0	136.8	115.9	1,690	17.5
2		2 ~ 3.5	- do -	20.2	134.6	111.9	960	17.5
3		3.5 ~ 5	Brownish Grey, Silty & Clayey SAND	16.7	116.1	99.5		
4		5 ~ 6.5	- do -	16.0	121.6	104.8		
5		6.5 ~ 8	- do -	17.1	119.1	101.7		
6		8 ~ 9.5	- do -	15.3	116.8	101.3		
7		9.5 ~ 11	- do -	15.2	118.0	102.4		
8		11 ~ 12.5	- do -	17.9	136.5	115.8		
9		12.5 ~ 14	- do -	18.1	132.3	112.0	945	13.8
10		14 ~ 15.5	Reddish Brown; Clayey SILT & SAND Trace Gravel	23.9	130.3	105.4	915	8.8
11		15.5 ~ 17	- do -	21.5	127.7	105.0	965	11.3
12		17 ~ 18.5	- do -	22.1	125.9	103.1	-	-
13		18.5 ~ 20	- do -	22.2	132.9	108.7	315	20.0
14		20 ~ 21.5	- do -	20.1	129.1	107.5	2,050	11.5
15		25 ~ 26.5	- do -	20.6	129.4	107.4	3,125	11.3
16		30 ~ 31.5	Reddish Brown SAND, some SILT, Trace Clay	23.9	131.4	106.0	985	13.8
17		35 ~ 36.5	- do -	18.3	130.6	110.4		
18		40 ~ 41.5	- do -	21.4	139.7	115.1		

BORING DATA OF THE NEAR-BY SITE

TRADE CORPORATION OFFICE BUILDING ST. JOHN ROAD

SHE. LBY. No.	SPL. IT. No.	DEPTH Ft.	VISUAL CLASSIFICATION	MOISTURE CONTENT %	DENSITY Lb./Cu. Ft.		UNCONFINED COMPRESSION Lb./Sq Ft.	STRAIN %
					WET	DRY		
1		0 ~ 2	Dark Brown SILT & SAND, Some Clay with pieces of Bricks	18.2				
2		2 ~ 4	- do -	18.1	96.9			
3		4 ~ 6	Yellowish Brown Clayey SILT & SAND with Lateritic Gravel	18.6	94.2			
4		6 ~ 8	- do -	20.8	93.4			
5		8 ~ 10	- do -	19.4	87.5			
6		10 ~ 12	Yellowish Brown SILT & SAND. trace Clay	17.9	91.5			
7		12 ~ 14	- do -	22.6	103.6	10,560		7.50
8		14 ~ 16	- do -	23.6	99.1	9,620		6.25
9		16 ~ 18	Reddish Brown Clayey SILT & SAND	23.6	99.6	5,900		7.50
10		18 ~ 20	- do -	22.7	99.1	4,250		7.50
11		20 ~ 22		21.1	100.8	3,470		7.50
12		25 ~ 27		17.1	100.2	820		5.00
13		30 ~ 32		15.4				
14		35 ~ 37		16.0				
15		40 ~ 42		14.1				

(5) Infrastructure at the Construction Site

Electric Power Facilities

Electric power is supplied by the Electric Power Corporation at 400 V, 6.6 KV and 33 KV and at a frequency of 50 Hz.

The general power facilities use three-phase 400 V and the lighting sockets use 230 V.

The project envisions electric power being fed to the project site from power lines running under the road south of the site. It will be stepped down to the voltage required for supply to each building.

Service Water Facilities

A main is buried under the road south of the site, and water is presently supplied from this. There are no wells. A well will be constructed under the site and the water from it is mostly to be used after treatment, and bucket up by service water.

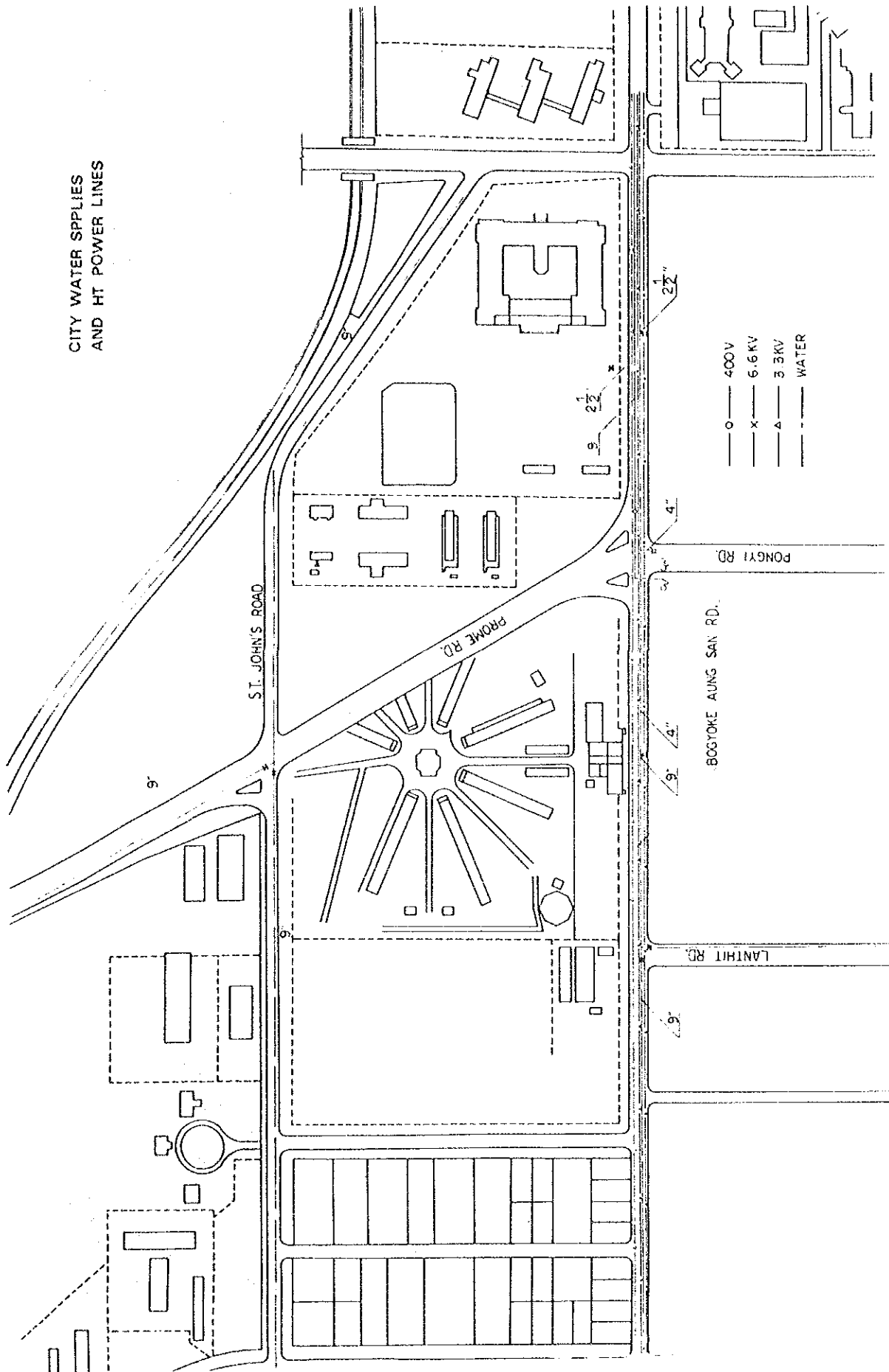
Sewerage Facilities

Some parts of Rangoon have sewers but not yet the area of the site. Treated waste water from the complex is to be discharged into a sewer line to be installed soon, or otherwise into a side gutter.

Town Gas Facilities

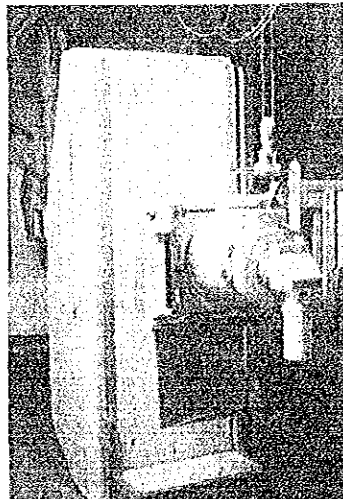
No town gas is supplied at present. Neighre are propane or other gases ready to be used as fuels in Burma. Firewood and coal are generally used instead.

CITY WATER SUPPLIES
AND HT POWER LINES



4-2-2 Medical Equipment

The medical equipment programme has been devised to facilitate sophisticated diagnoses at each department, including those of internal medicine, surgery (operations and ICUs), and paediatrics. In order to increase the accuracy of the diagnosis and treatment departments, the programme has been formulated to focus special attention on the Central Diagnosis and Treatment Department and the Radiology Department.



X-RAY EQUIPMENT
(RANGOON GENERAL HOSPITAL)

LIST OF MEDICAL EQUIPMENT

DEPARTMENT

INTERNAL MEDICINE

MEDICAL EQUIPMENT	UNIT	REMARK
<ol style="list-style-type: none"> 1. Examination unit 2. Sphygmomanometer 3. X-ray film viewer 4. Indirect film viewer (100 m/m) 5. Anthropometry 6. Endoscopes (Gastroscope, Bronchoscope, etc.) 7. Endoscope examination table 8. Endoscope cabinet 9. Endoscope film viewer 10. Fundus camera 		

DEPARTMENT

SURGERY (ORTHOPEDICS)

MEDICAL EQUIPMENT	UNIT	REMARK
<ol style="list-style-type: none"> 1. Small operating instrument set 2. Stretcher 3. Sphygmomanometer 4. X-ray film viewer 5. Anthropometry 6. Biopsy set 7. Proctoscope 8. Ligature for hemorrhoids 9. Rectoscope 10. Plaster bandage table 11. Gypsum cutter 12. Instrument cabinet 		

DEPARTMENT

OPERATION ROOM

MEDICAL EQUIPMENT	UNIT	REMARK
1. Operation table		
2. Operation light		
3. Suture instrument for gastroenteros- tomy		
4. Suture instrument		
5. Sphygmomanometer		
6. E.C.G.		
7. Film viewer		
8. Water sterilizer		
9. Electrical surgery apparatus		
10. Cryosurgery apparatus		
11. Pediatrics surgery unit		
12. Resuscitator		
13. Neuro-surgery operation unit		
14. Major operation instrument set		
15. Suction unit		

DEPARTMENT

EMERGENCY

MEDICAL EQUIPMENT	UNIT	REMARK
<ol style="list-style-type: none"> 1. Emergency set 2. Resuscitator 3. Portable E.C.G. 4. Portable X-ray 5. Water softener 6. Blood sediment rate 7. Tracheotomy apparatus 8. Patient stretcher 9. Suction unit 10. Instrument cabinet 		

DEPARTMENT

ANESTHESIA, RECOVERY ROOM

MEDICAL EQUIPMENT	UNIT	REMARK
1. Anesthesia apparatus 2. Anesthesia apparatus for child 3. Auto-respiratory apparatus 4. Oxygen tent 5. Aspirator 6. Auto resuscitator 7. X-ray film viewer 8. Refrigerator 9. Resuscitator 10. ICU		

DEPARTMENT

GYNECOLOGY

MEDICAL EQUIPMENT	UNIT	REMARK
<ol style="list-style-type: none"> 1. Examination couch 2. Gynecological examination unit 3. Artificial abortion instrument set 4. Sphygmomanometer 5. Stretcher 6. Resuscitator 7. Resuscitator for infant 8. Water sterilizer 9. Cubic ice maker 10. Colposcope 11. Hysteroscope 		

DEPARTMENT

DELIVERY, PEDIATRICS

MEDICAL EQUIPMENT	UNIT	REMARK
1. Examination couch 2. Examination light 3. Vacuum extractor 4. Foetus monitoring system 5. Kymographic insufflation apparatus 6. Examination couch for child 7. Icterus index meter 8. Anthropometry for infant		

DEPARTMENT

WARD - 1

MEDICAL EQUIPMENT	UNIT	REMARK
1. Communication system		
2. Formaldehyde gas sterilizer for bedclothes		
3. Stool disinfecter		
4. Urine pot stand		
5. Irrigator stand		
6. X-ray film viewer		
7. Oxygen tent		
8. Sphgmomanometer		
9. Thermometer		
10. Emergency cart		
11. Ward round cart		
12. Surgical treatment cart		
13. Stretcher		
14. Body sanitary cart		
15. Hair treatment cart		
16. Refrigerator		
17. Ice maker		
18. Respiratory apparatus		

DEPARTMENT

WARD - 2

MEDICAL EQUIPMENT	UNIT	REMARK
1. Resuscitator 2. Cardiac defibrillator		

DEPARTMENT

CENTRAL STERILE SUPPLY

MEDICAL EQUIPMENT	UNIT	REMARK
<ol style="list-style-type: none"> 1. Autoclave 2. Formaldehyde sterilizer 3. Dryer 4. Glove reclamation apparatus 5. Steel cabinet <p style="text-align: center;">- Laundry linen supply -</p> <ol style="list-style-type: none"> 1. Washer 2. Dryer 3. Cotton press 4. Laundry waggon 		

DEPARTMENT

PHARMACY

MEDICAL EQUIPMENT	UNIT	REMARK
1. Medicine dispensing counter 2. Balance 3. Water softener 4. Redistilled water 5. Refrigerator 6. Bottle sterilizer 7. Poison stocker 8. Autoclave, tabletop type		

DEPARTMENT

RADIOLOGY

MEDICAL EQUIPMENT	UNIT	REMARK
1. TV X-ray for digestive duct		
2. X-ray apparatus with condenser		
3. X-ray apparatus with transformer		
4. Tomography X-ray		
5. Indirect 100 m/m X-ray		
6. Surgical X-ray		
7. Portable X-ray		
8. Automatic film-developer		
9. Film development		
10. Film viewer		
11. Water softener		
12. Film dryer		
13. Universal X-ray table for child		
14. Protective apron & glasses		

DEPARTMENT

CLINICAL LABORATORY 1

MEDICAL EQUIPMENT	UNIT	REMARK
1. E.C.G. 2. Monitor (E.C.G.) 3. Spirometer 4. Phonocardiograph 5. EEG 6. Ultrasonic testing 7. Portable ECG		

DEPARTMENT

CLINICAL LABORATORY 2

MEDICAL EQUIPMENT	UNIT	REMARK
<p>- Teneral examination -</p> <ol style="list-style-type: none"> 1. Microscope 2. Specific gravity for urine <p>- Blood examination -</p> <ol style="list-style-type: none"> 1. Microsopce 2. Blood-cell counter (WBC, RBC) 3. Hb meter 4. Ht high speed centrifuge 5. Distilles & softener 6. Blood sediment rate 7. Refrigerator 8. High-quality microscope 		

DEPARTMENT

CLINICAL LABORATORY 3

MEDICAL EQUIPMENT	UNIT	REMARK
<p style="text-align: center;">- Biochemistry -</p> <ol style="list-style-type: none"> 1. Centrifuge 2. Spectrophotometer 3. Direct-reading balance 4. Chemical analyzer 5. Electrode Na-K meter 6. Blood gas analyzer 7. Electrophoresis 8. Densitometer 9. Protein refractometer 10. Water bath 11. PH meter 12. Refrigerator 13. Deep freezer 14. Poison stocker 15. Mixer 		

DEPARTMENT

CLINICAL LABORATORY 4

MEDICAL EQUIPMENT	UNIT	REMARK
<p>- Bacteriology -</p> <ol style="list-style-type: none"> 1. High-pressure steam sterilizer 2. Koch's steam sterilizer 3. Dry heat sterilizer 4. Incubator 5. Balance 6. PH meter 7. Microscope 8. Reagent equipment stocker 9. Refrigerator 10. Anaerobic culture bottle 11. Aseptics safety cabinet 12. Mixer 13. Water softener 14. Centrifuge 15. Burner 		

DEPARTMENT

CLINICAL LABORATORY 5

MEDICAL EQUIPMENT	UNIT	REMARK
<p style="text-align: center;">- Immuno-serology -</p> <ol style="list-style-type: none"> 1. Centrifuge 2. Shaker 3. Microscope 4. Water bath 5. Refrigerator 6. Dispenser 7. Deep-freezer 8. Timer <p style="text-align: center;">- Histopathology -</p> <ol style="list-style-type: none"> 1. Microtome & knife 2. Paraffin oven 3. Tissue processor 4. Cryotome 5. Microscope 6. Microscopic photography attachment 7. Microtome sharpener 8. Refrigerator 9. Balance 		

DEPARTMENT

CLINICAL LABORATORY 6

MEDICAL EQUIPMENT	UNIT	REMARK
<ul style="list-style-type: none">1. Preparation stocker2. Centrifuge3. Water-softener - Repair shop - 1. Repair tissue2. Tester3. Maintenance kit, tool box		

DEPARTMENT

BLOOD BANK

MEDICAL EQUIPMENT	UNIT	REMARK
1. Blood stocker 2. Microscope 3. Water bath 4. Centrifuge 5. Balance 6. Specific - gravity for whole blood		

DEPARTMENT

AUTOPSY ROOM

MEDICAL EQUIPMENT	UNIT	REMARK
1. Autopsy instrument unit 2. Balance 3. Corpse refrigerator 4. Corpse cart		

DEPARTMENT

CONFERENCE ROOM

MEDICAL EQUIPMENT	UNIT	REMARK
<ul style="list-style-type: none">1. Slide-projector2. Overhead projector3. Screen4. Recorder5. Wireless microphone - Medical records - 1. Filing cabinet		

4-2-3 Building Programme

(1) Scope of the Work

• Floor Area and Distribution

The use of floor area will be explained in detail later, in the blueprints. Here its distribution will merely be outlined.

- 1) The total floor area is 10,000 m² and the hospital is to be equipped with 220 beds.
- 2) The functions of the hospital are roughly divisible into the following five departments.
 - a. Wards (including ICUs)
 - b. Outpatient Service Department (including an emergency care unit, a pharmacy and a hall)
 - c. Central Diagnosis and Treatment Department (including a radiology department, a laboratory, a surgery department, a delivery room, and a pharmacy.)
 - d. Administration Department (a reception office, administration offices, etc.)
 - e. Service Department (a machinery room, laundry, etc.)

3) Floor area is distributed among the five departments as follows.

Department	Floor Area
a. Wards	3,650 m ² (36.5)%
b. Outpatient service	1,750 (17.5)
c. Central Diagnosis and Treatment Dept.	3,350 (33.5)
d. Administration	800 (8.0)

(2) Layout

• Location of Buildings and Approaches at the Site

Service zone	single-storey buildings
Central diagnosis and treatment zone	two-storey buildings
Outpatient, administration and ward zone	four-storey building

The whole floor space is divided into three zones. For the convenience of outpatients and other visitors, the frontal part of the hospital, which faces a road, is used for an outpatient service, administration and ward zone. Further inside the hospital, a central diagnosis and treatment zone will be in a position ensuring cleanliness and calm. The innermost part of the hospital is reserved for a service zone, to which services will have access from the back. Considerable space between the hospital buildings and the roads which face the front and one side of the hospital is planted with vegetation in order to insulate the wards from the noise of the roads outside.

• High-rise and Low Buildings and Ensurance of Cleanliness

The building containing the outpatient service, administration department and wards has four storeys. This layout is based on a strong request of the Burmese side, who want to make the most efficient use of the site. It also facilitates access to the hospital.

The Central Diagnosis and Treatment Department is housed in a two-storey building in order that patients do not have to move from floor to floor.

The Service Department is contained in a single-storey building.

Maximum cleanliness must be ensured for the Central Diagnosis and Treatment Department, which is housed in separate buildings.

- Relations with the Adjacent Medical College

As the hospital may be administratively and academically linked with the Medical College standing nearby to the east, the service department is positioned close to the college.

- Two Buildings for the Central Diagnosis and Treatment Department

One building is reserved for the radiology and operation departments, and the other for the laboratory and special wards. The radiology and laboratory departments are on the first floor.

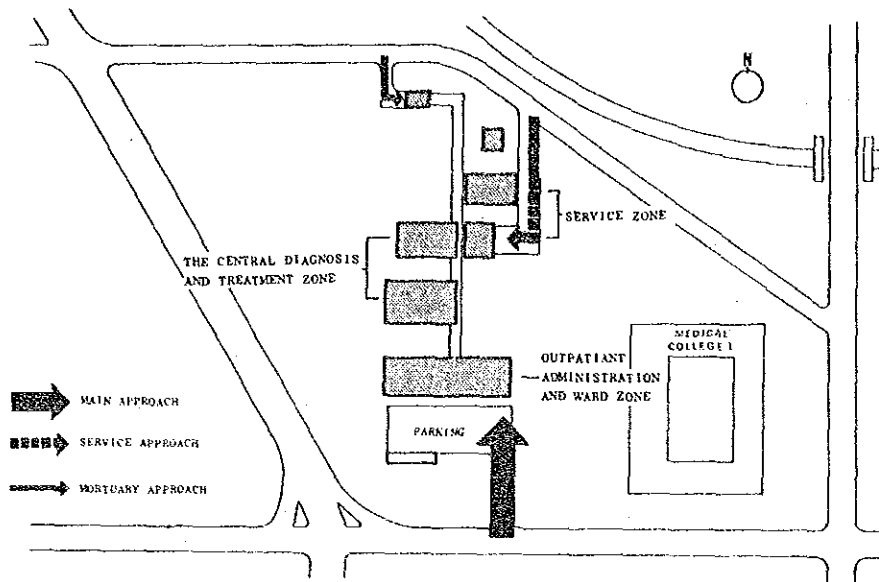


Fig 4-2 FLOW CHART

- Alignment of the Buildings

The north and south can be shaded by eaves from direct sunlight. The buildings are therefore aligned so that their short sides face the unshaded east and west.

- Future Expansion

The buildings of the hospital may be added to and altered. This is particularly likely for the Central Diagnosis and Treatment and the Outpatient Service departments. For this reason, each building is placed so that it may be expanded on the side away from the Medical College or to the west. The arrangement also allows additional wards to be built later in the innermost part of the site.

- Location of Sewage Disposal Tanks and Incinerators

The sewage disposal tanks are installed in the southeast corner, the place to which drainage can most conveniently be directed. The incinerator is in the northwest corner, a position dictated by the wind direction.

- Possible Location of Housing

Housing for physicians' families and dormitories for nurses and other employees, which are not incorporated in the present programme, may be located in Site E behind this hospital compound.

- Parking

A car park is provided next to the road, in a position which both makes access to it easy for visitors and avoids the danger of obstructing ambulances and other essential vehicles.

- Perimeter Areas and Vegetation

Vegetation is planted around the entrance and buildings and in the courtyard to make a restful impression. Green zones are provided along the roads to the west and south. They also have the practical purpose, noted above, of insulating the hospital from external noise.

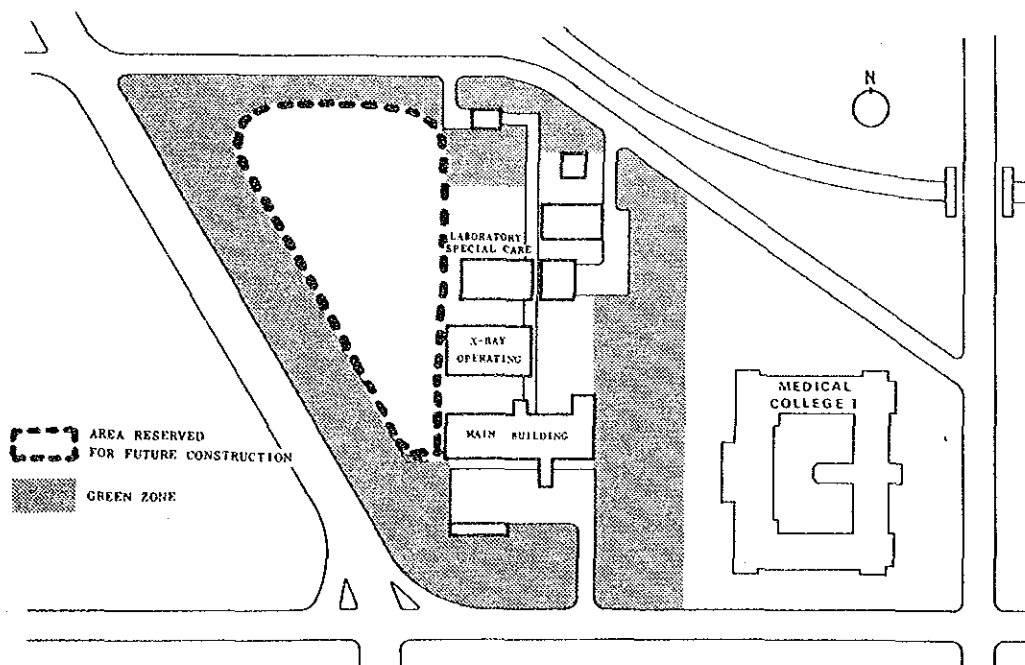
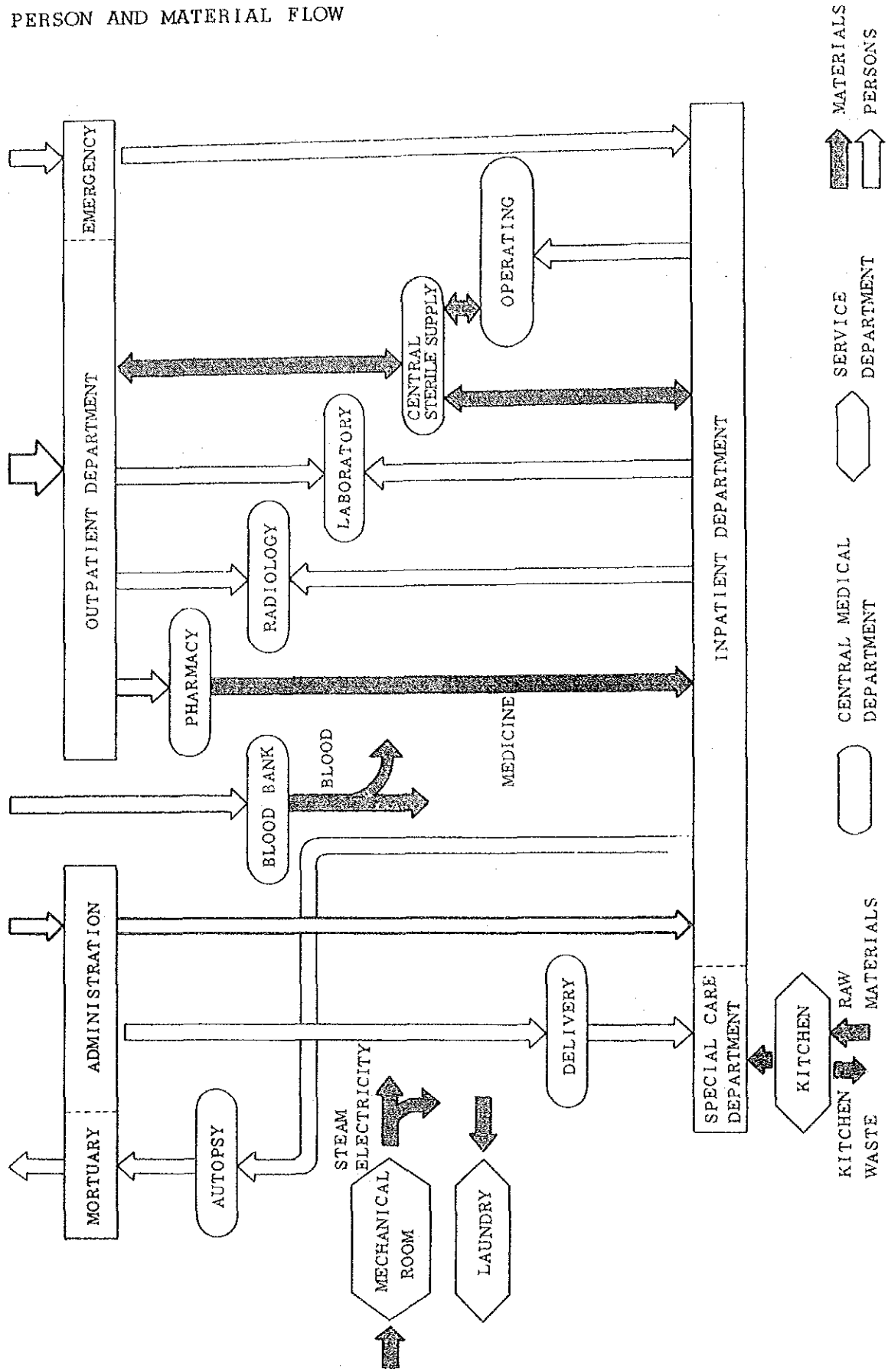


Fig 4-3 PLAN OF FUTURE DEVELOPMENT AREA

PERSON AND MATERIAL FLOW



(3) Plan

1) Division of Building

The buildings are of a pavilion type. Each building is structurally independent and connected to the others by corridors. This is an attempt to allocate as much space to each facility as possible and to make the functions of each building easy to understand. Additional buildings may be constructed later.

2) The High-rise Building

a) Cross-sectional Composition of the High-rise Building

The first floor is reserved for the outpatient service, reception room and pharmacy, the second floor for the administration department, a ward and a nursing unit, and the third and fourth floors for wards each with two nursing units.

4th floor	Ward, 2 NUs
3rd floor	Ward, 2 NUs
2nd floor	Ward, 1 NU, administration
1st floor	Outpatient service, reception room, pharmacy

When an additional ward building is built in the future, the wards on the second floor may be transformed into the extension of the Administration Department. In other words, the planned use permits future change.

b) Features of the High-rise Building

Two nursing units are to be placed in the central area of each floor; and elevators, stairways and lavatories are located close to these for efficiency and easier control.

Each nursing unit is divided into three sectors: a nursing station, a group of private bedrooms and a ward. The ward may be entered by patients' family attendants from the outside corridor. Each room is designed for adequate ventilation. Male and female inpatients are separated by being placed in different nursing units.

c) Distribution of Wards

General wards are in the high-rise building and special wards in the low building. As for the general wards, two NUs may be placed for internal medicine on the fourth floor, two for surgery on the third floor, one each for male and female inpatients. The second floor may be set aside for paediatrics.

The special wards have a high ratio of nurses to patients, and must be kept especially clean. One ICU and one obstetrics ward are included for the time being. However, wards for general obstetrics are accommodated in the building for general wards, and this ward is reserved for intensive care. ICU includes CCU.

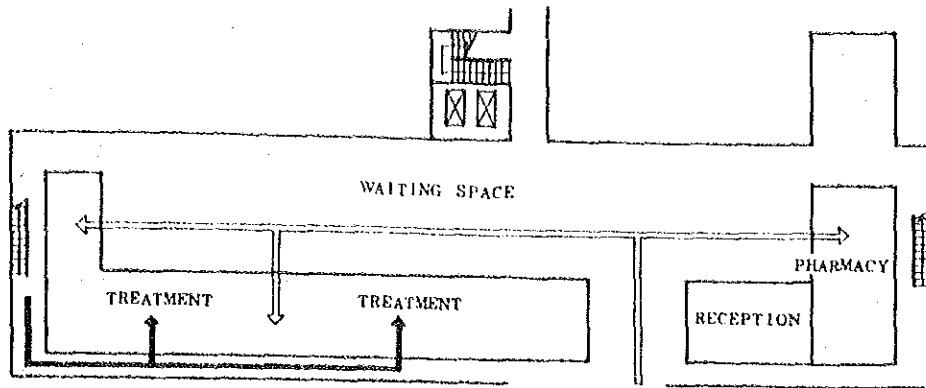
d) Disaster Prevention and Emergency Escape Routes

Two escape routes have been devised for the second storey and each storey above.

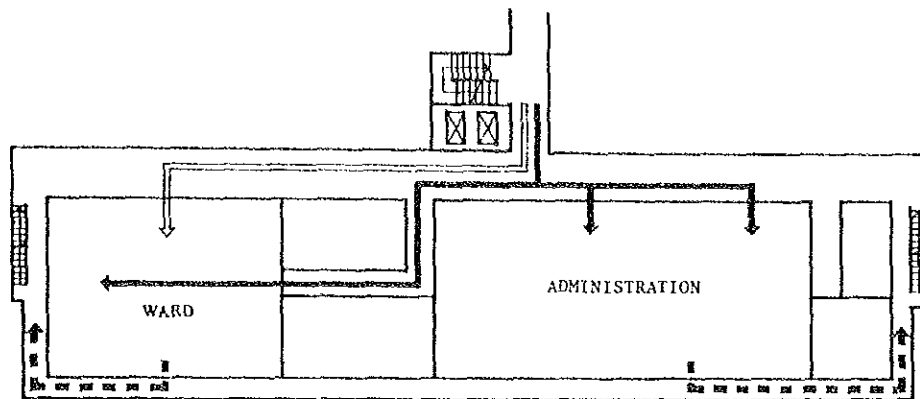
- Provisions for Family Attendants

Many family members are expected to visit the hospital to help look after the patients. Therefore the outpatient waiting hall should be large enough to accommodate all these people.

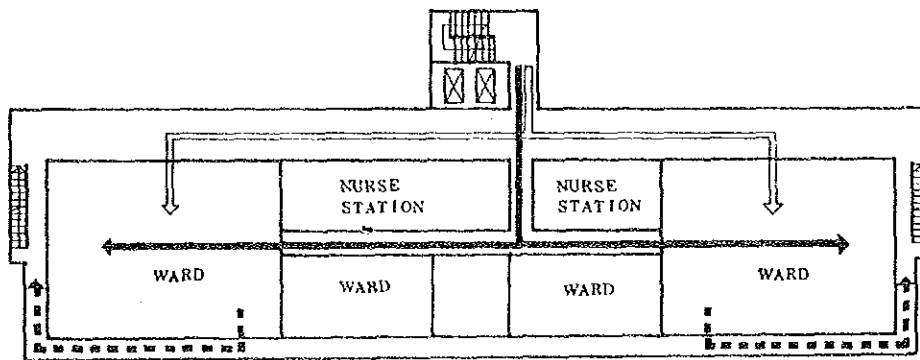
Family attendance on inpatients constitutes part of nursing and is inevitable under the present circumstances. But if all of them are allowed into the bedrooms, a clean and restful atmosphere cannot be ensured for the inpatients. In front of the bedrooms is an open corridor which keeps these attendants from entering the bedrooms except in the immediate vicinity of the patients they are visiting, and which thereby avoids most of the disturbance they would otherwise cause.



1F PLAN



2F PLAN



3, 4F PLAN

1F	WARD, IN. U. (NURSING UNIT)	WARD, IN. U. (NURSING UNIT)	← PATIENTS AND VISITORS
3F	WARD, IN. U. (NURSING UNIT)	WARD, IN. U. (NURSING UNIT)	← PHYSICIANS AND MEDICAL STAFF
2F	WARD, IN. U. (NURSING UNIT)	ADMINISTRATION DEPARTMENT	← ■ ■ ■ ■ EMERGENCY ROUTES
1F	OUTPATIENT SERVICE	RECEPTION AND OFFICES	

Fig 4-4 FLOOR PLANS OF THE HIGH-RISE BUILDING

3) Two Buildings for the Central Diagnosis and Treatment

The cross-section of these buildings is shown in the diagram below.

Outside corridors are provided for the radiology and surgical operation departments to make it easier for equipment to be moved, and as a convenient place for patients and their families to wait in.

The inside corridors are reserved for medical staff in order that they might not become congested.

a) Radiology Department

As noted above, the central corridor is arranged so that the radiologists can operate several rooms at a time. The conference hall, which may look somewhat large, may be used for additional functions in the future. Incidentally, radioisotope facilities may be installed in an additional building that may be constructed later.

b) Teaching and Training Facilities

A conference room is provided in the Central Diagnosis and Treatment Department, and a spacious library in the Administration Department.

c) Operation and Central Sterile Supply Departments

The surgical operation department requires the greatest possible cleanliness. A system suitable for conditions in Burma makes a strict division between "dirty" and "clean" zones. A "one-way" system is adopted: anyone and anything entering the "clean" zone must go through a process of sterilization, and postoperative impurities are taken out to the open corridor immediately, instead of having to go through the inside corridor.

In the central sterile supply department, priority is given to the equipment used by the surgical department. The equipment of other departments is also cleaned and sterilized. Endoscopes and other instruments are dealt with in the multipurpose room.

d) Laboratory

Various tests for each department are performed together in the laboratory, which also has a blood supply room.

e) Distribution of Wards

General wards are in the high-rise building and special wards in the low building. As for the general wards, two NUs may be placed for internal medicine on the fourth floor, two for surgery on the third floor, one each for male and female inpatients. The second floor may be set aside for paediatrics.

The special wards have a high ratio of nurses to patients, and must be kept especially clean. One ICU and one obstetrics ward are included for the time being. However, wards for general obstetrics are accommodated in the building for general wards, and this ward is reserved for intensive care. ICU includes CCU.

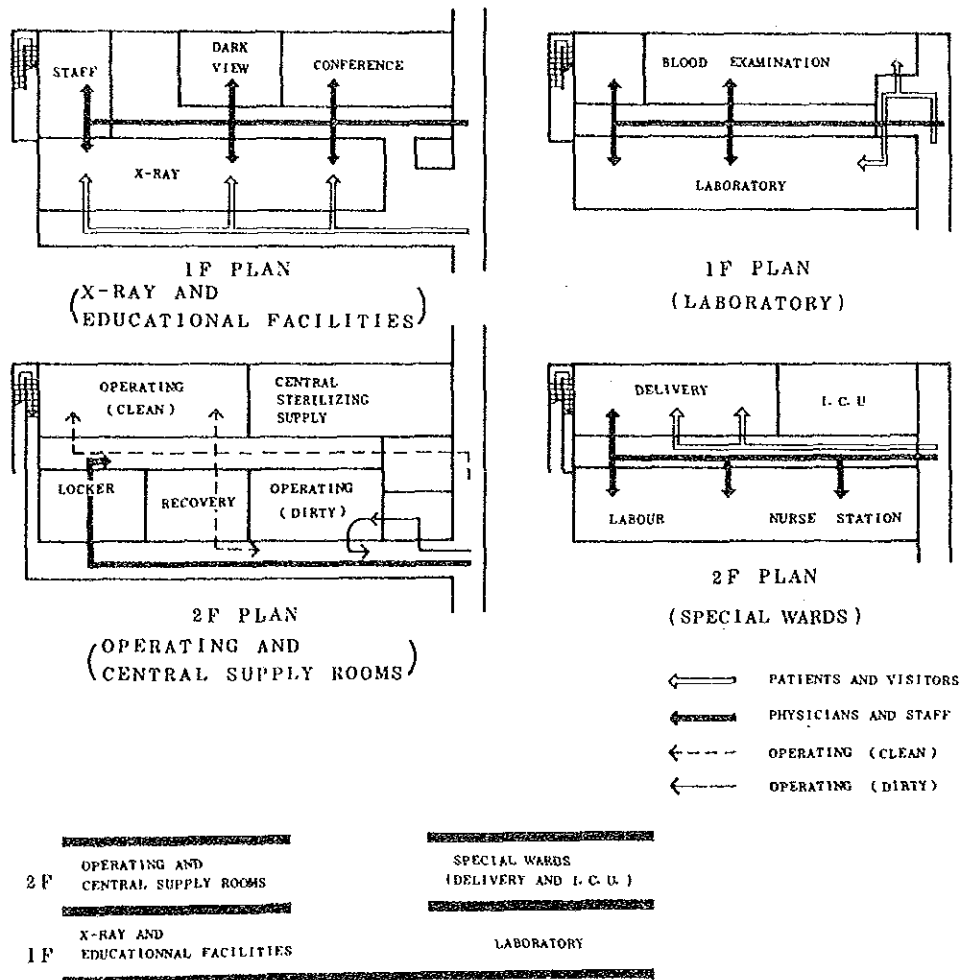
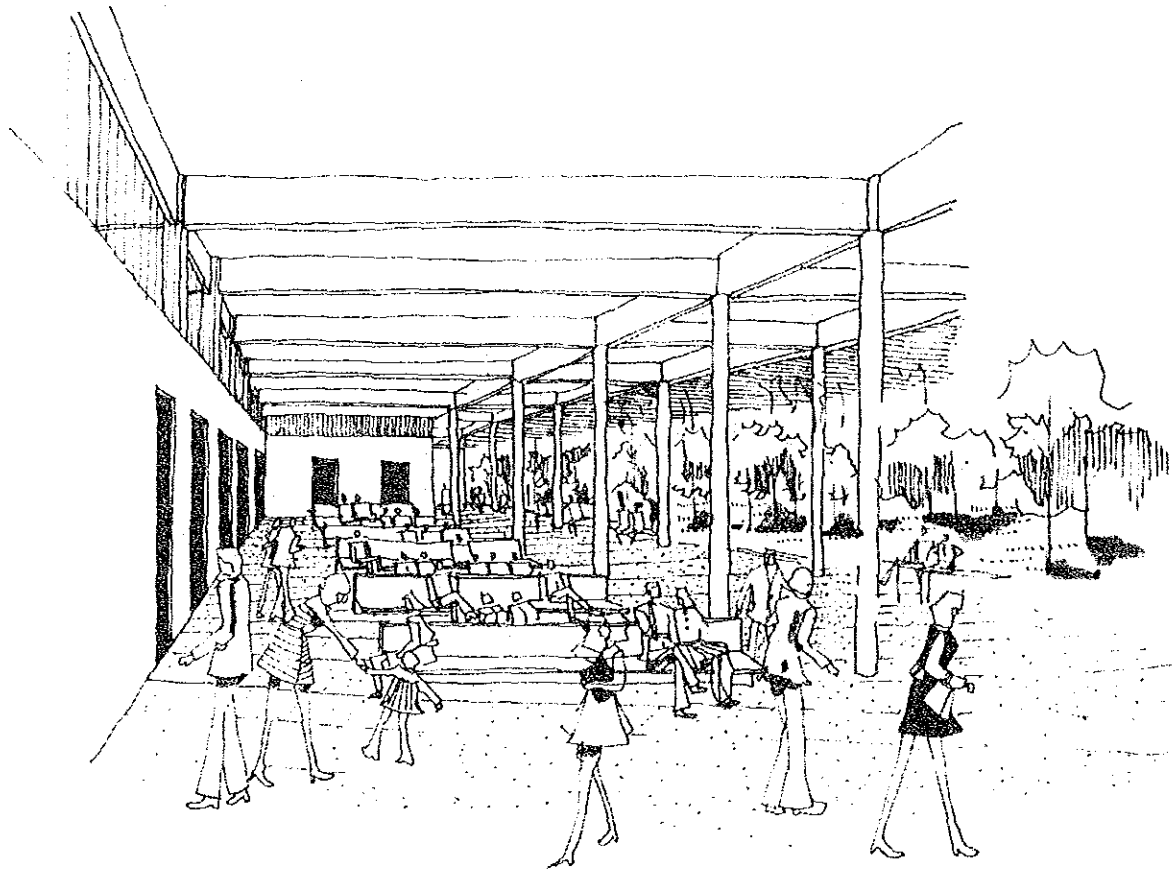


Fig 4-5 FLOOR PLANS OF THE CENTRAL DIAGNOSIS AND TREATMENT

f) Service Building

This building accommodates a power substation, a boiler room and a laundry.



SPACE FOR WAITING

(4) Distribution of Spans

- High-rise Building (Outpatient Service and Wards)

6 m grids are used since they allow a rational and efficient arrangement of the beds, and as their use is structurally economical. As a 1.5 m-wide corridor for medical staff runs through the centre of each ward, and a 3 m-wide open corridor runs along the front, the spans come in three sizes: 6 m x 6 m, 6 m x 7.5 m and 6 m x 3 m.

- Central Diagnosis and Treatment Department Buildings

The Radiology and surgery Building uses a 6 m grid, like that of the high-rise building. Since 3 m-wide corridors are provided centrally and on the outside, the spans come in three sizes: 6 m x 9 m, 6 m x 6 m and 6 m x 3 m.

The Laboratory and Special Ward Building also uses a 6 m grid. Since 3 m-wide corridors are provided centrally, the spans come in two sizes: 6 m x 9 m and 6 m x 6 m.

(5) Ceiling Height

The temperature is high in Burma throughout the year and ventilation is indispensable to make it tolerable. This makes it desirable to use high ceilings. If the ceilings were raised haphazardly, the resulting buildings would be uneconomical and raise problems for maintenance. Instead, we tried to unify the height. On the first floor, there is an entrance hall and relatively tall medical equipment, such as x-ray machines, is to be installed here; and the height of the ceiling is 4.5 m. For the second, third and fourth floors of the high-rise building, the height is 3.5 m. As many rooms on the second floor of the Central Diagnosis and Treatment Department buildings must be air-conditioned, the height is 4.0 m.

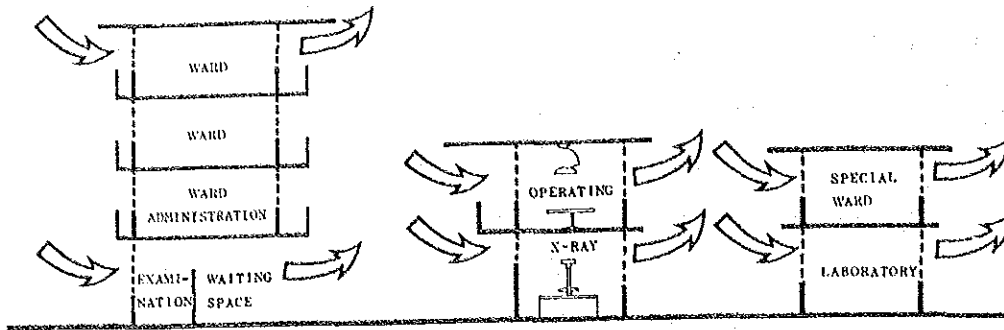


FIG 4-6 NATURAL VENTILATION

(6) Structure

The lateral force caused by earth tremors and winds is less in Burma than in Japan, but cannot be overlooked.

The principal difference in structural design between a four- and a two-storey building is in the foundation. The choice of foundation is influenced by the underlying soil. Unless an elaborate boring survey is conducted with the particular building layout in mind, no final decision may be made on which type of foundation to use. In view of the soil foundation of the surroundings, however, a shallow foundation with footings or strips may be used in sites C and D, even for four-storey buildings.

Frames are constructed at reasonable cost. The local engineering methods, with which the Construction Corporation is familiar, are slightly altered for improved aseismic characteristics.

1) Structure

a) Framing

The main frame is a rigid frame of reinforced concrete.

b) Roofs

The local timber for structures, Pyinkado, is adopted for the truss.

c) Floors

The second floor is of reinforced concrete. The material used for the first floor depends greatly on the soil conditions. Plain concrete will be laid on a sand fill if the soil permits.

d) Walls

Some of the aseismic walls and all the radiation-shielding walls are of ferroconcrete, and other general external walls of 9"-thick bricks, whereas the partitioned internal walls will be made primarily of 4 1/2"-thick bricks or wood.

2) Design Policy

a) Design Methods

There are no set regulations or building codes in Burma. In general, structures are designed according to the relevant British Standards (BS). But, for example, one engineer of the Construction Corporation, who has studied aseismic designs in Japan, designs according to Japanese standards.

In principle, the structural design of this project meets the provisions of the Japanese Building Standards Law and the standards of the Japan Architectural Engineering Society, but consideration has been given to local conditions.

b) Design Load and Lateral Force

• Dead Load

The dead load of the structures themselves and the materials are all computed.

• Live Load

In principle, the live load will be computed in accordance with the numerous stipulations of the Japanese Building Standards Law and the regulations concerning its implementation.

	(kg/m ²)		
Live load	Floor	Frame	Earthquake
Diagnosis and treatment rooms	300	180	80
Wards	180	130	60

The concentrated load of special medical equipment is considered separately.

- Seismic Force

Calculations are based on the weight of the buildings, with the seismic coefficient (k) set at 0.15.

- Wind Pressure

Calculations allow for a wind pressure of 130 kg/m^2 and a wind coefficient influenced by the configuration of the buildings.

c) Structural Materials

- Cement

Normal portland cement produced in Burma will be used to prepare concrete with a mixture of 1:2:4. The design standard strength is 180 kg/cm^2 .

- Reinforcing Bars

Since deformed reinforcing bars are supplied from Japan by Japanese Grant Aid for the hospital project, they shall be earmarked for the project.

The round bars are 6 - 9 and the deformed bars are D13 -25 in size; and 600 tonnes of reinforcing bars are scheduled to be shipped to Burma by the end of 1981.

- Timber

Pyinkado, grown in Burma, is strong and durable and is generally used for structural members. The fibre stress is 176 kg/cm^2 and the modulus of elasticity is $1.4 \times 10^5 \text{ kg/cm}^2$. This suggests that Pyinkado is stronger and more durable than oak, which has a fibre stress of 130 kg/cm^2 and a modulus of elasticity of $1.0 \times 10^5 \text{ kg/cm}^2$.

(7) Installations

1) Requirements for the facilities

Equipment is to be chosen and installed for the project according to the following guidelines;

- Natural and other conditions of Burma should be taken into account.
- The equipment should be durable.
- The equipment should be easy to operate and manipulator.
- The equipment should be easy to maintain and repair.
- The operating cost of the equipment should be low.
- The equipment should be easy to install.
- Local methods of construction should be used as much as possible.

2) Air-conditioning and Ventilation

The climate of Rangoon can be described as having two seasons: a dry season lasting from November to April, with temperatures regularly rising to 36°C; and a rainy season from May to October, with between 80 and 95% humidity. To cope with a climate such as this, air-conditioning will not rely solely on the use of mechanical equipment. Direct sunlight is shaded with architectural devices, which also assure natural ventilation suitable for the climate. Therefore, air-conditioning machinery is not installed in the outpatient service and ward buildings.

Forced air-circulation equipment will be installed only in rooms such as the surgical operation, ICU, recovery, X-ray, laboratory, labour and delivery and premature babies' rooms. These are closed, require especial cleanliness and must satisfy strict conditions for temperature and humidity. Rather than being centralized, air-conditioning equipment will be installed where needed using independent units, in order to make it easier to limit its use to wherever it is wanted at any given time.

The air-conditioning system will be of an air-cooling package type.

Air-conditioning systems are not widely used in Burma. Local construction methods are to be adopted for their installation as far as possible, and others introduced from Japan if need be.

3) Water Supply, Drainage and Other Facilities

The principal facilities include normal water supply and drainage and special facilities, including laundry, kitchen, fire-fighting and waste-water treatment facilities.

a) Water Supply

The daily consumption of water is estimated to be 200 m³/day. A well will be dug on the site of the hospital as the main water source. The well will be supplemented by the service water system if there is a shortage. Due attention will be paid to considerations of hygiene in the water supply; and precipitation, filtration and sterilization facilities installed if necessary. An elevated water tank is installed to supply water in a gravity system to facilities within and outside the buildings.

b) Drainage

Sewage will be discharged together with miscellaneous waste water into the drainage system inside the buildings. Waste water containing toxic matter and heavy metals drained from the laboratory and other facilities goes through a separate system of pipes into an outdoor tank and is then treated and disposed of outside the hospital.

c) Hygienic Equipment and Facilities

Equipment is selected in accordance with the customs of the Burmese people. Flush valves or low tanks will be used for cleaning urinals.

d) Gas

No gas facilities are included in this programme.

e) Fire-fighting facilities

Special hydrants and other taps are installed where required for immediate use by the occupants of the hospital.

f) Laundry Facilities

There is a laundry in the service building. It is used for sheets, medical overalls, and so forth. Steam is used as the heat source. The main laundry facilities include washing machines, hydroextractors, dryers and sheet rolls.

g) Kitchen

There is a kitchen in the service building. Plans assume that cooking will not generally be automated. Kitchen utensils provided will include at least those needed for Burmese cuisine, such as equipment for refrigeration, washing and sterilization, rice steamers, and braising pans. Electricity and steam will be used for heat. An ergonomic and hygienic layout is devised for this equipment.

h) Waste Water Treatment Facilities

Sewage and miscellaneous waste water are treated together by the activated sludge system.

The estimated waste concentrations of water before and after treatment in the special facilities provided are:

	(ppm)	
	B.O.D.	S.S
Before treatment	200	250
After treatment	20	50

B.O.D : BIOLOGICAL OXYGEN DEMAND

S.S : SUSPENDED SOLID

4) Electrical Facilities

a) Requirements for the Electric Facilities

The electric facilities are selected in accordance with the following principles.

- The equipment should be safe and easy to maintain and control in Burma.
- As it is difficult to procure equipment and materials locally, they must be reliable and durable and the stock of spare parts, etc., will be taken into account.
- Electric power will be received at 33 KV and stepped down to 6.6 KV to allow for future expansion.

b) Individual Electrical Facilities

• Electrical Supply

Power from a 33 KV power line, buried under the road to the south of the site, is supplied to an on-site transformer substation through a circuit of three three-phase lines at 33 KV and 50 Hz.

• Electrical Power Receiving Facilities

The voltage from the three three-phase lines is reduced at the transformer substation from 33 KV to 6.6 KV for three three-phase lines and 400 V/230 V for four three-phase lines for loaded distribution.

c) Emergency Generator

As a local power failure of 10 - 20 minutes takes place from one to three times a month, an emergency generator is installed to supply power during power failures for surgical operations and laboratory tests and also for security and lighting.

d) Power Facilities

Electric power is supplied to general machinery and medical equipment. The power facilities should be easy to operate and maintain.

e) Electric Lights and Sockets

Fluorescent lamps are used on the whole, with some incandescent lamps. Single-phase 230 V or 100 V sockets are installed.

f) Telephones

A telephone switchboard in the hospital speeds up both internal and outside calls.

g) Nurse Calls

Lines are installed between the nurse stations and each bed.

h) Alarms

Push-button alarm bells are installed for fire-fighting and emergency evacuation.

i) Paging Facilities

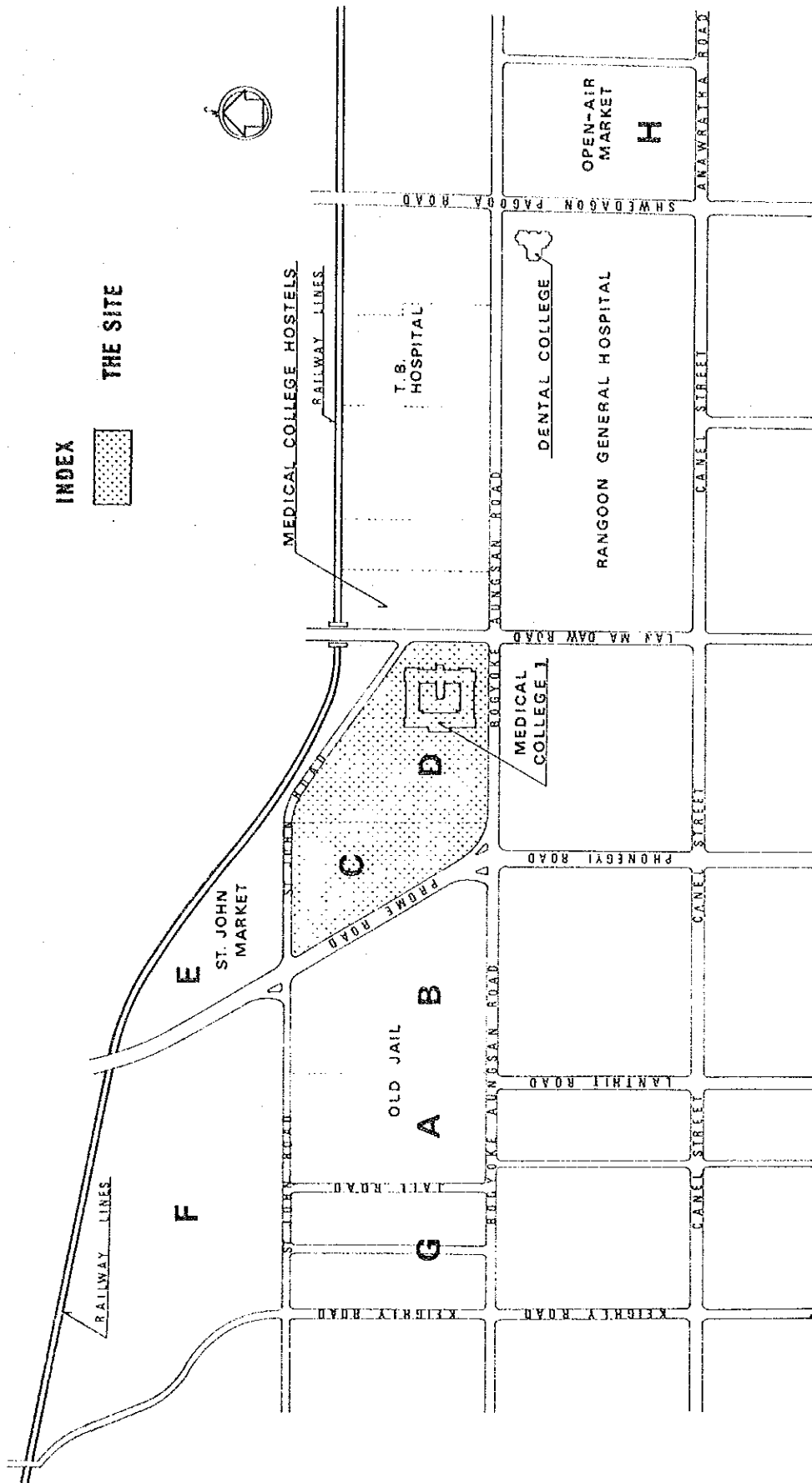
Paging facilities are installed to call physicians and nurses.

j) Inter-telephone Facilities

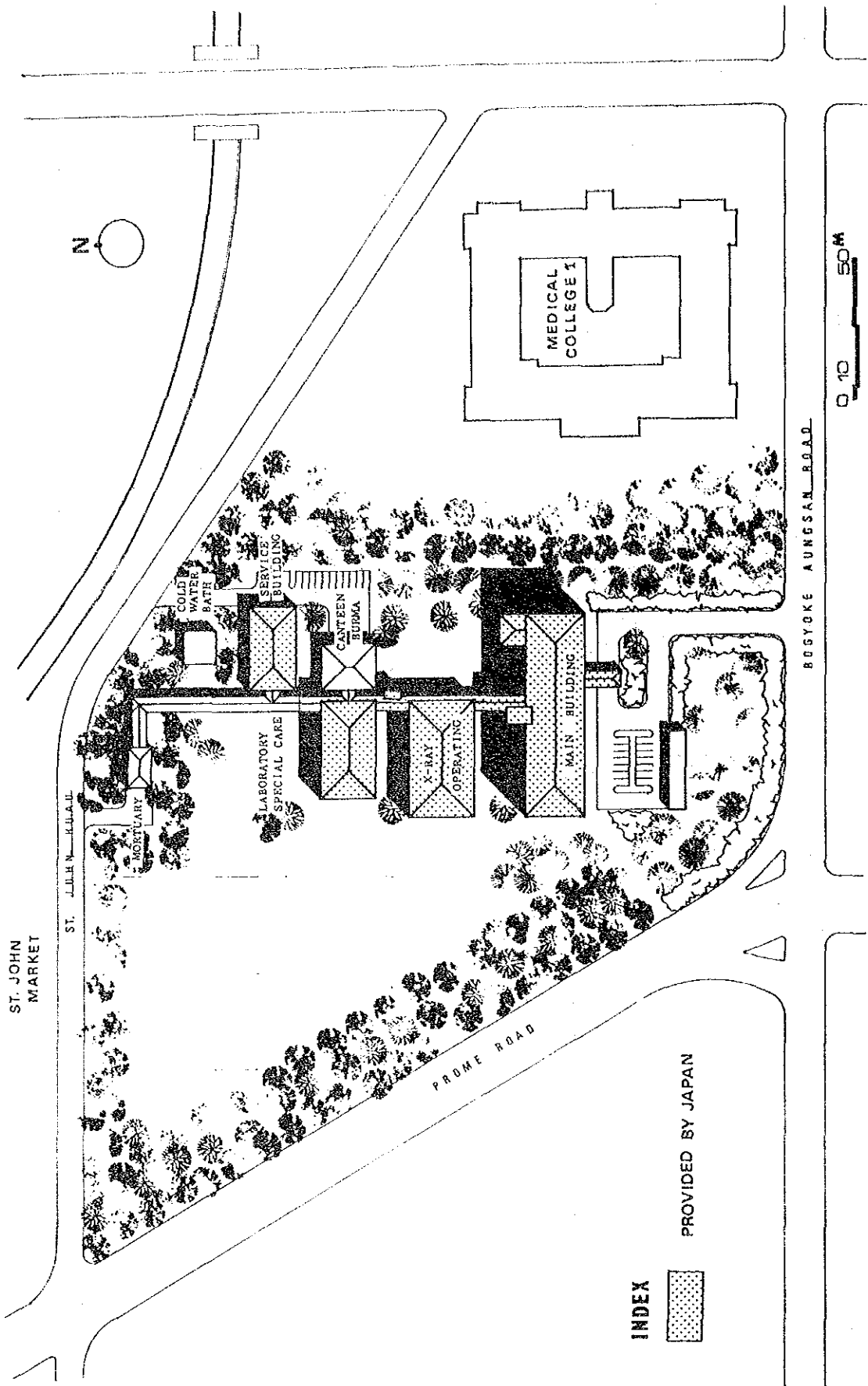
Internal telephone system are installed where they are needed for the functioning and management of the hospital.

4-2-4 Preliminary Drawings

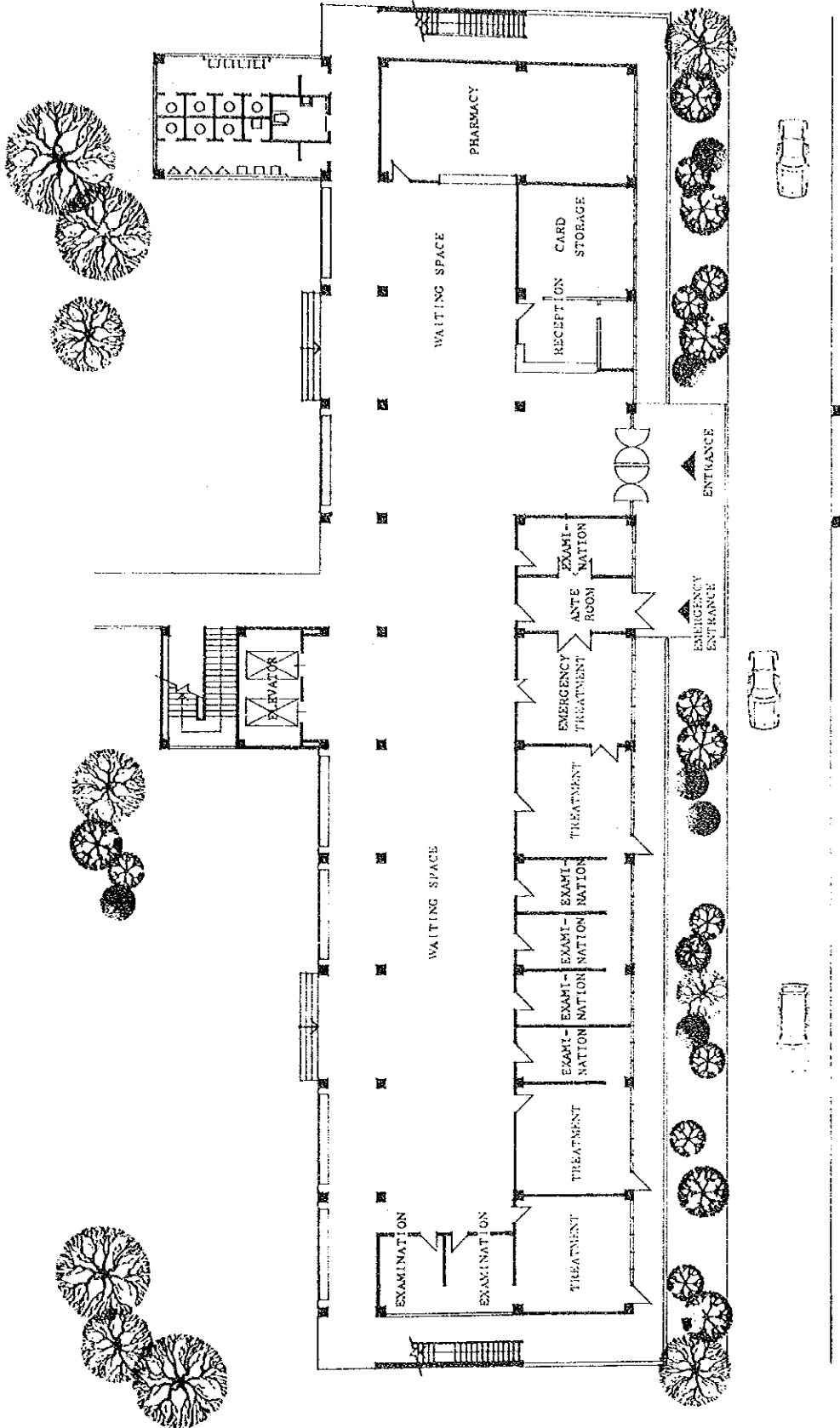
- 1 Map of the Area
- 2 Layout Plan of the Centre
- 3 Main Building (1F Plan)
- 4 Main Building (2F Plan)
- 5 Main Building (3, 4F Plan)
- 6 Main Building (South Elevation)
- 7 Main Building (East Elevation, Section)
- 8 Main Building (North Elevation)
- 9 X-Ray, Operating (1F Plan)
- 10 X-Ray, Operating (2F Plan)
- 11 X-Ray, Operating (North Elevation, West Elevation)
- 12 X-Ray, Operating (South Elevation, Section)
- 13 Laboratory, Special Care (1F Plan)
- 14 Laboratory, Special Care (2F Plan)
- 15 Laboratory, Special Care (North Elevation, West Elevation)
- 16 Laboratory, Special Care (South Elevation, Section)
- 17 Service Building (Plan, South Elevation, Section)



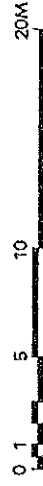
MAP OF THE AREA 01



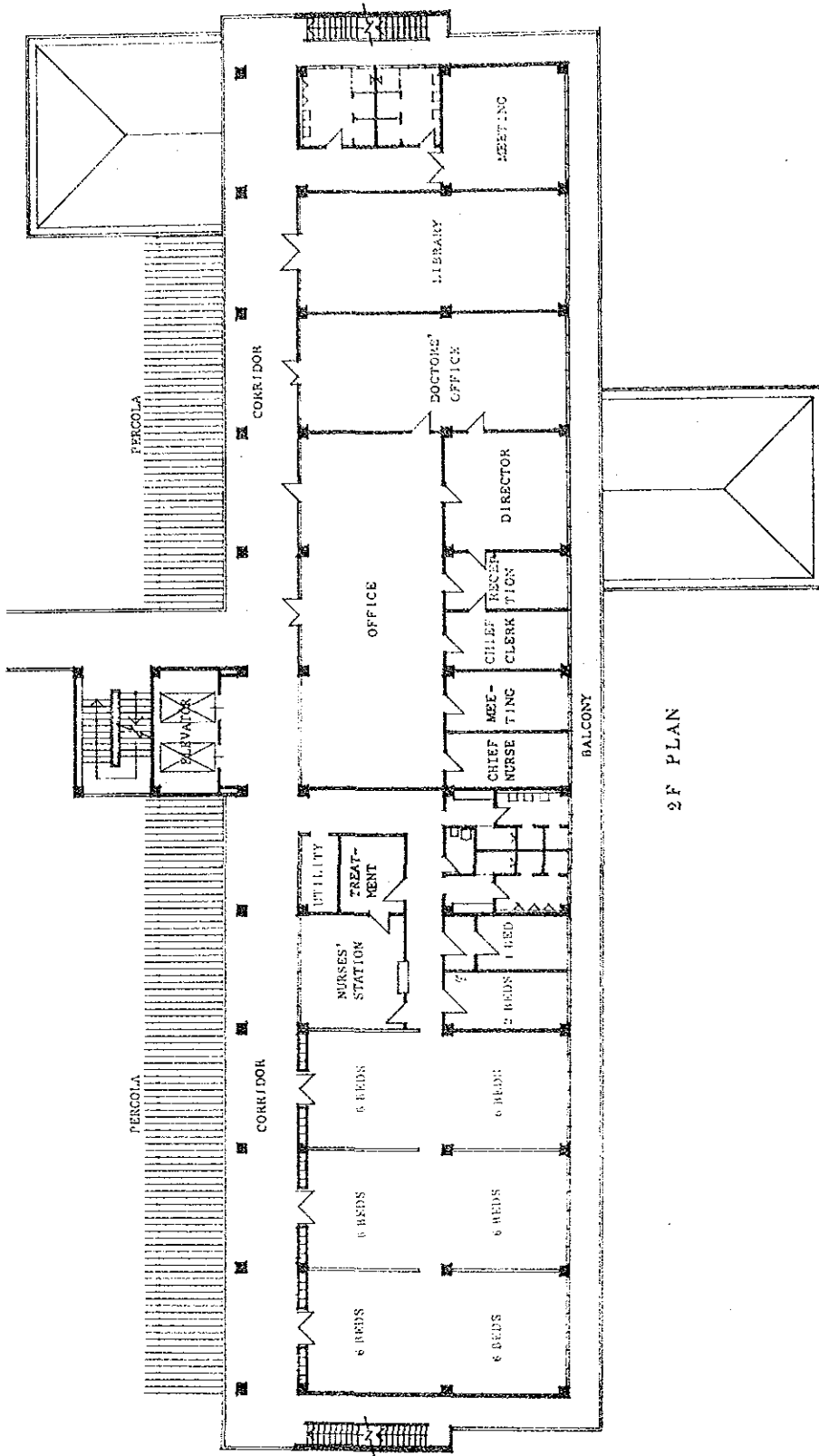
LAYOUT PLAN OF THE CENTRE 02



1 F PLAN

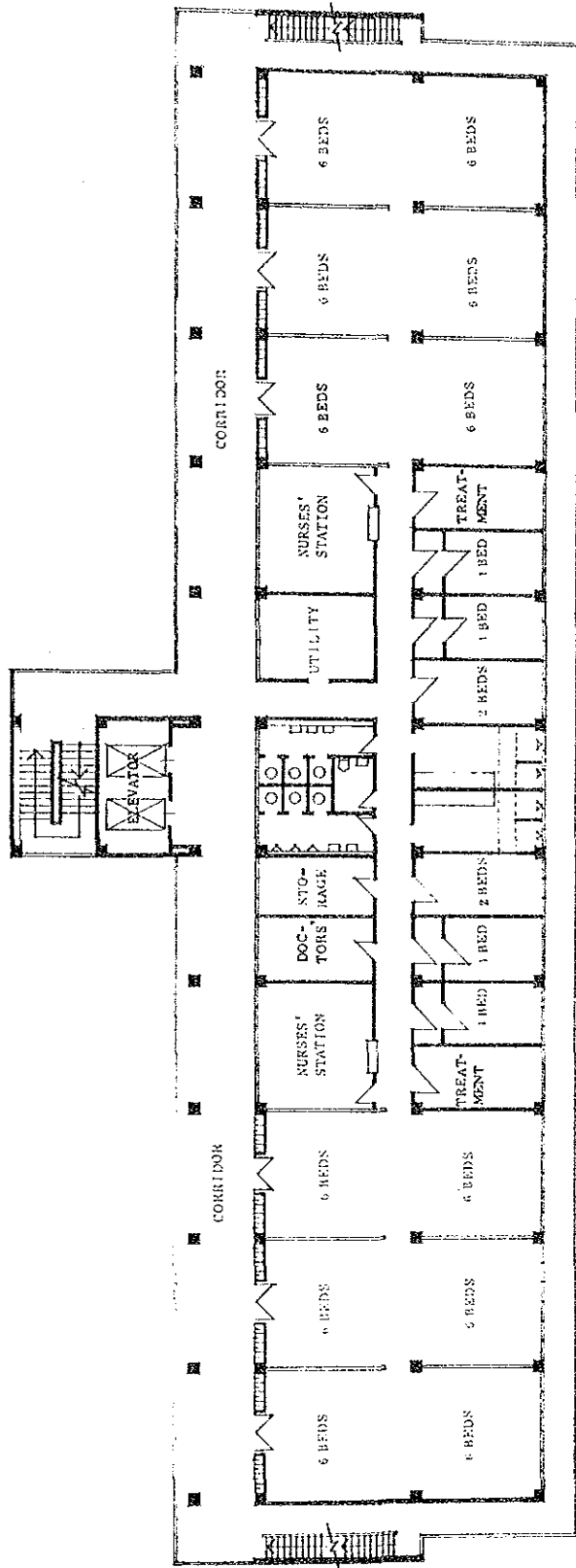


MAIN BUILDING 03



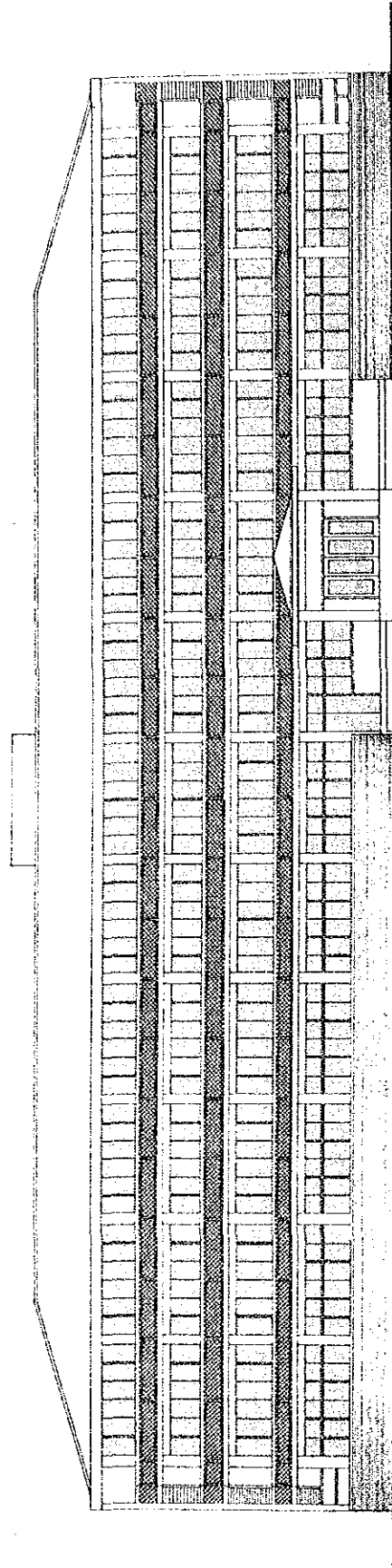
2F PLAN

MAIN BUILDING 04



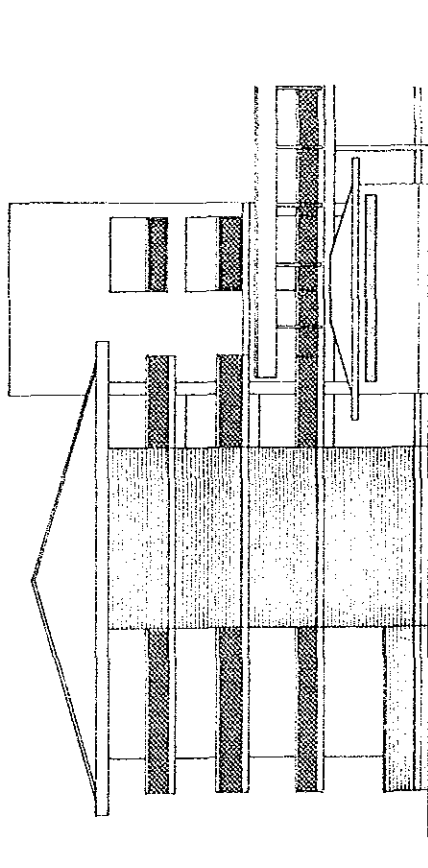
3, 4 F PLAN

MAIN BUILDING 05

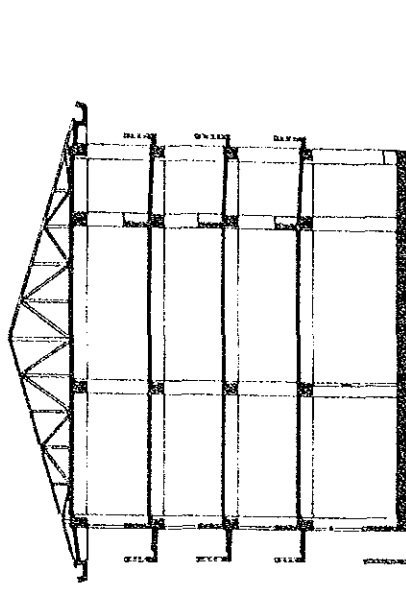


SOUTH ELEVATION

MAIN BUILDING 06

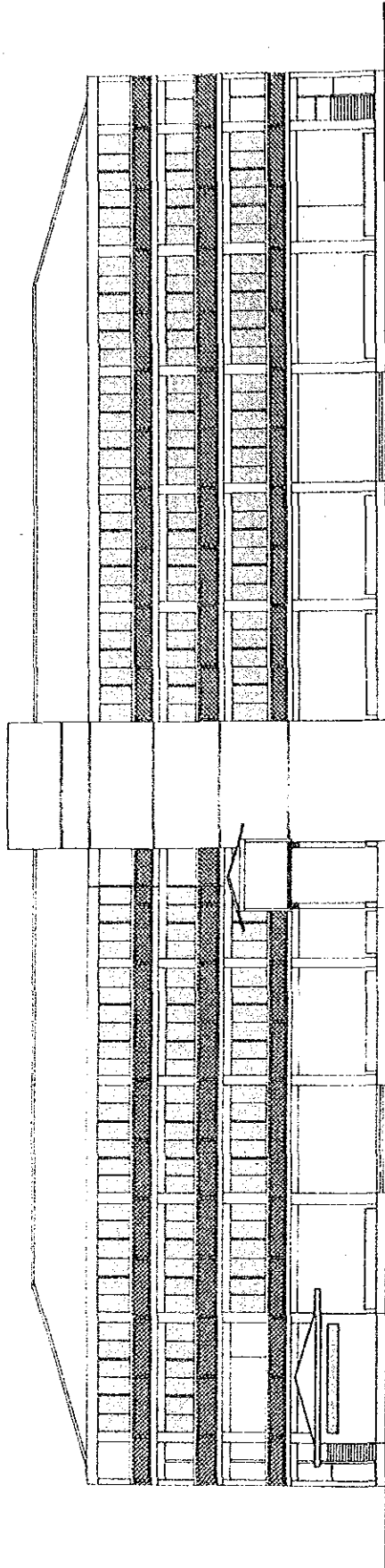


EAST ELEVATION



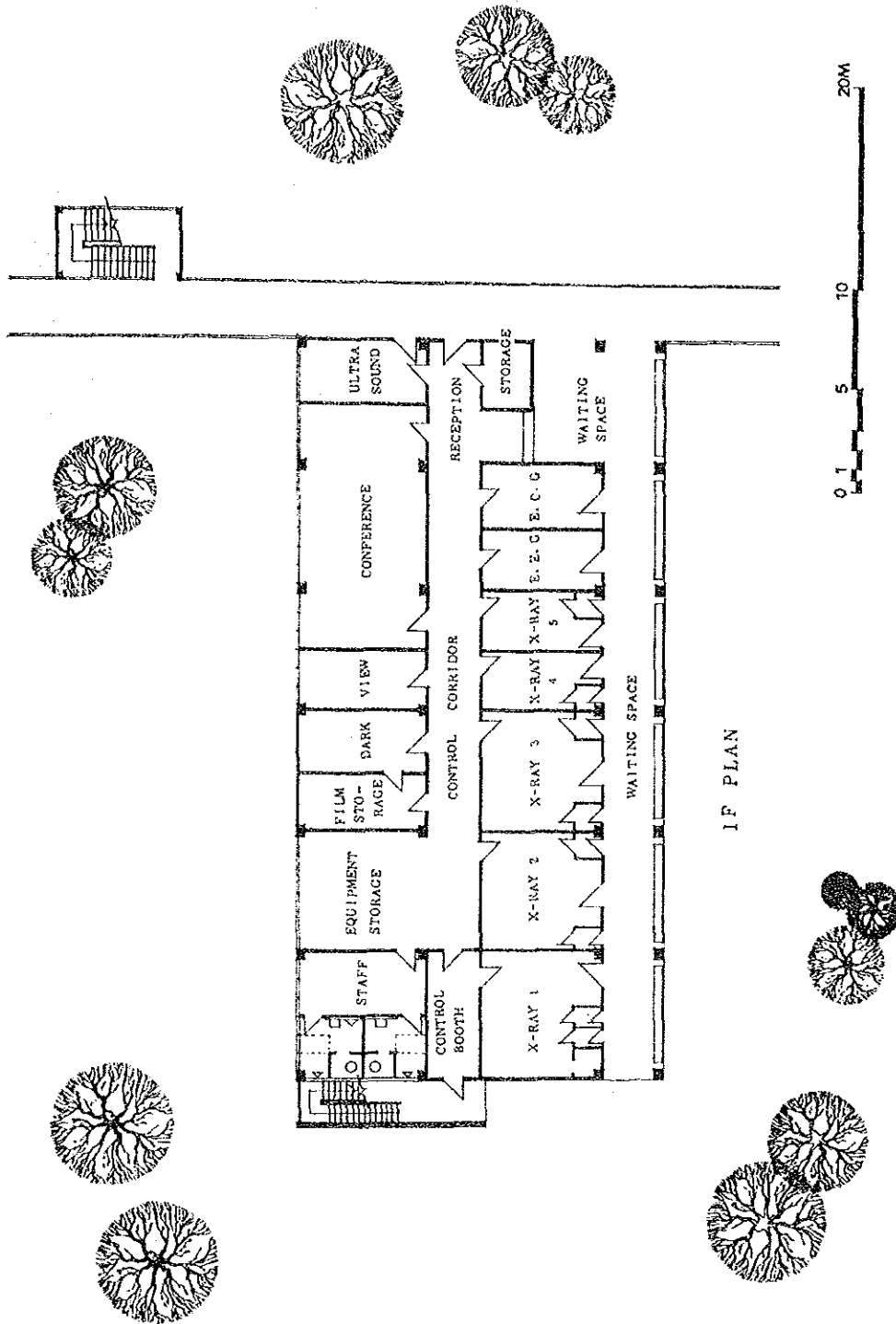
SECTION

MAIN BUILDING 07



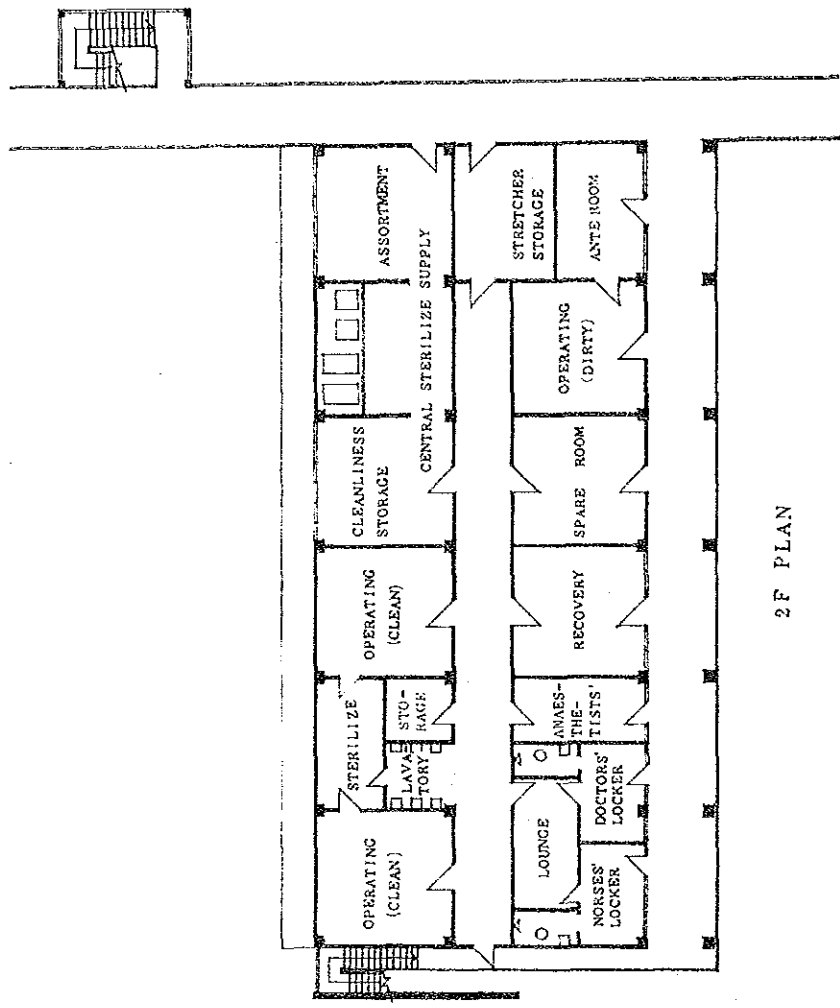
NORTH ELEVATION

MAIN BUILDING 08



IF PLAN

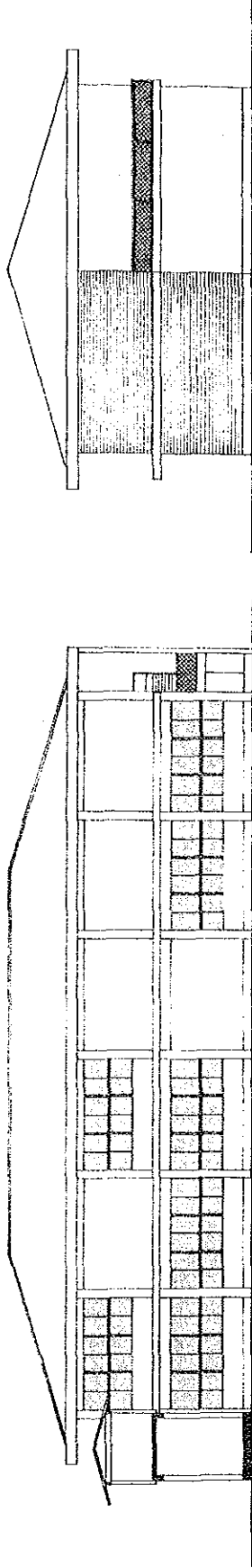
X-RAY, OPERATING 09



2 F PLAN

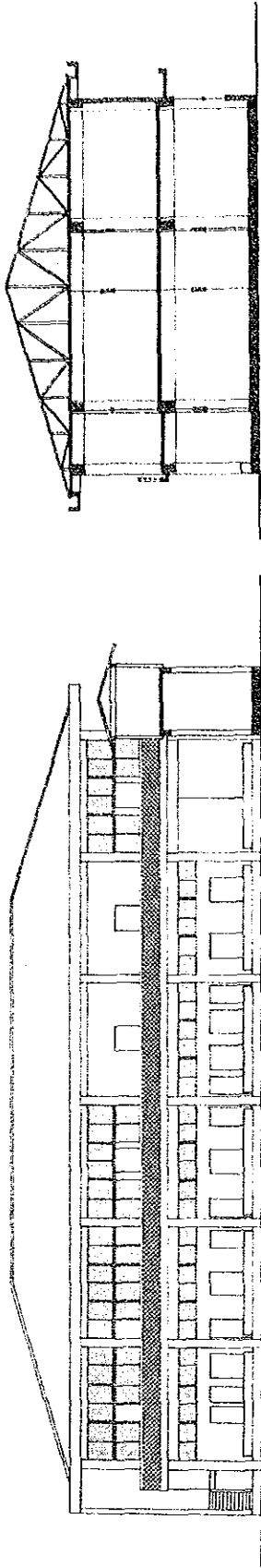


X-RAY, OPERATING 10



NORTH ELEVATION

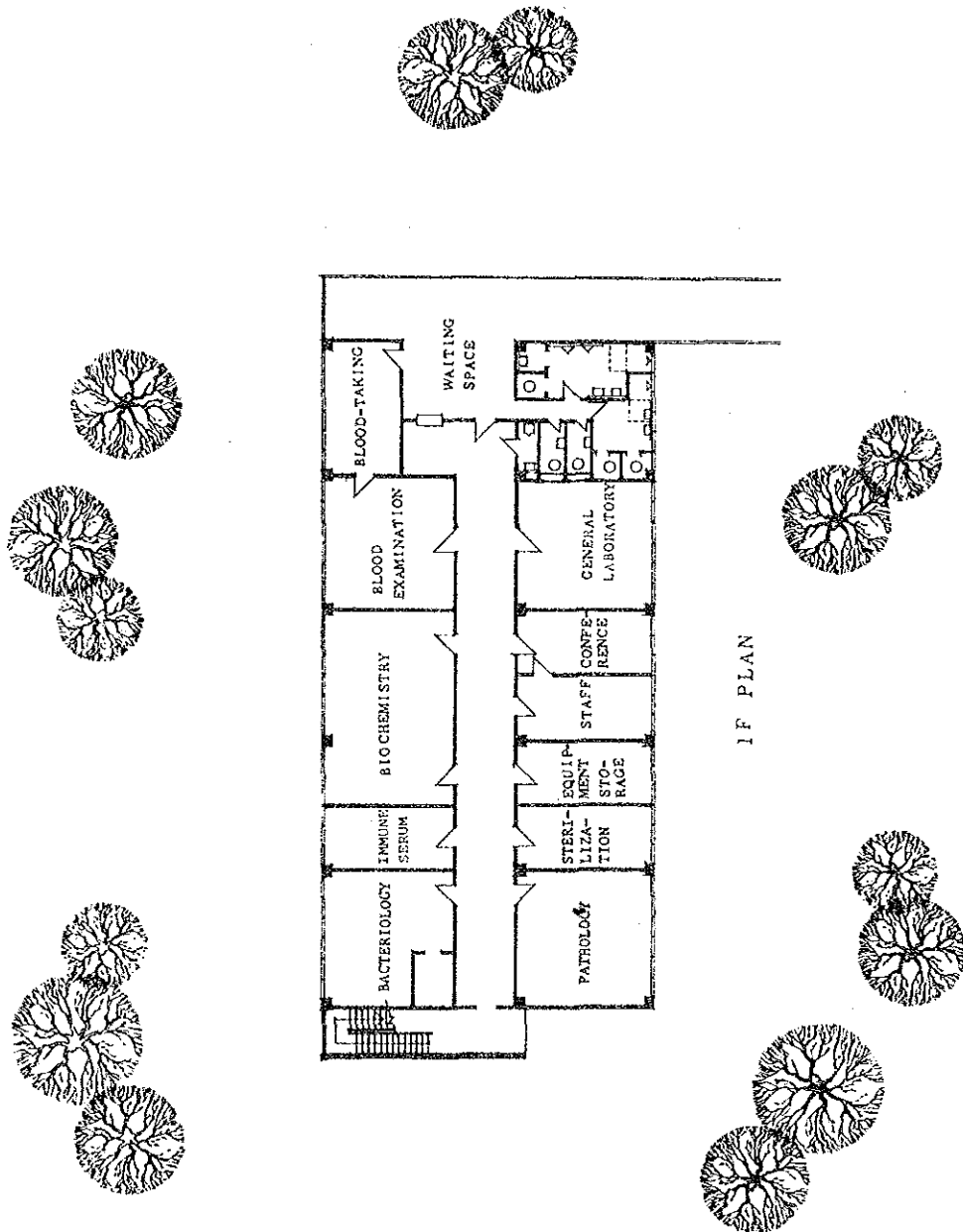
WEST ELEVATION



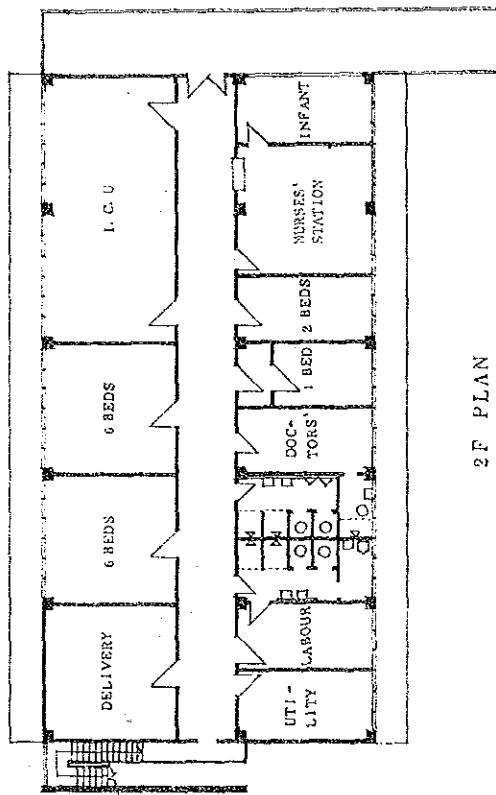
SECTION

SOUTH ELEVATION

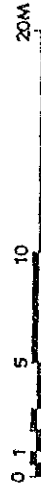
X-RAY, OPERATING 12



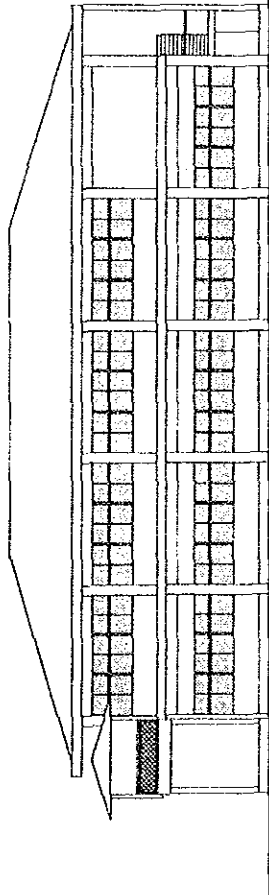
IF PLAN



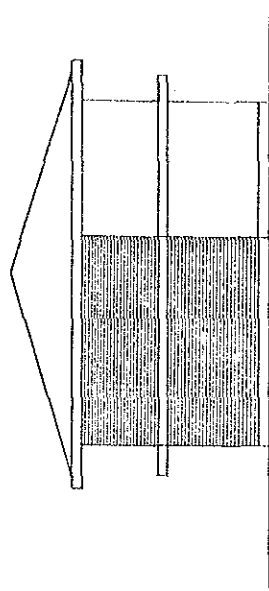
2F PLAN



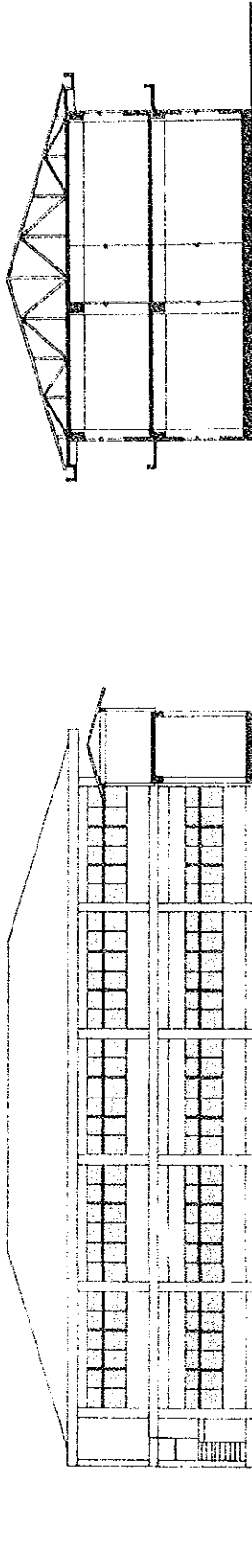
LABORATORY, SPECIAL CARE 14



NORTH ELEVATION



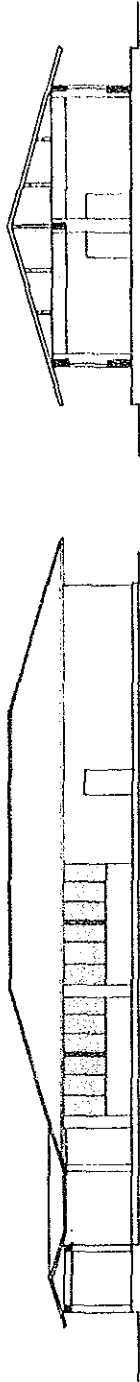
WEST ELEVATION



SECTION

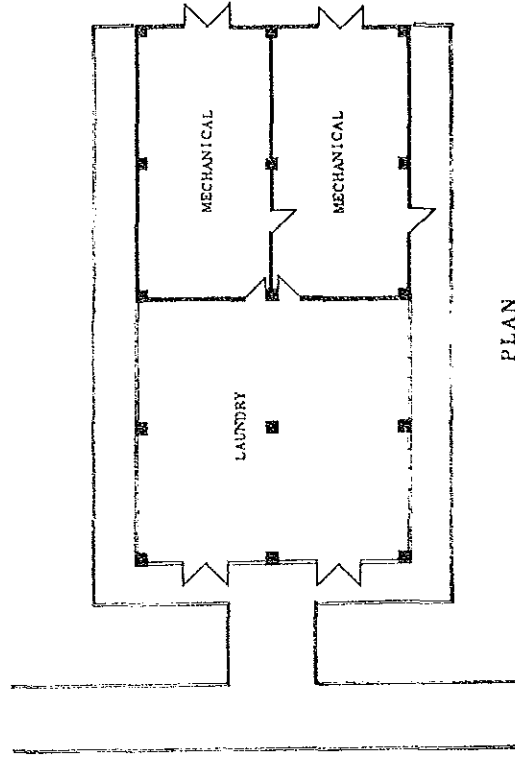
SOUTH ELEVATION

LABORATORY, SPECIAL CARE 16



SECTION

SOUTH ELEVATION



PLAN



SERVICE BUILDING 17

4-2-5 Implementation

(1) Institutions in Charge

The institution in direct charge of implementation is the Department of Health of the Ministry of Health. The Foreign Economic Relations Department of the Ministry of Planning and Finance is in charge of the international aspects of the project, and the Construction Corporation is in charge of the construction work.

(2) Responsibilities

Items requested by the Government of Burma whose cost will be borne by the Government of Japan;

1) Buildings

- * Outpatient Department
- * Ancillary Department
- * Inpatient Unit
- * Administration

2) Equipment to be supplied for the following fields of the medical departments;

- * Dept. of Medicine
- * Dept. of Surgery
- * Dept. of Paediatrics
- * Dept. of Obstetrics and Gynaecology

and some equipment for the Service Department

(Power sub-station, mechanical room, kitchen, laundry, repair shop) Refrigeration equipment and autopsy table for the mortuary.

The Government of Burma will take necessary measures as conditions for grant assistance of the Government of Japan to be extended to the Project:

- a) To provide information necessary for the design and the construction.

- b) To secure land necessary for the construction.
- c) To clear and level the Project Site before the start of the construction, including the removal of existing foundations and obstacles.
- d) To ensure prompt unloading and customs clearance in Burma of imported materials and equipment for the construction, and to facilitate the inland transportation of these.
- e) To exempt Japanese nationals concerned from customs duties, internal taxes and other fiscal levies which may be imposed in Burma on the occasion of the supply of goods and services for construction.
- f) To provide and accord necessary permits, licences and other authorization required for carrying out the Project.

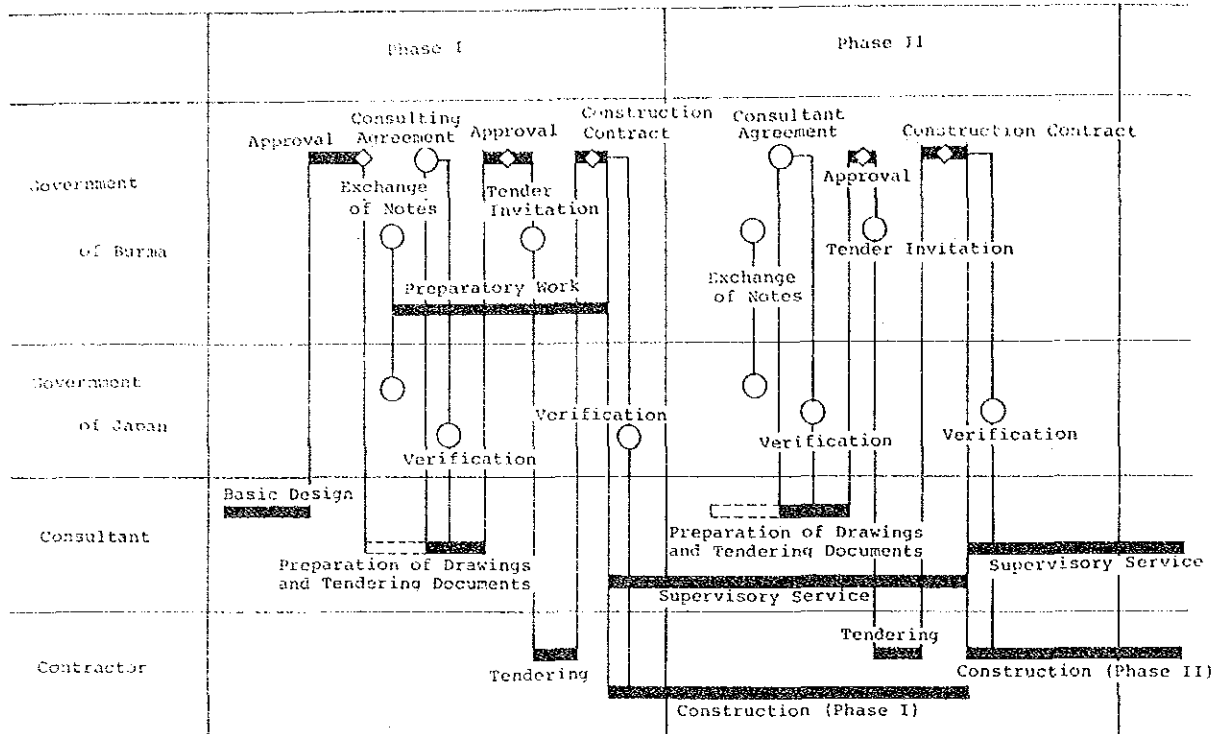
Items whose cost will be borne by the Government of Burma;

- 1) Buildings for the canteen, kitchen, laundry, power substation, repair shop, garage, mortuary, stores and other minor buildings.
- 2) Water supply mains to the Project Site and a deep well.
- 3) External drainage and sewage line from the Project Site.
- 4) Electrical power main line to the Project Site.
- 5) Sewer connection to the main sewage line.
- 6) Telephone lines (external connections).
- 7) Exterior Facilities and Landscaping including pavement and planting.
- 8) Provision of space necessary for such construction as temporary office, working area, stock yards, and others.

9) Furniture including beds (ordinary patient beds other than mechanized and specialized beds).

10) Items 2) and 4) shall be completed prior to the start of work on the site.

(3) Construction Schedule



**CHAPTER 5 PROPOSALS AND CONCLUSIONS
OF THE BASIC DESIGN SURVEY TEAM**

5-1 BENEFITS OF THIS PROJECT

5-2 NECESSARY TECHNICAL AND OTHER COOPERATION

**5-3 PROBLEMS FACING EXECUTION OF THE PROJECT,
AND ANTICIPATORY MEASURES**

5-1 Benefits of This Project

Burma needs to improve its medical services drastically from their present level in order to improve the health of its people across the country. And this project, the construction of just one hospital, cannot by itself go far towards this end. But the project must be as effective as possible, especially since it is so costly.

Thus, although this project constitutes just one addition to the medical facilities already in the vicinity, its purpose is to benefit these neighbouring facilities by supplementing them with facilities that they badly need and, at the same time, to enable the new hospital to be efficiently run as a new addition with modern equipment.

Thus if the proposed hospital is constructed as one with special emphasis on improving diagnostic methods for diseases of the epigastric region, recognizing this as a field in which the nation's medical service is presently particularly inadequate, it will significantly increase the capacity for diagnostic work of the medical facilities of Rangoon as a whole and help relations between the medical facilities in the neighbourhood, especially those between the new hospital and the adjacent Rangoon General Hospital. In so doing, it will contribute much to improving the health of the people of Burma. This improvement of diagnostic methods will lead to the saving of those medicines now being administered excessively. Further, it will serve as a model for modern medical care and also be suitable for medical training.

The proposed hospital would have not only these direct benefits but also the following indirect effects:

- 1) The improvement of methods of diagnosis would greatly help medical education and would be disseminated throughout the country.
- 2) The review of the hospital network it will bring about may lead to a reorganization making the system of diagnosis and referral into a more efficient network.

- 3) If the various measures to keep the hospital compound clean can be implemented successfully and without interruption, they will help to improve the sanitary practices of the general public.
- 4) Since this hospital would not be provided with especially sophisticated medical equipment but rather with equipment as possible and designed to be easily kept in good working order, it could indeed become a model for other hospitals and thereby serve to improve them.

It is believed that if public health in Burma improves through these efforts, this will eventually help to increase the potential of the country as a whole.

5-2 Necessary Technical and Other Cooperation

The following three conditions must be met for the successful operation of this hospital:

1. Autonomy within the Burmese medical services.
2. Proper operation and maintenance.
3. An uninterrupted supply of necessary materials.

Suitable facilities and materials must be provided for this, and the personnel to handle them must be secured. Proper education and training for physicians, nurses and technicians are particularly important.

5-3 Problems in Execution of the Project, and Countermeasures

5-3-1 Actions to be Taken by the Ministry of Health

The Ministry of Health needs to initiate action on the following matters in coordination with other agencies concerned:

- (1) Final decision of the site
- (2) To Demolish the existing structures on the site of the project before the start of construction
- (3) Preparation of the land before the start of construction
- (4) Securing a budget for the total project including the preliminary and construction phases
- (5) Salaries and wages and the cost of heat, light, other expendable supplies and other operating costs shall be assessed and planned for budget appropriation.

5-3-2 Securing Personnel and Their Qualitative Improvement

In order to utilize advanced medical equipment and new techniques most effectively, an all-out effort is needed to train physicians and technical staffs.

5-3-3 Measures Dealing with Problems of Construction Cost

In order to out down the construction costs, the following items shall be fulfilled by the Government of Burma:

- (1) To use both local materials and engineering methods whenever possible.
- (2) To employ local workers at most so as to minimize Japanese skilled workers to be dispatched.
- (3) To procure necessary local materials and labour when they are necessary.

- (4) To provide priority to enable us to mobilize
- a) temporary pipe supports for form work,
 - b) concrete batcher plant, and
 - c) truck cranes,
- which were already brought in from Japan in the previous projects.
- (5) To provide priority to utilize deformed bars supplied by Japanese grant assistance.
- (6) In connection with item 5), to provide deformed bars by the Government of Burma.
- (7) To authorize re-export of the construction equipment brought into Burma for this Project after completion of the Project.
- (8) To authorize necessary arrangements for the procurement of materials from third countries.

We firmly believe that this hospital will play an important role in promoting the improvement of medicine and be kept clean, indoors and outdoors, and run smoothly as expected in general.

JICA