

BASIC DESIGN STUDY  
ON  
CONSTRUCTION PROJECT  
OF  
GENERAL HOSPITAL  
IN NARAYANGANJ  
THE PEOPLE'S REPUBLIC OF BANGLADESH

APRIL, 1983

JAPAN INTERNATIONAL COOPERATION AGENCY

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## PREFACE

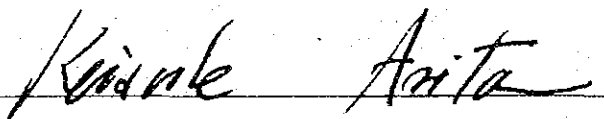
In response to the request of the Government of the People's Republic of Bangladesh, the Government of Japan decided to conduct a survey on Construction Project of General Hospital in Narayanganj and entrusted the survey to the Japan International Cooperation Agency. The J.I.C.A. sent to Bangladesh a survey team headed by Dr. Takashi Shimoyama, Professor of Hyogo College of Medicine, from October 28 to November 20, 1982.

The team had discussions with the officials concerned of the Government of Bangladesh and conducted a field survey in Narayanganj area. 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 Government of the People's Republic of Bangladesh for their close cooperation extended to the team.

April, 1983

A handwritten signature in black ink, reading "Keisuke Arita", is written over a horizontal line.

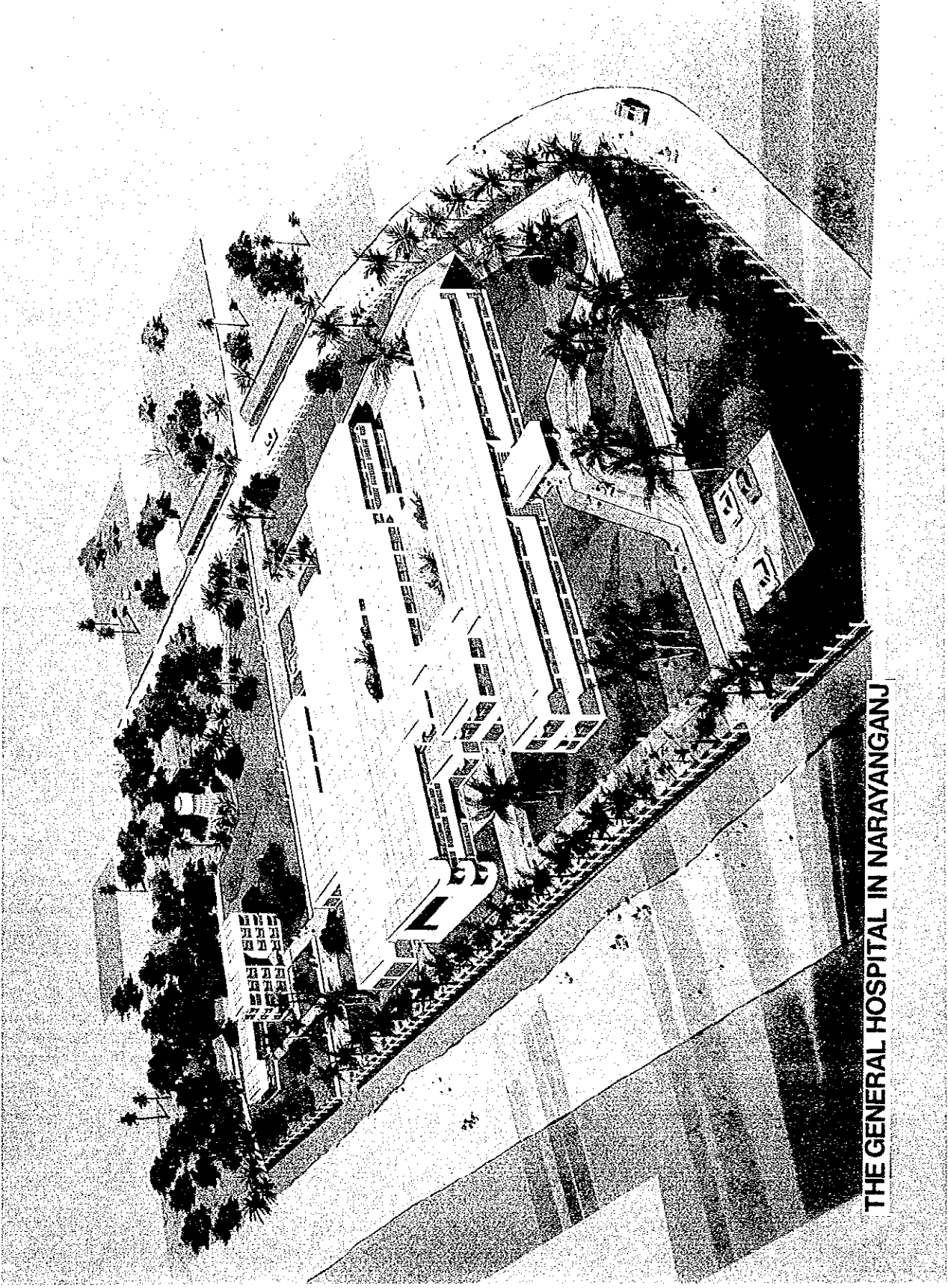
Keisuke Arita

President

Japan International Cooperation Agency





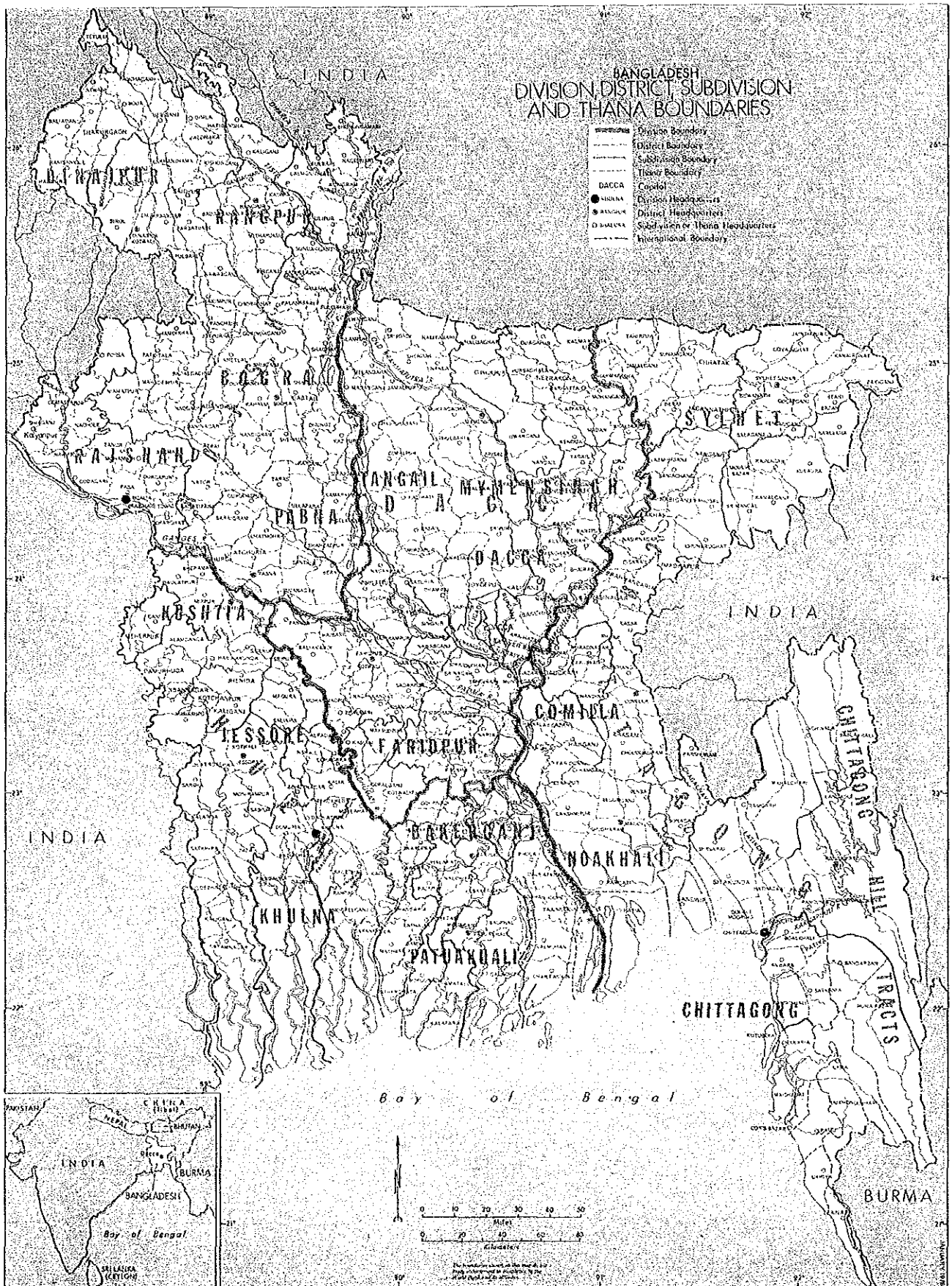


THE GENERAL HOSPITAL IN NARAYANGANJ

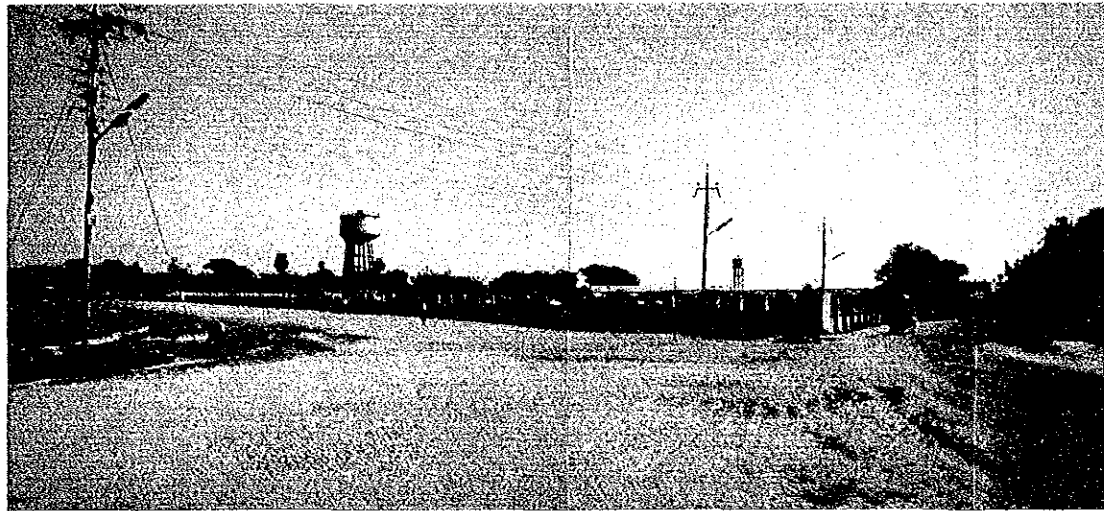


BANGLADESH  
DIVISION, DISTRICT, SUBDIVISION  
AND THANA BOUNDARIES

- Division Boundary
- District Boundary
- Subdivision Boundary
- Thana Boundary
- Dacca
- Capital
- District Headquarters
- Subdivision or Thana Headquarters
- International Boundary



MAP



**PROPOSED SITE**



## SUMMARY

The Bangladesh Government has drawn up a specific plan to improve the obsolete medical infrastructure in Bangladesh and is promoting it as an important national policy. Study on the hospital construction project based on grant aid cooperation by the Japanese Government, in response to a request from the Bangladesh Government, was started in 1981. At the Annual Meeting of Economic and Technical Cooperation in May 1982, it was suggested that the hospital would have 200 beds, and after a meeting with the Preliminary Basic Design Study Team which was dispatched in September, 1982 the site location was studied and finally Narayanganj in Dhaka district was selected by the Bangladesh Government. Moreover, on the basis of these results, the Basic Design Study Team has been dispatched recently, investigation and meeting for concrete details of the proposed hospital were held, and its outline was consented mutually.

Medical system in the country constitutes roughly a four-tier pyramidal form by towns and villages, district, division and nation, classified by administrative organization. The proposed Narayanganj district comprises high density of population of 1,300,000 inhabitants. Because of deterioration of the existing Sub-Divisional hospital, the proposed construction will be a substitute hospital.

### • Details of facilities -

Diagnostic departments: Medicine (include skin and venereal), surgery, obstetrics and gynecology, pediatrics, ENT, ophthalmology, dental surgery and physical therapy departments.

Other departments: X-ray test, physiological test, endoscopic test, clinical test, central operation, delivery and emergency departments.

Number of beds: 200 beds

• Scale of buildings -

Reinforced concrete structure, 2-storied.

Floor area approx. 8,823 m<sup>2</sup>

Hospital, 8,057 m<sup>2</sup>

Dormitory, 766 m<sup>2</sup>

Operation and maintenance of the proposed hospital will be managed by Bangladesh side, and operational expenses will be estimated annually as 8,316,000 taka.

Budget for 82/83 fiscal year of Ministry of Health and Population Control (MOH & PC) appropriated 758,000,000 taka, and out of the budget approx. 340,000,000 taka will be allocated annually for maintenance and control of the hospital. Ratio of maintenance cost to the budget will be 2.4%.

As regards construction materials and construction process of the project, reduction of construction cost and conformance to national economic policy are considered, thus local procurement is to be given priority.

Construction term will be 21 months in total over 3 fiscal years taking into consideration of rainy season (June to October) and special situation of the country.

Indispensability of proposed hospital is as related above, since main hospitals in Dhaka district originally were not constructed as hospital and medical function would be disturbed by extending such facilities. With facilities which comply with principles of hospital architecture on such location and maintain clean environment, and implanting of order and hygienic concepts among residents, far-reaching effects are anticipated on local health care. Therefore, grant aid by the Japanese Government will be considered to have sufficient validity.

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# CHAPTER 1

## INTRODUCTION



## 1-1 INTRODUCTION

The Bangladesh Government sounded out the possibility of receiving grant aid cooperation from the Japanese Government in 1981, for construction of a 550 beds general hospital to be linked with Specialized-cum-General Hospital at Sher-e-Banglanagar district in Dhaka City. Subsequently, as a result of discussions between both countries, basic consensus was reached for construction of a general hospital with capacity of 200 beds. Accordingly a preliminary study was carried out for the project, following which the Government of Bangladesh made a request for construction of a 200 beds general hospital as reconstruction and removal project for existing Sub-Divisional Hospital in Narayanganj.

Based on these requests, the Japanese Government dispatched the Basic Design Study Team through Japan International Cooperation Agency; i.e., studies were planned on confirmation of required details by Bangladesh side, and analysis of validity, necessary functions as secondary health care and its scale, site survey, situations of infrastructure and construction conditions were also investigated.

Besides, collection and analysis of data on implementation method and budget allocation for the project were achieved and site investigation for basic design were carried out from October 28 to November 20 in 1982, aiming to compile a useful survey report for basic design on implementation of Japanese grant aid cooperation.

Principal items of survey and discussions are as follows.

- (1) Confirmation of required details by the Bangladesh Government.
- (2) Survey of medical situations around Dhaka.
- (3) Survey of proposed site.
- (4) Discussions concerning the details and the scale of hospital, and programmes of medical equipment.
- (5) Survey of local construction conditions.

- (6) • Explanation concerning the system of the Japanese grant aid programme.
  - The scope of work to be shared by both Governments.
  - Discussions over the provisions of the budget and the system of maintenance and management followed by the Government of Bangladesh regarding this project.
- (7) Survey of similar facilities.

As a result, as regards the basic items of agreement, Minutes of Discussions were drawn up on November 5, 1982, and signed by both a representative of the Bangladesh Government and the survey team.

Refer to Appendix-1, -2 for members of survey team and daily schedule of survey work.

Refer to Appendix-3 for full text of Minutes.

Summaries of principal survey and items discussed for basic design are as follows.

- (1) In accordance with preliminary survey results which indicate outline of the project regarding general hospital construction programme and standard papers for 200 beds hospital project which were prepared by the Bangladesh Government, discussions were held on the basic concepts.
- (2) Although the area of the proposed construction site is almost flat, it is reclaimed land from a pond and backfilled soil is inferior in quality; hence, forms for foundation of buildings are planned to be pile foundation.
- (3) Based on results of discussions, the survey team have prepared outlined programme for layout, floor plan and medical equipment arrangement, and presented them for further discussion.

Consequently, hospital facilities are proposed as 2-story building (partially single-storied), comprised of 4 blocks by rough classification, i.e., outpatient diagnosis, central diagnosis, general ward and isolation ward respectively.

- (4) As regards enforcement of construction project for general hospital, the survey team have explained the planning and procedure of Japanese grant aid cooperation and construction schedules to the Bangladesh Government, and defined the scope of work to be shared by both Governments. Discussions were further held regarding administration, maintenance, management and the provision of a budget for the facilities after completion of construction.
- (5) The survey team carried out various investigations on such aspects as construction materials, building cost, labour situation and transport condition etc., as well as collection of data and information.
- (6) Concerning infrastructures of proposed site; electricity and gas are considered possible to be supplied, but as to water supply, it is not considered likely that the entire required volume of the hospital can be met, therefore deep tube well must be sunk.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial reporting and auditing. The text notes that incomplete or inaccurate records can lead to significant errors and potential legal consequences.

2. The second part of the document outlines the various methods and tools used for data collection and analysis. It mentions the use of spreadsheets, databases, and specialized software to manage large volumes of information. The importance of data integrity and security is highlighted, as well as the need for regular backups and access controls.

3. The third part of the document focuses on the process of data validation and quality control. It describes how to identify and correct errors, such as missing values, duplicates, and inconsistencies. The text stresses that high-quality data is crucial for making reliable decisions and generating accurate reports.

4. The fourth part of the document discusses the role of data in decision-making and strategic planning. It explains how data analysis can provide valuable insights into trends, patterns, and opportunities. The text encourages organizations to leverage data to optimize operations, improve customer service, and drive growth.

5. The fifth part of the document addresses the challenges and risks associated with data management. It identifies common issues such as data silos, integration problems, and security vulnerabilities. The text offers practical advice on how to mitigate these risks and ensure a robust data management strategy.

6. The sixth part of the document concludes by summarizing the key points and emphasizing the ongoing nature of data management. It encourages organizations to stay up-to-date with the latest technologies and best practices to maintain a competitive edge in the digital age.

## CHAPTER 2

# BACKGROUND OF THE PROJECT

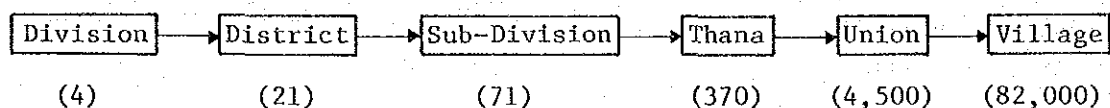




## 2-1 RECENT SITUATION OF MEDICAL SERVICES

Regardless of the stage of development or advancement of a nation, systematization of medical service is indispensable. In Bangladesh, aiming at the completion of an overall health care organization network including preventive medicine with priority on rural medicine, a five year plan has been drawn up and is being implemented now, while a second five year plan is now been drafted. Health care system in Bangladesh is classified in conformity with the administrative organization.

Present administrative organization and numbers are as follows.



In accordance with this system, health care systems are classified as following,

- i) Primary health care controls from Village to Thana level.
- ii) Secondary health care controls from Sub-Division to District.
- iii) Tertiary health care controls Division or National level.

and further specialized health care exists as entrusted facilities from medical universities or from other hospitals. (Refer to Fig.-1 and Fig.-2)

Primary health care includes approx. 1 Family Welfare Centre per extremely narrow domicile unit, and approx. 1 Thana Health Complex (THC) per 200,000 inhabitants.

THC facilities providing 6 beds for birth control treatment and 25 beds for general use, i.e., 31 beds in total and operated by 5 staff with examination and X-ray facilities. Secondary health care comprises District hospital of 100 beds standard and Sub-Divisional hospital of 50 beds standard. These hospitals include medicine, surgery, gynecology,

ophthalmic departments and pathologic examination, transfusion department and preventive health examination section.

Tertiary health care comprises local university hospital or intern training hospital on national level.

These hospitals provide more advanced treatment with 250 to 500 beds providing wide-ranging diagnostic departments with complete testing functions.

In specialized health care, special diagnostic units such as heart, kidney, neurology etc. belong to university or training hospital and mental, tuberculosis, orthopedics, pediatrics and ophthalmic departments are in certain other hospitals. Establishment of cancer center is also scheduled.

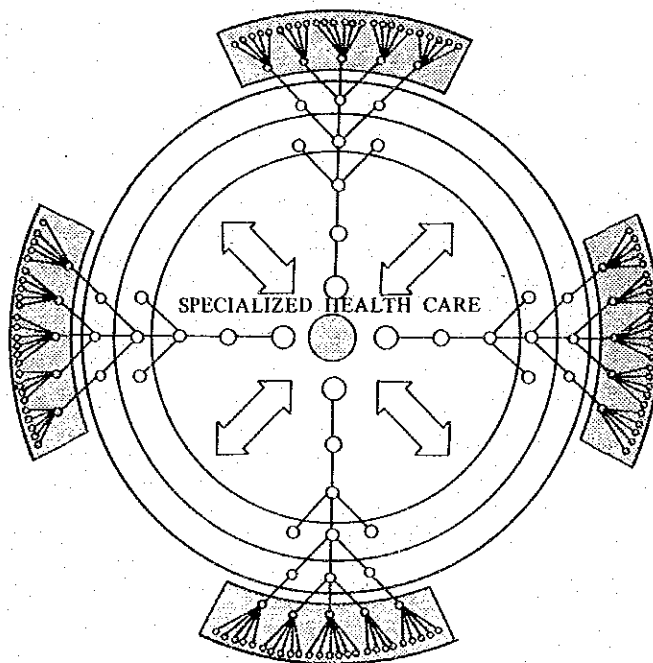


Fig.-1 MEDICAL COMPOSITION DIAGRAM IN BANGLADESH - 1

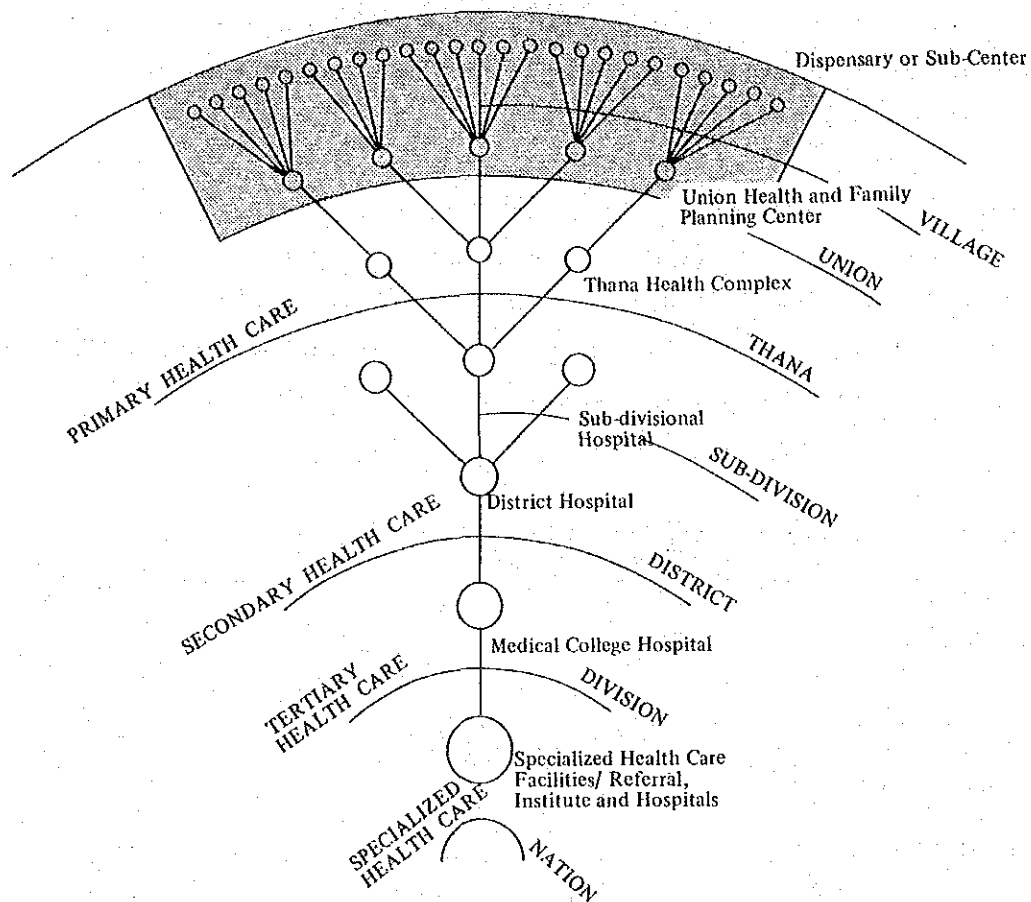


Fig.-2 MEDICAL COMPOSITION DIAGRAM IN BANGLADESH - 2

The foregoing chapters are the outline of the medical system in Bangladesh, and a diagram of the medical structure in Dhaka district is shown in Fig.-3 and number of hospitals and clinics in each district are indicated in Table-1.

The above medical system was set up in the first five year plan from 1973 and is still being implemented. However, the implementation rate is extremely low resulting in only 63% of the targeted beds during the 7 years up to 1980. (Refer to Table-2) Target number of facilities and beds in the second five year plan are shown in Table-3, with population per bed being approx. 5,500 in 1980. Even when the target is attained in 1985, the number will still be 3,900; compared with approx. 100 in Japan, shortage of medical facilities in the country is severe. Data for human resources in medicare are shown in Table-4, and population per doctor is 8,400 (800 in Japan), and the number per nurse is 50,000 (300 in Japan).

In terms of number of beds, it is 1.4 beds (9 in Japan) per doctor and 9 beds (3 in Japan) per nurse. There are a great shortage of human resources per population.

Especially, the reason for the small number of nurses originates the fact that there is no tradition of females working, because 80% of population are muslims. In addition, in view of the fact that number of beds per doctor is 1.4, the lack of facilities is deeply felt, and our study team observed acute overcrowding with 500 to 700 outpatients accomodated in a hospital with only 125 beds.

Health care expenses are free at public facilities, but in case expenses were to be charged, 80% of patients would become unable to receive any medical treatment because of their poverty.

At some private hospitals, charges for hospitalization are as much as 50 taka to 500 taka per day.

Following list levels number of doctors, beds and hospitals per population of other countries in 1977 with comparison to those in Bangladesh. (Refer to Table-5)

Fig.-3 MEDICAL STRUCTURE IN DHAKA

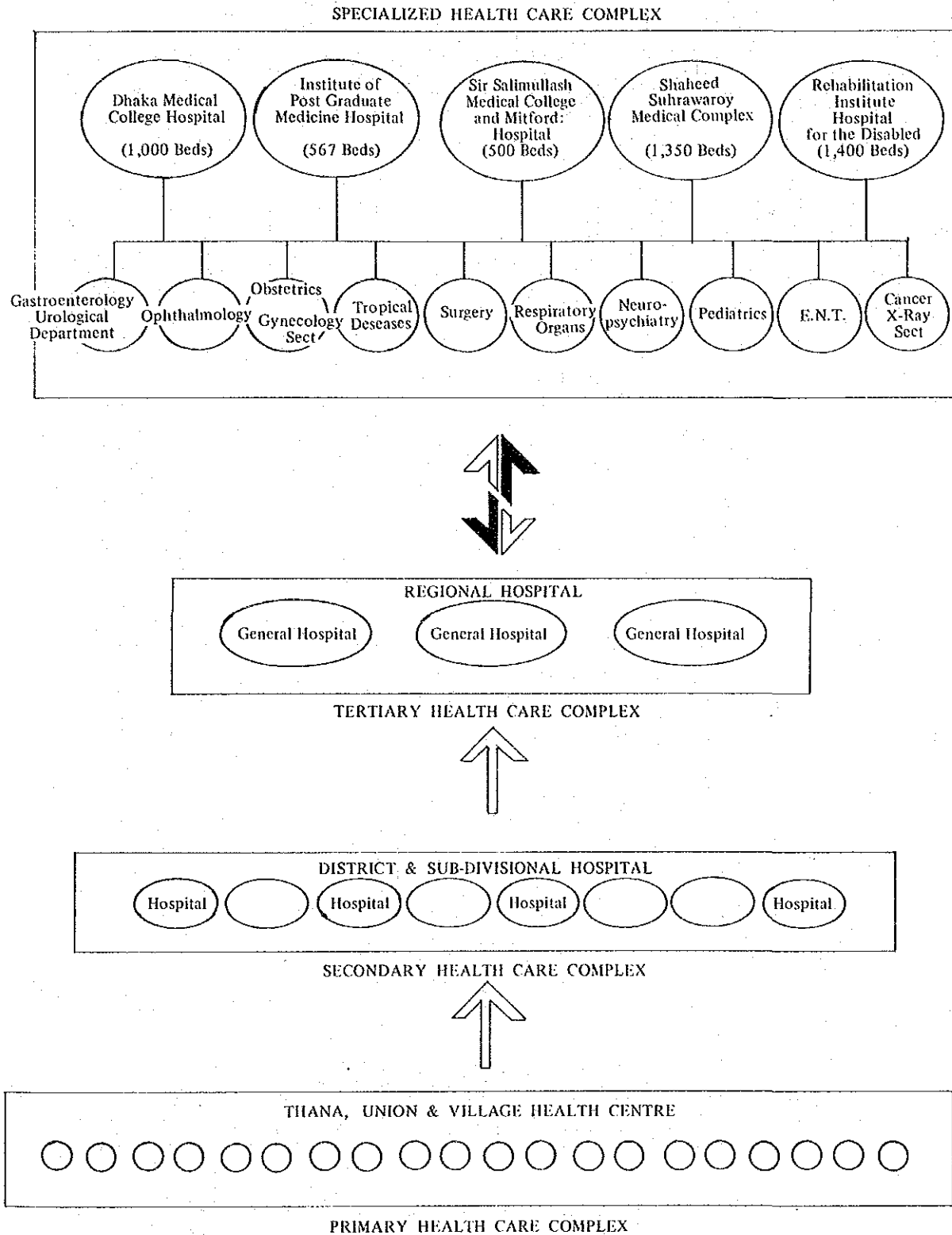


Table-1 HOSPITALS (WITH BEDS) AND DISPENSARIES UNDER MOH & PC (HEALTH DIVISION) BY DISTRICT

District	Population 1,000	Medical College Hosp.		District Hosp.		Sub-Div. Hosp.		THC Hosp. & Rural Hosp.		Other Hosp.		Total Hosp.		Dispensaries/Clinics				Total Static Health Care Facilities	
		No	Bed	No	Bed	No	Bed	No	Bed	No	Bed	No	Bed	Thana Disp. (TD)	HSC/ UHC/ RD/UC etc.	School Health Center	T.B Control Center		
1. Dinajpur	3,299	-	-	1	100	1	50	12	120	-	-	14	270	8	64	1	2	75	89
2. Rangpur	6,698	1	650	-	-	3	150	17	208	3	90	24	1,098	10	122	2	3	137	161
3. Bogra	2,803	-	-	1	100	-	-	10	131	1	20	12	251	2	51	1	1	55	67
4. Rajshahi	5,430	1	650	-	-	3	150	16	124	2	170	22	1,094	13	95	1	3	112	134
5. Pabna	3,529	-	-	1	100	1	100	11	105	2	420	15	725	5	36	1	2	44	59
6. Kushtia	2,346	-	-	1	100	2	100	8	106	-	-	11	306	-	46	1	3	50	61
7. Jessore	4,145	-	-	1	100	3	120	14	434	1	20	19	674	3	48	1	2	54	73
8. Khulna	4,507	-	-	1	148	2	100	14	170	3	140	20	558	6	42	1	3	52	72
9. Patuakhali	1,897	-	-	1	100	1	30	7	101	-	-	9	231	-	16	-	1	17	26
10. Barisal	4,815	1	520	-	-	3	130	24	354	1	20	29	1,024	2	48	1	3	54	83
11. Faridpur	4,917	-	-	1	100	3	150	18	269	1	20	23	539	5	100	1	3	109	132
12. Dhaka	10,459	2	1,470	-	-	4	275	21	651	8	1,499	35	3,895	25	118	4	3	150	185
13. Tangail	2,520	-	-	1	100	-	-	6	100	-	-	7	200	6	50	1	1	58	65
14. Jamalpur	2,522	-	-	1	50	-	-	7	139	-	-	8	189	5	35	-	1	41	49
15. Mymensingh	6,749	1	646	-	-	2	100	21	220	-	-	24	966	7	86	1	2	96	120
16. Sylhet	5,825	1	500	-	-	3	150	17	506	3	156	24	1,312	12	45	1	3	61	85
17. Comilla	7,095	-	-	1	110	2	100	19	505	1	20	23	735	10	85	1	3	99	122
18. Noakhali	3,932	-	-	1	160	1	50	13	244	1	20	16	474	3	56	2	2	63	79
19. Chittagong	5,683	1	854	-	-	1	50	19	212	3	140	24	1,246	18	82	3	2	105	129
20. Ctg. H. T.	770	-	-	1	100	2	100	6	165	-	-	9	365	3	20	1	1	25	54
<b>Total</b>	<b>89,941</b>	<b>8</b>	<b>5,290</b>	<b>13</b>	<b>1,368</b>	<b>37</b>	<b>1,905</b>	<b>280</b>	<b>4,864</b>	<b>30</b>	<b>2,735</b>	<b>368</b>	<b>16,162</b>	<b>143</b>	<b>1,245</b>	<b>25</b>	<b>44</b>	<b>1,457</b>	<b>1,825</b>

(Source: Ministry of Health & Population Control)

**Table-2 HOSPITAL BEDS: TARGETS AND ACHIEVEMENTS OF THE FIRST FIVE YEAR PLAN AND THE TWO YEAR PLAN**

Sl. No.	Category of hospital	Bench mark 1972-73	Plan Target	Achievement (as of June 1978)	Position June 1980 (Expected)	Achievement in percentage
1	Thana Health Complexes	900	11,036	2,400	3,800	34
2	Sub-divisional hospitals	1,086	3,800	1,845	2,200	58
3	District hospital	1,118	1,465	1,208	1,558	106
4	Teaching hospital (excluding T.B. Beds)	3,670	5,000	5,015	5,200	104
5	Specialised Hospital					
	(a) T.B. & Chest	966	1,200	1,030	1,030	86
	(b) Leprosy	60	120	130	130	108
	(c) Infectious	180	500	180	180	36
	(d) Mental	400	600	430	430	72
	(e) Dental			20	20	
	(f) Cancer		100	40	40	40
	(g) Children		400	250	300	75
	(h) Casualty		150	150	150	100
	(i) Orthopaedic			275	325	
	(j) Cardiovascular				100	
	(k) Eye				30	
<b>Total (1-5)</b>		<b>8,380</b>	<b>24,371</b>	<b>12,973</b>	<b>15,483</b>	<b>63</b>

(Source: The Second Five Year Plan 1980-85)



**Table-3 HOSPITALS AND CLINICS - TARGETS FOR PHYSICAL FACILITIES  
AND BEDS BY 1985**

Sl. No.	Category of Hospital	Physical structure		Beds	
		Position by 1980	Position by 1985	Position by 1980	Position by 1985
<b>Hospitals and Clinics:</b>					
(a)	Teaching hospital	11	18	5,200	6,700
(b)	Sadar hospital	13	14	1,550	1,875
(c)	Sub-divisional hospital	35	42	2,200	2,825
(d)	Specialised hospital				
1)	T.B. Control	5+(8 Seg- regation)	6+(7 Seg- regation)	1,030	1,546
2)	Leprosy	3	3	130	130
3)	Mental	1	1	430	430
4)	Children	2	4	300	500
5)	Cancer		1	40	140
6)	Eye	1	1	30	100
7)	Orthopaedic	1	1	325	325
8)	T.B. Clinics	44	54		
9)	Cardiovascular	1	1	100	100
10)	Infectious diseases	5	5	180	180
11)	Dental	1	4	20	20
12)	Homeopathic system of medicine		4		100
13)	Indigenous system of medicine	1	5		100
14)	Casualty	1	1	150	150
(e)	Thana Health Complex	290	356	3,800	11,036
(f)	Family Welfare Centre	1,773	4,500		
<b>Total</b>				<b>15,485</b>	<b>26,257</b>

(Source: The Second Five Year Plan 1980 - 85)

**Table-4 MANPOWER DEVELOPMENT: TARGETS AND ACHIEVEMENTS OF THE FIRST FIVE YEAR PLAN AND TWO YEAR PLAN TARGETS SET FOR 1985**

Serial No.	Category	Benchmark 1972-1973	Target 1980	Achievement by June 1978	Expected position in June 1980	Percentage of Col. 6 against 4	Target for 1985
1	2	3	4	5	6	7	8
1.	Graduate Doctor	7,000	11,268	9,600	11,000 (1:8,400) Population	98	17,000 (1:6,300) Population
2.	Post-Graduate Doctor	259	672	560	631	98	1,580 (Details in next page)
3.	Dental Graduate	310	470	407	457	97	582
4.	Basic Nurse	700	3,982	1,800	1,500	38	4,184
5.	Post-basic Nurse		290	190	280	97	540
6.	Junior Nurse						4,080
7.	Nursing Attendant	1,200		1,200	1,200		1,200
8.	Medical Assistant		600	192	450	75	5,500
9.	Medical Technologist (Laboratory)						40
10.	Medical Technologist (Equipment)						40
11.	Occupational Physiotherapist						40
12.	Sanitary Inspector	980	1,223	1,125	1,210	99	1,600
13.	Health Inspector			1,192	1,192		No increase is envisaged in view of integration
14.	Assistant Health Inspector			3,475	3,475		
15.	Pharmacists/Compounder	1,500	2,333	2,050	2,300	99	6,300
16.	Laboratory Technicians	270	760	660	740	97	1,630
17.	Radiographer/X-Ray	130	225	160	190	84	555
18.	Radiotherapy Technicians	10	260	68	68	26	128
19.	Physiotherapy Technicians	20	75	70	45	60	100
20.	Blood Bank Technicians	20	67	38	40	60	300
21.	Dental Technicians	20	130	58	80	61	500
22.	General Health Workers		20,300	11,000	13,500	67	No increase is envisaged in view of proposed integration
23.	Paill-Chikiuhox		5,000		5,000	100	65,000

(Source: The Second Five Year Plan 1980 - 85)

Table-5 WORLD MEDICAL SITUATION

Name of Country	Doctors*	Beds*	Hospitals*
AFRICA			
LIBYA	111.3	510.2	2.28
EGYPT	91.6	203.9	4.00
SUDAN	11.5	99.9	0.88
ZAIRE	6.2	284.0	15.80
UGANDA	3.6	148.0	3.40
CENTRAL AFRICA	3.5	99.4	2.00
CHAD	2.4	84.7	0.78
ETHIOPIA	1.4	30.2	0.29
ASIA			
JAPAN	118.3	1,070.0	7.50
KOREA	47.9	145.0	15.20
CHINA	38.4	199.0	6.90
INDIA	27.4	72.8	0.94
BANGLADESH	11.9	18.0	0.68
EUROPE			
WEST GERMANY	204.0	1,177.5	5.60
SWITZERLAND	201.0	1,144.9	7.50
EAST GERMANY	189.5	1,065.0	3.40
SPAIN	179.6	534.8	3.50
SWEDEN	177.5	1,490.0	8.70
FRANCE	163.2	1,055.0	6.70
ENGLAND	151.7	785.4	4.60

\* Number per 100,000 population

(Source: WHO Annual Report, 1980, but values are as of 1977)

## 2-2 COMPOSITION OF DISEASES

The health problems of Bangladesh are due mainly to the inferior levels of nutrition and social economy. They are related and interact with each other, and moreover, the rapid population increase and high illiteracy rate are further worsening the situation and causing confusion.

Malnutrition and infectious diseases occupy a high rate etiologically, and especially infectious diseases originate from insanitary environmental conditions and lack of personal hygiene. The following table shows investigation results relating to 1,002 inpatients at 150 THC and to 1,198 outpatients as examples in 1976.

Table-6 COMPOSITION OF DISEASE

Group Cause	Percentage of 1002 patients	
(i) Attempted suicide, homicidal injuries, injuries purposely inflicted by others; other accidents, burns, fractures; road transport accidents	20.76	
(ii) Anaemias; Protein-Caloric malnutrition, kwashiorkor, marasmus; avitaminosis and other nutritional disorders	12.47	
(iii) Dyspepsia, gastritis, epigastric pain, peptic ulcer	11.18	
(iv) Intestinal worms; dysentery, enteritis and other diarrhoeal diseases; typhoid, paratyphoid fever	10.48	
The above four group-causes constitute about 55% of the 1,002 patients.		
Leading Group/Single Causes having more or less common causation	No. of cases 1st & 2nd visits	% of total (1198)
(i) Intestinal worms; diarrhoea, enteritis, dysentery, typhoid and paratyphoid fevers	228	19.03
(ii) Scabies with or without secondary infection	151	12.60
(iii) Diseases of respiratory tract (excluding tuberculosis) i.e. sore throat, tonsillitis, etc. bronchitis, bronchial asthma, etc. pneumonia, other diseases of respiratory tract	149	12.43
(iv) Dyspepsia, gastritis, epg. pains, peptic ulcer	142	11.85
(v) Anaemia, protein-caloric malnutrition, avitaminosis, Goitre, etc.	98	8.18
Total	768	64.09

(Source: Bangladesh Health Profile 1977)

As indicated in the above table, many patients suffer diseases which originate from malnutrition and lack of sanitary care, except attempted suicide and external injuries including those purposely inflicted by others.

Average caloric intake reveals that the figure of 2,301 calories in 1964 has been reduced to 2,094 calories in 1976, and average meal composition relies heavily upon cereals, 85% of those being rice.

Besides, in Bangladesh, the rainy season is protracted (June to October) and due to inferior drainage condition, one third of land is usually inundated during this season. In Dhaka district, rainwater remains usually in the form of ponds, and it is common to see people bathing and washing at such places. Moreover, due to toilet customs etc., the method using water and other causes, conditions of ordure recycling in human body are observed everywhere. Without an improvement in the economic situation and the literacy rate, these patterns are likely to continue for the time being.

The following table is the four major causes of death classified by age and diseases based on annual death records of 2,664 cases at 1 thana during 1974 to 1975. (Refer to Table-7)

Table-7 NUMBER OF DEATHS IN AGE GROUPS

Group and Single Causes	-1	1-4	5-9	10-44	45+	Total	% of 2664
1. Dysentery and diarrhoea	48	189	34	51	208	530	19.89
2. Fever all forms	51	86	14	35	68	254	9.53
3. Tetanus	216	19	3	4	1	243	9.12
4. Measles	14	30	7	0	0	51	1.91
Total	329	324	58	90	277	1078	40.47

(Source: Bangladesh Health Profile 1977)

As indicated in the above table, 61% of deaths by above four major causes are of 1-4 years infant, especially caused by tetanus.

As the health improvement target in the second five year plan, the targets of reduction of specific diseases are shown in the following table.

(Refer to Table-8)

**Table-8 DISEASE PATTERN AND TARGET SETTING**

(Ref: Country Health Programming, 1977)

Problems	Index	Level 1980	Target, 1980-85
1. Smallpox	Incidence		
2. Cholera	Mortality rate	3.5/1000	Reduction by 50%
3. Diarrhoea/ dysentery	Prevalence rate	16.5/100	Reduction by 15%
4. Tuberculosis	Prevalence rate (10 years age)	7/1000	(a) 100% Immunization (b) Case detection and treatment of 100,000 cases
5. Malaria	Annual Parasite incidence		Reduction to 0.1
6. Measles	Mortality rate Incidence rate		Reduction by 25%, 30% case detection and treatment
7. Worm infestation	Prevalence	80% of children under 15 years	Deworming of children under 15 years every 6 months
8. Tetanus	Incidence 1 Mortality 5	271/1000 3.6/1000	
9. Diphtheria	Mortality rate	0.4/1000	
10. Pertusis	Incidence	18.2/1000	
11. Plionyelitis	Prevalence	0.8/1000	
12. Leprosy	Prevalence	2.6/1000	10 - 40% case treatment
13. Pneumonia	Mortality rate 5 years	5.3/1000	50% reduction
14. Scabies	Prevalence	5.95/1000	Do

(Source: The Second Five Year Plan 1980 - 85)

## 2-3 OBJECT OF THE PROJECT

Narayanganj where the proposed hospital is to be build is in Dhaka District, i.e., the industrial and commercial centre with the largest inland river port in the country, and large Sub-Division with 1,300,000 inhabitants.

Sub-Divisional hospital will accommodate 50 beds as standard, but as related above the hospital of the district is MSDH (Modernized Sub-Divisional Hospital) of 125 beds accommodation and that with 50 bed capacity is forced to expand to 125 bed capacity and, moreover, the facilities are in an extremely deteriorated condition. As for other surrounding medical facilities, only three Thana health complexes with 31 bed accommodation as standard exist, and these facts reveal the overcrowded conditions under this situation, although it is a Sub-Divisional hospital the proposed facilities will accommodate 200 beds in anticipation of 1,000 outpatients as a complete general hospital which greatly exceeds the standard in number of beds and diagnostic departments.

Besides, proposed facilities should be planned to lay stress on rationality and economic efficiency conforming to national circumstances in Bangladesh, especially clearly recognized matters as given conditions by recent investigation are that the hospital will feature abundant mobility.

Following items are the reasons.

1. Number of outpatients may exceed approx. 1,000 per day.
2. Many of inpatients will be brought in serious condition.
3. For maintenance and economic reasons, portions relying on automated measures are extremely limited in scope.

# CHAPTER 3

## OUTLINE OF THE PROJECT





### 3-1 THE NEED FOR ESTABLISHMENT OF A SUB-DIVISIONAL HOSPITAL

As related in the previous chapter, Narayanganj is one of 6 Sub-Divisions in Dhaka District and is located approx. 20 km south of central Dhaka and each Sub-Division is divided into 6 Thana administrative districts. A feature of each district is its high density of population because the city is the leading river port in Bangladesh and has long been commercial and industrial centre.

Density of population is 1,673 per 1 square km i.e., 1,300,000 people reside in 777 square km district. The said district is one of highest density regions even considering the high population density (585 per 1 sq. km) in Bangladesh. Despite its high population density, the district has at present only 1 Sub-Divisional Hospital with 125 beds and 3 Thana Health Complex with 31 beds respectively. Normally, Sub-Divisional Hospital is meant to have 50 beds as standard, but the Narayanganj Sub-Divisional Hospital has had to increase its number of beds from initial 50 beds to 80 beds and 125 beds with no extension or remodeling of building, there are now more than double the prescribed number. Besides, those buildings are falling into disrepair and the diagnostic facilities are of extremely low level capacity.

In spite of such inferior conditions, facilities are operated by 11 doctors, 31 nurses, 6 medical technicians and 31 clerical personnel for 125 inpatients and more than 500 outpatients per day. The following are staff composition and medical equipment of the said hospital.

#### Table of medical equipment

X-ray apparatus 1 set ----- for general Diagnostic X-ray Unit,  
product of Siemens Inc., West Germany  
effective output 100 mA.

Notes: Recently, at hospitals in developed countries, X-ray apparatus with effective output of at least 500 mA is equipped.

Operational appliances ----- Operating table 1, Anesthesia Apparatus  
 1, Suction unit 1, Operating Light 1,  
 Surgical instrument, Stretcher 2

Sterilizer ----- SCHIMELBUSH type  
 Boiling sterilizer (for minor articles)  
 1

Delivery ----- Simple delivery bed 1

Staff composition is as follows

Doctor	1. Junior Consultant	1
	2. Resident Medical Officer	1
	3. Medical Officer (Female)	1
	4. Asst. Surgeon-Cum-Radiologist	1
	5. Asst. Surgeon (Male)	3
	6. Asst. Surgeon (Female)	3
	7. Asst. Dental Surgeon	1
Nurse	1. Sister	2
	2. Senior Staff Nurse	10
	3. Junior Staff Nurse	1
	4. Nursing Attendance (Male and Female)	18
Technical/Para-Medical	1. Pharmacist	2
	2. Radiographer	1
	3. X-ray Technician	1
	4. Laboratory Technician	1
	5. Dental Technician	1
Administrative	1. Office Asst. (Clerk)	1
	2. Store Keeper	1
	3. Ambulance driver	1
	4. Stretcher bearer	2
	5. Office Peon	1
	6. Ward Servant (Male and Female)	10
	7. X-ray Servant	1
	8. Gate Keeper	1
	9. Sweeper	10
	10. Cook	1
	11. Helper	1
	Total	78

The facilities are operated by above 78 personnel.

In addition, no District Hospital is established in Dhaka district at present, Narayanganj Sub-Division has reached its limit already as administrative division viewed from density and number of inhabitants. The Bangladesh Government has decided to raise this Sub-Division to the status of District administrative division in the near future; construction of modern large-scale hospital which will substitute for the deteriorated 125 beds MSD Hospital, is a manifestly pressing need at present. When the proposed hospital is constructed, the number of beds will be doubled to 200 for inpatients from the present 125 beds in MSDH, and the number of outpatient will also be doubled to 1,000 from the present 500, and together with an increase in diagnosis capacity with modern medical equipment, medical services to local inhabitants will be greatly improved. As for service area of the hospital, approx. 10 km radius north of Dhaka City is assumed, because the service to this district will be overlapped by a hospital in the City, whereas the area will be assumed to extend approx. 55 km to the south, east and west districts respectively. Moreover, the proposed hospital which will play a central role in providing medical facilities for the district's inhabitants as senior hospital to existing 3 Thana Health Complexes, and the hospital will be obliged concurrently to play a role as District Hospital to cope with the fact that no such facilities are established in Dhaka City at present.

Since construction of a District Hospital in Dhaka District is not scheduled in near future (no provision has been included in the second five year plan), completion of projected hospital is urgent not only for Narayanganj but also for Dhaka District and it is of utmost importance that the project be materialized as soon as possible.

### 3-2 POSITION OF THE SUB-DIVISIONAL HOSPITAL IN MEDICAL CARE SYSTEM

Medical system in Bangladesh has been established in parallel with the administrative units of the country.

As indicated in the following chart (Refer to Fig.-4), the system consists of 4 diagnostic categories, i.e., the first group comprising Specialized health care at the top; the second group comprising Tertiary health care by Medical College Hospital which is located in each District centre; the third group comprising Secondary health care by District Hospital and Sub-Divisional hospital; and the fourth group comprising Primary health complex for central Thana, Family welfare center of each village. The Bangladesh population is not concentrated in cities since 85% of population are distributed in local cities, towns and villages, the government is laying emphasis on local administration, hence improvement of local medical system is projected positioning Thana health complex at top, while medical facilities in towns and villages are covered by diagnostic system emphasizing preventive diagnosis and birth control. Thana health complex has only 31 beds as hospitalization facilities, which consist of 25 general beds and 6 beds for birth control treatment, no hospitalization facilities exist in other installations. From scale of hospitalization beds, each hospital is classified as follows.

Thana health complex	31 beds
Sub-Divisional hospital	50 to 125 beds
District hospital	100 to 160 beds
Medical college hospital	500 to 850 beds
Specialized hospital	1,000 beds or more

Collation chart for administrative and medical system of Bangladesh is as follows. (Refer to Fig.-4)

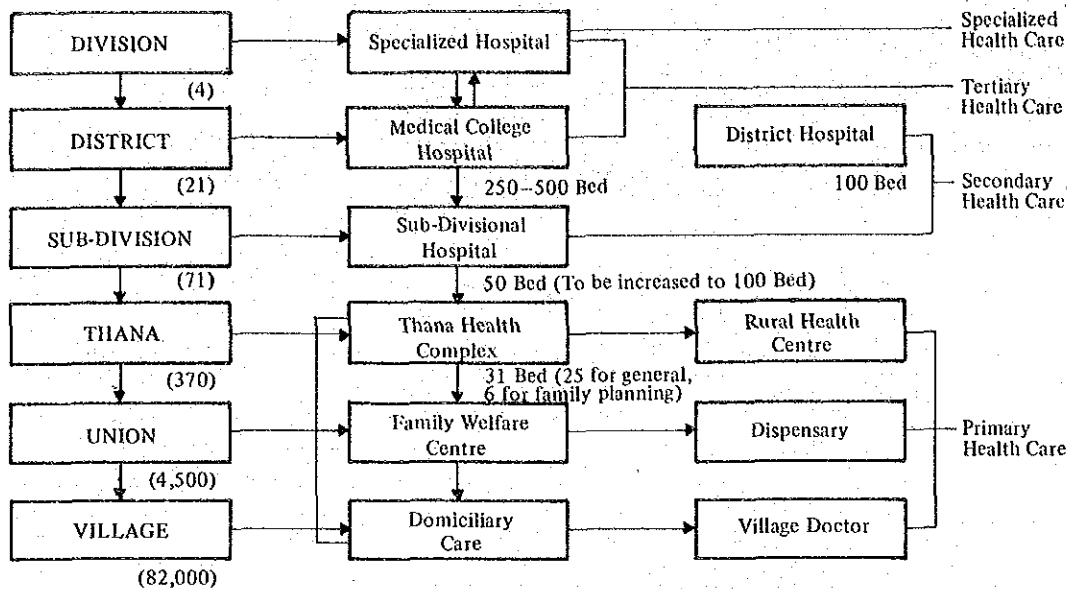


Fig.-4 MEDICAL ORGANIZATION OF BANGLADESH

After completion, the proposed hospital will have 200 beds for inpatients, 8 diagnostic departments (medicine, surgery, obstetrics, gynecology, pediatrics, ENT and dental dept.), central diagnostic dept. (X-ray test, physiological test, endoscopy test, clinical test, central operation, central supply, emergency and delivery dept.) and capacity of 1,000 assumed outpatients per day; and will be operated by 34 doctors, 63 nurses, 31 medical technicians and 135 clerical staffs, for a total of 263 personnel. The proposed hospital will be larger than District Hospital with regard to number of beds for inpatients, and also regarding diagnostic or health care level, the hospital will be on par with a District Hospital.

As indicated in the above chart of the medical system, District Hospital and Sub-Divisional Hospital alike are medical facilities which play intermediate role for local facilities under Thana health complex, for Medical College Hospital and Specialized Hospital; under the present situation where no District Hospital is being built in Dhaka, the Narayanganj Sub-Divisional Hospital should play both roles of District Hospital and Sub-Divisional Hospital. Besides, the proposed facilities will be located as hospital accepting serious patients from 3 Thana health complexes and as a central general hospital for inhabitants in Dhaka District, Narayanganj Sub-Division and 6 Thanas.

The organogram of the Ministry of Health and Population Control, Health Division, is shown in APPENDIX 5.

### 3-3 ORGANIZATION OF THE PROPOSED HOSPITAL

After completion of Narayanganj Sub-divisional hospital, operations are planned to be administered according to the following chart.

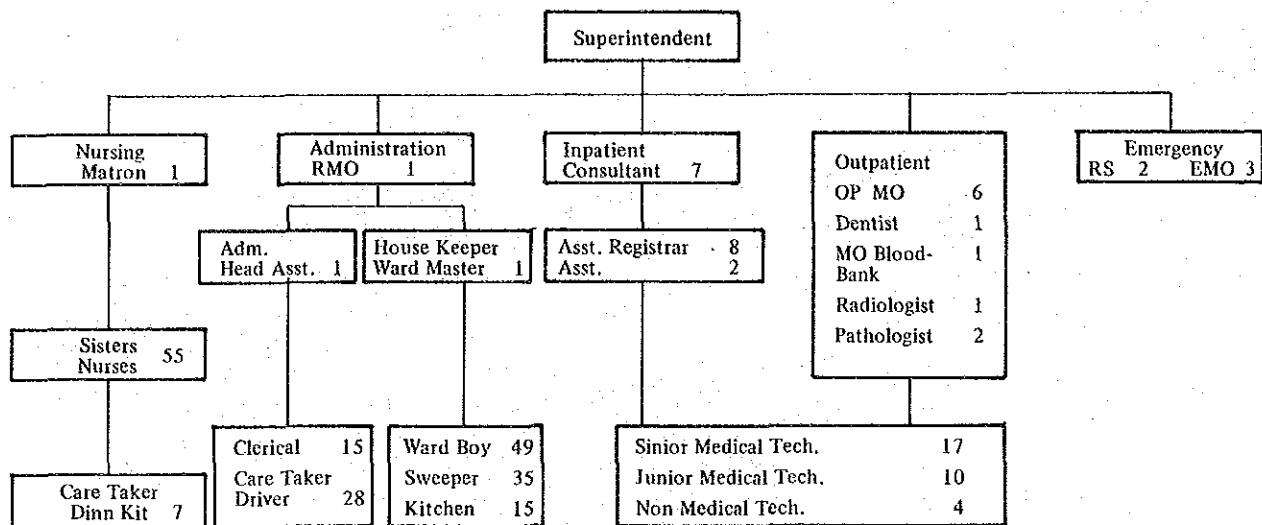


Fig.-5 ORGANOGRAM OF THE PROPOSED HOSPITAL

All staff working in existing Modernized Sub-divisional Hospital are scheduled to transfer to the projected hospital and regarding shortage of staff, hiring of local doctors, nurses and medical technicians is planned.

## CHAPTER 4

# SITE CONDITIONS





#### 4-1 PROPOSED CONSTRUCTION SITE

##### 4-1-1 Location of site and environment

Bangladesh is divided into 21 districts, with capital Dhaka as the centre. Scheduled construction site of the hospital is at Narayanganj Sub-Division of Dhaka District. The site is approx. 20 km south of Dhaka, comprising the largest inland river port in the country, and also the site is in an established industrial and commercial district. Population is approx. 1,300,000. Out of above, 400,000 of inhabitants being concentrating in the centre of the city. Proposed site of the hospital is situated in the centre of the district. The south and east sides adjoin a major bus route, the west faces a school with 30 m wide access road between, and on the north side a housing area is situated, so no difficulties regarding location of the hospital construction are apparent. However, the site is reclaimed land on what was previously a pond, and hence ground bearing capacity down to 4.0 m below ground surface can not be assured.

Urban transport means include buses, rickshaws and private motorcars as principal means of conveyance, and urban roads are being paved tentatively.

##### 4-1-2 Site configuration

Scheduled construction site for the hospital is reclaimed land on a former pond, though slight undulation is observed, but the area is almost flat and filling is possible using surplus soil from construction work. In the site, there is a huge pile of bricks (government property) at present, supervised by approx. 40 huts, but as all of these huts are scheduled to be demolished before commencement of construction, no problem will arise. Rough configuration of the site is as follows. (Refer to Fig.-6)

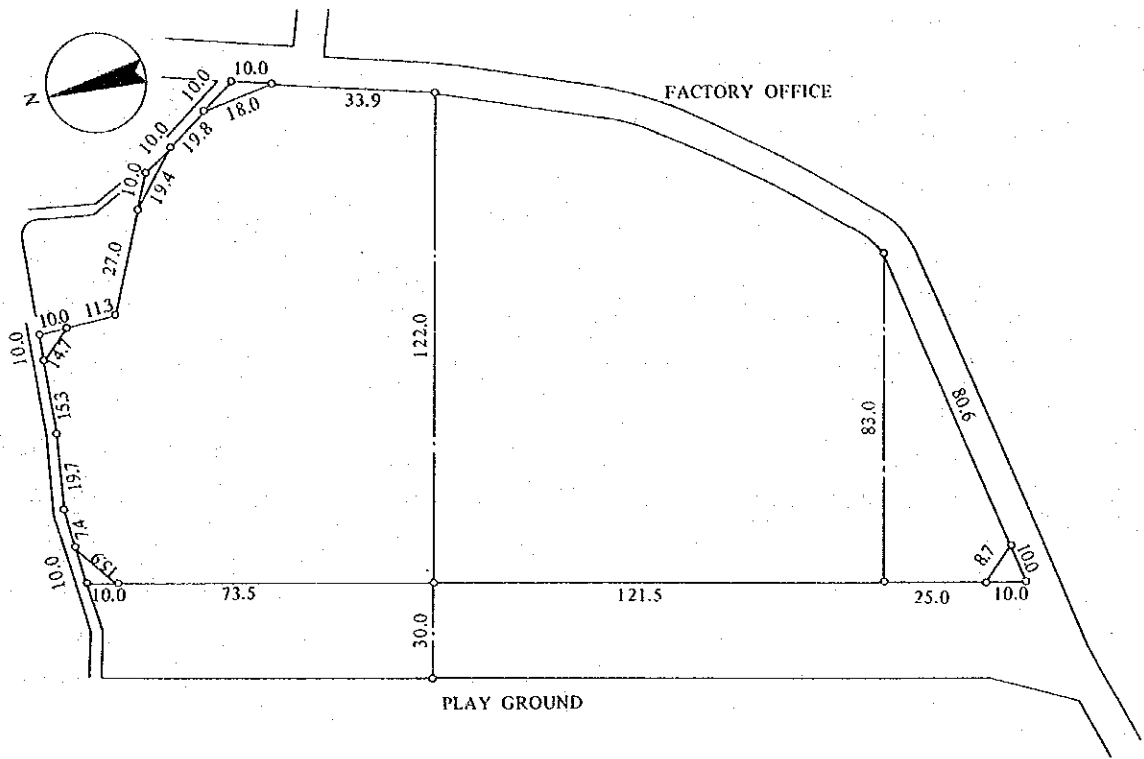


Fig.-6 SURVEY MAP OF THE PROPOSED SITE

#### 4-2 NATURAL CONDITIONS

Bangladesh is located on the east side of the Indian subcontinent, ranging from 20°75' to 25°75' latitude north, and 88°30' to 92°75' longitude east, with 87,000,000 population (as of 1981) and 144,000 km<sup>2</sup> territory. Most part of the land comprises the world's largest alluvial plain which is formed by 3 major rivers i.e. Ganges, Jamuna and Meghna with respective tributaries; various rivers flow reticulately, the land is almost totally flat except for some places (Chittagong Hill Tracts), and plains less than 10 m above sea level, 30 m at the highest point, occupy the major portion. Climate is tropical rain forest affected by monsoon from Indian Ocean, and the year is divided into 3 seasons i.e. winter (November to February), summer (March to May) and rainy season (June to October); besides, cyclones occur frequently before and after of the winter season, storms accompanied by rain blow inland from the Bay of Bengal, and annual precipitation totals 2,100 mm as mean value in the country, making the country one of the rainiest in the world.

As a whole, the climate is hot and humid, and is distinguished by a great difference in precipitation in wet and dry (winter) season; more than 80% of total annual rainfall occurs in the rainy season, and almost no rainfall occurs in the dry season. Due to this fact, rivers overflow in rainy season and most of the country becomes submerged, whereas water shortages occur during the dry season, and no farming can be carried out without some irrigation facilities.

## 4-3 INFRASTRUCTURE

### 4-3-1 Electric power

Along the road on the east side of the site, high-tension power lines with capacities of 11kV, 3-phase 3-wire, 50Hz, and low-tension lines with capacities of 400V - 230V 3-phase 4-wire, 50Hz, are supported by poles.

From the high-tension lines, electric power will be conveyed to receiving pole in the site through aerial or underground cables.

Although no substation exists near the site, abundant supply is possible for required electric power. Voltage fluctuation is  $\pm 5\% \sim \pm 10\%$ , failure of power supply frequently occurs, and considering actual circumstances of other hospitals, countermeasures for voltage stabilization and supply failure will be indispensable. Temperature conditions surrounding equipment or apparatus will be sufficient at 40°C.

### 4-3-2 Telephone

As for telephone lines, overhead lines pass along the south side road of the site. A cabinet is installed near the southern quarter of the site for underground cables, and wiring is possible from the cabinet to the site by underground cable.

### 4-3-3 Water supply

Water main (approx. 200 m/φ) is laid at approx. 1 m depth underground on east side road of the site. The water is conveyed by pump pressure from God Nail waterworks approx. 2.5 km from the site. Water resource of God Nail depends upon nearby Shitalaksha River, and its daily capacity is approx. 3,600m<sup>3</sup>. At present, water supply is being restricted (6:00 to 10:00, 12:00 to 13:30 and 16:00 to 18:00 hours); inconsideration of possible effect to houses in neighborhood, possible pipe diameter to the site will be 25 mm, and water pressure 1 to 2 kg/cm<sup>2</sup>. Because daily water consumption of the proposed hospital is anticipated to be approx. 100 m<sup>3</sup>, if it relies only on the existing water supply system, there will be a significant shortfall, so sinking of a deep tube

well will be necessary.

#### 4-3-4 Sewerage

Street gutters exist at east and west side of the site, the east side gutter being approx. 30 cm wide, approx. 70 cm deep and discharges into the Shitalaksha River, but because west side gutter is approx. 60 cm wide, approx. 80 cm deep and discharges into nearby farmer's pond, it can not be used. No sewerage main is installed.

#### 4-3-5 Gas

Gas main (150 mm $\phi$ ) is laid at approx. 1 m depth underground along east side road of the site. Pressures of gas main is 50 p.s.i. (approx. 3.5 kg/cm<sup>2</sup>), possible maximum pipe diameter to the site will be 150 mm.

Resource in natural gas, its main ingredient being methane gas, and its calorific content 1,050 BTU/cu.ft. (approx. 9,270 kcal/m<sup>3</sup>).

#### 4-4 CONSTRUCTION CONDITIONS

##### 4-4-1 General construction situation

Regarding structural aspect of buildings in Bangladesh (around Dhaka), majority of residences and shops are built of brick, only recently constructed major public buildings using reinforced concrete. Reinforced concrete construction in the country differs from that in Japan, because Dhaka district which is situated in southern Bangladesh is not in a seismic zone and has no past record of building damage from earth quake, hence, so called pure Rahmen structure of concrete columns, beams and floor slabs with brick masonry walls is recommended.

For large scale construction work, the choice narrows down to 3 or 4 local contractors in view of capacity to execute the work.

These large contractor possess considerably high level of technique, maintaining equipment and materials and manpower mobilization; thus no problems on execution of work are expected to arise.

As for labor situation, although unskilled labour is abundant, skilled workers such as carpenters or reinforcing bar placers are in short supply because many are working in the Middle East.

As for construction materials, all can be procured locally except deformed bars and structural angle steel; but for aggregate, brick chips are used usually. In regard to finishing materials, applicable local products which can be procured locally are limited to paint, terrazzo tile and wooden fittings etc. from point of view of productivity and quality.

Besides, several electrical and sanitary equipment can be procured domestically. The import of some of these construction materials has been restricted recently, resulting in problems in construction, i.e. care should be taken on the matter; details will be discussed in the following chapter.

In Bangladesh the rainy season continues for 5 months from June to October, its precipitation increasing to reach 350 mm/month. Due to these conditions in the rainy season, progress of work may be affected, and thus full consideration to construction schedule will be required.

**CHAPTER 5**  
**BASIC DESIGN**





## 5-1 BASIC DESIGN POLICY

The project is planned and prepared with reference to the preliminary study report dated on September 1982, for the construction project of Narayanganj General Hospital based on Japanese grant aid and also the discussions with Bangladesh authorities and site investigation by Basic Design Study Team which has been dispatched in October 1982. Basic policy for the project are as follows.

- 1) With sufficient recognition to required details from Bangladesh, reflect them on the project and hospital function will play advancing role on district medical development comply with the policy of Bangladesh medical administration.
- 2) Facilities will furnish easy working situation for administrators, doctors and service staff, with full capacities on outward communication and also reliable and familiar reception to visiting patient will be provided.
- 3) Facilities will be the one which pursue efficiency on functional and operational economy.
- 4) Facilities will be the one which refers the climate, living, environment and constructional situation of the country; the building will be of applicable style, material and construction with easy maintenance.
- 5) Architectural planning will harmonize surrounding condition. Especially, as the proposed site situates at industrial and commercial center, traffics congested by multitudes and rickshaw, so careful flow planning will be considered to provide better environmental situation.

## 5-2 DETAIL OF FACILITIES

Results of various discussions on recent investigation, follow the mutual consent between Bangladesh and Japan; after adding studies for hospital building, optimum facility details as Narayanganj General Hospital are tried to constitute.

At recent investigation, i.e. at the meeting of Directorate of Health Service, a Director of Nursing Service emphasizes their proposal for annex installation of nurse dormitory to meet with emergency diagnosis.

Later, dormitory installation for doctors, interns and nurses is formally proposed by Ministry of Health. The reasons for annex installation proposal are as follows.

### (1) Dormitory for emergency doctors and interns

Locational condition of proposed hospital covers wide range of diagnosis, as no installation with superior equipment is available within peripheral district and pregnant women are used to rush to hospital in urgent condition, resultantly emergency patient occupies high rate. At present, existing facilities are sparing wide space for emergency application.

Therefore, those dormitories are indispensable for night duty doctors of medicine, surgery and obstetric department, and for interns on 6 months duties in case of personnel interchange system with universities. Proposed number of dormitories are 3 for doctors and 6 for interns.

### (2) Dormitory for nurses

Dialy shifts are 8:00 in the morning, 16:00 in the evening and 24:00 at midnight. Dormitories for nurses whose duty ends at midnight are needed. There are 18 nurses for ward duty, 10 nurses for emergency duty (including delivery section), 28 nurses in total. In view of above reason and present situation of medical facilities, annex installation of both dormitories are indispensable for hospital operation and those construction carries enough validity to improve the situation.

Each section and rooms are as follows:

(1) Hospital

Sections	Components of facilities
Outpatient Dept.	
Internal medicine (Including skin & venereal)	Consulting rm, Treatment rm
Surgery	Consulting rm, Treatment rm (including Physio-therapy rm)
Obstetrics & Gynecology w/ Family planning	Consulting rm, Treatment rm
Pediatrics	Consulting rm, Treatment rm
E.N.T.	Consulting rm, Audiometry examination rm
Ophthalmology	Consulting rm, Dark rm
Dental	Consulting rm, Technical auxiliary rm
Central diagnosis dept.	
X-ray diagnosis	X-ray diagnosis rm, X-ray control rm, Dark rm, Film store, Staff rm,
Physiological exam.	ECG rm, Staff rm
Endoscopic	Endoscopic diagnosis rm, Staff rm
Clinical examination	General laboratory (Linen & feces), Haematological & biochemical laboratory, Bacteriological laboratory, Pathological Laboratory Toilet for examination, Staff rm
Operating	Operation theatre, Operation hall, Recovery rm, Equipment rm, locker rm, Doctor's rm, Examination rm
Central materials supply	Central supply rm, Sterilized apparatus rm
Emergency	Cleansing rm, Consulting rm, Minor operation rm, Observation rm, Reception rm, Nurse station, Doctor's rm
Delivery	Delivery rm, Labour rm, Recovery rm, Nurse station, Preparatory & bathing rm, Milk kitchen, Newborn baby rm
Pharmacy	Dispensary rm, Drug store
Blood bank	Waiting rm, Bleeding rm, Blood bank

Ward dept.

Surgery (Male)	6 bed rm, 4 bed rm, 2 bed rm, 1 bed
Surgery (Female)	rm, Toilet, Filth treatment rm,
Internal medicine (Male)	Shower rm, Linen rm, Nurse station,
Internal medicine (Female)	Work rm, Treatment rm, Doctor's rm,
Pediatrics	Store
Infectious	2 bed rm, 1 bed rm, Linen rm,
	Filth treatment rm, Shower rm,
	Changing rm, Nurse station,
	Sterilizer rm

Service dept.

Kitchen, Office rm, Food storage,  
Locker rm, Laundry, Mending rm,  
Linen store, Central store,  
Sweeper rm, Workshop, Machine rm,  
Electrical rm, Control rm,  
Incinerator

Administrative dept.

Superintendent rm, Secretary's rm,  
Reception rm, Doctor's rm, Office  
rm, Library, Meeting rm, Telephone  
exchanger rm, Cafeteria, Morgue,  
Autopsy rm

(2) Domitories

Doctor's domitory	Bed rm, Dinning rm, Drawing rm,
Intern's domitory	Kitchen, Toilet, Shower rm,
Nurse's domitory	Bed rm (4 bedded), Dinning rm, Shower rm

### 5-3 SITE PLANNING

Area of proposed site for Narayanganj General Hospital construction covers 6.5 acres (ca. 26,000 M<sup>2</sup>) in total, net area excluding obliged portion to spare for projected road remains ca. 18,000 M<sup>2</sup>.

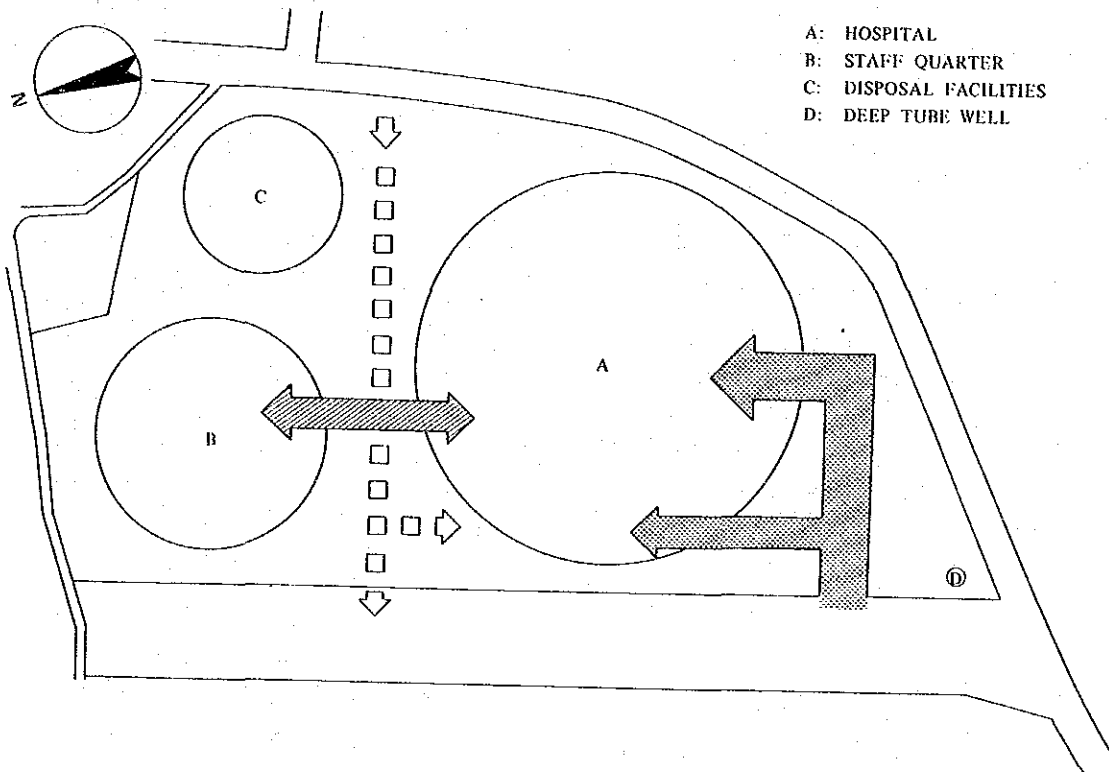


Fig.-7 CONCEPT OF SITE PLANNING

Main approach to the site will be considered from south-west of the area because urban district situates on the said direction. West side projected road is 30M in width and under open space condition with brick pavement at present. Service road will be located between hospital and proposed dormitory, so operational services will be furnished from rear of the hospital. As drainage is forced to dispose by permeat system, deep tube well will be located on isolated position on diagonal direction of the site.

## 5-4 ARCHITECTURAL PLANNING

### 5-4-1 Planning

As mentioned previously, high priority must be given to mobility of functions in proposed hospital. Comprising 1,000 outpatients, medical district range 10 km to north, 55 km to south, east and west, local situation is inferior as no surrounding facilities of superior accommodations for operation or delivery. Majority of patient in an emergency condition, delivery patient used to leave hospital within 3 days including aftercare, every functions must work smoothly and circulations between departments shall conjoin clearly. As for outpatient department, multitude control is considered mainly, crowding internal medicine department and mobile pediatrics department are planned to locate on first floor; confusions will be relieved around entrance on ground floor.

As for operation or delivery department, emergency system is inevitable as described above, and as elevator facility is avoided because of economical reasons such that expensive and inconvenient maintenance, those departments will be located on ground floor.

Surgical male ward is planned to locate near operation theatre, surgical female ward is planned to locate with delivery department, so mutual path of flow is adjoining each other, and intercrossing with other flow line is avoided. Emergency department is planned to locate near operational department providing for emergency operation thus flow path to male and female ward and to delivery department will be cleared. Direct access to infectious ward is planned, services such as meal or linen supply are conveyed through interior path of flow and discharge path will flow through sterilizer.

As regards flow for nurses and staff for infectious ward, path is planned through corners for changing clothe, and leaving patient should take shower and change their clothes through planned path of flow.

### 5-4-2 Construction material planning

One of most indispensable factor in the project is construction

material planning. Total construction cost may be effected by rate of possibility of applicable local material.

Application of local materials is procured as far as possible and reduction of construction cost will be attained in the project. Whereas in such case, reliability of timing and quantity of supply may effect practical progress of construction.

While, an import restriction has been enforced in Bangladesh at present on some materials which are able to manufacture or procure domestically. Therefore, when such materials shall be specified for application, discussion and confirmation with administrative authorities will be made previously.

(1) Structural materials

- a) Cement: As locally manufactured cement is packed in jute sack of 40 kg content, lot of marketed goods contains some moisture, hence no reliable quality is observed, so direct procurement from government controlled cement firms is advisable. On this occasion, monthly scheduled consumption shall be submitted to government and allotment by month must be dealt out. Submitted quantity may not be procured always and resulting disturbance of working schedule. Due to above reason a procedure should be programmed that 2/3 of total cement consumption will be procured locally and other 1/3 of quantity will be imported from Japan.
- b) Coarse aggregate: Two kinds of material are available as coarse aggregate in Bangladesh, i.e. crushed stone and Jhama brick chips. The former consists of natural stone of sylhet district which is crushed to required size but expensive in cost. The latter consists of Jhama brick which is crushed to required size, its cost is relatively low because it is produced nation-wide. Strength is not sufficient but when assuming concrete strength as  $180 \text{ kg/cm}^2$ , the Jhama concrete will be possible to apply.
- c) Fine aggregate (sand): Three kinds of sand are applicable for concrete i.e. Sylhet sand, best local sand (F.M. 1.5) and best local sand (F.M. 2.0). The second and third species are half in cost compare with the first species, but as the grade is fine



that no exclusive application is allowed, normally 1/3 of best local sand and 2/3 of Sylhet sand will be mixed. Besides, so call local fine sand is used for back-filling work. Abundant supply of sand will not interfere with construction work.

- d) Steel bar: Steel bars which is available in Bangladesh is ordinary round bar (1,400 kg/cm<sup>2</sup>) only. And because of poor quality control, fluctuant strength is observed. Resultantly, import of deformed bar from Japan should be considered.
- e) Structural steel: No procurement is anticipated in Bangladesh except light gauge steel, flat bar and small size angle steel.

(2) Building finishing materials

a) Exterior finish

Roof ——— Lime-terracing (Mix granulated brick and brick chips and lime, knead with water and tamp, then finish with lime mortar.)

Parapet coping ——— Exposed concrete.

Roof drain ——— Cast iron with baked coaltar.

Leader ——— Hard PVC pipe.

Exterior wall ——— Double facing brick masonry.

Exposed column and beam -- mortar trowel finish.

b) Interior finish

component rm	Floor	Wall	Ceiling
Examination rm	Terrazzo tile t=20	Mortar trowel E.P.	Repair exposed finish E.P.
Operation rm	Terrazzo, joint bar-glass	Tile finish	Rockwool acoustic board
Ward	Terrazzo tile t=20	Mortar trowel finish E.P.	Repair exposed finish E.P.
Toilet	ditto	ditto 100x100 wainscot, tile finish	Silica board t=6 V.P.
Kitchen	Terrazzo, joint bar-glass	ditto	ditto
Office	Terrazzo tile t=20	Mortat trowel finish E.P.	Repair exposed finish
Corridor	ditto	ditto	ditto

Reinforced concrete construction and brick wall is general local construction process and is advantageous in unit cost.

Roof water proofing will be of local process so called lime terracing, assurance is confirmed at other major construction site. Floors will be finished by local procured terrazzo for convenience repair work in future. Ceilings will be finished by emulsion paint on exposed concrete with economical reason and for convenience to installation of many ceiling fans, and to provide generous space for better living condition with no air conditioning equipment.

For aluminium sash, as no product with favorable quality is selected among nearby countries, Japanese product shall be considered.

(3) Electrical equipment

- a) Lighting fixtures: General lighting fixtures are contraband items for import except high brightness fixtures such as mercury lamp or sodium lamp. Lamps are manufactured by Philip Inc. and GE Co. Fluorescent tubes are manufactured by certain firm

which cooperates technically with a Japanese firm, productive capacity is 6,000 tubes monthly.

Lighting fixtures are manufactured under made-by-order system. Productive capacity is approx. 1,000 sets per month. (3 months of appointed date of delivery).

- b) Wiring instrument: Instrument below 15A of capacity are contraband items for import. Large tumbler switch (suited to Japanese double tumbler switch) are manufactured by local firms.

Mainly large 3 pin type wall outlet is applied and these are manufactured by same local firms related above,

- c) Cables: Cables are contraband items for import except high tension cables.

PVC insulated cables are mainly applies for low tension services, vinyl insulated wires such as Japanese product are scarce in market. Cable manufacturing firms exist in Bangladesh.

- d) Conduit tubes: Conduit tubes are contraband items for import, mainly vinyl chloride tubes are available, and steel tubes are scarce in market. Manufacturing firms exist in Dhaka.

- e) Transformers: Transformers upto 250KVA are contraband items for import, approx. 500KVA of capacity is assumed in the project so import from Japan is programmed.

- f) Switchboard: Scale of telephone exchange below 5 city lines and 25 extension lines are contraband items for import, approx. 5 city lines and 60 extension lines are assumed respectively in the project, so import from Japan is programmed.

- g) Clock: Clocks will be imported from Japan.

- h) Generators: Main equipment will be imported from Japan. Oil tanks (main & service tank) are contraband items for import, but considering the safety and endurance, it is better to be imported.

- i) Receiving & Transforming equipment:  
These equipment will be imported from Japan.

- j) Lighting protection system: These apparatus will be imported from Japan.

(4) Plumbing & air-conditioning equipment

Principal contraband items for import of plumbing & air-conditioning equipment are as follows.

Cast iron pipe, steel pipe (1/2" - 4"), vinyl chloride pipe (up to 8"), steel angle, electric wire and conduit, motor, drain fittings, ceiling fan, boiler, sanitary wares and manhole. In these items, e.g. steel pipe or vinyl chloride pipe is manufactured by BS standard and supplied to market abundantly, whereas non-manufactured items of quality and standard are included in contraband items for import.

Therefore, even if an item is restricted to import, when high quality and standardized items are impossible to procure in Bangladesh, those must be imported from Japan.

a) Piping materials

As related above, steel pipes and vinyl chloride pipes are BS standard articles and possible to apply. Steel pipes have 8 ton production capacities daily and vinyl chloride tubes have 3 ton production capacities daily. Fittings for above items are also available in Bangladesh.

Cast iron pipes are manufactured in the country but fluctuant in quality. Cement tubes are manufactured manually, and due to scarce reinforcing steel, reliability is inferior on pressure resisting capacity. Besides, lead pipe or copper pipe are not confirmed in the market.

b) Equipment and instrument

All air-conditioning equipment are not manufactured in Bangladesh. Ceiling fan is being manufactured with enough supplying capacity in the market, application will be possible. High quality sanitary wares are produced and possible to apply.

Pumps are import permitted products, but deep well pump and lift pump are easy to procure in Bangladesh. No centrifugal fans are confirmed in the market. Drain fittings are contraband items for import, but no supply in the market except perforated drain cap. Drainage trap for wash basin is contraband item for import, and manufactured domestically.

## 5-5 STRUCTURAL PLANNING

Proposed site for construction of the project, i.e. Narayanganj in Dhaka district is isolated from every seismic zone of the world, no heavy magnitude earthquake is recorded in past, hence no specific considerations on structural analysis is necessary. Out of above standpoint, appropriate structures of the building will be of reinforced concrete pure rahmen construction with double exterior walls and single partition walls of brick masonry.

The proposed site for the construction is reclaimed land on previous pond, and due to inferior quality of backfilled soil, N-value reveals 1.0 - 1.5 up to 3 to 4 meters below existing ground level, silty clay layer of 3 to 5 N-value succeeded underneath and ground-water level shows GL-3.5 m in pit. Out of above state, foundation type will be considered that friction pile to utilize underneath silty clay layer is most appropriate measures. Generally, piling work in Bangladesh is mainly of cast-in-place pile (earth-drill process). Working capacity is 2 to 3 piles/group per day (24 hours) with 400 $\phi$ , and 15 m in length.

Working progress must be programmed with specific care. Expansion and contraction of building caused by thermal variation and differential settlement must be considered, i.e. expansion joint will be programmed to install within every 50 meters of building length.

External forces and load to act on the building is assumed as follows.

1. Seismic force            K=0
2. Wind                      60 m/sec. (at cyclone)
3. Live Load                by Japanese building code.

### Applicable materials:

1. Concrete (Jhama concrete)    Fc-180 kg/cm<sup>2</sup>  
(4 weeks strength)
2. Steel bar                    SD 35 (19 m/m  $\phi$  or larger)  
                                  SD 30 (16 m/m  $\phi$  or smaller)
3. Structural steel            SS 41
4. Bolt                         ordinary bolt

## 5-6 SERVICE PLANNING

### 5-6-1 Applicable standards

Principally, BS standards will be applied. But those articles which is proper to apply Japanese standards out of local situation will be excluded. (e.g. substation equipment, generator and air-conditioning equipment etc.)

### 5-6-2 Electrical facilities planning

#### (1)-1 Substation equipment

Install lead-in pole in the site area, receive 11kV power (3 phase 50Hz) and connect to divisional switch in electric room through underground cable. In electric room, powers will be reduced from 11kV to 400V - 230V (3 phase 4 wire 50Hz) with transformer, and supply to lighting, motor and medical equipment.

A static condenser for power factor improvement shall also be equipped. As for the recording meter, watt-hour meter and maximum demand watt meter shall be equipped.

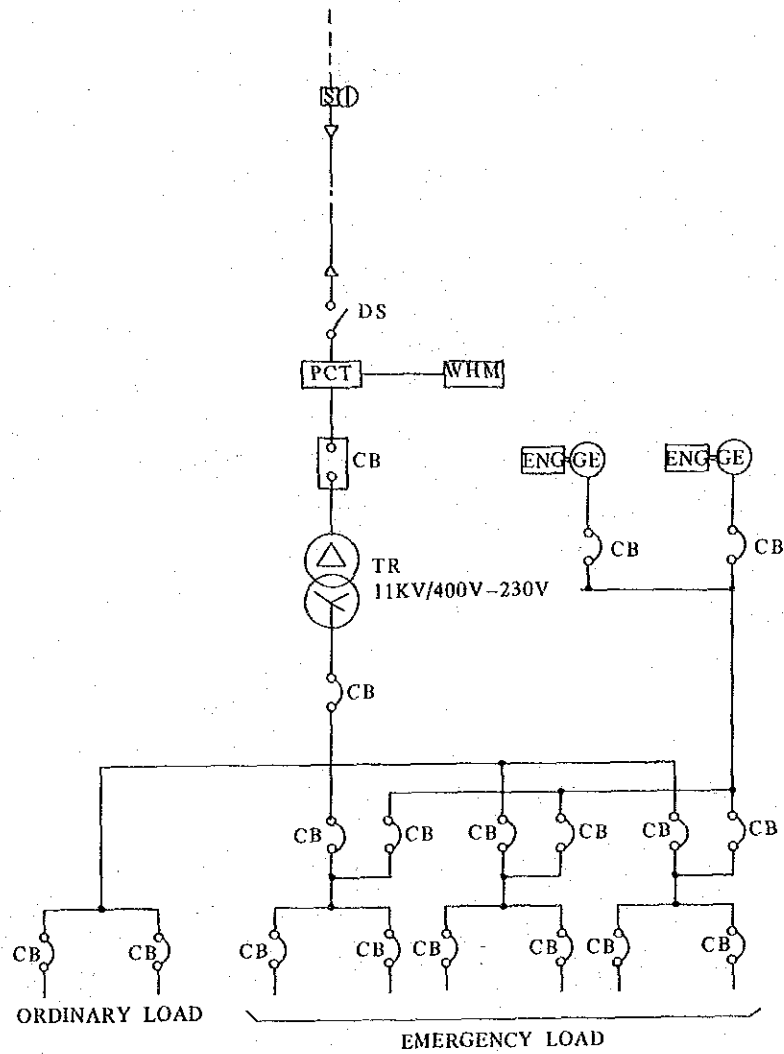
High tension and low tension switch board will be of cubicle type, transformer will be of outdoor type. (enclosed with netfence)

#### (1)-2 Generator equipment

As related in previous chapter, failure of supply may occur frequently. To prevent stop of hospital function, emergency generator must be installed. With the generator, powers for operation theatre, post-operation theatre, pathology dept. with blood transfusion, emergency dept., labour ward and labour operation theatre and gynaecological ward will be secured.

Two sets of generators (200kVA x 2) will be installed, one set is for use in case of troubles on another set or for maintenance period. Air cooling system will be applied.

(1)-3 Outline of power supply system



LEGEND

CB..... Circuit Breaker  
 DS ..... Disconnecting Switch  
 TR ..... Transformer

PCT ..... Potential Current Transformer  
 ENG ..... Diesel Engine  
 GE ..... Generator

Fig.-8 OUTLINE OF POWER SUPPLY SYSTEM

(2) Lighting fixtures

Source for illumination will mainly furnished by fluorescent lighting. Purpose of fluorescent lighting application is for reduction of maintenance cost regardless of initial cost increase to some extent.

Average illumination of principal rooms will be following degree.

Office & meeting room	200 lx
Laboratory rm & examination rm	300 lx
Operation theatre	300 lx
Ward	100 lx

Lighting fixtures will mainly of local produced FL 40W (20W) x 2, or FL 402 (20W) x 1 with shade, fitting style will be either of ceiling type of pipe pendant.

(3) Clock system

Manually operated wall clocks will be installed only in principal rooms. Time gauge clock will be installed in operation theatre.

(4) Telephone system

Telephone piping are installed from telephone exchange room to each principal room. Telephone exchange will be electronic type with capacity of 5 city lines and approx. 60 extension lines.

(5) Lightning protection system

Lightning rod will be installed on roof.

5-6-3 Plumbing and sanitary planning

(1) Water supply system

Deep tube well water will be conveyed with deep well pump to underground reservoir (concrete made approx. 100 m<sup>3</sup>), lift to elevated water tank (FRP made approx. 15 m<sup>3</sup>) after sterilizing process, and supply to each principal locations with gravity. Plumbing materials will be of HIP (shockproof type vinyl chloride pipe).



Besides, city water branch pipe 25A which is conveyed from border line of proposed site will be connected to the underground reservoir for emergency application.

(2) Drainage & vent system

Sewage and waste drain will be disposed by septic tank and infiltrating tubes which are installed at east corner in the site, but drains (sewage and waste drain) from infectious ward will be conveyed to septic tank after sterilizing process. Drainage systems will be of combined system at interior and exterior of the building, and vent system is extending pipe system.

Storm water will be discharged in site area and to existing street gutter. Plumbing materials for sewage, waste and vent will be of vinyl chloride (VP) pipe.

Drains from X-ray film developing apparatus will be conveyed to exclusive storage tank and disposed by consigned trade.

(3) Hot water supply system

Local supply system with gas water heater will furnish hot water, water heaters will be installed at each necessary locations. Plumbing materials will be of acid-extracted copper pipe (M type).

(4) Fuel gas supply system

Gas will be conveyed near east border line of the site, gas meter, pressure reducing apparatus and successive plumbing work will be installed, and supply gas to each necessary locations. Gas will be natural gas with  $1,050 \text{ BTU/ft}^3$  ( $9,270 \text{ kcal/m}^3$ ) of calories. Plumbing materials will be API (American Petroleum Institute) pipe.

(5) Interior fire extinguishing system

Comply with Japanese fire code, interior fire extinguishing system will be equipped. Plumbing materials will be galvanized carbon steel pipe or GI (BS - "A" class) pipe.

(6) Sanitary fixtures

Sanitary fixtures to suit local customs will be selected and installed rigidly.

(7) Kitchen equipment

Install gasrange, sink, refrigerator, cooking table, work table and storage, cooking equipment to suit local eating customs will also be installed.

(8) Laundry equipment

Wet system will be adopted, interchangeability between each apparatus must be programmed.

(9) Deep tube well

Deep tube well will be drilled in the site area, lift water to reservoir with deep well pump.

5-6-4 Air-conditioning & ventilating system

(1) Air-conditioning system

To maintain every functions of the hospital, control of interior cleanliness, pressure, temperature and humidity for operation theatre, recovery rm, central supply rm, and delivery rm will be managed with packaged type air-conditioner of water cooling system.

And for some private rooms, air will be conditioned with window type cooler. Zoning systems for air-conditioning facilities will be programmed as follows.

Zone A - Operation theatre, central supply room

Zone B - Delivery room

Zone C - Emergency department

(2) Ventilating system

Examination room and ward will be ventilated with ceiling fan, but exclusive ventilating system will be equipped for kitchen.

## 5-7 MEDICAL EQUIPMENT PLANNING

### 5-7-1 Present situation of medical equipment

Almost all of medical equipment in Bangladesh is imported articles, situations are as follows.

- (1) Conventionally, X-ray equipment is mainly procured out of European products, but recently Japanese products are delivered and its superiority and easy maintenance service is being recognized.
- (2) As for X-ray film, Japanese and European products share market in halves.
- (3) As for operational equipment, operating table, operating light and anesthetic apparatus have been mainly adopted European products but Japanese products are being delivered recently.
- (4) Surgical instruments (scissors, forceps, etc.) are mainly Pakistan products for popular use, but those for frequent application in the hospital, European products have been adopted.
- (5) As for general medical equipment (stethoscope, sphygmomanometer etc.), Japanese or European products are being adopted, but popular device for nurses are mainly products of People's Republic of China. Syringe and needles are also mainly products of China.
- (6) Glass wares for examination, syringe and medical porcelain wares (crucible, mortar etc.) are mainly products of China in the market. But apparatus for quantitative analysis, European or American product are mainly adopted.
- (7) In optical equipment, e.g. for microscope, Japanese, European or American products are mainly used in hospital.
- (8) General Beds are contraband items for import, hospital bed is being manufactured in certain firm in Dhaka area with enough capacity to procure.

(9) Ministry of Health of Bangladesh has required every hospital to submit annual quantities of necessary medical equipment. Sum of quantities are referred to national budget and those equipment are procured by international tender.

Example: (annual quantity of procurement)

Standard type operation table            12 sets

Suction Unit                                    20 sets

#### 5-7-2 Hospital function and medical equipment

Main purpose of the hospital establishment is to furnish modern medical facilities and hospital functions for approx. 1,300,000 of inhabitants in and around Narayanganj area.

##### a) Outpatient medical functions

The proposed hospital retains diagnostic and treatment functions for approx. 1,000 outpatient per day, principal diagnostic departments are medicine and pediatrics section, others are surgery, obstetrics & gynecology, ophthalmic, ENT, dental and rehabilitation sections.

Besides, based on the second five year plan of Bangladesh, and for health and hygienic, education, preventive medicine and health promotion etc., family planning instruction room is provided in outpatient department and family planning device and instruction data under guidance of WHO and UNICEF are furnished.

##### b) Medical examination functions

Considering on the locality of Narayanganj, examination functions are mainly programmed for pathology test, urine test, stool test, parasite examination, blood test, blood bank and X-ray examination etc.

As for X-ray test diagnosis, general photographing and tomography photographing are emphasize for rate of disease occurrence in the district, and modern testing function will also be furnished. X-ray machine with TV apparatus and portable type X-ray machine for clinical use are furnished.

c) Medical equipment

For necessary medical service at local district, medical equipment to suit local condition, locality and medicine level must be selected.

Following items are referenced for selection of proper equipment.

- 1) Equipment will be selected to meet the technical level of local medical personnel.

Technical level of those personnel in the hospital reveals regional differences, acquiritor of advanced medical technique in the country are used to study abroad.

After studied abroad, they are concentrated to large hospital in or around Dhaka area. Although proposed hospital will be modern general hospital, yet limited number of doctors, medical technicians are scarcely secured, modern equipment which is applied in advanced country will be neglected to select, and basic equipment will merely be delivered on purpose, hence Medical Electronics equipment delivery will be neglected as far as possible.

- 2) Maintenance control for medical equipment.

For selection of medical equipment, maintenance control after delivery will be an indispensable problem.

Considering on technical level, staff to be able to secure and maintenance cost; equipment of durable, easy maintenance after delivery and unbreakable will be selected.

Besides, a few Medical Electronics equipment will be delivered after confirmation of using frequency, maintenance condition after delivery, technical service and stability of power and voltage, and power stability apparatus will be attached respectively.

As for quantity of medical equipment to be delivered, locality, local condition, 1,000 outpatients per day,

200 inpatients and disease locality are considered.

3) Procurement of consumable materials

Recently, all medical examination and treatment equipment in advanced countries are using a sort of medical electronics device, automatic analyzing apparatus, automatic direct reading scale and disposable goods etc. In proposed hospital, running cost after completion, supplying situation of consumable materials are considered; analysis, examination and treatment systems will stand on conventional fundamental, basic examination and treatment method.

Applicable equipment will be of manually controlled type placing priority to basic equipment parts and consumable goods become necessary to procure supplementary, temporary substitutable materials which is easy to procure always in the market of Bangladesh are selected.

4) Repair and replacement of programmed equipment.

Because the programme of those medical equipment for the hospital is determined by above stated considerations, repair after delivery and replacement will be easy in Bangladesh. Especially, at selection of X-ray apparatus, not only capacity accuracy, testing items, frequency of application and adaptability to local hospital, but repair, maintenance and replacement after delivery are analyzed fully and determined.

On these problem, at selection of X-ray apparatus, conditions of local repair, maintenance and replacement on the products of X-ray apparatus manufacturing firms of foreign country and its countermeasures are analyzed.

Principal medical equipment for each department are as following lists.

Medical Equipment List

Outpatient Dept.		Q'ty
Internal Medicine (including skin & Veneral)	Doctor's Desk & Chair	3
	Examining Table	5
	Film Illuminator	3
	Diagnostic Instrument Set	3
	Treatment Bed	1
	Arm Rest Stand	2
	Medical Cabinet	1
	E.C.G. (1 ch)	1
	Skin Examining Inst.,	1
	Venereal Diagnostic Set	1
Surgery	Doctor's Desk & Chair	2
	Examining Table	3
	Film Illuminator	2
	Diagnostic Instrument Set	2
	Minor operation set	1
	Arm Rest Stand	1
	Medical Cabinet	1
	Bandage Cart	1
Boiling Sterlizer	2	
Gynecology & obstetrics with Family Planning	Doctors Desk & Chair	2
	Gynecology Table	2
	Diagnostic Instrument Set	2
	Film Illuminator	2
	Medical Cabinet	2
	Boiling Sterilizer	2
	Family Plan Unit	2
Model	4	
Pediatrics	Doctor's Desk & Chair	2
	Examining Table	2
	Film Illuminator	2
	Infant Bed	1
	Baby scale	1
	Baby Measuring Rod	1
	Treatment Bed	1
	Medical Cabinet	2
	Diaper Cart	1
Boiling Sterlizer	2	
E.N.T. (Ear, Nose, Throat)	Doctor's Desk & Chair	1
	E.N.T. Treatment Unit	1
	Film Illuminator	1
	Treatment Bed	1
	Diagnostic Instrument	1
	Audio Meter	2
	Suction Unit	2
Boiling Sterilizer	2	

Outpatient Dept.		Q'ty
Ophthalmology Eye	Doctor's Desk Chair	1
	Treatment Table	1
	Refracting Unit	1
	Treatment Unit	1
	Test Unit, for eye	1
	Slit Lamp	1
	Sight Tester	1
	Medical Cabinet	2
Dental	Dental Unit & Chair	2
	Dental Treatment Set	2
	Dental X-Ray Unit	1
	Dental Workshop Unit	1
Rehabilitation (Physiotherapy)	Grip Rehabilily	2
	Finger Rehabilily	2
	Bicycle Elgometer	1
	Dynamometer	1
	Rehabilitation Unit	1
Central Diagnosis Dept.		
X-Ray Room	Diagnostic X-Ray Unit	1
	Ditto, with TV system	1
	Ditto, Radiographic system	1
	Ditto, Mobile Type	1
	Film Developing Unit	2
	Film Storage Cabinet	3
	Film Illuminator	3
E.C.G.	E.C.G. (3 ch.)	1
	Examining table	2
	Examining Bed	2
Endoscopic	Gastroscope w/camera	2
	Film Illuminator	1
	Examing Table	2
Clinical Examin. Labo.		
General Labo (w/Urino)	Magnetic Mixer	1
	Urino meter	2
	Washer Bath	1
	Analytical Balance	1
	Vacuum Pump	1
	Centrifuge	1
	Microscope	1
	Incubator	1
	Centrifuge, electric	1
	Washer	1
	Laboratory Bench	1
Glass Wears Set	1	



		Q'ty
Haematological Labo.	Incubator	1
	Water Bath	1
	Microtome	1
	Microslide Manif. Unit	1
	pH Meter	1
	Microscope	1
	Reagent Cabinet	1
	Fume Hood	1
	Laboratory Bench	1
Glass Wears Set	1	
Biochemical Labo.	Spectrophotometer	1
	Centrifuge, electric	1
	Mixer	1
	Incubator	1
	Densitometer	1
	Pipette Washer	2
	Electrophoresis App.	1
	Pipette Sterilizer	2
	Reagent Cabinet	1
	Bench	1
Bacteriological Labo.	Water Bath	1
	Balance	1
	Bilirubin Meter	1
	Colony Counter	1
	Microscope	2
	Reagent Cabinet	1
	Bench	2
	Glass Wears Set	1
Operating Theater	Operating Table (General)	1
	Ditto, (Orthopedics)	1
	Ditto, (Gyne & Obste)	1
	Operating Light	3
	Surgical Unit, electric	3
	Anesthesia Apparatus	3
	Suction Unit	3
	Heart Monitor	3
	Film Illuminator	3
	Medical Cabinet	3
	Washing Unit	2
	Sphygmomanometer	5
Anesthesia Unit	9	
Recovery Room	Recovery Bed	3
	I.C.U. Monitor	2
	B.O.C. System	1
	(Ox. meter, suction etc.)	

		Q'ty
Central C.S.S.D.	Sterilizer, Hi speed	1
	Sterilizer, Schimmelbuch	2
	Washing Machine	1
	Instrument Cart	2
	Medical Cabinet	3
	Work Table	3
	Gastroscope Cabinet	1
	Linen Cart	2
	Operation Instruments	
	1) surgical	3
	2) gynecology	2
	3) orthopedics	1
	4) pediatrics	1
	5) E.N.T.	1
Emergency	First Aid Unit	2
	Light Stand	1
	Boiling Sterilizer	2
	Instrument Table	2
	Arm Rest Stand	1
	Irrigator Stand	1
	Medical Cabinet	1
	Treatment Unit	1
	First Aid Cart	1
	Stretcher Cart	1
Minor Operation	Operating Table	1
	Operating Light	1
	Film Illuminator	1
	Medical Cabinet	2
	Suction Unit	1
	Irrigator Stand	2
	Surgical Unit,	1
Emergency		
	Examination Room	
	Blood Test Unit	10
	Urino Collect Unit	10
	Weight Scale	1
Delivery		
	Delivery Room	
	Delivery Bed	2
	Infant Warmer	1
	Ventolise eutocique	2
	Sphgmomanometer	3
	Film Illuminator	1
	Surgical Unit,	1
	Anesthesia Apparatus	1
Respirator	1	
	Operating Light Stand	1

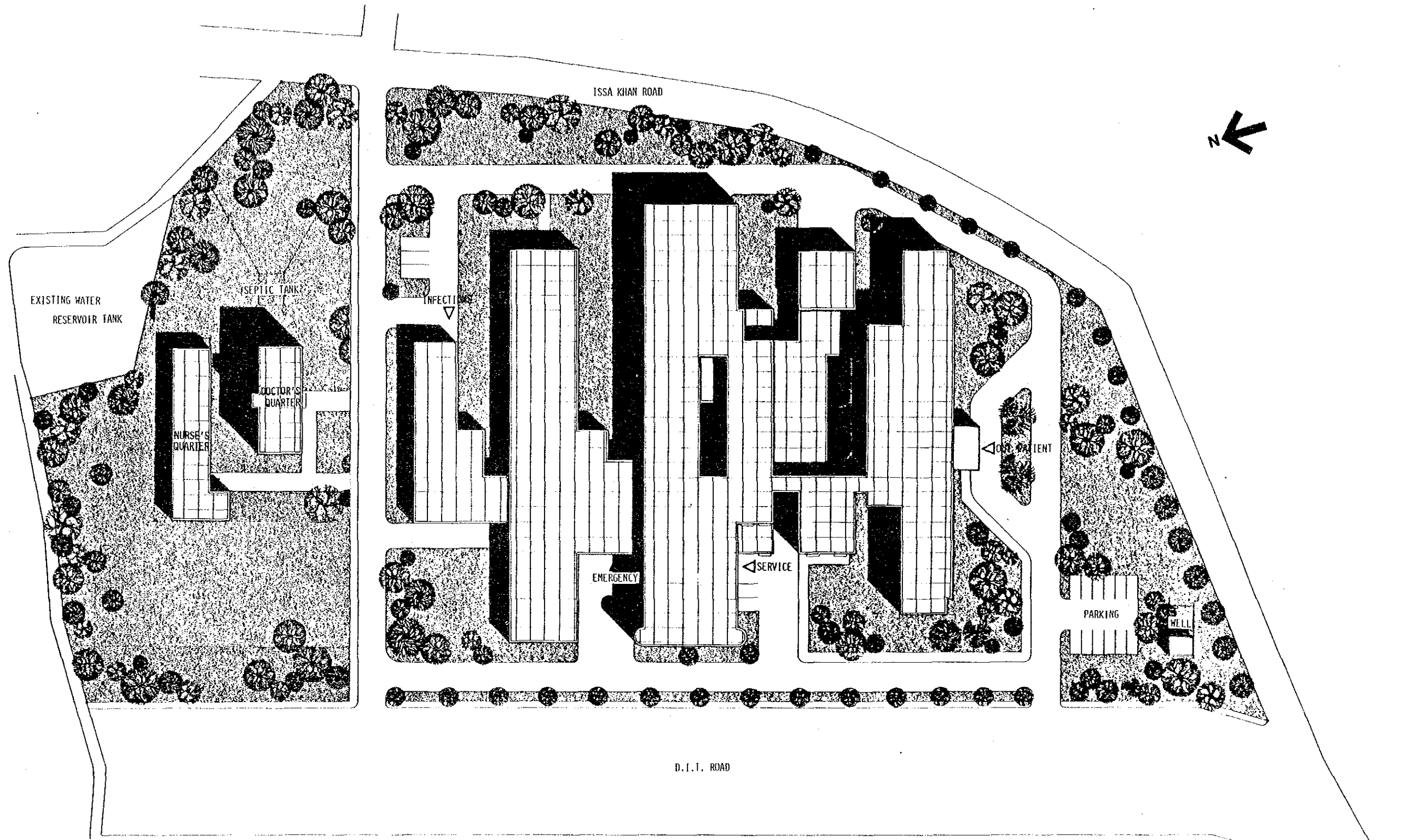
		Q'ty
Recovery Room	Irrigator Stand	4
	Recovery Bed	2
	Bedside Cabinet	2
	Instrument Table	2
	Infant Scale	1
	Treatment Bed	1
Labor Room	Obstetric Bed	2
	Bedside Cabinet	2
	Irrigator Stand	2
New Born Baby & Premature Room	New Born Baby Bed	20
	Infant Incubator	2
	Infant Scale	1
	Treatment Table	1
	Baby Scale	1
	Pump Unit	2
	Respirator	1
	Infant Pump	1
	Bath Carts	1
	Breast Pump	1
Bottle Warmer	1	
Milk Kitchen & Bath Room	Infant Carry	2
	Milk Bench	1
	Milk Warmer	1
	Bottle Sterilizer	2
	Bath Tab.	1
Pharmacy		
Pharmacy	L. Medicine Cabinet	3
	Medicine Cabinet	3
	Anesthetics Cabinet	1
	Medicine Refrigerator	2
	Prescription Counter	1
Blood Bank	Blood Refrigerator	3
	Blood Counter	10
	Pipette Shaker	1
	Centrifuge, Blood	1
	Microscope	1
	Bath Water	1
	Blood Pack Unit	1,000
Blood Donor Set	1,000	

Ward Dept.		Q'ty
Cabin	Hospital Bed	9
	Bedside Cabinet	9
	Irrigator Stand	9
	Overbed Table	7
	Ice Bag Rack	30
	Bed Pan	30
	Basin Stand	7
Ward	Hospital Bed	162
	Bedside Cabinet	162
	Bed Pan	80
	Basin Stand	5
	Wheel Stretcher	4
Pediatrics	Bed, for Child	20
	Commode	20
Duty Room	Urino Stock	5
	Bedpan Hanger	5
	Sterilizer, for Bedpan	2
Nurse Station	Instrument Table	2
	Basin Stand	1
	Work Table	1
	L. Medicine Cabinet	1
	Medical Cabinet	1
	Treatment Bed	1
	Film Illuminator	1
	Dressing Cart	1
	Suction Unit	1
	Chart File Case	1
Boiling Sterilizer	1	
Sterilizing Room	Sterilizer, Hi speed	1

## 5-8 BASIC DESIGN DRAWINGS

List of area by each department

Department	Rooms	Area (sq.m)	Area of dept. (sq.m)	Ratio (%)
Outpatient dept.	Consulting & Treatment	1,017.00	1,017.00	12.6
Central diagnosis dept.	Emergency	152.56		
	Physiological	42.75		
	Endoscopic	62.75		
	X-Ray	174.00		
	Clinical Exam.	144.00		
	Operating	375.50		
	Delivery	216.00		
	Blood bank	67.50		
	Pharmacy	75.00		
		Central material supply	54.00	1,364.06
Ward dept.	General ward	2,732.49		
	Infectious ward	299.00	3,031.49	37.6
Service dept.	Kitchen	221.30		
	Laundry	118.75		
	Storage	76.60		
	Mechanical	300.50	717.15	8.9
Admi. dept.	General office	144.00		
	Doctor's office	270.00		
	Nurse locker	72.00		
	Cafeteria	78.00		
	Morgue & Autopsy	90.63	654.63	8.1
Others	Corridor & hall	1,273.04	1,273.04	15.9
Total		8,057.37	8,057.37	100.0
Doctor's & Nurse's quarter			766.44	
Grand Total			8,823.81	



**THE GENERAL HOSPITAL IN NARAYANGANJ**

**SITE PLAN**

S=1:800



**01**

A  
B



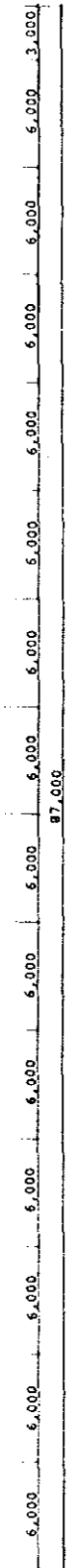
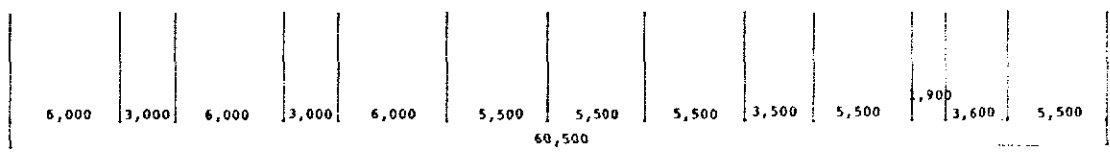
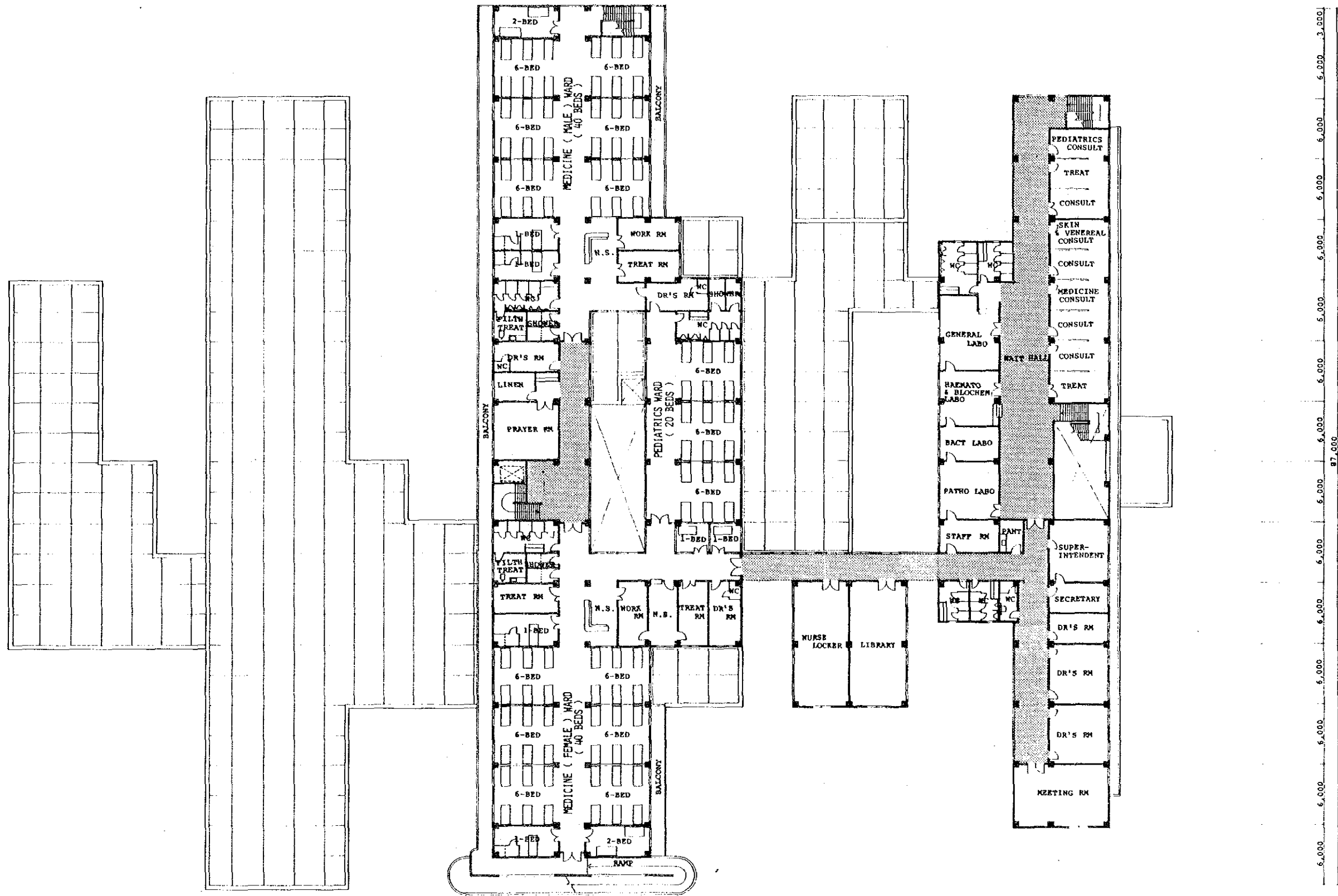
THE GENERAL HOSPITAL IN NARAYANGANJ

GROUND FLOOR PLAN

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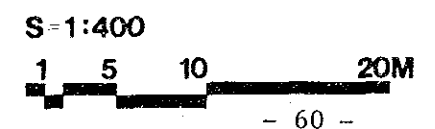


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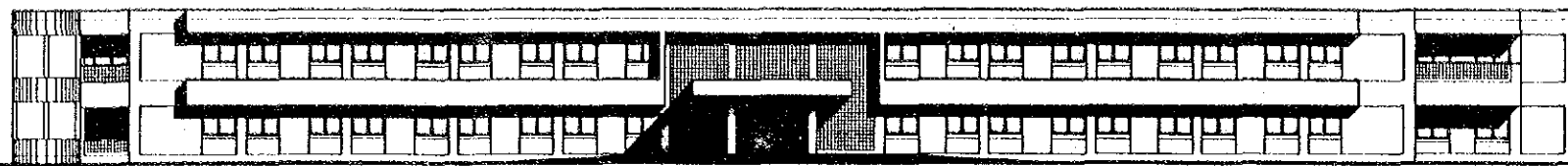
**THE GENERAL HOSPITAL IN NARAYANGANJ**

**FIRST FLOOR PLAN**



**03**

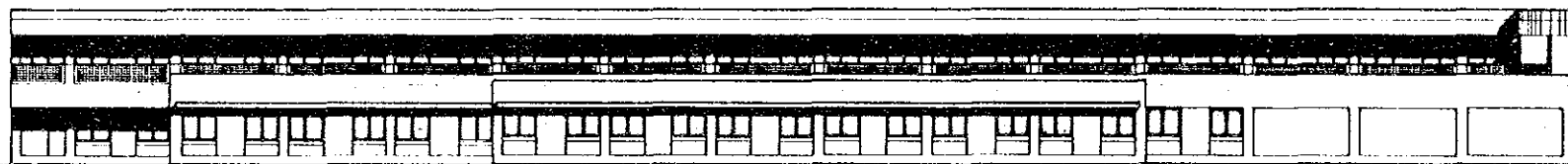




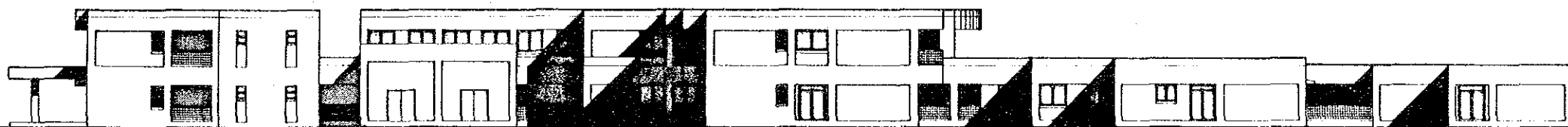
SOUTH ELEVATION



WEST ELEVATION

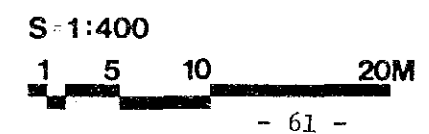


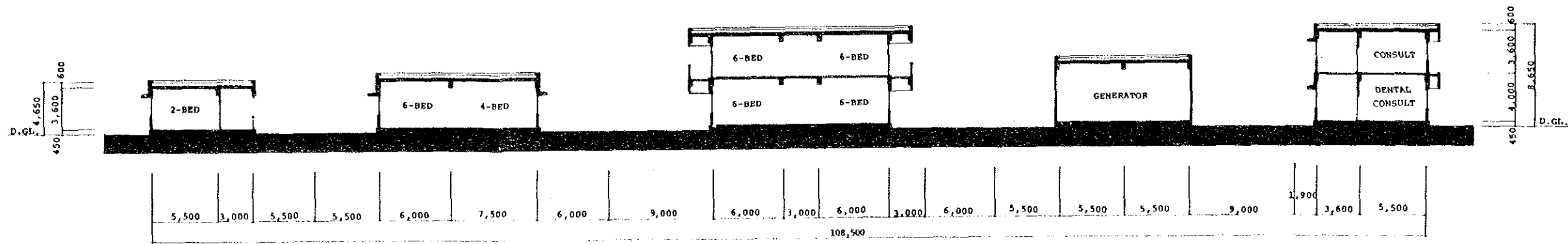
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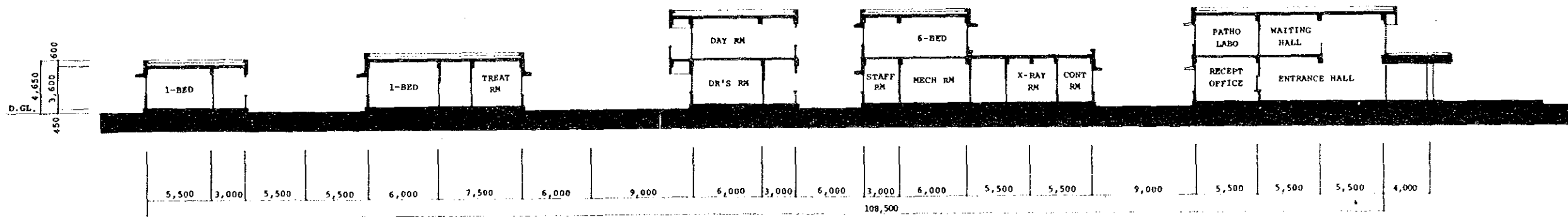
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THE GENERAL HOSPITAL IN NARAYANGANJ



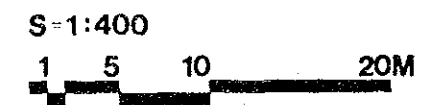


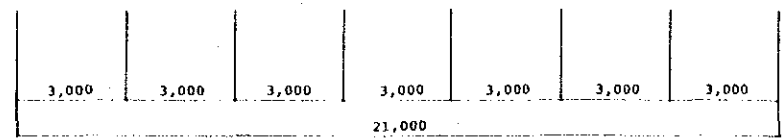
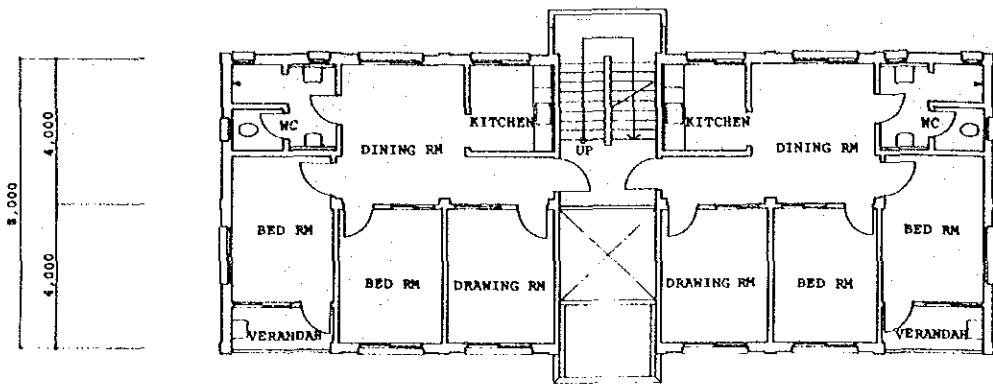
A-A' SECTION



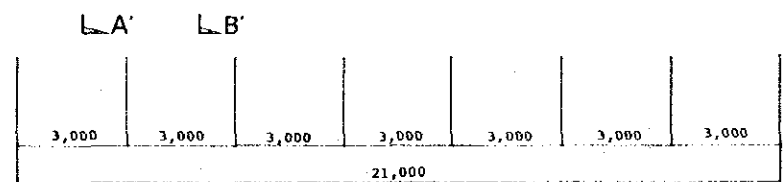
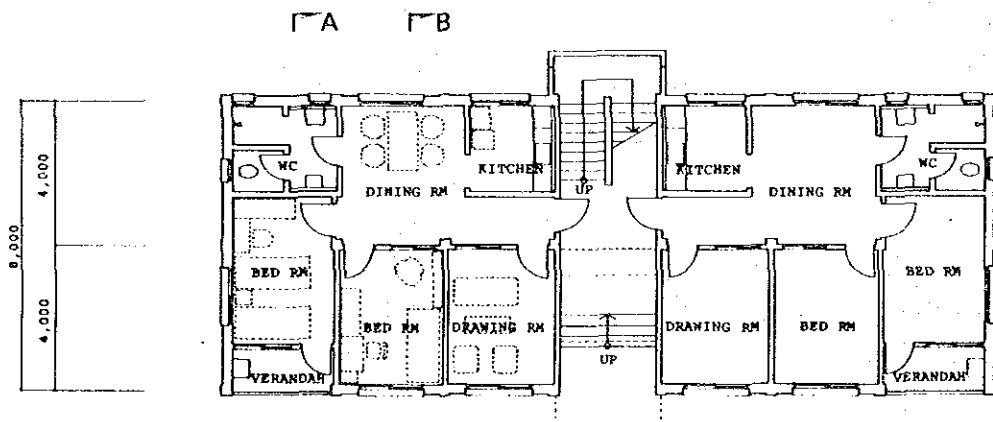
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THE GENERAL HOSPITAL IN NARAYANGANJ

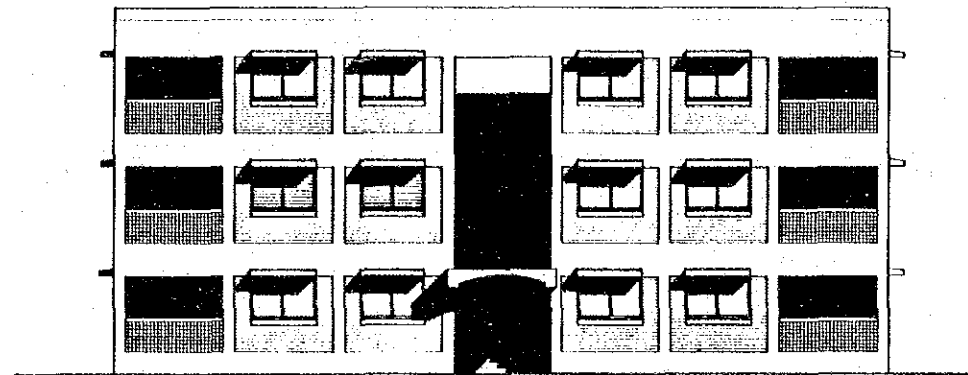




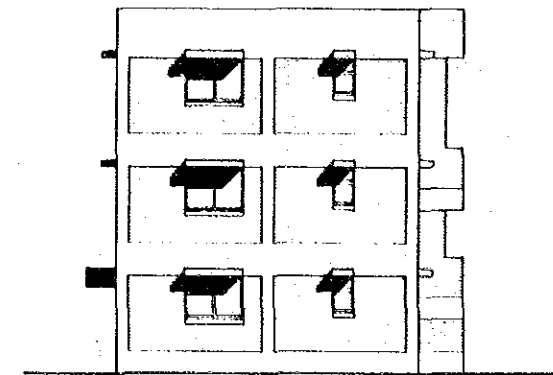
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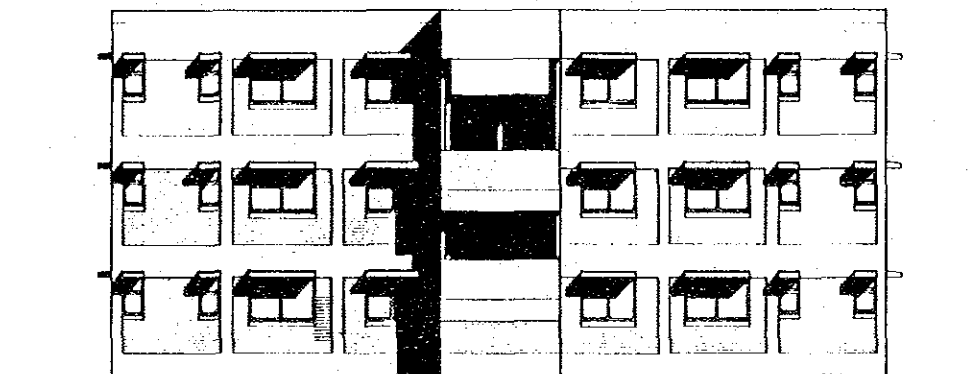
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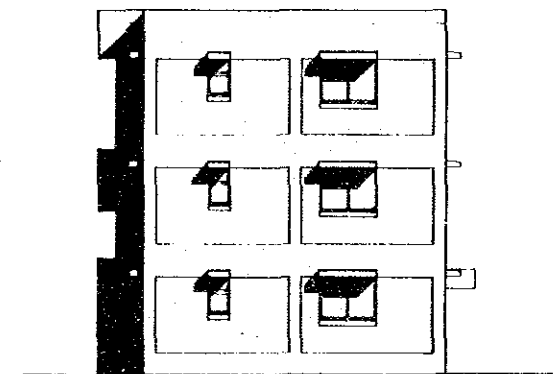
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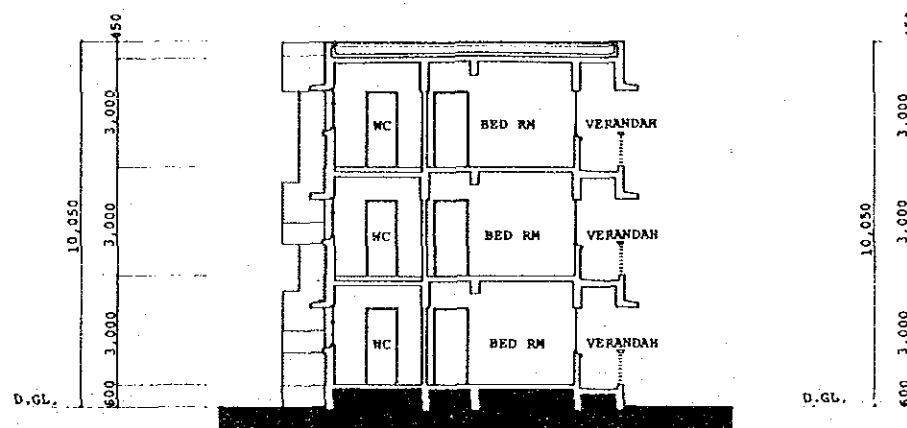
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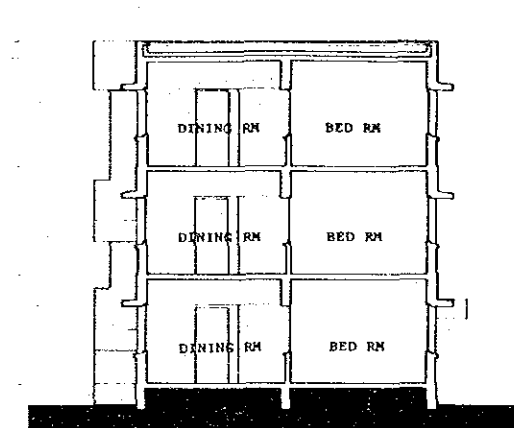
NORTH ELEVATION



WEST ELEVATION



A-A' SECTION



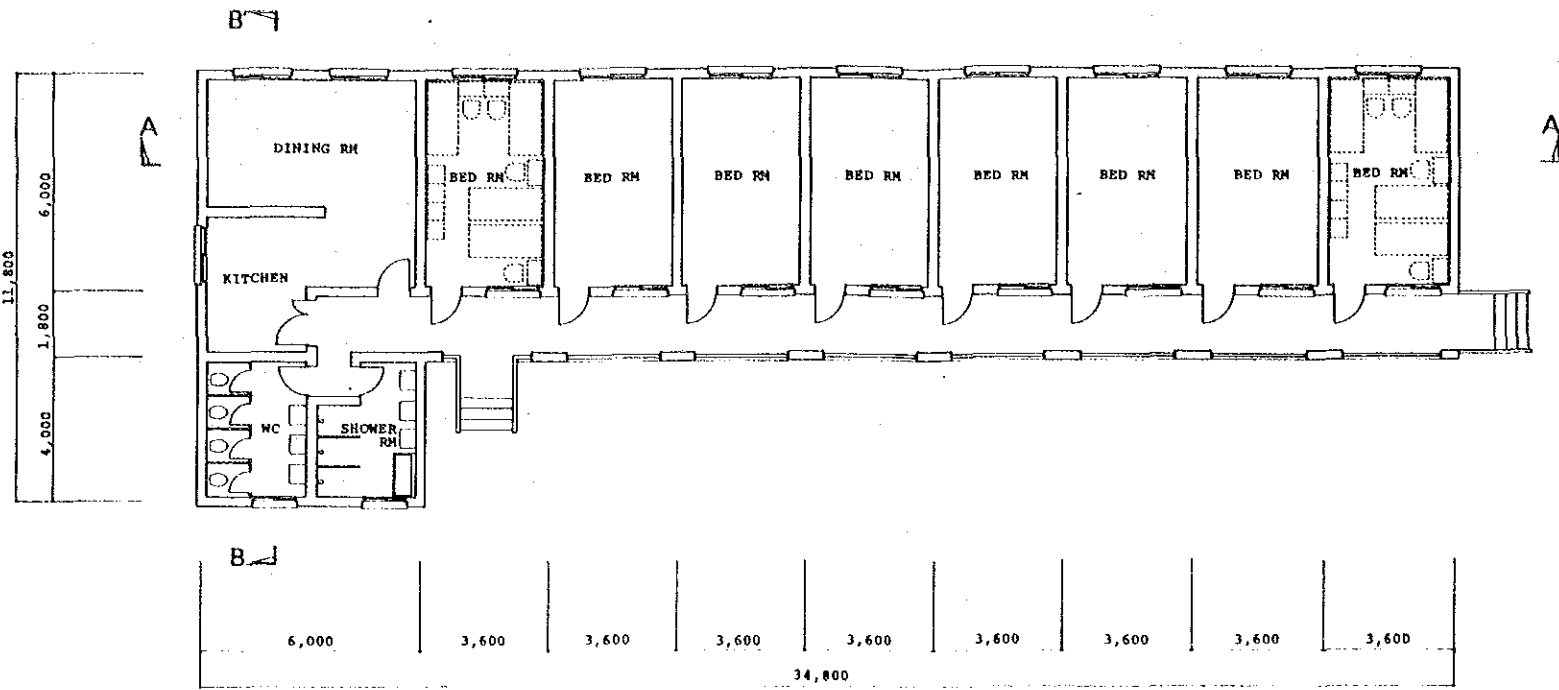
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THE GENERAL HOSPITAL IN NARAYANGANJ DOCTOR'S QUARTER

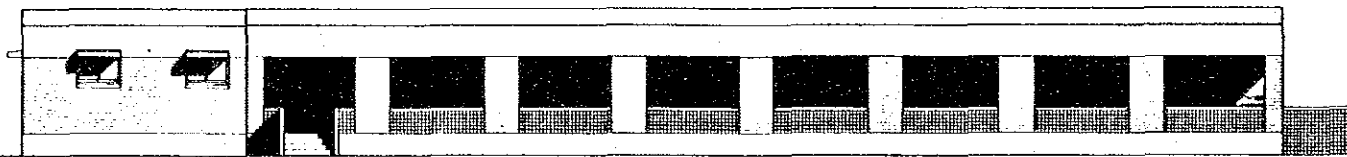
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06



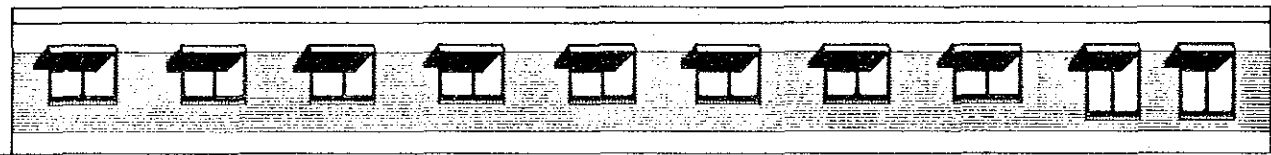
GROUND FLOOR PLAN



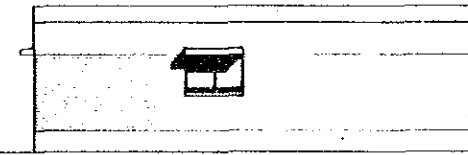
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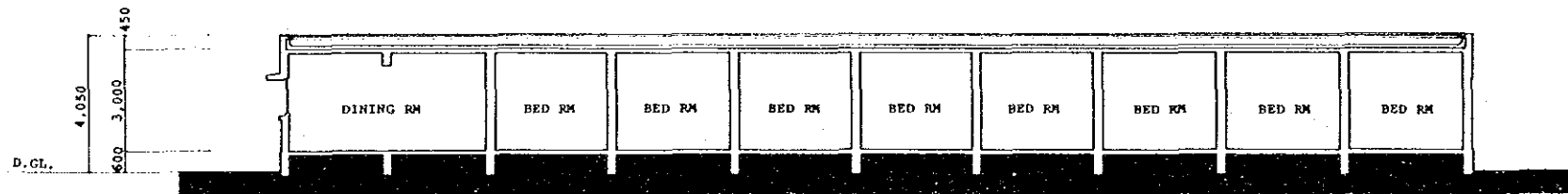
EAST ELEVATION



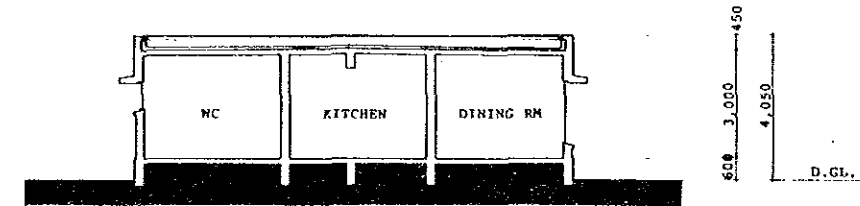
NORTH ELEVATION



WEST ELEVATION

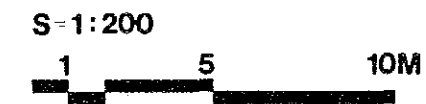


A-A' SECTION



B-B' SECTION

THE GENERAL HOSPITAL IN NARAYANGANJ NURSE'S QUARTER



07

5-9 ROUGH COST ESTIMATE OF THE PROJECT

ITEM	TOTAL	FIRST YEAR	SECOND YEAR	THIRD YEAR
1. Building Work	2,300,000,000	410,000,000	1,360,000,000	530,000,000
2. Equipment	320,000,000	—	260,000,000	60,000,000
3. Consultant Fee	260,000,000	180,000,000	60,000,000	20,000,000
Total	2,880,000,000	590,000,000	1,680,000,000	610,000,000

Currency exchange rate (As of November 1982)

1 US\$ = 23.0 TK

1 US\$ = 266.0 YEN



# CHAPTER 6

## PROJECT EXECUTION SYSTEM





## 6-1 EXECUTION BODY OF THE PROJECT

### 6-1-1 Implementing organization of the project

Implementing organization of the project in Bangladesh side is Ministry of Health as a core, and for constructive affairs, Ministry of Works will advise by case. Closely related posts are indicated as following organizational chart, each reception desk are marked as ① - ⑧.

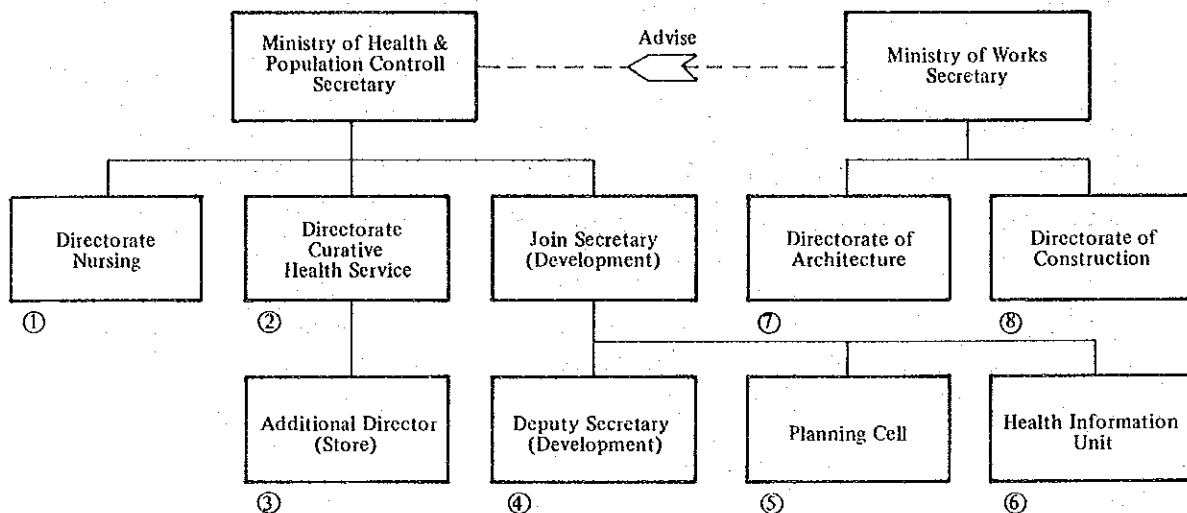


Fig.-9 PROJECT IMPLEMENTING ORGANIZATION CHART

- ① cover right of decision on basic items related to nurse
- ② cover right of decision on concrete items in medicine
- ③ synthetic supply of medical equipment and drugs
- ④ reception desk of transfer items to center directly
- ⑤ general project and reception desk, assistant section by doctor's group is included
- ⑥ information activity relate to all medical insurance, and provide up-to-date news
- ⑦ make advice on design and program relate to construction
- ⑧ make advice on technical problems relate to construction

## 6-2 CONSTRUCTION WORK PROGRAMME

Rainy season in Bangladesh starts in June and lasts in October. Because of clayey geology, and ground water absorption capacity is poor, working progress must be scheduled to finish foundation work before setting of rainy season in June.

The project requires 21 months for all progress of construction include piling work.

By calculating back the progress, construction work should be started in October of previous year.

And prior to commencement of construction work, water and electric supply should be completed by Bangladesh responsibility. And also custom clearance and tariff payment by Bangladesh responsibility during the construction period should be managed quickly.

Site has been prepared flat already, storage for construction material, installation of site offices are possible within the site area. Partially low elevation ground in the existing site area can be filled by construction surplus soil.

### (1) Working system

Refer to grant aid for construction work of the Hospital, after Exchange of Notes are concluded between both Governments, detail design work will be commenced. After completion of the design and documents, several contractors will be called for tender.

### (2) Construction programme

As related above, natural conditions may effect largely on construction period, so careful working programme should be considered.

### (3) Supervising programme

By scale of the project, one resident supervisor throughout all construction period shall be dispatched.

Besides, necessary engineers should be dispatched in response to progress of construction work, and necessary inspections will be managed by the engineer.