BASIC DESIGN STUDY REPORT
ON THE PROJECT
FOR URGENT UPGRADING & STRENGTHENING
OF HEALTH SYSTEM
FOR THE PROVINCE OF BENGUET
IN
THE REPUBLIC OF THE PHILIPPINES

NOVEMBER 1997

JAPAN INTERNATIONAL COOPERATION AGENCY
NIKKEN SEKKEI LTD

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PREFACE

In response to a request from the Government of the Republic of the Philippines Government of Japan decided to conduct a basic design study on The Project for Urgent Upgrading & Strengthening of Health System for the Province of Benguet and entrusted the study to the Japan International Cooperation Agency (JICA),

JICA sent to the Philippines a study team from June 23 to July 17, 1997.

The team held discussions with the officials concerned of the Provincial Government of Benguet, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to the Philippines in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the teams.

November, 1997

Kimio Fujita
President
Japan International Cooperation Agency

November, 1997

Letter of Transmittal

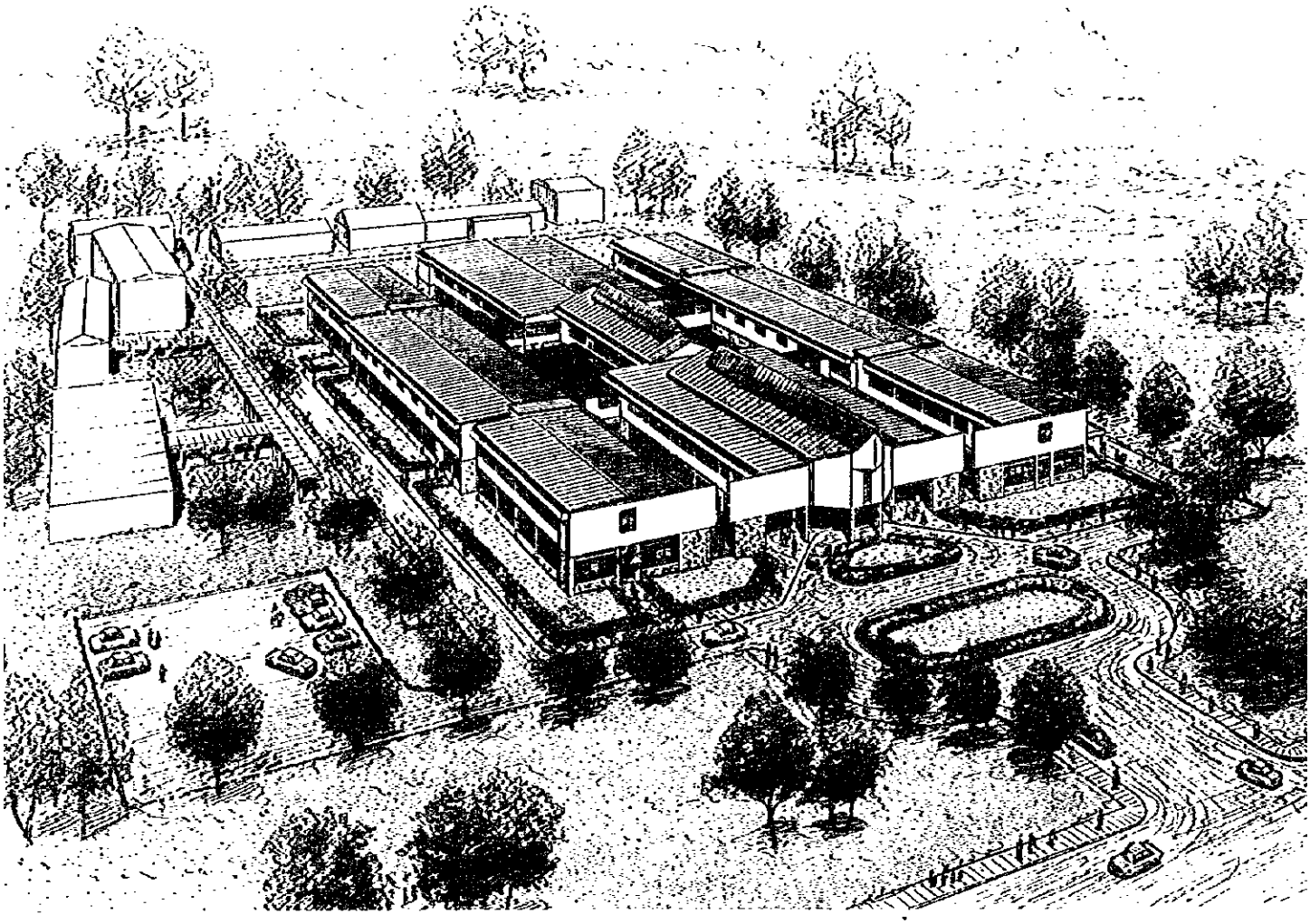
We are pleased to submit to you the basic design study report on The Project for Urgent Upgrading & Strengthening of Health System for the Province of Benguet and Cordillera Region in the Republic of the Philippines.

This study was conducted by Nikken Sekkei Ltd, under a contract to JICA, during the period from June 11 to November 28, 1997. In conducting the study, we have examined the feasibility and rationale of the project with due consideration tot he present situation of the Philippines and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Masami Tanaka
Project Manager,
Basic design study team on the
Project for Urgent Upgrading &
Strengthening of Health System for
the Province of Benguet,
The Republic of the Philippines
Nikken Sekkei Ltd



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CHAPTER 1
BACKGROUND OF THE PROJECT

Chapter 1 Background of the Project

1-1 Present Condition of Health Care in the Philippines

The government of the Philippines, under the regime of President Ramos started in 1992, has been making the efforts to improve a health and living condition of the people, after having accomplished an economic growth and political and social stabilization. Situation of health care and medical services in the Philippines has been gradually improving however, a number of the medical workers and hospital beds are still insufficient and the condition of the medical facilities and equipment need to be improved.

In 1992, 53,023 governmental hospital beds and 36,799 private hospital beds existed in the country. Besides the hospitals, well structured primary health care facilities consisting of 11,072 Barangay Health Stations and 2,327 Rural Health Units, where nurses, midwives and volunteer health workers offer immunization, family planning, mother and child education, etc., have been significantly contributing to the health care of the people.

As an operation of the public hospitals are welfare oriented, they offer clinical services to the poor people for a free of charge. Central or local governments financially support the operation of the hospitals however, the revenue is scarce for innovation of hospitals and equipment. In the rural area there are needs to increase a number of medical doctors.

Table-1 indicates various indices related to health and medical conditions.

TABLE - 1 Indices

	National Average	Car* Average	Benguet Province Average	Japan (1994)
Population (1995)	70,266,876	1,329,477	313,833	125,463,000
(1996)	71,899,136	1,361,656	315,967	1996
Life Expectancy at Birth (1995)	68.25	67.9	64.7	F 82.98 M 76.57
Infant Mortality Rate (per 1000) (1995)	13.70	15.92	12.36	4.2
Maternal Mortality Rate (per 1000)(1996)	0.80	0.87	0.61	0.18
Hospital Bed per Population (1995)	870	549 (include.Baguio)	974	75
Population per Physician (1995)	15,362	13,963 (include.Baguio)	26,469	543
Per Capita government Income (Peso) (1992)		P547.57	P453.48	
Average Family annual Income (1994)	P83,161	P58,876 (include.Baguio)	49,338	

1-2 Present Condition and Issues of Health Care in the Province of Benguet

The Province of Benguet, the site for the Project, is the center of the Cordillera Administrative Region situated at the northern part of Luzon Island. Majority of 316,000 population of the province is minority mountain tribes.

The medical health services in the province of Benguet has a referral structure, composed of 147 Barangay Health Stations (BHS), 13 Rural Health Units (RHU), 5 District Hospitals, and the Benguet General Hospital (BeGH) at the top.

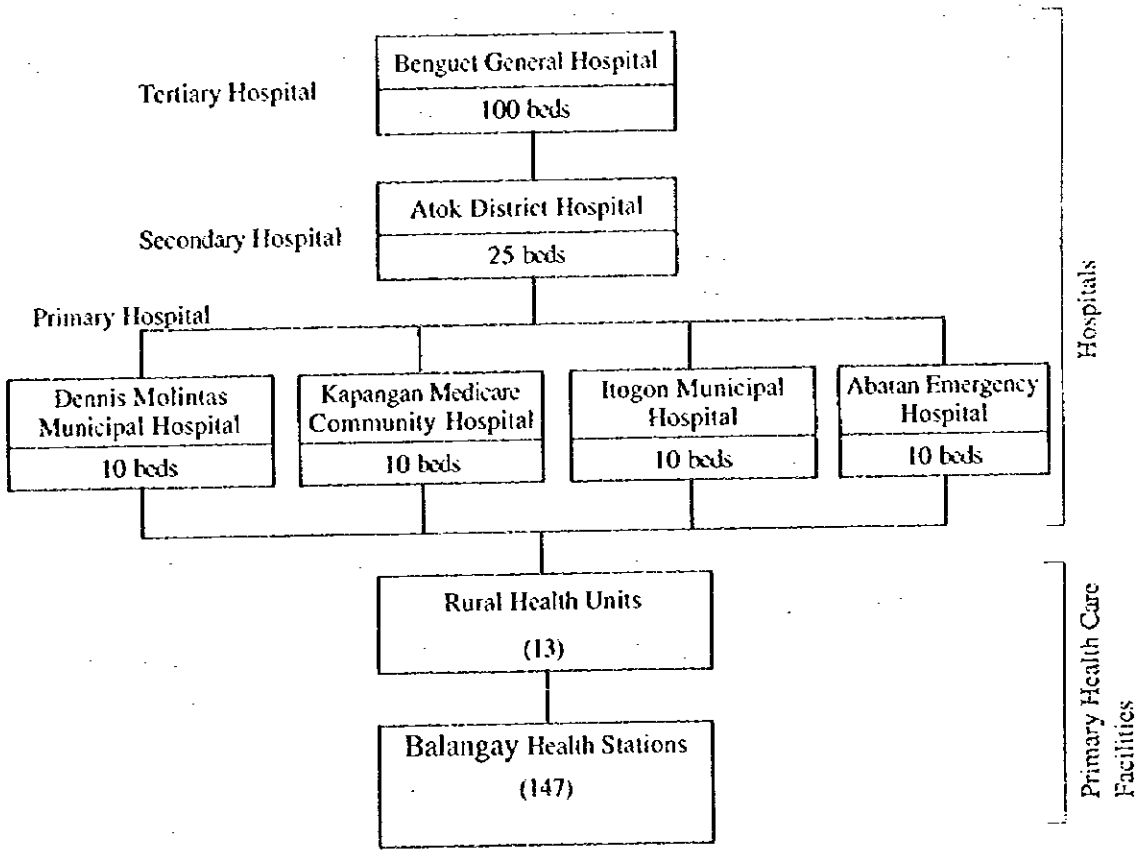


DIAGRAM - 1 Referral Structure in Benguet Province

Tabel - 2 indicates the situation of the hospitals and primary health care facilities in the refferal structure.

TABLE - 2 Activities and Staffing of Facilities

Rank	Name	Medical Services	Bed	Dr	Nurse	X-ray	Labo	Mid-wife	Phar-macist	Patients
Terti-ary	Benguet General Hospital	Medicine, Surgery, Pedia, Ob-Gyne, Dental	100	19	60	4	7	0	3	220
Second-ary	Atok District Hospital	Medicine, Surgery, Pedia, Ob-Gyne	25	5	9	1	3	0	1	110
Prim-ary	Denis Molintas Hospital	Medicine, Pedia, Ob-Gyne	10	3	6	1	1	0	1	80
RHU	Tuba RHU	Immunization, Family Planning, Nothe Child	0	11	3	1	1	14	0	40
BHS		Primary health care	0	0	0	0	0	1 or 2	0	Home visit

This organization structure is well formulated, but the health care delivery in the province has the following issues:

(1) The number of medical institutions and health personnel are very low for the size and population of the province. Although there are 165 public hospital beds and 171 private hospital beds or a total of 336 beds, the number is not only far lower than the proposed NEDA standard of 1 bed per 500 population, but is also lower than the national average in the Philippines. As a result 2,000 patients a year are sent to the Baguio General Hospital & Medical Center in Baguio. This is one of the reasons for over crowding at the Baguio General Hospital.

TABLE - 3 Inpatient Data

Year	Total Discharges	Total Inpatient Days	Occupancy (%)	Average Length of Stay
1973	2,133	15,059	82.5	7
1974	2,396	16,690	91.5	7
1975	2,572	18,004	98.7	7
1976	2,874	21,224	58.1	7
1977	3,516	23,919	65.5	7
1978	3,948	28,419	77.9	7
1979	5,017	34,280	93.9	7
1980	4,811	15,073	41.3	8
1981	4,612	20,813	570.	5
1982	5,121	24,124	66.1	5
1983	5,455	32,204	88.2	6
1984	6,305	31,209	85.5	5
1985	6,255	28,787	78.9	5
1986	6,485	30,811	84.4	5
1987	7,428	36,886	101.1	5
1988	7,058	36,243	99.3	5
1989	6,969	35,155	96.3	5
1990	6,655	30,405	83.3	5
1991	6,655	29,875	81.8	5
1992	6,867	29,583	81.0	4
1993	6,874	26,923	73.8	4
1994	6,971	28,248	77.3	4
1995	7,350	30,596	83.8	4
1996	7,747	31,349	85.6	4

Note) Occupancy rate is against registered number of 100 beds.

A decrease, in 1993 and 94, in the occupancy rate shown in the table above was resulted from a reduction of capacity caused by earthquake. The occupancy rates exceeding 73% after 1995 indicates that extra beds were placed in corridors. Length of stay was reduced to 4 days to accommodate large numbers of inpatients.

(2) 90% of the patients at the Benguet General hospital is the mountain tribes who do not like to be treated at the Baguio General Hospital which for them is too large and urbane. Because of insufficient capacity, Benguet General Hospital is not capable of fully accepting them.

(3) The Benguet General Hospital is positioned to offer tertiary medical service as the top referral hospital in the referral system. However the present conditions, such as unsuitableness of building type for hospital functions (originally a school building), deterioration of the building itself, acute shortage of necessary equipment make it incapable to offer the requisite services. As a result Benguet General Hospital operates not as a tertiary hospital, but rather as the hospital offering medical services at the secondary hospital level. This means that Benguet Province does not have a satisfactory hospital at the tertiary level in spite of their well-organized referral structure.

(4) Tabel below indicates that there are a number of outpatient for each of five departments the hospital has at present.

TABLE - 4 Outpatient Record

Department	1992	1993	1994	1995	1996	Ave.
Medicine	19,899	20,248	20,164	19,076	19,819	19,841
Surgery	8,019	8,792	8,179	8,755	9,293	8,507
Ob-Gyn	7,056	6,828	8,111	8,724	8,391	7,822
Pediatric	21,655	21,813	22,586	24,221	24,404	22,935
Dental	5,719	2,658	2,866	3,251	3,841	3,667

In addition to the patients for the existing departments, orthopedic, EENT and psychiatry patients come to the hospital as indicated bellow.

- EENT: 490 Ophthalmic patients and approximately 3000 ENT patients per year.
- Orthopedics is included in the surgery department at present with 148 treatment cases per year. There were 56 surgical operations in 1995 and 41 in 1996.
- Rehabilitation department: there are many patients who need physiotherapy and are now sent to another hospitals.
- Psychiatry: As the present hospital is not capable of taking care of the patients, psychiatric patients are sent to Baguio General Hospital.

- A present status of the Benguet General Hospital does not comply with the standard requirements for the tertiary hospital established by DOH as indicated below.

TABLE - 5 Tertiary hospital Requirements

	Standard	Benguet General Hospital
Clinical Services	Medicine Pedia Surgery Orthopedic Ob-Gyne EENT Psychiatry –	Medicine Pedia Surgery – Ob-Gyne – – Dental
Ancillary Medical Services	Laboratory Pathology Blood Service Anesthesia Radiology Pharmacy Social Service	Laboratory – – Anesthesia Radiology Pharmacy Social Service
Facility (excerpt)	Operation rooms to be airconditioned	Operation rooms are not airconditioned

(5) Medical equipment of the medical institutions at lower ranks in the referral system are deteriorated however can not be renewed due to financial difficulties and reduce the medical services.

(6) These institutions are dispersed as the map on P. 42 of the Report shows. Many in remote areas are without telephone lines and mobile telephones cannot be used because of the mountainous terrain. Communication between these institutions is in very poor situation at present.

1-3 Content of Request

Provincial Government of Benguet has established 'Benguet Province Master Plan 1996 - 2000' in order to improve the above mentioned issues and projected the plans for an improvement of the medical facilities, equipment and human resources. For an improvement of the health care delivery system in the province, it is considered to be indispensable to improve the medical referral system which is currently incomplete. The important and effective measure for this purpose is to upgrade the Benguet General Hospital to the level of the tertiary hospital to become capable of leading the medical care activities in the whole province. Also it is important to upgrade the other medical institutions in the referral system to improve their health services within their jurisdictions. These are projected in the Benguet Provincial Master Plan as the priority project.

Because the Province of Benguet is not capable to implement these projects by themselves due to a lack of a source of revenue, the Government of the Philippines has requested the Government of Japan to provide a grant aid for the realization of the project.

A content of the request is as follows:

(1) Construction of the new hospital of 200 beds and the procurement of the medical equipment. Clinical departments of EENT, Orthopedic and Psychiatry and ancillary services of rehabilitation, ICU, CCU, NICC will be newly included. Facilities for education and training department will be enlarged

(2) Medical and telecommunication equipment for 5 District Hospitals and 13 Rural Health Units.

TABLE - 6 Requested Floor Area

Department	Floor Area m^2
1. Administration	570
2. OPD	814
3. Emergency	198
4. Radiology, Laboratory, Pharmacy	518
5. Operation	459
6. Delivery	408
7. Nursery	144
8. Nursing Unit 200 beds	2,660
9. Dietary	659
10. Maintenance	423
11. Laundry	315
12. Training, Education	705
13. Auditorium	225
14. Common Space	4,431
Total	12,529

CHAPTER 2
CONTENTS OF THE PROJECT

Chapter 2 Contents of the Project

2-1 Objectives of the Project

The objective of the project is to develop medical services and education of the provincial health personnel through a construction of the new hospital building and a provision of the medical equipment for the Benguet General Hospital, and to strengthen the health services of the district hospitals and rural health units through an improvement of the medical equipment to contribute the strengthening of the medical referral system in the Province of Benguet.

The following diagram shows the relationship between the goal, objective, results and inputs of the project.

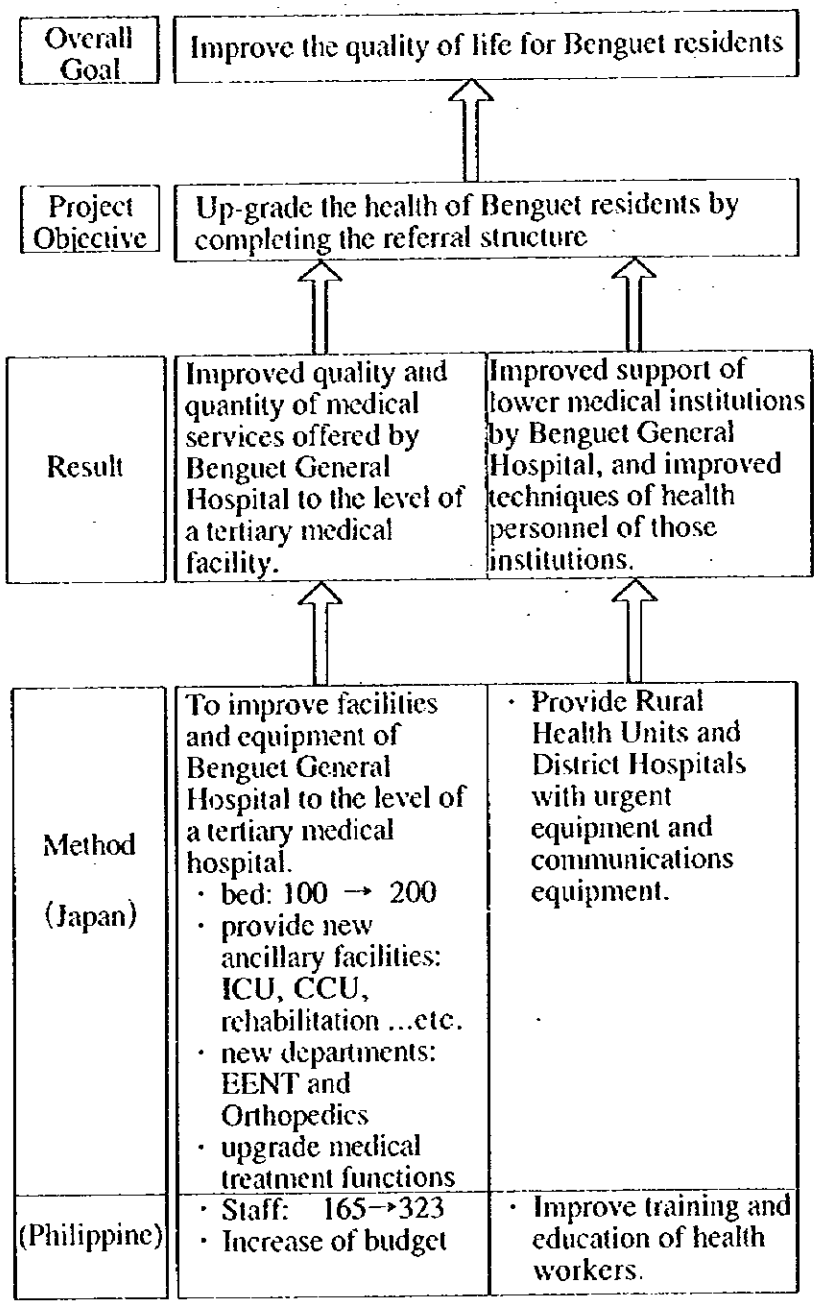


DIAGRAM - 2 Relationships among Project Goals

2-2 Basic Concept of the Project

The following plans are made to fulfill the objectives of an improvement of the condition of the Benguet General Hospital and a strengthening of the health services of the medical institutions of the lower ranks.

(1) Improvement of the Benguet General Hospital

1) To construct the new building of 11,000 m^2 in a total floor area

- At present many out-patients are sent to the Baguio General Hospital due to a shortage of the bed. A number of the bed will be increased to 200 to solve such situation.
- At present there are no clinical services for EENT. Also the orthopedic is not an independent department but attached service to the surgery department. In order to improve such situation as well as to comply with the standard requirements for the tertiary hospitals of the DOH, departments of EENT, Orthopedic cum rehabilitation services will be newly established in the hospital. Nursing services will be strengthened by a provision of ICU, CCU, NICU and Septic nursery. Psychiatry services will be added to the hospital's activities but for the time being it will not be an independent department but the services attached to the Medicine Department. One specialist consultant doctor will examine the patients and when necessary, the patients will be sent to the Baguio General Hospital for further examination and treatment.
- Seminar rooms and coordination office will be provided in the hospital as the education and training are important activities of the hospital.

(2) Procurement of medical equipment and radio communication facilities for the medical institutions of the lower ranks

1) To procure medical equipment urgently needed by 5 district Hospitals and 13 Rural Health Units in order to strengthen the health services for the mountain tribe populace and to improve a medical referral system of the Province.

- At present many out-patients are sent to the Baguio General Hospital due to a shortage of the bed. A number of the bed will be increased to 200 to solve such situation.

2) To procure the radio communication equipment to improve a communication between the Benguet General Hospital and 5 District Hospitals and 13 Rural Health Units which is in very poor condition at present.

(3) Equipment in advance procurement

Until the completion of the new building of Benguet General Hospital, medical services at existing hospital must be continued. But, considering the poor condition of existing equipment, it is ideal that some new equipment will be provided as early as possible in order to improve the level of medical services sooner. Equipment for the District Hospitals and Rural Health Units will be procured at the same time as these are to be used in the existing buildings even in the future.

2-3 Basic Design

2-3-1 Design Concept

Based on the deliberation of the meetings at the basic design survey and the result of evaluation of the current situation of the health services in the province of Benguet and the content of the request for grant aid, the basic design is performed in accordance with the following concepts.

(1) Making the most of a cool climate of the highland, the building will be planned to utilize a natural ventilation.

(2) To design the building to harmonize with the local townscape and environment and not to be luxurious, yet to look like as a modern medical institution. Also consideration to preserve or improve the environment of the surrounding area will be taken.

(3) To design the building which can be constructed with normal local construction techniques and materials for reasonable costs.

(4) To design the building in conformity with the local regulations and standards. Where there is no regulations for important matters as a safety, US or Japanese regulations will be taken into consideration however, in line with the local practice. Engineering Office of the Provincial Government of Banguet is going to assist the consultant in checking the design to see the conformity with the regulations and give advices on the findings. They are going to obtain the permits and approvals of the authorities required for the construction of the project. Therefore it is not necessary for the consultant to employ the local licensed architect for that purposes.

(5) To lower the maintenance and operation cost, an energy savings measures such as utilitation of natural ventilation and lighting, adoption of solar energy and use of durable materials will be considered.

(6) Consideration for Social Conditions

It is observed in the present Benguet General Hospital and other hospitals that there are many family members accompanying the patients. It is necessary to secure enough space for waiting lobby not to cause congestions.

Local people are pious Christians. The family of the patients and the hospital staff often pray in the hospital for the patients. It is anticipated that they use one of the conference rooms for prayer.

(7) Principles for Selection of Equipment

- Replacement of deteriorated existing equipment and provision of basic equipment required for basic clinical activities
- Equipment which can be operated with techniques of the medical staff of the hospital
- Equipment which will be maintained with the cost bearable by the hospital

2-3-2 Basic Design

(1) Site and Layout Plan

1) The site for the project will be the site of the existing hospital as it has a sufficient area. Also in this site the existing buildings can be used to supplement the hospital services. The site is suitably situated for the project as it has a good traffic access, infrastructures of good condition and is close to the National Benguet University and La Trinidad Municipality.

2) Principles for Planning

a. Medical services of the present hospital must be able to continue while construction work is in progress.

b. The Philippine side will fill the land and level the site which is now lower than the level of the highway and sloped down toward west.

c. The front surface of the new facility shall be set back from the highway to align with the front of the La Trinidad Municipal Hall to maintain a harmonized city scape. The land left open between the hospital and the highway will be landscaped by the Philippine side.

d. The new hospital complex will be laid out along three axis with sufficient open space kept between the buildings to ensure adequate natural light and ventilation. Windows will be basically on the north and south sides of the buildings to secure the natural ventilation.

e. Space will be set aside on the west side of the property for future expansion.

f. Drive way will be provided around the buidling for convenience and fire fighting activity.

g. The local custom for outpatients is to enter the hospital not from the main entrance but from the side entance. But, with the concept that the patient is a master of the hospital, in the present design an attempt is made to introduce the idea that patients share the use of the main entrance and lobby with doctors and visitors.

3) Utilization of Existing Buildings

There are 8 existing buildings and 2 buildings under construction in the site as shown in the following diagram. After completion of the new hospital, these will be remodeled and used to supplement the functions of the new hospital building as indicated in the table on the next page.

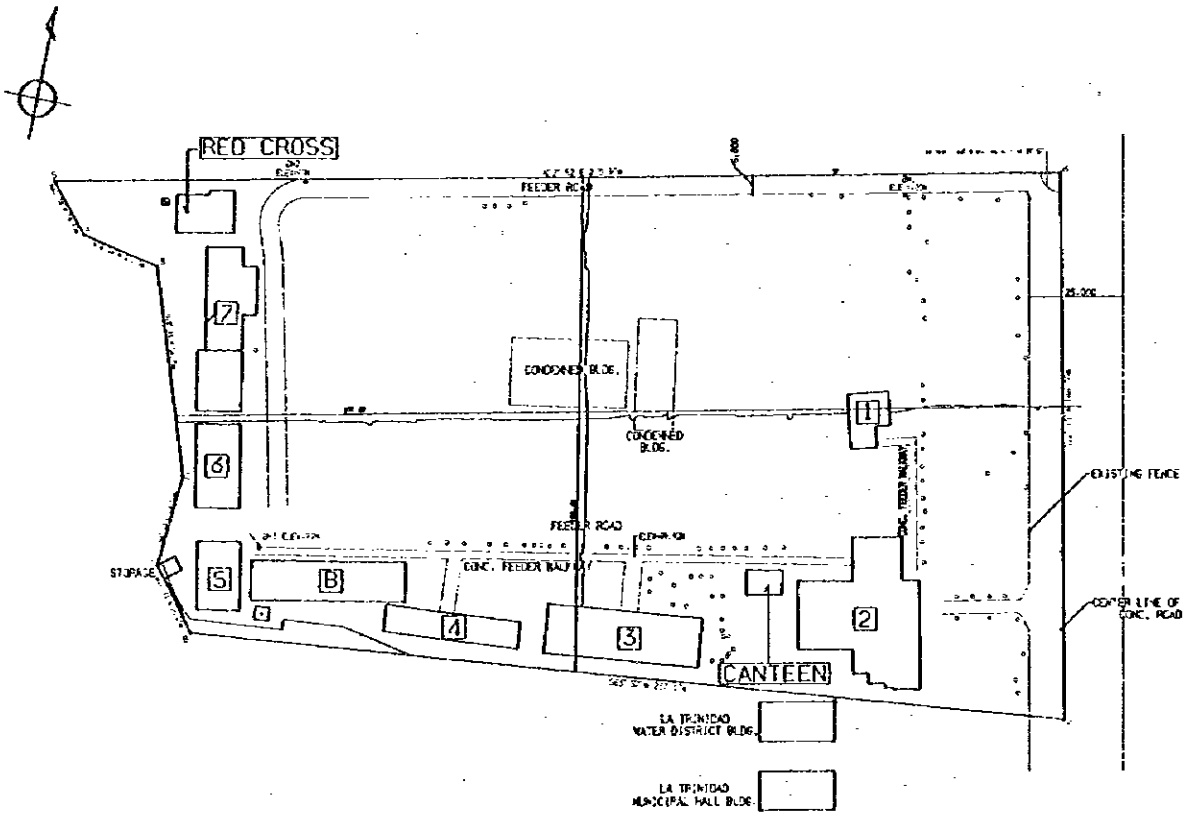


DIAGRAM - 3. Existing Buildings

TABLE - 7 Utilization of the Existing Buildings

Bldg. No.	Structure	Floor Area (sq. m.)	Present Use	Future Use
No. 1	Wood, one-story	160	Chief nurse room, meeting room, Surgeon's office	To be demolished before project construction.
No. 2	Wood, one-story	1,098	Main hospital building	To be demolished after project construction.
	Wood, one-story	65	Canteen	To be demolished after project construction.
No. 3	RC, one-story	525	Outpatient department, pediatrics ward, training department, office, small meeting room	Immunization, small meeting rooms, library
No. 4	RC, one-story	668	Medicine department ward, storage	Doctors' office, nurse resting room, staff room
No. 5	RC, two-story	460	Storage, meeting room 1st Fl.	Storage, 2nd Fl. small meeting room
No. 6	RC, one-story	305	Administration department	Visitor dining, kitchen (operated by cooperatives)
No. 7	RC, one-story	445	Garage, Laundry	Garage, plant for iodization of salt
Annex B Bldg.	RC, two-story	882	1st Fl.: Mother education, water quality examination laboratory, primary health care 2nd Fl: Accommodation for trainee	
Red Cross Bldg.	RC, two-story	350	Blood bank (for entire Benguet province)	

(2) Architectural Design

1) Floor Planning

a. Size and Grade

In Japan, a floor area of recent hospitals is no less than 50 m^2 per bed. An area per bed of the plan attached to the request of the Philippine side is 62 m^2. In the basic design for the project, the area for out-patient department is enlarged while the areas for administration, service and education/training are reduced from the request. Total floor area of the basic design is approximately 11,000 m^2. The overall floor area per bed is 55 m^2, or 49.2 m^2 if the area assigned for the Health Education and Training Department is excluded. Above figure for the project may be said to be a minimum sufficient by present standards.

As for the requirements for the sizes of the rooms of the hospital, "Manual on Technical Guidelines for Hospitals & Health Facilities Planning and Design" issued by the Department of Health (DOH) are observed and the standard plan for 100 bed hospital and "Hospital Standard Requirements for Physical Facilities" prepared by DOH are referred to. "Hospital Standard Requirements" is attached as Appendix 5.

b. Outpatient Department

The table below shows that the number of outpatients has increased 2.5 percent annually on average since 1993.

TABLE - 8 Outpatient Consultations

(persons)

Year	New	Old	Total	Ave./Day
1991	21,692	48,225	69,917	191
1992	18,746	45,017	63,763	174
1993	18,611	41,810	60,421	165
1994	22,097	39,897	61,994	170
1995	21,348	43,545	64,893	177
1996	20,761	45,127	65,888	180

The number of outpatients for each department is as listed below.

TABLE - 9 Outpatient Record

(persons)

Department	1992	1993	1994	1995	1996	Ave.
Medicine	19,899	20,248	20,164	19,076	19,819	19,841
Surgery	8,019	8,792	8,179	8,755	9,293	8,507
Ob-Gyn	7,056	6,828	8,111	8,724	8,391	7,822
Pediatric	21,655	21,813	22,586	24,221	24,404	22,935
Dental	5,719	2,658	2,866	3,251	3,841	3,667

Referring to the list above, the consulting rooms are allotted as follows:

TABLE - 10 Allocation of Consulting Rooms

	Basis of Allocation	Number of Room
Medicine	19,841×1.15÷312 d×15 m÷60 m = 18.3 hr ÷7 hr = 2.6 → 3 ECG 1	4
Surgery	8,507×1.15÷312 d×25 m÷60 m = 13.1 hr ÷7 hr = 1.9 → 2 Treatment Room 2	4
Ob-Gyne	7,822×1.15÷312 d×20 m÷60 m = 9.6 hr ÷7 hr = 1.4 → 2 Internal Examination 1 Family Planning 1	4
Pediatric	22,935×1.15÷312 d×15 m÷60 m = 21.1 hr ÷7 hr = 3.0 → 3	4
Dental	3,667×1.15÷312 d×30 m÷60 m = 6.8 hr ÷7 hr = 1.0 → 1	1
Orthopedic	(New to be shared by Surgery)	1
Eye	(New)	1
ENT	(New)	1
Psychiatry	(New to be shared by Medicine)	1
Total		21

A space for the outpatient department becomes larger compared to the hospitals in Japan to secure ample space for many watchers and to provide the consultation rooms for the consultants.

Physicians in both public and private hospitals in the Philippines are composed of consultants and residents. A consultant is a part time medical specialist who has his/her own patients and exercises medical examinations for them. The consultants rank above residents who work under guidance of consultants. The consultant's fee is paid by pay patients and examination and surgical operations are executed in the facilities provided from the hospital, producing income in a kind of open system. The reputation and the position of a hospital is raised by the number of excellent consultants it accommodates. The Benguet General Hospital does not have any consultants at present, but there will be two doctors in each of the four major departments, and one each in Eye, ENT, Orthopedics and Psychiatry for a total of 12, requiring 12 consulting rooms.

Loose furnitures for the clinical activities in this department are to be included.

c. Emergency Department

There are many emergency cases: 18,213 cases in 1996, reaching 50 cases a day on average. The most common cases are pneumonia, bronchus, tonsillitis, pharyn-gitis, digestive disease and injury. As more patients are expected, this department are strengthened. Five consultation rooms for medicine, pedia, ob-gyne, EENT and ORT and Minor Operation Room are provided.

TABLE - 11 Emergency Application(1996)

Department	Patients
Medicine	6,246
Surgery	5,132
Ob	2,089
Gyn	663
Pediatric	4,101
Total	18,231

d. Laboratory

In addition to the conventional examination of blood, urine, feces and bacteria, new pathologic examinations will be added to satisfy the criteria for tertiary hospitals. Additional tests for conventional examination are also planned. Blood bank functions, separate from the Red Cross blood bank under construction on the site, will handle blood donations and emergency blood specimen collection and analysis on off-days of Red Cross. The number of staff in the laboratory will increase from seven to fifteen.

e. Operating Room

There are not many patients having surgical operation at present because of poor existing facility. It is estimated, however, that the number will double. Four operating rooms will be provided as follows:

TABLE - 12 Number of Surgical Operation Cases, by Type

	Estimation for year 2003
1, 2. Cesarean section, Surgery	1,332
3. Outpatient surgery, injuries, orthopedics and emergency surgery	168
4. EENT	88
Total	1,588

"District Hospital Guidelines for Development, 1992" issued by Western Pacific Regional Office of WHO in Manila recommends one operation room per 50 beds. According to this, four operation rooms are considered as appropriate.

Arrangement of operating rooms shall be hall type and change of clothing and footware shall be exercised for cleanliness. Air-conditioning is installed to maintain this area clean.

f. Delivery Department

Septic Nursery is provided separately from ordinary nursery room. In this hospital, healthy newborn babies generally stay with the mothers so the room for newborn babies is not required.

g. Pharmacy

The process for the dispensing of medicines is: presentation of the prescription at the Pharmacy counter → computation and payment of charges (when unable to pay → Social Services) → receipt of medicines from the Pharmacy. Various counters involved in this process are located in the Entrance Hall. As the Pharmacy will operate a twenty-four hour service, an on-duty room is provided.

h. Rehabilitation Section

This section is situated so as to be easily accessible from both the Outpatient Department and the Nursing Units. As no DOH standard design was available for this section, the American standard was used as a reference.

i. Radiology Department

This department is centrally located to enable a convenient access from the Emergency Department, the Outpatients Department and Nursing Units. The Endoscope Room and the Ultrasonic Scanner Room are located in this section, thus consolidating all the on-screen diagnostic monitoring equipment in the same area.

j. Nursing Units

A number of bed in the Nursing Unit is 188, by deducting 3 ICU beds, 3 CCU beds, 2 NICU beds and 4 Septic Nursery beds from the total number of 200 beds.

- The number of inpatients for each department in 1996 is as listed below.

TABLE - 13 Inpatient Record (1996)

(persons)

	Medicine	Pediatrics	Surgery	OB-Gyn	Total
Patients	2,068	2,143	819	2,717	7,747
Rate	26.7%	27.7%	10.6%	35.0%	100%

The new surgery department may increase a demand for number of bed due to newly introduced Orthopedic and EENT patients. Because the structure of the building will not easily allow differently sized wards distributed as shown in the table above, wards of 47 beds will be assigned to each department. Nursing units in the region are generally composed of approx. 50 beds as is planned in the new facility.

- Pay Beds

  Type of patient in terms of payment and the assumed percentages of each type are shown in the table below.

TABLE - 14 Ratio of Payment Classification

Classification	payment style	% of total patients
A	100% self-pay	20%
B	Medicare, self pay for the excess	20%
C	Medicare, excess to be paid by province or partly self-pay	10%
D	charity patient	50%

This leads to the assumption that all type A and half of type B patients, (30% of the total), will be assigned to pay beds.

TABLE - 15 Distribution of Pay Beds

	private	two beds	four beds	total
No. of rooms	20	12	4	35
No. of beds	20	24	16	60
Fee (peso)	250	200	150	

For reference, the present condition of Baguio General Hospital is as follows:

TABLE - 16 Pay Beds in Baguio General Hospital

	Total bed	Private	Six bed
Bed	400	12	102
Fee (Peso)		250	200 (150 when used as eight bed room)
Rate		3%	25.5%

Location of Nursing Units for each department was agreed as follows.

- Northeast: Medicine
- Northwest: Ob-Gyne
- Southeast: Pediatrics
- Southwest: Surgery, Orthopedics, EENT

Pay beds will be located between two charity bed units for flexible use by two departments.

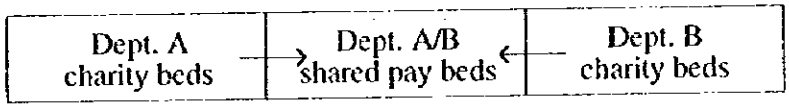


DIAGRAM - 4 Composition of Beds

k. Social Service

Taking the feelings of the patients visiting this service to apply for charity classification into consideration, this office is located off the main lobby.

l. Training and Education

Activities of this department are one of the important roles of this hospital. Six staff members assisting the chief who is a medical doctor organize 30 seminars and training courses a year now. When the new hospital is completed, four staff members will be added and more activities as listed in Appendix 6 are planned.

The Seminar Rooms as listed below, Training Coordination Office and Reference Room are provided for use for this activity. When more seminar rooms are needed, small meeting rooms to be provided in the existing buildings No. 3 and No. 5 in the future may be used, although these are not conveniently located and properly furnished.

TABLE - 17 Seminar Rooms

	Area	Capacity (persons)		No. of Room
		Table & Chair	Chair with memo table	
Small Seminar Room	36 m^2	18	24	2
Medium Seminar Room	72 m^2	42	60	1
Large Seminar Room	126 m^2	60	116	1

m. Administration

Floor area for this department is relatively small, because

- Shared use of a room by the department heads. No individual offices required.
- Changing and resting rooms for doctors, nurses and the other staff members and staff meeting rooms will be situated in the existing buildings.
- There will be no dining facilities for visitors and watchers. They will dine in the Cooperative Cafeteria to be located in the existing building.

n. Service Section

Whereas relatively little space is needed for laundry and housekeeping in Japanese hospitals due to out sourcing, a sufficient space is assigned for these services which are to be handled all in-house.

Existing building in the site will be utilized for garage space.

2) Vertical Design

- The complex will be constructed on two levels.
- Ceiling height is to be an usual height of 3,000 mm to accommodate natural ventilation.

3) Structural Design

a. Principles for Structural Design

- Calculations of stress and sizing of the structural members will be made in conformity with the Philippine standards. ACI code and the standards of Architectural Institute of Japan will be used as a reference.
- Reinforced concrete structure will be used as it is the commonest structural system in the Philippines and because of its aseismic properties. The use of reinforced concrete walls as a horizontal load-resistance element will be considered. Although concrete block wall is common and reinforced concrete wall is seldom used in the Philippines, reinforced concrete walls will be used at critical points in the building to improve the aseismic strength of the complex.
- In order to reduce the weight of the structure and to minimize costs, a concrete roof slab will not be provided. Steel roof frames will be constructed for ribbed metal roofing. This is the most common construction method in the region.
- Expansion joints will be provided at intervals as the building is very lengthy.

b. Live Loads

Live Loads in the following table will be adopted.

TABLE- 18 Live Load

Use of Space	Load(daN/m^2)[kg/m^2]
Patient Rooms	200 [204]
Consultation Rooms, OR, DR	300 [310]
Corridors and Hall	300 [310]
Offices	300 [310]
Storages	500 [510]
Roof	50 [52]

c. Wind pressure

The construction site is located in Zone II, which is listed as having a wind pressure factor of 20 psf (100 kg/m^2) for purposes of structural design.

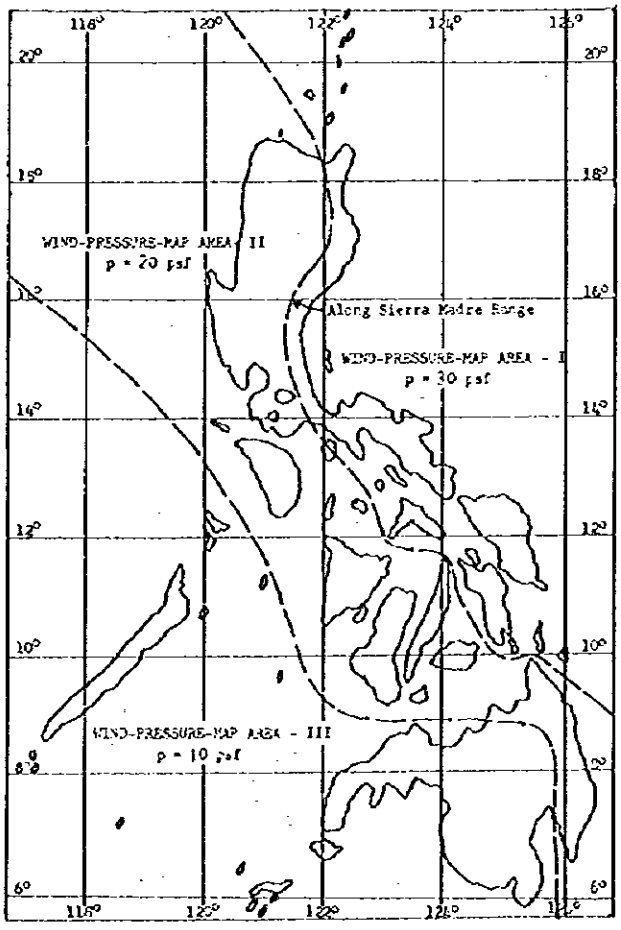


DIAGRAM - 5 Philippine Wind pressure Distribution Map

d. Seismic Force

Association of Structural Engineers of the Philippines (ASEP) specifies that the design seismic force shall be determined in conformity with to the American "Uniform Building Code". The Aseismic Design Standard of Japan may be also taken into account in the aseismic design.

The construction site falls within the Philippine Earthquake Zone (3), and its design seismic load (V) is calculated as follows:

V = ZIKCSW = 0.108 W

Zone Coefficient	V = 3/4 (Zone 3)
Importance Coefficient	I = 1.5 (Important building)
Structure Type	K = 0.8
Shearing Coefficient	C = 0.12
Earthquake Response Coefficient	S = 1.0
Weight of the Building	W

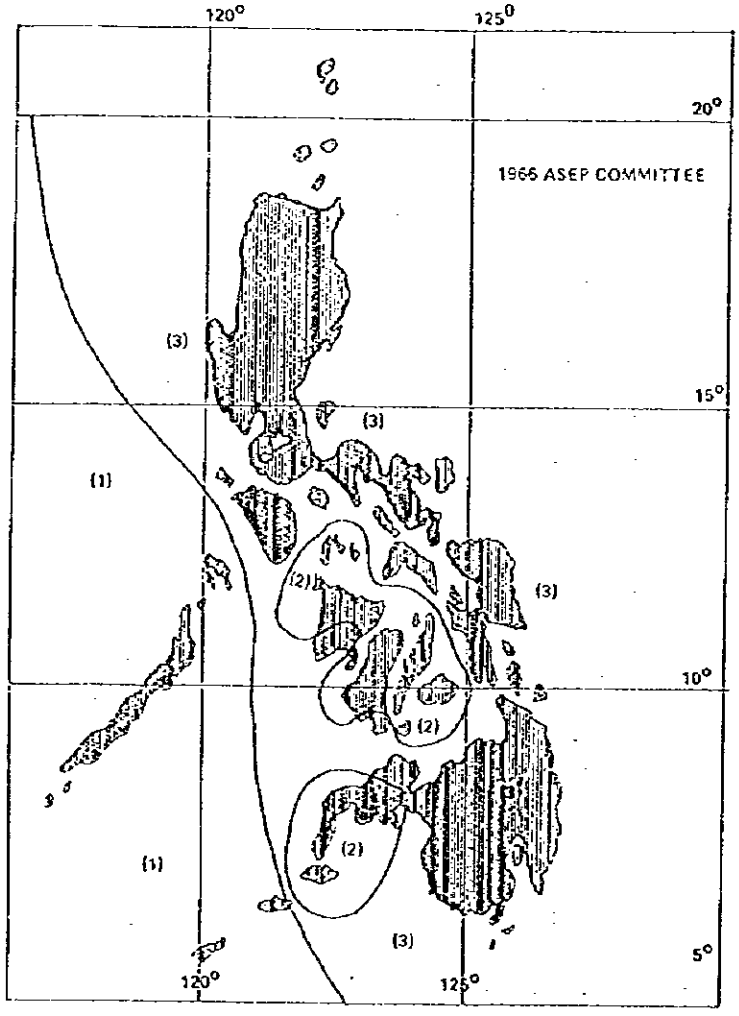


DIAGRAM - 6 Philippine Earthquake Distribution Map

e. Foundation Bed and Foundation Design

According to on-site boring tests, the strata of the site consists of a clay layer and silt, and the gravel layer which is considered to be a good stratum to support the pile foundation is located at a level of some 40 meters or more in depth.

As to the type of a foundation to be used, a pile foundation would make the design extremely uneconomical and can not be adopted. Laboratory tests of the soil have revealed that the clay and silt at the site may not be strong, but they are overcompressed and there is no worry about settlement due to the weight of the buildings. Therefore a direct isolated footing foundation will be used in the design, with the balance between the weight of the building and that of the excavated soil. The bottom of the isolating footings will be set at level of -500 mm below the present ground level. Soil improvement will be exercised underneath the footings for the depth of 1 m.

Prior to the detailed structural design, load bearing tests will be carried out to determine a bearing capacity of the soil.

4) Electric System

a. Switchgear and Transformer System

Electricity is to be led in from the high tension line on the road in front of the hospital.

Lead-in method:	pedestal method
Incoming system:	3ø3W 23.0KV (60Hz)
	one-circuit incoming

[Switchgear and Transformer System]

Type: indoor enclosed type power distribution panel

Capacity of the transformer:

self cooling oil immersed

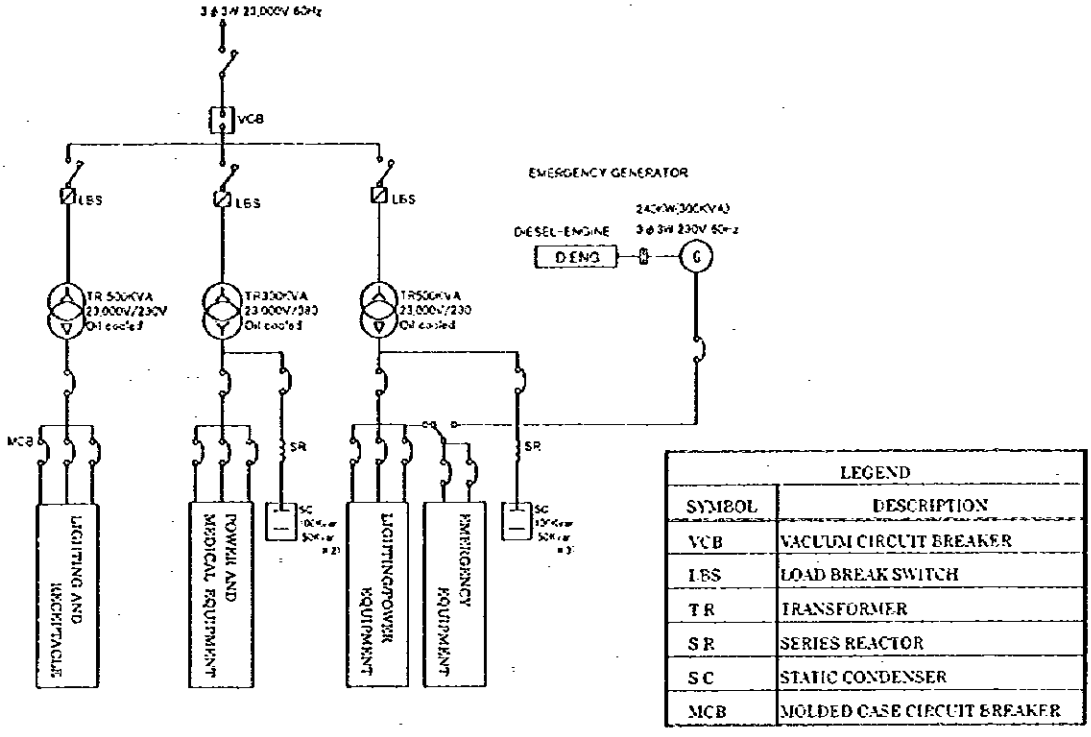
3ø 500KVA x 2 transformers (23.0KV/230V)

3ø 300KVA x 1 transformers (23.0KV/380V)

Low tension static capacitor:

100Kvar x 1 (50Kvar x 2)

150Kvar x (50Kvar x 3)



LEGEND	
SYMBOL	DESCRIPTION
VCB	VACUUM CIRCUIT BREAKER
LBS	LOAD BREAK SWITCH
TR	TRANSFORMER
SR	SERIES REACTOR
SC	STATIC CONDENSER
MCB	MOLDED CASE CIRCUIT BREAKER

DIAGRAM - 7 Single Line Connection Diagram for the Switchgear & Transformer System

b. Generator System for Emergency

An emergency generator system is planned for power failure.

Type:	diesel-engine generator (indoor package)
Fuel:	light oil for diesel (capacity of oil tnak: one day)
Capacity:	240KW (300KVA)
Supply voltage:	3ø 3W 230V

TABLE- 19 Supply Load of the Generator

Department	Area	Lighting	Receptacle	Air Conditioning & Plumbing System	Medical Equipments	Notes
A. Ward	2,948	○(20%)	○(10%)	× ○(partly)	○	air conditioning for ICU, CCU, NICU
B. Outpatients Department	1,528	○(20%)	○(20%)	×	○	
C. Consultation Department	2,025	○(20%)	○(20%)	× ○(partly)	○	air conditioning for operating rooms (2 of 4 rooms)
D. Supply Department	1,221	○(20%)	○(20%)	×	×	
E. Administration Department	1,300	○(20%)	○(20%)	×	×	
F. Common Use		×	×	○	×	water supply pumps etc.
Total	10,000 m^2	27KVA	30KVA	180KVA	18KVA	total 255KVA →300KVA

c. Main Line System

Power for motor control and lighting: CV Cable
Power for disaster prevention systems: FP Cable
Power for radioactive rays: CV Cable

d. Lighting and Receptacle System

Voltage of power supply: 1ø 2W 230V

Lighting fixtures:

Fluorescent lights are mainly used. Switching areas are to be subdivided.

Receptacle system: double receptacle (with ground wires)

Recommended lighting intensity:

Refer to "Manual on Technical Guidelines for Hospitals and Health Facilities Planning and Design / Health Infrastructure Service 1994"

e. Telephone System

Private telephone exchange will be installed for telephone communication in the hospital.

Lead-in method: An aerial wire is led in to a lead-in pole, and from the pole to the building the telephone wire is led in through the underground pipe.

Lead-in pipe: PVC50A x 2 pipes

Number of lines: 10

Number of extensions: 100

Intermediate stand: 1 stand
Others: provision of the doctor call system

f. Public Address System

An amplifier for public address is equipped and calls in the hospital are made through it.

Capacity of the amplifier: 360W 10 lines (individual and simultaneous broadcasting)
Remote microphone: 2 microphones

g. Intercom System

Interpcom for OR and Laboratory: Communications between Operating Rooms, Nurse Stations in Operation Dept. and Laboratory.

Nurse call:
One-bed-one-channel system is adopted. Nurse call panels are installed in Nurse Stations.

h. Disaster Prevention System

The following facilities are to be installed in accordance with the Fire Code.

Fire alarm system:

Receiving apparatus: P type about 100 circuits
Place of installment: administration office
Illuminated emergency exit sign: panel type
Emergency lighting equipment: floodlight projector type with batteries (mounted on the wall)

i. Other Information Systems

Master TV and radio system: Antennas for VHF and radio broadcasting are to be equipped. Future installation of the antenna for BS is to be taken into consideration.

j. Lightning Protection System

The lightning protection system is installed as lots of lightning occur.

Lightning conductor: transfixing rod type

k. Elevator

Elevator:	1 hospital type elevator (for eleven persons 45 m/min, 22KW)
Dumbwaiter:	1 dumbwaiter (100 kg 35m/min, 0.75KW)

l. Ceiling Fan

Ceiling fans are to be installed in waiting area, dining room and seminar rooms where many people gather.

5) Plumbing System

a. Water Supply

A water supply system consists of city water and well water. City water is used for medical treatment and drinking and well water is used for the toilet flush, laundry and outdoor irrigation.

City water is to be led in to the water tanks from the place designated by the authority. New well is to be constructed by the Philippine side and a well pump and well pit are to be provided too.

Well water and city water will be stored separately. Water will be distributed to each place from the elevated tanks by gravity. Well water is to be processed through sand separation, sand filtration, and chlorination.

Consumption of water is calculated as 1000 ℓ /bed·day and a rate for city water and well water is assumed to be 50:50.

Specifications for equipment

Water receiving tank for city water:

FRP single panel tank (two tank type) in capacity of approx. 50 m^3

Water receiving tank for well water:

Concrete water tank of underground pit type (lower part of the water tank) in capacity of approx. 100 m^3.

Elevated water tank for city water:

FRP single panel tank (two tank type) in capacity of approx. 10 m^3

Elevated water tank for well water:

FRP single panel tank (two tank type) in capacity of approx. 10 m^3

Water supply pump for city water:

Volute pump: 200 ℓ /min x 20 m x 2.2 KW x 2 pumps

Water supply pump for well water:

Volute pump: 200 ℓ /min x 20 m x 2.2 KW x 2 pumps

Well: 150ø x 120 m

Capacity of water supply: 120 m^3/day

Casing: SGR

Strainer: perforated-panel screen

Water supply pump for well water:

Underwater pump for deep well of 200 ℓ /min x 50 m x 5.5KW x 1 set

Sand separator: water-cyclone type with water processing capacity of 12 m^3/h x 2 separators

Filtration apparatus for well water:

Completely automatic with sand filtration metod

Water processing capacity: 12 m^3/h x 2 sets

Back wash pump:

volute pump: 350 ℓ /min x 25 m x 3.7KW x 2 pumps

chlorine sterilization apparatus unit with fixed quantity injecting pump x 2 sets

Materials for piping

Outdoor (under the ground): unplasticised polyvinyl chloride pipe (VP)

Indoor: unplasticised polyvinyl chloride pipe (VP)

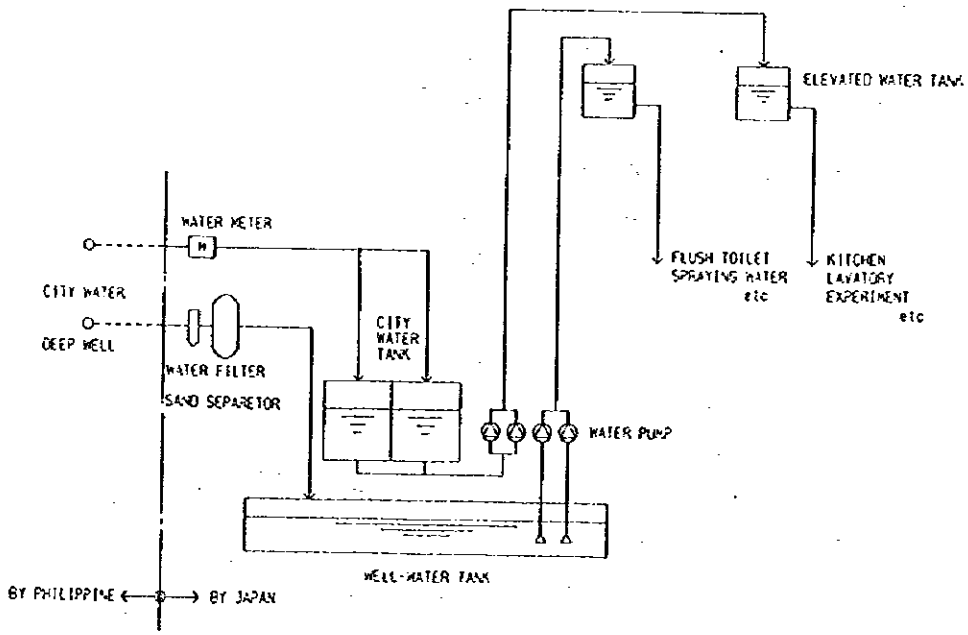


DIAGRAM - 8 Water Supply System Diagram

b. Plumbing Fixtures

Durable and sanitary fixtures are to be selected.

c. Hot Water Supply System

The central hot water supply utilizing solar heat is adopted. The solar heat collectors are installed on the sloping surface of the roof. As an auxiliary heat source, a hot water boiler using light oil is provided.

Hot water is supplied only to the kitchen, laundry, operating rooms, central supply and showers. Hot water supply is to be divided into two circuits, one for clinical departments and another for the kitchen and laundry.

Specifications for equipment

Solar heat collector:

vaccumed tubular glass collector with collector area of 1.8 m^2 x 80 collectors

Hot water reserve tank for heat collection:

made of stainless steel with capacity of 10 m^3 (installed on the rooftop)

hot water supply coil: 110 Mcal/h (100 ℓ /min)

Hot water reserve tank:

vertical type made of stainless steel

storing capacity: approx. 200 ℓ x 1 tank

Hot water boiler:

using light oil

heating capacity 160Mcal/h x 1 boiler

Pressure pump for hot water supply:

stainless steel line pump: 100 ℓ /min x 5 m x 0.25KW x 2 sets

Heat collecting pump for hot water supply:

stainless steel line pump: 60 ℓ /min x 5 m x 0.25KW x 2 sets

Hot water returning pump:

stainless steel line pump: 100 ℓ /min x 5 m x 0.25KW x 2 sets

Oil tank:

underground pit type made of steel sheets (epoxy resins coating) aprox. 1800 ℓ

Oil service tank:

square type made of steel sheets (rust-proof coating) with capacity of 90 ℓ

Oil gear pump: 12 ℓ /min

Materials for piping

Indoor: copper and copper alloy seamless pipes (C1220 L)

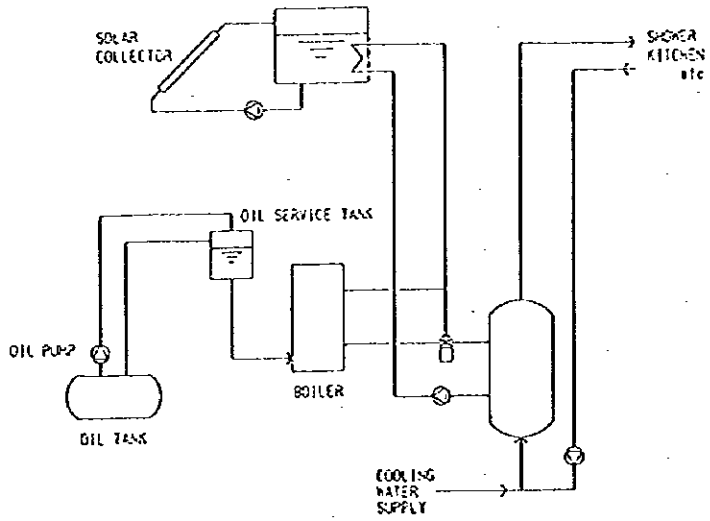


DIAGRAM - 9 Hot Water Supply System

d. Drainage System

Indoor drainage consists of sanitary sewage and general waste water and the separate system of specific sewage (waste water from the kitchen, waste water from toilets, etc.) will be combined outdoors. After that the sewage flows into the septic tank by gravity, and is processed in the tank. The processed water from the septic tank is to be pumped up and drained into the waterway through public sewage line.

Sewage from the existing buildings may be temporarily stored in the sewage intermediate pit and then pumped up into the new septic tank and processed together with sewage from the new facility.

Waste water from laboratory is collected in a test pit then it is combined with ordinary sewage. The neutralization processing equipment is not installed in particular. The waste water from the kitchen is drained through the grease trap. The harmful liquid used for development and fixation of film is stored in container on the spot, and entrusted to the company specialized in processing it.

Specifications for equipment

Septic tank:

Septic tank for combined treatment of toilet flush water and household waste (underground concrete pit)

Processing method:	Contact aeration method
Processing capacity:	200 m^3/day
Processing performance:	BOD less than 50 ppm
Removal rate:	85%

Sewage storing tank (Underground concrete pit)

Capacity: 6 m^3 (each place) x 4 tanks

Sewage draining pump (Underwater pump for waste water)

200 ℓ /min x12 kgf/cm^2 x 2 pumps x 4 places

Materials for piping

Indoor drainage:	unplasticised polyvinyl chloride pipe (VP)
Outdoor drainage:	unplasticised polyvinyl chloride pipe (VP)
Ventilation:	unplasticised polyvinyl chloride pipe (VP)

e. Fire Extinguishing System

The fire extinguishing system is to be installed in accordance with the Philippine Fire Code.

Specifications for equipment

Extinguishing pump:	volute pump 600 ℓ /min x 45 m x 11KW x 1 pump
Materials for piping:	Carbon steel pipe (black)

f. Gas System

The equipment for collected gas cylinders is to be installed. It provides propane gas as fuel for cooking and laboratory. The places where gas is supplied are restricted to a minimum for reasons of safety.

Specifications for equipment

Equipment for collecting gas cylinders:

2 rows for 20 cylinders (operated manually)

Materials for piping: Carbon steel pipe (SGP white)

g. Medical Gas System

A distribution apparatus for oxygen is to be equipped. The gas supply is limited only to the Operating Rooms, ICU, CCU, Recovery and Delivery Rooms.

Specifications for equipment

Portable gas cylinder apparatus for supplying liquid oxygen:

2 cylinders x 2

Liquid oxygen:	2 cylinders x 2
Spare oxygen manifold:	3 manifolds x 2

Materials for piping: phosphorous deoxidized seamless copper pipe

h. Kitchen Facilities

Kitchen facilities are to be equipped for the central supply service. The menu consists of six kinds of dish including the special food. In the staff dining room only pantry is installed because foods are supplied from Cooperative kitchen to be installed in the existing building in the site.

Service ability: 600 meals/day = 200 meals/time x 3 times/day

i Medical Waste Disposal

The incinerator for medical waste is to be installed for burning waste except sharps. The space for collecting and storing waste is to be provided.

Specification of Incinerator: incinerator for medical waste with grate area of 0.68 m^2 with control panel, oil burner, oil tank, etc.

j Laundry Facilities

The laundry facilities are to be provided for washing blankets, sheets, pillow cases, clothes for operation, gowns for patients, towels for operation, rubber sheets, eye sheets, wrapping sheets, sheets for delivery etc. The dry cleaning facility is not to be installed. The washing facility for operation is a separate one.

Main Equipment

Automatical washer (for general):	30 kg/time 5.5 kw
Extractor (for operation):	20 kg/time 3.7 kw
Drying tumbler:	electrical type x 2 pieces
	20 kg/time H15 kw, M0.4 kw, F0.2 kw
Press finishing:	electrical type 700 x 1500 x 2 pieces
	H7kw、M0.75 kw、F0.3 kw
Air compressor:	0.4kw

6) Air conditioning

a. Criteria for Air-conditioning

TABLE - 20 Conditions of Air-conditioning

	Summer		Winter	
	temperature (℃)	humidity (%)	temperature (℃)	humidity (%)
Outdoor Air	28	80	12	80
Operating Room	24	--	22	45
Ancillary Room to the Operating Room, ICU, CCU	25	--	22	45
Other Room to be Air Conditioned	25	--	22	45

b. Air-conditioning System

In principle, air-conditioning is restricted only to the rooms where cleanness and shielding are needed. In other rooms natural ventilation and mechanical ventilation (for the rooms without windows) are to be adopted. Air-conditioning controls only temperature, which means cooling or heating, and does not control humidity. Individual system with the air source heat pump package unit is adopted.

TABLE - 21 Air-conditioning System

System	Air Conditioning Method	Object Room	Expected Horse Power	Filter (class)	Expected Ventilation time	Expected Air Volume (CMH)
Operating Room	single-duct system + booster fan	4 operating rooms	8 x 4	HEPA	30	3780 x 4 systems
Operating Hall	single duct + electric reheat	operating hall, recovery	15	high performance	15	5400
Sterilizing and Washing	single duct	sterilizing room, washing room	8	high performance	10	3780
Delivery and Labor	single duct + electric reheat	delivery, labor, recovery	20	high performance	10	6600
Neonatal	single duct + electric reheat	neonatal	5	high performance	10	1700
CCU	single duct	ICU	8	high performance	12	3100
ICU	single duct	CCU	8	high performance	12	3100
X-Ray Room	hanging unit from the ceiling + ventilation fan (with lead trap attached to the penetrated part of the shield)	X-ray inspection room (1), (2)	1.5 x 2	ordinary performance	8	1300

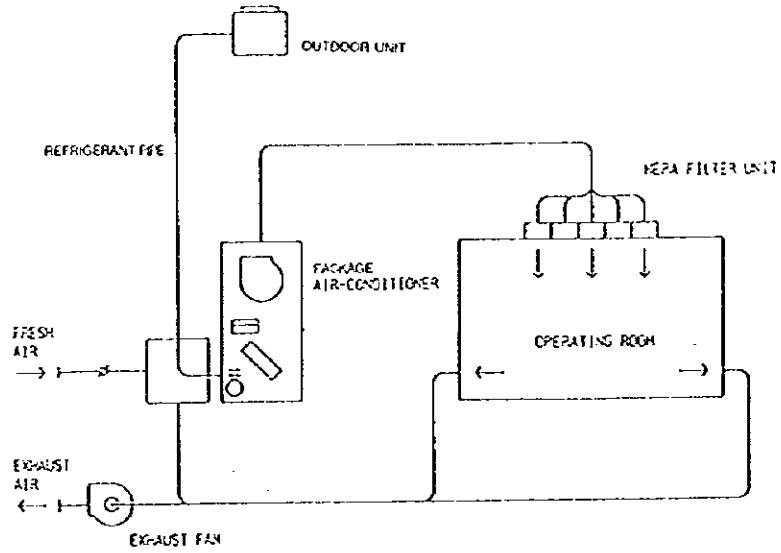


DIAGRAM - 10 Air Conditioning System

c. Ventilation System

The following rooms are mechanicaly ventilated.

TABLE - 22 Ventilation System

Object room	Ventilation Method	Expected Ventilation Time (time/h)	Expected Wind Volume (CMH)	Note
Kitchen	mechanical ventilation by supply fan & exhaust fan	30	18,000	
Laundry	mechanical ventilation by supply fan & exhaust fan	20	9,000	
Washing and Sterilizing Room	mechanical ventilation by supply fan & exhaust fan	10	2,000	for heat exhaust of autoclave
Toilet and other occupancy rooms without window	Mechanical ventilation by exhaust fan			

d. Smoke Control System

According to the Philippine's code, smoke control system will not be installed.

e. Automatic Control and Centralized Supervisory System

The automatic control system with control console is equipped for automatic control and operation of the facilities and for centralized supervisory.

TABLE - 23 Automatic Control Items

Control object	Control item	Notes
Oil Tank	start and stop of oil supplying and oil returning pumps	
Air Conditioner	temperature and humidity control, reheater control	
Solar Heat Collector	start and stop of heat collecting pumps	
Hot Water Storing Tank	start and stop of hot water supply pump	

7) Construction Materials

a. Construction Method

The most common methods which do not require special techniques are to be adopted.

TABLE - 24 Construction Methods

	Locally Common Method	Adopted Method	Reason
Foundation	Footing foundation or mat foundation	Footing foundation	Economical
Column, beam, girder	Reinforced concrete	Reinforced concrete	Appropritate for the structureal system of the project
Structural slab	Reinforced concrete	reinforced concrete	do.
Exterior wall	concrete block	Concrete block Partly Reinforced concrete wall	Locally common Aseismic measure
Roof structure	Light steel frame	Light steel frame	Locally common

b. Finishes

The interior and exterior finishes of the building shall not be ostentatious but shall be durable and easily maintainable materials. In the rooms requiring a high level of cleanliness, and in the rooms that house precision equipment, appropriate materials shall be used.

TABLE - 25 Finishes

	Locally Common Material	Adopted Material	Reason
Roof	Ribbed or corrugated metal roofing	Ribbed metal roofing	Locally common and available
Exterior wainscot	–	Broken ashlar of Benguet stone	Locally available
Exterior wall	Cement mortar paint	Cement mortar, resin paint sprayed	Durability and dirt free quality
Exterior floor	Wash-out pebble	Washed pebble	Locally common
Exterior window	Aluminum window	Aluminum window with high air-tightness	Protection against typhoon
door	Aluminum frame glass door	Stainless steel frame glass door	Durability
Ceiling			
General	Acoustic board with T-bar	Acoustic board with T-bar	Locally common
Spaces not require acousticity	Plywood painted	Silicate calcium board painted	Moisture proof quality
Interior wall			
General	Cement plaster painted	Cement plaster painted	Locally common
Toilet	Ceramic tile	Ceramic Tile	do.
Interior floor			
Ward, office	Vinyl tile	Vinyl tile	Locally common
Consultation, corridor	Ceramic floor tile or terrazzo	Ceramic floor tile or terrazzo	Locally common and easy for maintenance
Laboratory	Ceramic tile	Vinal sheet	Cleanliness
Seminar room, Private offices	Wood parquet	Wood parquet	Good and common material to substitute carpet
Doors	Plywood flush door painted	Plywood flush door painted	Locally common

(3) Equipment

1) Principles of Selection

a. Replacement of deteriorated existing equipment is given the priority.
A procurement of new equipment is to be limited to the basic equipment for basic clinical activities.

b. Equipment which can be maintained with the cost bearable by the hospital will be selected.

c. Equipment which can be operated with the techniques of the staffs of the hospital will be selected.

d. Equipment of which consumables and spareparts can be supplied at least for 5 years after delivery by the agencies in Manila will be selected.

e. Equipment for which the maintenance services are available by the agencies in Manila will be selected.

2) Necessity and Appropriateness of Equipment for Each Department.

a. Outpatient Department

① Medicine

Endoscopy is added to the medical consultation services, and gastro-intestinal and sigmoid endoscopes will be equipped. Endoscopy is not offered at present, but the existing medical staff holds a certificate of training completion. In 1996, there were 395 patients sent to other hospitals for upper endoscopy and 435 patients for lower endoscopy. These figures suggest that demand for these tests is high. A spirometer will be added too. Deteriorated existing equipment will be replaced with new ones.

Psychiatric Department is going to become a part of the Medicine Department. Patients requiring a close examination and treatment will be referred to Baguio General Hospital. No equipment is required.

② Operating Room

The number of surgical operations with general anesthesia is likely to increase requiring replacement of existing equipment and additional equipment. A central sterilizing room is indispensable for preventing internal infections in the hospital, and will be equipped with the necessary equipment.

③ Orthopedics

Orthopedics which is currently included in general surgery will become independent, so the basic required equipment will need to be provided. All necessary equipment is to be procured for the Cast Room.

④ Ophthalmology

One Consultation Room is assigned and the basic required equipment will be provided.

⑤ ENT

One Consultation Room is assigned to this department and the basic required equipment will be provided.

⑥ Rehabilitation

Because an Orthopedics Department will be established, the rehabilitation department will also be necessary. Hydrotherapy will not be provided, but the equipment for all general physiotherapy and exercise therapy will be provided.

b. Laboratory

A laboratory with capability to perform bacteriologic testing, and pathology and serology tests is planned. In addition to a replacement of the existing equipment, new equipment for the new functions are to be provided. A blood bank function is also necessary to serve for other departments such as operating room. There is the Blood Bank building under construction in the site supported by the Danish Red Cross but it is planned to offer only blood donation services.

The new complex will have both a morgue and an autopsy room.

c. Pharmacy

A general pharmacy is planned with expanded new prescription capability. In addition to a replacement of the existing equipment, new equipment are to be provided to facilitate expanded services.

d. ICU and CCU

The new facilities are to be equipped with the basic required equipment, such as respirators and a monitoring system.

e. NICU, Septic Nursery

The new intensive care facilities for premature or infectious neonatals are to be equipped with the basic required equipment.

f. Center of Wellness

TV and video for showing sanitary education programs to patients while they wait for consultation are to be provided.

g. Training and Seminar Rooms

As existing equipment is not sufficient, overhead projector, slide projector, video and a human anatomy mannequin are to be provided.

h. Vehicles

- Ambulances

Two ambulances which are out of order now are to be replaced.

- Audio-visual car

An important role of this hospital is training and education for the population and the health workers in Benguet Province. In order to implement this role effectively a vehicle equipped with audio-visual equipment is to be procured.

i. Equipment for District Hospitals and RHUs

There are 2 types of equipment to be procured for District Hospitals and Rural Health Units:

① In order to maintain a well balanced supply of medical services in the province, the reinforcement of the referral structure is important. For that purpose the existing equipment at 5 District Hospitals and 13 Rural Health Units are to be replaced and urgently needed equipment are to be procured. It has been agreed that the Japanese side will transport these equipment to Benguet General Hospital and hand them over to the Philippine side, after which the Philippine side will be responsible for distributing them to each institution. As the scope of services of each institution is different, the equipment is divided into three package types which are assembled accordingly. In Atok District Hospital, there is an operating room and a full-time surgion requiring operation related equipment, such as anesthetic instruments. Only necessary equipment are to be provided for 4 other hospitals and the least equipment for Rural Health Units.

Package 1.	For Atok District Hosspital	:	26 items
Package 2.	For other hospitals	:	22 items
Package 3.	For 13 RHU	:	14 items

② In order to improve a communication between Benguet General Hospital and 5 District Hospitals and 13 RHUs, the equipment listed below are to be provided. Distribution of these equipment will be carried out in the same manner as the medical equipment: the Japanese side will transport them to Benguet General Hospital and the rest of procedure including repeater installation will be completed by the Philippine side. The location of stations and repeaters are shown in the map below:

1. Repeaters	2	
2. Stations	19	(at Benguet General Hospital and 18 institution)
3. Mobile Stations	20	(for 2 ambulances of Benguet General Hospital and vehicles of 18 institutions)

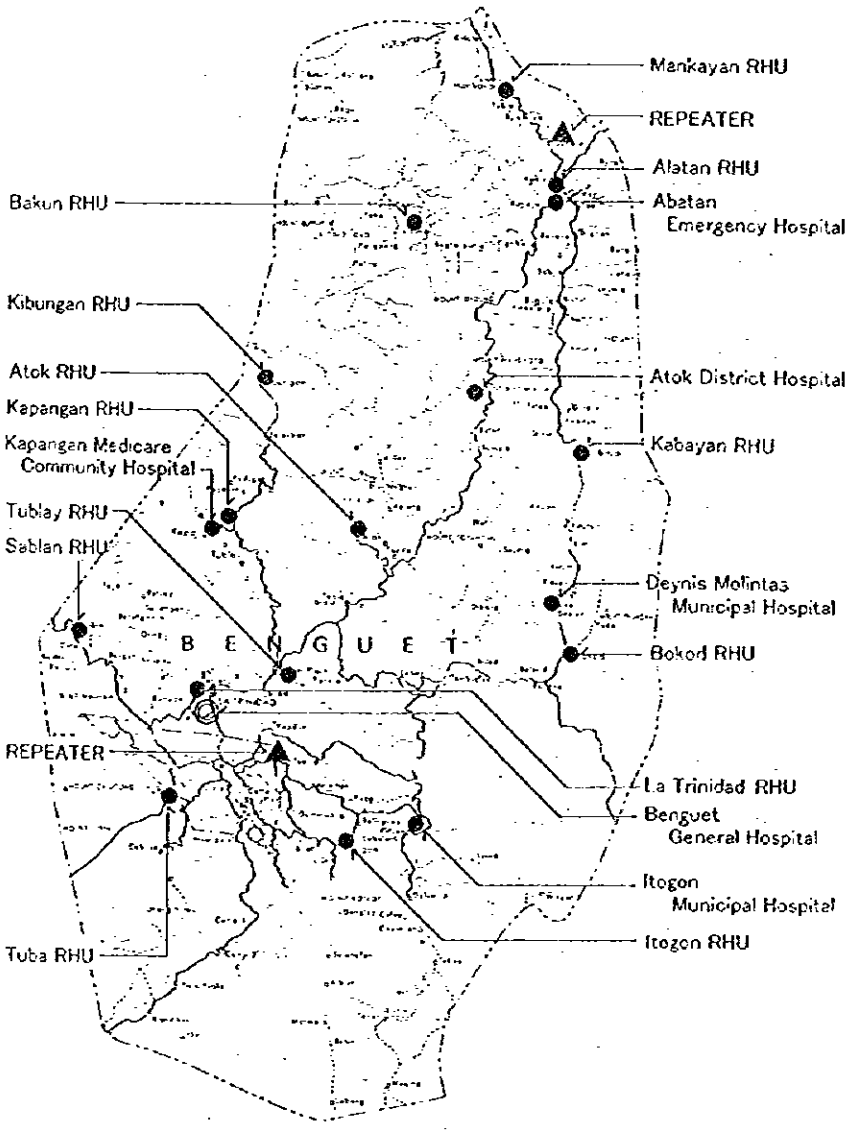


DIAGRAM - 11 Location of Stations and Repeaters

3) Equipment in advance procurement

The vehicles and a part of the equipment are to be procured to the existing facilities prior to a completion of new Benguet General Hospital. However, equipment that will require high labor to relocate when the new building is completed or electric work for temporary installation are excluded. Relocation after the completion of the new building is to be done by the Japanese side for reliability.

4) Principal equipment

TABLE - 26 Vehicles and Equipment in Advance Procurement for Benguet General Hospital

Equipment	No.	Equipment	No
Vehicle With Audio Visual With Portable Generator	1	ER Aspirator Resuscitator, Pediatric	1
Communication System/Units (Base)	1	ER Aspirator Resuscitator, Adult	1
Maintenance Tool Set	1	Lung Ventilator (CPAR), Neonatal	1
Patient Monitor	2	Fetal Monitor With Stand	2
Ambulance (4 Wheel Drive)	1	Major Operating Table	1
Ambulance With First Aid Kit	1	Ultrasound, Small	1
Operating Table, Minor Surgical	1	Ultrasound Scanner With Accessories Including 3 Types Of Probes	1
ECG Machine With Cart	3	Electrosurgical Unit	1
Infant Intensive Care System	2	Anesthesia Apparatus	2
Neonatal Monitor	1	Delivery Table	1
Infant Incubator	4	Operating Instrument Set	1
Infant Incubator, Servo Type	2	X-Ray Protective Set	1

TABLE - 27 Main Equipment for Benguet General Hospital

Equipment	No.	Equipment	No
Anesthesia Apparatus	3	Gastrointestinal Fiberscope Set	1
Autoclave, Single Door Type	1	Intermittent Lumber Traction Unit	1
Autoclave, Double Door Type	2	Laboratory Small Item Set	1
Automatic Film Processor	1	Major Operating Table	2
Automatic Tissue Processor	1	Major Operating Table With Traction Unit	1
Autopsy Set	1	Mobile X-Ray Unit	1
Bed For Burn Patient (Tent System)	2	Operating Instrument Set	1
Bedside Monitor	3	Operating Light, Major Combination	2
Biochemistry Apparatus	1	Operating Light, Minor Combination	2
Blood Cell Counter	1	Orthopedic Instrument Set	2
Cardiac Monitor	3	Patient Monitor	3
Cataract Set	1	Refrigerated Centrifuge With Blood Separator	1
Central Sterilization Instrument Set	2	Refrigerator For Morgue	2
Defibrillator With ECG And Cart	3	Retinal Camera	1
Delivery Table	1	Spectrophotometer	1
Dental Chair Unit	2	Ultrasonic Cleaner	1
Electrosurgical Unit	2	Ventilator (Respirator)	3
ELISA Reader, With Test Kit	1	Video Projector With Screen, Ceiling Type	1
ENT Treatment Unit	2	X-Ray TV System, 850mA With Accessories	1
Eundoscope	1	X-Ray-System, 500mA With Accessories	1
Pharmacy Small Item	1	Dialysis Instrument Set	2

TABLE - 28 Equipment in Advance Procurement for 5 Hospital and 13 Rural Health Unit

Equipment	No.	Equipment	No
Suction Unit	18	IUD Set	18
Sphygmomanometer, Stand Type	18	Medical Abdominal Surgery Set	1
Stethoscope	18	Cesarean Section Set	1
Minor Surgery Instrument Set	5	Excession Set	5
Weighing Scale, Adult	18	Bailatenal Tubal Ligation Set	1
Weighing Scale, Salter	18	Electrocardiogram	5
Microscope, Binocular	5	Dilation and Curettage Set	5
Equipment for Ambulances (Suction unit / Resuscitator)	5	Delivery Set (Normal and Complicated Cases)	5
Ambu Bags, Adult	18	Suturing Set of Wounds	18
Ambu Bags, Pediatric	18	Routine Laboratory Examination Set	5
Examination Lamp	18	Nebulizing of Patient	18
Anesthesia Apparatus	1	Boiling Sterilizer	18
Sound System	18	Diagnostic Instrument Set	18

Note) Equipment in 1 number are to be procured for Atok District Hospital, equipment in 5 numbers are to be procured for 5 district hospitals including Atok District Hospital and equipment in 18 numbers are to be procured for 5 district hospitals and 13 RHUs.

5) Procurement

a. Equipment in advance procurement

Japan: anesthesia apparatus, resuscitator, ECG, aspirator, monitor, etc. (67.8%)

Philippines: sterilizer, weighing scale, patient bed, examining lamp, examining table, etc. (32.2%)

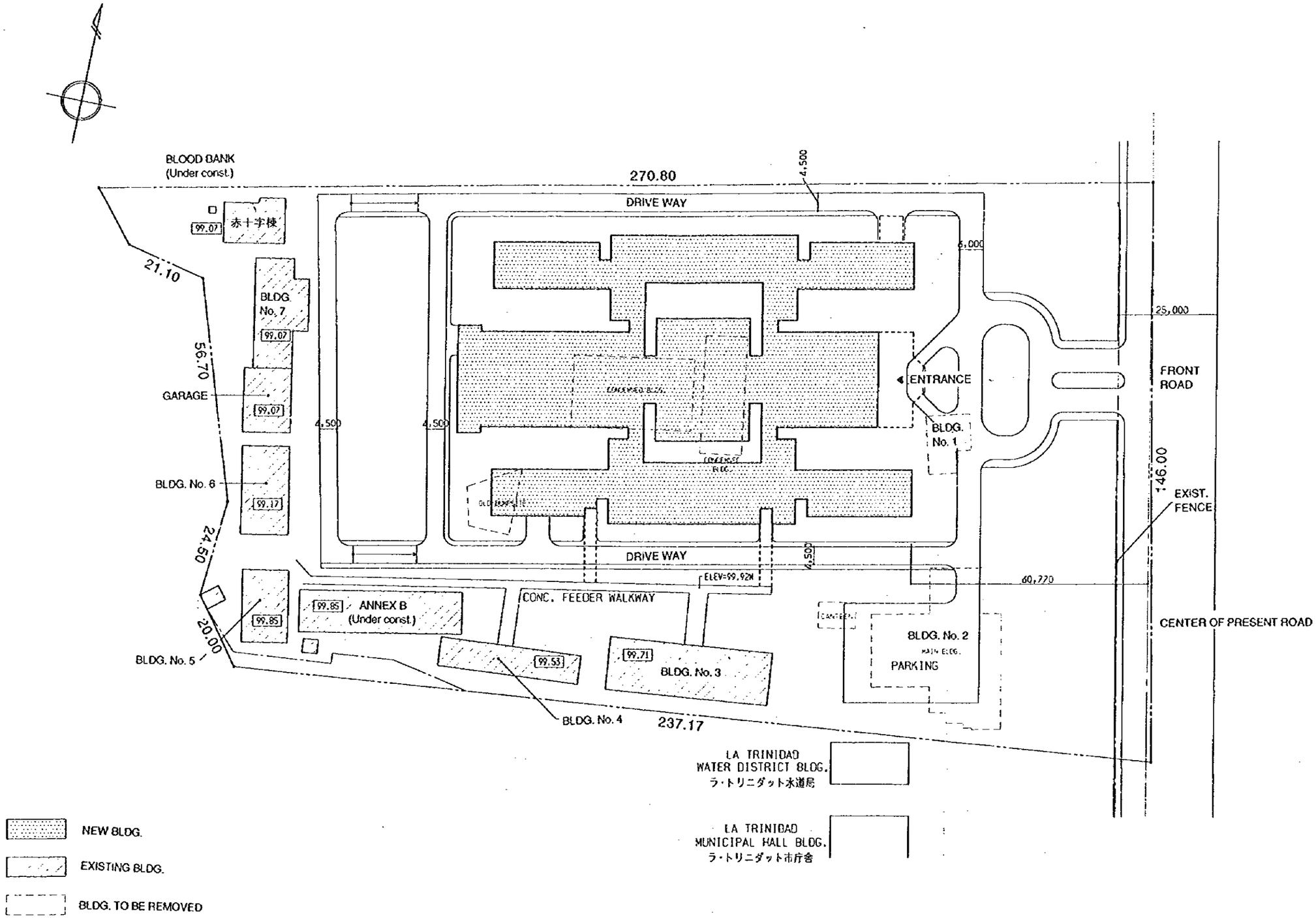
b. Main equipment

Japan: anesthesia apparatus, autoclave, monitor, etc. (74.7%)

Philippines: sterilizer, consultation chairs, examining table, refrigerator, patient bed, etc. (25.3%)

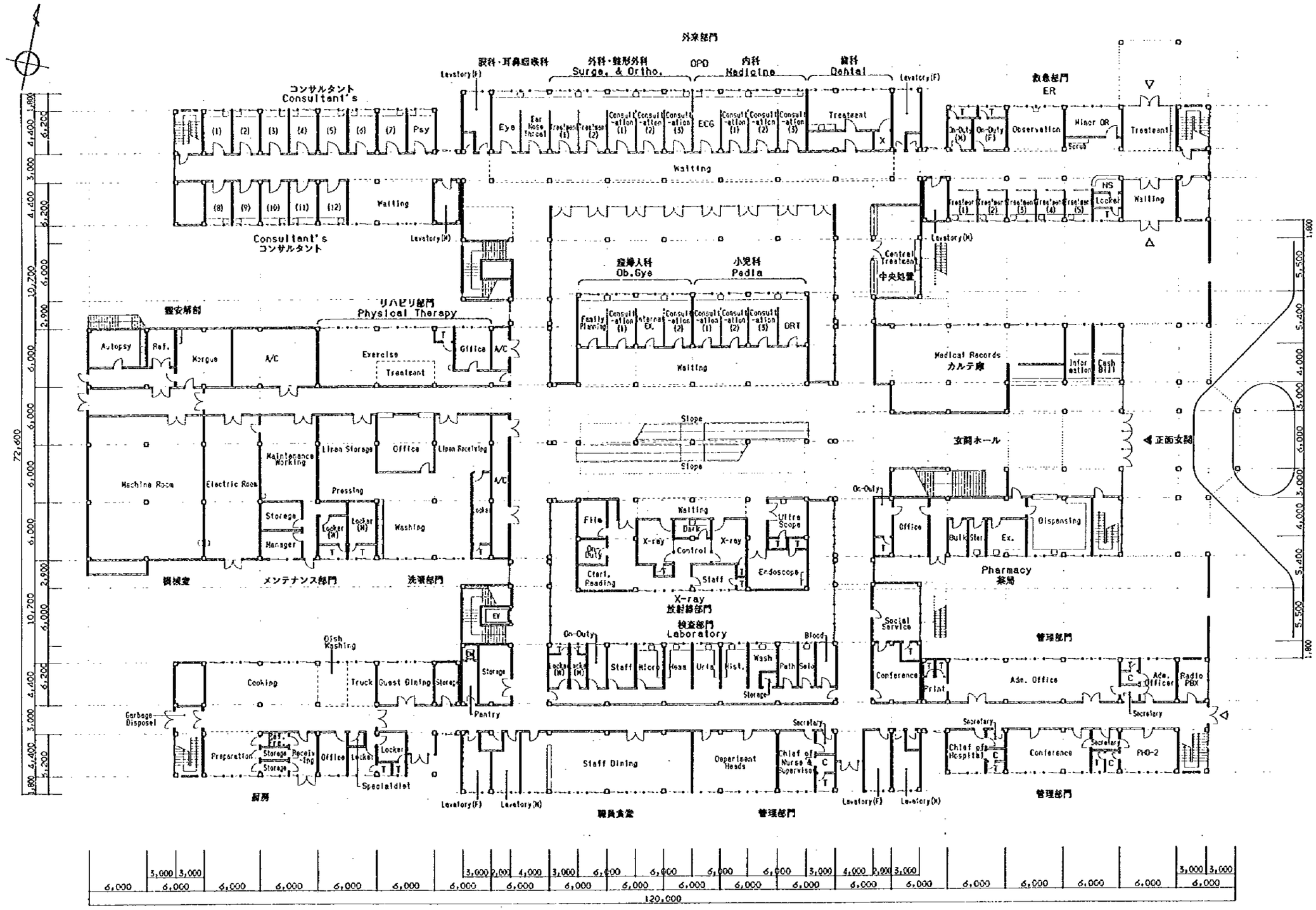
(4) Basic Design Drawings

- Site Plan
- First Floor Plan
- Second Floor Plan
- Elevations
- Sections



SITE PLAN

1/1000



FIRST FLOOR PLAN
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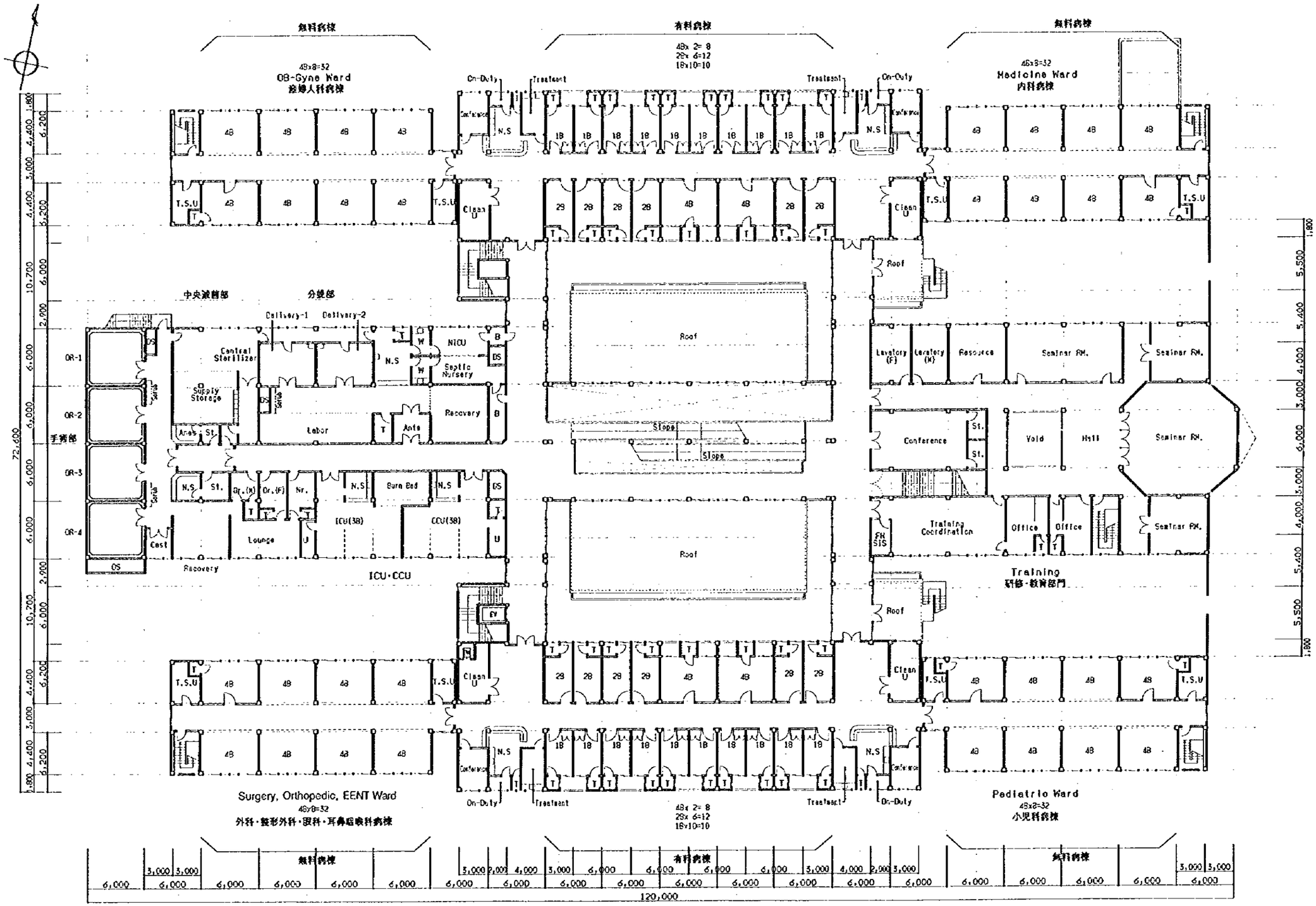

SECOND FLOOR PLAN

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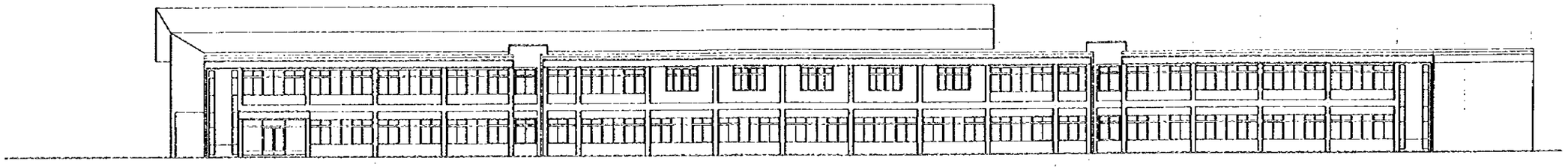
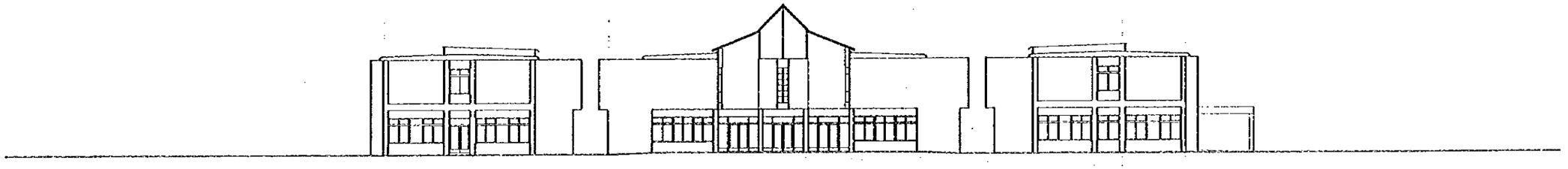
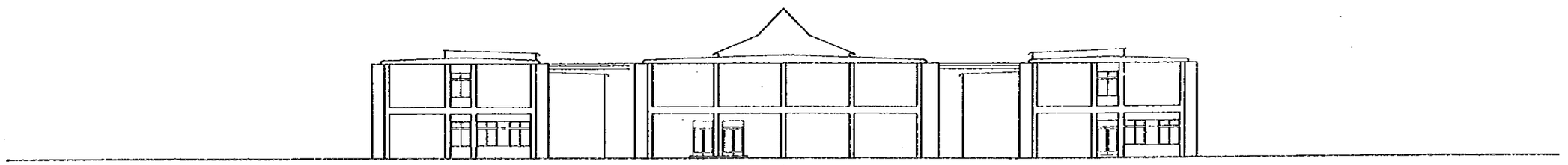


NORTH ELEVATION



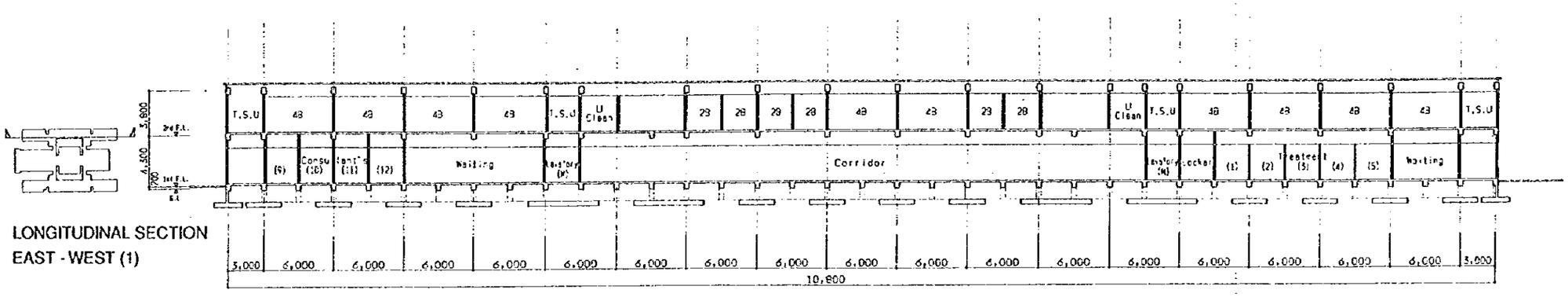
EAST ELEVATION

SOUTH ELEVATION



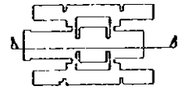
WEST ELEVATION

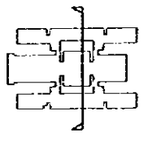
ELEVATION
1/400



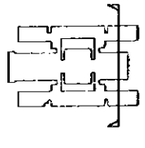
LONGITUDINAL SECTION
EAST - WEST (1)

LONGITUDINAL SECTION
EAST - WEST (2)

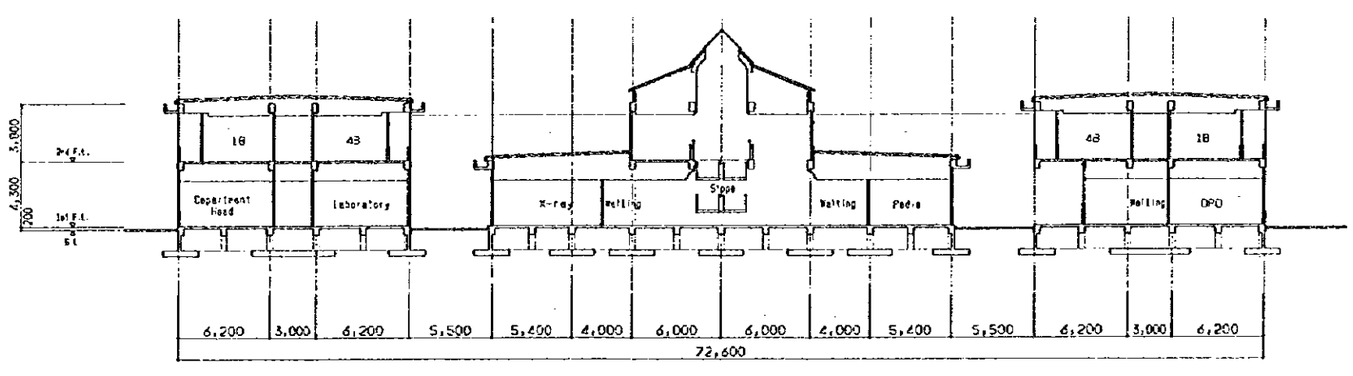


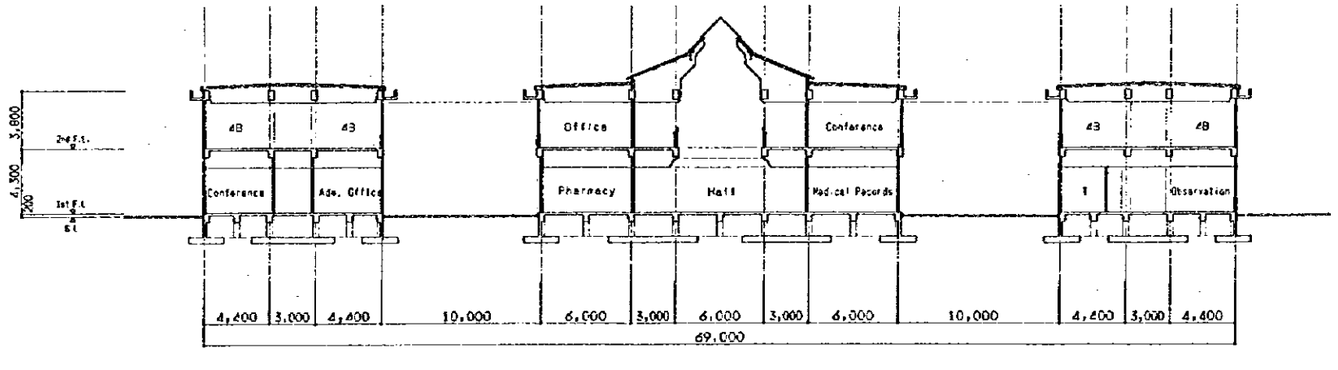


TRANSVERSE SECTION
NORTH - SOUTH (1)



TRANSVERSE SECTION
NORTH - SOUTH (2)





SECTIONS
1/400

CHAPTER 3
IMPLEMENTATION PLAN

Chapter 3 Implementation Plan

3-1 Implementation Plan

3-1-1 Implementation Concept

(1) Structure of Project Execution

The responsible agency for the execution of this project on the Philippine side is the Provincial Government of Benguet. In so far as the agency is not the central government but a local government, there was a concern about the fulfillment by the local government of the commitment by the central government with respect to E/N. It has been confirmed that the Provincial Government of Benguet with the assistance of NEDA and DOH will take necessary measures. The structure of the project execution is as follows:

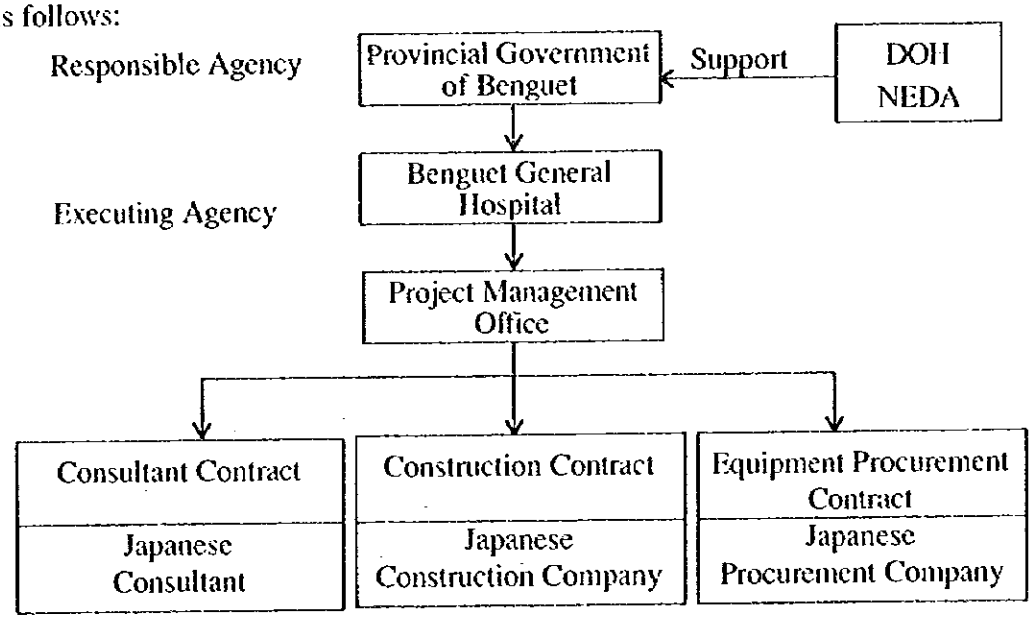
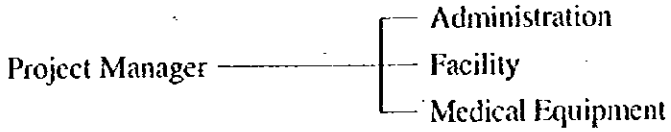


DIAGRAM - 12 Project Execution Structure

Project Management Office is going to be organized with the following members to be appointed by the Provincial Governor.



(2) Permits/Approvals

- Building permit and fire code approval: Architects and engineers of Provincial Engineering Office of Provincial Government will obtain the permit and approval from the La Trinidad Municipality. So there is no need to employ a licensed local architect for this purpose.
- Environmental Examination: Application must be filed with the Department of Environment and Natural Resources (DENR) prior to a filing of the application for the building permit. This is also handled by the Provincial Engineering Office.
- Investment Approval of Investment Coordination Council (ICC): The approval has already been awarded however, when the size of total investment increases more than ten percent, it must be obtained again. This approval is a prerequisite for E/N. The total investment amount will need to be established beforehand for the application. The Provincial Government will obtain the permits with the assistance of NEDA.
- Permits of DOH: The following will be obtained by the Provincial Government.
  ① Hospital License
  ② Construction Approval

(3) Consultant

For building construction work and procurement of equipment financed by Grant Aid, a Japanese consultant will contract with the Provincial Government of Benguet, after the conclusion of E/N. Verification of the Government of Japan is required for this contract. The consultant will proceed with detailed design for the project based on the basic design and will produce tender documents in consultation with the Provincial Government of Benguet. Subsequently, based on detailed design and tender documents, the project will be tendered, followed by selection of the contractors and the contracts for the construction and the procurement of the equipment. After the construction starts, the consultant will carry out supervisory services. The consultant must fulfill its obligations under the contract as well as to make a reporting to Japan International Cooperation Agency (JICA) on the progress of the project. Also the consultant must consult any changes to the basic design with JICA in advance.

(4) Construction Company

A contractor for building construction work will be chosen by a tender among Japanese construction companies through pre-qualification (P/Q) exercise, in accordance with the scheme of the Grant Aid. The selected contractor will contract with the

Provincial Government of Benguet and obtain the verification of the Government of Japan.

(5) Procurement Company

A procurement company in charge of procurement and installation of equipment will be chosen by a tender among Japanese companies qualified to participate in the tender process in accordance with the scheme of the Grant Aid. The chosen company will contract with the Provincial Government of Benguet and obtain the verification of the Government of Japan.

(6) Construction Plan

The following will be taken in the considerations for construction planning.

- Influence of the rainy season on the construction schedule.
- Coordination of the schedule of land reclamation, leveling and infrastructure works to be done by the Philippine side with the main construction schedule.
- The effect of the distance from Manila on procurement of the construction materials and equipment.
- Provision of access to the site at the west end of the site from the adjacent property, because the access from the main street will be exclusively used by the contractor.
- To plan to substantially complete the construction works prior to starting of an installation of the equipment to prevent the damages of equipment by the construction workers during a installation of the equipment.

3-1-2 Implementation Conditions

(1) Conditions of the construction industry in Benguet.

In the construction field of hotels and condominiums in Baguio City, heavy construction machines are not found because they are mid-size and mid-rise buildings. In La Trinidad, most of the construction are one or two story RC buildings not requiring a high level construction techniques. Therefore, this project is to be so designed as can be constructed with common and basic construction methods.

Among major construction materials, ready-mixed concrete can be supplied from two plants near the site. Reinforcing bars and concrete blocks are available in Benguet. Many finishing materials can be found in local suppliers but without stock. They are

generally ordered and transported from Manila, resulting in higher prices. Most of finishing materials for this project may be procured in Manila directly by the contractor.

Local building construction companies who might become a sub-contractor of Japanese main contractor are listed below, however, skilled workers are scarce and will probably be brought from Manila.

Specialist technicians will need to be dispatched from Japan for supervision of installation of the materials which require accuracy and technique such as X-ray room door and sterilizing equipment.

① Fuchigami Construction and Boring
② Mountainous Engineering and Construction
③ Half Circle "A" Construction
④ Gonza Construction

(2) Special Care to be Taken

The existing hospital continues medical activities during construction of the new building. Temporary works, delivery of materials, on-site transportation should be carried out in such a way as to insure the safety of the hospital staff and patients. Also reduction of noise and dust must be considered.

3-1-3 Scope of Works

According to the Grant Aid system, the Philippine side is responsible to bear the cost for some works. It is necessary to clarify the responsibility for various costs between Japan and the Philippines so that the Philippine side could take necessary actions to secure the budget and make required preparations.

The following table indicates the scope of works of Japanese side and the Philippine side.

TABLE - 29 Scope of Works

Japanese side	Philippine side
1. Construction work (including normal fixed furnitures and fixtures, loose furnitures for OPD and Seminar Rooms, curtain rails, room and directory signs)	1. Land reclamation, retaining walls, leveling
2. Electric work (including emergency generator)	2. Demolition of existing buildings
3. Mechanical work (including kitchen equipment, laundry equipment, incinerator, waste water treatment plant, work to connect the existing septic tank into a new treatment plant. medical gas installation)	3. Gate and fence
4. Elevator (including 1 dumbwaiter)	4. Connection from sump pit at site boundary into public sewage system
5. Site work and landscaping (driveway, planting, drainage, exterior lighting)	5. Infrastructure connections: electricity, water, telephone
6. Procurement and installation of equipment (including training of the hospital staff, relocation of equipment in advance procurement from the existing building to the new building)	6. FF&E: curtains, blinds, office furnitures
	7. Distribution and installation of radio communication transmitters and repeaters
	8. Landscaping of front yard
	9. Distribution and installation of equipment for 5 District Hospitals and 13 Rural Health Units. (handed over by the Japanese side to Benguet General Hospital)
	10. Relocation of existing equipment
	11. Renovation of existing buildings

3-1-4 Consultant Supervision

Based on the consultant agreement with the Provincial Government of Benguet, the consultant will execute construction supervisory services as listed below for implementation of the project.

(1) Objectives of Construction Supervision

1) To maintain a close communication with both the governments and insure a smooth progress of the construction work.

2) To administer the construction work to insure appropriate quality as a project of the Grant Aid.

3) To insure that the project be completed by the date scheduled by Grant Aid.

4) To verify that capital is used to the best advantage.

(2) Contents of Construction Supervision

1) Services relating to tender and contracting.

To prepare necessary tender documents and assist the client in tender and selection of the contractors for a construction and a procurement of equipment.

2) Services during construction

- To make the contractor understand the design intention correctly
- To produce necessary additional drawings as occasion demands, for helping the contractor to understand the design intent.
- To review the construction plan and give advice to the contractor
- To review and approve the shop drawings, materials, and samples.
- To supervise the quality of construction and instruct corrections when inappropriate.
- To review plans for bringing in and installation of equipment and coordinate with the construction schedule.
- The person in charge of equipment will deal with supervising the progress of procurement, checking of documents, inspecting product quality, installation, running tests, hand-over, certification of manuals, and plan for operation training.

- To watch the construction progress and, when there is a delay, look into the causes, make reporting to the client and give advise on the solutions.
- To review payment requests of contractors and make reporting to client.
- To execute completion inspection and make reporting to the client.
- To supervise and witness hand-over to verify the completion of the contract.
- To supervise and confirm preparation and submission of as-built drawings.

(3) Supervisory Organization

To accomplish the construction supervision duties described above, there must be one resident supervisor at the site. Architects and structural, electrical, mechanical and equipment engineers will visit the site for short period of time as required. In addition, these experts will support the resident supervisor by giving instructions and consultations at any time from Japan. This structure is drawn as follows:

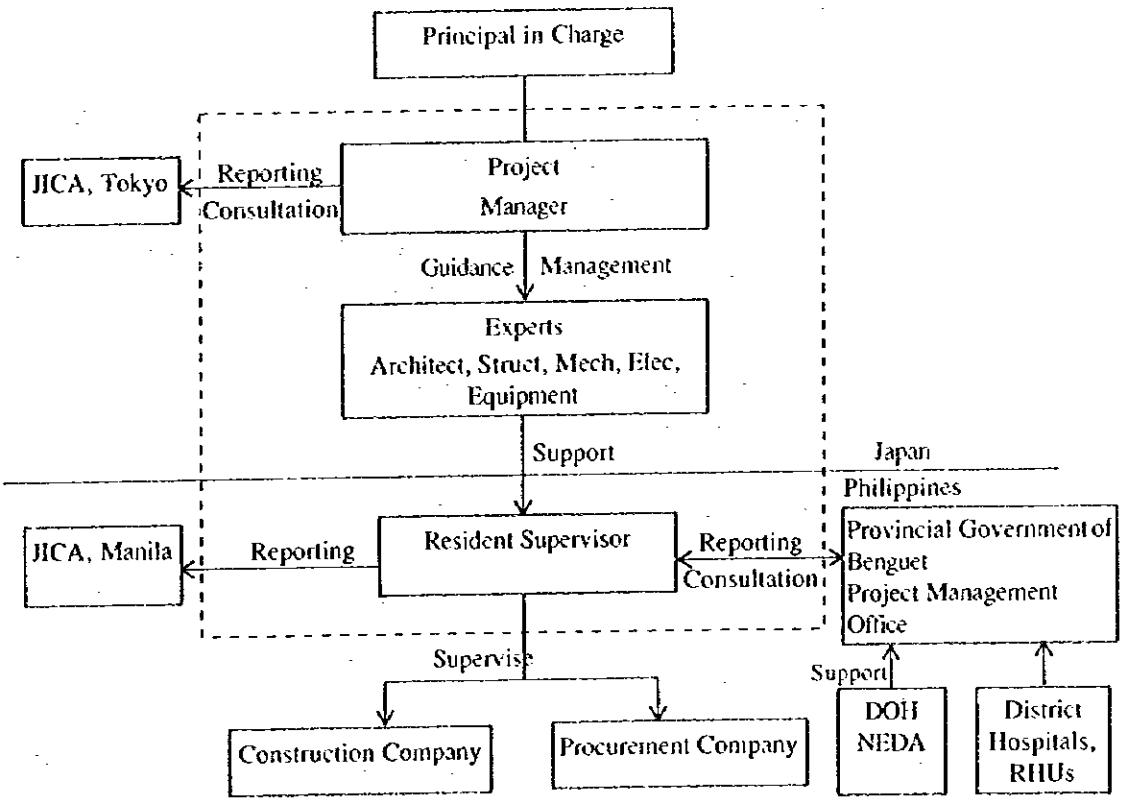


DIAGRAM - 13 Construction Supervision Organization

3-1-5 Procurement Plan

(1) Building Materials

1) Main Issues Regarding Building Materials Procurement

a. Procurement in the Philippines

Building materials should be procured locally whenever possible for economy and easier maintenance after the hospital is completed. However procurement must be carefully planned to insure that quality and supply capacity do not interfere with the construction progress. Imported materials available in the market of the Philippines will also be used. A percentage of materials and equipment for building services systems procured locally will be increased too.

b. Procurement in Third Countries

Materials difficult to be procured in the Philippines and cheaper in the third countries will be imported from the third countries. Quality of products produced in South East Asian countries such as Singapore, Taiwan and Thailand is recently improved because of improvements in manufacturing techniques. A careful investigation regarding quality, supply capacity as well as procurement route and cost must be carried out prior to the final selection. It will also be necessary for the contractors to communicate with government offices regulating smooth import and custom clearances.

c. Procurement from Japan

Basically, materials and equipment will be purchased either in the Philippines or from the third countries. Procurement from Japan will be done only when the cost of importing from Japan, including price, packing and transportation is cheaper, or when the necessary equipment and/or materials are not available in the Philippines or the third countries.

d. Transportation

In the case of importing from Japan or the third country, materials will be shipped to Manila Port to be unloaded and transported to the site in La Trinidad. Transportation from Manila to the site through mountain roads requires strong crating and packing of materials and equipment.

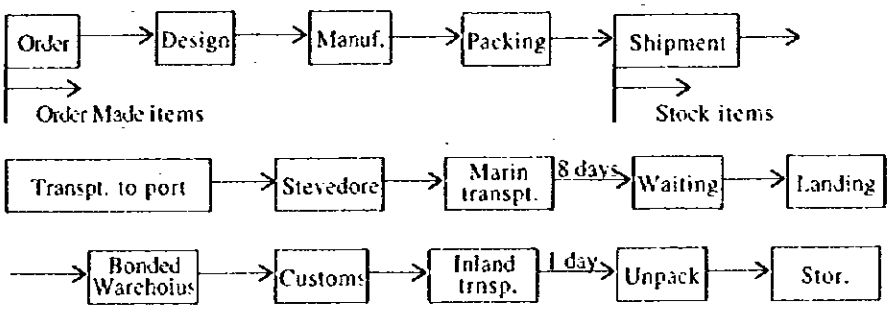


DIAGRAM - 14 Importation Process

2) Division of procurement of building materials is as listed below.

TABLE- 30 Division of Procurement of Building Materials

WORKS	MATERIAL	LCL	3rd	JPN	NOTE
Reinforced Concrete Work	concrete	○			ready-mixed concrete plants in Baguio
	reinforcing bar	○			
	formwork	○			
Masonry	concrete blocks	○			made in Baguio
Waterproofing	bituminous membrane	○			
Tile work	ceramic tile	○			
	porcelain tile	○			
Stone Masonry	marble, granite	○			
Carpentry	timber	○			
	plywood	○			
Metal work	light gauge steel	○			
	metal roof	○		○	
	finish hardware	○	○		
	custom hardware	○		○	to be procured in Japan to insure quality
Plaster work	cement plaster	○			
	gypsum plaster	○			
Wooden doors & windows	doors & frames	○			
	hardware			○	to be procured in Japan to insure quality
Metal doors & windows	aluminum sash		○	○	} choose a cheaper product
	steel sash		○	○	
	stainless steel door		○	○	
	x-ray door			○	to be procured in Japan to insure quality
	hardware				
	hardware			○	to be procured in Japan to insure quality
Glazing work	sheet glass	○			
	leaded glass			○	not available in the Philippines
Paint	paint	○			
Interior finishing work	gypsum board	○			
	acoustic asbestos-cement board	○			
	calcium silicate board	○			
	glass wool	○			
	wooden parquet flooring	○			
	vinyl tile	○			
	vinyl sheet			○	
Furniture	chair, desk, table	○			
	lockers	○			
Miscellaneous work	sinks	○		○	} up to the quality
	examining tables	○		○	
	scrubbing water sterilizer			○	
External work	paving materials	○			

3) Division of procurement for electrical work is as listed below.

TABLE - 31 Division of Procurement for Electrical Work

WORKS	MATERIAL	LCL	3rd	JPN	NOTE
Electrical work	receiving/transforming equipment	○			
	transformer	○			
	generator		○	○	up to the maintenance management of the manufacturer
	distribution panels	○			
	wiring equipment	○			
	lighting fixtures	○		○	Japanese products for emergency and operating room lighting
	wires and cables			○	CV, FP cable
	telephone exchanger		○	○	up to maintenance by manufacturer
	broadcasting equipment	○			
	nurse call system			○	
	fire alarm system	○			
	TV antenna	○			
	lightning system	○			
	elevator and dumb waiter		○	○	up to maintenance by manufacturer

4) Division of procurement for mechanical work is as listed below.

TABLE - 32 Division of Procurement for Mechanical Work

WORKS	MATERIAL	LCL	3rd	JPN	NOTE
Mechanical work	air cooled heat pump package		○	○	up to specification
	electric reheater		○	○	up to specification
	blower	○			
	ceiling fan / ventilation fan	○			
	supply / exhaust registers	○	○	○	up to specification
	damper		○	○	up to specification
	hood		○	○	up to specification
	filter		○	○	up to specification
	central monitoring panel			○	
	automatic control system			○	
	FRP reservoir tank	○		○	up to specification
	pump		○	○	
	water treatment equipment		○	○	up to specification
	sanitary fixtures		○		
	solar heat collector		○	○	
	hot water storage tank	○			
	boiler		○	○	
	oil tank	○			
	septic tank	○			
	fire hydrant box	○			
	LPG cylinder regulator	○			
	medical gas equipment			○	
	kitchen equipment	○		○	up to specification
	laundry equipment			○	
	PVC pipe	○			
	carbon steel pipe	○			
	copper pipe	○			
	valves		○	○	
	ducts	○			
	insulation	○			

(2) Procurement of Medical Equipment

The possibilities of procuring medical equipment in the Philippines, from Japan or from the third countries will be examined with respect to availability of supply, prices and the existence of manufacturer's agencies for maintenance services.

1) From Japan

Japanese made medical equipment such as patient monitoring systems and electrocardiogram equipment, operation / delivery related equipment, X-ray aparatuses, dental equipment, ophthalmic equipment, sterilizing equipment and vehicles are widely available through manufacturer's agencies in the Philippines and can receive maintenance services from them. Therefore, Japanese products will be considered first for above mentioned equipment.

2) In the Philippines

Items like stainless steel made general medical equipment, bed and bed-side cabinets are manufactured in the Philippines. But a capacity of production is not large and prices are not so much lower than Japanese products. Additionally, welding finish is sometimes not good. Careful examination of quality and prices of products of the Philippines and Japan must be carried out before final selection.

Medical record cart and consulting tables of unique local type will be procured in the Philippines, as well as office machienes such as audio-visual equipment, computers, copy machines and radio communication equipment. Office equipment must fit the long bond paper which is common in the Philippines.

3-1-6 Implementation Schedule

This project will be implemented in two packages; one for equipment in advance procurement and another for main works in order to procure the urgent equipment to the existing hospitals and RHUs as early as possible. In order to secure a necessary construction period, the main work shall be implemented under two E/Ns, one for detailed design services and another for construction, procurement of equipment and supervision services. Consequently, there will be three contracts with the consultant, two contracts with the procurement company and one contract with the construction company, totaling in six contracts. Implementation schedules for two packages are attached hereto.

TABLE - 33 PROJECT SCHEDULE (Main Works)

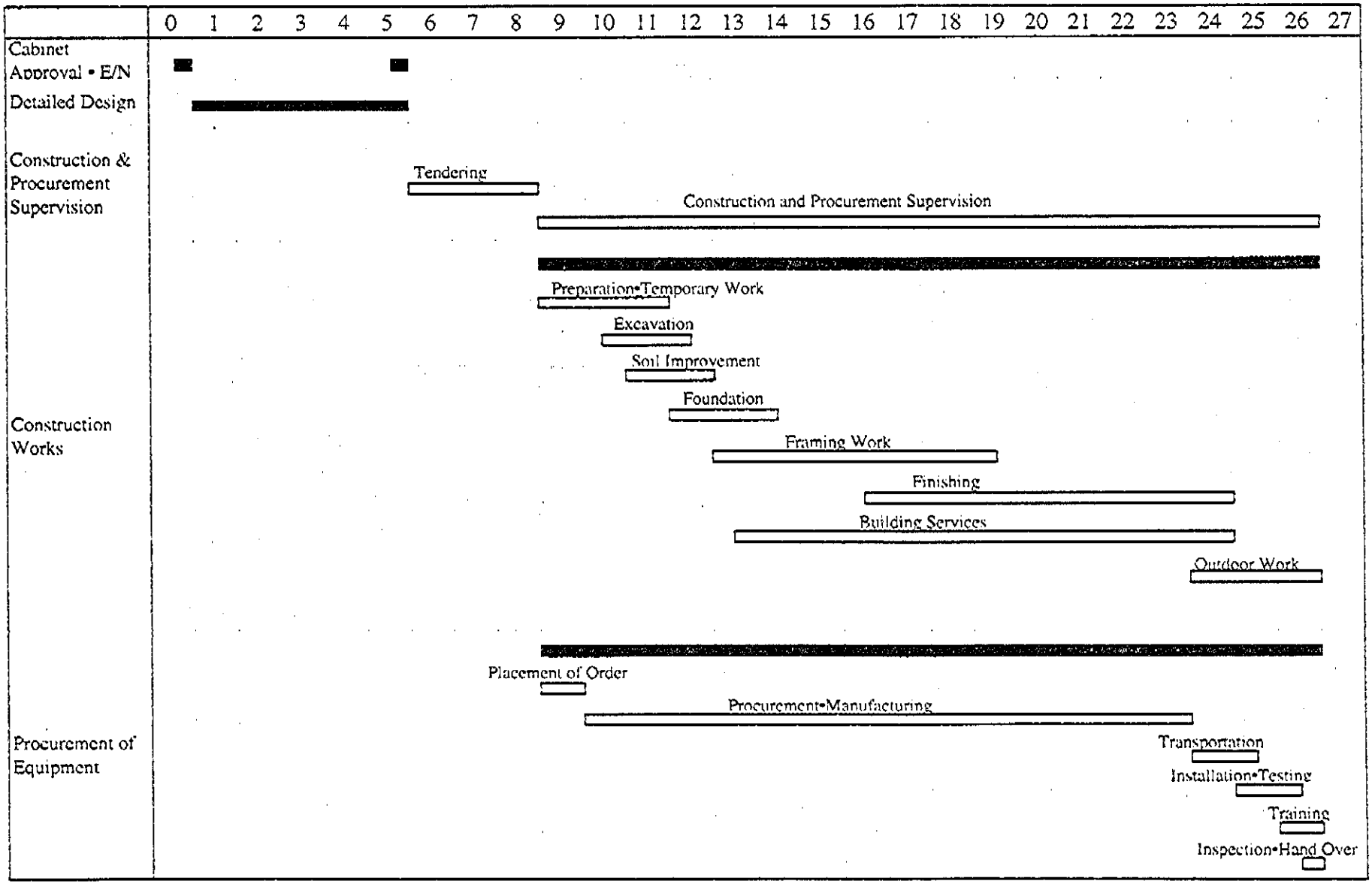
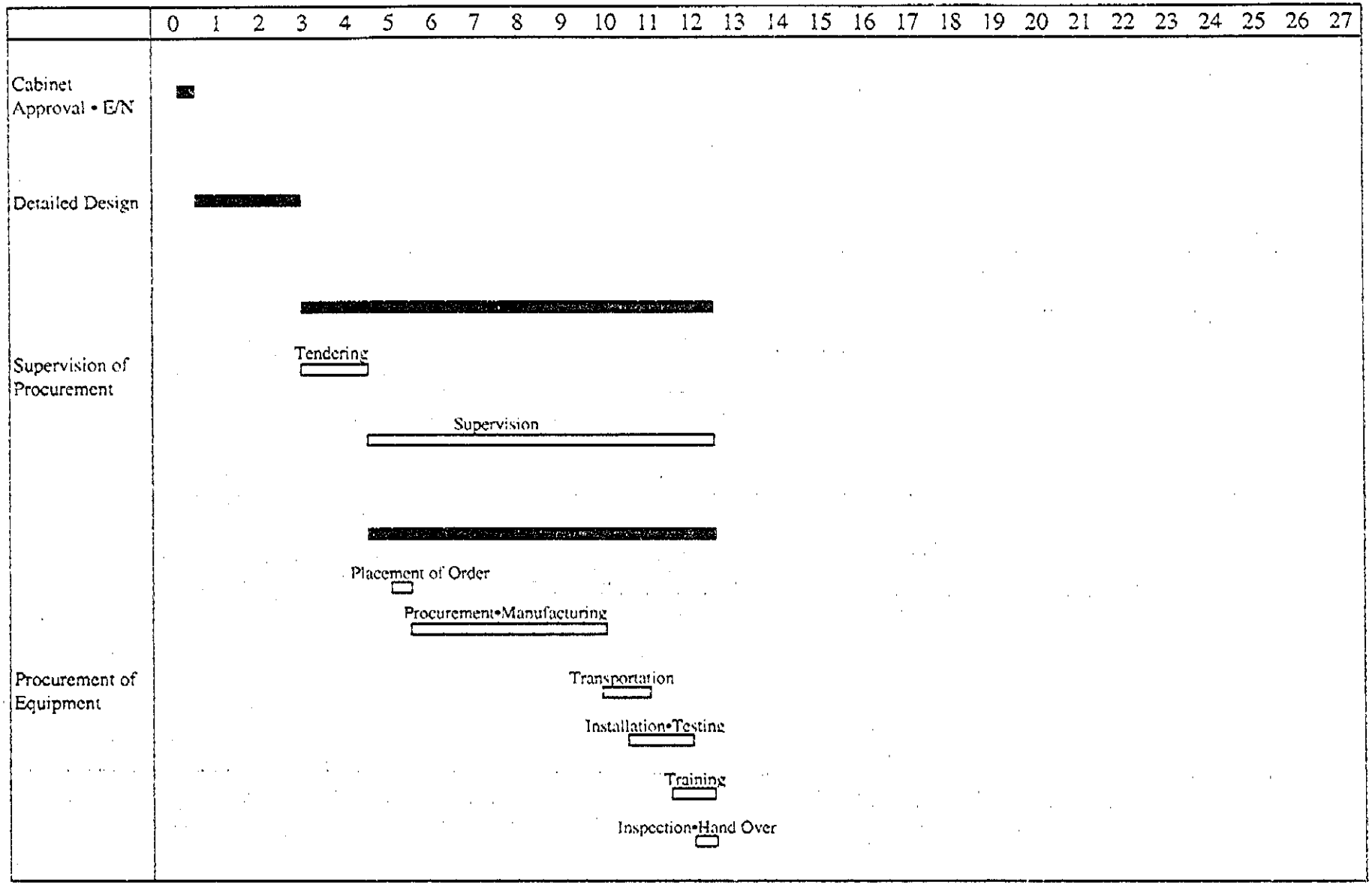


TABLE - 34 PROJECT SCHEDULE (Equipment in Advance Procurement)



3-1-7 Obligation of the Philippine Side

The Philippine side undertakes the following measures in addition to the works listed under Table-29.

1. To obtain the approvals and permits from the authority necessary for implementation of the project.

2. To bear the bank commissions.

3. To arrange the exemption of taxes for the materials and equipment imported for the project.

4. To accord Japanese nationals who are engaged in the services under the verified contract for the project, such facilities as may be necessary for the entry to and stay in the Philippines for a performance of their work.

5. To exempt Japanese nationals who are engaged in the project from customs duties and internal taxes.

6. To maintain and use properly and effectively the facilities constructed and the equipment provided under the Grant Aid.

7. To monitor the status of the operation of the hospital, the building and the specific equipment and submit the report to Japanese side annually.

8. To bear all the expenses other than those to be borne by the Grant.

3-2 Project Cost Estimation

Japanese and the Philippines sides are to bear the costs for their scope of the works listed in Table-29 (P. 59). The cost to be borne by the Philippine side is estimated as follows.

TABLE - 35 Cost Estimation for Works by Phlippinside

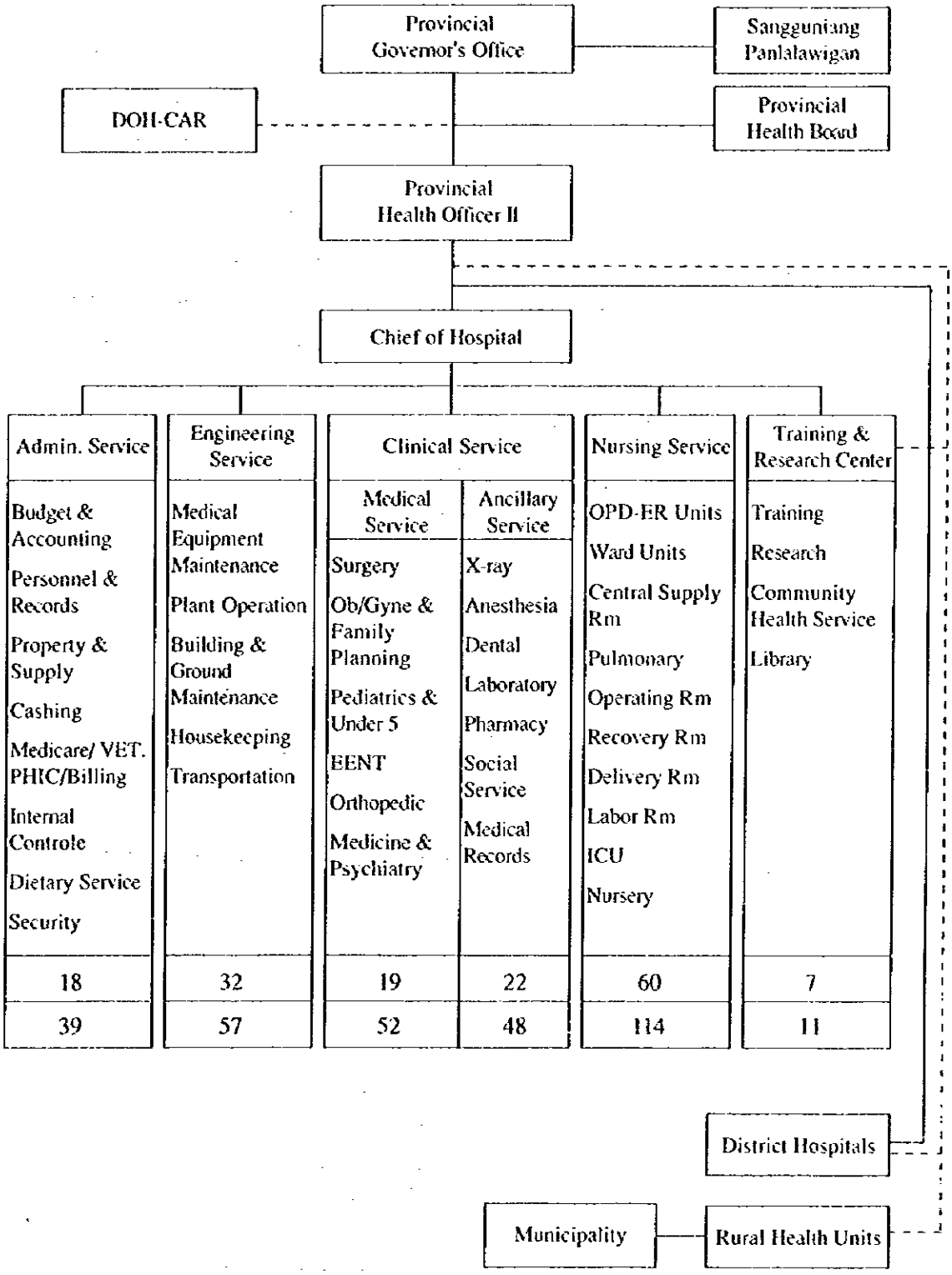
(Peso)

1	Land Reclamation	
	- Reclamation and Leveling	6,000,000.00
	- Retaining Wall	400,000.00
2	Removal of Existing Building and Objects	150,000.00
3	Fence and Gate	500,000.00
4	Connection of Drainage	1,000,000.00
5	Lead-in of Electrical Power	100,000.00
6	Lead-in of Telephone Tracks	50,000.00
7	Lead-in of City Water	10,000.00
8	Furnitures for Administration Department	150,000.00
9	Installation and Testing of Communication System	400,000.00
10	Landscaping of Mini Park	1,500,000.00
11	Parking Lot	500,000.00
12	Deep Well and Pump	1,000,000.00
13	Relocation of Existing Equipment to New Hospital	30,000.00
14	Modification of Existing Building	1,500,000.00
	Total	13,290,000.00

3-3 Operation and Maintenance Costs

3-3-1 Operation and Maintenance Organization

The Benguet General Hospital is now operated by 160 personnels headed by the Provincial Health Officer II under the organization illustrated in the following diagram. To cope with the expanded operation of the hospital, a number of the personnel is going to be gradually increased starting from 1999 and to reach the full staff of 323 in 2003, as indicated in Appendix 7, Staffing Plan.



Note) - Upper number: Staff at present
Lower number: Staff in 2003

DIAGRAM-15 Organization Chart

With regard to the maintenance of the building, the facilities and the equipment, at present 32 staff members composed of a building maintenance man, a electrician, a carpenter-painter and general workers are engaged. The Philippine side recognizes that the present organization is inadequate for the new building and medical equipment, and plans to establish the competent organization for maintenance and operation as indicated below. According to this plan, the Technological Service Department is to be composed of three sections each responsible for the maintenance of facilities and medical equipment, for building and general maintenance and for transportation. Total of 24 persons including one medical equipment technician, one plumber, one boilerman, will be added to the present team, totaling in 56 staff members.

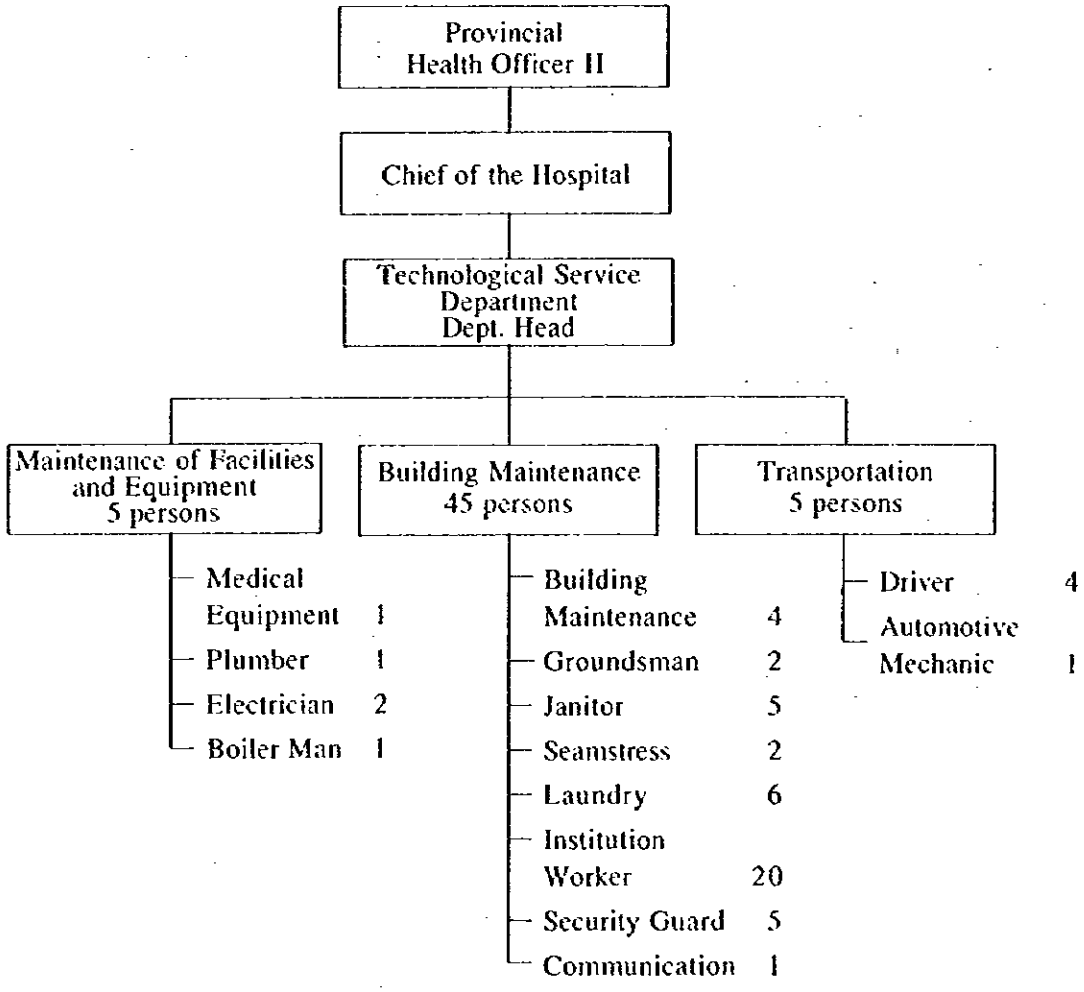


DIAGRAM - 16 Maintenance and Operation Organization

With regard to the maintenance of the medical equipment, there is no full-time personnel in charge of a maintenance of the equipment in the Benguet General Hospital at present, since there is no medical equipment of a higher level. The electrical engineer is additionally in charge of the equiment, but whenever there is a problem, the technicians are brought from the agency in Manila as there is neither a manufacturer of medical equipment nor an agency in the province of Benguet. Consumables and spare parts are ordered to the agencies in Manila too.

At Atok District Hospital there is no sophisticated equipments. The building maintenance man takes care of the equipment. When there is any problem, a technician is brought from the agency in Manila.

For the maintenance of the medical equipment of the new Benguet General Hospital, one full-time technician will be newly recruited, who will be assisted by the electrician who is taking care of the equipment now. Their responsibility is to conduct daily check of the condition of the equipment, cleaning and simple repairs. For a substantial repair, a technician will be called from the agencies in Manila. Also the Benguet General Hospital is going to contract with the agencies in Manila for a periodical checkup of certain sophisticated equipment as listed in Table-38 in order to maintain them in a good condition and to prevent a breakage.

3-3-2 Operation and Maintenance Expenses

Estimated expenditure of the Benguet General Hospital after the completion of the project is indicated in the table below.

TABLE - 36 Estimated Expenditure

(Peso)

	1999	2000	2001	2002	2003
1. Personal Services					
1) Salaries	19,459,504	22,668,252	26,498,048	30,017,320	33,433,084
2) Other Compensation	9,130,784	10,636,392	12,433,408	14,084,720	15,687,464
Sub-total	28,590,288	33,304,644	38,931,456	44,102,040	49,120,548
2. Maintenance & Other Operating Expenses					
1) Medical Supply	3,136,072	7,174,160	8,032,176	8,989,952	9,928,881
2) Maintenance Expenses	2,677,134	7,271,654	9,484,122	10,054,895	10,054,895
3) Other Expenses	1,835,749	4,199,508	4,701,762	5,262,411	5,812,028
4) Medicine Purchase	5,818,338	7,945,456	9,224,107	10,458,720	11,765,377
Sub-total	13,467,293	26,590,778	31,442,167	34,765,978	37,561,181
Total	42,057,581	59,895,422	70,373,623	78,868,018	86,681,729
3. Depreciation of Equipment	0	4,291,755	4,291,755	4,291,755	4,291,755
Grand Total	42,057,581	64,187,177	74,665,378	83,159,773	90,973,484

It is planned that the hospital will reach the full operation in 2003. Both the expenditure and income will continue to increase as a number of the personnels and the patients continues to increase until 2003 when the expenditure and income will become a constant state.

Estimated annual maintenance expenses are as follows.

TABLE - 37 Maintenance Expenses

	Basis of Estimation	Peso
① Electricity charge	3.7452 P/kwh x 240 kw x 4000 h = 3,595,392 P/year	3,595,392
② Water charge	34.55 P/m³ x 80 m³/d x 365 d = 1,008,860 P/year	1,008,860
③ Gas charge	70.2 P/kg x 1,200 kg/year = 84,240 P/year	84,240
④ Cost of fuel for the boiler	100 ℓ /d x 365 d x 7.65 P/ ℓ = 279,225 P/year	279,225
⑤ Maintenance Cost for Vehicles	5,500 US$/car·year x 5 car = 27,500 US$ = P 737,000	737,000
⑥ Maintenance cost of buildings	Cleaning, checking and repair of building and facilities 100 P/m²·year x 11,000 m² = 1,100,000 P/year	1,100,000
⑦ Maintenance cost of equipment		3,250,178
Total		10,054,895

The bases of estimation are as follows.

(1) Electricity Charge

According to the regulation of Benguet Electric Company (BENECO), an electricity charge applied to Benguet General Hospital is 3.7452 P/kwh. The contracted capacity for the Benguet General Hospital is estimated as about 240kw. Supposing annual operating hours at the peak load is 4000 hours, electricity charge is

3.7452 P/kwh×240 kw×4000 h = 3,595,392 P/year

(2) Water Charge

The estimated quantity of water consumption is 160m³/day, 50% of which is for drinking and clinical activities and the other is for toilet flush and outdoor sprinkling. Since water for toilet flush is supplied from the well in the site, it is excluded from the calculation of the charge. Accordingly quantity of city water used in the hospital is 80m³/day.

The water charge of Trinidad City is 34.55 P/m³

34.55 P/m³ x 80 m³/day x 365days = 1,008,860 P/year

(3) Gas Charge

Gas is used in the kitchen and the pantry in the hospital.

Gas consumption is assumed to be 1,200kg/year

70.2 P/kg x 1,200kg/year = 84,240 P/year

(4) Fuel for the Boiler

Light oil is used as fuel for the boiler.

Consumption of oil for boiler is estimated as 100 ℓ /day

The unit cost of oil is 7.65P/ ℓ

100 ℓ /day x 365 day x 7.65 P/ ℓ = 279,225 P/year

(5) Maintenance Cost for Vehicles

Repair costs, gassline, oil, tires, taxes and insurance for one year per one car will be approximately US$5,500.

Total costs for 5 cars will be

US$ 5,500 x 5 = US$ 27,500 = P 737,000

(6) Cost of Maintenance of Buildings

The costs of maintenance of buildings such as interior and exterior cleaning and repair, checking and repair of electric, water supply, drainage and air conditioning systems are supposed to be 100P/m^2·year.

The cost of maintenance of buildings will be,

100 P/m^2 · year x 11,000m^2 = 1,100,000 P/year

(7) Cost of Maintenance of Equipment

TABLE - 38 Cost of Maintenance of Equipment

(Yen)

Equipment	No.	Periodical Maintenance Contract Sum	Parts	Consumables	Sub Total	Total
Bed-side monitors	3			electrode, recording paper		
300 days	Total	80,000	0	199,000	279,000	837,000
Cardiac monitors	3			electrode, recording paper		
300 days	Total	80,000	0	199,000	279,000	837,000
Monitors	3			electrode, recording paper		
300 days	Total	80,000	0	199,000	279,000	837,000
Mobile X-ray unit	1		X-ray bulb (one every 3 years)	film		
250 days 10 patients/day 2 Films/patient	Total	70,000	300,000	1,500,000	1,870,000	1,870,000
X-ray system 500mA	1		X-ray bulb (one every 3 years)	film		
250 days 10 patients/day 2 Films/patient	Total	110,000	300,000	1,500,000	1,910,000	1,910,000
X-ray system 850mA	1		X-ray bulb (one every 3 years)	film		
250 days 10 patients/day 2 Films/patient	Total	320,000	540,000	1,575,000	2,435,000	2,435,000
Automatic film processor	1			developer fixer		
250 days 50 films/day	Total	150,000	0	125,000	275,000	275,000
Biochemical analyzer	1		electromagnetic valve	reagent recording paper		
250 days 90000 tests/year	Total	320,000	782,000	1,838,000	2,940,000	2,940,000
Blood cell counter	1			reagent recording paper		
250 days 20 tests/day	Total	200,000	0	1,148,000	1,348,000	1,348,000
Others						264,242
				Total Yen		13,553,242
				Total Peso at rate in 4.17		3,250,179

3-3-3 Income

The tabel below indicates the estimated income of the hospital. After 2000 an income from the pay beds is newly introduced.

TABLE - 39 Estimated Income

(Peso)

	1999	2000	2001	2002	2003
Single room	0	1,095,000	1,277,500	1,460,000	1,642,500
Two bed	0	876,000	1,022,000	1,168,000	1,314,000
Four bed	0	657,000	766,500	876,000	985,500
OR fees	661,065	1,057,840	1,164,165	1,280,540	1,407,320
Medicines	6,982,006	9,534,547	11,068,928	12,550,464	14,118,452
X'Ray	658,540	939,280	1,015,340	1,099,500	1,190,880
Ultrasound 730 x 240	0	175,200	192,720	211,920	233,280
548 x 460	0	252,080	277,380	304,980	335,800
548 x 640	0	350,720	385,920	424,320	467,200
ICU-CCU		328,500	383,250	438,000	492,750
Laboratory	1,697,360	2,284,530	2,448,065	2,624,785	2,744,865
New Laboratory	0	1,142,265	1,224,033	1,312,393	1,372,430
Training	1,210,000	1,885,450	1,979,723	2,078,709	2,262,540
Circumcission	60,000	72,000	75,600	79,440	83,400
Dental	333,450	400,125	420,150	441,150	463,200
ECG	225,000	375,000	412,500	450,000	487,500
Rehab room	0	71,250	71,250	71,250	120,000
Oxygen	345,600	403,200	443,520	488,160	540,000
Medical Cert. fees	1,200	2,000	2,100	2,200	2,400
Professional fees	518,029	828,625	911,014	1,001,926	1,102,300
Minor surgery	617,000	647,600	680,000	714,000	749,600
Nebulizing fees	45,520	81,536	88,457	96,031	104,275
DR fees	322,950	516,750	568,350	625,200	687,750
Incubator fees	75,600	120,960	133,350	146,650	161,350
Injection fees	70,5600	75,000	78,750	82,695	90,000
Dressing fees	99,225	119,070	125,023	131,280	137,850
Affiliation fee	155,000	155,000	170,500	187,550	206,300
Ambulance fees	115,140	183,270	199,620	215,970	238,110
Water bacteriological analysis fees	0	1,617,400	1,617,400	1,617,400	1,617,400
Philippine Charity Sweepstakes Office	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Endowment fund 20% Development Fund-Health Services	570,000	570,000	570,000	570,000	570,000
	15,763,185	27,817,198	30,773,108	33,750,513	36,928,952

3-3-4 Balance of Expenditure and Income

From the estimated expenditure and income above, the balance is calculated as the talbe below.

TABLE - 40 Balance

(Peso)

	2000	2001	2002	2003
Income	27,817,198	30,773,108	33,750,513	36,928,952
Expenditure	64,187,177	74,665,378	83,159,773	90,973,484
Deficit	36,369,979	43,892,270	49,409,260	54,044,532

Provincial government forecasts that its revenue, on 1997 price, will increase at a rate of approximately 10% annually in the future. Provided that this forecast is realized, the estimated deficit in the balance of income and expenditure indicated in Table-40 falls in approximately 14.5% of the revenue as listed below. This percentage is considered to be competent as it is the same rate with that of the current appropriation of the provincial budget for the hospital.

TABLE - 41 Rate of Deficit to Provincial Revenue

(Peso)

	1997	1998	1999	2000	2001	2002	2003
Revenue of Province	210,986,479	232,085,127	255,293,640	280,823,003	308,905,304	339,795,834	373,775,417
(growth rate)		(10%)	(10%)	(10%)	(10%)	(10%)	(10%)
Deficit of BcGH				36,369,979	43,892,270	49,409,260	54,044,532
Rate of Deficit to Revenue				13.0%	14.2%	14.5%	14.5%

Furthermore, the provincial government of Benguet undertakes to financially support the sustained operation of the hospital.

CHAPTER 4
PROJECT EVALUATION AND RECOMMENDATION

Chapter 4 Project Evaluation and Recommendation

4-1 Project Effect

4-1-1 Validity of Project

(1) Validity in terms of policies

In "Medium Term Philippine Development Plan, 1993 - 1998" as well as in "Cordillera Regional Development Plan (1993 - 1998)", a strengthening of medical service delivery system, improvement of regional health services such as nutrition and family planing and up-grading of an ability of the health workers are listed up as the strategy to fulfill the objective of an improvement of health condition of the people of the Philippines.

This project aims for improvement of medical services of the Benguet General Hospital through upgrading of the facility and the equipment as the tertiary hospital serving as the referral center in the province, and for upgrading of health services of the District Hospitals and Rural Health Units through provision of medical and communication equipment, altogether for strengthening of the health care delivery system in the province. The project is considered to be in line with the framework of the national and regional policies.

(2) Validity in terms of social need

A population of the province of Benguet has been and will be growing at the rate of 2.52% resulting in demand for increased medical care and more hospital beds. When the project is completed, the Benguet General Hospital accommodates more patients including mountain tribes, contributing to improvements of health status of the rural populace.

4-1-2 Effect of Project

(1) Benguet General hospital is not capable now of offering medical services of tertiary hospital level to the populace of the province due to inadequate and degenerated facility and deteriorated and insufficient equipment. This situation will be greatly improved both in capacity and in quality through implementation of the project.

(2) Benguet General Hospital is now sending approximately 2000 patients annually to Baguio General Hospital because of a lack of some clinical departments and of a shortage of the bed. Such undesirable situation will be improved resulting in relief of a congestion of Baguio General Hospital as well as an acceptance of more mountain tribe populace.

(3) Upgrading of health services of District Hospitals and Rural Health Units through provision of the medical and communication equipment can be expected.

(4) A replacement of the ambulances and a provision of communication facilities will improve acceptance and transportation of emergency patients.

As a result, a considerable effect on improvement of medical referral system, which is a major target of the provincial master plan, can be expected.

4-2 Recommendations

(1) Securing of personnels

It is imperative to secure the competent heads for the newly added departments and the head of laboratory of which position is now vacant.

(2) Hospital Administration

Size of operation and a number of the patient and the staff are going to be doubled. Current administration method will not be adequate. A new and efficient administration and operation system are need to be introduced and competent personnels must be recruited.